PROJECT MANUAL

LOWELL JOINT SCHOOL DISTRICT

MEADOW GREEN ELEMENTARY SCHOOL
SLOPED BANK RESTORATION

12025 Grovedale Drive
Whittier, CA 90604

MARCH 14, 2023

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DOCUMENT 00 01 07 - SEALS PAGE

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SECTION 01 10 00 - CONSTRUCTION DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. The General Conditions and Division 1 are a part of this Section and the Contract for this Work and apply to this Section as if repeated fully herein.

B. The Construction Documents include the Drawings and the Technical Specifications (including addenda, change orders, and other modifications), which are part of the Project Manual. Together with the other documents contained in the Project Manual they comprise the Contract Documents as described in the General Conditions. The Construction Documents describe the form and extent as well as the materials, products and equipment which are to be incorporated into the Work.

1.2 JURISDICTION

A. No trade jurisdictional allocation of this work is intended by the subdivision of the Construction Documents. It shall be the Contractor's sole responsibility to subdivide the Work in the manner he deems necessary. In that regard, it shall be the Contractor's responsibility to insure that all apportioned work be coordinated so as to provide complete working systems where such systems are composed of two or more components of work.

1.3 COMPLIMENTARY

A. The Drawings and Technical Specifications are complimentary and what is called for by one is called for by all. Generally, the Drawings show the composition of the various components and the Technical Specifications describe the nature and methods of incorporation of the various components. All aspects of the construction are not necessarily identified in both the Drawings and Technical Specifications. However, what is required by one is required by both. In cases of conflicting information, the Contractor is to provide the more costly option. In cases of conflicting information of equal value, Technical Specifications supersede the Drawings, Details supersede Notes and performance requirements supersede product model specifications. All cases of conflicting information shall be brought to the attention of the Architect.

1.4 USE OF MATERIALS, PRODUCTS AND EQUIPMENT

A. It is intended that all materials, products and equipment be used in the manner intended by the manufacturer. In the absence of instructions to be contrary, and where readily identifiable, the manufacturer's or his trade associations specifications and/or directions are hereby incorporated by reference. In the absence of specific manufacturer's instructions the trade associations general specifications or standards shall apply including any and all ASTM or ANSI performance and installation standards for the material, product or equipment.

1.5 INTENT OF THE DOCUMENTS

A. It is the intent of these Construction Documents to include all items and components for the proper execution of the Work, and the provisions of a complete and functional facility. In that regard all appurtenant and accessory items and components required for construction of complete and functional systems within the construction shall be provided whether specifically identified in these Construction Documents or not.

1.6 KEYNOTING

A. A keynoting system is used on the drawings for material references and notes. Refer to the Keynote Legend on the drawing for the information which relates to each keynote symbol on the respective drawing. Where provided within the drawings, keynotes reference specification sections by means of a five-digit number identifying the section where a more complete description of the item will be found. The letter suffix of the keynote is a sequential differentiation and does not relate to any corresponding reference letter in the specification. Keynotes do not describe construction means, methods, techniques, sequences, or procedures. No trade jurisdictional allocation of this work is intended by the subdivision of these keynotes. It shall be the Contractor's sole responsibility to subdivide the work in the manner he deems necessary.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PERFORMANCE BY THE CONTRACTOR

A. Performance by the Contractor shall be required only to the extent consistent with the Construction Documents and reasonably inferable form them as being necessary to produce the intended results.

B. "Reasonably inferable" is defined as a degree of interpretation of the documents which will provide, at the Contractor's expense, complete working systems within the parameters of the following examples, but not limited to these examples:

1. Where light fixtures or electrical appliances and equipment are indicated, it is reasonably inferable that power and circuiting be provided.
2. Where plumbing fixtures are indicated, it is reasonably inferable that waste and vent be provided and supply and or return lines.
3. Where HVAC equipment is indicated, it is reasonably inferable that structural support, power and condensate piping be provided.
4. Where casework is indicated, it is reasonably inferable that anchorage or support be provided.
5. Where waterproofing systems are indicated, it is reasonably inferable that bond breakers, protective boards, backer rods, sealants and flashing be provided.
6. Where items of work are indicated which are not prefinished it is reasonably inferable that shop or field finish is required. Finish shall be to the standard of quality specified for similar materials.

C. In providing complete working systems, in the absence of complete information, the Contractor shall be required to provide components to a standard of quality consistent with similar work specified. In the

absence of such standard, he shall be entitled to provide such items at the lease cost to him consistent with industry standards.

END OF SECTION 01 10 00

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SECTION 01 20 00 - PROJECT MEETINGS

GENERAL

1.1 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements for Project meetings, including but not limited to, the following:

1. Job start meeting.
2. Pre-installation conferences.
3. Progress meetings.
4. Meetings as required by the Owner and/or Owner's Representative.

1.2 RELATED SECTIONS

A. Section 01 30 00: Submittals

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION CONFERENCE

A. The Pre-construction conference shall take place no more than 10 days after the Notice of Award in accordance with General Condition, Owner's Representative will schedule a job start meeting before starting the Work, at a time and date determined by Owner's Representative. Meeting shall be held at the Project site or another location as determined by Owner's Representative. Meeting will be held in order to review responsibilities, procedures, and other administrative requirements contained within the Contract Documents.

B. Owner, Owner's Representative, Contractor, all major subcontractors and other interested parties shall attend the meeting. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda items shall include significant items which could affect progress of the Work, including, but not limited to the following:

1. Introduction and Identification of Owner's Representative, IOR, Owner's consultants, Contractor, Contractor's major subcontractors.
2. Construction schedule and updating frequency (establish schedule for progress meetings)
3. Critical work sequencing
4. Designation of responsible personnel: persons authorized to represent and sign documents for the Owner, Owner's Representative, Contractor, and major subcontractors, with examples of official signature of each. (list names, addresses and telephone numbers of those persons authorized to act for the Contractor in emergencies, include a 24 hour cell or phone number)
5. Modification Procedures and forms (i.e. RFI, Bulletins, etc.)

6. Contractor reports and frequency i.e. Daily site report, RFI log, Submittal log, Construction photograph log, etc.
7. Procedures and forms for processing Applications for Payment, including handling of retention, on site stored material payments, withholding payments, rejection of and/or modification of payment request, etc.
8. Owner supplied Contractor installed materials.
9. Testing and Inspections, Surveys and Layout.
10. Submittal schedules of Shop Drawings, Product Data, Material Lists, Samples. Etc.
11. Procedures and maintenance of project record documents.
12. Use of the Project site and/or premises: Contractors use of premises including location of office, construction and storage areas, equipment deliveries, parking availability and parking areas, and routes for construction traffic.
13. Owners site usage, school schedules, etc.
14. Safety and first aid procedures including designation of Contractors safety officer. Review safety program.
15. Security procedures
16. Housekeeping, project site clean up procedures
17. Normal working hours

Contract Compliance Officer

18. Environmental Health & Safety
19. Future Pre-installation meetings. (required for coordination of Work)

D. Owner's Representative shall prepare and issue meeting minutes to attendees and interested parties. Response and/or to meeting minutes due to Owner's Representative no later than two (2) calendar days after the meeting date.

3.2 PRE-INSTALLATION CONFERENCES

A. Contractor shall coordinate and conduct pre-installation conferences at the Project site as required by related Sections of the Contract Documents.

B. Contractor, manufacturers, and fabricators involved in or affected by the installation and its coordination or integration with other pre-ceding and/or subsequent installations of Work shall attend the meeting. Contractor shall advise IOR, and Architect of scheduled meeting dates in order to secure their attendance.

1. Contractor shall review the progress of construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:

a. Contract Documents
b. Options
c. Related Construction Directives and Change Orders
d. Purchases
e. Deliveries
f. Shop Drawings, Product Data, and quality-control samples
g. Review of mockups
h. Possible conflicts
i. Compatibility problems
j. Time schedules
k. Weather limitations
l. Manufacturer's recommendations

m. Warranty requirements
n. Compatibility of materials
o. Acceptability of substrates
p. Temporary facilities, barricades, utilities, sanitary facilities, signs and other temporary facility requirements.
q. Space and access limitations
r. Governing regulations
s. Safety
t. Inspecting and testing requirements
u. Required performance results
v. Recording requirements
w. Protection

C. Contractor shall record significant discussions and directives received from each conference. Contractor shall, within three (3) calendar days after the meeting date, distribute the minutes of the meeting to all concerned parties, including but not limited to, Owner's Representative, IOR, and Architect.

3.3 PROGRESS MEETINGS

A. Progress meetings will be held at the Project site at regular weekly intervals, or as determined by the Owner's Representative and/or Owner.

B. In addition to representatives of Contractor, Owner, IOR, Architect, each Subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of the Work shall, if requested by Owner's Representative, be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude all matters relating to the Work.

C. Failure of the Contractor to be so represented at any progress meeting which is held at a mutually agreed time or for which a written notice is given, shall not relieve Contractor from abiding by any and all Owner, Owner's Representative determinations or directives issued at such meeting.

D. Owner's Representative will review and correct or approve minutes of the previous progress meeting and will review other significant items affecting progress. Topics for discussion as appropriate to the status of the Project include but are not limited to:

1. Interface requirements
2. Construction Schedule
3. Sequence and coordination
4. Status of submittals / RFI's
5. Deliveries
6. Off-site fabrication
7. Access
8. Site utilization
9. Temporary Construction Facilities and Controls
10. Hours of work
11. Hazards and risks
12. Housekeeping
13. Quality and workmanship
14. Unforeseen conditions
15. Testing and Inspection

16. defective Work
17. Construction Directive
18. Request for Proposal
19. Change Order Proposals and Change Orders
20. Documentation of information for payment requests
21. Application for Payment
22. Other items as required or as brought forth.

E. No later than five (5) calendar days after each progress meeting, Owner's Representative will prepare and distribute minutes of the meeting to each present and absent party. Include a brief summary, in narrative form, of progress, decisions, directives, actions taken, and all other issues since the previous meeting and report.

3.4 ADDITIONAL MEETINGS

A. Owner's Representative, upon giving notice to the intended parties and without further obligation, may require additional meetings to discuss Work and/or Project related activities.

END OF SECTION 01 20 00

SECTION 01 30 00 - SUBMITTALS

GENERAL

1.1 SECTION INCLUDES

A. Procedures for submitting to the Architect/Engineer, schedules, shop drawings, product data, samples, material lists, manuals, warranties and certificates, etc., required by individual Specification Section and procedures for submitting finish hardware schedule and segregation of contract costs to the District.

B. Wherever possible, throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined by the name and catalog number of a manufacturer and by reference of recognized industry standards.

C. To ensure that specified products are furnished and installed in accordance with the design intent, procedures have been established for advance submittal of design data and for its review by the Architect.

1.2 RELATED SECTIONS

A. The General Conditions and Division 1 are part of this Section and the Contract for this Work and apply to this Section as if repeated fully herein.

B. Section 01 70 00: Contract Closeout.

C. Other Sections requiring submittals.

1.3 PROCEDURES

A. Contractor shall secure and submit Shop drawings, manufacturer's catalogs, samples, warranties, operating and instruction manuals, etc. to the Architect/Engineer for review and approval.

B. After the Architect has date-stamped, signed and reviewed submittals, with corrections noted, if any, the Architect will transmit submittals to Contractor.

1.4 SUBMITTALS

A. Approval of Submittals: Contractor shall clearly identify any deviations from the Contract Drawings and Specifications on submittals. Prior approval of any deviation by the District Architect/Engineer or his representative is required. Any deviation without said prior approval, even though stamped approved, is not acceptable.

1. Approval stamp is for design and quality only. No deviations. No quantities.

B. Deliver submittals to the Owner’s Representative. Identify project name and address, telephone number of Contractor, subcontractor and supplier. Identify, as appropriate, pertinent drawing sheets,

detail numbers and Specification Section numbers. Clearly identify any deviations from Contract Documents.

C. Make submittals in accordance with the approved Construction Schedule, and approved Shop Drawing Submission Schedule, in sequence that avoids delaying work and progress of other Contractors.

D. CONTRACTOR SHALL THOROUGHLY REVIEW SUBMITTALS PRIOR TO SUBMISSION TO THE ARCHITECT/ ENGINEER.

E. Timing of Submittals:

1. In accordance with General Conditions, Contractor shall submit to Owner's Representative those Shop Drawings, Product Data, diagrams, materials lists, Samples and other submittals required by the Contract Documents.
2. The Contractor shall submit within ten (10) Days of the Award of Contract, a itemized listing of required submittals with a scheduled date for each submittal. The schedule of submittals shall provide adequate time between submittals in order to allow for proper review without negative impact to the Construction Schedule.
3. Schedule of submittals shall be related to Work progress, and shall be so organized as to allow sufficient time for transmitting, reviewing, corrections, resubmission, and re-reviewing.
4. Contractor shall coordinate submittal of related items and Owner's Representative reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received by Owner's Representative.
5. Contractor shall revise, update and submit submittal schedule to Owner's Representative on the first of each month, or as required by Owner's Representative.
6. Contractor shall allow in the Construction Schedule, at least sixteen (16) days for Owner's Representative review following Owner's Representative receipt of submittal. For mechanical, plumbing, electrical, and other submittals requiring joint review with CMR, and/or others Contractor shall allow a minimum of eighteen (18) days following Owner's Representative receipt of submittal.
7. No adjustments to the Contract Time and/or Milestones will be authorized because of a failure to transmit submittals to Owner's Representative sufficiently in advance of the Work to permit review and processing.

F. In case of product substitution, Shop Drawing preparation shall not commence until such time Owner's Representative reviews said submittal relative to the General Conditions. Each submittal shall be accompanied by a letter of transmittal containing a complete itemized and numbered list of submitted materials. Separate letters of transmittal shall accompany each submittal from different subcontractors.

G. Resubmission: If requested, resubmit submittals in a timely manner. Resubmit as specified for initial submittal but identify as such. Indicate any changes which have been made other than those requested by the Architect.

1.5 SHOP DRAWINGS

A. Shop Drawings are original drawings prepared by Contractor, subcontractor, supplier, or distributor which illustrate some portion of work by showing fabrication, layout, setting, or erection details.

B. Draw shop drawings to an accurate scale that is large enough to indicate all pertinent features and methods.

C. Copies Required and Distribution: Unless otherwise indicated in individual specification sections, submit 6 sets of blueline prints.

1.6 PRODUCT DATA

A. Manufacturer's Standard Schematic Drawings:

1. Delete information which is not applicable to Project.
2. Supplement standard Drawings to provide additional information applicable to Project.

B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data:

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

C. Copies Required and Distribution: Submit 6 copies.

1.7 SAMPLES

A. Samples:

1. Submit samples of sufficient size and quantity to clearly illustrate:

   a. Functional characteristics of product or material, with integral parts and attachment devices.
   b. Full range of colors, textures, and patterns.

2. Provide permanent identification for each sample.
3. Color and Pattern: Whenever a choice of color or pattern is available in a specified product, submit accurate color chips and pattern charts to the Architect/Engineer for review and selection.
4. Number Required: Submit 3 of each.

B. Field Samples: When specified, erect field samples and mock-ups at project site to illustrate materials, equipment, or workmanship and to establish standards by which completed work shall be judged.

C. After return of office samples or review of field samples, these items may be used in construction of project with approval of the Architect/Engineer.

1.8 MANUALS

A. Where Manuals are required to be submitted covering items included in Work, prepare Manuals in durable binders, approximately 8-1/2" by 11" in size, and provide following information:

1. Identification on, or readable through, front cover stating general nature of manual.
2. Neatly typewritten index at front of Manual, furnishing immediate information as to location in Manual of data or equipment involved.
3. Complete instructions regarding operation and maintenance of equipment involved.
4. Complete nomenclature of replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.
5. Copy of all Guarantees and Warranties issued.
6. Copy of approved Shop Drawings with data concerning changes made during construction.

B. Extraneous Data: Where contents of Manuals include manufacturers' catalog pages, clearly indicate precise items included in this installation and delete, or otherwise clearly indicate, manufacturers' data which is not part of this installation.

C. Number of Copies Required: Deliver 6 copies to the Architect/Engineer for review, approval and distribution. The Architect/Engineer will return 3 copies to Contractor.

1.9 CERTIFICATES

A. Submit in triplicate, in accordance with requirements of each Specification Section.

1.10 COLOR SCHEDULES

A. The District shall review and approve color schedules prepared by the Architect/Engineer and distribute the approved schedules to Contractor.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION 01 30 00

SECTION 01 40 50 - TESTING AND INSPECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Testing and inspection services to meet requirements of the California Building Code (CBC), Title 24, Parts 1 and 2, as indicated on the Drawings.

C. Tests of materials are required by a DSA certified testing AGENCY as set forth in Section 4-335 of the California Building Standards Administrative Code.

1.02 RELATED SECTIONS

Provisions of the General Conditions, Supplemental Conditions and Division 01 apply to this Specification. Specifications that are referenced or related may include:

A. Section 01 04 50: Cutting and Patching

B. Section 01 10 00: Construction Documents

C. Section 01 30 00: Submittals

D. Section 01 50 00: Construction Facilities and Temporary Controls

E. Section 01 70 00: Contract Closeout

F. Section 01 74 00: Warranties and Guarantees

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 TESTS

A. OWNER will select and provide an independent DSA approved certified testing agency (AGENCY) to conduct tests, sampling, and testing of materials. AGENCY shall have DSA Laboratory Evaluation and Acceptance (LEA) Program acceptance. Selection of material to be tested shall be by the AGENCY and not by CONTRACTOR. Lab to be approved by Architect of record/Structural Engineer (where applicable) DSA.

B. Any material shipped from the source of supply prior to having satisfactorily passed such testing and inspection, or prior to the receipt of notice from IOR such testing and inspection is not required, shall not be incorporated into the Work.

C. OWNER will select, and directly reimburse, the AGENCY for costs of all DSA required tests and inspections; however, the OWNER may be reimbursed by CONTRACTOR for such costs for re-testing of deficient Work.

D. The independent testing AGENCY is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.

E. The AGENCY shall not perform any duties of CONTRACTOR.

F. CONTRACTOR shall provide an insulated curing box with the capacity for twenty (20) concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.

3.02 TEST REPORTS

A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations, when and as required, shall also be reported. Reports shall indicate the material (or materials) was sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Drawings. Test reports shall indicate specified design strength and specifically state whether or not the material (or materials) tested comply with the specified requirements.

3.03 VERIFICATION OF TEST REPORTS

A. Each testing AGENCY shall submit to the Division of the State Architect, in duplicate, a verified report covering all tests required to be performed by that AGENCY during the progress of the Work. Such report, covering all required tests, shall be furnished prior to Substantial Completion and/or, when construction on the Work is suspended, covering all tests up to the time of Work suspension.

3.04 INSPECTION BY OWNER

A. OWNER, and its representatives, shall have access, for purposes of inspection, at all times to all parts of the Work and to all shops wherein the Work is in preparation. CONTRACTOR shall, at all times, maintain proper facilities and provide safe access for such inspection.

B. OWNER, and its representatives, shall have the right to reject materials and/or workmanship deemed defective Work and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of without charge to OWNER. If CONTRACTOR does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, OWNER may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.

C. CONTRACTOR is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

3.05 INSPECTOR OF RECORD

A. An Inspector of Record (IOR) shall be employed by OWNER, and approved by ARCHITECT, STRUCTURAL ENGINEER and DSA in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein. Additional DSA certified inspectors may be employed and assigned to the Work by OWNER in accordance with the requirements of California Building Standards Administrative Code with their duties as specifically defined in Section 4-333(b).

B. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill all terms and conditions of the Contract Documents.

C. CONTRACTOR shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

3.06 TESTS AND INSPECTIONS

The following tests and inspections do not limit inspection of the Work but are required by DSA, other agencies, or are required in related Sections of the Contract Documents.

1. Concrete - CBC, Chapter 19A:

   a. Materials:

      1) Test of Materials: 1705A.3, ACI 318-14 Sections 26.12 & 26.13
      2) Portland Cement Tests: ACI 318, ASTM C 150.
      3) Concrete Aggregate: 1903A.5, ACI 318 Section 26.4.1.2, ASTM C 33.
      4) Reinforcing Bars: 1910A.2, ACI 318-14 Section 26.6.1.2
      5) Mix Designs: Table 1705A.3 Item 5, 1910A.1
      6) Admixtures: 1903A.6 ACI 318 Section 26.4.2.2 (b) and Table 26.4.2.2 (b)

   b. Quality:

      1) Proportions of Concrete: 1910A.1
      2) Mixing and Placing: Table 1705A.3 Item 5, 1910A.1
      3) Concrete Testing: 1905A.1.16, ACI 318-14 Section 26.12

   c. Inspection:

      1) Project Site Inspection: 1905A.7, 1705A.3.5
      2) Batch Plant: 1705A.3.3
      3) Weigh-Master Inspection: 1705A.3.3.1
      4) Reinforcing Bar Welding Inspection: 1705A.3.1 1903A.4.

2. Steel - CBC, Chapters 17A and 22A:

   a. Materials:

      1) Structural Steel: 2205A.1.
      2) Material Identification: 2203.A.1.

   b. Inspection and Tests:

      1) Test of Structural Steel: 1705A.2.
      2) Shop Fabrication Inspection: 1704A.2.5.
      3) Welding Inspection: 1705A.2.5.

3. Masonry - CBC, Chapter 21A:

   a. Materials:

      1) Masonry Units: 2103A.1.
      2) Mortar & Grout Aggregates: 2103A.3.1.
      3) Reinforcing Bars: 2103A.4.

b. Quality:

1) Portland Cement Tests: 2105A.2.
2) Mortar & Grout Tests: 2105A.3.
3) Masonry Core Tests: 2105.2
4) Reinforcing Bars: 2103A.4
5) Masonry Prism Tests: 2105A.2

c. Inspection:

1) Reinforced Masonry: 1705A.4.
2) Reinforcing Bar Welding: 1705A.3.1

END OF SECTION 01 40 50

SECTION 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description of temporary utilities and protection of construction facilities which are to be provided and maintained by Contractor.

1.2 RELATED SECTIONS

A. General Conditions

1.3 TEMPORARY UTILITIES

A. Water:

1. Water used on work will be furnished and paid for by the Contractor. Contractor shall provide necessary temporary piping and temporary water meters from distribution point to points on site where water is necessary to carry on work, and upon completion of work shall remove temporary piping.
2. Provide suitable drainage system, subject to approval of the District Inspector, to carry construction waste water from site to an approved disposal location.

B. Electricity:

1. The Contractor will furnish and pay for electrical power necessary for construction purposes at site. The Contractor shall meter and pay for electrical utilities that are from sources installed temporarily for the project. Contractor shall provide necessary temporary wiring and lighting and shall remove all temporary wiring and lighting at the completion of the Work. Temporary wiring and lighting shall comply with requirements of the National Electrical Code. Contractor shall be responsible for all damage caused by overloading or other causes and the installation shall be satisfactory to the District Inspector.
2. Furnish and install area distribution boxes, so located that individual trades may use 100'-0" maximum length extension cords to obtain adequate power and artificial lighting, at points where required for work, for inspection and for safety.
3. Provide electricity needed for construction including connections for construction equipment requiring power.

C. Gas: Contractor shall provide and install gas equipment, gas meters and piping necessary to perform his work, and shall remove same upon completion of work. District shall pay for only the gas used in work which is drawn from existing meter sources..

D. Heating and Ventilation:

1. Provide, maintain, and pay for temporary heat sources needed for proper installation of work and to protect materials and finishes from damage due to weather.
2. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulation of dust, fumes, or gases.

E. Temporary Telephone: Contractor shall provide and pay all costs for all cellular telephones, business telephones, telephone, fax and data telephone lines at site for his use. Use of school telephones will not be permitted. The Contractor shall provide and pay all costs for two (2) telephone lines (1 voice, 1 fax) for the District Inspector.

F. Use means necessary to maintain temporary facilities and controls in proper and safe condition throughout progress of work.

G. Make required connections to existing utility systems with minimum disruption to services in existing utility systems. When disruption of existing service is required, do not proceed without the District Inspector's approval and, when required, provide alternate temporary service.

1.4 CONTRACTOR'S FACILITIES

A. Temporary Offices:

1. Contractor shall provide and maintain a trailer(s) on site for duration of project.

    a. Trailer(s) shall have ample headroom; shall be properly lighted, heated and ventilated. Contractor shall provide an electric drinking fountain or bottled water.

2. Trailer(s), equipment and furniture shall remain Contractor's property. Contractor shall remove such property upon completion of work.

3. District's Inspector: The Contractor shall provide on site at the Contractor's sole expense, a temporary office structure of no less than 200 square feet and the said structure shall be utilized by the Inspector and Inspector shall be separate from space utilized by Contractor or construction personnel. All equipment and furnishings described herein shall remain the property of the Contractor and be maintained in good working order by the Contractor. Office is to be located as approved by the District Inspector and to be adequately maintained in fully operational condition until final acceptance of the project by the Board of Education. This office shall be of substantial waterproof construction with adequate natural light and ventilation. The door shall have a key-type lock and a deadbolt key lock. Equipment shall be as follows:

    a. One office desk, a table satisfactory for the study of plans, one chair on wheels with arms, and two standard chairs, a lockable one 2-drawer filing cabinet with key, one plan rack and one large bookshelf.
    b. Two private telephone lines, adequate electric lights, a plain paper facsimile machine and it’s supplies for the exclusive use of the District, and adequate air conditioning and heat for this office.
    c. An electric water cooler shall be provided in the Inspector’s trailer for drinking water.

B. Storage Units:

1. Provide secure and waterproof storage units where required for the temporary storage of furniture, equipment and other items.
2. Storage Unit Construction: Walls, roof and doors minimum 16 gage steel; floors 1" tongue and groove hardwood or 3/4" minimum exterior type plywood, with undercarriage designed to accommodate forklift blades 42" to 60" long; doors at one end of storage unit, double wide swing out with waterproof gaskets and lockable steel locking bars.
3. Pay all charges and set the storage unit where directed by the District Inspector.
4. Remove storage unit from the site after removal of all the items that were temporarily stored and when directed by the District Inspector.

C. Sanitary Facilities:

1. Contractor shall provide temporary toilet facilities including which may consist of portable chemical toilets. Number of toilets shall be provided according to Cal OSHA requirement. Handwash facilities shall be provided according to Cal OSHA requirements.
2. Toilet facilities shall be kept supplied with toilet paper and kept in a clean and sanitary condition until completion of work, and then be removed from work site. Upon removal, that portion of site shall be properly cleaned and graded.

D. Contractor's Security Barricade:

1. Contractor shall erect temporary security barricade as required for safety and as specified. New or used material may be used.
2. Unless otherwise indicated or specified, barricade shall be constructed of 6'-0" high chain link fencing. Space posts not to exceed 10'-0" on centers. Posts shall be of following nominal pipe dimensions: terminal, corner, and gate posts 2-1/2", line posts 2". Chain link mesh shall be not less than #13 gage, 2" mesh, and in one width. Posts, mesh and accessories shall be galvanized. Contractor shall provide a durable green fabric screening in one width at all temporary security barricades.

    a. Mesh shall be attached to posts with #14 gage tie wire at 16" centers. A #6 gage steel tension wire with turnbuckles shall be installed at top and bottom of barricade fencing. Wire tie mesh to tension wires at 18" centers.
    b. Fabric shall be attached to mesh at top and bottom with wire ties at 2’0” centers.

3. Chain link fencing shall be free from barbs, icicles or other projections resulting from galvanizing process. Fence mesh and fabric having such defects will be rejected even though it has been erected.
4. Gates shall be fabricated of steel pipe with welded corners, and bracing as required. Mesh to be attached to frame at 12" centers. Provide all gate hardware of a strength and quality to perform satisfactorily until barricade is removed upon completion of work.
5. At completion of work, remove barricade and concrete post footings from site; backfill and compact fence footing holes. Existing surface paving that is cut into or removed shall be patched and sealed to match surrounding areas.

E. Other Enclosures:

1. Provide lockable, temporary weather-tight enclosures at openings in exterior walls to create acceptable working conditions, to allow for temporary heating and for security.

2. Provide protective barriers around trees, plants and other improvements designated to remain.

F. Storage Yards and Sheds:

1. Contractor shall fence and maintain storage yards in an orderly manner.
2. Storage for materials that cannot be stored outside may be stored within building.
3. Exact location, size and access of storage yards shall be approved by District Inspector.
4. Remove storage yards and sheds as rapidly as progress of work will permit.

G. Contractor's Parking: Contractor is responsible for parking offsite at his expense and in locations acceptable to the District and local governing authorities.

1.5 GENERAL ITEMS

A. Staging areas for delivery of materials and equipment will be at locations designated by the Project Manager.

B. Safety and Security Lighting: Provide the foot candles minimum inside building(s) and the foot candles outside that comply with Cal OSHA requirements..

C. Noise Control: Contractor shall comply with all noise ordinances of the local authorities. Additionally the Contractor shall provide suspend all operations during District testing of students, two (2) separate days anticipated.

1.6 TRENCHES

A. Open trenches for installation of utility lines (water, gas, electrical and similar utilities) and open pits outside barricaded working areas shall be barricaded at all times. Barricades, such as traffic safety type saw horses or post should be used. High visibility orange netting shall be strung between horses or posts. Trenches shall be backfilled and patch-paved within 72 hours after approval of installation by the District Inspector, or shall have "walk plates" installed.

B. Open trenches deeper than 3'-0", and not located within a public street access, shall be enclosed within an 6'-0" high chain-link fence.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION 01 50 00

PART 1 - SECTION 01 63 00 - SUBSTITUTIONS

PART 2 - GENERAL

2.1 SUMMARY

A. Section Includes: Procedures for submittal of requests for substitution for materials.

B. Related Documents: General Conditions and Division 1 are a part of this Section and the Contract for this Work and apply to this Section as if repeated fully herein.

2.2 GENERAL REQUIREMENTS

A. Submit a written request for proposed substitutions to the District's Representative according to the General Conditions.

B. Where materials or items of manufacturer are specified in groups and are made or furnished by one manufacturer, no substitution will be considered that is not made or furnished similarly by one manufacturer. Where the Contractor proposes to use a system of equipment other than that specified or detailed on the Drawings the substitution shall be proposed as a complete system.

2.3 REQUIREMENTS FOR SUBMITTING SUBSTITUTIONS:

A. Changes to approved drawings and specifications shall be made by Addenda or Construction Change Document (CCD) and approved by the Division of the State Architect as required by CCR, Title 24, Part 1, Section 4-338 (C), IRA-6. Prior to fabrication and installation.

1. Construction Change Documents must be signed by all of the following:

    a. Architect of Record
    b. Structural Engineer (where applicable)
    c. Designated Design Professional (where applicable)
    d. DSA

B. Submit written request for each proposed substitution on form shown at the end of this Section. Provide data substantiating request as well as a "Certificate of Suitability" certifying that the proposed substitution is equal or better in all respects to that specified and that it will, in all respects perform the function for which it is intended. Include with request all required samples. Submit 3 copies of all written requests and data for proposed substitutions.

C. Submit complete information to the Owner's Representative so that proper evaluation can be made. The burden of proof of equality of the substituted item shall be on the Contractor. Acceptance of such substitutions is entirely at the discretion of the Owner's Representative and District. All materials or items of manufacturer, which the Contractor proposes to substitute for those specified, must be accepted by the Owner's Representative before they may be ordered.

D. The Owner's Representative will issue to the Contractor a list setting forth those items for which substitutions are accepted. No substitution will be accepted for any materials or item of manufacture called for in the Contract Documents which is not of equal quality and utility and which does not possess equal design or color characteristics to those of the specified material or item.

E. If, in the opinion of the Owner's Representative or District, the proposed substitution is not equal or better in every respect to that so indicated or specified, or was not submitted for acceptance in the manner outlined above, the Contractor shall furnish the specified materials.

F. It shall be the responsibility of the Contractor, in proposing a substitution for any item herein specified, to inform all other trades, vendors, and subcontractors of effects said substitution will have upon their construction activities or products. Failure to so notify shall require that the Contractor make all payments arising from alterations in specified materials or methods necessary to complete the Work in an approved and acceptable manner.

PART 3 - PRODUCTS (Not Applicable)

PART 4 - EXECUTION (Not Applicable)

END OF SECTION 01 63 00

SUBSTITUTION REQUEST FORM

Re:

Project Name

Project Manual Section Number

Item

To:

Owner's Representative

From:

General Contractor

We hereby submit for your consideration the following product comparisons of the specified item and the proposed substitution:

A.	Comparison	Specified Item	Substitution
1.	Product Name/Model	_____	
2.	Manufacturer	_____	
	Address	_____	
	Phone Number	_____	
3.	Product Cost	_____	
	Installation/Labor Cost	_____	
4.	Delivery Time	_____	
	Installation Time	_____	
5.	Product Characteristics	_____	
		_____	
		_____	
		_____	
6.	Dimensions	_____	
	Effects	_____	
		_____	

7. Guarantee/Warranty _____

_____

8. ICC-ES No. _____

9. UL Rating _____

B. Substantiating Data:

Attach manufacturer's literature for both specified item and substitution.

C. Samples:

Provide samples for both specified item and substitution, if applicable.

D. Similar Projects

1. _____
Name Date

Address

2. _____
Name Date

Address

E. What Effect does this substitution have on applicable code requirements?

F. Change Data:

Attach complete information as to whether the proposed substitution:

1) Is equal in quality/service/ability to the Specified Item;
2) Will entail no changes in detail, construction, and scheduling of related work;
3) Will be acceptable in consideration of the required design and artistic effect;
4) Will provide no cost disadvantage to the District;
5) Will require no excessive or more expensive maintenance, including adequacy and availability of replacement parts; and
6) Will require no change of the construction schedule.

Submitted by:

_____
Signature Name

Title

_____

Firm Date

Address

Signature must be by persons having authority to legally bind his firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

* * * * * * *

For Use by Owner's Representative:

_____ Accepted _____ Not Accepted

Owner's Consultant:

By:

Date:

_____ Accepted _____ Not Accepted

School District:

By:

Date:

* * * * * * *

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SECTION 01 70 00 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for Contract Closeout, including but not limited to, the following:

1. Inspections.

B. Closeout requirements for specific Work activities are included in the appropriate Sections in Divisions 01 through 16.

1.2 RELATED SECTIONS

A. Section 01 30 00: Submittals

B. Section 01 40 50: Testing and Inspection

C. Section 01 50 00: Construction Facilities and Temporary Controls

D. Section 01 74 00: Warranties and Guarantees

E. Section 01 74 50: Cleaning

F. Section 01 75 00: Starting of Systems

G. Section 01 78 00: Operating and Maintenance Manuals

H. Section 01 78 50: Project Record Documents

1.3 REQUIREMENTS FOR PREPARATORY TO FINAL INSPECTION

A. Remove temporary facilities from the Project site.

B. Thoroughly clean the Buildings and Project site.

C. All plumbing and mechanical equipment shall operate quietly and free from vibrations. Properly adjust, repair, balance, or replace equipment producing objectionable noise or vibration in the occupied areas of the buildings. Provide additional brackets, bracing, or other methods to prevent objectionable noise or vibration. All systems shall operate without humming, surging, or rapid cycling.

D. Properly mount all operation instructions for equipment and post as specified in their respective Sections.

E. Job Record specifications and prints “as builts” shall be completed, signed, and submitted to the Owner’s Representative as specified in respective Specification Sections.

F. Submit to the Owner's Representative, the material and equipment maintenance instructions, as specified in the body of the Specification Sections.

G. Submit to the Owner's Representative, all warranties, guarantees, and bonds, as specified in the body of the Specification Sections.

H. When requested, submit certificates indicating payment of all debts and Claims arising from the Work.

I. Deliver all tools which are a permanent part of equipment installed in the Work to the Owner.

J. Deliver all keys, construction and permanent, properly identified, to the Owner.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 SUBSTANTIAL COMPLETION

A. Inspection Procedures: On receipt of a request for a certificate of Substantial Completion, Owner's Representative and/or Owner will either authorize commencement of inspection or advise Contractor of unfilled requirements. IOR, Owner's Representative, and/or Owner and Contractor will inspect the Work and Owner's Representative shall prepare a comprehensive punch list of items to be completed.

1. IOR will repeat inspection when requested by the Contractor and assure the Work is complete.
2. Results of the completed inspection will form a partial basis of the requirements for Final Completion.

B. Re-inspection Procedures: IOR, Contractor and Owner's Representative will inspect the Work upon notice the Work, including final inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to Owner's Representative.

1. Upon completion of inspection, OWNER'S REPRESENTATIVE will recommend Final Completion. If the Work is incomplete, OWNER'S REPRESENTATIVE will advise Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for Final Completion.
2. If necessary, re-inspection will be repeated, but may be assessed against Contractor if Owner is subject to additional professional service and or additional costs of inspection.

C. After all requirements preparatory to the final inspection have been completed as herein specified in the Specification Sections, the Contractor will notify the Owner's Representative and IOR to perform the final inspection.

END OF SECTION 01 70 00

SECTION 01 71 23 - FIELD ENGINEERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surveying requirements for the Work.

1.02 RELATED SECTIONS

A. Section 31 20 00: Earthwork

1.03 SURVEY SERVICE

A. Unless otherwise stated by the Architect or noted in the Special Provisions, the CONTRACTOR shall provide all surveying services.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 SUBMITTALS

A. CONTRACTOR shall submit the name and address of the State of California licensed surveyor to Construction Management Representative (CMR), ARCHITECT and OWNER including any changes as they may occur.

B. CONTRACTOR shall submit to OWNER copies of cut sheets, coordinate plots, data collector printouts, and other documentation as available to verify completeness and/or accuracy of field surveying work.

C. Statement of Compliance: CONTRACTOR shall submit a statement of certification signed and sealed by Surveyor, counter-signed by CONTRACTOR indicating compliance with grade elevations, slopes and tolerances.

3.02 LAYOUT OF THE WORK

A. CONTRACTOR shall employ a State of California licensed surveyor to lay out the entire Work, set grades, lines, levels, control points, vertical and horizontal control, elevations, grids and positions. Before the commencement of Work, surveyor shall, in conjunction with OWNER and Construction Management Representative (CMR) provided engineering survey of the Project site, locate all reference points and benchmarks, then lay out all lines, elevations, and measurements for the entire Work including but not limited to, buildings, grading, paving and utilities.

B. All work under this contract shall be built in accordance with the lines and grades shown on the plans. Field survey for establishing these, and for the control of construction, shall be the responsibility of the Contractor. All such survey work including construction staking shall be done under the supervision of a California Licensed Land Surveyor or authorized Civil Engineer. Staking shall be done on all items ordinarily requiring grade and alignment, at intervals normally accepted by the agencies and trade involved.

C. The CONTRACTOR shall be responsible for any errors in the finished work, and shall notify the Engineer, in writing, within 24 hours, of any discrepancies, or design errors during the construction staking.

D. Contractor shall immediately remediate any areas found not to meet specification requirements.

3.03 SURVEY REQUIREMENTS

A. Establish a minimum of two permanent horizontal and vertical control points on the Project site, remote from the work area, referenced to data established by the survey control points.

B. Indicate the reference points on the project record drawings with the basis of elevation being the established benchmarks.

C. Establish lines, grades, locations and dimensions by instrumentation. From time to time, verify the layout of all Work by the same methods.

D. Provide grade stakes and elevations to construct over excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.

E. Calculate and layout proposed finished elevations and intermediate control as required to provide smooth transitions between the spot elevations indicated in the Contract Documents.

F. Provide stakes and elevations for grading, fill, and topsoil placement.

G. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas, electric and signal and provide vertical control in proportion to the slope of the line as required for accurate construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or AC surfaces at key locations such as BC's, EC's, grade breaks, corners or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.

H. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.

I. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.

J. Submit a certification, signed by the surveyor, confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01'. Building pad tolerance will be +- 0.10'.

3.04 ESTABLISHMENT OF GRADES IN HARDSCAPE AREAS

A. All work shall conform to the lines, elevations, and grades shown on the Grading Plans. Three consecutive points set on the same slope shall be used together so that any variation from a

straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.

B. Areas having drainage gradients of 2 percent or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly-drawn string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.

C. Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10 foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.

D. Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.

3.05 RECORD DRAWINGS

A. Upon Substantial Completion, CONTRACTOR shall obtain and pay for reproducible transparencies of the as built survey drawings. Deliver to ARCHITECT, final “record” drawings of the original drawings and completed Work within specified tolerances.

B. Record drawings shall indicate locations by coordinate of all utilities onsite with top of pipe elevations at major grade and alignment changes, rim grate or top-of-curb and flow line elevations of all drainage structures and manholes.

C. Completed record drawing transparencies shall be signed and certified as correct and within specified tolerances by the licensed surveyor.

D. Attention is called to other sections of the Contract Documents requiring verification or measurements of installed Work by survey. Surveyor shall perform and certify all such surveys or verification are completed in accordance with the Contract Documents.

END OF SECTION 01 71 23

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SECTION 01 74 00 - WARRANTIES AND GUARANTEES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers and/or installer's standard warranties on products and special product warranties.

B. Refer to General Conditions for terms of the guarantee period for the Work.

1.2 RELATED SECTIONS

A. Section 01 04 50: Cutting and Patching

B. Section 01 30 00: Submittals

C. Section 01 70 00: Contract Closeout

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 WARRANTY REQUIREMENTS

A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties shall not relieve Contractor of the warranty of the Work incorporating such materials, products, and/or equipment. Manufacturer's disclaimers and limitations on warranties do not relieve suppliers, manufacturers, installers, and Subcontractors of the requirement to countersign special warranties with Contractor.

B. Standard warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to Owner.

C. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for Owner.

D. Related Damages and Losses: When correcting failed or defective warranted Work, remove and replace Work that has been damaged as a result of such failure or which must be removed and replaced to provide access for correction of warranted Work.

E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement with the reinstated warranty equal to the original warranty.

F. Replacement Cost: Upon determination the Work covered by a warranty has failed and/or is defective, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. Contractor is responsible for the cost of replacing or rebuilding defective

Work regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life.

G. Owner Recourse: Expressed warranties made to Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which Owner can enforce such other duties, obligations, rights, or remedies.

H. Rejection of Warranties: Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

I. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, Owner reserves the right to refuse to accept the Work until Contractor presents evidence the entities required to countersign such commitments have done so.

3.2 SUBMITTALS

A. Submit written warranties to Owner's Representative prior to Final Completion of the Work. If the certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, submit written warranties as set forth in the certificate of Substantial Completion.

B. When a designated portion of the Work is partially used and/or occupied by Owner, submit properly executed warranties to OWNER'S REPRESENTATIVE within fifteen (15) days of the Partial Use or Occupancy of the designated portion of the Work.

C. When the Contract Documents require Contractor (s), or Contractor and a Subcontractor, installer, supplier or manufacturer to execute a special warranty, prepare a written document containing appropriate terms and identification, ready for execution by the required parties. Submit a draft to Owner, through the Owner's Representative, for approval fifteen (15) days in advance prior to final execution.

D. Refer to Divisions 02 through 16 for specific content requirements and particular requirements for submitting special warranties.

E. Form of Submittal: Prior to Final Completion of the Work, compile two copies of each required warranty properly executed by Contractor, or by Contractor and Subcontractor, installer, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the Specifications.

F. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½ by 11" (115 by 280 mm) paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the item or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title and/or name, and name of Contractor.
3. When warranted Work requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION 01 74 00

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SECTION 01 74 50 - CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The CONTRACTOR shall be solely responsible for the cleaning of the Project site.

B. Keep premises, and adjacent private and public properties free from accumulation of waste, debris and rubbish caused by construction process.

C. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus material, and clean all exposed surfaces. Remove remaining mock-ups and samples.

D. Leave Project clean and ready for occupancy.

1.2 RELATED SECTIONS

A.	Section 01 50 00:	Construction Facilities and Temporary Control.
B.	Section 01 70 00:	Contract Closeout

1.3 SAFETY

A. The CONTRACTOR shall be solely responsible for cleaning safety.

B. Standards: Maintain Project in accord with Federal, State, Local safety regulations, ordinances, anti-pollution laws and insurance standards.

C. Hazard Control: Maintain Project in accord with Federal, State, Local safety regulations, ordinances, anti-pollution laws and insurance standards.

D. Conduct cleaning and disposal operations to comply with Federal, State, Local safety regulations, ordinances, and anti-pollution laws.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 DURING CONSTRUCTION

A. The CONTRACTOR is solely responsible for the cleaning of all public and private property.

B. Keep premises, and adjacent private and public properties free from accumulations of waste materials and rubbish. Remove debris and dirt from public property promptly; clean sidewalks and adjacent streets daily when soiled by work performed under this Contract.

C. As often as necessary, and/or as required the CONTRACTOR shall clean site and dispose of waste materials, debris, and rubbish off the site in a legal manner. Remove all combustible materials in a legal manner.

D. Provide on-site containers for collection of waste materials, debris, and rubbish. Provide a collection can at each location used as an eating area. Pick-up and dispose of all garbage daily.

E. Remove waste materials, debris, and rubbish from site and legally dispose of at legal public or private dumping areas or recycling center off OWNER'S property.

F. Do not allow debris and combustible materials to accumulate in voids, cavities, and plenums created by wall partition, and ceiling construction. These areas must be thoroughly cleaned out before being sealed or closed off by installation of finish materials.

G. Do not allow debris to clog drains. Keep roof drains, scuppers, floor drains and area drains clean and free of debris.

H. Vacuum clean interior areas when ready to be painted, installation of carpet, installation of floor tile, etc. Refer to Sections for other provisions on preparations of finish surfaces.

I. Handle materials in a controlled manner with as few handling as possible; do not drop or throw materials from heights.

J. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on newly finished surfaces.

K. Wet down materials and rubbish to lay dust and prevent it form blowing.

3.2 FINAL CLEANING

A. Complete cleaning operations before requesting inspection for a certificate of Substantial Completion.

B. Employ experienced workers, or professional cleaners, for all final cleaning.

C. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

D. Remove labels that are not permanent labels.

E. Clean transparent materials, including mirrors and glass in doors and windows. Remove misplaced glazing compound and other substances. Replace chipped or broken mirrors, glass and other damaged transparent materials.

F. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors, walkways, and the like broom clean. Vacuum carpeted surfaces.

G. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

H. Clean the site, including landscaped areas, of rubbish litter and other foreign substances.

1. Contaminated earth:

a. Final clean-up operation includes the removal and disposal of earth contaminated or unsuitable for support of plant life in planting areas, and filling of resulting excavations with suitable soil.

b. Contaminated areas include those used for disposal of waste concrete, mortar, plaster, masonry, and similar materials, areas in which washing out of concrete and plaster mixers or washing of tools and like cleaning operations have been performed, and areas that have been oiled, paved, or chemically-treated.

2. Sweep paved areas broom clean; remove stains, spills and other foreign deposits.

3. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

I. The CONTRACTOR is to keep Project clean until it is occupied by OWNER.

END OF SECTION 01 74 50

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SECTION 01 75 00 - STARTING OF SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Starting systems.

B. Demonstration and instructions.

1.2 RELATED SECTIONS

A. Section 01 10 00: Construction Documents

B. Section 01 40 50: Testing and Inspection

C. Section 01 70 00: Contract Close Out

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify OWNER'S REPRESENTATIVE, IOR and/or OWNER five (5) days prior to start-up of each item.

C. Verify that each piece of equipment of system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and/or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible manufacturer's representative and CONTRACTORS' personnel in compliance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.2 DEMONSTRATION

A. Demonstrate operation and maintenance of products to OWNER'S REPRESENTATIVE, OWNER, and/or others fifteen (15) days prior to date of final inspection.

B. Demonstrate Project equipment and instruct in a classroom environment located at the Project site and instructed by a qualified manufacturers' representative knowledgeable about the Project to OWNER'S REPRESENTATIVE, and OWNER.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with OWNER'S personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shut-down of each item of equipment at scheduled at designated location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. The amount of time required for instruction on each item of equipment and system is that specified in individual Sections.

END OF SECTION 01 75 00

SECTION 01 78 00 - OPERATING AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SUMMARY

A. Principal work in this Section:

1. Compilation of product data and related information appropriate for OWNER'S maintenance and operation of products furnished under the Contract.
2. Instructions of OWNER'S personnel in the maintenance of products and in the operation of equipment and systems.

B. Related work:

1. Submittals of shop drawings, product data and samples
2. Contract closeout submittals
3. Submittals of warranties

1.2 RELATED SECTIONS

A.	Section 01 70 00:	Contract Close Out
B.	Section 01 74 00:	Warranties and Guarantees
C.	Section 01 78 50:	Project Record Documents

1.3 SUBMITTALS

A. Preliminary:

1. Submit three (3) copies of proposed manual or manuals to the CMR, for review by ARCHITECT seven (7) days prior to request for final inspection, start-up of systems, and/or training, which ever comes first. Allow enough time for corrections and final review.
2. Show general arrangement, nature of contents in each portion or section, proposed method of binding, and covering for the manual or manuals.

B. Final:

1. Following instruction of operation and maintenance personnel, make all necessary revisions of the manual.
2. Submit specified number of copies of approved data in final form at final inspection or acceptance.
3. Distribution of final copies with be to CMR who will distribute to the OWNER.

1.4 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel trained and experienced in maintenance and operation of the described products.

1.5 FORMAT

A. Prepare data in the form of an instruction manual for use by OWNER'S personnel.

B. Text: 20 lbs. white bond paper, 8 – 1/2 in. by 11 in.

C. Drawing:

1. Provide reinforced punched binder tab. Bind drawings with text.
2. Fan-fold larger drawings to size of text pages.

D. Fly-leaf: For each separate product or each piece of operating equipment provide the following.

1. Brief description of product, and major component parts of equipment.
2. Indexed tabs.

E. Cover: Identify each volume with typed or printed title **OPERATION AND MAINTENANCE INSTRUCTIONS.** List the following:

1. Title of Project.
2. Identity of separate structures as applicable
3. A brief and general identification of the subject matter covered in the manual.

F. Binders:

1. Commercial quality D-ring type three (3) ring binders with durable vinyl covers.
2. When multiple binders are used, correlate the date into related groupings.

G. Labels

1. Provide front and end spine labels for each manual clearly identified with the following information.

OPERATING AND MAINTENANCE INSTRUCTION
Name of school site
Address
City, CA. zip code

Name of Contractor
General subject of the manual
Space for approval date

1.6 CONTENT OF MANUAL

A. Table of contents:

1. List of each product required to be included, indexed to the content of the volume.
2. List, with each product, the name, address and telephone number of ;
   a. subcontractor and installer
   b. maintenance contractor, as appropriate

c. local source of supply of parts, and replacements.

B. Product data:

1. Include only those sheets which are pertinent to the specific product.
2. Annotate each sheet to clearly identify the data applicable to the installation. Delete references to inapplicable information.

C. Drawings: Supplement product data with drawings as necessary to illustrate:

1. Relations of components parts of equipment and systems.
2. Project record drawings shall not be used as maintenance drawings.

D. Instructions:

1. Written text as required to supplement product data for the particular installation.

E. Warranties

1. Provide a copy of each warranty, guaranty, bond, and service contract issued.
2. Provide information sheet for OWNER'S personnel, giving the following information:

a. Proper procedures in the event of failure or emergency.
b. Instances which might affect the validity of warranties, guaranties, or bonds.

3. Warranties will be addressed to each Building in particular method for assurance of operations as if owned by one entity.

1.7 MANUAL FOR MATERIALS AND FINISHES

A. Instructions for care and maintenance including:

1. Manufacturer's recommendation for types of cleaning agents and methods.
2. Cautions against cleaning agents and methods which may be detrimental to the product.
3. Recommended schedule for cleaning and maintenance.

1.8 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Content, for each unit of mechanical equipment and system, as appropriate:

1. Description of unit and component parts:

a. Function, normal operating characteristics, and limiting conditions.
b. Performance curves, engineering data and tests.
c. Complete nomenclature and commercial number of all replaceable
d. parts.

2. Operating procedures:

a. Start-up, break-in, routine, and normal operating instructions
b. Regulation, control, stopping, shut-down, and emergency instructions.

c. Summer and winter operating instructions.

3. Maintenance procedures:

a. Routine operations.
b. Guide to “trouble-shooting”.
c. Disassembly, repair, and reassembly.
d. Alignment, adjusting, and checking.

4. Servicing and lubrication:

a. Schedule for maintaining equipment.
b. List of manufacturer approved lubricants.

5. Manufacturer’s printed operating and maintenance instructions.
6. Description of sequence of operation by control manufacturer.
7. Original manufacturer’s parts list, illustrations, assembly drawings and diagrams required for maintenance.

a. Predicted life of parts subject to wear.
b. Items recommended to be stocked as spare parts.

8. Control diagrams by manufacturer on controls as installed in Project.
9. Coordination drawings of color-coded piping diagrams as installed by each subcontractor.
10. Charts of valve tag numbers with the location and function of each valve.
11. List of original manufacturer’s spare parts, manufacturer’s current prices and recommended quantities to be maintained in storage.

B. Content, of each electric and electronic system, appropriate:

1. Description of system and component parts.

a. Function, normal operating characteristics, and limiting conditions.
b. Performance curves, engineering data and test results.
c. Complete nomenclature and commercial number of replacement parts.

2. Circuit directories of panel boards.

a. Electrical service
b. Controls
c. Communications.

3. As-installed color coded wiring diagrams.
4. Operating procedures.

a. Routine and normal operating instructions.
b. Sequences required.
c. Special operating instructions.

5. Maintenance procedures:

a. Routine operations.
b. Guide to “trouble-shooting”.
c. Disassembly, repair, and reassembly.
d. Adjustment and checking.

6. Manufacturer’s printed operating and maintenance instructions.

C. Prepare and include additional date when the need for such data becomes apparent during instruction of OWNER’S personnel.

1.9 INSTRUCTION OF OWNER’S PERSONNEL

A. Prior to final inspection of acceptance, instruct OWNER’S designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment, and systems installed in Project.

B. Provide services on factory-trained instructors from the manufacturer of each major item of equipment of system.

C. Operating and maintenance manual shall constitute the basis of instruction.

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

END OF SECTION 01 78 00

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SECTION 01 78 50 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements governing Project Record Documents.

1.2 RELATED SECTIONS

A.	Section 01 10 00:	Construction Documents
B.	Section 01 30 00:	Submittals
C.	Section 01 40 50:	Testing and Inspection
D.	Section 01 70 00:	Contract Closeout
E.	Section 01 74 00:	Warranties and Guarantees
F.	Section 01 78 00:	Operating and Maintenance Manuals

1.3 SUMMARY

A. Maintain one copy of the following in the CONTRACTOR'S field office at the site.

1. Contract Drawings, including DSA stamped set.
2. Complete Set of Specifications and Addenda.
3. Reviewed shop drawings.
4. Bulletins, change orders, field change authorization, request of information, and all other modifications to Contract.
5. Approved submittal.

B. File record documents apart from construction documents and maintain in clean, dry, legible condition. Make record documents available for review by IOR, ARCHITECT, OWNER, and OWNER'S representatives during regular business hours. The CONTRACTOR will use all means necessary to protect "Project Record Documents" set from deterioration, loss or damage until completion of work.

C. Do not use record documents for construction purpose.

D. Record documents will be subject to a monthly review by the OWNER'S representatives prior to approval of each progress payment.

1.4 PAYMENTS

A. The OWNERS representative's approval of current status of "Project record Documents" will be a prerequisite to the OWNER'S representative's approval of requests for progress payments and request for final payment

1. Progress Approvals: Prior to submitting each request for progress payments, secure the IOR approval of status of "Project Record Documents".

B. Final Payment: Prior to submitting request for final payment and final inspection, CONTRACTOR shall submit "Project Record Documents" set to the OWNER'S Representative and/or OWNER, with transmittal letter, in duplicate, containing date, Project title and number, CONTRACTOR'S name and address, title and number of each record document.

C. CONTRACTOR shall certify that the "Project Record Documents" are complete and accurately reflect all changes or modifications to the original Construction Documents.

D. Transmittal letters with signature of CONTRACTOR or its authorized representative shall be notarized by state authorized agent.

1.5 RECORDING

A. Promptly following Contract Award, CONTRACTOR shall secure from the OWNER'S Representative or OWNER one complete set of Specifications and Contract Drawings and clearly mark them as "Project Record Documents".

B. CONTACTOR shall keep record documents current.

C. CONTACTOR shall be responsible for maintaining and recording changes on "Project Record Documents".

D. Do not use "Project Record Documents" set for any other purpose except entry of new data and for review by the OWNERS' representatives, IOR, ARCHITECT, and/or OWNER. Maintain separate job sets for subcontractors and workers daily use.

E. CONTRACTOR shall record entries and properly dimension deviations on the record drawing within 24 hours after receipt of information of work in affected area.

F. Making entries on "Project Record Documents"

1. Use erasable colored pencils, other than blue or colors not easily seen, not ink or indelible pencil.
2. Clearly describe change by note and by graphic line as required.
3. Date all entries.
4. Call attention to entry by a "cloud" around area or areas affected.
5. In event of overlapping changes, different colors may be used for each entry.
6. RFI submissions shall be referenced on each affected sheet, Drawing and/or Shop Drawing.

1.6 RECORD DRAWINGS

A. Maintain a clean, undamaged set of blue or black line white prints of Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which Drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Drawings. Provide detailed and accurate field dimensions for concealed elements that would be difficult to measure and record at a later date.

1. Utility location and depth below finished grade and/or above ceilings and attic spaces shall be fully dimensioned and indicated on record drawings. Dimensions shall be measured from building lines or permanent landmarks and shall be triangulated to those features.
2. Dimensions shall be taken to building lines or permanent landmarks.
3. Horizontal and vertical location of underground utilities are appurtenances referenced to permanent surface improvements. Cut-off points and points of connection of utilities.
4. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
5. Details not on original Contract Drawing.
6. Do not permanently conceal any work until required information has been recorded.

B. Prior to Final Completion of the Work, and review of the project record drawings by ARCHITECT, the CONTRACTOR shall prepare a final set of project record drawings using reproducible Mylar (5 mil.) and electronic CAD files on CD's of all Contract Drawing. Submit final set of transparencies and CD's to OWNER'S Representative who will then forward the project record drawings to the ARCHITECT.

1. Incorporate on transparencies and AUTO CAD files all changes noted on record set. This requirement applies to all disciplines. Work shall be performed by experienced, competent draftsmen. AUTO CAD work shall be performed in the same protocol as the files provided. Identify documents as "RECORD DRAWINGS".

1.7 RECORD SPECIFICATIONS

A. Maintain two complete copies of the Specifications, including Addenda. Include with the Specifications two copies of other written Contract Documents, such as Change Orders and/or Construction Directives issued during construction.

1. Mark these record documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
2. Give particular attention to substitutions and selection of options and information on concealed Work that cannot otherwise be readily discerned later by direct observation.
3. Note related record document information with Product Data.
4. Prior to Final Completion of the Work, submit record Specifications to OWNER'S representative for ARCHITECT review, and for OWNER'S records.

1.8 RECORD PRODUCT DATA

A. Maintain two copies of each Product Data submittal. Note related Change Orders and Construction Directives and mark-up of record drawings and Specifications.

1. Mark these documents to illustrate significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the Project site and from the manufacturer's installation instructions and recommendations.
2. Provide detailed and accurate information regarding concealed products and portions of Work that cannot otherwise be readily discerned later by direct observation. The CONTRACTOR should give particular attention to concealed areas of Work.

3. Prior to Final Completion of the Work, submit complete set of record Product Data to the OWNER'S Representative for the ARCHITECT'S review and for OWNER records.

1.9 RECORD SAMPLES

A. Immediately prior to Substantial Completion, CONTRACTOR shall meet with OWNER'S representative and/or OWNER, ARCHITECT at the Project site to determine which Samples are to be transmitted to OWNER for record purposes. Comply with OWNER'S representative for OWNER instructions regarding delivery to OWNER storage area.

1.10 MISCELLANEOUS RECORDS

A. Refer to other Specification sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date of Final Completion, complete and compile miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to OWNER'S representative for ARCHITECT review and for OWNER records.

1.11 SUBMITTALS

A. Deliver all "Project Record Documents" to OWNER'S representative at completion of Project as specified in Specification Sections.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

END OF SECTION 01 78 50

SECTION 03 10 00 - CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.

B. Openings for other affected work.

C. Form accessories.

D. Stripping forms.

1.2 REFERENCES

A. CBC - California Building Code. Throughout this volume, any reference to the CBC means the 2022 edition of the California Building Code.

B. ACI 301 - Specifications for Structural Concrete for Buildings, latest edition

C. PS-1 - Construction and Industrial Plywood.

1.3 SYSTEM DESCRIPTION

A. Design, engineer, and construct formwork, shoring, and bracing to meet design and code requirements, so that resultant concrete conforms to required shapes, lines, and dimensions.

1.4 QUALITY ASSURANCE

A. Construct and erect concrete formwork in accordance with ACI 301.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Plywood: PS-1, BB Plyform grade, Class I, Exterior classification.

B. Lumber: Douglas Fir species; construction grade; with grade stamp clearly visible.

C. Tubular Column: Round, of spirally wound laminated fiber; surface treated with release agent; of

2.2 FORMWORK ACCESSORIES

A. Form Ties: Snap-off metal of adjustable length; cone type; 1 inch break back dimension; free of defects that will leave holes no larger than one inch diameter in concrete surface.

B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Fillets for Chamfered Corners: Wood strips type; 3/4 x 3/4 inch size; maximum possible lengths.

D. Dovetail Anchor Slots: Minimum 22 gage galvanized steel; foam filled; release tape sealed slots; bent tab anchors; securable to concrete formwork; manufactured by Heckmann Building Products Co., www.heckmannbuildingprods.com.

E. Flashing Reglets: 26 gage thick galvanized steel; longest possible lengths; release tape sealed slots; with alignment splines for joints; securable to concrete formwork; Type CO reglet manufactured by Fry Reglet www.fryreglet.com.

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required; of strength and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify lines, levels, and measurements before proceeding with formwork.

3.2 PREPARATION

A. May use earth forms for footings.

B. Minimize form joints. Symmetrically align joints and make watertight to prevent leakage of mortar.

C. Arrange and assemble formwork to permit stripping, so that concrete is not damaged during its removal.

D. Arrange forms to allow stripping without removal of principal shores, where required to remain in place.

3.3 ERECTION

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.

C. Provide chamfer strips on external corners of walls.

D. Obtain approval before framing openings in structural members which are not indicated on Drawings.

E. Do not displace or damage vapor barrier placed by Section 033000.

F. Construct formwork to maintain tolerances in accordance with ACI 301.

3.4 APPLICATION OF FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

B. Do not apply form release agent where concrete surfaces are scheduled to receive applied coverings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for work embedded in or passing through concrete.

B. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

3.6 FORM REMOVAL

A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight and imposed loads.

B. Do not damage concrete surfaces during form removal.

C. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces.

3.7 CLEANING

A. Clean forms to remove foreign matter as erection proceeds.

B. Ensure that water and debris drain to exterior through clean-out ports.

3.8 EARTH FORMS

A. Construct wood edge strips at top sides of excavations as indicated on drawings.

B. Provide forms for footings and foundation walls wherever concrete cannot be placed against solid earth.

C. Remove loose dirt and debris from form area prior to concrete placement.

D. Concrete for foundations may be placed directly into neat excavations provided the foundation trench walls are stable as determined by a Soils Engineer

E. When earth formed foundations are used, the minimum formwork shown on the drawings is mandatory to insure clean excavations prior to and during concrete placement.

END OF SECTION

SECTION 03 20 00 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars, welded steel wire fabric fabricated steel bar or rod mats for cast-in-place concrete.

B. Support chairs, bolsters, bar supports, and spacers, for supporting reinforcement.

1.2 REFERENCES

A. CBC - California Building Code, 2022 edition.

B. ACI 301 - Specifications for Structural Concrete for Buildings.

C. ACI 315R-18 - Details and Detailing of Concrete Reinforcement.

D. ACI 318-19 - Building Code Requirements for Reinforced Concrete.

E. ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.

F. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

G. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

H. ASTM A706 - Standard Specification for Low Alloy Steel Deformed Bars for Concrete Reinforcement.

I. AWS D1.4 - Structural Welding Code Reinforcing Steel.

J. CRSI - Manual of Practice.

K. CRSI - Placing Reinforcing Bars.

1.3 QUALITY ASSURANCE

A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice.

B. Conform to ACI 301 and ACI 315R-18.

C. Conform to CBC California Building Code

1.4 CERTIFICATES

A. Submit mill test certificates of supplied concrete reinforcing, indicating physical and chemical analysis.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Steel: ASTM A615, Grade 60. Billet-steel deformed bars, uncoated finish.

B. Welded Reinforcement: ASTM A706, Grade 60, deformed bars, unfinished.

C. Welded Steel Wire Fabric: ASTM A185 plain type; coiled rolls; uncoated finish.

D. Steel Wire: ASTM A82, plain, cold drawn steel.

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 installation and placement of concrete including load bearing pad on bottom to prevent vapor barrier puncture.

2.3 FABRICATION

A. Fabricate in accordance with ACI 315R-18), providing concrete cover specified in Section 033000.

B. Locate reinforcing splices not indicated on Drawings at points of minimum stress. Indicate location of splices on shop drawings.

C. Weld reinforcing bars in accordance with AWS D1.4.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before placing concrete, clean reinforcement of foreign particles or coatings.

B. Place, support, and secure reinforcement against displacement. Do not deviate from alignment or measurement.

C. Mix fibrous reinforcement into concrete material according to Section 033000.

D. Do not displace or damage vapor barrier required by Section 033000.

3.2 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014000 and as required by the Division of the State Architect and District Inspector.

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END OF SECTION 03 20 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERALS

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements: None

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

    a. Contractor's superintendent.
    b. Independent testing agency responsible for concrete design mixtures.
    c. Ready-mix concrete manufacturer.
    d. Concrete Subcontractor.
    e. Special concrete finish Subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, forms and form removal limitations, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab

flatness and levelness, floor slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Construction Joint Layout: Not permitted unless specifically indicated on the drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Floor and slab treatments.
7. Bonding agents.
8. Adhesives.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

D. Field quality-control reports.

E. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

1.10 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent

of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

    a. High-density overlay, Class 1 or better.
    b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    c. Structural 1, B-B or better; mill oiled and edge sealed.
    d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

3. Overlaid Finnish birch plywood.

B. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

C. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Galvanized Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) deformed bars, ASTM A 767/A 767M.

D. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.

2.4 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type II/V
2. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
3. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm)

2. Retain "Fine Aggregate" Subparagraph below if optional restriction for fine aggregate in ASTM C 33/C 33M is required.

3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
7. Waterproofing Admixture: ASTM C 494

F. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Corp. - Construction Chemicals.
b. Euclid Chemical Company (The); an RPM company.
c. GCP Applied Technologies Inc. (formerly Grace Construction Products).
d. Sika Corporation.

G. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Corp. - Construction Chemicals.
b. GCP Applied Technologies Inc. (formerly Grace Construction Products).
c. Sika Corporation.

H. Water: ASTM C 1602/C 1602M and potable.

I. Waterproofing Admizture:

1. Provide waterproofing admixture in wall concrete as manufactured by Xypex or Equal

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Corp. - Construction Chemicals.
b. Bon Tool Co.
c. Brickform; a division of Solomon Colors.
d. ChemMasters, Inc.
e. Dayton Superior.
f. Euclid Chemical Company (The); an RPM company.
g. Kaufman Products, Inc.
h. L&M Construction Chemicals, Inc.
i. Lambert Corporation.
j. Metalcrete Industries.
k. Nox-Crete Products Group.
l. Sika Corporation.
m. SpecChem, LLC.
n. TK Products.
o. Vexcon Chemicals Inc.
p. W.R. Meadows, Inc.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Anti-Hydro International, Inc.
b. BASF Corp. - Construction Chemicals.
c. ChemMasters, Inc.
d. Dayton Superior.
e. Euclid Chemical Company (The); an RPM company.

f. Kaufman Products, Inc.
g. L&M Construction Chemicals, Inc.
h. Lambert Corporation.
i. Nox-Crete Products Group.
j. Right Pointe.
k. SpecChem, LLC.
l. TK Products.
m. Vexcon Chemicals Inc.
n. W.R. Meadows, Inc.

2.7 RELATED MATERIALS

A. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

2.8 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 3000 psi (21 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 15 percent.
2. Combined Fly Ash and Pozzolan: 15 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Normal-weight concrete.

1. Minimum Compressive Strength: 4500 psi (145 PCF) at 28 days.
2. Maximum W/C Ratio: 0.45
3. Slump Limit: See general notes on Structural Drawings.

2.11 FABRICATING REINFORCEMENT

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

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

F. Chamfer exterior corners and edges of permanently exposed concrete.

G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

H. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

I. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.3 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces.

3.6 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

D. Provide slip-resistant surface along the path of travel.

3.7 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.
b. Continuous water-fog spray.

c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

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

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

D. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.

6. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. Retain first subparagraph below if field-cured specimens are required.

9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength.

10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M).

END OF SECTION 03 30 00

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SECTION 03 36 10 – SHOTCRETE

PART 1 GENERAL

1.1 Division 1 and the General Conditions apply to all Work in this Section.

A. Work Included:

1. Shotcrete as an alternate to poured in place retaining wall.
2. Shotcrete is herein differentiated from Gunite. Shotcrete is a "ready-mix" emulsion where water is added at the batch plant, and the emulsion will be pumped through a hose to the applicator. In contrast, Gunite is herein defined as a dry mixture pumped through a hose where a nozzleman injects water as the mix is applied. Only shotcrete is allowed per this specification (the wet-mix process)

1.2 Quality Assurance:

A. All Work of this Section shall be performed by the contractor/subcontractor (C-53).

B. Qualifications of Workers:

1. To be eligible as a bidder, the Contractor shall have had at least three (3) years of experience in shotcrete construction and shall be able to list at least five (5) installations of this type and size, which, upon investigation, have been found to have been completed satisfactorily. Improper Work will be immediately rejected.
2. Use only thoroughly trained and experienced superintendents, gun operators, nozzle operators, and finishers with at least three (3) years of experience who are completely familiar with the materials and methods specified.

C. Standards: Except as otherwise indicated, provide shotcrete per American Concrete Institute Standard ACI 506R-16.

D. Mix Design: The shotcrete subcontractor shall submit a mix design per CBC and ACI 318-19. Mix design shall indicate the aggregate source and cement brands and admixtures used. All mix designs shall consider the character of locally available aggregate and make adjustments as necessary to conform with specified design criteria.

E. Testing and Inspection: At least three (3) cores shall be taken from the completed Work for each day of shotcrete operation or before each 50 cubic yards placed each day. The testing will be performed by District's Testing Lab and comply with CBC Section 1908.1 and ACI 318-19 Section 26.12. Continuous inspection of the shotcrete operation by a deputy inspector provided by the District shall be required. Inspecting pneumatically placed concrete Work shall comply with Section 1705.3 of California Building Code. Coring, sampling, soaking, and testing per ACI 318-19 Section 26.12

1.3 Submittals and Substitutions:

A. Provide submittals of shotcrete mix designs, admixtures & catalog cuts in conformance with requirements of Section 01 30 00 of this Project Manual. Mix design shall be prepared by a California licensed Engineer & approved by the testing lab.

B. Materials List: Within fifteen (15) days after issuance of Notice to Proceed and before shotcrete materials are delivered to the project site, submit to the District Representative a complete list of materials proposed to be used in this portion of the Work, showing manufacturer's name and catalog number of all items such as admixtures and curing membranes, and the name and address of the ready-mix supplier proposed.

C. Provide resume for nozzleman and list of representative projects.

D. Chosen curing method.

1.4 Product Handling:

A. Protection: Use all means necessary to protect shotcrete materials before, during, and after installation and protect the installed Work of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the District.

1.5 References:

A. Provide a list of five projects of similar scope accomplished by the Contractor for review. Before Bidding.

1.6 Qualifications of Workers:

A. The contractor/subcontractor for this portion of the Work shall have been successfully engaged in the business of cast-in-place concrete for at least five (5) years immediately before commencingment of this Work and shall demonstrate to the approval of the District's Representative that its' record of workmanship is satisfactory.

1.7 Product Handling:

A. Delivery: Deliver materials other than Ready-Mix to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.

B. Storage: Store materials undercover to prevent damage and contamination, and store only the specified materials at the Project Site.

C. Protection: Use all means necessary to protect the cast-in-place concrete before, during, and after installation and protect the installed Work and materials of all other trades.

D. Replacements: In the event of damage, immediately make all repairs and replacements necessary upon review by the District's Representative.

PART 2- PRODUCTS

2.1 All concrete, unless otherwise specifically permitted by the Engineer, shall be transit-mixed in accordance with ASTM C94.

A. The control of concrete production shall be under the supervision of a recognized testing agency selected by the District's Representative in accordance with Section 01400 of the Specifications.

B. Quality: All concrete shall have the following minimum compressive strengths at twenty-eight (28) days and shall be proportioned within the following limits:

C. Walls, Footings

1. 4,500 psi. minimum compressive strength
2. 3/8" maximum size aggregate.
3. 6.00 minimum sacks of cement per cubic yard.*
4. 4" maximum slump.

**For estimate only: to be determined by mix design. (Fly Ash is neither an acceptable add-mixture nor a substitute for Portland Cement). Mix design must be in accordance with CBC Chapter 1904 – durability*

2.2 Materials:

A. Cement:

1. All cement shall be Portland Cement conforming to ASTM C-150, type V, and shall be one manufacturer's product and the same for all shotcrete work. Water cement ratio shall not exceed .45.

B. Aggregates:

1. Shall conform to "Standard Specifications for Concrete Aggregates," ASTM C33, except as modified herein.
2. Coarse Aggregate: Clean sound-washed gravel or crushed rock. Crushing may constitute less than 30% of the coarse aggregate volume. No more than 5% flat, thin, elongated, or laminated material nor more than 1% deleterious material shall be present—3/8" graded aggregate, fineness modulus 6.90 to 7.40.
3. Fine Aggregate: Washed natural sand of hard, strong particles and shall contain not more than 1% of deleterious material, fineness modulus 2.65 to 3.05.

C. Water:

1. Clean, fresh, free from acid, alkali, organic matter, or other impurities liable to be detrimental to the concrete (potable).

D. Admixtures:

1. Admixtures shall be used only upon review of the District's Representative.
   a. air-entraining admixture: Conform to ASTM C260.
   b. water-reducing admixture: Conform to ASTM C494.
   c. waterproofing admixture: Conform to ASTM C494

E. Curing & Sealing Materials

1. Protect freshly deposited concrete from premature drying and maintain it without drying at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.
2. During the curing period, protect the concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. Protect all finished

concrete surfaces from damage caused by construction equipment, materials, or methods

3. Curing shall immediately follow the finishing operation.
   a. Prevent rapid drying of the concrete at the end of the curing period.
4. Pool Walls: Curing shall immediately follow the finishing operation. Keep concrete continuously moist for at least seven days using one of the following materials or methods.
   a. Ponding or continuous sprinkling
   b. Absorptive mat or fabric kept continuously wet.
   c. Sand or other covering kept continuously wet.

F. Protection:

1. Protect all finished surfaces from stains or abrasions. Protect surfaces or edges by providing temporary covers. Protect all concrete from rain, flowing water, or mechanical injury.
2. Protect Work from the dropping of plaster, paint, dirt chemicals, and other marring by covering with polyethylene plastic sheet, well lapped and sealed. Maintain covering in good condition until the danger of damage is passed.
3. Do not set scaffolding up over the new wall without submitting a concrete protection plan for scaffold work.

G. Miscellaneous:

1. Dobie to be Dayton Superior CCD 1.5 by 2 by 2.5 combo dobie
2. Bonding and Grounding lugs
3. Rebar may not be used for support and may not be in contact with the substrate, and must be correctly located and tied within the shotcrete matrix

2.3 Construction:

A. Submit plan as shop drawing for the proposed location of all and construction joints and obtain approval of same before construction. Additional reinforcing may be required at some construction joints and shall be supplied and installed at no additional cost.

PART 3- EXECUTION

3.1 Execution:

A. Inspection:

1. Before all Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
2. Verify that items to be embedded in shotcrete are in place and that shotcrete may be placed to the lines and elevations shown on the Drawings, with all required clearance from reinforcement. Bond any metal items.

B. Discrepancies:

1. If a discrepancy is encountered, immediately notify the District Representative.
2. Do not proceed with installation in areas of the discrepancy until all such

discrepancies are fully resolved.

3. Failure to notify the District Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.
4. Be sure reinforcement is free of rust and scale and properly placed. No bars larger than #5's can be used, and non-contact splices are required. Do not apply concrete if these conditions are not met.

3.2 Preparation:

A. General:

1. Thoroughly clean all areas where shotcrete is placed to ensure proper bonding of shotcrete.
2. Where shotcrete is placed against smooth surfaces (i.e., cast-in-place concrete), sandblast or thoroughly roughen surfaces to receive shotcrete to provide a clean aggregate surface, thereby ensuring proper bond between materials.
3. Construction joints shall conform to ACI 318-19 Section 26.5.6.1

B. Ground Wires: Adequate ground wires, to be used as screeds, shall be installed to establish the thickness and surface planes of the shotcrete work. Ground wires shall be placed so that they are tight and true to line and grade and in such a manner that they can be easily tightened and easy for the shotcrete applicator to utilize for conformance.

3.3 Proportioning and Mixing:

A. Accurately control the proportion of water to Portland cement to produce thorough and uniform hydration of the shotcrete that, when shot, forms a homogeneous mass containing neither sags nor dry sand formation.

1. Strength: Minimum 4,500 psi 28-day compressive strength unless otherwise indicated.

B. Discontinue shotcrete work if the time between the addition of mixing water to cement and aggregate, or cement to aggregates, and placement of shotcrete exceeds 90 minutes when the ambient temperature is below 85 degrees F or exceeds 60 minutes when the ambient temperature is above 85 degrees F.

3.4 Shotcrete Placing, Finishing, and Curing:

A. Operations: Use a positive displacement method to apply the wet process mix, shotcrete. The use of Compressed air may be used to increase the exit velocity. A minimum of 100 psi in a hose is a minimum of three times the internal diameter of the largest aggregate size. The wet mix nozzle is typically a rubber tip, an air injection ring, control valve, and housing. Use nozzle prescribed by mix design.

B. Placing: When shooting reinforcing, hold the nozzle perpendicular to 2-1/2 to 3 feet from the surface. Hold the nozzle at reinforcing bars to direct shotcrete behind bars and shoot each side of each bar separately. A nozzleman's helper equipped with an air jet shall precede the nozzle and blow out rebound or sand lodged behind bars, on forms, or placed shotcrete. Material shall emerge from the nozzle in a uniform flow. If the flow becomes intermittent for any reason, direct the nozzle away from the surface until the flow is again steady and

constant. Placing shotcrete horizontal members from the top is not allowed unless approved methods are employed to eliminate rebound. Do not reuse rebound or loose sand for any purpose.

C. Puddled Shotcrete: Use "puddled shotcrete" in which the air pressure is reduced, and the water content is increased to facilitate placing in difficult locations is not allowed. Where difficult shooting conditions occur, obtain good results by maintaining correct air pressure and water ratio and reducing material supply. Do not place shotcrete where the nozzle stream cannot be placed directly onto the involved and intended surface.

D. Construction Joints: Form joints with sloping beveled edges. Square-edged construction joints are not allowed. Clean and dampen the hardened joint surfaces before placing additional shotcrete.

E. Finishing: Rod exposed surfaces to true planes and lines on reaching the thickness and plane established by forms and ground wires. Tamp and wood float surfaces level and provide a rough raked finish.

F. Curing: Keep shotcrete continuously damp for not less than seven days after placing. Use sealed curing sheeting or other approved curing method where water curing is not feasible. Do not use curing compounds of any kind. Submit shop drawing indicating curing method.

3.5 Defective Work:

A. Cut out, remove and replace, or repair to the satisfaction of the District Representative, shotcrete not meeting compressive strength requirements, not true, plumb or level, not to required elevations, containing cracks detrimental to performance or appearance, containing shavings, debris, or voids.

B. Promptly perform the Work required to repair, patch, replace, render properly cleaned surfaces (by sandblasting if necessary) or otherwise make good any defective shotcrete at the Contractor's expense, including the expense of additional inspection, tests, etc. or supervision made necessary as a result of defective shotcrete.

3.6 Clean-Up:

A. Upon completion of the Work of this Section, immediately remove all shotcrete materials, debris, and rubbish occasioned by this Work upon review of the District Representative.

END OF SECTION 03 30 01

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

A. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all site clearing work as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

B. Removal of surface debris; removal of paving and curbs; removal of trees, shrubs, and other plant life; topsoil excavation; and repair of damaged vegetation and/or irrigation systems/system components.

C. Removal of concrete and bituminous surfacing.

1.02 RELATED SECTIONS

A. Section 31 20 00: Earthwork.

1.03 REFERENCE STANDARDS

A. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2021 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

1.04 REGULATORY REQUIREMENTS

A. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency, pay for all fees and give all necessary notices required for the construction of the work. The School District shall reimburse the contractor for all necessary permits or inspection fees by any legally constituted agency.

B. Perform all work of this Section in strict accordance with applicable Government Codes and Regulations especially meeting all safety standards and requirements of CAL/OSHA, County of Orange and the City of Whittier. Provide additional measures, added materials and devices as may be needed as directed by the District Representative at no added cost to the District.

C. Comply strictly to Rule 1404, South Coast Air Quality Management District.

B. Coordinate clearing Work with utility companies.

PART 2 – PRODUCTS

2.01 Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Section 31 20 00 – Earthwork.

A. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify that existing plant life designated to remain is tagged or identified.

B. Identify a waste area for placing removed materials.

3.02 PROTECTION

A. Protect existing structures and site improvements indicated to remain, from damage by approved methods and/or as authorized by the District Representative. Removal of all protections shall be when work of this Section is completed or when so authorized by the District Representative.

B. Protect Existing Utilities indicated or made known to remain traversing the job-site and serving existing adjacent facilities.

C. Protect Existing Trees and Shrubs indicated to remain by providing temporary surrounding fencing so located a sufficient distance away so that trees and shrubs will not be damaged by site-clearing operations.

1. Protection Barrier: A protection barrier shall be installed around the shrubs or trees to be preserved. The barrier shall be constructed of a durable fencing material, such as plastic construction fencing, snow fence, or chain link. The barrier shall be placed at or beyond the drip line. "Drip line" as referred to herein means a line which may be drawn on the ground around the tree directly under its outermost branch tips and which identifies that location where rainwater tends to drip from the tree. Placement of barrier to be approved by District Representative (Grounds Supervisor). If barrier is placed inside the drip line, then 3/4 inch plywood must be placed over the root zone up to the drip line. The fencing shall be maintained in good repair throughout the duration of the project, and shall not be removed, relocated, or encroached upon without permission of the District Representative (Grounds Supervisor).

2. Storage of Materials: There shall be NO storage of materials or supplies of any kind within the area of the protection barriers. Concrete, cement, asphalt materials, block, stone, sand and soil shall not be placed within the drip line of the tree(s).

3. Fuel Storage: Fuel storage shall NOT be permitted within 150 feet of any tree to be preserved. Refueling, servicing and maintenance of equipment and machinery shall NOT be permitted within 150 feet of protected trees.

4. Vehicles/equipment: NO parking or driving of vehicles or storage of equipment shall be permitted within the drip line of any tree to be preserved.

5. Debris and Waste Materials: Debris and waste from construction or other activities shall NOT be permitted within protected areas. Wash down of Concrete, cement or asphalt handling equipment, in particular shall NOT be permitted within 150 feet of protected areas.

6. Grade Changes: Grade changes can be particularly damaging to trees. Any grade changes should be approved by the District Representative (Grounds Supervisor) before construction begins and precautions taken to mitigate potential injuries.

7. Damages: Any damages or injuries to the preserved trees (including pruning or cutting of such trees not in conformity with the International Society of Arboricultural Pruning Guidelines and ANSI A300 Pruning Standards) shall be reported immediately to the District Representative (Grounds Supervisor). Severed roots shall be pruned cleanly to healthy tissue, using proper pruning tools. Broken branches/limbs shall be pruned according to International Society of Arboricultural Pruning Guidelines and ANSI A300 Pruning Standards. In the event that any damage, injury, improper pruning or cutting of a protected tree is deemed to be so substantial as to require its replacement (such determination to be made in the sole discretion of the District Representative), Contractor shall replace such tree with the same species and variety of tree, up to a box size of 48 inches, or if no such replacement is available, with a substitute species or variety as determined in the sole discretion of the District Representative. Any replacement tree shall be approved in advance by the District Representative. The value of the tree to be replaced shall be determined by a Certified Arborist selected by Contractor from the District's approved list of Registered Consulting Arborists. To the extent that the value of the replaced tree as determined by the Certified Arborist exceeds the cost of the replacement tree, Contractor shall be liable to District for such difference in value in addition to all costs associated with replacement of the damaged tree.

8. Removal of Existing Tree or Shrub: Prior to removing or cutting any trees designated for removal, the contractor shall coordinate with the District's Ground Supervisor. In the event that Contractor, a Subcontractor, Sub-Subcontractor, material supplier or anyone else performing the Work of the Contract willfully, negligently or mistakenly removes any tree or shrub not designated for removal, Contractor shall immediately report such removal to the District Representative (Grounds Supervisor). Contractor shall replace such tree with the same species and variety of tree, up to a box size of 48 inches, or if no such replacement is available, with a substitute species or variety as determined in the sole discretion of the District Representative. Any replacement tree shall be approved in advance by the District Representative. The value of the tree to be replaced shall be determined by a Certified Arborist selected by Contractor from the District's approved list of Registered Consulting Arborists. To the extent that the value of the replaced tree as determined by the Certified Arborist exceeds the cost of the replacement tree, Contractor shall be liable to District for such difference in value in addition to all costs associated with replacement of the damaged tree.

9. Unauthorized Tree Removal or Injury: Criminal Penalties: Reference is made to California Penal Code §384a which provides that any person who willfully or negligently cuts, destroys, mutilates or removes any tree or shrub or portion thereof growing on public land without a written permit from the owner of said public land is guilty of a misdemeanor, subject to a fine of up to $1,000, imprisonment in county jail for up to 6 months, or both. Contractor is advised that, in addition to all remedies

provided herein and in the Contract Documents, the District shall cooperate with appropriate authorities in prosecuting and enforcing Penal Code §384a and other criminal sanctions as appropriate concerning trees and shrubs located on District property.

10. Preventive Measures: Before construction begins fertilization of the affected areas to be applied at a rate to be determined by the District Representative (Grounds Supervisor).

D. Protect bench marks, survey control points, and existing structures from damage or displacement.

E. Protection of Persons and Property (existing structures and site improvements):

1. Provide barricades, warning signs at open depressions and holes on adjacent property and public accesses.

2. Provide operating warning lights during hours from dusk to dawn each day or as otherwise required.

3. Protect existing remaining structures, utilities, sidewalks, pavements other facilities from damage as caused by settlement, undermining, washout or other hazards created by site-clearing operations of this Section.

F. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors and to others performing work on or near the job-site.

G. Maintain access to the job-site at all times.

3.03 CLEARING

A. Clear areas required for access to site and execution of Work.

B. Remove all rubbish and debris existing and resulting from work operations of this Section as soon as possible, do not allow to pile up. Do not burn rubbish and debris on the job-site.

C. Where active utility lines need to be capped or plugged, perform such work in accordance with requirements of the Utility Company.

3.04 REMOVAL

A. Remove debris, rock, and extracted plant life from site.

B. Excavate and remove associated plumbing piping.

C. Prior to demolition work, the Contractor shall notify the District Representative to identify the existing items for salvage purposes. The materials identified for salvage shall be returned to the District in a timely manner agreed upon by the District Representative.

3.05 CONCRETE AND BITUMINOUS SURFACE REMOVAL

A. Where noted on the construction drawings, break up and completely remove all existing concrete surfacing, curbs, gutters, walks and bituminous surfacing to limits indicated to be removed. All cutting shall be done to a neat and even line with proper tools or a concrete cutting saw. Minimum depth of cut shall be 1-1/2", unless otherwise specified. Remove any concrete broken beyond the indicated limits to the nearest joint or score line and replace with new concrete to match the existing.

B. Removed concrete and bituminous materials shall be disposed of off-site unless otherwise noted on the construction drawings. All such items to be removed shall be disposed of off the property in a legal manner.

C. Bituminous pavement saw cutting shall conform to the provisions of Section 300-1.3.2 (a) of the Standard Specifications. The residue resulting from the saw cutting operations shall not be permitted to flow beyond the specific work location and shall be removed the same day.

D. Removal of concrete curb / curb & gutter covered by this section shall include saw-cutting and removal of a twelve (12") inch wide section of the adjacent bituminous pavement.

E. When saw cutting concrete curb / curb & gutter, the cuttings shall be continuously wet vacuumed to prevent the materials from entering catch basins, storm water conveyances, or waters of the State. Vacuumed cuttings shall be disposed of according to applicable regulations.

F. Concrete curb and concrete curb and gutter shall be removed to the lines, grades and locations shown on the plans in accordance with Section 300-1.3.2 of the Standard Specifications.

G. Concrete removal in sidewalk and driveway areas shall extend to existing score lines unless specifically indicated otherwise on the Plans or in the Project Special Provisions, or unless otherwise approved by the Engineer.

H. Reinforcing or other steel may be encountered in portions of concrete to be removed. No additional compensation will be allowed for the removal of concrete containing reinforcing or other steel.

I. In those areas where existing bituminous surfacing is removed to make way for new planting or lawn areas, remove soil 6" below existing exposed soil surface. Removed soil may be used only as fill under buildings or other areas to be paved, only if approved by the District Inspector. Legally dispose of off site, if material is not approved as fill material.

3.06 REPAIRS

A. During demolition and construction, ensure that trees, shrubs and other plant material and vegetation are protected inside and outside of the work zone and that the vegetation is being watered, maintaining the proper moisture content according to the season. Failed vegetation, including sod, due to lack of water, and/or plant material destroyed during construction period are to be replaced to equal or better size and condition at no additional cost to the District.

B. If the irrigation system is damaged or modified during construction, it shall be repaired to the Districts standards, and shall be in equal or better condition than prior to damage or

modification. All repairs shall be, inspected and approved by the District Representative (Grounds Supervisor) prior to backfilling or covering of said repairs. The District representative requires forty-eight hours prior notice, when contractor requests inspection of completed repairs. All repairs shall be made so as to ensure proper operation prior to the close of the contract at no additional cost to the District.

C. Controller Wires: If damaged, cut or removed, repair by splicing, soldering and silicone sealing. To ensure proper operation, reconnect the wires to the valve to correspond with the map on the controller to the correct station.

D. Hydraulic Tubes: If damaged/cut or removed, repair by replacing the tubing using equal or better material.

E. Valves: If damaged, repair/replace with equal or better material. All valves are to be flushed/cleaned thoroughly.

F. Mainlines: If damaged, repair/replace with equal or better material. All lines are to be flushed/cleaned thoroughly.

G. Lateral Lines: If damaged, repair/replace with equal or better material. All lines are to be flushed/cleaned thoroughly.

H. Irrigation Heads: If damaged, repair/replace with equal or better material. All heads are to be flushed and filters cleaned thoroughly.

I. Controllers: If damaged repair/replace with equal or better material.

J. Backflow Prevention Devices: If damaged, repair/replace with equal or better material.

K. Gate/Ball/Quick Coupler Valves: If damaged repair/replace with equal or better material.

L. Valve Boxes: If damaged, repair/replace with equal or better material. Concrete boxes and concrete lids with the appropriate markings for identification shall be used. The top of the box shall be buried below finish grade, equal to existing depth or deeper. The top of the valve stems shall be 6" below the underside of the top of the box.

M. Construction in grass areas: Sod shall be removed by sod cutting at a soil depth of 2", stored on site, and watered on a daily basis. Upon completion of work, stored sod shall be reinstalled over the areas disrupted due to construction. An option may be to bypass cutting the sod, however at the completion of the project, finish grading and installation of new Hybrid Bermuda GN -1 sod over the areas disrupted by construction shall be required.

3.07 EXCESS MATERIALS DISPOSAL

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

3.08 SITE CLEANUP

A. Cleanup of branches, limbs, logs, or any other debris resulting from any operations shall be promptly and properly accomplished. The work area shall be kept safe at all times until all

operations are completed. Under no circumstances shall the accumulation of brush, limbs, logs, or other debris be allowed in such a manner as to result in a hazard to the public. All debris shall be cleaned up each day before the work clew leaves the site, unless permission is given by the Owner to do otherwise. All lawn areas shall be raked, all streets and sidewalks shall be swept, and all brush, branches, rocks or other debris shall be removed from the site. Areas are to be left in a condition equal to or better than that which existed prior to the commencement of operations.

END OF SECTION 31 10 00

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SECTION 31 20 00 - EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. The work of this section shall include excavation, unclassified cut, unclassified fill, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled, and all other work necessary to complete the grading of the site. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Geotechnical Engineer. Included with this Work are the following:

1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.

2. Excavating, filling, backfilling, and compacting for Project site pavement, planting areas, buildings, and other structures.

3. Subgrade preparation for hardscape.

4. Excavating and backfilling trenches.

5. Shoring plan guidelines.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Section 01 71 23 - Field Engineering.

1.02 DEFINITIONS

A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

C. Borrow: Soil material obtained off site when sufficient approved soil material is not available from excavations.

D. Base Course: The layer placed between the subgrade and surface pavement in a paving system.

E. Drainage Fill: Course of washed granular material supporting slab on grade placed to cut off upward capillary flow of pore water.

F. Permeable Backfill: Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations.

G. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man made stationary features constructed above or below ground surface.

I. Utilities include underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.03 SUBMITTALS TO CONSTRUCTION MANAGER

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for the following:

1. Each type of plastic warning tape.

2. Filter fabric.

C. Test Reports: In addition to test reports required under field quality control, submit the following:

1. One optimum moisture-maximum density curve for each soil sample.

2. Laboratory analysis of each soil material proposed for fill or backfill from borrow sources.

D. Excavation support & protection (shoring) shop drawings for informational purposes: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1.04 QUALITY ASSURANCE

A. Codes and Standards:

1. 2022 California Building Code, Title 24, Part 2, Volume 2 of 2, Appendix J, Grading.

2. ASTM D422 - Method for Particle Size Analysis of Soils

3. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

4. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop.

5. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures.

6. ASTM D2922 - Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).

7. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).

8. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

9. AASHTO T217 - Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Meter.

10. ASTM D4829 - Expansion Index Test.

B. Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2021 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

C. Comply with all requirements of permit for export of soil from site. Permit is to be obtained and paid for by Contractor. Furnish copies of all permits and licenses required by the City of Whittier to Owner's representative.

D. Professional Observation: A soils engineer will be retained by the Owner for purposes of inspection, testing and approval of all work under this section. Perform work of this Section under inspection and approval of the soils engineer. Give soils engineer not less than 48 hours advance notice of readiness for inspection.

E. The soils engineer will have the authority over all filling, grading, and compaction operations, including interruption of work if deemed necessary due to improper work

F. Pre-Grading Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1. Before commencing earthwork operations, meet with representatives of the governing authorities, Owner, Architect, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

1.05 CONSTRUCTION MONITORING

A. All earthwork and foundation construction should be monitored by a qualified engineer/technician under the supervision of a Geotechnical Engineer, including;

1. Observation of all site preparations;

2. Observation of shoring installation, if needed:

3. Observation of all site excavations;

4. Test and approval of all import soil;

5. Observation of placement of all compacted fills and backfills;

6. Observation of all surface and subsurface drainage systems;

7. Observation of all foundation and pile excavations;

8. Observation of subgrade preparation for paved and building areas.

B. The Geotechnical Engineer of Record should be notified at least three (3) days in advance of the start of construction. A joint meeting between the Contractor and Geotechnical Engineer is recommended prior to the start of construction to discuss specific procedures and scheduling. The Geotechnical Engineer should be present to observe the soil conditions encountered during construction, to evaluate the applicability of the recommendations presented in the Soils Report to the soil conditions encountered, and to recommend appropriate changes in design or construction if conditions differ from those described herein. The Geotechnical Engineer of Record should inspect and approval all imported backfill material prior to its placement as backfill, approve the subgrade beneath all fills, fill placement and bottom of all foundation excavations before concrete or steel is placed.

C. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Civil Engineer at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.

1.06 IMPORT AND EXPORT OF EARTH MATERIALS

A. Fees: Pay as required by government authority having jurisdiction over the area.

B. Bonds: Post as required by government authority having jurisdiction over the area.

C. Hauling Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.07 TRUCK HAUL ROUTE

A. A proposed truck haul route is to be submitted to the City of Whittier Public Works for review and approval. Upon approval, an approved copy shall be returned to the Contractor. The Contractor shall post an approved copy on the job site. All trucks working that project shall also carry a copy. If a truck(s) is found not to be carrying an approved copy, the Contractor shall be subject to a Notice of Noncompliance (stop work order)

B. All trucks must cover their dirt with an acceptable tarp during transport for dust containment. Provisions for street sweeping and watering will also be required unless an active wheel washing facility proves that they are un-necessary to the satisfaction of the Engineer.

C. All truck haul routes, as approved, are good only for the project time period, and trucks shall have to comply with the approved route only. If during the progress of the project an alternate route is needed, the Contractor shall submit a new plan. The haul route application shall contain the following information:

1. Map showing the proposed route

2. Project name

3. Grading Contractor’s name, address and phone number

4. Type of material being hauled

5. Encroachment or construction permit number

1.08 DIG ALERT NOTIFICATION

A. Before any excavation in or near the public right-of-way, the Contractor must contact the Underground Service Alert of Southern California (Dig Alert) at 811 for information on buried utilities and pipelines.

B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.

C. Call at least Two (2) full working days prior to digging.

D. If the members (utility companies) have facilities within the work area, they will mark them prior to the start of your excavation and if not, they will let you know there is no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).

E. The Law requires you to hand expose to the point of no conflict 24" (inches) on either side of the underground facility, so you know its exact location before using power equipment.

F. If caught digging without a Dig Alert ticket you can be fined as much as $50,000 per California government code 4216.

1.09 SUBSURFACE CONDITIONS

A. Where investigations of subsurface conditions have been made by the Owner with respect to subsurface conditions, utilities, foundation, or other structural designs, and that information is shown in the Plans, it represents only a statement by the Owner as to the character of materials which have actually been encountered by the Owner's investigation. This information is only included for the convenience of Bidders.

B. Investigations of subsurface conditions are made for the purpose of design only. The Owner assumes no responsibility with respect to the sufficiency or accuracy of borings or of the log of test borings or other preliminary investigations or of the interpretation thereof. There is no guaranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the Work, or any part of it, or that unanticipated conditions may not occur. When a log of test borings is included in the Plans, it is expressly understood and agreed that said log of test borings does not constitute a part of the Contract. The log of test borings represents only an opinion of the Owner as to the character of the materials to be encountered, and is included in the Plans only for the convenience of the Bidders. Making information available to Bidders is not to be construed in any way as a waiver of the provisions of the first paragraph of this Section, and Bidders must satisfy themselves through their own investigations as to conditions to be encountered

1.10 PROJECT CONDITIONS

A. Data: Maps, boring logs, geotechnical and foundation investigation reports, and like reference data, not included in Contract Documents but made available to Contractor by Architect or Owner are for information only, and the Architect and Owner assume no responsibility for any conclusions Contractor may draw from such information. Should questions or issues arise, contact Architect or Owner for clarification.

B. Contractor shall determine existing conditions under which the Contractor will operate in performing the Work.

C. Information on Drawings does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

D. Existing utilities: Locate existing underground utilities in all areas of work prior to excavation or commencement of work. If utilities are to remain in place provide adequate means of protection during earthwork operations.

1. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult Utility Owner immediately for direction. Cooperate with Owner and Utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of Utility Company.

2. Do not interrupt existing utilities serving facilities occupied or used by Owner, or others, except when permitted in writing by Owner's Representative, and then only after acceptable temporary services have been provided.

3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut off of services if lines are active.

E. Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances.

F. Water for Grading: Contractor shall obtain and pay for all water required for his grading operation. This may include, but is not limited to, payment of deposits to utility for construction meter, and payment of all monthly service and water charges. Construction meter shall be in place throughout construction period unless alternative arrangements are made with the local water purveyor to provide construction water for all purposes. Contractor shall be aware of water moratoriums and restrictions, and shall immediately advise Owner of effects on construction schedules.

G. Existing Conditions: Prior to commencing work at site, verify agreement of existing conditions with indicated conditions. Notify Owner's Representative in writing of discrepancies found. Start of work without notification constitutes acceptance of conditions, without cause for extra compensation.

H. Shrinkage is the decrease in volume of soil upon removal and recompaction expressed as a percentage of the original in-place volume. Subsidence occurs as natural ground is densified to receive fill. These factors account for changes in earth volumes that will occur during grading. Our estimates are as follows:

- Shrinkage factor = 10%-15% for soil removed and replaced as compacted fill.
- Subsidence factor = 0.1 foot.

The degree to which fill soils are compacted and variations in the insitu density of existing soils will influence earth volume changes. Consequently, some adjustments in grades near the completion of grading could be required to balance the earthwork.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. General: All soils materials to be used throughout the site shall be approved for use by the Geotechnical testing engineer. Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.

B. No earthwork analysis has been completed with respect to the volumes of soils to be excavated, placed, or imported in order to provide the finished grades shown on the plans. The Contractor is solely responsible for verifying the earthwork quantities necessary to complete the project.

C. Satisfactory Soil Materials: In general, on-site soils consist of silty sand and are considered as suitable for use as fill. All fill soils should be free of organics, debris, rocks or lumps over three inches in largest dimension, other deleterious material, and not more than 40 percent larger than ¾ inch. Larger chunks, if generated during excavation, may be broken into acceptably sized pieces or may be disposed offsite.

D. Borrow / Imported Fill Material: Soil excavated from site or imported conforming to requirements for fill material.

1. Unless otherwise noted, any soil re-used or imported as fill for the completion of subgrade preparation should consist of predominantly "Very Low" expansive, granular material exhibiting an EI not greater than 20. Import material should also have low corrosion potential (that is, chloride content less than 500 parts per million [ppm], soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher. All fill soils should be evaluated and approved by the soil testing representative prior to importing or filling.

E. Engineered Fill: Site soils and/or import materials approved for use as fill should be placed in loose horizontal lifts not exceeding 8 inches, moisture conditioned to a minimum of one (1) percentage point above optimum moisture content per ASTM D1557-12 Test Method, unless otherwise stated.

F. Bedding Material for Trenches:

1. Bedding sand shall be as defined by Standard Specifications, Section 200-1.5, and shall be free of expansive material and organic matter. On-site soils are not considered suitable for bedding of utilities.

2. Sand providing a sand equivalent of at least 30. All of the sand bedding shall be compacted to a minimum 90 percent of maximum density as indicated in the Contract Documents by mechanical means. Flooding and jetting shall not be permitted without prior written approval from the Geotechnical Engineer. Where sheeting or shoring is used densification of the bedding shall be accomplished after the sheeting or shoring has been removed from the bedding zone, unless the sheeting or shoring is to be cut off or left in place. Pipe bedding material shall be placed in horizontal layers not exceeding (8) eight inches.

G. Backfill Material for Trenches:

1. The on-site soils have been determined to be suitable for being used for backfilling purposes in trenches. Utility trenches should be backfilled with granular materials

and mechanically compacted. Fill materials should be compacted to a minimum relative compaction of 90 percent unless indicated otherwise. The relative compaction should be determined by ASTM D1557.

2.02 ACCESSORIES

A. Detectable Warning Tape: Acid and alkali-resistant polyethylene film metallic warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.

1. Tape Colors: Provide tape colors to utilities as follows:

a. Red: Electric, Fire Water.

b. Yellow: Gas, oil, steam, and dangerous materials.

c. Orange: Telephone and other communications.

d. Blue: Water systems, with “Caution: Water Line Below.”

e. Green: Sewer systems, with “Caution: Sewer Line Below.”

f. Green: Storm systems, with “Caution; Storm Drain Line Below.”

2.03 EXCAVATION SUPPORT & PROTECTION – SHORING PLAN

A. The CONTRACTOR shall have at the Worksite, copies or suitable extracts of: Construction Safety Orders, Tunnel Safety Orders and General Industry Safety Orders issued by the State Division of Industrial Safety. The CONTRACTOR shall comply with provisions of these and all other applicable laws, ordinances, and regulations.

B. Before excavating any trench 5 feet or more in depth, the CONTRACTOR shall submit a detailed plan to the Owner showing the design of shoring, bracing, sloping, or other revisions to be made for the Workers’ protection from the hazard of caving ground during the excavation of such trench. If the plan varies from the shoring system standards, the plan shall be prepared by a registered Civil Engineer. No excavation shall start until the DISTRICT has accepted the plan and the CONTRACTOR has obtained a permit from the State Division of Industrial Safety. A copy of the permit shall be submitted to the DISTRICT.

C. The INSPECTOR will provide a competent person trench/excavation certification form to the CONTRACTOR. It shall be completely filled out before any worker has access to trench or excavation and returned to the INSPECTOR before the end of the first working day. The CONTRACTOR shall certify by this form the name of the competent person administering the Work, the soil classification, and the type of excavation protective system provided and/or installed.

D. The CONTRACTOR shall completely fence all excavations to provided protection against anyone falling into the excavation and to the satisfaction of the INSPECTOR. The fencing shall be in place at all times except when workers are present and actual construction operations are in progress.

E. The fencing material shall be chain link fabric or welded wire fabric and 6 feet high, constructed according to one of the following:

1. Tensioned fencing material and have top and bottom tension wires securely fastened to driven steel posts or other equally rigid elements at a maximum spacing of 12 feet; or

2. Untensioned fencing materials securely fastened to extended trench shoring elements at a maximum spacing of 8 feet and fastened to continuous top and bottom rails constructed of nominal 2 in x 4 in lumber or equally rigid material. Framed panels with suitable supporting elements fastened together to form a continuous fence may also be used.

F. Payment for performing all work necessary to provide safety measures shall be included in the prices bid for other items of work except where separate bid items for excavation safety are provided, or required by law.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect adjacent property and existing improvements and structures as necessary to prevent undermining, caving of cuts, and miscellaneous damage.

B. Provide cribbing, sheeting, and shoring necessary to safely retain the earth banks and protect excavations and adjoining grades from caving and other damage resulting from excavating together with suitable forms of protection against bodily injury to personnel employed on the work and the general public. Be responsible for the design, installation, and maintenance of required cribbing and shoring and shall meet the approval of the State Division of Industrial Safety and local governing agencies requirements.

C. Utility lines and structures shown shall be protected and treated as indicated. Where work not shown is encountered, report it to the Architect before proceeding with excavation. Encase active lines in sleeves where they pass through concrete; remove inactive lines as directed, and plug the remaining ends. Bear the costs for repairs to damaged or broken utilities and any damages related thereto.

D. Protect existing improvements and adjacent properties from storm damage and flood hazard originating on this project until final acceptance by the Owner. Prevent silt run-off from the limits of work in accordance with governmental requirements.

E. A minimum 6-foot high, temporary chain link fence and gates, (pair 26' wide, minimum) shall be erected prior to any grading operations at the construction limits perimeter. Coordinate the exact location with Architect and Inspector.

3.02 DEWATERING

A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Any water entering an excavation shall be immediately pumped out and the exposed excavation allowed to dry.

B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3.03 GRADE STAKES

A. The Contractor's Surveyor will set grade stakes. The Surveyor shall be a California registered land surveyor or licensed Civil Engineer. The Surveyor shall be hired and paid by the Contractor, and shall be subject to the approval of the District. Contractor shall notify the District at least 48 hours before staking is to be started. The District will determine if work is ready for staking.

B. All work shall conform to the lines, elevations, and grades shown on the Construction Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.

C. Protect and maintain stakes in place until their removal is approved by the District. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.

D. Grades for underground conduits will be set at the surface of the ground. The Contractor shall transfer them to the bottom of the trench.

3.04 EXCAVATION

A. In preparation for grading, the construction areas should be cleared of surface vegetation, concrete, pavement and any loose surficial soils. Any unsuitable material encountered should be properly disposed of and not incorporated into any new fill.

B. Excavate to the depths, lines and grades indicated on the approved Grading Plan. Excavate sufficiently over-size to permit installation and removal of concrete forms and other required work. Should soil of inadequate density and bearing capability be encountered at the elevations indicated on the drawings, or where new fill is to be placed upon existing loose fill material exposed by excavation, the excavation shall be carried to the depth required to attain soil of bearing quality as determined by the Geotechnical Engineer.

C. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for asphalt concrete pavement and concrete pavement structural sections, have been achieved prior to re-compaction.

D. Should footing excavations exceed required dimensions or should sloughing occur, fill such extra space with concrete at no additional cost to the contract. If unsuitable material is found at the indicated depths, immediately notify the Inspector.

E. Notify the Inspector 48 hours before foundation excavations are ready for inspection.

F. The bottoms of footings shall be free of loose material, debris, and water before concrete is placed.

G. Cut banks shall be neatly trimmed to the required finish surface as the cut progresses, or the Contractor shall have the option of leaving the cuts full and finish grading by mechanical equipment which shall produce the finish surfaces as shown on the Drawings.

H. Surplus earth not needed for filling and grading shall be disposed of in a legal manner off the site.

I. All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act of 1970, and the Construction Safety Act should also be followed.

J. Bills of lading or equivalent documentation will be submitted to the IOR on a daily basis.

K. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

L. All retaining wall footing areas shall be undercut, moistened, and compacted as necessary to produce soils compacted to a minimum of 90% relative compaction to a depth of 2 feet below the bottom of the footing. Footing areas shall be defined as the area extending from the edge of the footing for a distance of 3 feet into the site.

M. The exposed soils beneath all overexcavation should be scarified an additional 12 inches, moisture conditioned and compacted to a minimum of 90% relative compaction.

3.05 HAZARDOUS MATERIALS

A. All import fill material shall be characterized, handled, and documented in accordance with applicable US EPA and State of California hazardous waste and hazardous materials regulations.

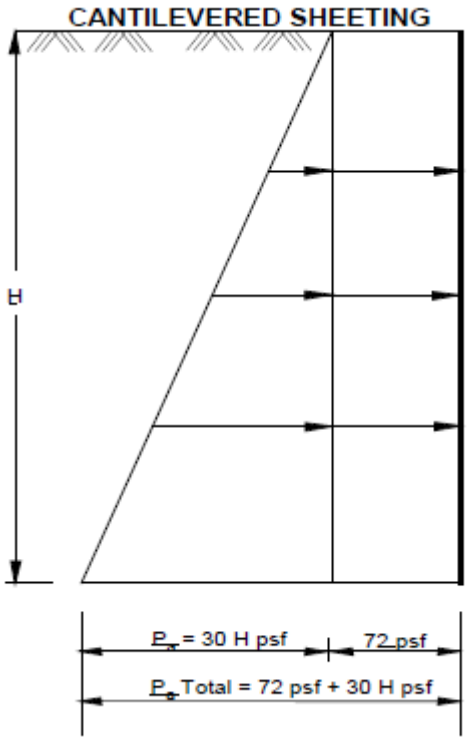
B. "Contaminated" shall mean any soil or geotechnical material at a concentration, which would require disposal at a regulated facility (i.e., California hazardous or RCRA hazardous).

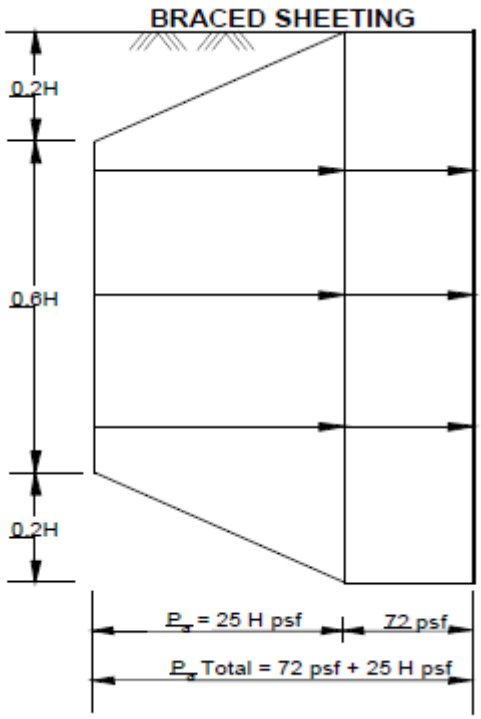
C. Owner's Authorized Representative (OAR) must be notified at least 72 hours prior to the disposal of any hazardous waste or hazardous material. No material disposal or reuse can take place without prior written approval of the OAR.

D. Replacement of earth material, that has been removed due to hazardous waste reasons, shall be placed back to meet the requirements of Section 2.01, E – Engineered Fill.

3.06 TEMPORARY SLOPES

A. Temporary excavations in existing alluvial soils may be safely made at an inclination of 1:1 or flatter. If vertical sidewalls are required in excavations greater than 4 feet in depth, the use of cantilevered or braced shoring is recommended. Excavations less than 4 feet in depth may be constructed with vertical sidewalls without shoring or shielding. Our recommendations for lateral earth pressures to be used in the design of cantilevered and/or braced shoring are presented below. These values incorporate a uniform lateral pressure of 72 psf to provide for the normal construction loads imposed by vehicles, equipment, materials, and workmen on the surface adjacent to the trench excavation. However, if vehicles, equipment, materials, etc., are kept a minimum distance equal to the height of the excavation away from the edge of the excavation, this surcharge load need not be applied.





B. Periodic observations of the excavations should be made by the geotechnical consultant to verify that the soil conditions have not varied from those anticipated and to monitor the overall condition of the temporary excavations over time. If at any time during construction conditions are encountered which differ from those anticipated, the geotechnical consultant should be contacted and allowed to analyze the field conditions prior to commencing work within the excavation.

3.07 EXCAVATION, BACKFILL & COMPACTION FOR UTILITIES

A. Field conditions may require deviations from information indicated on Drawings. Such changes in work shall be covered by a Change Order, indicating an increase or decrease in the Contract sum.

B. Before excavation, Contractor shall contact the "Underground Service Alert of Southern California" (USASC) for information on buried utilities and pipelines.

C. When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit. The Engineer shall be given the opportunity to inspect the existing pipe or conduit before connection is made. Any adjustments in line or grade which may be necessary to accomplish the intent of the plans will be made, and the Contractor will be paid for any additional work resulting from such change in line or grade.

D. Trenches, ditches, pits, sumps, and similar items which are outside the barricaded working area shall be barricaded to conform to Cal OSHA standards.

E. Trenches over 5'-0" in depth shall conform to the Construction Safety Orders of the California Division of Industrial Safety, see Section 2.3 EXCAVATION SUPPORT & PROTECTION – SHORING PLAN.

F. Safe and suitable ladders which project 2 feet above the top of the trench shall be provided for all trenches over 4 feet in depth. One ladder shall be provided for each 50 feet of open trench, or fraction thereof, and be so located that workers in the trench need not move more than 25 feet to a ladder.

G. Where indicated and/or required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.

H. Backfill over excavations to the required elevations with earth, gravel, sand, or concrete and compact as required. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. Slope adjacent grades away from excavations to minimize entry of water.

I. Do not excavate trenches parallel to footings closer than 18" from the face of the footing or below a plane having a downward slope of 2 horizontal to one vertical, from a line 9" above bottom of footings.

J. If soft, spongy, unstable, or other unsuitable material is encountered upon which the bedding material or pipe is to be placed, this material shall be removed to a depth ordered by the Engineer and replaced with bedding material suitably densified. Additional bedding so ordered, over the amount required by the Plans or Specifications, will be paid for as provided in the Bid. If the necessity for such additional bedding material has been caused by an act of failure on the part of the Contractor or is required for control of groundwater, the Contractor shall bear the expense of the additional excavation and bedding.

K. Unless indicated otherwise on the plans are within this specification, excavate trenches to the required depths for utilities, such as pipes, conduit and tanks, with minimum allowances of 6 inches at the bottom and 6 inches at the sides for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Maximum allowances at the sides for trenching shall be 12 inches. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.

L. Where portions of existing structures, walks, paving, etc. must be removed or cut for pipe or conduit installation, replace the material with equal quality, finished to match adjacent work.

M. Provide a minimum clear dimension of 6 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and/or tanks.

N. DO NOT place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.

O. Bedding material immediately around a utility line and to a point 12 inches above the line should consist of sand, fine-grained gravel, or cement slurry to support the line and protect it.

P. Bedding zone shall be defined as the area containing the material specified that is supporting, surrounding, and extending to 12″ (inches) above the top of pipe.

Q. Bedding material shall first be placed on a firm and unyielding subgrade so that the pipe is supported for the full length of the barrel. There shall be 6″ (inch) minimum of bedding below the pipe barrel and 1″ (inch) clearance below a projecting bell for sewer, storm drain and water pipe. The material in the bedding zone shall be placed and densified by mechanical compaction only.

R. Mechanically compacted backfill shall comply with section 306-1.3.2 of the Standard Specifications for Public Works Construction.

S. Above the bedding, up to finished subgrade at areas other then landscape areas and up to one foot below flatwork and pavements, utility trenches should be backfilled with granular materials and mechanically compacted to at least 90%.

T. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.

U. Fill voids with approved backfill materials as shoring bracing and sheeting is removed.

3.08 INSPECTION & TESTING AT TRENCHES

A. Pipe will be inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the Engineer and shall be at NO cost to the Owner.

B. The Inspector or Geotechnical Engineer will inspect all subgrades and excavations prior to placing bedding & backfill materials.

C. DO NOT place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.

D. Utility backfill compaction test shall be performed in accordance with ASTM D1557, method "C".

E. Utility backfill in place density test per ASTM D 1556 (sand cone) or other test method as considered appropriate by the Geotechnical Engineer.

F. Hydrostatic pressure tests shall be done only after backfill has been placed and final compaction has been achieved.

3.09 APPROVAL OF SUBGRADE

A. Notify Geotechnical Engineer when excavations have reached required over-excavation subgrade.

B. When Geotechnical Engineer determines that unforeseen unsatisfactory soil is present, continue work only after receiving direction from the Contracting Officer.

C. Reconstruct subgrades damaged by rain, accumulated water or construction activities as directed by the Soils Engineer.

3.10 UNAUTHORIZED EXCAVATION

A. Fill of unauthorized excavation below bottoms of foundations or wall footings will be engineered fill.

B. Fill unauthorized excavations under other construction as directed by the Soils Engineer.

C. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Geotechnical Engineer.

3.11 STORAGE OF SOIL MATERIALS

A. After the site has been stripped of all debris, vegetation and organic materials, excavated on site soils may be reused as engineered fill provided they meet the satisfactory soils material conditions in Section 2.01, part D. High in-site moisture contents will require aeration prior to placement as engineered fill.

B. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees. Cover to prevent wind-blown dust.

3.12 PLACEMENT OF ENGINEERED FILL

A. Compaction Testing:

1. The Geotechnical Engineer's representative shall observe the excavation, filling, and compacting operations and shall make density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or moisture content of any layer of fill or portion thereof does not meet the specified density or moisture content, the particular layer or portions shall be reworked until the specified density and moisture content have been obtained.

2. Sampling and testing of materials for determination of compliance with the specified compaction requirements will be conducted by the Geotechnical Engineer's representative at any location and time as the Owner may determine.

3. The Contractor shall be responsible for excavation of the test pits and for providing and installing any shoring, ladders, or other equipment necessary to protect the

testing personnel. The Contractor shall also suspend operations as necessary and at no cost to the owner for the purpose of conducting such testing.

4. Test pits shall be excavated in the backfill by the Contractor as directed by the Engineer for the purpose of testing the backfill compaction. At the option of Engineer, density tests may be taken on a lift of compacted backfill immediately before placing the next lift.

5. Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the one-year warranty period will be considered to be caused by improper compaction methods and shall be corrected at the Contractor's expense. Structures damaged by settlement shall be restored to their original condition by the Contractor at the Contractor's expense.

6. When initial compaction testing performed by the Engineer indicates the required density has not been obtained, the Contractor shall re-compact or replace the backfill as necessary to meet the specified minimum density.

7. The Contractor shall be responsible for rescheduling compaction testing with the Engineer and shall bear all costs for subsequent retesting in the areas of noncompliance. Costs associated with retesting and scheduling delays shall be the sole responsibility of the Contractor. The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Owner and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

3.13 BACKFILL - GENERAL

A. Backfill excavations promptly, but not before completing the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Surveying locations of underground utilities for record documents.

3. Testing, inspecting, and approval of underground utilities.

4. Concrete formwork removal.

5. Removal of trash and debris from excavation.

6. Removal of temporary shoring and bracing, and sheeting.

7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.14 GRADING

A. Rough & Fine Grading: Rough grade area sufficiently high to require cutting by fine grading.

B. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between existing adjacent grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
3. Grade area for paving to a depth below finish grades indicated, equal to base and pavement thickness to be constructed.
4. Cut banks neatly to required finish grades as cut progresses, or leave cuts full and finish grading by mechanical equipment, which will produce finish grades indicated on Drawings.
5. Grade filled banks full and compact beyond grade of finish bank so that when trimmed to finish grades, soil is compacted to density specified for final slope face.
6. Bring areas to be graded to approximate finish grades and then scarify, moisten and roll to obtain required density. Scarify, moisten and roll resulting high and low areas to obtain required finish grades by cutting and filling.
7. Grade future planting areas so that, upon cultivation and fertilization, they will conform to finish grades indicated for planting areas.
8. Protect all utilities.

C. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Building pad tolerance plus or minus ½ inch (0.05-foot).
2. Lawn or Unpaved Areas: Plus or minus (0.10-foot).
3. Walks: Plus or minus (0.04-foot).
4. Pavements: Plus or minus (0.04-foot).

D. Grading Inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10-foot straightedge.

3.15 FIELD QUALITY CONTROL

A. The CONTRACTOR shall provide an independent approved California Department of Health Services certified testing laboratory, to perform sampling and testing of import/export fill materials in accordance with the terms as specified in Section 01 31 32: Import Materials Testing.

B. A Geotechnical Engineer, designated by the Owner, will be engaged to perform continuous inspection of the placing and compacting of all fills and backfills within the limits of grading of this project. All work shall be done in accordance with the approved plans and these specifications and as recommended and approved by the Geotechnical Engineer. Revised recommendations relating to conditions differing from the approved soils engineering and engineering geology reports shall be submitted to the owner, inspector, architect and the civil engineer. Costs for all such inspections and tests shall be paid by the Owner. The Contractor shall be responsible for notifying the Geotechnical Engineer in advance so that he may be present to perform his services as needed.

C. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Architect at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.

D. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.

1. Perform field in-place density tests according to ASTM D 1556 (sand cone method) or other test method as considered appropriate by Geotechnical Engineer.

a. Field in place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.

b. When field in place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.

2. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in place density test for each 150 feet or less of trench, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

F. Owner’s inspector will inspect foundation excavations when completed and ready for forms, after forms are in place, and before first placement of concrete.

3.16 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and re establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.

C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 31 20 00

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. PVC coated chain link fences and gates as indicated.

A. Related Requirements:

1. Division 01 - General Requirements.

2. Section 03 30 00_- Cast-in-Place Concrete.

3. Section 31 10 00 – Site Clearing.

4. Section 31 22 00 - Grading.

5. Section 31 23 16 - Excavation and Fill for Paving.

6. Section 32 01 17 - Pavement Repair.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation conference: conduct conference at Project Site.

1. Review required testing, inspecting, and certifying procedures.

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1.3 SUBMITTALS

A. Shop Drawings: Submit dimensioned plans and details indicating extent of fences, locations of gates, and details of attachment and footings for each type of fence and gate assembly. Indicate means and methods for surface preparation and finishing.

1. Include plans, elevations, sections, details, and attachments to other work.

2. Include accessories, hardware, gate-operation, and operational clearances.

B. Product Data: for each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Fence and gate posts, rails, and fittings.

b. Chain Link Fabric, reinforcements, and attachments.

C. Certifications: Manufacturers material certifications in compliance with the ASTM standards referenced in this Section.

D. Product Certificates: For each type of chain-link fence, and gate.

E. Product Test Reports: For framework strength according to ASTM F1043, for tests performed by a qualified testing agency.

F. Field Quality Control Reports.

G. Sample Warranty: for Special Warranty.

1.4 REFERENCES

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

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

C. ASTM A824 – Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence.

D. ASTM F552 - Standard Terminology Relating to Chain Link Fencing.

E. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

F. ASTM F567: Standard Practice for Installation of Chain Link Fence.

G. ASTM F626 - Standard Specification for Fence Fittings.

H. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric.

I. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.

J. ASTM F934 - Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.

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

L. ASTM F1184: Standard Specification for Industrial and Commercial Horizontal Slide Gates.

M. ASTM F1664 – Standard Specification for Poly Vinyl Chloride (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence.

N. ASTM F2200 - Standard Specification for Automated Vehicular Gate Construction.

O. UL 325 - UL Standard for Safety Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specialized in manufacturing chain link fence products with at least five years of experience.

B. Fence Installer: Company with demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and with at least five year experience.

C. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.7 WARRANTY

A. Special Warranty: Manufacturer and installer agree to repair or replace components of chain-link fences and gates that fail in materials and/or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

b. Faulty operation of gates-operators and hardware

2. Warranty Period: Five Years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Chain Link Fence and gate Frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7.

1. Design Wind Load: As indicated on Drawings. If not indicated on drawings design wind load shall be 80 MPH (129 km/h)

B. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

2.2 SUSTAINABILITY REQUIREMENTS

A. Comply with applicable provisions in the CGBC.

B. Recycled Content of Steel Products: Recycled content not less than 20 percent.

2.3 CHAIN LINK FABRIC

A. General: Provide fabric in one piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI product manual" and requirements indicated below:

1. Fabric Height as shown on the drawings.

2. Steel Wire for Fabric: Wire Diameter of not less than 0.149 inch (3.7948 mm), 9 gage.

a. Galvanized Chain Link Fabric: Conforming to ASTM A392, Type II, Class 2 zinc coating, 2.00 ounces minimum per square foot (610 g/sq. m) of uncoated wire surface, hot-dipped galvanized after weaving, and with top and bottom edges knuckled (kk).

b. Tie wires and hog rings shall conform to ASTM F626, and shall be 9 gage and galvanized.

3. Selvage:

a. Fabric not more than 72 inches (1830 mm) high knuckled at both selvages.

b. Fabric more than 72 inches (1830 mm) high knuckled top and twisted bottom.

B. Polymer Coated Chain Link Fabric: Galvanized fabric material, tie wires and hog rings shall be as specified on part 2.3A.2 above, with polymer coating conforming to ASTM F668, Class 2b, fused and adhered. Color shall be in compliance with ASTM F934.

C. Chain Link Fabric Requirements:

1. Fabric for perimeter fencing and interior fencing shall be 0.1494 inch (3.7948 mm) 9 gage woven wire with 1-inch (50 mm) mesh size, unless otherwise specified.

2. For perimeter fences 16 feet high, the upper 8 feet of fabric may be 11 gage.

3. Fences 12 feet high or less shall be furnished with single width fabric.

4. Fabric for fencing on top of handball court shall be 9 gage wire minimum with 1 inch mesh.

5. Fabric for fencing of tennis courts shall be full height, single width, 9 gage by 1-3/4 inches mesh chain link fabric.

6. Installed fence fabric shall be free from barbs, icicles, or other projections. Fence fabric with such defects will be deemed defective Work.

2.4 STEEL FENCE FRAMEWORK

A. Posts, Top Rails, Brace Rails and Gate Frames: Standard weight, galvanized, welded steel pipe conforming to ASTM F1083, Group IA Heavy Industrial Fence Framework, with a minimum yield strength of 30,000 psi. Minimum 1.8 Oz/ft2 hot dipped zinc coating average for interior and exterior.

B. Polymer Coated Framework: PVC coating fused and adhered to the exterior zinc coating of the post or rail. PVC coating shall have a minimum thickness of 10 mils per ASTM F1043. Color shall be per ASTM F934 and shall match fabric.

C. Schedule of Posts, Rails, Bracings and Footings: Unless indicated otherwise on the drawings, shall be of sizes indicated on the following schedule.

Item	Height	Nominal Pipe Size (inches)	Outside Diameter (inches)	Weight (pounds per foot)	Footings	
					Diameter(inches)	Depth (inches)
Top Rail, Brace Rails and Transom Rails	Up to 10′-0″	1-5/8	1.660	2.27	N/A	N/A
	10′-1″ to 16′-0″	1-7/8	1.900	2.72	N/A	N/A
Line Posts	Up to 6′-0″	2-3/8	2.375	3.65	12	24
	6′-1″ to 8′-0″	2-3/8	2.375	3.65	12	36
	8′-1″ to 10′-0″	2-7/8	2.875	5.80	12	36
	10′-0″ to 16′-0″	3-1/2	3.5	7.58	14	60
	14′-0″ to 16′-0″	4	4.000	9.12	14	60
Terminal, Corner, Angle & Pull Posts	Up to 8′-0″	2-1/2	2.875	5.79	12	36
	8′-0″ to 10′-0″	2-1/2	2.875	5.79	14	42
	10′-1″ to 16′-0″	3	3.5	7.58	14	60
Pedestrian Gate Posts	Up to 8′-0″	2-1/2	2.875	5.79	14	36
Gate Frames	Up to 8′-0″	1-1/2	1.900	2.72	N/A	N/A
Driveway Double-Leaf Swing Gate Posts: Opening						
Up to17'-3-1/2"	Up to 8′-0″	3 1/2	4	9.11	16	42
17'-4" to 20'-3-1/2"	Up to 8′-0″	3-1/2	4	9.11	16	42

2.5 FITTINGS

A. Fittings shall be malleable iron conforming to ASTM F626.

B. Post Caps: Designed to fit snugly over posts with a minimum projection of 1-1/2 inches below top of posts. Post caps shall be manufactured with a curved top.

C. Eye Tops: Designed to fit over line posts, and for through passage of top rail.

D. Expansion Sleeve Couplings for Top Rails: Steel, 6 inches long, designed to fit tightly on inside of rail, fitted with raised center.

E. Rail Ends for Top Rails and Brace Rails: With holes to receive 3/8 inch bolts for securing to rail end bands.

F. Tension Bands and Bands for Securing Rail Ends: Mild steel flats, at least 11 gage x one inch, tension bands in gates shall be 11 gage by 1 inch. Bolts for use with tension bands and rail end bands shall be galvanized machined 3/8 inch by 1 ½-inch.

G. Tension Bars: Mild steel flats at least 3/16 inch by 3/4 inch.

H. Polymer Coated Fittings: In conformance with ASTM F626. Polymer coating minimum thickness 0.006 inch, fused and adhered.

2.6 FITTINGS

A. Fittings shall be malleable iron conforming to ASTM F626.

B. Post Caps: Designed to fit snugly over posts with a minimum projection of 1-1/2 inches below top of posts. Post caps shall be manufactured with a curved top.

C. Eye Tops: Designed to fit over line posts, and for through passage of top rail.

D. Expansion Sleeve Couplings for Top Rails: Steel, 6 inches long, designed to fit tightly on inside of rail, fitted with raised center.

E. Rail Ends for Top Rails and Brace Rails: With holes to receive 3/8 inch bolts for securing to rail end bands.

F. Tension Bands and Bands for Securing Rail Ends: Mild steel flats, at least 11 gage x one inch, tension bands in gates shall be 11 gage by 1 inch. Bolts for use with tension bands and rail end bands shall be galvanized machined 3/8 inch by 1 ½-inch.

G. Tension Bars: Mild steel flats at least 3/16 inch by 3/4 inch.

H. Polymer Coated Fittings: In conformance with ASTM F626. Polymer coating minimum thickness 0.006 inch, fused and adhered.

2.7 TENSION WIRE

A. 6 gage marcelled steel wire conforming to ASTM A824, Type II Class 5 zinc coated, 2.0 ounces minimum per square foot of uncoated wire surface. Wavy type wire is not acceptable.

B. Polymer Coated: Galvanized tension wire shall be as specified on above paragraph, with polymer coating conforming to ASTM F1664. Color shall match fabric and shall be in compliance with ASTM F934.

C. Turnbuckles for installation with Tension Wires: Eye and hook type, drop forged steel, right and left hand threads, at least 3/8 inch screw diameter with at least 4 ½-inches of take-up.

2.8 PAINT FOR GALVANIZING REPAIR

A. Paints for Refurbishing Galvanizing: Organic zinc-rich paint conforming to ASTM A780. Paints used on the site shall be approved by OWNER's Office of Environmental health and Safety (OEHS).

2.9 GROUT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications "Rapid set Cement".

2.10 GATES

A. Accessibility Requirements:

1. Fences, Gates, and Hardware:

   a. Gates that are part of the accessibility route shall meet all the requirements of an accessible door in compliance with CBC Section 11B-404.

   b. The Levers of lever actuated latches or locks for accessible gates shall be curved with a return to within ½" of the gate surfaces to prevent catching on clothing or persons. California Referenced Standards Code. T-24 Part 12, Section 12-10-202, Item (F).

   c. Swing Doors and Gate Surfaces within 10" of the finish floor or ground shall have a smooth surface on the push side extending the full width of the door or gate. Parts creating horizontal or vertical joints in these surfaces shall be withing 1/16" of the same plane as the other and be free of sharp or abrasive edges. Cavities created by added kick plates shall be capped. CBC Section 11B-404.2.10.

B. General:

1. Gate framework shall be fabricated of tubular steel of sizes indicated on the drawings and conforming to ASTM F1083, Group IA, with a minimum yield strength of 30,000 psi. Joints at corners shall be miter cut and continuously welded to sides.

2. Install fence fabric to side members with tension bars and tension bands as specified, spaced not more than 14 inches apart. Tension bars shall extend full height of gate. Install fence fabric to top and bottom members and to brace rail with wire ties as specified for top rails, spaced not more than 12 inches apart. Chain link fabric shall match adjacent fence system.

3. Latches and Hinges: Weld gate latches and strikes to gate posts and frames. Weld hinges to posts. Weld 3 hinges on each post for swing gates more than 16 feet wide or as specified on drawings.

Welding shall be performed before gate frames are galvanized, or welds shall be finished as specified below.

4. Grind welds flush and smooth. Hot-dip galvanize fabricated parts after welding, or be protected by zinc-rich paint in conformance to ASTM A780.

5. Electrically operated gates shall be manufactured and installed in accordance with the safety requirements of ASTM F2200 and UL325.

C. Swing Gates: Galvanized steel welded fabrication in conformance with ASTM F900, fabric size and gage shall match fence. Hardware as indicated on the drawings or if not indicated provide positive locking gate latch fabricated of 5/16 inch thick by 1 ¾ inch pressed steel galvanized after fabrication. Weldable hinges.

D. Horizontal Overhead Slide Gates: Shall be in conformance to ASTM F1184 Type I. Positive locking gate latch shall be fabricated of 5/16 inch thick by 1 ¾ inch pressed steel galvanized after fabrication. Provide manufacturer's standard overhead support beam/structure, track, rollers and accessories to support gate panel. The overhead support beam/structure shall be galvanized or shall receive proper corrosion protection.

E. Cantilever Slide Gates: Shall be in conformance to ASTM F1184 Type II, Class 1. Positive locking gate latch shall be fabricated of 5/16 inch thick by 1 ¾ inch pressed steel galvanized after fabrication. Provide manufacturer's standard overhead beam/structure, track, rollers and accessories to support gate panel. Gates shall be designed and fabricated to open or close by applying an initial pull force no greater than 40 pounds. Positive locking latch fabricated of galvanized pressed steel. Galvanized steel drop bars shall be provided on with double gates. Provide safety protective guards for top and bottom external rollers.

F. Cantilever Internal Roller Gates: Shall be in conformance to ASTM F1184 Type II, Class 2. Length of back frame support section shall be a minimum of 40 percent of the opening. Slide gates shall comply with the performance deflection criteria listed in ASTM F1184. Gates shall be designed and fabricated to open or close by applying an initial pull force no greater than 40 pounds. Internal truck assemblies shall be designed to handle the forces required for gate size opening and height. Polymer coated gate frames and gateposts shall match the coating type and color specified for the fence framework. Moveable parts such as hinges, latches and drop rods shall be field coated using a liquid polymer touch up.

2.11 PRIVACY FENCE SLATS (where indicated on the drawings)

A. Flat tubular shape with bottom lock track fabricated of PVC material with UV inhibitors.

B. Privacy Percentage Factor: 75% min.

2.12 CONCRETE

A. Comply with requirements of Section 03 30 00, Cast-in-Place Concrete. Provide normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3,000 psi, 4-inch slump, and one inch maximum size aggregate.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to the following Sections for earthwork related work:

1. Section 31 2200 - Grading.

2. Section 31 2316 - Excavation and Fill for Paving.

3. Section 32 0117 - Pavement Repair.

3.2 FRAMEWORK INSTALLATION

A. Install fences as indicated on Drawings.

B. Space fence posts at equal intervals between terminal, angle, corner, and gate posts, and not more than 10 feet apart measured from center to center of posts. In curved fence sections having a radius of 50 feet or

less, space posts not more than 5 feet - 6 inches apart. Install posts so that top of eye of post caps are level with top of fabric.

C. Install angle or corner posts at each change in direction of 15 degrees or more, at change of 5 percent or more in grade of fencing, and at the beginning and end of curved fence sections.

D. Install terminal posts at ends of runs of fencing. Install gateposts on both sides of driveway and pedestrian gates. For double-leaf gates, net opening between gate posts shall be gate size as indicated on Drawings, plus 3 ½-inches; for single leaf gates, net opening shall be gate size plus 2 ½-inches.

E. Embed posts into footing 6 inches less than the depth of the footing unless noted otherwise on drawings.

F. Where a fence is to be installed on a curb, construct footings with top of footing level with the lower finish grade. Align posts, set plumb and true before placing footings. Remove splattered concrete from exposed pipe surfaces while concrete is still soft. In bituminous surfaced areas, install seal coat on top of concrete footings.

G. Install fences with top rail. Top rail shall pass through eye tops and be secured at ends with rail-end fittings and bands.

H. Install fences over 10 feet in height, in addition to top rail, with a full length horizontal mid-rail set at mid-height of fence and rigidly secured to posts with rail end fittings and bands.

I. In fences higher than 10 feet, install brace rails at angles, corners, and terminals at 1/4 and 3/4 of fence height. Provide one horizontal brace rail in panels adjacent to terminal, angle, corner, and gateposts, install at mid-height of fence and rigidly secured to posts with rail end fittings and bands. Provide horizontal brace rails, as specified, in panels of curved sections having a radius of 50 feet or less. Brace rails are not required in fencing 4 feet or less in height.

J. Provide a transom rail and fabric at top of pedestrian gate openings. Install transom rail 6 feet 8 inches above high point of grade at gate opening. Ends of transom rails shall be pinned or riveted to rail end fittings with 1/4 inch mild steel rivets. Pin or rivet shall go through rail and peen. Welding on rail ends is not permitted.

K. Install bottom tension wire a minimum of 3 inches from grade for fencing and secure to fence posts with ties. Provide a turnbuckle for each 150 feet of wire or fractional part thereof. Turnbuckles are not required in runs of 15 feet or less. Install ends of tension wires to posts in a manner to prevent slipping or loss of tension. Wrap should start from fence side of post. Turn end of wire around post tightly twisted at least

three times around wire. At turnbuckles, wire through eye and tightly twist end at least three times around wire. Cut tail of bottom wire flush.

3.3 CHAIN LINK FABRIC INSTALLATION

A. Install fence fabric on outward facing side of posts, except for tennis courts. Install fence fabric with top edge projecting above top rail of fence.

B. Install bottom of fence fabric to clear finish grades, except on bituminous surface install 3/4 inch above such surface. Locally shape and trench ground surfaces where necessary to provide uniform top and bottom alignment of fence.

C. Tightly stretch fabric and at terminal, pull corner, angle, and gateposts, secure with tension bars extending full height of fence. Secure tension bars to posts with bolted tension bands spaced not more than 14 inches apart.

D. Bands and Ties: Install bands and ties in accordance with following schedule:

15 bands on 16 feet fence	16 ties on 16 feet fence
11 bands on 12 feet fence	12 ties on 12 feet fence
7 bands on 8 feet fence	7 ties on 8 feet fence
6 bands on 6 feet fence	6 ties on 6 feet fence
4 bands on 4 feet fence	4 ties on 4 feet fence

E. Fasten fabric to line posts with wire ties spaced not more than 16 inches apart. Where 6 gage aluminum ties are furnished, hook the tie at both ends. Installation of hooked ties with links is not permitted.

F. Fasten fabric to top rails, mid-rails, brace rails, with wire ties spaced not more than 18 inches apart. Bend back ends of tie wires so as not to be a hazard. At bottom tension wire, install hog rings spaced not more

than 18 inches apart. Where 2 fabrics are furnished, lap the fabrics one mesh at mid-rail and tie both fabrics with 9 gage wire or 6 gage aluminum ties to midrails.

3.4 WELD GRINDING

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

3.5 FIELD AND COURT FENCING

A. Tennis Courts: Perimeter fences for tennis courts shall not be less than 12 feet in height. Instead of providing bottom tension wire, provide with horizontal bottom rail. Remove bottom tension wire or redwood header in existing chain link fences and add bottom rail, if not existing. Install fabric on courtside of posts.

B. Handball Courts: Posts, rails, chain link fabric and accessories required for a complete installation shall be as specified, except that chain link fabric shall be 9 gage wire minimum by 1 inch mesh.

C. Baseball and Softball Fields: Chain link fabric for the field fence and backstop shall be installed on the field side. Chain link fabric for batting cages shall be installed on the inner side of the cage. Chain link fabric for the batting cages and backstop hood shall be installed over the framework structure.

3.6 INSTALLATION ON TOP OF CONCRETE WALLS

A. Posts for fences on top of new concrete or concrete masonry walls shall be installed in 24 gage galvanized iron inserts one inch larger than the outside post diameter. Wall thickness for such installation shall be 8 inches minimum. Depth of embedment of post shall not be less than 15 inches for fence height not exceeding 4 feet. Install post plumb, true, and fill joint space with non-shrink grout, finished flush with top of wall. Remove excess grout and clean posts.

B. Fencing on Gravity Walls: Post of fence not exceeding 8 feet high shall have a minimum of 15 inches embedment in gravity walls with a top width of 10 inches minimum and side of 1H: 4V. Where the height of gravity wall from top to bottom, within 5 feet from each side of a post, is less than 22 inches, provide

concrete fence post footings and embed posts in accordance with the schedule of posts and footings as set forth in this section.

C. Do not install footings on existing walls without the review of the ARCHITECT.

3.7 HORIZONTAL APPLICATIONS

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

3.8 ALTERATIONS TO EXISTING FENCING

A. Resetting Fences:

1. Existing fences shall be reset where finish pavement is raised or lowered more than 6 inches from existing grade. Remove and reinstall entire fence assembly as specified in this Section.

a. Where the finish grade is raised 6 inches or less, cut and re-knuckle the existing fence fabric. Adjust tension wire and tie to fabric. Bottom of fence fabric shall be installed ¾" above finish grade.

b. Where the finish pavement is lowered 6 inches or less, demolish the fence footing flush with the finish grade and adjust the fabric and its attachments. Bottom of fence fabric shall be installed ¾ inches above finish grade.

2. Where existing fencing posts are indicated to be removed, reset or relocated, remove posts including their concrete footings

a. Fill footing cavity with sand, compact and cap surface matching existing adjacent material.

b. Construct new concrete footings, as specified, in their designated location and set posts as indicated above in Framework Installation Article.

3. Bent posts, rails and accessories shall be replaced with new parts as specified to complete reinstallation. New materials shall closely match design of existing installation. Cut bent portion of

posts and weld new sections of equal diameter and thickness. Install splice to inside of all welded section prior to welding. Previously repaired or welded posts shall be replaced.

4. Top rail is required in reinstalled fencing which does not have top rail in its existing condition. Install as specified for new installations.

5. Fabric Removal: Do not remove more than what can be replaced during one day unless a barricade, providing equal security, will be installed in its place. If freestanding temporary fence is used, it shall be clamped and wrap tied.

6. Remove and dispose of off-site concrete debris, chain link, hardware and accessories. Use new hardware and accessories.

7. Gates:

   a. Remove non-welded type existing hinges and replace with OWNER provided weldable hinges. On existing welded hinges remove bolts and replace with new. Remove existing latches and replace with new.

   b. Weld gate latches and hinges to posts as indicated for new fencing.

B. Painting: Disassemble existing fence and all attachment hardware (bands, pipe, and wire) prior to preparation of posts for painting. Replace attachment hardware with new.

1. Preparation: Prepare exposed steel posts, rails and accessories thoroughly cleaned of rust, oil and foreign materials. Painted galvanized metal shall be stripped to bare metal before applying prime coat.

2. Priming: Spot prime areas from which the original surface coating had been removed with a metal primer to match adjoining surfaces. Subsequently, install a prime coat to the entire surface to be painted.

3. First Coat: Install first coat as recommended by the paint manufacturer. Furnish a color that is 10 percent to 15 percent lighter or darker than the finish coat.

4. Second or Finish Coat: Install finish coat after the first coat has cured.

5. Install paint in accordance with manufacturer's written recommendations.

6. Protect adjacent structures, walls, concrete or asphalt from paint.

3.9 INSTALLATION OF GATES

A. Provide gates of the sizes indicated on Drawings. Allow clearance on gates of 1-1/2 inches at bottom and one inch at top. Construct gates installed in sloping areas to conform to the grade. Provide an opening in each gate for access to locking device or padlock. Knuckle ends of fabric cut for opening to eliminate hazards.

B. Sliding Gates and Swing Gates: Fabricate and install as indicated on Drawings. Wheel housing shall be designed to fit tightly to roll track and prevent gate from rolling over objects. Unsupported cantilever type roll gates are not acceptable. Install gate stops in accordance with the drawings. Both top and track stops are required.

3.10 COMPLETION

A. Completed fencing shall form continuous units between points indicated with required parts, accessories, and fittings provided and installed. Clean exposed metal surfaces of cement, grout and other foreign substances.

B. Fill in holes left by removal of existing fence footings, except in areas where grading Work is indicated or specified, to existing grade with clean earth thoroughly compacted to at least same density as adjoining soil.

3.11 PROTECTION

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

3.12 CLEANUP

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

END OF SECTION

SECTION 32 84 00 PLANTING IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Piping.
2. Manual valves.
3. Automatic control valves.
4. Sprinklers.
5. Quick couplers.
6. Boxes for automatic control valves.

1.2 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For irrigation systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Zoning Chart: Show each irrigation zone and its control valve.

B. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. PVC Pipe: ASTM D1785, PVC 1120 compound, Schedules 40 and 80.

1. PVC Socket Fittings: ASTM D2466, Schedules 40 and 80.
2. PVC Threaded Fittings: ASTM D2464, Schedule 80.
3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.

C. PVC Pipe, Pressure Rated: ASTM D2241, PVC 1120 compound, SDR 21 and SDR 26.

1. PVC Socket Fittings: ASTM D2467, Schedule 80.
2. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

2.2 PIPING JOINING MATERIALS

A. Solvent Cements for Joining PVC Piping: ASTM D2564. Include primer according to ASTM F656.

2.3 MANUAL VALVES

A. Brass Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or equal.
2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.

e. Body Material: Forged brass.
f. Ends: Threaded or solder joint if indicated.
g. Seats: PTFE or TFE.
h. Stem: Brass.
i. Ball: Chrome-plated brass.
j. Port: Full[or regular, but not reduced].

B. Plastic Ball Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or equal.
2. Description:

a. Standard: MSS SP-122.
b. Pressure Rating: 150 psig.
c. Body Material: PVC.
d. Type: Union
e. End Connections: Socket or Threaded
f. Port: Full.

2.4 AUTOMATIC CONTROL VALVES

A. Bronze, Automatic Control Valves:

1. Description: Cast-bronze body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

2.5 SPRINKLERS

A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.

B. Plastic, Pop-up, Gear-Drive Rotary Sprinklers:

1. Description:

a. Body Material: ABS.
b. Nozzle: ABS.
c. Retraction Spring: Stainless steel.
d. Internal Parts: Corrosion resistant.

2. Capacities and Characteristics:

a. Flow: 45 gpm.
b. Pop-up Height: 6 inches aboveground to nozzle.
c. Arc: variable.
d. Radius: variable .
e. Inlet: NPS 1/2.

2.6 BOXES FOR AUTOMATIC CONTROL VALVES

A. Plastic Boxes:

1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.

a. Size: As required for valves and service.

1) Lettering: " RCV, QC, MV, GV, NV, FS."

B. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch minimum to 3 inches maximum.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

B. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.

C. Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel or crushed stone, graded from 3 inches, to 12 inches below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.

D. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 18 inches below finished grade. ,
2. Circuit Piping: 12 inches.
3. Sleeves: 24 inches.

3.2 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated.

B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

C. Install piping free of sags and bends.

D. Install groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

F. Install unions adjacent to valves and to final connections to other components with NPS 2 or smaller pipe connection.

G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 or larger pipe connection.

H. Install underground thermoplastic piping according to ASTM D2774.

I. Install expansion loops in control-valve boxes for plastic piping.

J. Lay piping on solid subbase, uniformly sloped without humps or depressions.

K. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

E. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.

F. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join schedule number, ASTM D1785, PVC pipe and PVC socket fittings according to ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D2855.
3. PVC Nonpressure Piping: Join according to ASTM D2855.

3.4 VALVE INSTALLATION

A. Aboveground Valves: Install as components of connected piping system.

B. Throttling Valves: Install in underground piping in boxes for automatic control valves.

3.5 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 24 inches from walls and 24 inches from other boundaries unless otherwise indicated.

3.6 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.

1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Section 31 20 00 "Earth Moving" for warning tapes.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Any irrigation product will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.8 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2 inch-above, finish grade.

3.9 PIPING SCHEDULE

A. Install components having pressure rating equal to or greater than system operating pressure.

B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.

C. Underground irrigation main piping, NPS 4 and smaller, shall be the following:

1. Schedule 40, PVC pipe and socket fittings, and solvent-cemented joints. 1 ½ " pipes and smaller.
2. Class 315, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints. 2" pipes and larger.

D. Circuit piping, NPS 2 and smaller, shall be the following:

1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.

E. Underground Branches and Offsets at Sprinklers and Devices: Schedule 80, PVC pipe; threaded PVC fittings; and threaded joints.

1. Option: Plastic swing-joint assemblies, with offsets for flexible joints, manufactured for this application.

F. Risers to Aboveground Sprinklers and Specialties: Schedule 80, PVC pipe and socket fittings; and solvent-cemented joints.

3.10 VALVE SCHEDULE

A. Drain Valves:

1. NPS 1/2 and NPS 3/4: Plastic ball valve.

END OF SECTION 32 84 00

SECTION 32 91 13 - SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes planting soils specified by composition of the mixes.

1.2 DEFINITIONS

A. Imported Soil: Soil that is transported to Project site for use.

B. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Soils Report done for this project site as specified in Section 1.4B.

1.4 QUALITY ASSURANCE

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

B. Soil Analysis: After rough grading, provide for agricultural suitability testing and a written report by a qualified soil-testing laboratory. Recommendations of agricultural suitability and fertility analysis soils report, will take precedence over these specifications.

1. The soil-testing laboratory shall oversee soil sampling. Quantity of test sites shall be determined by Landscape Architect, up to 10 Locations.
2. Report suitability of tested soil for plant growth.
    a. Recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.
3. Provide a soils analysis of each soil type and test location.
4. Take soils samples after soil in areas previously paved have been removed. Section 3.02A.

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

A. Planting Soils: ASTM D 5268 topsoil topsoil or existing, native surface topsoil amended with inorganic and organic soil amendments and fertilizers in specified quantities shall consist of fertile, friable soil of loamy character, and shall contain an amount of organic matter normal to the area. It shall be reasonably free from weeds, refuse, roots, heavy or stiff clay, stones larger than one inch in diameter, sticks, brush, litter and other deleterious substances. Topsoil may be obtained from the site if approved by the District.

1. For bidding purposes the following amendments shall be uniformly cultivated into the upper eight inches per 1000 square feet, of soil by suitable equipment operated at approximate right angles in at least two directions.

    a. Nitrogen stabilized organic amendment:4 CY
    b. Gro Power Plus:150 LBS
    c. Agricultural Gypsum:100 LBS

B. Backfill for Plant Pits: Backfill shall be machine-mixed prior to incorporation in planting pits. For bidding purposes the following amendments shall be provided

1. On-site Soil:6 parts by volume
2. Nitrogen stabilized organic amendment 4 parts by volume
3. Gro Power Plus17 pounds per CY of mix
4. Iron Sulfate1 pounds per CY of mix
5. Agricultural Gypsum10 pounds per CY of mix

2.2 INORGANIC SOIL AMENDMENTS

A. For bidding purposes the following inorganic amendments shall be provided.

1. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

    a. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
    b. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.

2. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
3. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
4. Perlite: Horticultural perlite, soil amendment grade.
5. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
6. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

2.3 ORGANIC SOIL AMENDMENTS

A. Nitrogen stabilized organic amendment shall be a ground or processed wood product derived from wood of redwood, fir or cedar, treated with a non-toxic agent to absorb water quickly. Nitrogen content, based on dry weight, shall be 0.5 percent for redwood and 0.7 percent for fir and cedar. Iron content, based on dry weight, shall be 0.1 percent.

B. Wood derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil or toxic materials.

2.4 FERTILIZERS

A. Fertilizers shall comply with applicable requirements of the State Agricultural Codes and shall be packaged, first grade, commercial quality products identified as to source, type of material, weight and manufacturer's guaranteed analysis. Fertilizers shall not contain toxic ingredients in quantities harmful to human, animal, or plant life.

B. Commercial fertilizer shall be pelleted or granular product having the chemical analysis specified herein and shall be free-flowing material delivered in original unopenend containers. Use of material which becomes caked or otherwise damaged shall not be permitted.

C. Organic base fertilizer shall be a highly concentrated humate material derived from decomposed animal, fish, and vegetable matter with humic acids and trace minerals.

D. Iron sulfate shall be ferrous sulfate containing not less than twenty-one and one-half percent (21.5%) iron expressed as metallic iron.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements Contractor provided soils report.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from all designated planting areas that were previously asphalt paving. Remove to a depth of 12 inches and dispose offsite.

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: remove stones larger than 1 inch in diameter.

E. Replace soil in excavated planter areas with approved top soil.

3.3 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is muddy, or excessively wet.

B. Preparation: Till unamended, existing soil in planting areas to a minimum depth eight inches (8″). Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off District's property.

C. Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.

1. Mix lime and sulfur, if required, with dry soil before mixing fertilizer.
2. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698-12e2 except where a different compaction value is indicated on Drawings.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 PROTECTION AND CLEANING

A. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

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

END OF SECTION

SECTION 32 92 00- TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Hydroseeding.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Planting Soil: Existing, on-site soil; Contractor responsible to provide a soils analysis and recommendations from certified laboratory.

C. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in turf installation in addition to requirements in Section 01 40 00 "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's personnel assigned to the Work shall have certification in all of the following categories from the Professional Landcare Network:

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Lawncare Manager.
    c. Landscape Industry Certified Lawncare Technician.

5. Pesticide Applicator: State licensed, commercial.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Grass-Seed Mix: Proprietary seed mix as follows:

1. Products: Subject to compliance with requirements, provide the following:

a. Football Field & Surrounding Site Turf: Pro Sportsfield Supreme – Stover Seed – Seeding Rate: 12 lb per 1,000 square feet or 500 lbs per acre

1) Affinity Perennial Ryegrass98% Minimum purity
2) Evening Shade Perennial Ryegrass90% Minimum germination
3) Manhattan 4 Perennial Ryegrass
4) Improved Sultan Bermudagrass

2.2 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 MULCHES

A. Hydroseed Wood Fiber Mulch – Environ-Fiber – Stover Seed

B. Hyrdoseed Mix Organic Binder – Environ-Mend – Stover Seed

C. Kelloggs Topper Mulch (Area B): Apply ¼" on top of seed for overseed areas.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 WEED ABATEMENT OPERATIONS

A. The irrigation system and finish grade shall be completed prior to weed abatement operations. All new planting areas to receive weed abatement operations.

B. Contractor shall spray existing turf area with organic herbicide per all manufacturer's recommendations. Verify that Herbicide is approved by District, and Notify District of timing of spraying, to schedule a approved time and date.

C. Contractor shall operate the irrigation system to keep planting areas uniformly moist for a period of three (3) weeks (21 consecutive calendar days). At the end of the three (3) week period, Contractor shall spray all visible weeds with organic contact herbicide. Application method shall be as recommended by manufacturer. After spraying, planting areas shall remain unwatered for a minimum of forty-eight (48) hours. Remove grass and weeds from site and amend soil per soil report and recommendations.

D. Water seven (7) additional consecutive calendar days from the first application, and apply a organic contact herbicide as may be necessary. Repeat steps in "C" minimum of three times. After third spraying, water shall not be applied for an additional forty-eight (48) hour period. Applications shall continue at seven (7) day intervals as determined by District/Owner.

E. Contractor shall apply spray chemicals when air currents are still; preventing drifting onto adjoining property and preventing any toxic exposure to persons whether or not they are in or near the project.

F. Weed and debris shall be disposed of off-site.

3.3 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.4 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Contractor supplied soil analysis report and recommendations from certified laboratory.

B. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

C. Before planting, obtain architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 HYDROSEEDING

A. Hydroseeding: Mix specified seed, commercial slow-release fertilizer as specified in soils report, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight (or as recommended by manufacturer), and seed component is deposited at not less than the specified seed-sowing rate.
3. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.6 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain irrigation system per plan.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch.
2. Water turf as required to establish seed and turf.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow 'Pro Sportsfield Supreme' bermudagrass to a height of 1/2 to 1 inch.

D. Turf Post fertilization: Apply fertilizer per soil report recommendations

3.7 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 100% coverage and a playable ballfield.
2. Satisfactory Sodded Turf: at end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.8 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.9 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Seeded Turf: 90 days from date of Substantial Completion.

a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

END OF SECTION

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SECTION 32 93 00 PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plants.
2. Landscape Edging

1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

C. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 13 "Soil Preparation" for drawing designations for planting soils.

E. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Photographs of each type of tree and shrub from the Nursery Facility, with person or object in photo to determine scale/ size. Include Plant names, container size and size specifications with each submittal photo.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

1.5 QUALITY ASSURANCE

A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.
2. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in jurisdiction where Project is located, current member of ASCA, or registered Consulting Arborist as designated by ASCA.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Do not deliver trees until photographs have been reviewed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

B. Handle planting stock by root ball.

C. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1.7 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
b. Structural failures including plantings falling or blowing over.

2. Warranty Periods: From date of planting completion and acceptance by Owner.

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 21-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

A. Organic Mulch: Composted nitrogen stabilized organic wood product. Size range ½"-1 ½".

2.4 PESTICIDES

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

2.5 LANDSCAPE EDGING

A. Concrete mowstrips as shown and detailed on plans

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect existing root systems from damage caused by runoff or spillage of noxious materials while mixing, placing or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

B. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.

1. Apply 3-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.

3.2 PROTECTION ZONES AROUD EXISTING TREES

A. Protection zone shall extend to the extent of the tree canopy and include all areas with visible surface roots.

B. Maintain protection zone free of weeds and trash.

3.3 EXCAVATION

A. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut only roots smaller than 2″ in diameter, as required for root pruning, in accordance with Temporary Tree and Plant Protection Section 01 56 39.

B. Do not allow exposed roots to dry out before placing permanent backfill.

3.4 CROWN PRUNING – EXISTING TREES

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only injured, broken, dying or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1)

B. Cut branches with sharp pruning instruments; do not break or chop.

C. Do not paint or apply sealants to wounds.

D. Chip removed branches and dispose off site.

3.5 REPAIR AND REPLACEMENT

A. General: Repair or replace existing trees, shrubs, or other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect and the District.

1. Perform repairs of damaged trunk, branches, and roots within 24 hours according to arborist's written instructions.
2. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect, and approved by the District.

3.6 WEED ABATEMENT OPERATIONS

A. The irrigation system and finish grade shall be completed prior to weed abatement operations.

B. Operate the irrigation system to keep planting areas uniformly moist for a period of three weeks. At the end of the three-week period, spray all visible weeds with a contact herbicide. Application method shall be as recommended by manufacturer. After spraying, planting areas shall remain unwatered for a minimum of forty-eight hours. Remove weeds from site.

C. Water seven addition consecutive calendar days from the first application, and apply a contact herbicide as necessary. After second spraying, water shall not be applied for additional forty-eight-hour period. Applications shall continue at seven-day intervals until accepted by the City/Owner.

D. Contract shall apply spray chemicals when air currents are still; preventing drifting onto adjoining property and preventing any toxic exposure to persons whether they are in or near the project.

E. Weeds and debris shall be disposed of off-site.

3.7 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to Section 32 91 13 "Soil Preparation."

B. Placing Planting Soil: Blend planting soil in place.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.8 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter.
3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
5. Excavate around all existing trees for shrub planting by hand and adjust plant locations as necessary to avoid large roots.

B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

3.9 TREE AND SHRUB PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

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

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

1. Backfill: Amended planting soil as indicated in Section 32 91 13 Soil Preparation
2. Container-Grown Stock: Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

    a. Quantity: As recommended by manufacturer.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.10 TREE AND SHRUB PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

3.11 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs at spacing as indicated on Drawings in even rows with triangular spacing.

B. Use amended planting soil as specified in Section 32 91 13 Soil Preparation for backfill.

C. Dig holes large enough to allow spreading of roots.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.12 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

D. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

E. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.13 MAINTENANCE FERTILIZATION

A. As noted in the Soils Report.

3.14 MAINTENANCE SERVICE

A. Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period for Trees, Shrubs, Ground Cover and Other Plants:

    a. 30 day Establishment Period after planting. At the end of the Establishment Period, a job walk with M&O and Landscape Architect will take place. If approved, the Contractor will receive approval the establishment period, and the Maintenance Period will start.
    b. Maintenance Period after approval of Establishment Period shall be a 90 day period. Architect and M&O will review for approval once Maintenance Period is complete.

END OF SECTION