PROJECT MANUAL

RIVER CITY HIGH SCHOOL
TENNIS COURT REPAIRS 2026

1 Raider Lane
West Sacramento, CA 95691

Volume 2

Technical Specifications

Washington Unified School District
930 Westacre Rd.
West Sacramento, CA 95691

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PART 1 – GENERAL

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1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – District General Conditions and Contractual Requirements

B. Section 31 00 00, Earthwork.

C. Section 31 25 00, Erosion Control

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable jurisdictional authority regulations and codes for disposal of debris.
B. Coordinate clearing Work with utility companies.
C. Maintain emergency access ways at all times.
D. Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including contaminated soils, hazardous material transformers, and similar materials or components.

1.04 SUBMITTALS:

A. Schedule: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.

B. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.

1.05 EXISTING CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

1.06 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations.

Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Safety Precautions Prevent damage to existing elements identified to remain or to be salvaged, and prevent injury to the public and workmen engaged on site. Demolish roofs, walls and other building elements in such manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate on site. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends.

1. Protect existing items which are not indicated to be altered. Protect utilities designated to remain from damage.
2. Protect trees, plant growth, and features designated to remain as final landscaping as shown on drawings.
3. Protect bench marks from damage or displacement.

D. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

E. Fire Safety: The contractor shall conform to chapter 33 of the California Fire Code (CFC), "Fire Safety During Construction and Demolition", at all times during the construction process. A copy of this chapter can be provided.

F. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

G. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

H. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

I. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine conditions of work in place before beginning work; report defects.

B. Report existence of hazardous materials or unsafe structural conditions.

3.02 PREPARATION

A. Scheduling:

1. General: Coordinate and schedule demolition work as required by the Owner and as necessary to facilitate construction progress.

B. Hazardous Materials:

1. General: Identify chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations, and notify such jurisdictional agencies as may be required. Collect and legally dispose of such materials at official disposal locations away from the site.
2. Asbestos: If asbestos or materials containing asbestos are encountered, stop work immediately and contact the Owner. Do not proceed with demolition until directed by Owner.

C. Utility and Service Termination

1. Locate and identify existing utility, service and irrigation system components affected by work of this contract. Review existing record drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
2. Prior to beginning any demolition, properly disconnect all water, gas and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
3. Prior to demolition or disconnect, obtain Owners approval that such system does not impact facilities or systems beyond the extent of this contract.
4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project Record Documents.

D. Verify that existing plant life and features designated to remain are tagged or identified.

1. The Architect will mark the features, trees, and shrubs to remain within the construction area. Contractor shall not commence clearing and grubbing operations until authorized by the Owner and all protective measures are in place.

E. Coordinate the time and duration of all system disconnects with Owner.

3.03 DEMOLITION

A. General Requirements

1. Clear areas required for access to site and execution of Work, including pavements, structures, foundations, vegetation, trash and debris.
2. Coordinate with Owner the time of day and route to remove demolished materials from premises.
3. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.
4. Remove all buried debris, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
5. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with specified fill material.

B. Fixture and Equipment Removal:

1. Remove existing fixtures and equipment as identified and shown on drawings and required by Architect.
2. Verify all service connections to fixtures and equipment designated for removal have been properly disconnected.
3. Remove all conductors from conduit at all abandoned circuits.

3.04 UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

A. Where crossing paths and potential points of interference with existing utility services are shown or can be reasonably inferred from surface conditions or evidence of subsurface systems, such as meter boxes, vaults, relief vents, cleanouts and similar components.

1. Review all contract documents showing crossing paths and potential points of interference.
2. Pot-hole or determine by other means the accurate depth and location of such utilities.
3. Incorporate all costs required to complete work under this contract, including additional trenching, re-routing of existing and new utilities, and all means necessary to construct work under this contract.
4. No additional cost to the Owner will be allowed for work necessary to accommodate utility conflicts where such crossing paths are shown on contract drawings or can be reasonably inferred from surface conditions or components.

B. Remove all conductors from conduit at all abandoned electrical circuits.

C. Seal off ends of all piping, drains and other components as directed by Architect and serving utility.

D. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components.

1. Re-circuit all electrical as required.
2. Re-circuit all landscape irrigation valving and control systems as required.
3. Temporarily terminate landscape system components in approved boxes or with approved caps, suitable for re-connection or extension.

4. Extend or otherwise modify all site drainage systems, including catch basins, drain inlets and piping. Fine grade to maintain proper drainage flow pattern to drains.

E. Demolish structure in an orderly and careful manner.

1. Use of explosives prohibited.

3.05 SITE PAVEMENT REMOVAL

A. Remove sidewalk and curb where required for new construction as specified and as indicated on the Drawings.

1. Remove all paving by saw-cutting.
2. Remove concrete paving and curbing at locations shown on drawings. Locate closest adjacent expansion or weakened plane joint to define start of removal or saw-cutting.

B. Remove asphalt concrete paving areas where required for new construction as specified and as indicated on the Drawings.

1. Remove all paving by saw-cutting.
2. Remove paving assembly as required to expose subgrade.

3.06 LANDSCAPE AND IRRIGATION SYSTEMS DEMOLITION AND RENOVATION

A. Clearing, grubbing, and planting demolition.

1. Remove grass and grass roots to a minimum depth of two inches below existing grade.
2. Remove all shrubs, plants and other vegetation within the area of the work unless designated to remain. Grub and remove all roots of all vegetation to a depth of 24 inches below existing grade.
3. Remove only those trees which are specifically designated for removal, or as shown on the drawings, within the construction area. Remove all stumps. Remove root ball and root systems larger than 1 inch in diameter to a depth of two feet below existing or finished grades, whichever is lower and a minimum of five feet beyond the edge of paving, structure, wall or walkway.
4. Hand cut existing tree roots over 1 inch in diameter as necessary for trenching or other new construction, apply multiple coats of emulsified asphalt sealant especially made for horticultural use on cut or damaged plant tissues to cut faces and adjacent surfaces. Cover exposed roots with wet burlap to prevent roots from dying out until backfilling is complete.
5. Disking and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
6. Remove all buried debris, organic material, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
7. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with fill material in compliance with Section 31 00 00.

8. Selected equipment of such sizes and capacities that the existing environment is disturbed as little as possible, and to afford ease of mobility within limited and relatively confined work areas. Make every effort to preserve the topography in its natural state.
9. Keep drains, catch basins, surface drainage courses and related drainage system components clear of debris and construction materials.
10. Remove irrigation piping and appurtenances as necessary within area of work, unless noted otherwise to remain. Replace irrigation piping and appurtenances to irrigate new and/or existing landscaping. Contractor shall be responsible for temporary landscape irrigation until such time that irrigation system is restored and operational.

3.07 DISPOSAL

Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.

A. Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority.

B. It is recommended that all materials that are of a recyclable nature, be transported to a suitable legal recycling facility instead of a dump or refuse facility (unless they are one-in-the same). Refer to Cal-Green Construction Debris requirements. Most Government operated dump or transfer facilities comply with Cal Green Requirements by default, however usage of private sump facilities may be subject to additional requirements and documentation.

C. Burning and Burying of Materials: NOT ALLOWED.

D. Haul Routes:

1. Obtain permits as required by jurisdictional agencies. Establish haul routes in advance; post flagmen for the safety of the public and workmen.
2. Keep streets free of mud, rubbish, etc.; assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.

E. Remove demolished materials and debris from site on a daily basis.

3.08 CLEANING

A. Upon completion of work of this Section promptly remove from the working area all scraps, debris.

B. Clean excess material from surface of all remaining paved surfaces and utility structures.

C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION

SECTION 11 68 33

ATHLETIC FIELD EQUIPMENT

PART 1 - GENERAL

1.01 SCOPE OF WORK

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

1. Tennis Court posts
2. Tennis Court nets
3. Tennis Court center hold down and anchor.

1.02 RELATED WORK

A. Examine contract documents for requirements that affect work of this section. Other specification divisions and sections that directly relate to the work of this section include, but are not limited to:

1. .
    1. Division 1 – District Contractual Requirements
    2. Division 03 – Concrete; Sections: Cast-in-Place Concrete
    3. Division 31 – Earthwork; Sections: Excavation and Backfill and Establishment of Sub-Grade Elevations
    4. Division 32 – Exterior Improvements; Sections: Athletic and Recreational Surfacing, Concrete and Asphalt

1.03 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. National Federation of State High School Associations (NFHS).
2. American Sports Builders Association (ASBA)
3. Manufacturer’s Data and Recommended Installation Requirements.

1.04 SUBMITTALS

A. Manufacturers Product Data

1. Provide manufacturers product data prior to ordering. Architects or Owners representatives review and approval is required prior to the installation of such materials. Contractor shall be responsible for any costs associated with materials ordered prior to approval, which are subsequently denied.

2. Refer to Section 00 13 00.

B. Shop Drawings

1. Provide drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Architects or Owners representatives review.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer or applicator who has a minimum 5 years of experience in installing play equipment types similar to that required for this Project and who is acceptable to manufacturer of primary materials.

B. Qualified Materials: Request for material approvals for any products other than the specified products must be submitted to the architect two weeks prior to the bid, including complete application specification, physical characteristics, and chemical resistance data. Any request after this date will not be accepted. Failure of performance requires immediate removal and replacement of unapproved substituted material with those originally specified at no cost to the owner, architect, construction manager, or general contractor.

1.06 PRODUCT DELIVERY AND STORAGE

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

1.07 REQUIREMENTS OF REGULATORY AGENCIES

A. Work and materials shall be in full accord with Title 24, California Code of Regulations; Uniform Plumbing Code; California Building Code; National Electric Code; State Fire Marshall; California OSHA; National Fire Protection Association; and other applicable state or local laws or regulations. Nothing in drawings or specifications shall be construed to permit work not conforming to these Codes.

1.07 WARRANTEE

A. Tennis Court Post
   a. Materials - 1-YEAR LIMITED WARRANTY (From Manufacturer).
   b. Installation - 1 Year minimum installation warrantee per General Conditions.
      i. To cover installation only, not material defects.

B. Tennis Court Net
   a. Materials – 30 day money back Grantee (From Manufacturer).
   b. Installation - 1 Year minimum installation warrantee per General Conditions.
      i. To cover installation only, not material defects.
      ii. Assumed void if net removed/replaced by others within warrantee period.

C. Tennis Court Center Hold Down anchor and strap
   a. Materials - 1-YEAR LIMITED WARRANTY (From Manufacturer).
   b. Installation - 1 Year minimum installation warrantee per General Conditions.
      i. To cover installation only, not material defects.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

1. Edwards (Co.UK) (Basis of Design, see below)
   Bridport,
   Dorset DT6 3UX

   Distributed though (also available through other sellers):
   BSN Sports
   Phone: 800-856-3488 (Toll Free)
   Fax: 800-899-0149
   www.bsnsports.com

2. Douglas Sports (Alternate Approved Manufacturer)
   3441 S 11th Ave
   Eldridge, IA 52748
   Phone: (800) 553-8907
   www.douglas-sports.com

3. Sportfield Specialties (Basis of Design, wind screen only)
   41155 State Highway 10
   PO Box 231
   Delhi, NY 13753
   Toll Free: 888-975-3343
   Fax: 607-746-8481
   www.sportfieldspecialties.com

4. Alternate Suppliers and materials may be submitted for reviewed for approval however contractor will be responsible for adjustments to the design as needed for the incorporation of such new materials. There is no guarantee that any other manufacturers products and materials will work with the proposed design in all cases.

   Note: Jaypro Sports Tennis court products will not be acceptable due to prior project history.

   Manufactures listed above are either the basis of design, or have pre-approved products. Alternative manufacturers of similar products may be submitted for review and approval, see line 105.B above. While it is impossible for products to be an exact match, any such products will be reviewed against the basis of design using the following criteria:
   i. Quality and value of the product.
   ii. Size, shape and construction/manufacturing of the product
   iii. Function of the product.
   iv. Cost of the product.
   v. Availability and lead time of the product.
   vi. Manufacturer warrantee/guarantees of the product.
   vii. Manufactured/Assembled location (Made in the USA)
   viii. Available Certifications/Warrantees of the product.
   ix. Carbon footprint of the product (if applicable).
   x. Compliance with governmental statues and codes.
   xi. Compliance with administrative authorities.

2.02 Tennis Court Netting Post system

A. Edwards Wimbledon 3” Tennis Court Netting Posts system.
Alternate Approved Product: Douglas Premier SQ, 3” Tennis post.

Manufactured by:

Edwards (Co.UK) (Basis of Design, see below)
Bridport,
Dorset DT6 3UX
Distributed though (also available through other sellers):
BSN Sports

B. COMPONENTS:

A. 3” outside diameter square 11 gauge steel
B. Aluminum Caps with stainless steel fixing pins
C. Integral lacing Rods 3/16" welded to posts
D. Zinc dipped for rust protection inside and out
E. Polyester powder coated
F. Complete with brass internal winder with 3/1/4" brass pulley
G. Worm gear will not recoil
H. Removable handle
I. Anchor end post has 2- 5/16" hooks welded for net cable anchoring
J. Weight: 48lb
K. Ground sleeves, NOT included in standard order post set.
L. Available in green or black, Color to be provided: Green
M. **Provide Optional Ground Sleeve Pair, sold separately.**

2.03 Tennis Court Netting

A. Edwards Championship Quad stitched Doubles net with Vinyl headband and double netting

Provide and Install (1) One net at each court, and also provide (1) One extra replacement net for each court. Extra net to be supplied to district/school athletic staff for storage.

Manufactured by:

Edwards (Co.UK) (Basis of Design, see below)
Bridport,
Dorset DT6 3UX
Distributed though (also available through other sellers):
BSN Sports

B. COMPONENTS:

1. Full-size 42ft (12.8m) Championship vinyl net for doubles tennis courts
2. Stronger 3.5mm twisted polyethylene netting designed for very long-term use
3. Quad-stitched vinyl headband resists fraying and is easy to clean
4. Double netting top for extra strength and impact resistance
5. Easy to install on all standard tennis posts
6. Premium professional tennis net for high-profile sports venues and LTA clubs
7. Taped nylon bottom with side pockets and dowels

8. Black

2.04 Tennis Court Netting Accessories

A. Edwards Center Hold Down strap and anchor.

Provide and Install Center strap at each court, and also provide (1) One replacement center strap for each court. Extra strap to be supplied to district/school athletic staff for storage. Only provide (1) One installed A-2 Anchor.

Manufactured by:

Edwards (Co.UK) (Basis of Design, see below)
Bridport,
Dorset DT6 3UX
Distributed though (also available through other sellers):
BSN Sports

B. COMPONENTS:

1. 2" adjustable nylon webbing.
2. Double snap hook**.**
3. Aluminum anchor with stainless steel drive pin for easy snap assembly.

PART 3 - EXECUTION

3.01 INSTALLATION OF EQUIPMENT

A. Install all equipment and accessories as noted and described above in accordance with the plans and supplied manufacturers recommended installation instructions.

B. Installer should have at least the minimum experience as noted for each type of equipment specified.

C. See Section 32 13 00 for concrete materials used in footing construction, as applicable.

3.02 EXCESS MATERIALS

A. Excess materials left over from installations of equipment shall be bagged with durable plastic bags or cardboard boxes, and labeled as to their use and supplied to owner for storage onsite.

3.03 CLEANUP AND CLOSE OUT PROCEDURES

A. Refer to Division 1 – District General Conditions and Contractual Requirements

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris.

C. Save all installation instructions, manuals and other paperwork provided by suppliers and compile into binder to be provided to owner as part of the for project close procedures.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – District General Conditions and Contractual Requirements

B. Section 31 25 00, Erosion and Sediment Controls

C. Section 31 32 00, Soil Stabilization

D. Section 32 12 00, Asphalt Concrete Paving.

E. Section 32 16 00, Site Concrete.

F. Section 33 00 00, Site Utilities.

G. Section 33 40 00, Site Drainage.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting of inadequate compaction or moisture content is the sole responsibility of the contractor.

D. Tests (See Part 3 for Compaction Testing).

E. Contractor shall be solely responsible for all subgrades built. Failures resulting from inadequate compaction or moisture content are the responsibility of the contractor. Contractor shall be solely responsible for any and all repairs.

1.04 SUBMITTALS

A. Refer to Division 1 – District General Conditions and Contractual Requirements.

B.

C. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.05 WARRANTY

A. Refer to Division 1 – District General Conditions and Contractual Requirements

1.06 REFERENCES AND STANDARDS

A. General: Site survey, included in the drawings, was prepared by Warren Consulting Engineers, Inc., dated January 30th, 2026, Project No. 26-001, and is the basis for data regarding current conditions. While the survey is deemed generally accurate, there exists discrepancies and variations due to elapsed time, weather, etc. Existing dirt grades may vary 0.2 ft. from that shown.

B. Geotechnical Engineering Report was prepared specific for this project and is the source of soils information used in the development fo these plans and specifications. Report was prepared by Matriscope Engineering Laboratories, Inc. and is entitled Proposed Asphalt Rehabilitation Recreation Area Tennis Courts, MEL No. 3851, and is on file with Architect/Engineer of record. Soils information in this report has been used in the design oft these plans and specifications, however, conditions may not be exactly as indicated across some or all areas of the proposed works, and contractor should be cautioned about making any assumptions based on this report. Contractor is responsible for any conclusions drawn from this data; should he prefer not to assume such risk he is under obligation to employ his own experts to analyze available information and/or to make additional explorations, at no cost to Owner, upon which to base his conclusions. Neither Owner, Soils Engineer nor Architect guarantees information will be continuous over entire site of work.

C. Site Visitation: All bidders interfacing with existing conditions shall visit the site prior to bid to verify general conditions of improvements. Discrepancies must be reported prior to the bid for clarification.

D. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

E. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

F. ANSI/ASTM D1557-02e2 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

G. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

H. ANSI/ASTM D 422-63(2007) E1 Test Method for Particle Size Analysis of Soil.

I. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

J. CALTRANS Standard Specifications Section 17.

K. CAL-OSHA, Title 8, Section 1590 (e).

L. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

B. Excavation dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for excavation dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

1.09 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 ON SITE UTILITY VERIFICATION AND REPAIR PROCEDURES

A. Ground-breaking requirements:

1. All underground work performed by a Contractor must be authorized by the District’s Construction Manager or the Low Voltage Consultant prior to start of construction.
2. The Contractor is to obtain and keep the original School’s construction utility site plans on site during all excavation operations. Contractor can contact the District’s Construction Manager, Facilities Manager, or the Low Voltage Consultant to procure the drawings.

B. Private Underground Utility Locating:

The contractor **SHALL** hire an Underground Utility Locating Service to locate existing underground utility pathways in areas affected by the scope of work for excavation. Damaged unforeseen utilities will require immediate repair which may be a burden to the project and Schedule. The following are recommended criteria for such locating:

1. Contractor must use an underground utility locator service with a minimum of 3 years' experience. The equipment operator must have demonstrated experience.

2. The Underground Utility Locator Service must have the use of equipment with the ability to locate by means of inductive clamping, induction, inductive metal detection, conductive coupling, or TransOnde (Radio detection) to generate signals, passive locating (free scoping) for "hot" electric, and metal detector.

3. The Underground Utility Locator Service must be able to locate existing utilities at a depth of at least 72".

4. The Underground Utility Locator Service must be able to locate but are not limited to locating the following types of utility pathways:
   a) All conduit pathways containing 110 volt or greater 50-60Hz electrical wire.
   b) All conduit pathways containing an active cable TV system.
   c) All conduit pathways containing wire or conductor in which a signal can be attached and generated without damaging or triggering the existing systems.
   d) All empty conduit pathways or pipe in which a signal probe or sonde (miniature transmitter) can be inserted.
   e) All conduit pathways containing non-conductive cables or wires in which a signal probe or sonde (miniature transmitter) can be inserted.
   f) All plastic and other nonconductive water lines in which a TransOnde Radio detection) or other "transmitter" can be applied to create a low frequency pressure waive (signal) without damaging or triggering the existing systems.
   g) All copper or steel waterlines and plastic or steel gas lines

6. All markings made by the Underground Utility Locator Service or other shall be clear and visible.

7. The contractor shall maintain all markings made by Underground Utility Locator Service or other throughout the entire length of the project.

8. The Underground Utility Locator Service shall provide the contractor with two sets of maps showing the location of utilities and average depth. They will be referenced to permanent buildings. Contractor will deliver one copy to the district at no additional charge.

C. Public Underground Utility Locating (USA):

9. Contractor **is responsible** to contact Underground Service Alert (U.S.A. 800/227-2600) and receive clearance prior to any excavation operations. This applies for both onsite and offsite improvements as public utilities may run through private properties.

10. Contractor shall inform the District's Construction Manager no later than five (5) days prior to the date scheduled for the utility locator service to be on site.

1.11 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

1.12 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

B. Excessively wet fill material shall be bladed and aerated per section 3.08, B.

1.13 TESTING

A. General: Refer to Division 1 – District General Conditions and Contractual Requirements.

B. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of

Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and back charged to Contractor.

1. If Contractor elects to process or mine onsite materials for use as Suitable Fill, Aggregate Sub Base, Aggregate Base, Rock, Crushed Rock or sand the cost of all testing of this material shall be paid for by the Contractor.

2. Testing of import fill for compliance with Department of Toxic Substance Control (DTSC) shall be paid for by the Contractor.

1.14 ARCHEOLOGICAL AND CULTURAL RESOURCES

A. If archeological or cultural resources are discovered during the Work, the Contractor must cease all construction operations in the vicinity of the discovery until a qualified archeologist can assess the value of these resources and make recommendations to the State Historic Preservation Officer. Archeological and cultural resources include artifacts, large amounts of bone, shell, or flaked stone, and other evidence of human activity. If the State Historic Preservation Officer or the Owner directs that work be temporarily ceased at the location of an archeological or cultural find, the Contractor must temporarily suspend work at the location.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Engineered Fill Materials: All fill shall be of approved local materials supplemented by imported fill if necessary. **Onsite Clayey soils are not anticipated to be suitable for direct support (top 12”of subgrades) of pavement and flatwork without the use of stabilizing textiles (geogrid) or chemical treatment (where applies).** Use of chemical soil stabilization may be approved for additional uses onsite, upon pavement removal and inspection, but shall not be the basis for bidding. Only those areas identified as acceptable for chemical treatment shall be the basis of bidding. "Approved" local materials are defined as local soils tested and approved by Geotechnical Engineer free from debris, and concentrations of clay and organics; and contain rocks no larger than 3-inches in greatest dimension. The soil and rock should be thoroughly blended so that all rock is surrounded by soil. This may require mixing of the soil and rock with a dozer prior to placement and compaction. Clods, rocks, hard lumps or cobbles exceeding 3-inches in final size shall not be allowed in the upper 12 inches of any fill. Native clay or clayey soils will not be permitted within the upper 12 inches of building pad areas, paving or synthetic turf areas.

B. Imported Engineered Fill Material: Imported fill may be required to complete work. Proposed import fill material shall meet the above requirements; shall be similar to the native soils. Import fill shall meet the above requirements; shall be a compactable material, granular in nature. It shall have plasticity index of 15 or less per ASTM D4318; an Expansion Index of 20 or less per ASTM D4829; be free of particles greater than 3-inches in largest dimension; be free of contaminants and have corrosion characteristics within the acceptable limits. Be free of significant organic content and be at a moisture content that allows the degree of compaction required. <u>All import fill material shall be tested and approved by Soils Engineer prior to transportation to the site.</u> Proposed fill material shall

comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material.

1. DTSC TESTING: Site work contractor is to coordinate testing with an analytical lab, hired by the owner, licensed by the State of California for the DTSC testing. The costs associated with the testing will be paid by the contractor.
2. DTSC testing shall include documentation as to the previous land use, location, and history. Soils shall be analyzed for all compounds of concern to ensure the imported soil is uncontaminated and acceptable. Testing shall be performed per the recommendations included in DTSC Imported Fill Advisory http://www.dtsc.ca.gov/Schools/upload/SMP FS Cleanfill-Schools.pdf). Soils shall be tested prior to import to the project site.
   Lab shall determine geographically which tests and analysis comparison will be appropriate for the testing. (CAM 17 / Title 22); (RWQCB) Regional Water Quality Control Board; or (OEHHA) Office of Environmental Health Hazard Assessment.

3. Frequency of testing shall be conducted in accordance with DTSC's Imported Fill Advisory as follows;

   Fill Material Sampling Schedule

Area of Individual Borrow Area	**Sampling Requirements**
2 Acres or less	Minimum of 4 samples
2 to 4 Acres	Minimum of 1 sample every ½ Acre
4 to 10 Acres	Minimum of 8 Samples
Greater than 10 Acres	Minimum of 8 locations with 4 subsamples per location

   Volume of Borrow Area Stockpile

Up to 1,000 Cubic Yards	1 sample per 250 cubic yards
1,000 to 5,000 Cubic Yards	4 samples for the first 1000 cubic Yards + 1 sample per each additional 500 cubic yards
Greater than 5,000 Cubic Yards	12 samples for the first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

4. Reports/ Documentation

   a. Results of the testing analysis shall be sent to the Owner; Architect; Project Inspector, Project Civil Engineer, DTSC, and DSA. Letter shall reference DSA file and application numbers.

C. Landscape Backfill Material:

1. Following the stripping of organic material (lawn, weeds and other planting), the top

4" of native topsoil stripped from the site may be used for landscape backfill material provided it meets the requirements of the Districts Landscaper or Landscape Contractor.

2. Imported Topsoil may be required to complete work. Consult with districts landscaper or landscape contractor for requirements. Proposed Topsoil material shall comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material.

D. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

E. Aggregate Base: Provide Class 2 3/4" Aggregate Base conforming to standard gradation as specified in Cal Trans Standard Specifications, Section 26,-1.02A.

F. Lime: Not used.

PART 3 – EXECUTION

3.01 INSPECTION LAYOUT AND PREPARATION

A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point where this installation may properly commence

B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.

C. Verify that specified items may be installed in accordance with the approved design.

D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 PERFORMANCE

A. GENERAL:

1. General: Do all grading, excavating and cutting necessary to conform finish grade and contours as shown. All cuts shall be made to true surface of subgrade.

2. Archaeological Artifacts: Should any artifacts of possible historic interest be encountered during earthwork operations, halt all work in area of discovery and immediately contact the Architect for notification of appropriate authorities.

3. Degree of Compaction: Percentage of maximum density, hereinafter specified as degree of compaction required, means density equivalent to that percentage of maximum dry density determined by ASTM D1557 Compaction Test method, and such expressed percentage thereof will be minimum acceptable compaction for specified work.

4. Moisture Content: Moisture content shall be as noted below and as called for on the plans. Moisture content shall be maintained until subgrade is covered by surfacing materials.

3.03 DEMOLITION, DISPOSAL AND DISPOSITION OF UNDESIRABLE MAN-MADE FEATURES

A. All other obstructions, such as abandoned utility lines, septic tanks, concrete foundations, and the like shall be removed from site. Excavations resulting from these removal activities shall be cleaned of all loose materials, dish shaped, and widened as necessary to permit access for compaction equipment. Areas exposed by any required over-excavation should be scarified to a depth of 12", moisture-conditioned to 2% above the optimum moisture content, and recompacted to at least 90% of the maximum dry density.

3.04 TESTING AND OBSERVATION

A. All grading and earthwork operations shall be observed by the Geotechnical Engineer or his representative, serving as the representative of the Owner.

B. Field compaction tests shall be made by the Geotechnical Engineer or his representative. If moisture content and/or compaction are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified moisture or compaction. Notify Geotechnical Engineer at least 48 hours in advance of any filling operation.

C. Earthwork shall not be performed without the notification or approval of the Geotechnical Engineer or his representative. The Contractor shall notify the Geotechnical Engineer at least two (2) working days prior to commencement of any aspect of the site earthwork.

D. If the Contractor should fail to meet the compaction or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory, as determined by the Geotechnical Engineer or Architect/Engineer.

E. After each rain event Geotechnical Engineer shall test fill material for optimum moisture. Do not place any fill material until desired moisture is achieved.

3.05 CLEARING AND GRUBBING

A. Prior to grading, remove all debris off-site. Remove trees and brush including the root systems. Holes resulting from tree and brush removal should be prepared and backfilled in accordance with paragraphs 3.07, 3.08, 3.09, and 3.10. This may require deepening and/or widening the holes to adequately remove disturbed soil and provide room for compaction equipment. Strip the surface of all organics. Stripping’s meeting the requirements of the

Districts Landscaper or Landscape Contractor may be used in landscape areas only.

3.06 CUTTING & OVEREXCAVATION

A. Following demolition and clearing operations, subgrades beneath buildings, pavement (asphalt and concrete), and other paved surfaces shall be excavated to at least the proposed subgrade elevation. Excavated soil may be processed for use as engineered fill if found to be non-expansive in nature, however, clayey soils as determined by the site geotechnical engineer, may not be re-used in the upper 12” of such subgrades unless, covered with structural geotextile (geogrid) or other approved means, or removed and used in other non-structural or non-paving subgrades such as planting. Such soils may be used as engineered fill in accordance with this specification below the top 12” of subgrades, or exported from the site and replaced with imported non-expansive fill.

B. Building or other similar type of structural pads that are located within a cut/fill transition area will have to be overexcavated to provide a semi-uniform fill beneath the building pad. The portions of building pads located in cut areas shall be overexcavated to provide no more than 1 foot difference in fill placed in the same building pad.

C. Do all cutting necessary to bring finish grade to elevations shown on Drawings.

D. When excavation through roots is necessary, cut roots by hand.

E. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.

3.07 STRUCTURAL EXCAVATION

A. General: Excavate to bear on firm material at contract depth shown on Structural Drawings (if provided) or Footings for smaller non-structural type footings shown on Civil plans.

B. SFootings: All footing excavations shall be of sufficient width for installation of formwork, unless earth will retain its position during concreting. All portions of footings above grade must be formed. In the event that footings are placed against earth, footing widths below grade shall be increased 2 inches from those shown on Drawings and positive protection shall be provided for top corners of trench.

C. Unsuitable Ground: Any errors in structural excavation, soft ground, or clay soils found when excavating shall be reported to Architect. In no case shall work be built on any such soft or clayey unsuitable surface without direction from the Architect. Restore excavations to proper elevation with engineered fill material compacted to 90% of dry density, the upper 12 inches of subgrades under paving and flatwork to 95%.

3.08 SUBGRADE PREPARATION

A. Grade compact and finish all subgrades within a tolerance of 0.10' of grades as indicated on Drawings and so as not to pool water. Subgrade within building pads and concrete walks and other paving shall be within 0.05' of grades indicated. This is not the final finish

tolerance, that will be specified elsewhere.

B. After clearing, grubbing and cutting, and over-excavation (where necessary) as outlined above, subsurface in court area shall be chemically stabilized per section 31 32 00. Areas outside the court shall be plowed or scarified to a depth of at least 12", until surface is free from ruts, hummocks or other uneven features and uniform and free from large clods. Moisture condition to 2% above the optimum moisture content and recompact to at least 90% of the maximum dry density as determined by ASTM Test Method D1557. If the existing soils are at a water content higher than specified, the contractor shall provide multiple daily aerations by ripping, blading, and/or disking to dry the soils to a moisture content where the specified degree of compaction can be achieved. After seven consecutive working days of daily aerations, and the moisture content of the soil remains higher than specified, the contractor shall notify the architect. If the existing soils have a moisture content lower than specified, the contractor shall scarify, rip, water and blade existing soil to achieve specified moisture content. The contractor shall make proper allowance in schedule and methods to complete this work.

C. Subgrade in areas to receive topsoil and landscaping shall be compacted to 90%.

D. Where Contractor over-excavates through error, the resulting excavation shall scarified, and re-compacted as indicated above, and engineered fill placed and compacted as engineered fill at Contractor's expense, or contractor bear the cost of additional base rock with engineer approval.

3.09 PLACING, SPREADING AND COMPACTING FILL MATERIAL IN BUILDING PAD, CONCRETE AND ASPHALT PAVEMENT AREAS:

Fill material not expected to be needed this project, however, should it be needed:

A. Selected fill material shall be placed in layers which, when compacted, shall not exceed 6 inches in compacted thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity in moisture content.

B. Selected fill material shall be moisture-conditioned to specified moisture content. Selected fill material shall be unfrozen. When moisture content of fill material is below that specified, add water until proper moisture content is achieved. When moisture content is above that specified, aerate by blading or other methods mentioned in 3.08 B until moisture content is satisfactory.

C. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to a minimum of 90% as determined by the ASTM D1557 Compaction Test. Compact each layer over its entire area until desired density has been obtained.

D. Recompaction of Fill in Trenches and Compaction of Fill Adjacent to Walls: Where trenches must be excavated, backfill with material excavated. Place in lifts that when compacted do not exceed 6”, moisture conditioned to 2% above the optimum moisture content, and compact to a minimum of 90% relative compaction in building pad paving and synthetic turf areas, and to 90% relative compaction in landscape areas.

E. Jetting of fill materials will not be allowed.

F. Final subgrades in these areas shall be chemically treated, see final compaction, section 3.10 and section 31 32 00.

3.10 FINAL SUBGRADE COMPACTION

A. Flatwork Areas: Upper 12" of all final flatwork subgrades shall be compacted to 95%, regardless of whether final subgrade elevation is attained by filling, excavation, or is left at existing grade. After acceptance of final compaction test, contractor shall maintain the required moisture content of subgrade until concrete flatwork is placed. If non expansive soils are found, onsite geotechnical engineer may review and approve for use as engineered fill, and specifically for this upper 12” of subgrades.

B. Paving and Flatwork Areas: Upper 12" of all final subgrades supporting pavement and flatwork chemically stabilized native soils compacted to 95% per Section 31 32 00. After acceptance of final compaction test, contractor shall maintain the required moisture content of subgrade until concrete flatwork is placed.

C. Other Fill and Backfill: Upper 12” of all other final subgrades or finish grades shall be compacted to 90% of maximum dry density. Clayey soils shall be moisture conditioned to at least 2% above the optimum moisture content, while more non-expansive granular fill materials, like Class II AB, may be moisture conditioned to the optimum content.

D. Gravel Fill: Do not place compacted gravel fill until after underground work and foundations are in place. Compact gravel fill with vibratory plate or similar equipment to preclude settlement.

3.11 PLACING, SPREADING, AND COMPACTION OF LANDSCAPE BACKFILL MATERIALS

A. All landscaped areas shall receive topsoil. After subgrade under landscape area has been scarified and brought to 90% maximum dry density, top soil shall be placed evenly to depth of 10" at 85% of maximum dry density.

B. Project Inspector must verify that materials are uniformly spread to minimum depth specified.

3.12 SLOPE CONSTRUCTION

A. Cut slopes shall be constructed to no steeper than 2H:1V (horizontal:vertical). Fill slopes shall be constructed to no steeper than 3H:1V (horizontal:vertical). Slopes anticipated to receive new lawn shall be sloped no steeper than 5H:1V (horizontal:vertical) to facilitate mowing equipment. Prior to placement of fill on an existing slope the existing slope shall be benched. The benches shall be in a ratio matching that of the proposed slope with a vertical depth not exceeding 36 inches. The face of the fill slopes shall be compacted as the fill is placed, or the slope may be overbuilt and then cut back to the design grade. Compaction by track walking will not be allowed.

3.13 FINISH GRADING

A. At completion of project, site shall be finished graded, as indicated on Drawings. Finish grades shall be uniformly graded to a “FLAT PLANE” in accordance with the grades shown on the drawing. Mounding of finish grades will not be allowed unless otherwise directed on the landscape drawings. Tolerances for finish grades in drainage swales shall be +-0.05’. Tie in new and existing finish grades. Leave all landscaped areas in finish condition for lawn seeding. Landscaped planters shall be graded uniformly from edge of planter to inlets. If sod is used for turf areas the finish grade on which it is placed shall be lowered to allow for sod thickness.

In TENNIS COURT areas, final grade of finished class ii AB base rock should be graded and compacted to a tolerance of 1/4” in 10 feet so as to ensure the final paving tolerances can be achieved.

B. All landscape areas shall be left free of rock or foreign material.

C. All landscape areas shall be approved by Architect prior to any planting.

3.14 SURPLUS MATERIAL

A. Excavated material not required for grading or backfill shall be removed from site at contractor’s expense.

3.15 CLEANING

A. Refer to Division 1 – District General Conditions and Contractual Requirements.

B. Remove from fill all vegetation, wood, form lumber, casual lumber, and shavings, in contact with ground; buried wood will not be permitted in any fill.

END OF SECTION

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 – GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The general conditions, supplementary conditions and Division 1 are fully applicable to this section as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – District General Conditions and Contractual Requirements

B. Section 31 00 00, Earthwork.

C. Section 31 32 00 Soil Stabilization

D. Section 33 40 00, Site Drainage.

E. Section 33 00 00, Site Utilities.

F. Section 32 12 00, Asphalt Concrete Paving

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. Contractor / Installer shall have been in business for five (5) years providing/finishing similar size projects and complexity.

1.04 SUBMITTALS

A. Refer to Division 1 – District General Conditions and Contractual Requirements

B. Submit Manufacturers data and shop drawings.

1.05 WARRANTY

A. Submit fully executed warranty for work and materials in this section per Division 1 – District General Conditions and Contractual Requirements.

1.06 REFERENCES AND STANDARDS

A. California Building Code 2025 edition.

B. California Plumbing Code 2025 edition.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Contractor shall acquaint himself with all existing site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Field verify that all components, backing, etc. by others are installed correctly to proceed with installation of products as herein specified.

C. Trench dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for trench dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

1.09 PROTECTION

A. Adequate protection measures shall be provided to protect workers and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations. Repair all trenches in grass areas with new sod (seeding not permitted) and "stake-off" for protection.

B. Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Architect or Owner is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. Keep all excavations free from water during entire progress of work, regardless of cause, source or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance.

H. Trees: Carefully protect existing trees which are to remain.

1.10 TRENCH SAFETY PROVISIONS

A. General Contractor shall be solely responsible for safety design, construction and coordination with agencies having jurisdiction. If such plan varies from shoring system standards established by Construction Safety Orders, plan shall be prepared by registered civil or structural engineer.

B. Nothing herein shall be deemed to allow use of shoring, sloping or protective system less effective than that required by Construction Safety Orders of California State Division of Industrial Safety.

C. When trenching through paved surface, provide steel trench plates to cover open trenches daily until trenches are backfilled.

1.11 SEASONAL LIMITS

A. No backfill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, full operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

B. Material above optimum moisture shall be processed per section 31 00 00, 3.08, B.

1.12 TESTING

A. General: Refer to Division 1 – District General Conditions and Contractual Requirements

PART 2 – PRODUCTS

2.01 MATERIALS

A. Backfill materials: Pipeline and conduit trench backfill as shown on the plans and as specified below.

1. 3/4" clean crushed angular stone.

2. Native Materials: Soil native to Project Site, free of wood, organics, and other deleterious substances. Rocks shall not be greater than 3-inches.

3. Sand: Fine granular material, free of organic matter, mica, loam or clay.

4. Lean Mix Concrete:
   a. May be used for trench backfill beneath and within 4 feet of footings and structures (with approval from Structural Engineer):
   b. Shall be 3 sack sand/cement slurry.
   c. Shall have a design strength between 250 and 500 psi

5. Controlled Density Backfill:
   a. May be used for trench backfill in non-structural applications difficult to backfill with traditional means and not within 4 feet of footings.
   b. Shall be 2 sack sand/cement slurry.
   c. Shall have a design strength between 100 and 200 psi

6. Class 2 aggregate base, 3/4” crushed stone with gradation in accordance with Caltrans section 26. Recycled aggregates acceptable provided they meet Caltrans Section 26.

B. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

C. Provide other bedding and backfill materials as described and specified in Section 31 00 00, Section 33 40 00 and Divisions 15 and 16.

PART 3 – EXECUTION

3.01 INSPECTION

A. Verification of Conditions:

1. Examine areas and conditions under which work is to be performed.
2. Identify conditions detrimental to proper or timely completion of work and coordinate with General Contractor to rectify.

3.02 COORDINATION

A. General Contractor shall coordinate work as herein specified, in accordance with drawings and as required to complete scope of work with all related trades.

3.03 INSTALLATION

A. Perform work in accordance with pipe manufacturer’s recommendations, as herein specified and in accordance with drawings.

3.04 TRENCHING

A. Make all trenches open vertical construction with sufficient width to provide free working space at both sides of trench around installed item as required for caulking, joining, backfilling and compacting; not less than 12 inches wider than pipe or conduit diameter, unless otherwise noted.

B. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.

C. Trench straight and true to line and grade with bottom smooth and free of edges or rock points.

D. Where depths are not shown on the plans, trench to sufficient depth to give minimum fill above top of installed item measured from finish grade above the utility as follows:

1.	Sewer pipe:	depth to vary
2.	Storm drain pipe:	depth to vary
3.	Water pipe - Fire Supply:	36 inches
4.	Water pipe – Domestic Supply:	30 inches

E. Where trench through existing pavement saw cut existing pavement in straight lines. Grind existing asphalt on each side of trench 3” wide x ½ the depth of the section. Apply tact coat to vertical surfaces before installing new asphalt. Replace asphalt and concrete pavement sections to matched existing conditions. In concrete pavement provide expansion and control joints to match existing joint layout.

3.05 BACKFILL

A. Pipe Trench Backfill is divided into three zones:

1. Bedding: Layer of material directly under the pipe upon which the pipe is laid.
2. Pipe Zone: Backfill from the top of the bedding to 6 inches (compacted) over the top of the pipe.
3. Upper Zone: Backfill between top of Pipe Zone and to surface of subgrade.

B. Bedding: Type of material and degree of compaction for bedding backfill shall be as defined in the Details and Specifications.

C. Pipe Zone and Upper Zone Backfill:

1. Type of material and degree of compaction Pipe Zone and Upper Zone Backfill shall be as required by Drawings, Details, & Specifications.
2. Upper Zone Backfill shall not be placed until conformance of Bedding and Pipe Zone Backfill with specified compaction test requirements has been confirmed.
3. Backfill shall be brought up at substantially the same rate on both sides of the pipe and care shall be taken so that the pipe is not floated or displaced. Material shall not be dropped directly on pipe.

D. Backfill Compaction:

1. Backfill shall be placed in layers which, when compacted shall not exceed 6 inches in thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity. Do not backfill over, wet, frozen or soft subgrade surfaces. Employ a placement method that does not disturb or damage foundation walls, perimeter drainage, foundation damp-proofing, waterproofing or protective cover.

2. When moisture content of fill material is below that required to achieve specified density, add water until proper moisture content is achieved. When moisture content is above that required, aerate by blading or other methods until specified moisture content is met, see section 31 00 00, 3.08, B.

3. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to 90% of maximum dry density while at specified moisture content. Compact each layer over its entire area until desired density has been obtained.

4. The top 12 inches of subgrade compaction under pavement or building shall be per Earthwork section 31 00 00.

5. Compaction: All backfill operations shall be observed by the Inspector of Record and/or Geotechnical Engineer. Field density tests shall be made to check compaction of fill material. If densities are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified densities. Notify Inspector and Architect at least 24 hours in advance of any operation.

E. Backfill in Areas Previously Lime or Cement Treated

1. If trenching is necessary in areas that have been previously lime treated the contractor shall backfill the trench with class 2 aggregate base from the top of utility initial backfill up to subgrade in accordance with these specifications. **Lime treated soil may not be re-used once it has been compacted and cured. If re-excavated, it must be disposed of**. In Synthetic track and Synthetic Turf areas, following backfill to subgrade, a 13’ wide bridging geogrid, Tensar BX 1100 or Tx140 shall be lain centered over trench on subgrade along entire length of the trench. Geogrid may be waived by the onsite geotechnical engineer based on actual soil conditions.

3.06 TRENCH AND SITE RESTORATION

A. Finished surface of trenches shall be restored to a condition equal to, or better than the condition as existed prior to excavation work.

3.07 PROTECTION

A. Protect existing surfaces, structures, and utilities from damage. Protect work by others from damage. In the event of damage, immediately repair or replace to satisfaction of Owner.

B. Repair existing landscaped areas to as new condition. Replant trees, shrubs or groundcover with existing materials if not damaged or with new materials if required. Replace damaged lawn areas with sod, no seeding will be permitted.

C. Replace damaged pavement with new compatible matching materials. Concrete walks to be removed to nearest expansion joint and entire panel replaced. Asphalt to be cute neatly and replaced with new materials.

D. Any existing materials removed or damaged due to trenching to be returned to new condition.

3.08 SURPLUS MATERIAL

A. Remove excess excavated material, unused materials, damaged or unsuitable materials from site.

3.09 CLEANING

A. Refer to Division 1 – District General Conditions and Contractual Requirements.

B. Contractor will keep the work areas in a clean and safe condition so his rubbish, waste, and debris do not interfere with the work of others throughout the project and at the completion of work.

C. After completion of work in this section, remove all equipment, materials, and debris. Leave entire area in a neat, clean, acceptable condition.

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END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENT CONTROLS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. GENERAL: Provide all materials, equipment and labor necessary to furnish and install erosion control measures and implement best management practices, including but not limited too; straw wattles, silt fence barriers; stabilized entrances, etc. at locations shown on the drawings and in the Storm Water Pollution Prevention Plan (when required, see below).

B. STORM WATER POLLUTION PREVENTION PLAN:

1. Due to the project size and project timing (summer). A Storm Water Pollution Prevention Plan (SWPPP) is not anticipated to be required. Should size or timing change, Contractor will be responsible for development of a Storm Water Pollution Prevention Plan (SWPPP) by a Qualified SWPPP Developer (QSD) and also provide all necessary State Permitting with the States online “SMARTS” System. Although a SWPPP is not anticipated to be required, contractor will still be responsible to implement appropriate measures to prevent illicit discharges from the site, such as sediment or otherwise contaminated water and dust.

2. If a SWPPP is required, Contractor shall provide a Qualified SWPPP Practitioner (QSP) to implement the SWPPP onsite and also provide and upload the necessary reports to the State SMARTS System. QSP shall be certified as such by the state of California. if Erosivity Waiver is granted as anticipated, contractor shall still assign site personnel the responsibility of implementing and maintaining erosion control devices to prevent erosion or illicit discharges by water or wind, regardless of the source.

3. Contractor shall Comply with State Water Resources Control Board requirements and Local Jurisdiction where applicable.

4. When SWPPP Required, the Contractor shall amend the SWPPP Map during the course of construction to the contractor’s approach to the work in this contract. The Contractor shall as a minimum address and show:
   a. Cut and fill operations
   b. Temporary stockpile locations and protection measures
   c. Vehicle and equipment storage, maintenance and fueling operations
   d. Concrete and asphalt disposal areas and protective measures
   e. Dust control measures
   f. Tracking of dirt, mud and off-site streets and subsequent street cleaning when required.
   g. Pipe flushing and disposal of sediment latent flush waters.

1.02 QUALITY ASSURANCE

A. GENERAL: Comply with local governing codes and regulations.

1.03 SUBMITTALS

A. SMARTS & NOTICE OF INTENT (NOI): If SWPPP required, contractor shall be responsible for submittal to the State of California Storm Water Multiple Application and Report Tracking System (SMARTS). A Copy of the complete SWPPP and NOI receipt letter is to be provided to the Architect and owner for record.

PART 2 - PRODUCTS

2.01 MATERIALS

A. STRAW WATTLES: Shall be new manufactured straw roles in compliance with state requirements for sediment control.

B. SILT FENCES: Comply with state and local requirements.

C. HYDRO SEED MIX: Contractor shall provide a blended seed mix containing both seeds blends and in the following mixture:

Blando Brome – 12 lbs/acre (0.3 lbs per sf)

Annual Ryegrass – 9 lbs/acre (0.2 lbs per sf)

Contractor, or Contractor's erosion control specialist or subcontractor may submit an alternative seed mix for review, however, sample projects need to be provided in the greater Sacramento Area that show this mix design is effective.

D. STRAW HYDROSEED /TACKIFIER: Straw Hydroseed with Tackifier mulch shall be composed of fibers derived from straw products with no growth or germination inhibiting substances. Mulch shall be manufactured in such a manner that when thoroughly mixed with seed, fertilizer, and water, in the proportions specified, it will form a homogeneous slurry which is capable of being sprayed to form a porous mat. The fibrous mulch in its air-dry state shall contain not more than fifteen percent by weight of water. The fiber shall have a temporary green dye and shall be accompanied by a certificate of compliance stating that the fiber conforms to these specifications. Product shall be Hydrostraw^{TM} or equal.

E. CONCRETE WASHOUT(S): Shall be pre-constructed or built onsite with plastic sheeting and supporting material such as straw bales. Washouts shall be sized for expected concrete work, or multiple washouts provided.

PART 3 - EXECUTION

3.01 INSTALLATION

A. STRAW WATTLES: Shall be installed per the drawings and/or as required by the SWPPP and Local Authority.

B. SILT FENCES: Shall be installed per the Drawings and/or as required by the SWPPP and Local Authority.

C. HYDROSEEDED AREA:

1. Preparation: Do all slurry preparation at the job site:

a. Water, straw mulch w/tacifier, fertilizer, and other ingredients shall be added to the tank simultaneously so that the finished load is homogenous mix of the specified ingredients.
b. Seed shall be added last and shall be discharged within two hours (2hrs.). Loads held over four hours (4 hrs.) will be recharged with one-half (1/2) the seed rate before application.
c. Once fully loaded, the complete slurry shall be agitated for three to five minutes (3-5 min.) to allow for uniform mixing.

2. Application:
a. General: All hydroseed applications are to be applied in a sweeping motion to form a uniform mat at the specified rates.

Two-step Slope Application

Step One

Material	Lbs/Ac
Hydrostraw	2,000
7.2.3 Slow Release Fertilizer	1,000
Seed as per section (2.02 Seed)	#
Am 120 Mycorrhizal Inoculant	60

Step Two

Material	Lbs/Ac
Hydrostraw	2,000

b. Protection: Contractor is to apply the hydrostraw in such a way as to complete the application in an orderly manner and stay off partially and completely treated areas.
c. Unused Loads: If mixture remains in tank for more than 8 hours it shall be removed from the job site at Contractor's expense.

3.02 MAINTENANCE AND REMOVAL:

A. GENERAL: Maintain and repair existing and new erosion and sediment controls facilities throughout the construction period. Remove silt build up as needed. Repair damage to earth slopes and banks. Erosion and sediment controls measures shall be left in place until final paving and landscaping are complete or as required by SWPPP.

B. MONITORING: Provide monitoring of erosion and sediment controls measures before and after storm events. Provide a daily log of construction activities and impact on erosion and sediment controls measures. Update SWPPP continuously throughout construction period.

C. CLEANING: Keep area clean of debris.

D. Remove erosion and sediment controls measures prior to placing finish landscaping.

END OF SECTION

SECTION 31 32 00

SOIL STABILIZATION

PART 1 – GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – District General Conditions and Contractual Requirements.

B. Section 31 00 00 Earthwork

C. Section 31 23 33, Trenching and Backfilling.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Tests (See Part 3 for Compaction Testing).

E. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.

F. Failures due to the lack of continuous moisture control during the curing period will be the sole responsibility of the contractor.

G. Any trenching through the finished cured lime/cement section will result in the contractor having to backfill trench with class 2 aggregate base rock, or cement/sand slurry,

1.04 SUBMITTALS

A. Division 1 – District General Conditions and Contractual Requirements.

1.05 WARRANTY

A. Refer to Project Contract General Conditions

1.01 SCOPE OF WORK

A. Description: Provide Lime Stabilization Treatment, including spreading and mixing lime and water with in-place materials, and compacting the mixture to the lines, grades and dimensions shown on the plans and/or specified.

B. Related Work Specified Elsewhere:

i. Measure and Payment: See Division 1 – District General Conditions and Contractual Requirements.

1.02 QUALITY ASSURANCE

A. General: All Quality Assurance procedures specified on the drawings shall apply to this Section in addition to those shown below.

B. Testing:

0. Geotechnical Engineer: Owner is retaining a Geotechnical engineer to determine compliance of Lime Stabilization Treatment with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except that costs incurred for re-tests or re-inspection will be paid by Owner and back charged to Contractor.

C. Inspection: Work shall not be performed without the physical presence and approval of Geotechnical Engineer. The Contractor shall notify the Geotechnical Engineer at least two working days prior to commencement of any aspect of site earthwork.

D. Field Density: Field density and phenolphthalein reaction tests shall be made by the Geotechnical Engineer after completion of compaction. Where compaction equipment has disturbed the surface to a depth of several inches, density tests shall be taken in the compacted material below the disturbed surface.

1.03 SUBMITTALS

A. Weighmaster Certificates: Provide certificates as required in Section 2.01B.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lime Treated Engineered Fill: The materials to be treated shall consist of on-site soils or approved import material as described in Section 31 00 00.

B. Lime: Lime in areas to be treated shall be lime. The percentage of lime shall be based on a soil weight of 100 pcf; hence, 4.5 pounds lime should be utilized per cubic foot. A certification of compliance shall be submitted to the Geotechnical Engineer with each delivery of lime.

C. Water: Water shall be added during the preliminary mixing operations and, if necessary, during final mixing and to keep the cured material moist until curing is complete. The amount of water added shall be subject to the approval of the Geotechnical Engineer at all times.

PART 3 - EXECUTION

3.01 PREPARATION

A. General: Layout all work, establish grades, locate existing underground utilities, set markers and stakes, set up and maintain barricades and protection facilities; all prior to beginning actual earthwork operations.

3.02 EQUIPMENT

A. Lime Spreader: The lime shall be spread by equipment which shall uniformly distribute the required amount of lime. The rate of spread per square foot of blanket shall not vary more than 5 percent from the designated rate, unless otherwise approved by the Geotechnical Engineer.

B. Mixing Equipment: Mixing equipment shall be capable of mixing or remixing the materials to a uniform mixture free of streaks or pockets of lime to the full required depth.

3.03 START OF WORK UNDER THIS SECTION

A. General: Prior to starting physical work under this Section, the property line is to be clearly staked and identified. No lime treated materials shall be allowed to contaminate areas outside of the property.

B. Utilities; Contractor is to engage with a licensed contractor specialized in the Utility Locating Business. The contractor shall locate any and all utilities and pothole the same. The frequency of potholing shall be enough to establish the elevations of all utilities located.

3.04 LIME SPREADING

A. Engineered Fill: Provide lime treatment in areas shown on plans and extending a minimum distance of 2 feet from outside edge of curb, building footing, wood header, and to a depth of at least 18-inches. Where existing curbs are planned to remain, lime treatment shall extend up to edge of existing curb.

B. Temperature: Lime shall not be spread while the atmospheric temperature is below 35 degrees Fahrenheit or when conditions indicate that the temperature may fall below 35 degrees Fahrenheit within 24 hours.

3.05 MIXING

A. Lime shall be added to the material to be treated at a rate of 4.5 pounds lime per cubic foot based on a soil unit weight of 100 pcf.

B. Lime shall be spread by equipment that will uniformly distribute the required amount of lime/ for the full width of the prepared material. The rate of spread per linear foot of blanket shall not vary more than five percent (5%) from the designated rate.

C. The spread lime shall be prevented from blowing by suitable means selected by the Contractor. Quicklime shall not be used to make lime slurry. The spreading operations shall be conducted in such a manner that a hazard is not present to construction personnel or the public. All lime spread shall be thoroughly mixed into the soil the same day lime spreading operations are performed.

D. The distance which lime may be spread upon the prepared material ahead of the mixing operation will be determined by the Geotechnical Engineer.

E. No traffic other than the mixing equipment and water truck will be allowed to pass over the spread lime until after the completion of mixing. After mixing, grading and compacting are completed, only the water truck is allowed on the treated area to maintain the optimum moisture for curing.

F. Mixing equipment shall be equipped with a visual depth indicator showing mixing depth, an odometer or footmeter to indicate travel speed and a controllable water additive system for regulating water added to the mixture.

G. Mixing equipment shall be of the type that can mix the full depth of the treatment specified and leave a relatively smooth bottom of the treated section. Mixing and re-mixing, regardless of equipment used, will continue until the material is uniformly mixed free of streaks, pockets, or clods of lime), and moisture is at approximately two percent (2%) over optimum and the mixture complies with the following requirements:

Minimum Sieve Size	Percent Passing
1-1/2”	100
1”	95
No. 4	60

H. Non-uniformity of color reaction when the treated material, exclusive of one inch or larger clods, as tested with the standard phenolphthalein alcohol indicator, will be considered evidence of inadequate mixing.

I. Lime -treated material shall not be mixed or spread while the atmospheric temperature is below 35°F. The entire mixing operation shall be completed within seventy-two (72) hours of the initial spreading of lime, unless otherwise permitted by the Geotechnical Engineer.

3.06 SPREADING AND COMPACTING

A. The treated mixture shall be spread to the required width, grade and cross-section. The maximum compacted thickness of a single layer may be determined by the Contractor provided he can demonstrate to the Geotechnical Engineer that his equipment and method of operation will provide uniform distribution of the lime and the required compacted density throughout the layer. If the Contractor is unable to achieve uniformity and density throughout the thickness selected, he shall rework the affected area using thinner lifts until a satisfactory treated subgrade meeting the distribution and density requirements is attained, as determined by the Geotechnical Engineer, at no additional cost to the Owner.

B. The finished thickness of the lime-treated material shall not vary more than five hundredths of a foot (0.05') from the planned thickness at any point.

C. The lime - treated soils shall be compacted to a relative compaction of not less than ninety five percent (95%) as determined by the ASTM D1557-01 Compaction Test.

D. Initial compaction shall be performed by means of a sheepsfoot type roller or a vibratory padfoot roller. Final rolling shall be by means of a smooth drum roller.

E. Areas inaccessible to rollers shall be compacted to meet the minimum compaction requirement by other means satisfactory to the Geotechnical Engineer.

F. Final compaction shall be completed within thirty-six (36) hours of final mixing. The surface of the finished lime -treated material shall be the grading plane and at any point shall not very more than five hundredths of a foot (0.05') foot above or below the grade established by the plans.

G. Before final compaction, if the treated material is above the grade tolerance specified in this section, uncompacted excess material may be removed and used in areas inaccessible to mixing equipment. After final compaction and trimming, excess material shall be removed and disposed of off site. The trimmed and completed surface shall be rolled with steel or pneumatic-tired rollers. Minor indentations may remain in the surface of the finished materials so long as no loose material remains in the indentations.

H. At the end of each day's work, a construction joint shall be made in thoroughly compacted material and with a vertical face. After a part-width section has been completed, the longitudinal joint against which additional material is to be placed shall be trimmed approximately three inches (3") into treated material, to the neat line of the section, with a vertical edge. The material so trimmed shall be incorporated into the adjacent material to be treated.

I. An acceptable alternate to the above construction joints, if the treatment is performed with cross shaft rotary mixers, is to actually mix three inches (3") into the previous day's work to assure a good bond to the adjacent work.

3.07 FINAL GRADING

A. Finish all lime treated engineered fill grades to within a tolerance of 0.05’ of grades shown for top of lime/cement stabilization treatment or as indicated by drawings and specifications.

B. Leave all areas in suitable condition for subsequent work.

C. Excess materials not needed for final grading operations shall be removed from the site.

3.07 CURING

A. The surface of compacted and finish graded lime treated soil shall be kept moist for at least 3 days after final trimming, rolling and compacting. No equipment or traffic shall be permitted on the lime treated material during the 3 day cure, except for the water truck to keep the treated area at or above the optimum moisture. After the 3 day cure apply aggregate base. Maintain moisture curing at optimum level until aggregate base is placed

3.08 TRENCHING

B. If trenching is necessary in areas that have been previously lime treated the contractor shall backfill the trench with class 2 aggregate base from the top of utility initial backfill up to subgrade in accordance with these specifications. **Lime treated soil may not be re-used once it has been compacted and cured. If re-excavated, it must be disposed of**. In Synthetic track and Synthetic Turf areas, following backfill to subgrade, a 13’ wide bridging geogrid, Tensar BX 1100 or Nx850 shall be lain centered over trench on subgrade along entire length of the trench.

END OF SECTION

SECTION 32 12 00

ASPHALT PAVING

PART 1 – GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – District General Conditions and Contractual Requirements.

B. Section 31 00 00, Earthwork.

C. Section 31 23 33, Trenching and Backfilling.

D. Section 32 12 16.26 Fiber-Modified Asphalt Concrete Paving

E. Section 32 80 00, Irrigation

F. Section 33 40 00, Site Drainage.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Contractor shall provide verification that asphalt mix temperature meets the requirements of this specification at time of application.

E. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.

F. Sieve analysis from testing laboratories identifying rock/sand percentages within the asphalt mix shall have a testing date within 90 days of contract signing.

G. Sieve analysis from a testing laboratory identifying rock/sand percentages within the class 2 aggregate base rock shall have a testing date within 90 days of contract signing.

1.04 SUBMITTALS

A. Refer to Division 1 – District General Conditions and Contractual Requirements.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.05 WARRANTY

A. Refer to Division 1 – District General Conditions and Contractual Requirements.

1.06 REFERENCES AND STANDARDS

A. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

E. ANSI/ASTM D 422-63 Test Method for Particle Size Analysis of Soil.

F. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

G. CALTRANS Standard Specifications.

H. CAL-OSHA, Title 8, Section 1590 (e).

I. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Environmental Requirements:

1. Base Course: Do not lay base course on muddy subgrade, during wet weather, or when atmospheric temperature is below 40 degrees F.

2. Asphalt Surfacing: Do not apply asphaltic surfacing on wet base, during wet weather, or when atmospheric temperature is below 50 degrees F.

1.09 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the owner’s representative is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

E. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

F. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

1.11 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests

indicate that moisture content and density of fill are satisfactory.

1.12 TESTING

A. General: Refer to Division 1 – District General Conditions and Contractual Requirements.

B. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sterilant: Soil sterilizer shall be CIBA GEIGY's Pramatol 25-E, Treflan EC or Esplanade 200 SC.

1. Soil sterilizer shall be applied in strict accordance with manufacturer's instructions.

B. Aggregate Base: State Specifications, Section 26, Class 2 aggregate base (3/4" max.).

C. Asphalt Binder (General Asphalt Paving): Steam-refined paving asphalt conforming to State Specifications, Section 92, viscosity grade PG 64-10.

D. Asphalt Binder (Tennis Courts): Steam-refined paving asphalt conforming to State Specifications, Section 92, viscosity grade PG 64-28 (polymer modified).

E. Liquid Asphalt Tack Coat: Per CALTRANS section 94.

F. Surface Course Aggregate(s): Mineral aggregates for Type "A" asphalt concrete, conforming to State Specifications 39-2.02, Type A as follows:

1. <u>General asphalt paving:</u>
   i. 1/2” maximum, medium grading, all lifts.
2. <u>Tennis Courts:</u>
   ii. 3/8" maximum grading surface course asphalt lift.
   iii. 3/4" maximum grading base course asphalt lift.

All aggregates used in tennis court paving shall be pyrite free.

G. Seal Coat: shall be a pre-mixed asphalt emulsion blended with select fillers and fibers such as: (**<u>Do not place sealcoat over asphalt for tennis courts)</u>**

1. “Park-Top No. 302”, Western Colloid Products.
2. “OverKote”, Reed and Gram.
3. “Drivewalk”, Conoco Oil.

H. Wood Headers and Stakes: Pressure treated.

I. Pavement Marking: Colors as directed by Architect. Colors of painted traffic stripes and pavement markings must comply with ASTM D 6628.

1. Waterborne traffic line - colors white, yellow and red, State specification PTWB-01R3.
2. Waterborne traffic line for the international symbol of accessibility and other curb markings – blue, red and green, Federal specification TT-P-1952F.

J. Precast Concrete Bumpers: 3000 psi at 28 day minimum strength; 48" length unless otherwise indicated and 5.5” max height; provide with steel dowel anchors and concrete epoxy.

K. Pavement Epoxy; K-Lite; Ktepx-590; Ennis Epoxy HPS2 or an approved equal.

L. Crack Filler;

1. Cracks up to ½”: QPR model CAR08, 10oz asphalt crack filler; Star STA-FLEX Trowel Grade crack filler or approved equal.

2. Cracks ¼” – 1”: “Docal 1100 Viscolastic, distributed by Conoco, Inc., Elk Grove, CA, (916) 685-9253, or approved equal.

3. Cracks greater than 1”: Hot Mix, Topeka.

M. Reclaimed Asphalt Pavement (RAP). HMA Type A may be produced using RAP providing it does not exceed 15% of the aggregate blend.
Do not use RAP in Tennis Court paving, only virgin aggregates

N. Fiber Reinforcement Additives: To be added to asphalt paving mix within all asphalt paving in Tennis Court areas. See Section 32 12 16.26

2.02 MIXES

A. General: Plant mixed conforming to State Specifications, Section 39, Type A, 1/2” maximum, medium grading (all lifts). 3/8" maximum grading for surface course lifts and 3/4” maximum grading for base course lifts shall be used at tennis courts.

B. Temperature of Hot Mix Asphalt: Not less than 275 degrees F nor more than 325 degrees F when added to aggregate.

C. Temperature of Hot Mix Aggregate: Not less than 250 degrees F nor more than 325 degrees F when asphalt is added.

D. Temperature of Hot Mix Asphalt Concrete: Asphalt shall be not less than 285 degrees at time of application, nor more than 350 degrees. Asphalt not meeting the required temperature shall not be used.

E. Temperature of Warm Mix Asphalt: Mixing and placement; Per the approved manufactures heat range recommendations for mixing and placement.

PART 3 - EXECUTION

3.01 EXAMINATION OF CONDITIONS

A. Conditions of Work in Place: Subsurfaces which are to receive materials specified under this Section shall be carefully examined before beginning work hereunder, and any defects therein shall be reported, in writing, to the Architect. Work shall not be started until such defects have been corrected. Starting of work shall imply acceptance of conditions as they exist.

3.02 PREPARATION

A. Sub-Grade: Clean, shape and compact to hard surface free from elevations or depressions exceeding 0.05’ in 10' from true plan. Compact per Section 310000. Compaction and moisture content shall be verified immediately prior to placement of aggregate base. Proof roll subbase in presence of geotechnical engineer prior to placement of aggregate base.

B. Cleaning: Existing surfaces and new surface shall be clean of all dirt, sand, oil or grease. All cracks shall be cleaned and free of all debris and vegetation. Hose down entire area with a strong jet of water to remove all debris.

3.03 INSTALLATION

A. Headers:

1. General: Install as edging to asphalt paving, except where adjoining existing pavement, concrete curbs, walks or building.

2. Existing Headers: Remove existing headers where new paving will join existing. Saw cut existing asphalt to provide clean edge.

3. Lines and Levels: Install true to line and grade. Cut off tops of stakes 2-inches below top of header so they will not be visible on completion of job.

B. Aggregate Base (AB) for Asphalt Paving:

1. Base Course: Install AB in accord with California State Specifications (Caltrans), Section 26. For AB sections less than 0.50 feet, place and compact in one uniform layer. For sections over 0.50 feet, place in 2 or more uniform layers, each not exceeding 0.50 feet. Each layer shall be moistened and compact to relative compaction of not less than 95%, ASTM D1557. The material shall be deposited on the subgrade in such a manner as to provide a uniform section of material within five percent tolerance of the predetermined required depth. Deposition will be by spreader box or bottom dump truck to prevent segregation of the material. The

material so deposited on the subgrade shall have sufficient moisture which, in the opinion of the Architect is adequate to prevent excessive segregation. It shall then be immediately spread to its planned grade and cross section. Undue segregation of material, excessive drifting or spotting of material will not be permitted. If in the opinion of the site geotechnical engineer, the material is unsuitably segregated, it shall be removed or completely reworked to provide the desired uniformity of the material.

a. Moisture content and compaction of base material shall be tested immediately prior to placement of asphalt paving.

2. Sterilant: Apply specified material at manufacturer's recommended rate. Applicator of sterilant material shall be responsible for determining location of all planter areas. Apply specified material over entire base course area just prior to application of asphalt. Follow manufacturer's printed directions.

3. Liquid Asphalt Tack Coat: Apply as "tack coat" to all vertical surfaces of existing paving, curbs, walks, and construction joints in surfacing against which paving is to be placed. Tack coat is not require on AB surfaces.

4. Asphalt Concrete Surface Course:

a. Comply with State Specifications, 39-6 except as modified below.

i. Final gradation shall be smooth, uniform and free of ruts, humps, depressions or irregularities, with a minimum density of 95% of the test maximum density determined by California Test Methods #304 and 375. Maximum variation 1/8 inch in 10' when measured with steel straightedge in any one direction. Test paved areas for proper drainage by applying water to cover area. Correct portions that do not drain properly by patching with plant mix. In no case shall accessible parking spaces or loading and unloading areas exceed 2% slope in any direction.

ii. Asphalt material shall be delivered to the project site in a covered condition to maintain acceptable temperature. Onsite inspector shall verify temperature of asphalt upon truck arrival to the site.

iii. Fiber Reinforcement Additives: To be added to asphalt paving mix within all asphalt paving in Tennis Court areas. See Section 32 12 16.26.

b. At Tennis Courts, following base course AC installation and grinding of portions existing asphalt to remain, contractor to check the planarity on a 10’ grid. AC shall not exceed 1/4” variance from design. Contractor shall provide additional grinding in high spots and a thin layer of hot topeka mix to fill low spots until a uniform base is achieved. Contractor shall water test to find any ponding water locations and repair as above. After all imperfections are repaired, contractor may continue with final surface course AC lift.

5. Placement and adjustment of Frames, Covers, Boxes and Grates: The Contractor shall set and adjust to finish grade all proposed and existing frames, covers, boxes, and grates of all manholes, drop inlets, drain boxes, valves, cleanouts, electrical boxes and other appurtenant structures prior to placement of asphaltic concrete.

6. Water Testing: All paved areas shall be water tested, to check drainage, in the presence of the project inspector prior to placement of seal coat. The surface of asphalt paving shall not vary more than 1/8 inch above or below the grade established on the plans. If variations in grade are present, they will be corrected by overlaying paving and/or pavement removal and replacement as directed by the Architect.

7. Patching: Cut existing paving square and plumb at all edges to be joined by new paving. In trenches; grind existing asphalt on each side of trench 3" wide x ½ the depth of the section. Apply tact coat to vertical surfaces before installing new work. Warp carefully to flush surface, with seal over joints, and feather edge. Sawcut, remove and patch existing paving where cutting is necessary for installation of piping or conduits under Divisions 2, 15 and 16.

C. Seal Coat:

1. Seal coat shall be applied no sooner than 30 days from time of asphalt placement, no exceptions.

2. **DO NOT APPLY SEALOAT IN TENNIS COURT PAVING AREAS**. Refer to section 32 18 23 for Tennis Court Surfacing.

3. Surface Preparation: surface and cracks shall be clean of all dirt, sand, oil or grease. All cracks shall be filled to a level condition after curing. Make multiple fill applications until a level condition is achieved. Failure to do so will be the reason for rejection. Hose down entire area with a strong jet of water to remove all debris. Remove soft, loose, or otherwise damaged areas of asphalt concrete to full depth of damage and replace with compacted hot mix asphalt concrete as specified herein. Minor holes and imperfections may be patched using hot mix asphalt or mastic using sand/SS-1-H. Use wire brush for removal of oil and grease; prime with shellac or synthetic resin as recommended by manufacturer of pavement sealer material.

4. Seal Coat Seal Application: Thoroughly mix materials and apply in the presence of the onsite inspector. Failure to do so will be cause for rejection. Apply in accordance with manufacturer's written instructions.

   a. The minimum application rate for each applied coat shall be 30gals per 1000 sq. ft. Two coats of sealcoat will be required.

   b. Clean-Up and Precautions: As recommended by pavement sealer material manufacturer.

D. Asphalt Concrete Overlay Paving:

1. Comply with State Specifications, 39-6 except as modified below.

2. Grind or remove existing asphalt concrete paving at limits of overlay paving to provide a minimum 1-1/2" overlay thickness. Limits of grinding or removal shall be field verified to insure that finished paving surface will have a one percent minimum slope.

3. Thoroughly clean surface to remove vegetation, dirt, sand, gravel and water from surface and from cracks. Vegetation shall be treated 7 days prior to removal with an herbicide.

4. Cracks greater than 1 inch shall be filled with hot mix asphalt and rolled and compacted. Cracks less than one inch shall be filled with crack filler. Potholes shall be filled with hot-mix rolled and compacted. Contractor shall have Engineer approve crack and pothole repair prior to overlay. Provide leveling courses of hot mix asphalt as required to achieve finish grades shown on the drawings.

   a. Cracks less than one inch in width shall be level after curing. Contractor shall make multiple filling applications as necessary to achieve a level condition.

5. Place overlay when ambient air temperature is 40 degrees F. and rising, and when pavement is dry.

6. An asphalt tack coat shall be applied to existing surface area at a rate of 0.20 gallons per square yard. Application width shall be width of fabric plus 2 to 6 inches.

7. Place, spread and compact asphalt overlay to provide a minimum density of 95% of maximum theoretical unit weight as determined by California Test Method #304. Maximum variation 1/8" in 10' when measured with steel straight edge in any one direction. Test paved areas for proper drainage by applying water to cover area. Correct portions that do not drain properly by patching with plant mix. Minimum compacted overlay thickness 1-1/2 inches.

8. At Tennis Courts, overlay shall be 3/8” surface course AC as listed herein.

E. Pavement Marking: pavement markings shall be done only after the seal coat has thoroughly dried. Existing surfaces to be striped with traffic paint shall be cleaned of dust, dirt, grime, oil, rust or other contaminants which will impair the quality of work or interfere with proper bond of paint coats. Surfaces shall be thoroughly cleaned by whatever means necessary that will satisfactorily accomplish the purpose without damage to asphalt concrete. Provide measured layouts, temporary markings, templates, and other means necessary to provide required marking. Prepare and apply paint in accordance with manufacturer’s instructions; paint shall be applied by spray and shall achieve complete coverage free from voids and thin spots. Where indicated on the Drawings, paint parking stall strips, lettering, arrows, accessible symbols, playfield markings, etc. on asphalt concrete paving. Paint strips shall be 4 inches wide (except otherwise indicated) and applied with two (2) coats of herein specified Traffic Line Paint; white (except as otherwise

specified or indicated).

1. Paints shall be delivered to the site in unopened containers.

   a. Paint shall not be diluted, or watered down.
   b. Paint shall be applied in 10-12 wet mil thickness (4-6 mil dried). Each coat thickness shall be verified by the project inspector.

2. International Accessible Symbol: Symbol shall be white figures on a blue background. Blue shall be equal to color No. 15090 in Fed. Std. 595c. Lines and symbols shall be accurately formed and true to line and form; lines shall be straight and uniform in width. Painted edges shall be clean cut and free from raggedness, and corners shall be cut sharp and square. Tolerances: Apply striping within a tolerance 1/2 inch in 50 feet. Apply markings and striping to widths indicated with a tolerance of 1/4 inch on straight sections and 1/2 inch on curved sections.

F. Colors: As directed by Architect

G. Precast Concrete Bumpers: Install in location where shown, using steel rebar dowels, and epoxy.

3.04 DEFECTIVE ASPHALT;

Defective asphalt is as described below.

A. Exposed rock pockets on the finished surface that lack the # 8- #200 fines that is required per the sieve analysis.

B. Asphalt not placed to the design grades.

C. Asphalt that ponds water.

D. Asphalt that was compacted below the minimum required temperature and is cracked.

E. Asphalt that fails to meet the minimum compaction requirements.

F. Asphalt that lacks the minimum thickness required per plan.

G. New asphalt contaminated by a petroleum product, or spilled paint.

H. Asphalt that has depressions, cracks, scored divits from dumpster wheels, heavy equipment use, heavy construction products,

I. Asphalt placed on pumping, unstable sub-grades.

3.05 CLEANING

A. Refer to Division 1 – District General Conditions and Contractual Requirements.

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

C. Clean excess material from surface of all concrete walks and utility structures.

END OF SECTION

SECTION 32 12 16.26

FIBER REINFORCED ASPHALT CONCRETE (FRAC)

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This work shall consist of providing and placing FRAC in accordance with these specifications and lines, grades, thicknesses and typical cross-sections shown in the plans. Furnish all materials, equipment, labor and incidentals for mixing fiber in hot mix asphalt (HMA), when fiber is required as a mixture ingredient. Paving FRAC shall be in accordance with these specifications as well as those outlined in section 302-5 of these and the standard specifications, whichever is more stringent.

1.02 DEFINITIONS

A. Reinforcing Fibers: High tensile strength aramid fiber blend specially formulated to reinforce hot mix asphalt.

B. Fiber Reinforced Asphalt Concrete (FRAC): A mixture of hot or warm mix asphalt and reinforcing fibers that has greater resistance to rutting, thermal cracking, fatigue cracking, and reflective cracking as compared to conventional non-fiber asphalt mixes.

C. Fiber Reinforced Asphalt Rubber Hot Mix (FR-ARHM): A mixture of rubberized asphalt and reinforcing fibers that has greater resistance to rutting, thermal cracking, fatigue cracking, and reflective cracking as compared to non-fiber rubberized asphalt mixes.

D. Aramid Dispersion State Ratio (ADSR): A measure of the dispersion efficiency of the Reinforcing Fibers within asphalt mixes. ADSR is calculated by comparing the mass of aramid in the individual state to the total mass of extracted aramid fibers, expressed as a percentage.

1.03 REFERENCES

A. ASTM D2172, Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

B. ASTM D6433, Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys.

C. AASHTO T322, Determining the Creep Compliance and Strength of Hot-Mix Asphalt (HMA) Using the Indirect Tensile Test Device.

D. AASHTO TP79, Standard Method of Test for Determining the Dynamic Modulus and Flow Number (FN) for Asphalt Mixtures Using the Asphalt Mixture Performance Tester.

E. Zeiada, W., Underwood, S., Stempihar, J., “Extraction of Aramid Fibers from Fiber Reinforced Asphalt Concrete – Special Test Method”, Arizona State University, May 11, 2016.

1.04 SUBMITTALS:

Submit the following as part of the bid package:

A. Representative fiber product sample.

B. Fiber product data sheet and certification from the Manufacturer that the fiber product supplied meets the requirements of this specification.
C. Manufacturer's instructions and general recommendations.
D. Performance results of ADSR testing from a minimum of three separate laboratory trials to validate Dispersion Efficiency.
E. Performance results of PCI testing from a minimum of three separate field trials to validate Cracking Resistance.
F. Performance results of FN testing from a minimum of three separate laboratory trials to validate Rutting Resistance.

****NOTE: Testing is NOT required on samples from the job mix, submit previously completed lab testing only.**

Submit a minimum of five unique project examples and references where the reinforcing fiber product was used within 250 miles of the project location.

PART 2 - PRODUCTS

2.01 MATERIAL PERFORMANCE:

Reinforcing Fiber Properties

1. Provide a reinforcing fiber blend of Virgin Polyolefins and/or Virgin Aramids.

   a. Acceptable products:
      - FORTA-FI®, provided by Forta Corporation
      - Ace XP, provided by SurfaceTech

   b. Product Contacts
      - Manufacturer:
        FORTA Corporation
        100 N. Forta Drive
        Grove City, PA 16127
        (800) 245-0306
        www.forta-fi.com
        Technical Contact:
        Mike Hass
        mhass@pacificgeosource.com

      - SURFACE TECH LLC
        Headquarters
        312 S. Cedros Ave., Suite 200
        Solana Beach, CA. 92075
        U.S. +1 619 880 0265
        CA +1 647 613 6988
        https://surface-tech.com/
        info@surface-tech.com

   c. If a different aramid-based fiber blend is proposed, performance test results comparing and contrasting the selected fiber and either of the two approved suppliers listed must be submitted at least two weeks prior to bid date for approval by engineer.

d. Non-aramid fiber blends will not be considered as acceptable alternatives to this specification.

e. Non-aramid fiber blends, aramid fiber blends with dosages less than 1 pound per ton, or fiber ton equivalents will not be accepted.

2.02 PERFORMANCE TESTING REQUIREMENTS

All historical test results submitted to validate the fiber's performance in asphalt mixes shall be from previously completed laboratory and field trials using plant-produced FRAC from a documented source only. Results from lab-produced FRAC or FRAC from an undocumented source will not be accepted. **Testing is NOT required on samples from the job mix.**

Fiber dosage rate in all submitted test reports must be equal to the rate proposed for this project. Only testing performed by an AASHTO accredited laboratory or nationally recognized university testing lab will be considered.

1. Aramid Dispersion State Ratio (ADSR) Tests from a minimum of three (3) separate laboratory trials.
   a. Perform ADSR test based on modified ASTM D2172 procedures as provided in the document entitled "Extraction of Aramid Fibers from Fiber Reinforced Asphalt Concrete – Special Test Method". A copy of the modified extraction methodology can be obtained by making an inquiry to the Pavement and Materials Laboratory at Arizona State University at NCE@asu.edu.

   b. To validate ADSR results, average extracted aramid fiber quantity must equal 0.007 percent by total sample weight with no individual result less than 0.005 percent of the total sample weight.

   c. All tested fiber mixes must achieve a minimum ADSR of 85%.

2. Pavement Condition Index (PCI) side by side comparison from a minimum of three (3) field trails with a minimum in-service pavement age of four years.

   a. PCI surveys shall be performed according to ASTM D6433.
   b. Tests results shall include a control and a fiber reinforced pavement section. FRAC mix shall be identical to control mix except for the inclusion of fibers added at the same dosage as proposed on the project.
   c. In field performance sections shall be subject to the same environmental and traffic conditions. A minimum surface area of 500 yd^2 per FRAC and control section is required.
   d. PCI results from fiber sections shall show a minimum 10 PCI points greater than the control section after a minimum of 4 years.

3. Flow Number (FN) Tests from a minimum of three (3) separate laboratory trials.
   a. Perform FN tests using the protocol from AASHTO TP79.
   b. Tests results shall include a control and a fiber reinforced mix. FRAC mix shall be identical to control mix except for the inclusion of fibers added at the same dosage as proposed on the project.
   c. Results from fiber specimens shall each show an average FN increase of at least 75% over control specimens.

PART 3 - EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

Add aramid and polyolefin reinforcing fiber blends at a dosage rate of one (1) pound fiber per one (1) ton of asphalt. Non-aramid fiber blends, aramid fiber blends with dosages less than 1 pound per ton, or fiber ton equivalents will not be accepted. Add alternative aramid fiber blends that achieves the ADSR, PCI, and FN results required by Section 302-15.2. Have a fiber manufacturer's representative on site during mixing and production. This requirement can be waived if fiber manufacturer and asphalt producer can supply evidence of manufacturer's brand of fiber being successfully produced a minimum of three times at the asphalt plant to be used for the project.

3.02 JOB MIX FORMULA REQUIREMENTS

Store, mix and produce the fiber reinforced ACP mixture in accordance with the following requirements:

1. Deliver fiber-reinforcement in sealed, undamaged containers with labels intact and legible, indicating material name and lot number.

2. Deliver fiber-reinforcement to location where it will be added to each batch or loaded into the mixer.

3. Store materials covered and off the ground. Keep sand and dust out of boxes and do not allow boxes to become wet.

4. Add aramid and polyolefin reinforcing fiber blends at a dosage rate of one (1) pound fiber per one (1) ton of asphalt. Non-aramid fiber blends, aramid fiber blends with dosages less than 1 pound per ton, or fiber ton equivalents will not be accepted.

5. Have a fiber manufacturer's representative on site during mixing and production. This requirement can be waived if fiber manufacturer and asphalt producer can supply evidence of manufacturer's brand of fiber being successfully produced a minimum of three times at the asphalt plant to be used for the project.

6. Batch Plant. When a batch plant is used, add fiber to the aggregate in the weigh hopper and increase both dry and wet mixing times. Ensure that the fiber is uniformly distributed before the injection of asphalt cement into the mixture.

7. Drum Plant: a. Inject fibers through the RAP collar with a metered air blown system to promote rapid and complete fiber dispersion. Rate the feeding of fibers with the rate the plant is producing asphalt mix. If there is any evidence of fiber bundles at the discharge chute, increase the mixing time and/or temperature or change the angle of the fiber feeder line to increase dry mixing time. b. Add fibers continuously and in a steady uniform manner. Provide automated proportioning devices and control delivery within ±10% of the mass of the fibers required. Perform an equipment calibration to the satisfaction of the fiber manufacturer's representative to show that the fiber is being accurately metered and uniformly distributed into the mix. Include the following with the air blown system:

    - Low level indicators
    - No-flow indicators
    - A printout of feed rate status in pounds/minute
    - A section of transparent pipe in the fiber supply line for observing consistency of flow or feed.
    - Manufacturer's representative's approval of fiber addition system

3.02 DELIVERY STORAGE AND HANDLING

Deliver fiber-reinforcement in sealed, undamaged containers with labels intact and legible, indicating material name and lot number.

Deliver fiber-reinforcement to location where it will be added to each batch or loaded into the mixer.

Store materials covered and off the ground. Keep sand and dust out of boxes and do not allow boxes to become wet.

3.03 PLACEMENT

Follow manufacturer's and engineer's recommendations for placement of FRAC.

3.04 QUALITY CONTROL

1. Aramid Dispersion Visual Test: Collect a 10kg sample of mix from the discharge chute during first 50 tons of production. Visually assess the state of aramid fibers in the sample as "Pass" or "Fail" as described below.

    i. "Pass" = All fibers exist in an Individual State and no Undistributed Clips or Agitated Bundles of fiber are detected. ii.
    ii. "Fail" = One or more Undistributed Clips or Agitated Bundles are detected.

2. If a sample is rated as "Fail", adjust mixing operations to improve fiber dispersion and repeat Step 1 above.

3. If Visual Test results in three consecutive "Fail" ratings, contact the fiber manufacturer for corrective measures.

4. In addition to Visual Test, use a shovel to inspect FRAC mix in the back of first three trucks and every tenth truck thereafter to confirm adequate blending of the fiber.

5. Remove any observed fiber bundles from placed mixture and adjust operations per the manufacturer's recommendation to eliminate future fiber bundle development, and repeat Steps 1 through 3 above to confirm adequate aramid fiber dispersion.

<u>Manufacturer Certification Buy-American:</u>

1. Provide manufacturer notarized certification that aramid fibers and any other materials used in conjunction with the fibers are 100% American made and manufactured.

3.05 PAVING PATCHING AND REPAIR

A. Paving Patching and Repair: All paving that is damaged due to trenching, etc., or that is damaged due to construction under this Contract, shall be repaired and/or replaced hereunder as determined by Architect with new paving and base. All work shall be in accordance with the applicable material and application requirements specified herein.

    1. Saw cut existing asphalt concrete paving at all areas indicated or required for

new construction work and at edges of paving to be replaced and remove debris from the site. Excavation work and removal of material and backfill below bottom of base shall be the responsibility of the trade involved in the work.

3.06 TESTING

A. Complete surfacing shall be thoroughly compacted smooth, true to grade and cross section, free from ruts, humps, depressions or irregularities. After the surfacing has been placed the entire area shall be tested for proper drainage by applying water in sufficient amount to cover the surface. If any portion fails to drain properly, the condition shall be corrected by patching with asphalt concrete until correction of improper drainage is completed.

1. No ponding water is acceptable on new paving or adjacent areas caused by new work.

B. The District will employ an accredited independent testing Laboratory to sample materials, perform tests, and submit test reports during and after paving placement.

C. A 24” long SMART Level will be used for all measurements by percent of slope and cross slope to determine compliance.

3.07 PROTECTION

A. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case sooner than six (6) hours.

1. Provide barricades and warning devices as required to protect pavement.

[END OF SECTION 32 12 16.26]

SECTION 32 16 00

SITE CONCRETE

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – District General Conditions and Contractual Requirements.

B. Section 31 00 00, Earthwork.

1.03 QUALITY ASSURANCE

A. Use only new materials and products.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Sieve analysis from testing laboratories identifying rock/sand percentages within the concrete mix; or class 2 aggregate base shall have the current project name and project location identified on the report. Outdated analytical reports greater than 90 days old will not be accepted

1.04 SUBMITTALS

A. Refer to Division 1 – District General Conditions and Contractual Requirements

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Materials list: Submit to the Architect a complete list of all materials proposed to be used in this portion of the work. Submitted items should include but are not limited to sand, gravel, admixtures, surface treatments, coloring agents, sealers, fibers, cast-in-place accessories, forming and curing products and concrete mix designs.

D. With concrete submittal, provide documented history of mix design performance.

1.05 WARRANTY

A. Refer to Division 1 – District General Conditions and Contractual Requirements

1.06 REFERENCES AND STANDARDS

A. California Building Code, latest edition.

B. ACI Standards, ACI 211.1, ACI 318-14, ACI 302, IR-04, ACI 301-16, ACI 305R-10, ACI 306R-16, ACI 308-16.

C. ASTM C-94, Specification for Ready-Mixed Concrete.

D. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice (latest edition).

E. ASTM – American Society for Testing and Materials.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

E. Store cement in weather tight building, permitting easy inspection and identification. Protect from dampness. Lumpy or stale cement will be rejected.

F. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregate. Use only one supply source for each aggregate stock pile.

1.08 TESTING

A. General: Refer to Division 1 – District General Conditions and Contractual Requirements.

B. Cement and Reinforcing shall be tested in accordance with CBC Section 1910A. Testing of reinforcing may be waived in accordance with Section 1910A.2 when approved by the Structural Engineer and DSA.

1.09 ADEQUACY AND INSPECTION

A. Design, erect, support, brace and maintain formwork and shoring to safely support all vertical and lateral loads that might be applied until such loads can be carried by concrete.

B. Notify Inspector, Architect and DSA at least 48 hours prior to placing of concrete.

1.10 PROTECTION

A. Finish surfaces shall be protected at all times from concrete pour. Inspect forming against such work and establish tight leak-proof seal before concrete is poured. Finish work damaged, defaced or vandalized during the course of construction shall be replaced by

contractor at contractor expense.

1.11 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting, slopes and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement: Portland cement, ASTM C150, Type II, per ACI 318-14 Section 26.4.

B. Concrete Aggregates: Normal weight aggregates shall conform to ASTM C33, except as modified by this section. Combined grading shall meet limits of ASTM C33. Lightweight aggregate shall conform to ASTM C330, suitably processed, washed and screened, and shall consist of durable particles without adherent coatings.

C. Water: Clean and free from deleterious amounts of acids, alkalis, scale, or organic materials and per ACI 318-14 Section 26.4.1.3.1.

D. Fly Ash: Western Fly Ash, conforming to ASTM C618 for Class N or Class F materials (Class C is not permitted). Not more than 15% (by mass) may be substituted for portland cement.

E. Water Reducing Admixture: Admixture to improve placing, reduce water cement ratio, and ultimate shrinkage may be used. Provide WRDA 64 by Grace Construction Products or approved equal. Admixture shall conform to ASTM C494 and ACI 318-14 Section 26.4.1.4.19(a). Such admixture must receive prior approval by the Architect, Structural Engineer, and the Testing Lab, and shall be included in original design mix.

F. Air-entraining Admixture: Daravair 1000 by Grace Construction Products or approved equal. Admixture must conform to ASTM C260 and ACI 318-14, section 26.4.1.4.

G. Exterior Flatwork Expansion Joint Sealant: 1-part polyurethane sealant, Sikaflex -1c SL or approved equal.

H. Surface Retarder (for exposed aggregate finishes): Rugasol-S by Sika Corporation or approved equal.

I. Form Coating: Material which will leave no residue on concrete surface that will interfere with surface coating, as approved by the Architect.

J. Reinforcement Bars: New billet steel deformed bars conforming to requirements of ASTM A615 or ASTM A706; Grade 60. Dowels for installation through expansion joints or construction joints to existing sidewalks or concrete features shall be smooth or shall be sleeved on one end for slippage.

K. Wire Mesh may be used in difficult areas where contractor may wish for added protection from cracking, not as general slab reinforcing, see Reinforcing Bars above. If elected to provide in addition to reinforcing specified, it shall be 6”x6” #10 W.W.F. in 5’x10’ flat sheets.

6”x6” #10 wire rolls will not be accepted.

L. Reinforcing supports: Galvanized metal chairs or spacers or metal hangers, accurately placed 3’-0” O.C.E.W. Staggered and each support securely fastened to steel reinforcement in place. Bottom bars in footings may be supported with 3” concrete blocks with embedded wire ties. Concrete supports without wire ties will not be allowed.

M. Truncated Domes: Vitrified Polymer Composite (VPC), Cast-In-Place Detectable/Tactile Warning Surface Tiles; “Armor-Tile”, “Access Tile Tactile Systems”, or approved equal. Tiles shall comply with Americans with Disabilities Act and the California Code of Regulations (CCR) Title 24, Part 2, Chapter 11B (dome spacing shall be 2.35”). Install tiles as recommended by manufacturer.

1. Color: Federal Yellow, No. 33538

N. Curing Compound (for exterior slabs only): Burke Aqua Resin Cure by Burke by Edoco, 1100 Clear by W.R. Meadows or accepted equal. Water based membrane-forming concrete curing compound meeting ASTM C 309 and C1315.

O. Concrete Bonding Agent: Weld-Crete by Larson Products Corp., Daraweld C by Grace Construction Products or accepted equal.

P. Patching Mortar: Meadow-Crete GPS, one-component, trowel applied, polymer enhanced, shrinkage-compensated, fiber reinforced, cementitious repair mortar for horizontal, vertical and overhead applications as manufactured by W.R. Meadows or accepted equal.

Q. Non-shrink Grout: Masterflow 713 Plus by Master Builders or approved equal. Premixed,non-metallic, no chlorides, non-staining and non-shrinking per CRD-C621, Corps of Engineers Specification and ASTM C 1107, Grades B and C.

R. Aggregate Base: Class 2 AB per Caltrans specification section 26-1.02A.

S. Expansion Joint Material: Preformed 3/8" fiber material, full depth of concrete section, with bituminous binder manufactured for use as concrete expansion joint material, as accepted by the Architect.

T. Joint sealant for expansion joints: Single component silicone sealant, Type S, ASTM D5893

U. Pre- Formed plastic Expansion Joint; W.R. Meadows 3/8” “Snap Cap”, Tex-Trude expansion joint cap, or an approved equal.

V. Adhesive Anchoring (Epoxy): Hilty HIT-HY 200 Safe Set, or approved equal.

2.02 CONCRETE DESIGN AND CLASS

A. Proportion concrete mix designs according to ACI 211.1 and ACI 301 to provide normal weight Class “B” Concrete with the following properties:

a. Compressive Strength at 28 Days:

i. Light Strength Concrete - 2,500 psi. min.
1. Water main Thrust blocking.

2. Backflow assembly housekeeping pads.
3. Sign/fence post footings (use surrounding slab mix strength when in concrete paved areas)
4. Bollard post footings(use surrounding slab mix strength when in concrete paved areas)

ii. Medium Strength Concrete - 3,500 psi. min.
1. Sidewalks & other pedestrian (non-vehicular) slabs
2. Concrete curbs
3. Concrete mow strips
4. Concrete fence aprons
5. Landscape & seating walls not exceeding 4' in retained height.(measured top of footing to top of retained soil, or if no footing, top of lower grade to top of retained soil)

iii. Heavy Strength Concrete - 4,000 psi. min.
1. Vehicular Concrete Slabs
2. Vehicular Flush Curbs (driven over)
3. Vehicular Rolled Curbs (driven over)

b. Maximum Water-Cement Ratio at Point of Placement: 0.50.

B. Slump Limits: Provide concrete, at point of final discharge, of proper consistency determined by Test Method ASTM C143 with a slumps of 4" plus or minus 1".

C. Mix Design: All concrete used in this work will be designed for strength in accordance with provisions of ASI 318-14 Section 26.4. Should the Contractor desire to pump concrete, a modified mix design will need to be submitted for review. Fly ash may be used in concrete to improve workability in amounts up to 15% of the total cementitious weight.

D. Air Entrainment: 1.5%

E. Slab Thickness: As shown on plans.

2.03 MIXING OF CONCRETE

A. Conform to requirements of 2019 CBC, Chapter 19A.

B. All concrete shall be mixed until there is uniform distribution of material and mass is uniform and homogenous; mixer must be discharged completely before the mixer is recharged.

C. Concrete shall be Ready-mixed Concrete: Mix and deliver in accordance with the requirements set forth in ASTM C94 and ACI 301. Batch Plant inspection may be waived in accordance with CBC Section 1705A.3.3.1, when approved by Structural Engineer and DSA.

1. Approved Testing Laboratory shall check the first batching at the start of the work and furnish mix proportions to the Licensed Weighmaster.
2. Licensed Weighmaster to positively identify materials as to quantity and to

certify to each load by ticket.

3. Ticket shall be transmitted to Project Inspector by truck driver with load identified thereon. Project Inspector will not accept load without load ticket identifying mix and will keep daily record of pours, identifying each truck, its load and time of receipt and will transmit two copies of record to DSA.
4. At end of project, Weighmaster shall furnish affidavit to DSA on form satisfactory to DSA, certifying that all concrete furnished conforms in every particular and to proportions established by mix designs.
5. Placement of concrete shall occur as rapidly as possible after batching and in a manner which will assure that the required quality of the concrete is maintained. In no case may concrete be placed more than 90 minutes from batch time.
6. Water may be added to the mix only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. In no case shall more than 10 gallons of water shall be added to a full 9 yard load, or 1 gal. per yard on remaining concrete within the drum providing load tag indicates at time of mixing at plant will allow for additional water.

2.04 MATERIALS TESTING

A. Materials testing of concrete and continuous batch plant inspection may be waived in accordance CBC Sections 1704A.4.4 when approved by Structural Engineer and DSA.

B. Testing of concrete shall be performed per article 3.12 of this specification.

2.05 EQUIPMENT

A. Handling and mixing of concrete: Project Inspector may order removal of any equipment which in his opinion is insufficient or in any way unsuitable.

PART 3 - EXECUTION

3.01 APPROVAL OF FORMS AND REINFORCEMENTS

A. Forms and reinforcements are subject to approval by the Project Inspector, and notice of readiness to place first pour shall be given to DSA, Architect and Structural Engineer 48 hours prior to placement of concrete. Before placing concrete, clean tools, equipment and remove all debris from areas to receive concrete. Clean all reinforcing and other embedded items off all coatings oil, and mud that may impair bond with concrete.

B. All reinforcing steel and or W.W.F. shall be adequately supported by approved devices on centers close enough to prevent any sagging.

C. All reinforcing bar lap splices shall be staggered a minimum of 5 ft.

D. If used, W.W.F. shall be lapped a minimum of 6” on each side of sheets and 12” on each end. Laps shall be wired together 2ft on center maximum spacing. End laps shall be staggered 2’-0” minimum from adjacent reinforcement.

E. Additional reinforcing steel shall be placed around all utility boxes, valve boxes, manhole

frames and covers that are located within the concrete placements.

1. The bars shall be placed so that there will be a minimum of 1 ½" clearance and a maximum of 3" clearance. The reinforcing steel shall be placed mid-depth of concrete slab.

F. At all right angles or intersections of concrete walks, additional 2'x2' #5, 90 degree bars shall be added at all inside corners for additional crack control. The bars shall be placed 2" from concrete forms and supports at mid-depth of slab.

3.02 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

C. Sub-Grade in vehicular concrete paved areas: Subgrade shall be clean, shaped and compact to hard surface free from elevations or depressions exceeding 0.05' in 10' from true plan. Compact per Section 31 00 00. Compaction and moisture content shall be verified immediately prior to placement of concrete. Proof roll subbase in presence of geotechnical engineer prior to placement of aggregate base.

3.03 CLEANING

A. Reinforcement and all other embedded items at time of placing concrete to be free of rust, dirt oil or any other coatings that would impair bond to concrete.

B. Remove all wood chips, sawdust, dirt, loose concrete and other debris just before concrete is to be poured. Use compressed air for inaccessible areas. Remove all standing water from excavations.

3.04 FORMING

A. Form material shall be straight, true, sound and able to withstand deformation due to loading and effects of moist curing. Materials which have warped or delaminated, or require more than minor patching of contact surfaces, shall not be reused.

B. Build forms to shapes, lines, grades and dimensions indicated. Construct form work to maintain tolerances required by ACI 301. Forms shall be substantial, tight to prevent leakage of concrete, and properly braced and tied together to maintain position and shape. Butt joints tightly and locate on solid backing. Chamfer corners where indicated. Form bevels, grooves and recesses to neat, straight lines. Construct forms for easy removal without hammering, wedging or prying against concrete.

C. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.

D. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.

E. Build in securely braced temporary bulkheads, keyed as required, at planned locations of construction joints.

F. Slope tie-wires downward to outside of wall.

G. Brace, anchor and support all cast-in items to prevent displacement or distortion.

H. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.

I. Concrete paving, Curbs, Curb and Gutters, Ramps:

1. Expansion Joints: Install at locations indicated, and so that maximum distance between joints is 20’ for exterior concrete unless otherwise shown. Expansion joint material shall be full depth of concrete section. Recess for backer rod and sealant where required. Expansion joints shall not exceed ¼ inch depth measured from finish surface to top of felt or sealant, and ½ inch width.

2. Curbs, Valley Gutter, and Curb & Gutter: Install expansion joints at 60’ on center, except when placing adjacent to concrete walks, the expansion joints shall align with the expansion joints shown for the concrete walks. Expansion joint material shall be full depth of concrete section. Recess for backer rod and sealant will be required.

3. Isolation Joints: 3/8” felt between walls and exterior slabs or walks so that paved areas are isolated from all vertical features, unless specifically noted otherwise on plans.

4. Exterior Concrete Paving: Install expansion joints at 20’ on center maximum, both directions, unless shown otherwise on plans.

5. Ramps; whether shown or not all ramps shall have control joints and expansion joints.

a. Control joints on ramps shall be aligned and be placed in between with the vertical posts for the handrails. The curbs, if required shall have control joints that align with the handrail posts.

b. Expansion joints shall be placed at the upper, intermediate, and bottom landings.

c.

3.05 FORM COATING

A. Before placement of reinforcing steel, coat faces of all forms to prevent absorption of moisture from concrete and to facilitate removal of forms. Apply specified material in conformance with manufacturer's written directions.

B. Before re-using form material, inspect, clean thoroughly and recoat.

C. Seal all cut edges.

3.06 INSTALLATION

A. General: Reinforcement shall be accurately placed at locations indicated on the drawings within required tolerances and providing required clearances. Reinforcement shall be secured prior to placement of concrete such that tolerances and clearances are maintained. Coverage shall be in accordance with Section 1907A.7 of the CBC. Keep a person on the job to maintain position of reinforcing as concrete is placed. Reinforcement must be in place before concreting is begun. Install dowels as shown on drawings. Give notice whenever pipes, conduits, sleeves, and other construction interferes with placement; obtain method of procedure to resolve interferences. All expansion and construction joints in concrete shall have dowels of size and spacing as shown, or as approved by Architect.

B. Placing Tolerances:

1. Per ACI 301 or CRSI/WCRSI Recommended Practice for Placing Reinforcing Bars, unless otherwise shown.

2. Clear distance between parallel bars in a layer shall be no less than 1", the maximum bar diameter not 1 ½ times the maximum size of coarse aggregate.

C. Splices:

1. General: Unless otherwise shown on drawings, splice top reinforcing at midspan between supports, splice bottom reinforcing at supports and stagger splices at adjacent splices 5 foot minimum. Bar laps shall be wired together. Reinforcing steel laps shall be as follows:

a. Lap splices in concrete: Lap splice lengths shall not be less than 62 bar diameter for No. 5 bar, 56" minimum for No. 6 bars. No. 4 bar shall have a minimum of 24" splice. 93 bar diameters for No. 7 bars and larger.

b. All splices shall be staggered at 5 feet minimum.

3.07 INSPECTION

A. Approval of reinforcing steel, after installation, must be received from Inspector. Architect, Structural Engineer and DSA must be notified 48 hrs. in advance of beginning of concrete placement operations.

B. Slope of concrete forms and finish condition shall be checked with a two foot (2') digital level.

3.08 PLACING OF CONCRETE

A. Adjacent finish surfaces shall be protected at all times during the concrete pour and finishing. Verify that all formwork is tight and leak-proof before concrete is poured. Finish work defaced during the concrete pour and finishing shall be replaced at no extra cost to the owner.

B. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients. Deposit as close as practicable in final position to avoid re-handling or flowing. Partially hardened concrete must not be deposited

in work. Concrete shall not be wheeled directly on top of reinforcing steel.

C. Placing: Once started, continue concrete pour continuously until section is complete between predetermined construction joints. Prevent splashing of concrete onto adjacent forms or reinforcement and remove such accumulation of hardened or partially hardened concrete from forms or reinforcement before work proceeds in that area. Free fall of concrete shall not to exceed 4'-0" in height. If necessary, provide lower openings in forms to inject concrete and to reduce fall height.

D. Remove form spreaders as placing of concrete progresses.

E. Place footings as monolithic and in one continuous pour.

F. Keep excavations free of standing water, but moisture condition sub-grade before concrete placement.

G. Compacting: All concrete shall be compacted by mechanical vibrators. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms. Vibrating shall not be applied to concrete which has already begun to initially set nor shall it be continued so long as to cause segregation of materials.

H. Grout under column bearing plates: Dry pack with specified Non-shrink Grout, as recommended by manufacturer. Use as little water as practicable. Ram grout solid into place.

I. Concrete Flatwork:

1. All flatwork shall be formed and finished to required line and grades. Flatwork shall be true and flat with a maximum tolerance of 1/8" in 10’ for flatness. Flatwork which is not flat and are outside of the maximum specified tolerances shall be made level by the Contractor at no additional expense to the Owner.
2. Concrete vibrator shall be used to assist concrete placement. Contractor shall have spare concrete vibrator on site during concrete placement.

J. Placing in hot weather: Comply with ACI 305R-10. Concrete shall not exceed 85 degrees F at time of placement. Concrete shall be delivered, placed and finished in a sufficiently short period of time to avoid surface dry checking. Concrete shall be kept wet continuously after tempering until implementation of curing compound procedure in accordance with this specification.

K. Placing in cold weather: Comply with ACI 306R-16. Protect from frost or freezing. No antifreeze admixtures are permitted. When deposited concrete during freezing or near-freezing weather, mix shall have temperature of at least 50 degrees F but not more than 90 degrees F. Concrete shall be maintained at temperature of at least 50 degrees F for not less than 72 hours after placing or until it has thoroughly hardened. Provide necessary thermal coverings for any flat work exposed to freezing temperatures.

L. Horizontal construction joint: Keep exposed concrete face of construction joints continuously moist from time of initial set until placing of concrete; thoroughly clean contact surface by chipping entire surface not earlier than 5 days after initial pour to expose clean hard aggregate solidly embedded, or by approved method that will assure equal bond, such as green cutting. If contact surface becomes contaminated with soil, sawdust or other

foreign matter, clean entire surface and re-chip entire surface to assure proper adhesion.

3.09 CONCRETE FINISHES

A. Concrete Slab Finishing: Finish slab as required by ACI 302.1R. Use manual screeds, vibrating screeds to place concrete level and smooth. Use “jitterbugs” or other special tools designed for the purpose of forcing the course aggregate below the surface leaving a thick layer of mortar 1 inch in thickness. Surface shall be free from trowel marks, depressions, ridges or other blemishes. Tolerance for flatness shall be 1/8" in 10'. Provide final finish as follows:

1. Flatwork, medium broom finish: Typical finish to be used at all exterior walks and stairs.
2. Ramps, heavy broom finish: Concrete surfaces with slope greater than 5% including all ramps. Brooming direction shall run perpendicular to slope to form non-slip surface
3. Under no circumstances can water be added to the top surface of freshly placed concrete.

B. Curb Finishing: Steel trowel.

C. Joints and Edges: Mark-off exposed joints, where indicated, with ¼” radius x 1” deep jointer or edging tool. Joints to be clean, cut straight, parallel or square with respect to concrete walk edge. Tool all edges of exposed expansion and contraction joints, walk edges, and wherever concrete walk adjoins other material or vertical surfaces.

1. The expansion joints shall be full depth as shown in the plan details. Failure to do so will result in non-compliance and shall be immediately machine cut by the contractor at his expense.

D. Exposed Concrete Surface Finishing (not including top surface of flatwork): Remove fins and rough spots immediately following removal of forms from concrete which is to be left exposed. Damaged and irregular surfaces and holes left by form clamps and sleeves shall be patched with grout. Tie wires are to be removed to below exposed surface and holes pointed up with neat cement paste similar to procedure noted under "Patching" below. Removal of tie wires shall extend to distance of 2" below established grade lines. Ends of tie wires shall be cut off flush at all other, unexposed locations. Care shall be taken to match adjacent finishes of exposed concrete surface. After patching, all concrete that is to remain exposed, shall be sacked with a grout mixture of 1-part cement, 1 1/2- parts fine sand and sufficient water to produce a consistency of thick paint. After first wetting the concrete surface, apply mixture with a brush and immediately float entire surface vigorously using a wood float. Keep damp during periods of hot weather. When set, excess grout shall be scraped from wall with edge of steel trowel, allowed to set for a time, then wiped or rubbed with dry burlap. Entire finishing operation of any area shall be completed on the same day. This treatment shall be carried to 4" below grade, and all patching and sacking shall be done immediately upon removal of the forms.

E. Stair Treads and Risers: Tool exterior stair tread nosing per ADA requirements and as detailed. Paint or stain tooled area at every stair tread nosing or as detailed. Stair tread nosing shall contain no pockets, voids or spalls. Patching is not allowed. Damaged nosing shall be replaced.

3.10 CURING

A. Cured Concrete in Forms: Keep forms and top on concrete between forms continuously wet until removal of forms, 7 days minimum. Maintain exposed concrete in a continuous wet condition for 14 days following removal of forms.

B. Flatwork/Variable Height Curbs, Curb and gutter, Valley Gutter: Cure utilizing Curing Compound. If applicable, the Contractor shall verify that the approved Curing Compound is compatible with the approved colorant system. Upon completion of job, wash clean per manufacturer's recommendations.

1. Curing compound shall be applied in a wet puddling application. Spotty applications shall be reason for rejection and possibly concrete removal and replacement at the contractor's expense with no compensation from the owner.

C. No Curing Compound shall be applied to areas scheduled to receive resilient track surface including, curbs, ramps, run ways, etc.

3.11 DEFECTIVE CONCRETE

A. Determination of defective concrete shall be made by the Architect or Engineer. His opinion shall be final in identifying areas to be replaced, repaired or patched.

B. The Owner reserves the right to survey the flatwork, if it is determined to be outside of the maximum tolerance for flatness. If the flatwork is found to be out of tolerance, then the Contractor will be required to replace concrete. The Contractor will be responsible for reimbursing the Owner for any surveying costs incurred. Determination of flatwork flatness, surveying and any remedial work must be completed far enough in advance so that the project schedule is maintained, delays are avoided and the new flatwork or flatwork repairs are properly cured.

C. As directed by Architect, cut out and replace defective concrete. All defective concrete shall be removed from the site. No patching is to be done until surfaces have been examined by Architect and permission to begin patching has been provided.

D. Permission to patch any area shall not be considered waiver of right, by the Owner, to require removal of defective work, if patching does not, in opinion of Architect, satisfactorily restore quality and appearance of surface.

E. Defective concrete is:

1. Concrete that does not match the approved mix design for the given installation type.
2. Concrete not meeting specified 28-day strength.
3. Concrete which contains rock pockets, voids, spalls, transverse cracks, exposed reinforcing, or other such defects which adversely affect strength, durability or appearance.
4. Concrete which is incorrectly formed, out of alignment or not plumb or level.
5. Concrete containing embedded wood or debris.
6. Concrete having large or excessive patched voids which were not completed under Architect's direction.
7. Concrete not containing required embedded items.

8. Excessive Shrinkage, Traverse cracking, Crazing, Curling; or Defective Finish. Remove and replace if repair to an acceptable condition is not feasible.
9. Concrete that is unsuitable for placement or has set in truck drum for longer than 90 minutes from the time it was batched.
10. Expansion joint felt that is not isolating the full depth of the concrete section, and recessed as required for backer rod and sealant where required.
11. Concrete that is excessively wet or excessively dry and will not meet the minimum or maximum slump required per mix design.
12. Finished concrete with oil stains from equipment use, and or rust spots that cannot be removed.
13. Control joints (weakened planed joints) that do not meet the required minimum depth shown on the drawings.

F. Patching: Install specified Patching Mortar per manufacturer's recommendations. REPAIRS TO DEFECTIVE CONCRETE WHICH AFFECT THE STRENGTH OF ANY STRUCTURAL CONCRETE MEMBER OR COMPONENT ARE SUBJECT TO APPROVAL BY THE ARCHITECT AND DSA.

3.12 CONCRETE TESTING

A. Comply with CBC Section 1903A, 1905A.1.16, 1910A and 1705A.3 and as specified in B. below. Costs of tests will be borne by the Owner.

B. Four identical cylinder samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. In addition, samples for strength tests for each class of concrete shall be taken for seven-day tests at the beginning of the concrete work or whenever the mix or aggregate is changed.

C. Strength tests will be conducted by the Testing Lab on one cylinder at seven (7) days and two cylinders at twenty-eight (28) days. The fourth remaining cylinder will be available for testing at fifty-six (56) days if the 28-day cylinder test results do not meet the required design strength.

D. On a given project, if the total volume of concrete is such that the frequency of testing required by paragraph B. above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.

E. Cost of retests and coring due to low strength or defective concrete will be paid by Owner and back-charged to the Contractor.

F. Each truck shall be tested for slump before concrete is placed.

3.13 REMOVAL OF FORMS

A. Remove without damage to concrete surfaces.

B. Sequence and timing of form removal shall insure complete safety of concrete structure.

C. Forms shall remain in place for not less than the following periods of time. These periods

represent cumulative number of days during which temperature of air in contact with concrete is 60 degrees F and above.

1. Vertical forms of foundations, walls and all other forms not covered below: 5 days.
2. Slab edge screeds or forms: 7 days.
3. Concrete columns and beam soffits: 28 days.

D. Concrete shall not be subjected to superimposed loads (structure or construction equipment) until it has attained its full design strength and not for a period of at least 21 days after placing. Concrete systems shall not be subjected to construction loads in excess of design loads.

3.14 CLEANING

A. Refer to Division 1 – District General Conditions and Contractual Requirements.

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

C. Clean excess material from surface of all concrete walks and utility structures.

D. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION

SECTION 32 18 23

TENNIS COURT SURFACING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This specification covers the application of a new Plexipave Hardcourt System for Tennis Courts.

B. California Sport Surfaces “Plexipave” Standard Tennis Court system is the basis of design:

California Sport Surfaces
150 Dascomb Rd.
Andover, MA 01810
Telephone: (978) 623-9980
Fax: (978) 623-9970

C. Alternates may be submitted for review and approval if found to be of comparable quality and durability. Supplier shall have at least 10 commercial tennis court installations within the state. Pre-approved acceptable alternate manufacturers are as follows:

Laykold USA (by APT) Hardcourt Masters Color System
109 Conica Lane, PO Box 160
Harmony, PA 16037, USA
Telephone: 1 (866) 664 9917
info@laykold.com

SportMasters Standard Tennis Court System
SportMasters
PO Box 2277
Sandusky, OH 44870
Sacramento Rep Contact:
Telephone: (888) 713-7325

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plexipave Court Patch Binder: Shall comply with Specification 10.14 of California Products Corporation.

B. Plexipatch: Shall comply with Specification 10.21 of California Products Corporation.

C. Acrylic Resurfacer: Shall comply with Specification 10.8 of California Products Corporation.

D. Plexipave Color Base: Shall conform to Specification 10.5 of California Products Corporation.

E. Plexichrome: Shall conform to Specification 10.1 of California Products Corporation.

F. Plexicolor Line Paint: Shall conform to Specification 10.4 of California Products Corporation.

G. Water: The water used in all mixtures shall be fresh and potable.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Surface Preparation: The surface to be coated must be sound, smooth, and free from dust, dirt or oily materials. Prior to the application of surfacing materials, the entire surface should be flooded, and checked for minor depressions or irregularities. Any puddled area covering a nickel shall be marked and repaired with Court Patch Binder using the following mix:
100 lbs. 60 – 80 mesh silica sand (dry)
3 gallons Plexipave Court Patch Binder
1 to 2 gallons Portland Cement (dry) (depending on humidity and temperature)

B. Tack coat consisting of 1 part Court Patch Binder and 2 parts water shall be applied to the patch areas and allowed to dry thoroughly prior to patching. For more information see CPC Specification 10.14 or 10.21.

C. After patching, the surface shall not vary more than 1/8 inch in ten feet measured in any direction.

3.02 SURFACE PREPARATION

A. In order to provide a smooth, dense underlayment for the Plexipave system, one application of California Acrylic Resurfacer shall be applied to the surface to obtain a coverage of 15 – 20 sq. yds. Per gallon (.07 - .05 gallons per square yard). No application shall be covered by a succeeding application until thoroughly cured. Dilution with water and sand is required utilizing the following mix:

Acrylic Resurfacer	55 gallons
Water (Clean and Potable)	20-40 gallons
Sand (45-60 Mesh)	600 – 900 lbs.
Liquid Yield	112 – 138 gallons

3.03 FORTIFIED PLEXIPAVE

A. Fortified Plexipave shall be applied by rubber bladed squeegee on the clean, dry surface in 3 applications to obtain a total quantity of not less than .15 nor more than .23 gallons per sq. yd. of area, based on the material prior to any dilution. No application shall be covered by a succeeding application until thoroughly cured. Fortified Plexipave can be job mixed as follows:
Plexipave Color Base 30 gallons
Plexichrome 20 gallons
Water 20 gallons

B. The diluted material shall be homogenous. Segregation before or during application will not be permitted.

C. The finished surface shall have a uniform appearance and be free from ridges and tool marks.

3.04 LAYING LINES

A. Four hours minimum after completion of the color resurfacing, 2-inch wide playing lines shall be accurately located, marked, and painted with Plexicolor Line Paint as specified by U.S. Tennis Association.

All 4 corners of each tennis court, as well as all post locations for the netting posts shall be located by field survey performed by or under the direction of a licensed surveyor. Tennis Court surfacing subcontractor may or may not provide this service as part of their bid so bidding contractor may be required to provide this. In any case, the cost of this work shall be included in the bid.

String lines and tape measures may be used for preliminary layout of courts if desired, but shall be verified by a field survey as noted above. Internal court line work may be laid out with string lines and tape measures as desired.

Should any stripes be found in error after installation, the entire inner and outer court area of the court shall be re-surfaced with color coats and all new striping provided. Painting/Patching individual lines found to be in error will not be acceptable.

3.05 LIMITATIONS

A. No part of the construction involving the Plexipave System shall be conducted during rainfall, or when rainfall is imminent. The air temperature must be atleast 50°F and rising. Do not apply when surface temperature is above 140°F. The Plexipave System will not prevent surface or structural cracks from reoccurring.

[END OF SECTION 32 18 23]

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fence framework, fabric, and accessories.

B. Excavation for post bases; concrete foundation for posts.

C. Manual gates and related hardware.

1.02 RELATED SECTIONS

A. Division 1 – District General Conditions and Contractual Requirements.

1.03 REFERENCES

A. ANSI/ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

B. ANSI/ASTM F567 – Installation of Chain link Fence.

C. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. ASTM C94 – Ready-mixed Concrete.

E. Chain link Fence Manufacturers' Institute (CLFMI) – Product Manual.

1.04 SYSTEM DESCRIPTION

A. Fence Height: 12'-0" max unless otherwise noted.

B. Line Post Spacing: At intervals not exceeding 10 feet, 8 feet for fence heights 10' and higher.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.

B. Installer: Company specializing in installations of chain-link fencing with a minimum of five years of experience. If any welding is required provide welders' certificates, verifying AWS qualification within the previous 12 months.

1.06 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on shop drawings.

1.07 SUBMITTALS

B. Submit shop drawings and product data under provisions of Division 1 – District General Conditions and Contractual Requirements.

1.08 WARRANTY

A. Manufacture of slats to provide a 25 year warranty against color fading and breakage of slats.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Fabric:

1. Fabric: Standard Industrial grade, 2” mesh, 9 gauge hot-dipped galvanized steel wire, top selvage, knuckle end closed, bottom selvage, knuckled end closed.
   i. 48” Nominal Height, where specified.
   ii. 72” Nominal Height, where specified.
   iii. 96” Nominal Height, where specified.
   iv. 120” Nominal Height, where specified.
   v. 144” Nominal Height, where specified.

B. Line Posts: ASTM F1083 SCH 40 galvanized, round, 2.875 inch diameter.
   i. Salvage and re-use existing posts where specified.

C. Terminal and Corner Posts: ASTM F1083 SCH 40 galvanized, round, 4.000 inch diameter. Salvage and re-sue existing posts where specified.

D. Gate Posts:
1. ≤10’ leaf = ASTM F1083 SCH 40 galvanized, round, 4.0 inch diameter.
2. >10’ leaf = ASTM F1083 SCH 40 galvanized, round, 6.0 inch diameter.

E. Gate Frame: 1-7/8 inch SCH 40 galvanized diameter, for fittings and truss rod fabrication.

F. Top Rail, Middle Brace Rail and Bottom Rail: ASTM F1083 SCH 40 galvanized, round, 1.66 inch diameter, plain end, sleeve coupled at top.

G. Tie Wires: 9 gauge galvanized steel wire.

H. Concrete: ASTM C94; Portland Cement, 2,500 p.s.i. strength at 28 days, 3 inch slump; one inch maximum sized coarse aggregate.

I. Kickplate: 12 ga. Steel hot dipped galvanized.

J. Cane Bolt Receiver: 1-1/4” x 8” galvanized pipe.

2.02 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel galvanized.

C. Gate Hardware: Fork latch with gravity drop mechanical keepers; three 180 degrees gate hinges per leaf and hardware for padlock. Padlock to be provided by District.

D. ADA Accessible Gate Latch (when specified), Lockable; Paddle type lever that opens gate without full rotation.

2.03 FINISHES

A. Components and Fabric: Galvanized to ANSI/ASTM A123; 1.2 oz./sq. ft.

B. Hardware: Galvanized to ASTM A153, 1.2 oz./sq. ft. coating.

C. Accessories: Same finish as framing.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ANSI/ASTM F567-93 and manufacturer’s instructions.

B. Drill caissons to diameter and depth as shown in the drawings, and or details. Clean holes and remove all loose dirt to a hard undisturbed bottom.

1. When placing fence posts in existing asphalt, the existing asphalt shall be cored drilled with a diamond core hole saw 3’ larger than the caisson diameter. Under no circumstances shall an auger dirt bit be used to drill through the asphalt.

2. When placing fence posts where the new surrounding finish surface will be asphalt, the fence posts shall be placed first before the asphalt is laid. Top of post caisson shall be at the top of aggregate base.

C. Set intermediate, terminal and gate posts plumb in concrete caisson. Slope top of concrete for water runoff. Use concrete vibrator in each caisson during concrete placement to settle and seat concrete.

D. Line, Terminal, and Gate Post Footing Depth Below Finish Grade: See plans.

E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, on bay from end and gate post.

F. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

G. Install center and bottom rails all around enclosure.

H. Stretch fabric between terminal posts.

I. Position bottom of fabric 1 inch above finished grade.

J. Fasten fabric to top, center and bottom rail and line posts with tie wire at maximum 12 inches on centers.

K. Attach fabric to end, corner and gate posts with tension bars and tension bar clips at 12 inches on center.

L. Install gate with fabric to match fence. Install three hinges per leaf, Install latches, catches, retainers and locking clamp.

M. Provide kickplate at all gates on plan specified to be “accessible”. Weld to gate frame with 3/16” x 1” welds at 4” o.c. Weld all 4 corners. Grind all welds and edges smooth. Treat all welds with galvanizing zinc “Hot Stick.”

N. All field welding to be performed by certified welder and all welds are to be ground down smooth and treated.

O. All areas of welds are to be thoroughly cleaned, fluxed, and treated with galvanizing zinc “Hot Stick”. Do not over heat pipe when treating.

P. At double swing gates, install cane bolt receiver in concrete measuring 8” diameter, 12” deep.

3.02 ERECTION TOLERANCES

A. Maximum variation from plum: 1/8 inch.

B. Maximum offset from true position: 3/8 inch.

C. Components shall not infringe adjacent property lines.

END OF SECTION