



SECTION F
TECHNICAL SPECIFICATIONS

**ORO GRANDE PARK
REVITALIZATION PROJECT**

FOR

**COUNTY SERVICE AREA (CSA) 42
ORO GRANDE, CALIFORNIA**

PROJECT NO.: 30.30.0150

CSA42- Oro Grande Park Oro Grande, CA

Technical Specifications

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SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Coordination and project conditions.
 2. Field engineering.
 3. Preconstruction meeting.
 4. Site mobilization meeting.
 5. Progress meetings.
 6. Pre-installation meetings.
 7. Cutting and patching.
 8. Special procedures.
 9. Construction staking.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.
- C. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

- A. Employ Land Surveyor registered in State of California and acceptable to the Engineer.

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- B. Locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.
- C. Control datum for survey is that shown on Drawings. Verify its accuracy with the existing improvements elevation.
- D. Verify setbacks and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit copy of site drawing signed by Land Surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.
- G. Maintain complete and accurate log of control and survey work as Work progresses.
- H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- I. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

1.4 PRECONSTRUCTION MEETING

- A. Owner or Engineer will schedule meeting after Notice of Award.
- B. Attendance Required: Owner, Engineer, and Special Subconsultants Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.

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4. Submission of list of Subcontractors, list of products, schedule of values, unit costs and progress schedule.
 5. Designation of personnel representing parties in Contract, inspection and Engineer.
 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
 8. Scheduling activities of Geotechnical Engineer and other technical subconsultants.
- D. Record minutes and distribute copies within two (2) days after meeting to participants, with copies to Engineer, Owner, and those affected by decisions made.

1.5 SITE MOBILIZATION MEETING

- A. This meeting could be the same as the pre-construction meeting. Engineer or Owner will schedule meeting at Project site prior to Contractor occupancy.
- B. Attendance Required: Owner, Engineer, Geotechnical Engineer, Surveyor, or other Special Consultants, Contractor, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
1. Use of premises by Owner and Contractor.
 2. Owner's requirements and partial occupancy.
 3. Construction facilities and controls provided by Owner.
 4. Temporary utilities provided by Owner.
 5. Survey layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
- D. Record minutes and distribute copies within two 2 days after meeting to participants, with copies to Engineer, Owner, and those affected by decisions made.

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1.6 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at a maximum of monthly intervals.
- B. Contractor will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Engineer, or as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems impeding planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Review of requests for information (RFI).
 - 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 (2) days after meeting to participants, with copies to Engineer, Owner, and those affected by decisions made.

1.7 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections, convene pre-installation meetings at Project

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site prior to commencing work of specific section.

- B. Require attendance of parties directly affecting, or affected by, Work of specific section.
- C. Notify Engineer four (4) days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of installation, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two (2) days after meeting to participants, with copies to Engineer, Owner, and those affected by decisions made.

PART 2 - PRODUCTS - Not Used

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 3 - EXECUTION

3.1 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements affecting:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.
- E. Cut masonry and concrete materials using masonry saw or core drill.
- F. Restore Work with new products in accordance with requirements of Contract Documents.
- G. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection.
- H. Identify hazardous substances or conditions exposed during the Work to Engineer for decision or remedy.

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3.2 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products and salvaged products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original or specified condition.
- H. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- I. Where change of plane of 1/4 inch or more occurs, submit photograph with recommendation for providing smooth transition; to Engineer for review request instructions from Engineer.
- J. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.

3.3 CONSTRUCTION STAKING

- A. All improvements to be surveyed by an engineer/surveyor licensed in the State of California to provide surveying services.
- B. Contractor to provide to District/Engineer all cut sheets, stake-out sheets upon request.

END OF SECTION

NOT FOR BID

NOT FOR BID

SECTION 01 31 00 - MOBILIZATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions of the "Standard Specifications for Public Works Construction," Latest Edition, Sections 7, 8, and 9, apply except as modified herein.

1.2 SCOPE OF WORK

- A. Mobilization shall consist of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for the establishment of all offices, buildings, and other facilities necessary for work on the project and for all other work and operations which must be performed or costs incurred prior to beginning work on the project site.

PART 2 - MATERIALS

2.1 CONSTRUCTION FENCING

- A. Prior to beginning any site work the contractor shall install a 6' tall (min.) temporary construction fence around the entire perimeter of the work as shown on plans. The fence shall be galvanized chainlink (new or used), free of openings or breaks in the fabric, with fence posts at 10' o.c. maximum. The fabric shall be minimum 2" diamond mesh, interwoven, 11 gauge twisted tight top and bottom. The posts shall be minimum 2" dia. schedule 40 galvanized pipe installed 24" into the ground. A concrete footing is not required.
- B. A gate or gates are to be located in such a way as to allow adequate access of workers and work vehicles. Site is to be kept secure, gates locked, at all times when work is not being performed at the site.
- C. The fence shall be maintained in place throughout the construction period and through to the end of the maintenance period. The temporary fence shall be removed prior to the final inspection/project acceptance at the end of the maintenance period.

2.2 TEMPORARY UTILITIES

- A. The Contractor shall furnish temporary water, and power complete with connecting piping, wiring, lamps, meters, and similar equipment as required for the work. Install, maintain, and remove temporary lines upon completion of the work. All expenses in connection with temporary services and facilities shall be paid by the Contractor.
- B. Subsequent to the setting of the permanent utility meters, the Contractor will be responsible for payment of utility bills rendered for utility service through the respective permanent meters until acceptance of project by the city. The Contractor shall make all arrangements for setting permanent meters.

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2.3 TEMPORARY TOILETS

- A. The Contractor shall install and maintain in a sanitary condition suitable toilets for the use of workers. Toilets shall be portable and shall be removed from the job site at the end of each work day. There shall be a minimum of one (1) toilet for each multiple of twenty (20) Contractor's employees or fractional part thereof working at the job site.

2.4 TEMPORARY OFFICE

- A. The Contractor shall provide and maintain a watertight office on the premises where directed, for own and Subcontractor's use. Building/trailer shall be heated, provided with operating windows, doors with locks, tables, chairs, racks for drawings, and file drawers. This office shall have a minimum floor space of 120 square feet.

2.5 TEMPORARY TELEPHONE

- A. The Contractor shall provide at his own expense a non-pay telephone for use of the Contractor and Subcontractor, as well as for the use of the Landscape Architect and the City. The Landscape Architect's and the City's use will be for local calls only. For toll calls, all charges will be reversed.

2.6 OFFICE EQUIPMENT

- A. Contractor shall furnish and maintain necessary office equipment, including a copy machine and fax phone. Cost for use of office equipment for the duration of the project shall be borne by the Contractor.

2.7 TRASH REMOVAL AND CLEANING

- A. The Contractor shall provide trash receptacles for collecting debris and shall remove debris from the job site at regular intervals not less than weekly. The Contractor shall not park equipment on the street after work hours or overnight.

PART 3 - EXECUTION

3.1 PAYMENT

- A. Payment for mobilization will be at the lump sum price bid for mobilization. Payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work in mobilization and demobilization as herein specified, 10% retention shall apply to all mobilization work.

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Submittal procedures.
 - 2. Construction progress schedules.
 - 3. Proposed products list.
 - 4. Product data.
 - 5. Shop drawings.
 - 6. Samples.
 - 7. Design data.
 - 8. Test reports.
 - 9. Certificates.
 - 10. Manufacturer's instructions.
 - 11. Manufacturer's field reports.
 - 12. Construction photographs.

1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer accepted form.
- B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Identify Project, Contractor, subcontractor and supplier, pertinent drawing and detail number, and specification section number, appropriate to submittal.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite Project and deliver to District's Project Manager. Coordinate submission of related items.
- F. For each submittal for review, allow seven (7) calendar days excluding delivery time to and from Contractor.
- G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- H. Allow space on submittals for Contractor and Engineer review stamps.
- I. When revised for resubmission, identify changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- K. Submittals not requested will not be recognized or processed.

SECTION 01 33 00 - SUBMITTAL PROCEDURES

1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedules within fifteen (15) days after date of Owner-Contractor Agreement or as established in Notice to Proceed. After review, resubmit required revised data within ten (10) days.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- E. Submit computer generated horizontal bar chart with separate line for each section of Work, identifying first workday of each week.
- F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
- G. Indicate estimated percentage of completion for each item of Work at each submission.
- H. Submit separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products and products identified under Allowances, and dates reviewed submittals will be required from Engineer. Indicate decision dates for selection of finishes.
- I. Indicate delivery dates for Owner furnished products and products identified under Allowances.
- J. Revisions To Schedules:
 - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
 - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
 - 3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect (including effect of changes on schedules of separate contractors).

1.4 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Owner-Contractor Agreement or as stated in the Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.5 PRODUCT DATA

- A. Product Data: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit one (1) electronic copy.

SECTION 01 33 00 - SUBMITTAL PROCEDURES

- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.6 SHOP DRAWINGS

- A. Shop Drawings: Submit to Engineer if necessary or requested in construction documents for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
 - 1. Include signed and sealed calculations to support design.
 - 2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 - 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Submit number of opaque reproductions Contractor requires, plus one (1) copy Engineer will retain.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.7 SAMPLES – Not Used

1.8 DESIGN DATA

- A. Submit for Engineer's knowledge as contract administrator or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 TEST REPORTS

- A. Submit for Engineer's knowledge as contract administrator or for Owner.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

SECTION 01 33 00 - SUBMITTAL PROCEDURES

1.10 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.12 CONSTRUCTION PHOTOGRAPHS – Not Used

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section Includes:
 - 1. Quality control and control of installation.
 - 2. Tolerances.
 - 3. References.
 - 4. Labeling.
 - 5. Mock-up requirements.
 - 6. Testing and inspection services.
 - 7. Examination.
 - 8. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. 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.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

1.3 TOLERANCES

- A. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on Contract Documents except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

SECTION 01 40 00 - QUALITY REQUIREMENTS

- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 LABELING

- A. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
 1. Model number.
 2. Serial number.
 3. Performance characteristics.

1.6 MOCK-UP REQUIREMENTS – Not Used

1.7 TESTING AND INSPECTION SERVICES

- A. Public Works Field Inspector shall be assigned to conduct inspections for compliance.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Products.
 - 2. Product delivery requirements.
 - 3. Product storage and handling requirements.
 - 4. Product options.
 - 5. Product substitution procedures.
 - 6. Equipment electrical characteristics and components.

1.2 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- E. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

SECTION 01 60 00 - PRODUCT REQUIREMENTS

- G. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.
- B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that Bidder:
 - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 - 2. Will provide same warranty for Substitution as for specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner [and Engineer] for review or redesign services associated with re-approval by authorities having jurisdiction.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit three (3) copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
 - 3. Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Quality Assurance – all work
 2. Closeout procedures.
 3. Final cleaning.
 4. Protecting installed construction.
 5. Project record documents.
 6. Product warranties and product bonds.

1.2 QUALITY ASSURANCE – ALL WORK

- A. All work performed under these specifications and construction drawings shall conform as a minimum with the latest edition of the following requirements:
1. Standard Specifications for Public Works Construction (SSPWC)
 2. California Building Standards Codes, Title 24, 2019 Edition (CBC-19).

1.3 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to Engineer and District.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. District will occupy all areas constructed and landscaped.

1.4 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean site: sweep paved areas, rake clean landscaped surfaces.
- C. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.5 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Prohibit traffic from landscaped areas.

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

1.6 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following approved documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. All documents are to be reviewed, approved, and permits issued by the District IOR. One set of approved construction documents shall be used onsite for construction purposes.
- 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, not less than weekly.
- 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.
 - 4. All documents are to be reviewed, approved, and permits issued by the District IOR. One set of approved construction documents shall be used onsite for construction purposes.
- F. Record Drawings and Shop Drawings, if applicable: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish surface datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Field changes of dimension and detail.
 - 4. Details not on original Contract drawings.
- G. Submit documents to Engineer with claim for final Application for Payment.

1.7 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Submit prior to final Application for Payment.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Form accessories.
 - 4. Form stripping.
- B. Related Sections:
 - 1. Section 32 13 13 – Concrete Paving

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Formwork (Vertical Structures):
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes form materials, placement, placing accessories, stripping.
- B. Formwork (Horizontal Supported Structures):
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes form materials, placement, placing accessories, stripping.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI 347 - Guide to Formwork for Concrete.
- B. American Forest and Paper Association:
 - 1. AF&PA - National Design Specifications for Wood Construction.
- C. The Engineered Wood Association:
 - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
- D. American Society of Mechanical Engineers:
 - 1. ASME A17.1 - Safety Code for Elevators and Escalators.
- E. ASTM International:
 - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- F. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
- G. Standard Specifications for Public Works Construction (SSPWC).

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

- H. California Building Standards Codes, Title 24, 2022 Edition (CBC-22).

1.4 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 318 and to conform to design SSPWC requirements to achieve concrete shape, line and dimension as indicated on Drawings.

1.5 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on void form materials and installation requirements.

1.7 QUALITY ASSURANCE

- A. Inspections shall be requested to County of San Bernardino Special Districts Department (Owner).
- B. Perform Work in accordance with ACI 347, ACI 301 and ACI 318.
- C. For wood products furnished for work of this Section, comply with AF&PA.
- D. Perform Work in accordance with SSPWC and the CBC-22
- E. Maintain one (1) copy of each document on site.

1.8 QUALIFICATIONS – Not Used

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver void forms and installation instructions in manufacturer's packaging.
- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 2 - PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Form Materials: At discretion of Contractor and as approved by Engineer.

2.2 PREFABRICATED FORMS

- A. Manufacturers:
 1. Aluma-Systems Inc., Burke Co.
 2. Economy Forms Corp.
 3. Molded Fiber Glass Concrete Forms Co.
 4. Sonoco Products Co.
 5. Symons Corp.
 6. Western Forms, Inc.
 7. Substitutions: Permitted as approved by Engineer.

2.3 FORMWORK ACCESSORIES

- A. Form Ties: Removable type, galvanized metal, adjustable length, with waterproofing washer, free of defects.
- B. Spreaders: Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. Wire ties, wood spreaders or through bolts are not permitted.
- C. Form Anchors and Hangers:
 1. Do not use anchors and hangers exposed concrete leaving exposed metal at concrete surface.
 2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member.
 3. Penetration of structural steel members is not permitted.
- D. Form Release Agent: Colorless mineral oil that will not stain concrete or absorb moisture.
 1. Manufacturers:
 - a. Arcal Chemical Corporation Arcal-80.
 - b. Industrial Synthetics Company Synthex.
 - c. Nox-Crete Company Nox-Crete Form Coating.
 - d. Substitutions: Permitted as approved by Engineer.
- E. Corners: Fillet or Chamfer, rigid plastic or wood strip maximum possible lengths, size per drawings.
- F. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, release tape sealed slots, anchors for securing to concrete formwork.
- G. Vapor Retarder: Where indicated on Drawings, 8 mil thick polyethylene sheet.
- H. Bituminous Joint Filler: ASTM D1751.
- I. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

- J. Water Stops: Rubber or Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

2.4 COATINGS

- A. Coatings for Aluminum: Polyamide epoxy finish coat with paint manufacturer's recommended primer for aluminum substrate. Apply one coat primer and one coat finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Engineer.

3.2 INSTALLATION

- A. Earth Forms – Not Allowed
- B. Formwork - General:
 - 1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
 - 2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
 - 3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
 - 4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
 - 5. Complete wedging and bracing before placing concrete.
- C. Forms for Smooth Finish Concrete:
 - 1. Use steel, plywood or lined board forms.
 - 2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
 - 3. Install form lining with close-fitting square joints between separate sheets without springing into place.
 - 4. Use full size sheets of form lines and plywood wherever possible.
 - 5. Tape joints to prevent protrusions in concrete.
 - 6. Use care in forming and stripping wood forms to protect corners and edges.
 - 7. Level and continue horizontal joints.
 - 8. Keep wood forms wet until stripped.
- D. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.
- E. Framing, Studding and Bracing:

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

1. Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood.
 2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
 3. Construct beam soffits of material minimum of 2 inches thick.
 4. Distribute bracing loads over base area on which bracing is erected.
 5. When placed on ground, protect against undermining, settlement or accidental impact.
- F. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 and ACI 318.
- G. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- H. Install fillet and chamfer strips on external corners if indicated in drawings.
- I. Install void forms in accordance with manufacturer's recommendations.
- J. Do not reuse wood formwork more than three (3) times for concrete surfaces to be exposed to view unless approved by Engineer. Do not patch formwork.

3.3 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install water stops continuous without displacing reinforcement.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

so joints will not be apparent in exposed concrete surfaces.

- H. Form Ties:
 - 1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
 - 2. Place ties at least 1 inch away from finished surface of concrete.
 - 3. Leave inner rods in concrete when forms are stripped.
 - 4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.
- I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- J. Construction Joints:
 - 1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
 - 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
 - 3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
 - 4. Arrange joints in continuous line straight, true and sharp.
- K. Embedded Items:
 - 1. Make provisions for pipes, sleeves, anchors, inserts, anchor slots, nailers, water stops, and other features.
 - 2. Do not embed wood or uncoated aluminum in concrete.
 - 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
 - 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
 - 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- L. Screeds:
 - 1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
 - 2. Slope slabs to drain where required or as shown on Drawings.
 - 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

3.6 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

3.7 ERECTION TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301 and ACI 318.

3.8 FIELD QUALITY CONTROL

- A. All inspections are to be conducted by Owner IOR.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing bars.
 - 2. Welded wire fabric.
 - 3. Reinforcement accessories.

- B. Related Sections:
 - 1. Section 03 10 00 – Concrete Forming and Accessories.
 - 2. Section 03 30 00 – Cast-In-Place Concrete.
 - 3. Section 04 20 16 – Reinforce Unit Masonry.
 - 4. Section 33 05 13 – Manholes and Structures.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Bar Reinforcement:
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes reinforcement, placement, and accessories.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
 - 3. ACI 530.1 - Specifications for Masonry Structures.
 - 4. ACI SP-66 - ACI Detailing Manual.

- B. ASTM International:
 - 1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 3. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - 4. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 6. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
 - 7. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 8. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 9. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 - 10. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
 - 11. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.

SECTION 03 20 00 - CONCRETE REINFORCING

12. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
 13. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars.
- C. American Welding Society:
1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.
- D. Concrete Reinforcing Steel Institute:
1. CRSI - Manual of Standard Practice.
 2. CRSI - Placing Reinforcing Bars.
- E. Standard Specifications for Public Works Construction (SSPWC).
- F. California Building Code, 2022 Edition (CBC-22).

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
1. Submit certified copies of mill test report of reinforcement materials analysis.

1.5 QUALITY ASSURANCE

- A. Inspections shall be requested to County of San Bernardino Special Districts Department (Owner).
- B. Perform Work in accordance with ACI 301 and ACI 318.
- C. Prepare shop drawings in accordance with ACI SP-66.
- D. Perform Work in accordance with SSPWC and CBC-22.
- E. Maintain one (1) copy of each document on site.

1.6 QUALIFICATIONS

- A. Welders: AWS qualified within previous 12 months.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 - PRODUCTS

SECTION 03 20 00 - CONCRETE REINFORCING

2.1 REINFORCEMENT

- A. Deformed Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished.
- B. Welded Deformed Wire Fabric: ASTM A497; in flat sheets or coiled rolls; unfinished.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces type; size and shape to meet Project conditions.

2.3 FABRICATION

- A. Fabricate concrete reinforcement in accordance with ACI 318.
- B. Form standard hooks for bends as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Form ties and stirrups as indicated in drawings.
- F. Weld reinforcement in accordance with AWS D1.4 if specified in drawings.
- G. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with Architect/Engineer.

2.4 SOURCE QUALITY CONTROL

- A. Make completed reinforcement available for inspection at manufacturer's factory prior to packaging for shipment. Notify Architect/Engineer at least seven days before inspection is allowed.
- B. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.

SECTION 03 20 00 - CONCRETE REINFORCING

PART 3 - EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
1. Do not weld crossing reinforcement bars for assembly except as permitted by Architect/Engineer.
- B. Do not displace or damage vapor retarder.
- C. Accommodate placement of formed openings.
- D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318 of one bar diameter, but not less than 1 inch.
1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.
- E. Maintain concrete cover around reinforcement in accordance with ACI 318 as follows:

Reinforcement Location		Minimum Concrete Cover
Footings and Concrete Formed Against Earth		3 inches
Concrete exposed to earth or weather	No. 6 bars and larger	2 inches
	No. 5 bars and smaller	1-1/2 inches
Supported Slabs, Walls, and Joists	No. 14 bars and larger	1-1/2 inches
	No. 11 bars and smaller	3/4 inches
Beams and Columns		1-1/2 inches
Shell and Folded Plate Members	No. 6 bars and larger	3/4 inches
	No. 5 bars and smaller	1/2 inches

- F. Splice reinforcing where indicated on Drawings in accordance with splicing device manufacturer's instructions.

3.2 ERECTION TOLERANCES

- A. Install reinforcement within the following tolerances for flexural members, walls, and compression members:

Reinforcement Depth	Depth Tolerance	Concrete Cover Tolerance
Greater than 8 inches	plus or minus 3/8 inch	minus 3/8 inch
Less than 8 inches	plus or minus 1/2 inch	minus 1/2 inch

- B. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls and retaining walls.

SECTION 03 20 00 - CONCRETE REINFORCING

3.3 FIELD QUALITY CONTROL

- A. All inspections are to be conducted by Owner IOR.
- B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Reinforcement Inspection:
 - 1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
 - 2. Welding: Inspect welds in accordance with AWS D1.1. (If required in drawings).
 - 3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete for the following:
 - 1. Control, expansion and contraction joint devices.
- B. Related Sections:
 - 1. Section 03 10 00 – Concrete Forming and Accessories.
 - 2. Section 04 05 03 – Masonry Mortaring and Grouting.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Concrete - Slab-on-fill or grade:
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes concrete steel reinforcing, placement accessories, consolidating and leveling, troweling, curing.
- B. Concrete - Vertical in Forms:
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes concrete steel reinforcing, placement accessories, consolidating, curing.
- C. Concrete - Miscellaneous Locations:
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes concrete steel reinforcing, placement accessories, consolidating and leveling, troweling, curing.
- D. Concrete - Grouting:
 - 1. Basis of Measurement: By the square foot.
 - 2. Basis of Payment: Includes preparation of substrate, grout, placement, consolidating, troweling, curing.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 305 - Hot Weather Concreting.
 - 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 4. ACI 308.1 - Standard Specification for Curing Concrete.
 - 5. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 3. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

- Sawed Beams of Concrete.
6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 8. ASTM C150 - Standard Specification for Portland Cement.
 9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
 14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
 15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
 16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
 18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
 19. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
 20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
 22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
 24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
 25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
 26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
 27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
 31. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
 32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 33. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
 34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
- C. South Coast Air Quality Management District:
1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.
- D. Standard Specifications for Public Works Construction (SSPWC).
- E. California Building Standards Codes, Title 24, 2022 Edition (CBC-22).

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

- B. Product Data: Submit data on joint devices, attachment accessories, admixtures and aggregates.
- C. Design Data:
 - 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - 2. Hot and cold weather concrete work.
 - 3. Air entrained concrete work.
 - 4. Identify mix ingredients and proportions, including admixtures.
 - 5. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
 - 6. All mix designs shall be in accordance with Section 201 of SSPWC.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.6 QUALITY ASSURANCE

- A. Inspections shall be requested to County of San Bernardino Special Districts Department (Owner).
- B. All mix designs, mix uses and other work shall conform to Section 201 of the SSPWC.
- C. Perform Work in accordance with ACI 301 and ACI 318.
- D. Conform to ACI 305 when concreting during hot weather.
- E. Conform to ACI 306.1 when concreting during cold weather.
- F. Acquire cement and aggregate from one source for Work.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.
- B. Comply with local agencies environmental requirements.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 - PRODUCTS

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type V - Sulfate Resistant, Portland type.
- B. Normal Weight Aggregates: ASTM C33.
 - 1. Combined (Coarse and Fine) Aggregate Maximum Size: In accordance with ACI 318 and table 201-1.1.2(A) of the SSPWC.
- C. Water: ACI 318; potable, without deleterious amounts of chloride ions conforming to Section 201 of the SSPWC.

2.2 ADMIXTURES

- A. Furnish materials in accordance with SSPWC and CBC-22.
- B. Air Entrainment: ASTM C260, if approved by Engineer.
- C. Chemical: ASTM C494/C494M Type A - Water Reducing, Type B - Retarding, Type C - Accelerating, Type D - Water Reducing and Retarding, Type E - Water Reducing and Accelerating, Type F - Water Reducing, High Range, Type G - Water Reducing, High Range and Retarding, if approved by Engineer.
- D. Fly Ash (Calcined Pozzolan): ASTM C618 Class F.
- E. Silica Fume: ASTM C1240, if approved by Engineer.
- F. Slag: ASTM C989; Grade 100; ground granulated blast furnace slag, if approved by the Engineer.
- G. Plasticizing: ASTM C1017/C1017M Type I, plasticizing or Type II, plasticizing and retarding, if approved by the Engineer.

2.3 ACCESSORIES

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler: ASTM D1751, ASTM D994; Asphalt impregnated fiberboard or felt, or as approved by the Engineer.
- B. Expansion and Contraction Joint Devices: ASTM B221.
- C. Sealant: ASTM D6690.

2.5 CONCRETE MIX

- A. Select proportions for normal weight concrete mix and admixtures in accordance with ACI 301 and Section 201 of SSPWC.
- B. Select Concrete Class or alternate Class according to the type of construction conforming to table 201-1.1.2 (A) of the latest edition of the SSPWC.
- C. Select Concrete aggregates combined gradation types A, B, C, D or E conforming to Table 201-

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

1.3.2 (A) of SSPWC.

- D. Do not use calcium chloride unless otherwise approved by the Engineer.
- E. Use a water-cement ratio by weight sufficient to obtain the required slump, not to exceed 0.50.
- F. Use Cement Type II or V
- G. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M or ASTM C685/C685M.
- H. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 and ACI 318.
- B. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- D. Separate slabs on grade from vertical surfaces with $\frac{3}{4}$ -inch thick joint filler.
- E. Place joint filler in pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- F. Extend joint filler from bottom of slab to within 1/8-inch of finished slab surface.

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

- G. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- H. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- I. Install joint covers in longest practical length when adjacent construction activity is complete.
- J. Apply sealants in joint devices.
- K. Deposit concrete at final position. Prevent segregation of mix.
- L. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- M. Consolidate concrete.
- N. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- O. Place concrete continuously between predetermined expansion, control, and construction joints.
- P. Do not interrupt successive placement; do not permit cold joints to occur.
- Q. Place floor slabs in saw cut pattern indicated.
- R. Saw cut joints within 12 hours after placing. Use 3/16-inch-thick blade, cut into 1/4 depth of slab thickness.
- S. Screed slabs on grade level, maintaining surface flatness.

3.4 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish as Scheduled in this section.
- B. Finish concrete floor surfaces in accordance with ACI 301.
- C. Steel trowel surfaces which are indicated to be exposed.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete in accordance with ACI 308.1.

3.6 FIELD QUALITY CONTROL

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

- A. All inspections are to be conducted by Owner IOR.
- B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318 unless otherwise specified in contract documents.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Submit proposed mix design of each class of concrete to Engineer and an inspection and testing firm for review prior to commencement of Work.
- E. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- F. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured.
 - 3. Sample concrete and make one (1) set of three (3) cylinders for every 10 cu yds or less of each class of concrete placed each day and for every 1,000 sf of surface area for slabs and walls.
 - 4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
 - 5. Make one additional cylinder during cold weather concreting, and field cure.
- G. Field Testing:
 - 1. Slump Test Method: ASTM C143/C143M.
 - 2. Air Content Test Method: ASTM C173/C173M.
 - 3. Temperature Test Method: ASTM C1064/C1064M.
 - 4. Measure slump and temperature for each compressive strength concrete sample.
 - 5. Measure air content in air entrained concrete for each compressive strength concrete sample.
- H. Cylinder Compressive Strength Testing:
 - 1. Test Method: ASTM C39.
 - 2. Test Acceptance: In accordance with ACI 318.
 - 3. Test one (1) cylinder at seven (7) days.
 - 4. Test two cylinders at 28 days.
 - 5. Retain one (1) cylinder for 28 days for testing when requested by Engineer.
 - 6. Dispose remaining cylinders when testing is not required.
- I. Core Compressive Strength Testing:
 - 1. Sampling and Testing Procedures: ASTM C42/C42M.
 - 2. Test Acceptance: In accordance with ACI 318.
 - 3. Drill three (3) cores for each failed strength test from concrete represented by failed strength test.
- J. Water Soluble Chloride Ion Concentration Test Method: ASTM C1218; tested at 28 days.
 - 1. Maximum Concentration: As permitted by SSPWC.
- K. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.7 PATCHING

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections as directed by Engineer and in accordance with ACI 301.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements.
- B. Repair or replacement of defective concrete will be determined by Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

3.9 SCHEDULE - CONCRETE TYPES AND FINISHES

- A. As stated in Section 201 of the SSPWC.

3.10 SCHEDULE - JOINT FILLERS

- A. Slab Perimeter: Joint filler Type A set 1/8 inch below floor slab elevation.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removing surface debris.
 - 2. Removing designated paving, curbs, gutters and v-ditches.
 - 3. Removing designated trees, shrubs, and other plant life.
 - 4. Removing abandoned utilities.
 - 5. Excavating topsoil.
- B. Related Sections:
 - 1. Section 31 22 13 - Rough Grading.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Site Clearing:
 - 1. Basis of Measurement: By lump sum.
 - 2. Basis of Payment: Includes clearing site, loading and removing waste materials from site, applying herbicide to designated plant life.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

1.4 REFERENCES

- A. Standard Specifications for Public Works Construction (SSPWC).
- B. California Building Code 2022 (CBC-22).

1.5 QUALITY ASSURANCE

- A. Inspections shall be requested to County of San Bernardino Special Districts Department (Owner).
- B. Conform to SSPWC and CBC-22 as a minimum for environmental requirements, disposal of debris and use of herbicides.
- C. Perform Work in accordance with SSPWC and these specifications.
 - 1. Maintain one (1) copy of each document on site.

SECTION 31 10 00 - SITE CLEARING

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Herbicide: As approved by authority having jurisdiction and selected by Owner/Architect/Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify existing plant life designated to remain is tagged or identified.
- C. Identify waste area and salvage area for placing removed materials.

3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three (3) working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping as specified in Section 01 50 00 - Temporary Facilities and Controls.
- C. Protect benchmarks, survey control points, and existing structures from damage or displacement.

3.4 CLEARING

- A. Clear areas required for access to site and execution of Work to minimum depth of six (6) inches.
- B. Remove trees and shrubs within marked areas. Remove stumps, main root ball, root system to depth of 24 inches, surface rock, and others as specified in demolition plans.
- C. Clear undergrowth and deadwood, without disturbing subsoil.
- D. Apply herbicide to remaining stumps to inhibit growth.

SECTION 31 10 00 - SITE CLEARING

3.5 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
- B. Partially remove paving, curbs, and gutter as indicated on drawings. Neatly saw cut edges at right angle to surface.
- C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- E. Do not burn or bury materials on site. Leave site in clean condition.

3.6 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, re-landscaped, or regraded and marked areas without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated and protect from erosion. Stockpile material on impervious material and cover, until disposal.
- D. Remove excess topsoil not intended for reuse, from site.

END OF SECTION

SECTION 31 22 13 - ROUGH GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Site grading, backfilling, and compacting.
 - 2. Topsoil materials.
 - 3. Subsoil materials.
 - 4. Erosion control.

- B. Related Sections:
 - 1. Section 02 00 00 - Site Demolition.
 - 2. Section 31 10 00 - Site Clearing.
 - 3. Document: Geotechnical report; bore hole locations and findings of subsurface materials

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Topsoil Fill:
 - 1. Basis of Measurement: By lump sum
 - 2. Basis of Payment: Includes excavating existing soil, supplying soil materials, stockpiling, scarifying substrate surface, placing where required, grading and compacting.

- B. Subsoil Fill:
 - 1. Basis of Measurement: By lump sum
 - 2. Basis of Payment: Includes excavating existing subsoil, supplying subsoil materials, stockpiling, scarifying substrate surface, placing where required, grading and compacting.

- C. Structural Fill:
 - 1. Basis of Measurement: By lump sum
 - 2. Basis of Payment: Includes excavating existing subsoil, supplying structural fill materials, stockpiling, scarifying substrate surface, placing where required, grading and compacting.

- D. Granular Fill:
 - 1. Basis of Measurement: By lump sum
 - 2. Basis of Payment: Includes supplying granular fill materials, stockpiling, scarifying substrate surface, placing where required, grading and compacting.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

- B. ASTM International:
 - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m<sup>3 - 3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³</sup>

SECTION 31 22 13 - ROUGH GRADING

5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
 8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- C. Standard Specifications for Public Works Construction (SSPWC).
 - D. California Building Standards Codes, Title 24, 2022 Edition (CBC-22).
 - E. California Stormwater Quality Association BMP Handbook (CASQA)

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in air-tight containers, 10 (ten) lb sample of each type of fill material to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.6 QUALITY ASSURANCE

- A. Furnish each fill material from single source throughout the Work.
- B. Inspections shall be requested to County of San Bernardino Special Districts Department (Owner).
- C. Perform Work in accordance with SSPWC and CBC-22 as a minimum.
- D. Maintain one (1) copy of each document on site.

PART 2 - PRODUCTS

2.1 SUBSOIL AND FILL MATERIALS

- A. Comply with the requirements of Section 200 of the SSPWC.

SECTION 31 22 13 - ROUGH GRADING

- B. Subsoil Type S1 – Unclassified Fill: Conforming to Section 300-4 of the SSPWC
- C. Subsoil Type S2:
 - 1. Excavated and re-used material or imported borrow, conforming to Section 300-5 of the SSPWC

2.2 TOPSOIL MATERIALS

The Engineer shall determine the suitability of topsoil prior to use. Topsoil shall be transported from the source to its final destination unless stockpiling is specified.

- A. Topsoil Class A (Imported): Conforming to Section 212-1.1.2 of the SSPWC.
- B. Topsoil Class B (Selected): Conforming to Section 212-1.1.3 of the SSPWC.
- C. Topsoil Class C (Unclassified): Conforming to Section 212-1.1.4 of the SSPWC.

2.3 EROSION CONTROL MATERIALS

- A. Conform to Sections 300-9, 300-11 and 308-4.9 of the SSPWC and the CASQA Manual.

2.4 SOURCE QUALITY CONTROL

- A. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698, ASTM D1557 or AASHTO T180, as approved by Geotechnical Engineer.
- B. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698, ASTM D1557 or AASHTO T180, as approved by Geotechnical Engineer.
- C. When tests indicate materials do not meet specified requirements, change material and retest.
- D. Furnish materials of each type from same source throughout the Work

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify site conditions.
- C. Verify survey benchmark and intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three (3) working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.

SECTION 31 22 13 - ROUGH GRADING

- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities, if necessary.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.
- F. Protect benchmarks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, re-landscaped, or regraded, marked areas, without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site and protect from erosion. Stockpile material on impervious material and cover, until disposal, or reuse.
- D. Remove excess topsoil not intended for reuse, from site.

3.4 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, re-landscaped, or regraded. and marked areas.
- B. Do not excavate wet subsoil.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Remove excess subsoil not intended for reuse, from site.
- E. Stockpile excavated material in area designated on site.
- F. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key placed fill material to slope to provide firm bearing.
- G. Stability: Replace damaged or displaced subsoil as specified for fill.

3.5 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill material in continuous layers and compact in the maximum compacted depth approved by Geotechnical Engineer.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Slope grade away from building minimum two (2) percent slope for minimum distance of 10 ft, unless noted otherwise.

SECTION 31 22 13 - ROUGH GRADING

- E. Make grade changes gradual. Blend slope into level areas.
- F. Install Work in accordance with SSPWC and CBC-22 as a minimum.

3.6 TOLERANCES

- A. Top Surface of Subgrade ± 0.10 foot from required elevation.

3.7 STOCKPILING

- A. Stockpile materials on site as designated by Architect/Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Stockpile topsoil eight (8) feet high maximum, unless otherwise approved by Engineer.
- E. Prevent intermixing of soil types or contamination.
- F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- G. Stockpile unsuitable and hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.8 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.
- B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

3.9 EROSION CONTROL

- A. Place erosion control measures as shown on construction drawings and conforming to Sections 300-9, 300-11 and 308-4.9 of the SSPWC.

3.10 FIELD QUALITY CONTROL

- A. All inspections are to be conducted by Owner IOR.
- B. Perform laboratory material tests in accordance with SSPWC, ASTM D1557 or ASTM D698, as approved by the Geotechnical Engineer.
- C. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

SECTION 31 22 13 - ROUGH GRADING

- E. Frequency of Tests:
 - 1. Perform tests as frequent as required by the Geotechnical Engineer.

END OF SECTION

NOT FOR BID

SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aggregate subbase.
 - 2. Aggregate base course.
- B. Related Sections:
 - 1. Section 31 22 13 - Rough Grading: Preparation of site for base course.
 - 2. Section 32 12 16 - Asphalt Paving: Binder and finish asphalt courses.
 - 3. Section 32 13 13 - Concrete Paving: Finish concrete surface course.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Aggregate Subbase:
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.
- B. Aggregate Base Course:
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m<sup>3 - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m<sup>3 - 4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D2940 - Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
 - 7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).</sup></sup>
- C. Standard Specifications for Public Works Construction (SSPWC).

SECTION 32 11 23 - AGGREGATE BASE COURSES

- D. California Building Code, 2022 Edition (CBC-22).

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit data for geotextile fabric and herbicide.
- C. Materials Source: Submit name of aggregate materials suppliers.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Inspections shall be requested to County of San Bernardino Special Districts Department (Owner).
- B. Furnish each aggregate material from single source throughout the Work.
- C. Perform Work in accordance with SSPWC and CBC-22 as a minimum.
- D. Maintain one (1) copy of each document on site.

PART 2 - PRODUCTS

2.1 AGGREGATE MATERIALS

- A. Subbase Aggregate: ASTM D2940; graded type.
- B. Base Aggregate: ASTM D2940; graded type.
- C. Comply with requirements of Section Chapter 2 of SSPWC.

2.2 ACCESSORIES

- A. Herbicide: as approved by Architect/Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted substrate is dry and ready to support paving and imposed loads.
 - 1. Proof roll substrate compaction roller in a minimum of two (2) perpendicular passes to identify soft spots to the satisfaction of IOR.

SECTION 32 11 23 - AGGREGATE BASE COURSES

2. Remove soft substrate and replace with compacted fill.
- C. Verify substrate has been inspected, gradients and elevations are correct.

3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

- A. Place aggregate equal thickness layers to total compacted thickness of six (6) inches \pm two (2) inches.
 1. Maximum Layer Compacted Thickness: eight (8) inches.
 2. Minimum Layer Compacted Thickness: four (4) inches.
- B. Roller compact aggregate to 95 percent maximum density.
- C. Level and contour surfaces to elevations, profiles, and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- E. Maintain optimum moisture content of fill materials to attain specified compaction density.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

- A. Maximum Variation From Thickness: 1/4 inch.
- B. Maximum Variation From Elevation: 1/2 inch.

3.5 FIELD QUALITY CONTROL

- A. All inspections are to be conducted by Owner IOR.
- B. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- C. Compaction testing will be performed in accordance with ASTM D1556, ASTM D1557, ASTM D698, AASHTO T180, ASTM D2167, ASTM D2922, or ASTM D3017, as directed by Geotechnical Engineer.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
- E. Frequency of Tests: As scheduled by the Owner IOR.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Asphalt materials.
 - 2. Aggregate materials.
 - 3. Asphalt paving base course, binder course, and wearing course.
 - 4. Asphalt paving overlay for existing paving.
 - 5. Surface slurry.
- B. Related Sections:
 - 1. Section 31 22 13 - Rough Grading: Preparation of site for paving and base.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Asphalt Paving Base Course:
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes priming surfaces, tack coating surfaces, furnishing, placing, compacting, and testing base course.
- B. Asphalt Paving Binder Course:
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes priming surfaces, tack coating surfaces, furnishing, placing, compacting, and testing binder course.
- C. Asphalt Paving Wearing Course:
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes priming surfaces, tack coating surfaces, furnishing, placing, compacting, and testing wearing course.
- D. Tack Coat:
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes preparing surfaces and applying.
- E. Crack Treatment:
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes all work involved in treating cracks, complete in place, including filling treatment.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
 - 2. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
 - 3. AASHTO M140 - Standard Specification for Emulsified Asphalt.
 - 4. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
 - 5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 6. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.
 - 7. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for

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- Concrete and Asphalt Pavements.
8. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.
- B. Asphalt Institute:
1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types.
 2. AI MS-19 - Basic Asphalt Emulsion Manual.
 3. AI SP-2 - Superpave Mix Design.
- C. ASTM International:
1. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
 2. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 3. ASTM D242 - Standard Specification for Mineral Filler For Bituminous Paving Mixtures.
 4. ASTM D692 - Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
 5. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
 6. ASTM D977 - Standard Specification for Emulsified Asphalt.
 7. ASTM D1073 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
 8. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
 9. ASTM D2027 - Standard Specification for Cutback Asphalt (Medium-Curing Type).
 10. ASTM D2397 - Standard Specification for Cationic Emulsified Asphalt.
 11. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
 12. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
 13. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
 14. ASTM D3515 - Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
 15. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
 16. ASTM D3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal.
 17. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
 18. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
 19. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
 20. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
 21. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. California Department of Transportation (Caltrans) Standard Specifications.
- E. Standard Specifications for Public Works Construction (SSPWC).
- F. California Building Standards Codes, Title 24, 2022 Edition (CBC-22).

1.4 PERFORMANCE REQUIREMENTS

- A. Per construction documents.

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1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit product information for asphalt and aggregate materials.
 - 2. Submit mix design with laboratory test results supporting design.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Inspections shall be requested to County of San Bernardino Special Districts Department (Owner).
- B. Mixing Plant: Conform to SSPWC and CBC-22 as a minimum.
- C. Obtain materials from same source throughout.
- D. Perform Work in accordance with SSPWC and CBC-22 as a minimum.
- E. Maintain one (1) copy of each document on site.

1.7 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt mixture when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.
- B. Place asphalt mixture when temperature is not more than 15 degrees F less than initial mixing temperature.
- C. Do not place asphalt mixture during rainy days.

PART 2 - PRODUCTS

2.1 ASPHALT MATERIALS

- A. Asphalt Binder: Shall conform to Sections 203 and 302 of the SSPWC.
- B. Primer: In accordance with Sections 203 and 302 of the SSPWC.
- C. Tack Coat: ASTM D977 and AASHTO M140; diluted emulsified asphalt, type SSS-1h unless otherwise specified in construction documents.
- D. Oil: In accordance with Sections 203 and 302 of the SSPWC.

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2.2 AGGREGATE MATERIALS

- A. Coarse and Fine Aggregate: in accordance with Sections 203 and 302 of the SSPWC.
- B. Mineral Filler: ASTM D242 or AASHTO M17; finely ground mineral particles, free of foreign matter.

2.3 ACCESSORIES

- A. Sealant: ASTM D6690 Type II or Type III; hot applied type, unless otherwise specified on drawings.

2.4 MIXES

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Asphalt Paving Mixtures: Designed in accordance with sections 203 and 302 of the SSPWC with maximum 15 percent by weight reclaimed asphalt pavement.
- C. Asphalt Base Course Mix: C2-PG 64-10.
- D. Parking and Drive Area Mix: D2-PG 64-10.
- E. Surface Slurry: ASTM D3910, Type I; emulsified asphalt slurry.

2.5 SOURCE QUALITY CONTROL

- A. Submit proposed mix design of each class of mix for review and approval by Engineer prior to beginning of Work.
- B. Test samples in accordance with AI MS-2.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.
- C. Verify compacted subgrade subbase is dry and ready to support paving and imposed loads.
 - 1. Compact native soils to 95% relative compaction in preparation for base and/or direct application of ac pavement.
 - 2. Proof roll subbase with compaction roller approved by Engineer in minimum two (2) perpendicular passes to identify soft spots.
 - 3. Remove soft subbase and replace with compacted fill as specified in these specifications.
- D. Verify gradients and elevations of base are correct. Tolerance ± 0.05 feet.

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- E. Verify gutter drainage grilles and frames, manhole frames and other features are installed in correct position and elevation.

3.2 SUBBASE

- A. Verify that subbase is in accordance with SSPWC.

3.3 EXISTING WORK

- A. Saw cut and notch existing paving as indicted on Drawings.
- B. Clean existing paving to remove foreign material, excess joint sealant and crack filler from paving surface.
- C. Repair surface defects in existing paving to provide uniform surface to receive new paving.

3.4 PRIMER

- A. Apply primer in accordance with AI MS-2 and SSPWC.
- B. Use clean sand to blot excess primer.

3.5 TACK COAT

- A. Apply tack coat in accordance with AI MS-19 and SSPWC.
- B. Apply tack coat to contact surfaces of curbs, gutters.
- C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt paving. Do not tack coat these surfaces.

3.6 SINGLE COURSE ASPHALT PAVING

- A. Install Work in accordance with Sections 203 and 302 of the SSPWC.
- B. Place asphalt within 24 hours of applying primer or tack coat.
- C. Place asphalt wearing course to thickness indicated on Drawings.
- D. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
- E. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.7 DOUBLE COURSE ASPHALT PAVING

- A. Place asphalt binder course within 24 hours of applying primer or tack coat.
- B. Place binder course to thickness indicated on Drawings.

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- C. Place wearing course within 24 hours of placing and compacting binder course. When binder course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing wearing course.
- D. Place wearing course to thickness indicated on Drawings.
- E. Compact each course by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
- F. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.8 ASPHALT PAVING OVERLAY

- A. Apply tack coat to existing paving surface at rate recommended by geotextile fabric manufacturer.
- B. Install geotextile fabric in accordance with manufacturer's instructions to permit asphalt saturation of fabric. Lap fabric edge and end joints 4 inches.
- C. Place wearing course to thickness indicated on Drawings.
- D. Compact overlay by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
- E. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.9 SURFACE SLURRY

- A. Install uniform thickness surface slurry over existing paving in accordance with ASTM D3910.
- B. Allow slurry to cure.
- C. Roll paving to achieve uniform surface.

3.10 ERECTION TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation from Indicated Elevation: Within 1/2 inch.

3.11 FIELD QUALITY CONTROL

- A. All inspections are to be conducted by City IOR.
- B. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- C. Take samples and perform tests in accordance with AI MS-2 or AI SP-2 as approved by Geotechnical Engineer.

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- D. Verify that tests are in accordance with SSPWC.
- E. Asphalt Paving Mix Temperature: Measure temperature at time of placement.
- F. Asphalt Paving Thickness: ASTM D3549; test one core sample from every 1000 square yards compacted paving or as directed by Engineer.
- G. Asphalt Paving Density: ASTM D1188 or ASTM D2726; test one core sample from every 1000 square yards compacted paving or as directed by Engineer.

3.12 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from mechanical injury for 24 hours or until surface temperature is less than 140 degrees F.

END OF SECTION

SECTION 32 13 13 - CONCRETE PAVING

GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aggregate subbase and base course.
 - 2. Concrete paving for:
 - a. Concrete pavement.
 - b. Concrete curbs.
 - c. Curb ramps.
- B. Related Sections:
 - 1. Section 03 10 00 – Concrete Forming and Accessories.
 - 2. Section 03 30 00 – Cast-In-Place Concrete
 - 3. Section 31 22 13 – Rough Grading.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Concrete Paving:
 - 1. Basis of Measurement: By square foot.
 - 2. Basis of Payment: Includes forms, reinforcing, concrete, accessories, placing, finishing, curing, and testing.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
- B. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- C. ASTM International:
 - 1. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 2. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 3. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 4. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 5. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 6. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 7. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 - 8. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
 - 9. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.

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10. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 11. ASTM C33 - Standard Specification for Concrete Aggregates.
 12. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 13. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 14. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 15. ASTM C150 - Standard Specification for Portland Cement.
 16. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 17. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 18. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 19. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 20. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 21. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
 22. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
 23. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 24. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
 25. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
 26. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 27. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
 28. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
 29. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 30. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
 31. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 32. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 33. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 34. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
 35. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
 36. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
 37. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
 38. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. Standard Specifications for Public Works Construction (SSPWC).
- E. California Building Standards Codes, Title 24, 2022 Edition (CBC-22).

SECTION 32 13 13 - CONCRETE PAVING

1.4 PERFORMANCE REQUIREMENTS

- A. Paving: Designed for pedestrian and light vehicle traffic.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit data on concrete materials, joint filler, admixtures, and curing compounds.
- C. Design Data:
 - 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - 2. Identify mix ingredients and proportions, including admixtures.
 - 3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
- D. Samples: Submit samples illustrating exposed aggregate finish as required by Engineer.

1.6 QUALITY ASSURANCE

- A. Inspections shall be requested to County of San Bernardino Special Districts Department (Owner).
- B. Perform Work in accordance with ACI 301 and requirements of Section 03 10 00 and Section 03 20 00.
- C. Obtain cementitious materials from same source throughout.
- D. Perform Work in accordance with SSPWC and CBC-22.
- E. Maintain one (1) copy of each document on site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three (3) years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.8 MOCKUP – Not Used

1.9 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one (1) week prior to commencing work of this section.

SECTION 32 13 13 - CONCRETE PAVING

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Form Materials: Conform to ACI 301 and as specified in Section 03 10 00.
- B. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick.

2.2 REINFORCING

- A. Not Used.

2.3 CONCRETE MATERIALS

- A. Concrete Materials: As specified in Section 03 30 00. Provide in accordance with SSPWC Section 201.

2.4 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1, Class A.
- B. Joint Sealers: Specified in Section 03 30 00.

2.5 CONCRETE MIX

- A. Design mix and deliver concrete in accordance with Section 03 30 00 – Cast-In-Place Concrete.

2.6 SOURCE QUALITY CONTROL AND TESTS

- A. Submit proposed mix design of each class of concrete to appointed firm for review prior to commencement of Work.
- B. Tests on cement, aggregates, and mixes will be performed to ensure conformance with specified requirements.
- C. Test samples in accordance with Section 03 30 00 – Cast-In-Place Concrete.

SECTION 32 13 13 - CONCRETE PAVING

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted subgrade subbase is dry and ready to support paving and imposed loads.
 - 1. Proof roll subbase with compaction roller approved by Engineer in minimum two (2) perpendicular passes to identify soft spots.
 - 2. Remove soft subbase and replace with compacted fill as specified in these specifications.
- C. Verify gradients and elevations of base are correct.

3.2 SUBBASE or BASE COURSE

- A. Prepare subbase or base course in accordance with SSPWC.

3.3 PREPARATION

- A. Moisten substrate to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole catch basin frames with oil to prevent bond with concrete paving.
- C. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

3.4 FORMING

- A. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Conform to requirements of Section 03 10 00 – Concrete Forming and Accessories.

3.5 REINFORCING

- A. Place reinforcing as indicated on Drawings.
- B. Interrupt reinforcing at contraction and expansion joints.
- C. Place reinforcing to achieve paving and curb alignment as detailed.
- D. Provide doweled joints at regular spacing at interruptions of concrete with one end of dowel set in capped sleeve to allow longitudinal movement.

3.6 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 and as specified in Section 03 30 00.
- B. Place concrete in accordance with SSPWC and CBC-22.

SECTION 32 13 13 - CONCRETE PAVING

- C. Ensure reinforcing, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- D. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- E. Place concrete to pattern indicated on drawings.

3.7 JOINTS

- A. Place expansion joints at 20-foot intervals unless otherwise directed by Engineer. Align curb, gutter, and sidewalk joints.
- B. Place joint filler between paving components and building or other appurtenances.
- C. Provide sawn joints as specified on drawings.
- D. Provide keyed joints as indicated on drawings.
- E. Seal joints as indicated on Drawings.

3.8 FINISHING

- A. Sidewalk Paving: Light broom, radius to ¼-inch radius, and trowel joint edges. Wood float.
- B. Curbs and Gutters: Light broom, radius to ½-inch radius.
- C. Direction of Texturing: Parallel to paving direction.
- D. Place curing compound on exposed concrete surfaces immediately after finishing.

3.9 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure floor surfaces in accordance with ACI 301 and SSPWC. See Section 03 30 00.

3.10 ERECTION TOLERANCES

- A. Maximum Variation of Surface Flatness: ¼-inch in 10 ft.
- B. Maximum Variation from True Position: ¼-inch.

3.11 FIELD QUALITY CONTROL

- A. All inspections are to be conducted by Owner IOR.

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- B. See Section 03 30 00, Subsection 3.6.

3.12 PROTECTION

- A. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian or vehicular traffic over paving for seven (7) days minimum after finishing or until 75 percent design strength of concrete has been achieved.

3.13 SCHEDULES

- A. Per Table 201-1.1.2(A) of the SSPWC.

END OF SECTION

SECTION 32 15 40 - DECOMPOSED GRANITE

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide all decomposed granite surfacing work, complete.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Decomposed Granite
 - 1. Basis of Measurement : By the square foot.
 - 2. Basis of Payment: includes decomposed granite, stabilizer, compacting, mock up, leveling, delivery, and watering.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete: 03 30 00

1.4 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 1557 1991 Laboratory Compaction

Characteristics of Soil Using Modified Effort

(55,000 ft-lbf/ft (2,700 KN-M/m))

- B. ASTM C136- Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D2419- Sand Equivalent Value of Soils and Fine Aggregates.
- D. "Greenbook" Standard Specifications for Public Works Construction.

1.5 SEQUENCING

- A. Do not install work specified in the Section prior to acceptance of earth moving.
- B. Coordinate work specified in the Section with the work specified in other sections to minimize cutting of and operation of heavy equipment over installed decomposed granite surfacing.

1.6 QUALITY CONTROL

- A. Deliver one sample (1 s.f.) of the decomposed granite to the project site for approval by the Landscape Architect or District's Authorized Representative prior to delivery of the remainder.

- B. Manufacturer's product data sheet and installation instructions indicating that product complies with specifications for decomposed granite surfacing.

1.7 **MOCK UP**

- A. Install 20 s.f. minimum of decomposed granite surfacing, including edging, at location approved by Landscape Architect or District's Authorized Representative.
- B. Allow Landscape Architect or District's Authorized Representative to review mock-up before proceeding with the rest of decomposed granite surfacing.

1.8 **DELIVERY, STORAGE, AND HANDLING**

- A. Protect decomposed granite mix from contamination. Store under cover.

1.9 **FIELD CONDITIONS**

- A. Do not install decomposed granite surfacing when subbase is wet at saturated field capacity.

PART 2 - PRODUCTS

2.1 **MATERIALS**

- A. Specifications is based on products by Gail Materials, Corona, CA; phone 951-667-6102; www.gailmaterials.net.
- B. Decomposed Granite:
 - 1. Produce from naturally friable granite. Blends of coarse sand and rock dust are not acceptable.
 - 2. Gradation, in accordance with ASTM C136:

Sieve Size	Percent Passing
1/2"	100
3/8"	90-100
No. 4	50-100
No. 30	25-55
No. 100	10-20
No. 200	5-18
 - 3. Sand Equivalent: 30 minimum in accordance with ASTM D2419.
 - 4. Color: Per Plans
 - 5. Supplier: Per Plans
- C. Binder: Provide Natracil™ by Gail Materials and comply with following requirements:

1. Swell Volume: 35 ml/gm minimum in accordance with USP procedures.
 2. 90% minimum shall pass a No. 40 mesh screen.
- D. Factory Blending:
1. Mix decomposed granite and Natracil™ with a pug mill that includes a weigh-beltfeeder.
 2. Pedestrian Paths and seating areas: Mix 12 lbs. of binder per 2000 lbs. of aggregate.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine grading and subsoil conditions. Do not proceed until conditions are acceptable.

3.2 PREPARATION

- A. Excavation: Excavate to depth required so edges of decomposed granite surfacing will match adjacent grades and have a maximum cross slope of 1 percent. Remove excavated soil from site.
- B. Subgrade Preparation: Comply with Greenbook Section 301-1 – “Subgrade Preparation”.
- C. Geosynthetic Fabric: Comply with Greenbook Section 300-10 – “Geotextiles for Separation” Do not extend beyond limits of decomposed granite surfacing.
- D. Base Course Installation: Comply with Greenbook Section 301-2 – “Untreated Base”

3.3 INSTALLATION

- A. Prior to installation, thoroughly presoak surface on which decomposed granite surfacing is to be placed. Natracil™ Decomposed.
- B. Install in 2” maximum lift thickness and soak with sufficient water to activate Natracil™ through entire depth of lift. Install the additional lifts and soak with sufficient water to activate Natracil™ as required.
- C. Grade and smooth to required elevation.
- D. Compact: After +/- 4 hours, compact final lift with a three-five ton double or single static drum roller.
- E. Minimum Compacted Thickness: Install to depth shown on Drawings.
- F. Minimum Compacted Thickness: 4” within Pedestrian Paths
- G. Surface shall follow overall contours of landscape. Flat areas shall be crowned for drainage. Slope one percent minimum to drain away from structures.
- H. Completed surface shall be of consistent quality and free of deleterious materials such as organic materials, nails, stones, and loose material. Surface shall not have depressions or humps greater than ¼ inch in ten feet.

3.4 FIELD QUALITY CONTROL

- A. Material shall comply with manufactures specifications.

3.5 PROTECTION

- A. Do not allow traffic on decomposed granite surfacing for four days after placement or until compacted decomposed granite has fully cured.
- B. Protect decomposed granite surfacing from damage until Project completion. Repair damaged areas to match specified requirements.

3.6 MAINTENANCE & REPAIRS

- A. Loose aggregate will appear on the surface over time which is a natural occurrence. If excessive aggregate over ¼ inches occurs, redistribute the decomposed granite over the entire surface, water thoroughly and re-compact with a minimum one ton drum roller. This process can be repeated as needed.
- B. To repair, excavate damaged area leaving a minimum one inch depth of existing decomposed granite, water and scarify. Scarifying existing decomposed granite will prevent a cold joint layer between the existing decomposed granite and the newly imported pre-blended decomposed granite.
- C. Add water to the pre-blended decomposed granite to activate. Apply moistened pre-blended decomposed granite to excavated area at or above finished grade.
- D. Compact with a walk behind drum roller. Do not allow traffic on decomposed granite surfacing for one-two days after placement or until compacted decomposed granite has fully cured.
- E. Clean-up spills and remove surplus material to an off-site legal disposal area. Leave adjacent walks and paved areas broom clean.

END OF SECTION

SECTION 32 33 00 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The work of this section shall conform to the "Standard Specifications for Public Works Construction", latest edition, except as modified herein.

1.2 SCOPE OF WORK

- A. Work of this Section includes all materials, labor and equipment necessary to provide and install the Site Furnishings as shown on the drawings, as reasonably implied or as specified herein. The equipment shall be assembled on site as per manufacturer's recommendations and this section. All work and equipment provided shall be subject to approval of the Project Inspector.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete: Section 03 30 00

1.4 SUBMITTALS

- A. Contractor shall submit a complete list of materials along with manufacturer's catalog data for all materials proposed for use in the work at the pre-construction conference. Proposals for substitution of those materials specified herein shall be submitted and reviewed.
- B. Manufacturer's Product Data: Submit three (3) copies of manufacturer's literature for each item of site furnishings.
- C. Shop Drawings: Manufacturer's shop Drawings shall be provided for all prefabricated items. Shop Drawings which show complete details shall be furnished in quadruplicate for all items requiring shop fabrication in accordance with Section 2-5.3 of the Standard Specifications.

1.5 GUARANTEE & LIABILITY INSURANCES

- A. Manufacturer shall guarantee all materials and workmanship for a period of one (1) year exclusive of vandalism. Manufacturer will be required to provide product liability insurance coverage in the minimum amount of \$10,000,000 per incident. Manufacturer or his representative shall inspect all installation work and provide written certification that equipment has been installed in accordance with the manufacturer's specifications.
- B. Each Manufacturer will be required to provide complete installation drawings including specifications and a replacement parts list for all products.
- C. Contractor shall provide a written guarantee on his firm's letterhead for all materials and workmanship for a period of one (1) year exclusive of vandalism. Written guarantee shall be submitted to the District at the final inspection prior to final acceptance of the work.

SECTION 32 33 00 - SITE FURNISHINGS

1.6 PROPOSED SUBSTITUTIONS

- A. Products proposed for substitutions as "equals" to those specified are subject to the approval of the District. If at the time proposed equals are delivered to the site, it is determined by the District that they are not equal to those specified, they shall be removed and products as specified shall be provided by the Contractor at no additional cost to the District.

1.7 LOCATION INSPECTION

- A. No equipment or apparatus or foundations for same shall be placed until location stakes have been inspected for recommended approval by the Landscape Architect and/or Project Inspector.

PART 2 - MATERIALS

ALL MATERIALS SHALL BE AS CALLED FOR ON PLANS

2.1 EXECUTION: "OR APPROVED EQUIVALENT" PRODUCTS

- A. This project is a Public Works project. Sole sourcing of material is not allowed. Any reference or call out on the plans and/or in the specifications to a specific manufacturer shall be interpreted as "or approved equivalent". The District Engineer's and Landscape Architect's approval is required as to whether or not a product meets the District's standard to be an approved equivalent. **Bidders shall use the pricing for the products as specified to avoid risks of disapproval. No substitutions will be considered prior to the award of the contract.**

PART 3 - EXECUTION

3.1 LAYOUT

- A. Contractor shall stake/mark locations for all slabs equipment or apparatus or foundations for same and shall obtain the acceptance of their location from Landscape Architect and/or Park Inspector prior to commencing any digging. Locations shall be adjusted to provide minimum clear distances required from all edges of slabs, trees, irrigation heads, or other obstructions.

3.2 CONCRETE WORK

- A. All concrete foundation work shall be performed in accordance with the Standard Specifications, Section 201. Contractor shall obtain the acceptance of all forming from the Park Inspector prior to pouring any concrete. Foundations holes shall be inspected and accepted by the Inspector prior to pouring concrete.

3.3 STEEL FABRICATION AND WELDING

- A. All steel members shall be thoroughly hand cleaned and solvent cleaned to remove all rust, scale, oil, grease, and foreign material prior to welding. All welds shall be continuous fillet welds along all abutting surfaces. Sand all welds smooth. Galvanized steel shall be touched up after welding with Galvicon paint.

SECTION 32 33 00 - SITE FURNISHINGS

3.4 SITE FURNISHINGS

- A. All Site Furnishings shall be installed plumb, at a height above the finish surface as recommended by the manufacturer. Minimum footing size shall conform to the manufacturer's recommendations. All footings shall be installed prior to placement of concrete slabs, where they occur. **No "block outs" will be permitted.**

3.5 PAINTING

- A. All items to be painted shall be properly primed prior to application of a minimum of two (2) finish coats.
- B. After installation, all site furnishings and play equipment shall be touched-up as necessary. Touch-up paint shall be as supplied by the manufacturer.

3.6 CLEAN-UP

- A. Contractor shall clean up and legally dispose of all unused materials, excess soil, and debris at regular intervals throughout the duration of the work, and as directed by the District.

3.7 PAYMENT TERMS

- A. Payment for site furnishings will be at the lump sum price bid for site furnishings. Payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work in site furnishings as herein specified.

END OF SECTION

SECTION 32 80 00 - IRRIGATION SYSTEM

PART 1 - GENERAL REQUIREMENTS

1.1 DESCRIPTION

- A. Work Included: Unless otherwise specified, the construction of irrigation systems shall include the furnishing, installing and testing of mains, laterals, risers and fittings, quick couplers, gate valves, back flow preventers, furnishing and installing of irrigation controllers, booster pumps, excavation and backfill, and all other work in accordance with the plans and specifications for a complete operating system.
1. The intent of the drawings and specification is to indicate and specify a complete and efficient irrigation system ready for use in accordance with the manufacturer's recommendations and meeting the recommended approval of the Landscape Architect. All work shall be in accordance with applicable District and County codes, and these plans/specifications.
 2. Irrigation systems shall be constructed to the sizes and grades and at the location shown on the drawings. Lines shown on the plans are essentially diagrammatic. Locations of all heads, valves, etc., shall be reviewed by the Landscape Architect at the time of construction. Do not exceed spacing of the heads as shown on plans.
 3. The applicable provisions of the General Conditions and the Special Conditions of these specifications shall govern the work of this section as if herein written in full.
 4. The Contractor shall maintain, continuously, a competent superintendent or foreman, satisfactory to the Owner, during the progress of work, with authority to act for him in all matters pertaining to the work.
 5. Work noted as "N.I.C.", "existing" or "to be supplied and/or installed by others" is not a part of this section.
 6. The work in this section shall be coordinated with all underground utilities and trades responsible for their installation.
- B. Field Conditions: Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Report to the Landscape Architect all conditions which prevent proper execution of this work.
- C. Permits and Fees: The contractor shall apply and pay for all necessary fees and permits required in the pursuit of his work as required by governing codes.
- D. All assemblies specified herein shall be installed in accordance with the respective details. In the absence of detail drawings or specifications pertaining to the specific items required to complete the work, the Contractor shall perform such work in accordance with the best standard practice and to the satisfaction of the Landscape Architect.
- E. Irrigation Contractor is responsible for replacing or repairing any acts of theft or vandalism during construction and the maintenance period.
- F. Permission to shut off any water lines must be obtained from the Owner. Disruption of existing systems shall be kept to a minimum.
- G. Contractor shall maintain irrigation system throughout plant establishment and maintenance period.
- H. Contractor shall provide one year guarantee.

SECTION 32 80 00 - IRRIGATION SYSTEM

1.2 RELATED WORK DESCRIBED ELSEWHERE

- A. Planting: Section 32 90 00

1.3 QUALITY ASSURANCE

- A. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the latest rules of the National Electrical Code and the Electrical Safety Orders of the State of California, Division of Industrial Safety, for all electrical work and materials.
- B. Qualifications of Installers: Provide at least one 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 materials manufacturer's recommended methods of installation, and who shall direct all work performed under this Section.

1.4 SUBMITTALS

- A. General: Comply with the provisions of Section 01 32 00.
- B. Product Data: Within 45 days after award of the Contract, and before any materials of this Section have been delivered to the job site, submit to the Architect:
 - 1. A complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. The manufacturer's recommended methods of installation which, when recommended for approval by the Architect, shall become the basis for review and accepting or rejecting actual installation methods used on the work when not otherwise specified or detailed.
- C. Materials and Samples: If materials are to be employed, other than designated on the plans, the Contractor shall, prior to the installation of any irrigation work, submit for recommended approval by the Landscape Architect, a list of materials and equipment he proposes to use. The material and equipment list shall include, but not be limited to, polyvinyl chloride pipe, automatic controllers and control valves, quick coupling valves and irrigation heads.
 - 1. Should the Contractor propose to use materials or equipment other than those listed on the plans, he shall submit samples of the make and type proposed. Samples shall be submitted a sufficient time in advance of the start of construction to allow a period of not less than seven (7) days for testing and recommended approval.
 - 2. Recommended approval of irrigation equipment and materials shall depend on the following:
 - a. Conformance to specification requirements.
 - b. Acceptable test results and/or field performance.
 - c. Durability and low maintenance.
 - d. Availability of parts and service.
 - e. Compatibility with owner's materials inventories.
- D. Project Record Drawings: Provide separate and complete Project Record Drawings prepared in accordance with the provisions of these Specifications, Sub-section 3.8, following

SECTION 32 80 00 - IRRIGATION SYSTEM

1.5 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Delivery: Polyvinyl chloride pipe shall be delivered to the work site in unbroken bundles or rolls packaged in such a manner as to provide adequate protection for the pipe ends, threaded or plain.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the recommended approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 "OR APPROVED EQUIVALENT" PRODUCTS

- A. This project is a Public Works project. Sole sourcing of material is not allowed. Any reference or call out on the plans and/or in the specifications to a specific manufacturer shall be interpreted as "or approved equivalent". The District Representative and Landscape Architect's approval is required as to whether or not a product meets the District's standard to be an approved equivalent. **Bidders shall use the pricing for the products as specified to avoid risks of disapproval. No substitutions will be considered prior to the award of the contract.**

2.2 PIPE

- A. Plastic Pipe:
 - 1. Unless otherwise specified, the construction of lateral lines and main lines shall include excavation and backfill, the furnishing, installing and testing of pipe, tube and fittings, the furnishing and installing of anchors, thrust blocks and location wire, the improvements, line flushing and testing, and all other work in accordance with the plans and specifications.
 - 2. Main supply pressure lines shall be PVC; 4" and larger Class 200, 2" - 3" Class 315, 1 1/2" and smaller Schedule 40, as manufactured by Pacific Plastics, Inc., or approved equal.
 - 3. Lateral non-pressure lines shall be PVC. Schedule 40 polyvinyl chloride, as manufactured by Pacific Plastics, Inc., or approved equal.
 - 4. Irrigation Lines Sleeves shall be PVC. Schedule 40 polyvinyl chloride, as manufactured by Pacific Plastics, Inc., or approved equal.
 - 5. Low Voltage Control Wire Sleeves (valve wires) shall be PVC Schedule 40 polyvinyl chloride, as manufactured by Pacific Plastics, Inc., or approved equal. All exposed wires shall be sleeved in PVC Schedule 40 ULV electrical conduit with ULV Schedule 40 fittings.
 - a. Identification: All pipe shall be continuously and permanently marked with the following information: The normal pipe size, the type and schedule or class of material, the working pressure or pressure rating at 73.4 degrees F., the manufacturer's name or trade mark, and the National Sanitation Foundation (N.S.F.) seal of approval.
 - 6. All plastic pipe shall be guaranteed by its manufacturer to have passed, or be capable of passing, the Anhydrous Acetone Immersion Test and to be free from manufacturing defects.
 - 7. All main line and lateral piping shall be per plan.

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B. Identification: All pipe shall be continuously and permanently marked with the following information: The normal pipe size, the type and schedule or class of material, the working pressure or pressure rating at 73.4 degrees F., the manufacturer's name or trade mark, and the National Sanitation Foundation (N.S.F.) seal of approval.

1. All plastic pipe shall be guaranteed by its manufacturer to have passed, or be capable of passing, the Anhydrous Acetone Immersion Test and to be free from manufacturing defects.

C. Polyvinyl Chloride Pipe Fittings and Connections:

1. Polyvinyl chloride pipe fittings and connections approved for irrigation systems shall be polyvinyl chloride, Type II, Grade I, Schedule 40, high impact molded fittings, manufactured from virgin compounds.
2. The Schedule 40 fittings shall be tapered socket type, or molded thread type, suitable for either solvent weld or screwed connections.
3. Machine threaded fittings will be acceptable only if thread-stripping resistance test results are submitted and approved.
4. In line fittings, such as couplings, unions and bushings may be machined from extruded stock.
5. Plastic saddle and flange fittings will not be acceptable.
6. All fittings shall be permanently marked with the following information: The normal pipe size, the type and schedule of material, and the National Sanitation Foundation (N.S.F.) seal of approval.

D. Galvanized Pipe and Fittings:

All galvanized steel pipe shall be Schedule 40, threaded, coupled and hot-dip galvanized, and shall comply with ASTM A120 and A53.

1. All fittings for galvanized steel pipe shall be 150 PSI rated galvanized malleable iron, banded pattern.
2. Pipe sizes indicated on the drawings are nominal inside diameter unless otherwise noted.

2.3 VALVES

A. Ball Valves:

1. All ball valves shall be all bronze construction full port; 1/2" thru 2", Nibco T585.
2. Working Pressure Rated: 150 PSI stem, 400 PSI W.O.G.
3. Ball valves installed underground shall be housed in a rectangular plastic valve box.

B. Gate Valves:

1. All gate valves shall be all bronze construction full port; 1/2" thru 3", Nibco T113K.
2. Working Pressure Rated: 200 PSI non rising stem, screw in bonnet, solid wedge.
3. Gate valves installed underground shall be housed in a 10" round plastic valve box.

C. Automatic Control Valves (Electric):

1. All automatic control valves (electric) shall be as called for on plans, electrically controlled, hydraulically operated, single seat, normally closed no equivalents or equals.

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2. The valves shall be actuated by a normally closed solenoid valve operator using 24 volts, 60 cycle alternating current. The wires in the coil of the solenoid shall be embedded in an epoxy resin. Valves shall automatically close in event of electrical power failure.
3. All automatic control valves shall have a flow control device for manually adjusting the amount of flow of water through the valve. The flow control device shall be adjusted so that the pressure at the nozzle of the irrigation head farthest from the automatic control valve shall be that as specified in the irrigation legend per plan. The pressure at the irrigation head shall be measured by means of a pilot pressure gauge while the irrigation head is operating.
4. Automatic control valves shall be constructed of brass or stainless steel springs and screens, and composition material (neoprene) seals and seat washers.
5. Valve stems shall have a cross handle.
6. All automatic control valves shall be equipped with a pet clock for manual operation control.
7. The Contractor shall furnish one valve box key for each six or less valve boxes installed.
8. All valves shall have a T.C. Christie valve marking plastic tag.

2.4 QUICK COUPLERS

- A. Quick couplers shall be as called out for on plans.

2.5 CONTROLLERS AND WIRE

- A. Automatic Controllers (Electric):
 1. Controller shall as called for on plans.
 2. All automatic controllers treated in this specification shall be for use with solenoid operated (24-volt electric), normally closed, control valves.
 3. Automatic controllers shall meet the following requirements:
 - a. Be completely automatic in operation with remote control.
 - b. Shall electrically start the sprinkling cycle.
 - c. Shall electrically time the individual stations.
 - d. Shall operate on single phase, 120 volt, 60 cycle, and alternating current.
 - e. Shall contain electrical circuits for pump and master valve operations.
 - f. Shall have complete operating instructions and charts indicating controller station to valve locations mounted inside the controller in full view when controller is open.
 - g. Smart irrigation controller which automatically adjusts frequency and/or duration of irrigation events in response to changing weather conditions.
- B. Control Wire:
 1. All control wire shall be of the Underwriter's Laboratory type UF (underground feeder), single conductor, solid copper, plastic insulated, 600 volt rated, for direct burial applications. Maximum conductor operating temperature, 60 degrees C. for both wet and dry locations. Wire composition is as follows:
 - a. Conductor - The conductors shall be solid annealed uncoated copper meeting the applicable requirements of the latest revisions of A.S.T.M. B-3.

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- b. Insulation - The insulation shall be colored plastic which meets the test requirements of I.P.C.E.A. (The Insulated Power Cable Engineer's Association) Pub. No. S-61-402, dated July 1961, Section 3.7 for 60 degrees C. polyvinyl chloride insulation. The insulation shall be flame retardant, resistant to fungus, resistant to corrosive fumes, suitable for wet locations and furnish some degree of inherent protections against mechanical abuse. Insulation thickness shall be 47 mils for AWG #14, 12 & 10, and 62 mils for AWG #8.
- c. Color Coding - The conductor insulation shall be color coded as follows:
 - 1) All common ground wire shall be white.
 - 2) All pilot (valve control) wire shall be black.
 - 3) All spare wires shall be orange.
- d. All wire splices shall be made within a control valve box or a separate valve box. Each splice shall be made with a Spears Dri-Splice DS-100 wire connector and filled with Spears DS-300 sealant.

2.6 VALVE BOXES

- A. Valve Boxes: All valve boxes and lids shall be made of rigid polyolefin. Valve boxes shall be green unless specified for use with reclaimed water, then valve box shall be purple and marked for such use. Rectangular valve boxes shall be 16" wide by 21-1/2" long and 12" high. Use rectangular boxes for master valves, flow sensors, ball valves, butterfly valves, control valve, and pull boxes. Use jumbo rectangular valve boxes for drip valve assemblies. Round valve boxes shall be 10" diameter and 10-1/4" high. Use round valve boxes for gate valves, quick couplers, flush valve and spare wires. Heat brand valve box lid with appropriate two-inch high (2") identification letter or numbers.

2.7 IRRIGATION HEADS

- A. Irrigation Heads:
 - 1. Irrigation heads shall be as called for on plans. Irrigation heads shall be of the types and sizes, with the diameter (or radius) of throw, pressure, discharge and any other designations necessary to determine the types and sizes, as indicated on the plans.
 - 2. All irrigation heads of a particular type of function in the system shall be of the same manufacture and, with the exception of shrubbery heads, shall be marked with the manufacturer's name and model number. This identification shall be visible without having to remove the irrigation head from the system.
 - 3. Unless otherwise specified, all irrigation heads & body shall be constructed of cyclac with the following exceptions: bearings, washers, gaskets, seals, spray pins and rocker arms.

2.8 POP UP ROTOR:

- A. All pop-up rotors shall have a rubber cover and be constructed of heavy duty plastic except for wiper seal, bearing spring and bearing washers. The riser shall be constructed of plastic or of plastic encased in a stainless steel sleeve. All rotors to have a reinforced rib design with flange encasement.
- B. Pop-up height shall be as listed in drawings and in no case be shorter than 3-1/2 inches.
- C. The rotor shall have a diffuser pin for regulating flow and radius.

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- D. The rotor shall have a screen to protect it from clogging and have a minimum inlet of 3/4 inch.
- E. Medium Range rotors shall be capable of covering 16-55 feet radius at 20-60 PSI with a rate of .5 - 9.2 GPM and be adjustable from 1-360 degrees. Long range rotor shall be capable of covering 16-55 feet radius at 40-74 PSI with a rate of 3.8 - 27.5 GPM and be adjustable from 1-360 degrees.

2.9 DRIP VALVE ASSEMBLIES:

- 1. Not Used

2.10 HARD PIPED POINT TO POINT DRIP IRRIGATION:

- 1. Not Used

2.11 SUB SURFACE DRIP IRRIGATION:

- 1. Not Used

2.12 CHECK VALVES:

- A. Swing Check Valves: PVC, Slip x Slip check valves, for non-pressure lateral line applications on slopes.
- B. Spring Check Valves: for pop-up spray heads and spray heads on risers and 3/4" for popup rotors and rotors on risers.

2.13 FLUSH VALVE ASSEMBLIES:

- A. Schedule 40 Ball Valve, threaded schedule 80 nipples and fittings with polyethylene tubing for flush hose.

2.14 BUBBLERS:

- A. Bubblers shall be constructed of heavy duty plastic and be pressure compensation full circle. The bubbler shall have a 20 mesh screen to protect it from clogging.
- B. Bubblers shall have a fixed flow from .25, .50, 1.0 or 2.0 GPM and operate between 20-90 PSI.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 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.

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2. Verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the reference standards and the manufacturer's recommendations.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Landscape Architect.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 FIELD MEASUREMENTS

A. General:

1. Trenches and other excavations for irrigation pipe and appurtenances shall be excavated true to alignment and grade, and shall be of ample size for the proper performance of installation work, review, testing and backfill.
2. Where it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and tree roots.
3. Protect all existing utilities and repair any damage to existing utilities with matching new materials, at no increase in contract price.
4. Generally, piping under concrete shall be installed by jacking, boring or hydraulic driving. Where any cutting or breaking of sidewalks and/or concrete work is necessary, it shall be removed and replaced by the Contractor. Permission to cut or break sidewalks and/or concrete shall be obtained from the Architect. No hydraulic driving will be permitted under asphaltic concrete paving.
5. Coordinate with planting operations, as 10" deep cross-ripping is required prior to irrigation systems installation. (Cross-ripping is part of the planting work).

B. Plastic Pipe Trenches:

1. Minimum trench width shall be six (6) inches.
2. Minimum trench depth below bottom of pipe shall be two (2) inches.
3. Minimum cover shall be based on finished grades, unless otherwise noted on Drawings.
 - a. Lateral Line minimum cover shall be twelve (12) inches.
 - b. Main Line minimum cover shall be eighteen (18) inches.
 - c. Pipe and Wire Sleeves minimum cover shall be twenty-four (24) inches.

C. Backfill Material:

1. All plastic pipe shall be bedded and encased with approved backfill material free of rocks and clods as indicated in the following table and/or shown on the plans.
 - a. Thickness Under Pipe Minimum Two (2) inches
 - b. Thickness Above Pipe Minimum Four (4) inches
 - c. Thickness at Side of Pipe Minimum Two (2) inches
2. The balance of backfill material shall be approved soil. Unsuitable material, including clods and rocks over 2 to 2-1/2 inches in size, shall be removed from the premises and disposed of legally at no cost to the Owner.
3. Backfill material shall be sufficiently compacted under and on each side of the pipe to provide support free of voids. On slope areas over 3:1 gradient compaction shall be 85%

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(min) or equal to the requirements of the grading plans, whichever is greater. Pipe joints shall remain exposed until the completion of pressure and leakage test, unless authorized by the Architect. The top six (6) inches of backfill shall be free of rocks over one (1) inch, subsoil, rubbish and debris.

4. The remainder of the backfill material shall contain no lumps or rocks larger than two and one-half (2-1/2) inches, nor contain rubbish and debris.
5. Backfill shall be tamped or puddled to the dry density of adjacent soil. Backfill within areas of structurally compacted soils shall be returned to the original relative density as before trenching.

D. Location Wire:

1. Location wire shall be placed on top of the four-inch select backfill over all mainline (pressure bearing) pipes, except copper pipe. Wire shall be No. 12 gauge copper, new or used or an approved substitute, and shall provide a continuous electrical conductor between gate valves and control valves. Each end shall be brought to the valve sleeve and two feet of wire looped free in the trench beside the valve body. This location wire may be omitted where copper hydraulic control tubing or electric control wire follows the water main.

3.3 INSTALLATION OF POLYVINYL CHLORIDE PIPE

- A. Polyvinyl chloride pipe shall be installed in such a manner so as to provide for expansion and contraction as recommended by the manufacturer.
- B. All polyvinyl chloride pipe shall lay free in the trench with no induced strain. Where there is evidence of induced pipe strain, the Contractor shall be required to make pipe cuts and install angle fittings as necessary to eliminate the strain.
- C. When a connection is plastic to metal, a female adapter shall be used. The metal nipple shall be hand-tightened, plus one turn with a strap wrench. Joint compound shall be Permatex, Type 2, or Teflon Tape.
- D. The Contractor will be required to remove and replace any fitting which induces a torque strain to the pipe.
- E. Polyvinyl chloride pipe shall be cut with a PVC pipe cutter, hand saw or hack saw with the assistance of a square and sawing vise or in a manner so as to ensure square ends. Burrs at cut ends shall be removed prior to installation so that a smooth unobstructed flow will be obtained.
- F. All plastic to plastic joints shall be solvent-weld joints. Only the solvent recommended by the pipe manufacturer shall be used.
- G. The solvent-weld joints shall be made in the following manner:
 1. Thoroughly clean the mating pipe and fitting with a clean dry cloth.
 2. Try the parts for fit. The parts should "dry-mate" between one-third and two-thirds the depth of the socket. If adequate insertion is not obtained, or bottoming occurs, try another part until a satisfactory "dry-fit" is obtained.
 3. Apply a uniform coat of solvent to the outside of the pipe with a non-synthetic bristle brush.

NOTE: For PVC, Type I, 1120-1220, pipe mating surface shall first be cleaned with the application of Methyl Isobutyl Ketone (MIBK) solvent. This cleaning shall be accomplished by applying MIBK solvent to the full mating surface area and wiping off with a clean cloth,

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repeating the process, if necessary, until no trace of shine remains (neither streaks nor spots). The use of commercial PVC solvent-cement thinners as a substitute of MIBK is not allowed.

4. Apply a uniform coat of solvent-weld to the fitting socket.
5. Re-apply a light coat of solvent-weld to the pipe and quickly insert it into the fitting.
6. Give the pipe or fitting a quarter turn to ensure even distribution of the solvents and make sure that the pipe is inserted to the full depth of the fitting socket.
7. Hold in position for at least 15 seconds.
8. Wipe off excess solvent that appears at the outer shoulder of the fitting.

3.4 INSTALLATION OF CONTROL WIRE

- A. Unless otherwise specified, the installation of control wire shall include excavation and backfill, the furnishing, installing and testing of the wires, the removal and/or restoration of existing improvements and all other work in accordance with the plans and specifications.
- B. Unless otherwise specified all neutral (common ground) wire shall be AWG #12 and all pilot (valve control) wire shall be AWG #14.
- C. At least one spare wire shall be installed from the controller clock to the most distant valve. When wire runs go in different directions from the controller clock, a separate spare wire shall be installed from the controller clock to the most distant valve in each different wire run direction.
- D. Tape and bundle all control wires at 10' o/c maximum; place wiring with 18" minimum cover. When wiring is placed in common trenches with piping, set wiring 2" from any piping.
- E. All wire splicing shall take place in the valve boxes and/or pull boxes. All splices shall be made with a mechanical connector encased in a self-curing epoxy resin which provides a permanent watertight connection.
- F. All direct burial control wires shall be identified as to their respective valve number and controller clock letter in all pull boxes and at all wire termination. Spare wires and "future valve" wires, if any, shall also be identified. Labels and tags shall be used for identification which are not affected by moisture or temperatures between minus 30 degrees F. and plus 200 degrees F. The labels and tags shall be resistant to abrasion, dirt, grease, and chemicals used in lawn fertilizers and conditioners. The labels and tags shall be firmly attached to the wire in every case. The Contractor shall submit samples of the labels or tags to be used, to the Architect for recommended approval, prior to the installation of the control wire. Examples of nomenclature of tags or labels are as follows:
 1. Neutral (common ground) wire = "Neutral" Clock "A"
 2. Pilot (valve control) wire = "A.V. #1." Clock "A"
 3. Spare Wire = "Spare" Clock "A"
- G. The final operating sequence of the remote control valves, within each individual controller clock, shall be as called out on drawings.
- H. Testing:
 1. All direct burial control wire installed shall be tested in the following manner.
 - a. Before any backfill material is placed over the control wires in the trench, the wires shall be tested with a meter for insulation resistance. Minimum insulation resistance

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to ground shall be fifty (50) megohms. Any conductor not meeting this requirement shall be replaced.

- b. After backfill encasement, the wires shall again be tested with a meter. The minimum acceptable insulation resistance to ground on this test shall be one (1) megohm. Any conductor not meeting this requirement shall be replaced.

- I. Provide separate common wire for each controller installed.

3.5 INSTALLATION OF VALVES

- A. General: Unless otherwise specified, the installation of the valves shall include excavation and backfill, the furnishing, installing and testing of risers, fittings and valves, the furnishing and installing of appurtenances, accessories, anchors and thrust blocks, the removal and/or restoration of existing improvements and all other work in accordance with the plans and specifications.
- B. Group control valves together as specified on the drawings with a minimum spacing of 36" between each valve box.
- C. Automatic control valves shall be set upright with a minimum clearance of 3" between top of cross and bottom of valve box lid. The Contractor shall brand, the identification number of the valve and clock on the outside cover of the box.

3.6 INSTALLATION OF AUTOMATIC CONTROLLERS

- A. Unless otherwise specified, the installation of automatic controllers shall include the furnishing, the installing, making necessary electrical connections, the testing of controllers and connection, and all other work as called for on the plans and/or in the specifications.
- B. All electrical conduit shall be P.V.C. Sunstop ULV Schedule 40 pipe & fittings.
- C. Install controllers at 5' min. away from 3 phase power.
- D. Install a separate ground rod and wire for each controller as specified on the drawings and per manufacture's specifications.
- E. Unless otherwise specified the installation of controllers shall be as detailed on plan.
- F. Controllers shall be tested for fourteen (14) calendar days after complete installation of the irrigation system. System shall operate automatically in the manner shown on the drawings and/or specified herein.

3.7 INSTALLATION OF IRRIGATION HEADS

- A. Unless otherwise specified, the installation of irrigation heads shall include excavation and backfill, the furnishing, installing and testing of risers, fittings and heads, the furnishing and installing of anchors and thrust blocks, the furnishing and installing of cone shaped screens at base of each head, the removal and/or restoration of existing improvements and all other work shall be in accordance with the plans and specifications.
- B. Flushing: All water lines shall be thoroughly out before heads are installed.

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- C. Location and arc of heads shall be adjusted, if required to eliminate any dry spots, over water or spillage on adjacent areas.
- D. All seeded area irrigation heads shall be installed adjacent to existing walks, curbs, or other paved areas, shall be set to the grade of the improvements. Irrigation heads which are to be installed in areas where the turf has not yet been established shall be set one (2) inches above the proposed finished grade. Heads installed in this manner shall be lowered by the Contractor prior to final acceptance. In established lawn areas the irrigation heads shall be set to existing grade.
- E. All shrubbery heads to be installed within three (3) feet of curbs shall be set to a maximum height of six (6) inches above the grade of the curb. Shrubby heads installed in all other areas shall be twelve (12) inches above finished grades unless otherwise indicated on the plans. Pop-up shrub heads shall be installed as detailed.

3.8 DRIP IRRIGATION SPECIALTY INSTALLATION

- A. There is no drip on this project.

3.9 DRAWINGS OF RECORD AND TURNOVER ITEMS

- A. Record Drawings: The Contractor shall provide and keep up to date, a complete record set of bond prints which shall be corrected daily and show every change from the original drawings and specifications and the exact locations, sizes and kinds of equipment. Prints for this purpose may be obtained from the Owner. This set of drawings shall be kept on the site and shall be used only as a record set.
- B. The drawings shall also serve as work progress sheets, and the contractor shall make neat and legible annotations thereon daily as the work proceeds, showing the work as actually installed. These drawings shall be available at all times for inspections and shall be kept in a location designated by the Owner.
- C. In order to complete the record drawings in a neat, legible manner, the contractor shall employ a competent draftsman, satisfactory to the Owner's authorize representative, to indicate the necessary changes on mylar tracings or revised CAD drawings procured from the Owner and deliver same to the Owner two weeks prior to the final review by the Architect.
- D. The contractor shall dimension from two (2) permanent points of reference, building corners, sidewalks, or road intersections, etc., the location of the following items:
 - 1. The routing of the irrigation main lines
 - 2. Connections to the existing water lines
 - 3. Control valves and Butterfly valves
 - 4. Hose Bibs
 - 5. Any other pertinent underground item, if so deemed by the Landscape Architect.
- E. Controller Charts:
 - 1. Provide one controller chart for each controller supplied.
 - 2. Record drawings shall be recommended for approval by the Landscape Architect before charts are prepared.
 - 3. These charts shall be completed and reviewed prior to final observation of the irrigation system, and prior to final payment.

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4. Update and prepare new controller charts at end of the 1 year maintenance period.
 5. The chart shall show the area controlled by automatic controller and shall be no larger than the 24" x 36" original.
 6. The chart is to be a reduced drawing of the actual system. However, the chart shall only be reduced to a size which is completely legible.
 7. Chart shall be black line print and shall be colored with a different color for each station.
 8. The chart shall be mounted using Velcro, or an approved equal type of tape.
 9. When completed and recommended for approval, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 20 mils thick.
- F. Turnover Items, supply as part of this contract the following items:
1. Four (4) additional irrigation heads of each type and spray pattern shown on plans.
 2. Two (2) wrenches for disassembly and adjustment of each type of irrigation head shown on plans.
 3. Two (2) keys for each automatic controller.
 4. Two (2) service manuals for equipment installed.
 5. Two (2) quick couplers with a 3/4" bronze hose bib, bent nose type with hand wheel and two (2) quick coupler keys to match quick couplers shown on plan.
 6. Two (2) valve box cover keys or wrenches.
 7. One (1) 5-foot tee wrench for operating gate valves.
 8. Backflow device valve handles and Water Department inspection documentation.
 9. 100 L.F. of drip tubing.

3.10 TESTS

- A. Pressure Tests:
1. All pressure lines shall be tested under hydrostatic pressure of 125 pounds per square inch, and all non-pressure lines shall be tested under the existing static pressure and both be proved watertight. Contractor shall provide all equipment for hydrostatic tests at no cost to the Owner.
 2. Pressure shall be sustained in the lines for not less than two (2) hours. If leaks develop, the joints shall be replaced and the test repeated until the entire system is proved watertight.
 3. Tests shall be observed and recommended for approval by the Landscape Architect prior to backfill.
- B. Coverage Test:
1. When the irrigation system is completed, the Contractor, in the presence of the Architect, shall perform a test coverage of water afforded the planting areas, complete and adequate. The Contractor shall furnish all materials and perform all work required to correct any inadequacies of coverage disclosed arising from his work.
 2. Contractor shall inform the Owner's representative of any deviation from the plan required due to wind, planting, soil or site conditions that bear on proper coverage; and upon approval, perform changes to provide for proper coverage at no additional cost to the Owner.

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3.11 REVIEWS

- A. Normal Progress Reviews: Normal progress reviews shall be requested from the Architect at least 48 hours in advance of any anticipated review. A review will be made by the Architect on each of the steps listed below. The Contractor will not be permitted to initiate the succeeding steps of work until he has received written approval to proceed by the inspector.
1. Immediately prior to the commencement of the work of the section.
 2. Irrigation materials and equipment to be used.
 3. After trenching and before backfill.
 4. Completion of line testing, test to be made prior to backfill.
 5. After placement of all heads, bubblers, emitters, valves and controllers for coverage.
 6. Final review and receipt of "Record Drawings"/"Controller Charts".
 7. Final acceptance of project by Owner.
 8. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval. Any work covered prior to review shall be opened to view by the Contractor, at his expense.
- B. Unprepared Review Requests: In the event the Contractor requests review of work and said work is incomplete, the Contractor shall be responsible for review cost.
- C. Completion: The work will be accepted, in writing, when the whole shall have been completed satisfactorily to the Owner and the Architect. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved by Owner, in writing, at the proper times.
1. Leave the entire installation in complete operating order, free from any and all defects in material, workmanship or finish, regardless of any discrepancies and/or omissions in plans or specifications.
 2. Remove from the site all debris and rubbish resulting from the work, and leave the installation in clean condition.

3.12 GUARANTEE

- A. General: The entire irrigation system, including all work done under this contract, shall be guaranteed against all defects and fault of material and workmanship for a period of one (1) year following the filing of the Notice of Completion. All materials used shall carry a manufacturer's guarantee of one (1) year.

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 the District within ten (10) calendar days of receipt of written notice from the District. When the nature of the repairs as determined by the District constitute an emergency (e.g. broken pressure line) the District may proceed to make repairs at the Contractor's expense. Any and all damages to existing improvement resulting either from faulty materials or workmanship, or from the necessary repairs to correct same, shall be repaired to the satisfaction of the District by the Contractor, all at no additional cost to the District.

- B. Form of Guarantee: Guarantee shall be submitted on Contractors own letterhead as follows:

FORM OF GUARANTEE FOR IRRIGATION SYSTEM

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We hereby guarantee that the 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 defects in materials or workmanship which may develop during the period of one year from date of filing of the Notice of Completion and also the repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the District. We shall make such repairs or replacements within 10 calendar days following written notification by the District. In the event of our failure to make such repairs or replacements within the time specified after receipt of written notice from the District, we authorize the District to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT: _____
LOCATION: _____
SIGNED: _____
ADDRESS: _____

PHONE: _____

- C. After the system has been completed, the Contractor shall instruct the Owner in the operation and maintenance of the system and shall furnish a complete set of operating instructions.
- D. Any setting of trenches which may occur during the one-year period following acceptance shall be repaired to District's satisfaction by the Contractor without any additional expense to the District. Repairs shall include the complete restoration of all damage to planting, paving or other improvements of any kind as a result of the work.

3.13 MAINTENANCE

- A. Maintenance of irrigation system prior to job completion, and during the Landscape Maintenance period, shall be the responsibility of the Contractor including, but not limited to, the following:
 - 1. Cleaning of plugged irrigation heads.
 - 2. Irrigation heads adjustments.
 - 3. Volume of water being applied (coordinate with landscape maintenance.)
 - 4. Programming of the controller (coordinate with landscape maintenance.)
 - 5. Repairing leaking valves, etc.
 - 6. Any other problem areas which occur after installation attributed to the irrigation system.
 - 7. Repair or replace equipment due to acts of vandalism, theft or pest damage.
 - 8. Lower all seeded area heads to final grades prior to final acceptance by Owner.

3.14 PAYMENT TERMS

- A. Payment for irrigation work will be at the lump sum price bid for irrigation. Payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work in irrigation as herein specified

END OF SECTION

SECTION 32 90 00 - PLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions of the "**Standard Specifications for Public Works Construction, (SSPWC)**" latest edition, shall apply except as modified herein.

1.2 SCOPE

- A. Work of this Section includes all material, equipment, and labor necessary for and incidental to completing all Landscape Planting work as indicated on the Drawings, or as reasonably implied, or as designated herein, including, but not limited to, the following.
 1. Soil testing approvals.
 2. Weed abatement.
 3. Soil preparation.
 4. Finish grading.
 5. Preparation of all planting holes.
 6. Furnishing and installation of all plant materials unless otherwise noted.
 7. Sodding indicated turf area.
 8. Furnishing and installation of all required fertilizers, planting backfill materials, top
 9. Dressing and miscellaneous materials.
 10. Staking and tying trees.
 11. Providing plant establishment (30 days).
 12. Providing landscape maintenance (90 days).
 13. Clean-up and weeding of all landscape areas.
 14. One year guarantee.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Earthwork: Section 31 10 00
- B. Irrigation system: Section 32 80 00

1.4 QUALITY ASSURANCE

- A. The Contractor shall provide at least one person who shall be present at all times during execution of this portion of the work, who shall be thoroughly familiar with the type of materials being installed and the proper materials and methods for their installation, and who shall direct all work performed under this Section.
- B. All plants and planting material shall meet or exceed the specifications of Federal, State and County laws requiring inspection for plant disease and insect control.

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- C. Quality and size shall conform with the current edition of "Horticultural Standards" for number one grade nursery stock as adopted by the American Association of Nurserymen, and California Department of Agriculture regulations.
- D. The Applicator of all weed control materials shall be licensed by the State of California as a Pest Control Operator and a Pest Control Advisor in addition to any subcontractor licenses that are required.
- E. All materials and methods used for Weed Abatement must conform to Federal, State, and Local Regulations.

1.5 APPROVALS

- A. All irrigation system work shall be inspected for recommended approval by the Landscape Architect and/or the District prior to start of any work in this section.

1.6 TESTING

- A. An Agricultural Soil Suitability Report for all planting areas shall be obtained by the Contractor, after completion of rough grading, and prior to start of soil preparation work. The Contractor, at his own expense, shall submit at least four (4) site soil samples to a Soil Laboratory recommended by the Landscape Architect. Samples are to be taken from the top six inches (6") of soil in areas to receive planting. All test results and recommendations shall be provided to the Landscape Architect and/or the District. The requirements for fertilization and amendments as specified herein, may be modified as necessary prior to start of work in this section.
- B. After the completion of soil preparation and prior to the start of any planting, soil samples shall again be taken. Quantity and methods shall be the same as previously executed. Contractor shall not commence planting until so directed by the Landscape Architect and the District.

1.7 SUBMITTALS

- A. Materials lists: Within forty-five (45) days after award of the Contract, submit a complete list of all materials proposed to be furnished and installed under this Section, demonstrating complete conformance with the requirements specified.
 - 1. Materials list shall include the weed control materials and quantities per acre intended for use in controlling the weed types prevalent and expected on the site, as supplied by the Pest Control Advisor. Pest Control Advisor shall furnish the Landscape Contractor and Landscape Architect data to demonstrate the compatibility of the weed control materials and methods with the intended plant and seed varieties.
 - 2. Materials list shall include nursery provided photos of trees and plant material. Each photo shall note representative height x width and box size of trees, gallon size of plants, and nursery company name/location/contact name. Quantities of each plant type shall be noted.
- B. Certificates: Deliver all certificates to the Landscape Architect upon delivery to job site. Include:
 - 1. Quantity of commercial fertilizers used.
 - 2. Quantity of soil amendments.
 - 3. Quantity of seed.
 - 4. Quantity of plant material.

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1.8 PRODUCT HANDLING

- A. Delivery and Storage:
 - 1. Deliver all items to the job site in their original containers with all labels intact and legible at time of Landscape Architect's or District's review.
 - 2. Immediately remove from the site all plants which are not true to name, and all materials which do not comply with the specified requirements.
 - 3. Use all means necessary to protect plant materials before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the recommended approval of the Landscape Architect and at no additional cost to the District.

1.9 RESPONSIBILITY AND COORDINATION DURING WEED ABATEMENT

- A. During Weed Abatement procedures, the Landscape Contractor is responsible for the erection of all signs and barriers required to prevent intrusion into the treated areas and to notify the public.
- B. No material or methods used for Weed Abatement shall affect the landscape planting or hydroseed germination. No material or method shall render the job site unusable for more than ten (10) days from date of application.

PART 2 - MATERIALS

All materials shall conform to the requirements of Section 212 of the Standard Specifications, except as modified herein.

2.1 LANDSCAPE FINISH GRADING

- A. Site topsoil material - No import soil.

2.2 NON-SELECTIVE HERBICIDES

- A. Non-selective contact herbicide and/or non-selective systemic herbicides (as recommended by the Pest Control Advisor).

2.3 SELECTIVE HERBICIDES

- A. Selective pre-emergent herbicides ('Ronstar G' or equal or as recommended by the Pest Control Advisor).

2.4 SOIL CONDITIONERS AND FERTILIZERS

- A. Soil conditioners may include any or all of the conditioners herein specified and shall be applied at rates indicated on the plans or as determined by the Agronomical Soils Report.
- B. Shavings: Nitrogen stabilized organic amendments derived from redwood sawdust, fir sawdust or finely ground bark of fir or pine containing the following physical properties:

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<u>Percent Passing</u>	<u>Sieve Size</u>
95 – 100	6.33 mm (1/4 inch)
80 – 100	2.38 mm (No. 8, 8 mesh)
0 – 30	500 Micron (No. 35, 32 mesh)

- C. Nitrogen Content - Dry weight 0.56% - 0.84%
- D. Iron Content - Minimum 0.08% dilute acid soluble Fe. on dry weight basis.
- E. Soluble Salts - 2.5 millimhos/centimeter at 25 degrees C. as determined by maximum saturation extract method.
- F. Ash - (Dry weight) 0 - 6.0%
- G. Fertilizer: Commercial fertilizers with an analysis of 5-3-1 Gro-Power Plus, 16-20-0, and 12-8-8 Gro-Power Controlled Release Nitrogen, as designated herein, or approved substitute as required by the Agronomical soils report.
 - 1. Fertilizer shall be delivered to the site in the original unopened containers, bearing the manufacturer's guaranteed analysis. Any fertilizer that becomes caked or damaged, making it unsuitable for use, will not be accepted.
 - 2. Available from: Gro Power (213) 245-6849 or (714) 750-3830.
- H. Gypsum: To be agricultural grade gypsum and shall conform to Section 212-1.2 of Standard Specifications for Public Works Construction, Latest Edition.
- I. Iron Sulfate: Pelleted or granular form containing not less than 18.5% expressed metallic iron and shall be registered as an agricultural mineral, with the State Department of Agriculture in compliance with Article 2 - "Fertilizer Materials," Section 1030 of the Agricultural Code.
- J. Ammonium Sulfate: Granular form containing not less than 21% nitrogen and 24% sulfur and shall be registered as an agricultural miner, with the State Department of Agriculture in compliance with Article 2 - "Fertilizer Materials," Section 1030 of the Agricultural Code.

2.5 PLANTING TABLETS

- A. Fertilizer planting tablets shall be tightly compressed commercial grade planting tablets having a 12-8-8 formula, weighting 7 grams each, as "Gro-Power" planter tablets or equal. The planting tablets shall be delivered to the site in the original, unopened containers, bearing the manufacturer's guaranteed analysis. Any damaged tablets will not be accepted.

2.6 PLANT MATERIALS

- A. Nomenclature: The scientific and common names of plants herein specified conform to industry standards. (Refer to list of plant materials on Drawings).
- B. Labeling: Each group of plant materials delivered to the site shall be clearly labeled as to species and variety and nursery source.
- C. Quality and Size:
 - 1. Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules and grading. All plants shall have a normal habit

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of growth and shall be sound, healthy, vigorous, and free of insect infestations, plant diseases, sun scalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. All plants shall have normally well-developed branch system, with vigorous and fibrous root systems which are not root or pot bound. In the event of disagreement as to condition of the plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than two plants or more than 2% of the total number of plants of each species or variety. Where container grown plants are from several sources, the roots of not less than two plants of each species or variety from each source will be inspected. In case the sample plants reviewed are found to be defective, the Landscape Architect and the District may judge acceptability. Any plants rendered unsuitable for planting because of this review will be considered as samples and will be provided at the expense of the Contractor.

2. The size of the plants will correspond with that normally expected for species and variety of commercially available nursery stock, or as specified in the special Conditions or Drawings. The minimum acceptable size of all plants measured before pruning with the branches in normal position, shall conform with the measurements, if any, specified on the Drawings in the list of plants to be furnished. Plants larger in size than specified may be used with the recommended approval of the Landscape Architect, but the use of larger plants will make no change in contract price. If the use of larger plants is recommended for approval, the ball of earth or spread of roots for each plant shall be increased proportionately.

D. Rejection or Substitution: All plants not conforming to the requirements herein specified shall be considered defective, and such plants, whether in place or not, shall be marked as rejected and immediately removed from the site of the work and replaced with new plants at the contractor's expense. The plants shall be of the species, variety, size and condition specified herein or shown on the drawings. Under no condition will there be any substitution of plants or sizes for those listed on the accompanying plans, except with the expressed consent of the Landscape Architect.

E. Pruning: At no time shall the tree or plant materials be pruned, trimmed or topped prior to delivery, and any alteration of their shape shall be conducted only with the recommended approval and when in the presence of the Landscape Architect.

F. Protection: All plants at all times shall be handled and stored so that they are adequately protected from drying out, from wind burn, or from any other injury.

G. Right of Review: The Landscape Architect reserves the right to recommend approval or rejection at any time upon delivery or during the work, any or all plant material regarding size, variety or condition.

2.7 SEED MIX

A. Seeds shall be fresh, clean, new crop seed. Conforming to Section 212-1.3 of the Standard Specifications. Seed shall be pre-mixed by mechanical mixer. Contractor to submit seed mix specifications from supplier, prior to purchase of seed.

<u>Turf Seed Mix</u>	<u>by weight</u>	<u>Purity</u>	<u>Germination</u>
Perennial Rye (50% 'Caliente Fine', 50% 'Prelude')	60%	95%	90%
PJ Bluegrass (50% 'Rugby' 50% 'Parade')	10%	98%	80%
Un-Hulled Bermuda (Certified Arizona Common)*	30%	98%	85%

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Seeding rate: 218 pounds per acre (5 LBS/1,000 SF)

*Note: For applications in May through September, use Hulled Bermuda.

2.8 HYDROSEEDING AND HYDROMULCHING MATERIALS

1. Not Used

2.9 STOLONS

1. Not Used

2.10 SODDED TURF

- A. Sod type and supplier per planting legend.

2.11 MULCH

- A. Ground wood product shall be Type I, as specified in the "Standard Specifications for Public Works Construction," latest edition, Section 212-1.2.4.

2.12 TREE SUPPORTS

- A. Tree ties shall be "CINCH-TIE" black rubber ties, and shall be uniform throughout the project. Or, District approved equal.
- B. Tree support stakes shall be minimum two inches (2") diameter lodge pole pine, copper naphthenate treated, ten feet (10') length.

2.13 JUTE NETTING

1. Not used

PART 3 - EXECUTION

Installation shall conform to the requirements of Section 308 of the "Standard Specifications," except as modified herein.

3.1 GENERAL

- A. Prior to the start of work of this Section, all trash and deleterious materials on the surface of the ground shall be removed and legally disposed of.

3.2 WEED ABATEMENT

- A. Prior to the installation of the irrigation system, all weed growth shall be removed within the areas designated to be cleared and grubbed. Refer to plans for limit of work.
 1. If in the opinion of the Pest Control Advisor, perennial grasses and weeds existing in the planting areas will require control prior to removal, spray these areas per Pest Control

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Adviser's recommendations. Allow herbicide to kill all weeds. Rake or hoe off all dead weeds to a depth of one to two inches (1" to 2") below the surface of the soil. Physically remove all weeds from the site.

- B. Upon completion of the irrigation system and rototilling of soil amendments into the soil and immediately preceding the installation of plant material, perform weed abatement as follows, and per Pest Control Advisors recommendation.
1. Apply Sulfate of Ammonia at the rate of five pounds (5 lbs.) per one thousand square feet (1,000 sf.) to all planting areas.
 2. Irrigate area for fourteen (14) consecutive days, to germinate existing weed seeds.
 3. Apply by spray a non-selective herbicide to eradicate all existing weeds. Do not irrigate for seven (7) days after application.
 4. Remove weeds after herbicide has had time to sufficiently kill. Remove all dead weeds by rake or hoe to a depth of one to two inches (1" to 2") below the surface of the soil. Remove all weed residue and top growth and dispose of in a legal manner.

3.3 SOIL PREPARATION AND FINE GRADE

- A. Soil Preparation: Prior to spreading soil amendments and prior to installation of irrigation systems, crossrip or otherwise till to a depth of ten inches (10") all planting areas to receive soil preparation. All rock one inch (1") and larger shall be removed to a depth of twelve inches (12"). Dispose of all debris off-site in a legal manner.
- B. Planting Areas: To all planting areas (turf, shrub and groundcover), uniformly broadcast soil amendments and thoroughly incorporate to a minimum six inch (6") depth by means of a rototiller or equal.
- C. Soil Amendments are to be thoroughly incorporated at the following rates per one thousand square feet (1,000 sf.) by rototilling or other approved method:
- | | |
|------------|---------------------------------------|
| 3 cu. yds. | Nitrogen stabilized organic amendment |
| 200 lbs. | 5-3-1 commercial fertilizer |
| 10 lbs. | Iron Sulfate* |
| 50 lbs. | Agricultural Gypsum |
- (Mix to be used for bidding purposes only, to be verified with Agronomical Soils Test.)
* Care shall be taken when using or handling Iron Sulfate to avoid contact with cement.
- D. Finish Grade:
1. Rough grade has been left within one tenth (1/10) of one foot (1') of finish grade.
 2. Work such as fine grading and light cultivation are required of all planting areas indicated on plan to prepare grades prior to seed or stolon planting.
 3. After approximate finished grades have been established, all soil areas shall be compacted and settled by application of heavy irrigation to a minimum depth of twelve inches (12").

3.4 EROSION CONTROL

- A. All slopes areas greater than 5 feet in height and exceeding 3:1 shall receive jute netting. Netting shall also be provided during the Plant Establishment & Maintenance Period, when and as directed by the Landscape Architect, along flow lines and other locations where erosion is evident. Jute netting shall be installed loosely, up and down the slope. The installed netting shall fit the soil surface contour and shall be held in place by 9-inch long, 11-gauge (minimum) steel wire staples driven vertically into the soil at approximately 24-inch spacing. Jute netting strips shall

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overlap along the sides at least 6 inches. Ends of strips shall be buried into the soil at least 6 inches. Lap all ends of rolls a minimum of 24"."

3.5 FINAL GRADES

- A. After the foregoing specified deep watering, minor modifications to grade may be required to establish the final grade. These areas shall not be worked until the moisture content has been reduced to a point where working it will not destroy soil structure.
- B. Finish grading shall ensure proper drainage of the site.
- C. Finished earth berm surfaces shall be smooth and even between contours; shapes shall be to the satisfaction of the Landscape Architect.
- D. All areas shall be graded so the final grades will be one inch (1") below adjacent paved areas, sidewalks, valve boxes, clean-outs, drains, manholes, etc.
- E. All shrub areas to receive one inch (1") of bark chips.
- F. Surface drainage shall be away from all building foundations.
- G. Eliminate all erosion scars.
- H. The Contractor shall request a review by the Landscape Architect for recommended approval of the final grades and elevations before beginning planting operations.

3.6 TREE AND SHRUB INSTALLATION

- A. All planting and bare dirt areas (except areas to receive hydroseed) are to be treated with a pre-emergent chemical (subject to approval by Landscape Architect prior to application). Chemicals are to be applied by a licensed by a Pest Control Agent at the rates recommended by the manufacturer. This treatment shall be applied at the following times during the contract: a) before planting, b) at the beginning of plant establishment period and c) at the end of the plant establishment period. No chemicals shall be applied other than in the presence of the inspector.
- B. Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice, as reviewed by the Landscape Architect.
- C. All irrigation work shall have been reviewed by the Landscape Architect prior to beginning any planting.
- D. Installation of all plant material shall be in accordance with the details on the Planting Plans.
- E. Locations for plants and outlines of areas to be planted shall be marked on the ground by the Contractor before any plant pits are dug. All such locations shall be reviewed by the Landscape Architect and Owner/Agent. If an underground construction or utility line is encountered in the excavation of planting areas, notify Landscape Architect so that other locations for planting may be selected.
- F. Excavation for Planting:
 - 1. Excavation for planting shall include the stripping and stacking of all acceptable topsoil encountered within the areas to be excavated for trenches, tree holes, plant pits and planting beds.

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2. Protect all areas from excessive compaction when trucking plants or other material to the planting site.
3. All excavated holes shall have vertical sides with roughened surfaces and shall be of a size that is at least two times the width and depth of the original plant container. The holes shall be, in all cases, large enough to permit handling and planting without injury or breakage to the roots or root ball.

G. Planting:

1. No planting shall be done in any area until the area concerned has been satisfactorily prepared in accordance with these Specifications.
2. No more plants shall be distributed in the planting area on any day than can be planted and watered on that day.
3. Containers shall be cut and plants shall be removed in such a manner that the ball of earth surrounding the roots is not broken, and they shall be planted and watered as herein specified immediately after the removal from the containers. Containers shall not be cut prior to placing the plants in the planting area.
4. The amended surface soil can be used for backfill around trees and shrubs; where additional quantities are required, use the following formula (thoroughly blended):

a. Native On-Site Soil (No rock larger than 1")	6 parts
b. Nitrolized Wood Shavings	4 parts
c. Commercial Fertilizer Gro-Power Plus, 5-3-1	15 lbs/cy
d. Iron Sulfate	2 lbs/cy
e. For Acid Loving Plants	
1) 80% Course Peat Moss	
2) 20% Sponge Rock or Light Soil Mix	

(Mix to be used for bidding purposes only, to be verified with Agronomical Soils Test).
5. Three inches (3") of amended backfill shall be thoroughly mixed with three inches (3") of native soil at the bottom of each hole to provide a transitional soil mix of at least six inches (6") between the native soil and the backfill.
6. Backfill shall be placed at the bottom of each hole, and thoroughly compacted to a height that when a plant is placed in the hole, its root crown is slightly above the established final grade. Any plants which settle deeper than specified above shall be raised back to the correct level. After the plant has been placed, additional backfill shall be added to the hole to cover approximately one-half the height of the root ball. At this stage, water shall be added to the top of the partly filled hole to thoroughly saturate the root ball and adjacent soil.
7. After the water has completely drained, fertilizer tablets shall be placed as indicated below:

a. 3 tablets per one gallon container.
b. 6 tablets per five gallon container.
c. 12 tablets per fifteen gallon container.
d. 14 tablets per 24" box container.
e. 18 tablets per 36" box container.

The remainder of the hole shall then be backfilled.
8. Set the tablets to be used with each plant on the top of the root ball while the plants are still in their containers so the required number of tablets to be used in each hole can be easily verified.

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9. After backfilling, an earthen basin shall be constructed around each plant. Each basin shall be of a depth sufficient to hold at least two inches (2") of water. Basins shall be of a size suitable for the individual plant. In no case, shall the basin for a fifteen (15) gallon plant be less than four feet (4') in diameter; a five (5) gallon plant less than three feet (3') in diameter; and a one (1) gallon plant less than two feet (2') in diameter. the basins shall be constructed of amended backfill material. Rake out basins prior to planting lawn areas or groundcover areas.
- H. Pruning: Pruning shall be limited to the minimum necessary to remove injured twigs and branches, and to compensate for loss of roots during transplanting, but never to exceed one-third (1/3) of the branching structure. Upon recommended approval of the Landscape Architect, pruning may be done before delivery of plants, but not before plants have been reviewed and recommended for approval. Cuts over three quarters of an inch (3/4") in diameter shall be painted with an approved tree wound paint.
- I. Staking and Tying:
 1. Support stakes tall enough to support the particular tree shall be driven thirty-six inches (36") into the soil. Stake shall be placed on the leeward side of the tree from the most troublesome direction, refer to details on Drawings.
 2. Ties shall be placed as low on the trunk as possible but high enough so the tree will return to upright after deflection.
 3. To find the proper height for tie locations, hold the trunk in one hand, pull the top to one side and release. The height at which the trunk will just return to the upright when the top is released is the height at which to attach the ties.
 4. Ties are to form a loose loop around the tree trunk so that the trunk cannot work towards the support stakes.
 5. One tree of each size shall be staked and reviewed by the Landscape Architect prior to continued staking.

3.7 HYDROSEED TURF AND GROUND COVER INSTALLATION

- A. Grade smooth all surfaces to be seeded. Soil surface shall be three-quarters inch (3/4") below adjacent pavement after settling. Roll lightly and fill in all soil depressions. All areas shall slope to drain. Remove all rocks one inch (1") or larger from the top two inches (2") of soil.
- B. Soil shall be level, smooth and moist prior to hydroseeding.
- C. The seed bed shall be reviewed by the Landscape Architect to determine its suitability prior to planting. The Contractor shall obtain such recommended approval prior to seeding grass. No seeding shall be performed until all other construction operations have been completed, except by authorization of the Landscape Architect.
- D. Mixing of hydromulch slurry shall be performed in a tank with a built-in continuous agitation and recirculation system of sufficient operating capacity to produce a homogeneous slurry of mulch fiber, binding agent, fertilizer and water as specified in this Section 2.09, in the designated unit proportions:
 1. Mulch Fiber 2,000 lbs. per acre
 2. Seed Mix As specified in this Section 2.09
 3. Binding Agent 100 lbs. per acre
 4. Fertilizer-Gro-Power Hi-Nitrogen 250 lbs. per acre
 5. Water 3,000 gallons per acre

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- E. With agitation system operating at part speed, water shall be added to the tank, good recirculation shall be established. Materials shall be added in such a manner that they are uniformly blended into the following sequence.
1. When tank is 1/3 filled with water:
 - a. Add binding agent, 1/2 acre requirement
 - b. Add 3 - 50 lbs. bales of fiber
 - c. Add seed, 1/2 acre requirement
 - d. Add fertilizer, 1/2 acre requirement
 2. When the tank is 1/2 filled with water:
 - a. Agitate mixture at full speed.
 3. Before tank is 3/4 filled with water:
 - a. Add 7 - 50 lbs. bales of fiber.
 4. As tank becomes filled with water:
 - a. Add remaining requirements.
 5. Slurry distribution should begin immediately.
 6. Area to be hydroseeded shall be moistened to a depth of six inches (6") just prior to application.
- F. Application: Hydromulched slurry shall be applied under high pressure, evenly and result in uniform coat on all areas to be treated. Care shall be exercised to assure that plants in place are not subjected to the indirect force of an application. Slurry shall be immediately removed from walks, structures, etc. that are inadvertently sprayed.

3.8 MECHANICAL STOLONIZING

- A. Grade smooth all surfaces to be stolonized. Soil surface shall be three-quarter inch (3/4") below adjacent pavement after settling. Roll lightly and fill in all soil depressions. All areas shall slope to drain.
- B. Soil shall be level, smooth and moist prior to stolonizing.
- C. The lawn bed shall be reviewed by the Landscape Architect to determine its suitability, prior to planting. The Contractor shall obtain such recommended approval prior to stolonizing lawn. No stolonizing shall be performed until all other construction operations have been completed, except by authorization of the Landscape Architect.
- D. Stolonizing shall be done by using a mechanical stolonizer to punch or push the full length stolons into the soil at the rate of four (4) bushels per one thousand square feet (1,000 sq. Ft.) Or one hundred seventy two (172) bushels of stolon per acre. "TIF Green" to be treated similar to hybrid Bermuda Grass. Stolon rate: Four (4) bushels per one thousand square feet (1,000 sq.ft.) or two hundred sixty-two (262) bushels per acre.

3.9 SODDED COOL SEASON TURF

- A. Turf grass shall be planted by sod laying, as indicated per plan. Turf sod shall be specified on planting plan and legend.

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- B. Sodding - irrigate areas to be sodded prior to installation. Moisture shall be uniformly present to a depth of 2". Sod shall be installed within one day of delivery, rolls shall be placed in shaded areas prior to installation. Sod shall conform to all lawn shapes as designated per plan and shall be installed in such a manner as to visually eliminate all joints and edges of sod strips. Following installation, irrigate turf areas thoroughly to provide even moisture penetration. Roll all sod prior to beginning installation within two (2) hours - prior to beginning irrigation, sod shall be uniformly smooth in appearance and shall be flush with the finished grade of all walks, curbs, etc.
- C. Maintenance - three (3) weeks following installation of turfgrass, areas shall be mowed regularly at intervals not exceeding once per week. Mowing shall be done with sharp, well adjusted mowers or cut more than half the existing top growth in one mowing. Mowing heights shall be 2" to 2 1/2", during hot weather seasons never less than 2" and shall be 1 1/2" TO 2" during cool weather seasons. Turfgrass areas that do not properly grow shall be resodded as necessary. At the termination of the maintenance period all turfgrass areas shall be completely covered, leaving not barren spots larger than three inches (3") x three inches (3").

3.10 WATERING

- A. Apply water to all planted areas during operations and thereafter, until acceptance of the work.
- B. Immediately after planting, apply water to each shrub by means of a hose. Apply water in a moderate stream in the planting hole until the material about the roots are completely saturated from the bottom of the hole to the top of the ground.
- C. Apply water in sufficient quantities and as often as seasonal conditions require to keep the planted areas sufficiently moist at all times, well below the root system of grass and plants.
- D. All turf and groundcover areas shall be kept damp at all times and irrigation should be adjusted accordingly. This normally would involve four (4) to six (6) watering periods daily, each watering period (ON) regulated to just dampen the mulch without creating run off.
- E. Intervals between irrigation (OFF) sequence should be judged by the length of the time mulch remain damp. Once the mulch begins to dry out, the water (ON) sequence should be repeated.

3.11 ESTABLISHMENT AND MAINTENANCE PERIOD

- A. The Contractor shall continuously maintain all areas involved in this contract during the progress of the work and during the establishment and maintenance period until final acceptance of the work by the District.
- B. Plant establishment period: The contractual establishment period shall be for no less than thirty (30) continuous calendar days. The contractual establishment period begins on the first day after all planting in this project is completed and accepted and the planted areas are brought to a neat, clean and weed free condition.
 - 1. Any day upon which no work will be required, as determined by the Landscape Architect, will be credited as one of the plant establishment working days regardless of whether or not the Contractor performs plant establishment work.
 - 2. Any day when the Contractor fails to adequately maintain plantings, replace unsuitable plants or do weed control or other work, as determined necessary by the Landscape Architect, will not be credited as one of the plant establishment working days.
 - 3. In order to carry out the plant establishment work, the Contractor shall furnish sufficient men and adequate equipment to perform the work during the plant establishment period.

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4. Improper maintenance or possible poor condition of any planting at the termination of the scheduled establishment period may cause postponement of the final acceptance of Plant Establishment. Contractor shall bear all costs for extension of the Plant Establishment period.
- C. Plant Maintenance Period: The contractual maintenance period shall be no less than ninety (90) continuous calendar days, and shall begin at the acceptance of the Plant Establishment Period.
1. All areas shall be kept free of debris, and all planted areas shall be weeded at intervals of not more than ten (10) days. Watering, trimming, fertilization, spraying and pest control, as may be required, shall be included in the maintenance period. Maintenance shall include pest control (squirrel, gopher, rabbits, etc.).
 2. Post fertilize all turf areas at the end of every 30 days (of maintenance) at the rate of five pounds (5 lbs.) per one thousand square feet (1,000 s.f.) using ammonium sulfate, evenly applied and thoroughly watered in. Post fertilize all groundcover areas at the end of every thirty (30) days (of maintenance) at the rate of thirty pounds (30 lbs.) per one thousand square feet (1,000 s.f.), using 5-3-1 Gro-Power. For the final feeding of all areas, use 12-8-8 Gro-Power Controlled Release Nitrogen at the rate of thirty pounds (30 lbs.) per one thousand square feet (1,000 s.f.).
 3. Mowing of turf will commence when turf grass has reached a height of one and one-half inches (1 1/2"). Turf shall be cut with a reel type mower at a one (1) inch height. Mowing will be at least weekly after the first cut. Turf must be well established and free of bare spots and weeds to the satisfaction of the Landscape Architect prior to final acceptance by the District. Excess grass clippings, as determined by the Landscape Architect, shall be picked up and removed from the site and premises.
 4. The Contractor shall maintain the irrigation systems in a like new operating condition; adjusting head heights and spray arcs as necessary. The Contractor is responsible for proper watering of all planting areas, for providing any necessary supplemental water as may be required, and shall replace any material damaged due to improper moisture.
 5. During the maintenance period, the Contractor shall be responsible for maintaining adequate protection for all planting areas. Any damaged areas shall be repaired and any plant materials replaced at the Contractor's expense.
 6. The Contractor's maintenance period will be extended past ninety (90) days if these provisions are not filled.

3.12 GUARANTEE AND REPLACEMENT

- A. All plant material installed under the contract shall be guaranteed against any and all poor, inadequate or inferior materials and/or workmanship for a period of one (1) year. Any plant found to be dead or in poor condition due to such faulty materials or workmanship, as determined by the Landscape Architect, shall be replaced by the Contractor at his expense.
- B. All palms shall be guaranteed by the contractor for twenty-four (24) months after final acceptance of the project. Contractor liability shall cover cost of labor, equipment, and materials to replace trees of similar size during the covered period.
- C. Any material found to be dead, missing, or in poor condition during the establishment period shall be replaced immediately. The Landscape Architect or District shall be the judge as to the condition of material. Material to be replaced within the guarantee period shall be replaced by the contractor within fifteen (15) days of written notification by the District.
- D. Replacement shall be made to the same specifications required for original plantings within five (5) working days after written notification.

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- E. Material and Labor involved in the replacing of material shall be supplied by the Landscape Contractor at no additional cost to the District.

3.13 REVIEWS

- A. Normal progress reviews shall be requested from the Landscape Architect or District at least forty-eight (48) hours in advance of an anticipated inspection. A review will be made by the Landscape Architect on each of the steps listed below. The Contractor will not be permitted to initiate the succeeding steps of work until he has received written recommendation of approval to proceed by the Landscape Architect.
 1. Immediately prior to the commencement of the work on this Section.
 2. Spotting of all shrubs, trees and palms, and minor adjustments prior to planting.
 3. Preparation of areas to groundcover and turf installation.
 4. Final review, start of establishment & maintenance period.
 5. After thirty (30) day plant establishment & maintenance.
 6. Final acceptance of project/ninety (90) day maintenance.

3.14 PAYMENT TERMS

- A. Payment for planting work will be at the lump sum price bid for planting. Payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work in planting as herein specified.

END OF SECTION

SECTION 32 90 01 – TREE PROTECTION AND TRIMMING

PART 1- GENERAL REQUIREMENTS

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes trimming and protection of trees that are indicated to remain but interfere with or are close to new construction, as herein specified. Trees which are to remain and must be protected are indicated on the Drawings.
 - 1. Pruning Terminology to be utilized as developed by the National Arborist Association.
- B. Related Section Division 2 Section, "Site Clearing" limits removal of trees, shrubs, and other vegetation to plants interfering with new construction, unless otherwise indicated. The following Section contains requirements that relate to this Section:

1.3 SUBMITTALS

- A. Certification: Submit written certification by qualified arborist that trees indicated to remain have been protected during the course of construction in accordance with recognized standards and that where damage did occur, trees were promptly and properly treated. Indicate which damaged trees (if any) are incapable of retaining full growth potential and are recommended to be replaced.
 - 1. "Arborist" shall be an individual currently a member of the National Arborist Association or the International Society of Arboriculture and verify proof of certification by such organization.

1.4 QUALITY ASSURANCE

- A. Arborist Qualifications: Engage a qualified certified arborist who has successfully completed tree protection and trimming, to perform the following work:
 - 1. Remove branches from trees that are to remain, if required.
 - 2. Recommend procedures to compensate for loss of roots and perform initial pruning of branches and stimulation of root growth where removed to accommodate new construction.

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3. Recommend procedures for excavation and grading work juxtaposed to established plants.
4. Perform tree repair work for damage incurred by new construction.
5. All pruning to conform to ISA Pruning Standards and National Arborist Association Class I-IV as specified.

1.5 PROJECT CONDITIONS

- A. Temporary Protections: Provide a minimum of 5'-0" height temporary fencing, barricades, or other suitable guards located outside drip-line (outer perimeter of branches) to protect trees and other plants that are to remain from damage.
- B. Protect root systems: Do not store construction materials, debris, or excavated material within drip line of trees to remain. Do not permit vehicles within drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems within drip line.

PART 2- PRODUCTS

2.1 MATERIALS

- A. Drainage Fill: Selected stone or gravel, graded to pass a 3-inch sieve and retained on a 1-inch sieve.
- B. New Topsoil: Fertile, friable, surface soil, containing natural loam. Obtain from local sources or from areas having similar characteristics to indigenous topsoil. Provide topsoil that is reasonably free of subsoil and clay lumps, and free of brush, weeds, roots, stones larger than 2 inches in any dimension and free of other extraneous or toxic matter harmful to plant growth. Obtain topsoil only from well-drained sites where soil occurs in depth of 4 inches or more; do not obtain from bogs or marshes. All top soil, prior to use, must be laboratory tested for horticulture suitability and such test must be approved by Architect prior to placement.

PART 3- EXECUTION

3.1 GENERAL

- A. Protect tree root systems from damage due to noxious materials caused by run-off or spillage during mixing, placement, or storage of construction materials. Protect root systems from flooding, eroding, or excessive wetting resulting from dewatering operations.
- B. Do not allow fires under or adjacent to trees or other plants that are to remain.
- C. Branches may be removed for construction purposes only upon approval of the Architect or Arborist and subject to local governing agency ordinances.

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1. Where directed by Architect/Arborist, extend pruning operation to restore natural shape of entire tree.
2. Cut branches and roots, if required, with sharp pruning instruments; do not break or chop.

3.2 EXCAVATION AROUND TREES

- A. Excavate within proximity of trees only where indicated. Do not machine excavate within drip line.
- B. Where excavating for new construction is required within drip line of trees, hand excavate to minimize damage to root systems. Provide sheeting at excavations if required. Use narrow-tine spading forks and comb soil to expose roots.
 1. Relocate roots in backfill areas wherever possible. If large, main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches back from new construction.
- C. Do not allow exposed roots to dry out before permanent backfill is placed; provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in moist condition and temporarily support and protect from damage until permanently relocated and covered with earth.
- D. Where trenching for utilities is required within drip line, tunnel under or around roots by hand digging. Do not cut main lateral roots or tap roots; cut only smaller roots that interfere with installation of new work. Cut roots cleanly with sharp, appropriate pruning instruments; do not break or chop roots.
- E. Prune branches to balance loss to root system caused by damage or cutting of root system as directed by Architect/Arborist.

3.3 GRADING AND FILLING AROUND TREES

- A. Maintain existing grade within drip line of trees.
- B. Lowering Grades: Where existing grade is to be lowered around a specimen tree, gradually slope grade away from the tree as recommended by the Arborist. Do not reduce the grade within the tree drip line. Consult Architect/Arborist for appropriate plans on grade cuts exceeding 12" which may require details as to drains, special backfill mixes and retaining walls.
 1. Branch pruning may be required to stimulate root growth and to compensate for loss of roots. All pruning only shall be accomplished per written recommendations from Arborist and will conform to established pruning standard practices. Arborist to provide Owner typed instructions for recommended long-term maintenance procedures to be followed after completion of construction operations.

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- C. Raising Grades: Where existing grade is to be raised 6" or more within the tree root zone, the Architect/Arborist shall be consulted to provide appropriate remedial plans to accommodate this grade change. Such plans may address perforated pipe bents, drain lines, grates and retaining walls as may be required.
 - 1. No soil fill will be allowed to cover over existing tree root zone grade. No soil shall be placed as to cover the tree trunk root flare.

3.4 REPAIR AND REPLACEMENT OF TREES

- A. Repair trees damaged by construction operations. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged trees.
- B. Remove and replace dead and damaged trees that arborist determines to be incapable of restoration to normal growth pattern.
- C. Provide new trees of same size and species as those being replaced. Plant and maintain as specified under Section "Trees and Shrubs."
- D. If trees over 6 inches in caliper measurement (taken 12 inches above grade) are required to be replaced, provide new trees of 6-inch caliper size and of species selected by the Architect.

3.5 DISPOSAL

- A. Burning on Owner's property of removed trees and branches is not permitted on site.
- B. Removal from Owner's Property: Remove excess excavation, displaced trees, and trimmings and dispose of in a legal manner off Owner's property.

END OF SECTION