ADDENDUM TO THE CONTRACT DOCUMENTS

SOLANO COMMUNITY COLLEGE	ADDENDUM NO. 001
	Project: Solano Community College District **Aeronautics Nut Tree Facility Improvements Project** Project Number: 22-008
	Date: March 7, 2022

Addendum No. 001 – The following clarifications are provided and must be added/considered when completing your bid: Acknowledgement of receipt of this ***Addendum No. 001***, is required on the Bid Form. Please clearly note the addendum date and number.

ITEM NO. 1 – GENERAL INFORMATION

1.1. TECHNICAL SPECIFICATIONS

- Addition of Technical Specifications.

ITEM NO. 2 – DRAWINGS

2.1. *None*

ITEM NO. 3 – RESPONSES TO QUESTIONS SUBMITTED

3.1. *None*

List of Attachments:

- Technical Specifications, Aeronautics Nut Tree Facility Improvements Project.

END OF DOCUMENT

31 00 00
EARTHWORK AND GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. This section describes general requirements, products, and methods of execution relating to on-site earthwork. Any work within the public right-of-way shall be constructed to the standards of Solano County, and the State of California Department of Transportation. Earthwork includes, but is not limited to, the following:
   1. Grading.
   2. Material.
   3. Excavation.
   4. Filling and backfilling.
   5. Soil Sterilant.
   6. Termiticide.

B. Provide labor, material and equipment and services necessary to complete the excavations, recompaction and finish grading as specified and indicated on Plans.
   1. Obtain permit from local authorities.
   2. Provide surveying for grading operations.
   3. Provide shoring design.
   4. Provide dewatering operations.
   5. Provide Site grading, cut, fill and finish.
   6. Provide excavation and backfill for filling construction, including trenches within building lines.
   7. Preparation for subgrade for building slabs, walks, pavements, and landscaping.
   8. Provide distribution of stockpiled topsoil.
   9. Provide sub-base course for walks and pavements.
   10. Provide sand and gravel for capillary break/moisture barrier under building slabs.
   11. Provide sub-surface drainage backfill for walls and trenches.
   12. Provide Engineered fills for building slabs and foundations.

C. The work includes removal and legal disposal off the site of debris, rubbish and other materials resulting from clearing and grubbing operations.

D. Work specified in Related Sections:
   1. Section 31 10 00 – SITE PREPARATION.
   2. Section 31 23 33– TRENCHING, BACKFILLING, & COMPACTING.

1.2 DEFINITIONS

A. Engineered Fill:
   1. Soil or soil-rock material approved by Project Manager and transported to the site by the Contractor in order to raise grades or to backfill excavations.
   2. The District's Testing Agency will make sufficient tests and/or observations for the purpose of issuing a written statement that specification requirement.

B. On-site Material: Soil or earth material obtained from required on-site excavation.

C. Excavation: Consists of the removal of material encountered to subgrade elevations and the re-use or disposal of materials removed.

D. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

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

F. Base Course: The layer placed between the sub-base and surface pavement in a paving system.

G. Relative Compaction: In-place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure American Society for Testing and Materials (ASTM) D1557.

H. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below top soil, rock base course, or drainage fill.

1.3 SYSTEM DESCRIPTION

A. Requirements:
1. Grades and elevations are to be established with reference to bench marks referenced on Plans.
2. Maintain Engineering markers such as monuments, bench marks and location stakes. If disturbed or destroyed, replace.

B. Criteria:
1. The character of the material to be excavated or used for subgrade is not necessarily as indicated.
2. Ground water elevations indicated are those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction.
3. Blasting will not be permitted.
4. Remove material in an approved manner.

C. Shoring Design: Where shoring is required by State Law or determined by the Contractor to be necessary, provide proposed excavation shoring method for review prior to commencement of excavation requiring shoring. Include the following information:
1. Basic design assumptions.
2. Design Calculations.
3. Describe materials or shoring system to be used.
4. Indicate whether or not any components will remain after filling or backfilling.
5. The shop plans for the proposed shoring system.
6. Coordinate with the Construction Documents and identify any proposed modifications or deviations.
7. Certification of the above by a registered professional civil or structural Project Manager licensed by the State of California.

D. Dewatering Plan: Based upon site surface and subsurface conditions, including available geotechnical and hydrological data, provide a system to perform the following:

1. Lower the ground water level two feet below the bottom of excavation.
2. Relieve the hydrostatic pressure below the subgrade to prevent uplift.
3. Prevent surface drainage from accumulating within work area.
4. Legally discharge and dispose of excess water.
5. Submit description of basic components of proposed dewatering system and its planned method of operation.

E. Safety:
1. The Contractor shall take all necessary precautions to eliminate the exposure of workers, students, staff and the public to asbestos fibers, including but not limited to: dust control measures and measures included in Section 93106 and Section 93105 of California Code of Regulations, Title 17.

1.4 SUBMITTALS

A. Comply with provisions of Section SUBMITTAL PROCEDURES.

B. Product Data: Manufacturer's literature and data, including, where applicable, capacity, labels, or other markings on equipment made to the specified standards for materials, for the following:
1. Imported materials.
2. Class II aggregate base (CDT Section 26).
3. Storm Water Pollution Prevention / Erosion Control Plans.
4. Permit/Notice of Intent (N.O.I.), for discharge of storm run-off from the construction site.
5. Soil Sterilant.
6. Termiticide.

C. Test Reports: Submit following reports for import material directly to Project Manager from the Contractor's testing services:
1. Test reports on borrow material.
2. Density test reports.
3. One optimum moisture-maximum density curve for each type of soil encountered.
4. Report of actual unconfined compressive strength and/or results of bearing test of each strata tested.
5. At least one laboratory optimum moisture - maximum dry density curve for each type of soil encountered.

D. Shoring Design: Submit 4 copies of shoring design and shop plans; none will be returned unless a concern is observed.

E. Submit description of dewatering methods proposed for use.

F. Submit description of vibratory compactors proposed for use when requesting placement of backfill and fill materials in layers greater than 6 inches thick.

G. Samples:
1. 20-lb. Samples, sealed in air-tight containers, of each proposed fill and backfill soil material from on-site or borrow sources.
2. 12-by-12 inch sample of filter fabric.

1.5 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. Comply with State of California Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."
   2. Comply with State of California Code of Regulations (CCR).
   3. Comply with State of California Construction Safety Orders, Latest Edition (CAL/OSHA).
   4. San Mateo Department of Public Works, Standards and Specifications and Plans.

B. Soil Testing:
   1. District will engage a geotechnical testing agency, to include testing soil materials proposed for use in the work and for quality control testing during excavation and fill operations.
   2. Test results will be distributed in compliance with Section TESTING AND INSPECTION.

C. Codes and Standards:
   1. Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.
   2. Storm Water Pollution Prevention and Monitoring Plan to be prepared by others.
   3. Statewide General Permit to Discharge Storm Water associated with construction activity.

D. Comply with the latest editions of the following Standards and Regulations:
   1. American Society for Testing and Materials (ASTM):
      a. C33: Concrete Aggregates.
      b. C125: Standard Terminology Relating to Concrete and Concrete Aggregates.
      c. C136: Sieve Analysis of Fine and Coarse Aggregates.
      d. C566: Total Evaporable Moisture Content of Aggregate by Drying.
      e. D421: Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants.
      f. D422: Particle Size Analysis of Soil.
      g. D854: Specific Gravity of Soils.
      h. D1556: Density of Soil by the Sand Cone Method.
      i. D1557: Laboratory Compaction Characteristics of Soil Using Modified Effort
      j. D2216: Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
      k. D2487: Classification of Soils for Engineering Purposes.
      l. D2922: Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
      m. D2937: Density of Soil in Place by Drive Cylinder Method.
      n. D3017: Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
      o. D4318: Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
   2. California Code of Regulations, Title 24, Part 2 - Basic Building Regulations, Chapter 24 - Excavations, Foundations, and Retaining Walls.
   3. California Department of Transportation (CDT) Standard Specifications:
      a. Section 17:
      b. Section 18:
      c. Section 19: Earthwork.
   4. CAL/OSHA, Title 8.
   5. Other authorities having jurisdiction

E. Geotechnical Engineering Services:
   1. Geotechnical Engineer will observe grading observations during preparation offsite, excavation, and compaction of fill materials.
   2. Make visits to site to familiarize himself generally with progress and quality of work.
   3. Make field observations and tests to enable him to form opinions regarding adequacy of site preparation, acceptability of fill materials and extent to which earthwork construction and relative compaction comply with specifications requirements.
   4. Examine conditions exposed in foundation excavations.

F. Site Information:
   1. Soil borings and other exploratory operations may be made by Contractor at no cost to District. Submit proposed boring locations for review prior to performing the work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect materials of this section before, during and after installation; objects designated to be retained; and the installed work of other trades.

B. In the event of damage to any of these items, immediately make repairs or replacements necessary to the acceptance of the Project Manager and at no additional cost to the District.

C. Comply with provisions of Section 01500 - TEMPORARY FACILITIES AND CONTROLS where necessary to control dust and noise on and near the work caused by operations during performance of the Work.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
   1. When unfavorable weather conditions necessitate interrupting filling and grading operations, prepare areas by compaction of surface and grading to avoid collection of water.
   2. Provide adequate temporary drainage to prevent erosion.
   3. After interruption, reestablish compaction specified in last layer before resuming work.
   4. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to District.
   5. Protect existing streams, ditches and storm drain inlets from water-borne soil by means of straw bale dikes, filter fiber dams, or other methods as approved by the Project Manager.

B. Barricade open excavations and post with warning lights.
   1. Comply with requirements of Section TEMPORARY FACILITIES AND CONTROLS.
   2. Operate warning lights as recommended by authorities having jurisdiction.
   3. Protect structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement,

undermining, washout and other hazards.

C. Protection of Subgrade: Do not allow equipment to pump or rut subgrade, stripped areas, footing excavations, or other areas prepared for project.

D. At Contractor's option, a working pad of granular material may be laid to protect footing and floor subgrade soils from disruption by traffic during wet conditions.

E. Transport all excess soils materials by legally approved methods to disposal areas.
   1. Coordinate with the Project Manager.
   2. Sufficient topsoil and fill material shall be retained from the site to complete project requirements.
   3. Any additional topsoil and fill requirements shall be the responsibility of the Contractor.

F. Use of explosives will not be permitted.

G. Dust Control Requirements: At all times during earthwork operations and until final completion and acceptance of the earthwork, the Contractor shall prevent the formation of an airborne dust and dirt nuisance from interfering with the surrounding normal operations. The Contractor shall effectively stabilize the site of work in such a manner that it will confine dust particles to the immediate surface of the work and to obtain a minimum of 40 percent emissions reduction by applying a dust palliative. The dust palliative shall be non-petroleum based. Water alone is not considered to be a dust palliative. The dust palliative shall be applied at the rate and method in conformance with Section 18, "Dust Palliative," of the CDT Standard Specifications and as recommended and/or specified by the manufacturer. Contractor shall assume liability for all claims related to dust and dirt nuisances.

1.8 Existing Utilities

A. The Contractor shall contact local utility agencies prior to construction and arrange for the shut-off of all utilities serving the buildings to be demolished. Coordinate work required to abandon active lines with the Project Manager and the District.

B. Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during excavation operations.

C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility Project Manager immediately for directions.
   1. Cooperate with the District and public and private utility companies in keeping their respective services and facilities in operation.
   2. Repair damaged utilities to the satisfaction of the utility District.

D. Do not interrupt existing utilities serving facilities occupied and used by the District or others, except when permitted in writing by Project Manager and then only after acceptable temporary utility services have been provided.

1.9 SEQUENCING AND SCHEDULING

A. The sequence of operations shall be reviewed by the Project Manager prior to commencement of any work.

B. Coordinate operations with relocation of existing utilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
   1. Fill material will be subject to approval of the Geotechnical Engineer.
   2. For approval of imported fill material, notify the Project Manager at least 7 days in advance of intention to import material, designated proposed borrow area, and permit the Geotechnical Engineer to sample as necessary from borrow area for purpose of making acceptance tests to prove quality of material.
   3. The Geotechnical Engineer's report on acceptability shall be final and binding.
   4. During grading operations, soil types other than those analyzed in the geotechnical report for the project, may be encountered.
   5. Consult the Geotechnical Engineer to determine the suitability of these soils.

B. Engineered Fill Material: Soil excavated from site or imported conforming to requirements for fill material.
   1. Imported materials should have a plasticity index not less than 5 nor greater than 15, as determined by ASTM D4318; and expansion index not exceeding 20, as determined by UBC Specification 29-2; and a particle size not exceeding 3 inches as determined by ASTM D422.

C. Topsoil: Friable clay loam surface soil found in a depth of not less than 10 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 2 inches in diameter, and without weeds, roots and other objectionable material.
   1. Use topsoil for top 2 feet of fill against exterior walls, except at paving, sidewalks, and slabs.
   2. Topsoil may also be used beyond the area within 5 feet of building, except under paving and sidewalks.
   3. Confirm suitability of stockpiled materials.

D. Sand: Clean, well-graded fine to coarse sand with not more than 2 percent passing the #200 sieve based on wet sieve analysis.
   1. Provide 2-inch layer under building slabs on grade or as specified by the geotechnical report for this project.
   2. Provide at other locations indicated.
   3. Where coarse sand is required, provide sand no finer than No. 40 sieve.

E. Graded Rock Base:
   1. Bedding for utility piping: Washed, uniformly graded mineral aggregate ASTM D448 with percentage composition of dry weight conforming with following limits:
      a. Passing 1-inch Sieve: 100 percent.
      b. Passing 3/4-inch Sieve: 90-100 percent.
      c. Passing No. 4 Sieve: 0-10 percent.
   2. Base at Slab-on-Grade: As specified in the geotechnical report for this project.
   3. Absorption of water to saturated-surface dry condition shall not exceed 3 percent of oven-dry weight of a sample.

F Backfill material for use behind retaining walls shall be a granular material consisting of sand, broken rock, or a mixture of sand and gravel containing no size larger than 2 ½ inches and not more than 15 percent passing the No. 200 sieve.

G Imported Fill Requirements: Imported fill, where required, shall be non expansive granular soil, free of organic matter and deleterious substances. Imported fill material shall conform to the following requirements:

1. Grading:

U. S. Sieve Size	Percentage Passing Sieve
2 ½ inch	100
No. 8	25-45
No. 200	0-10

2. Be thoroughly compactable without excessive voids.
3. Meet the following plasticity requirements:
   a. Maximum Plasticity Index of 12, as determined by ASTM D4318.
   b. Maximum Liquid Limit of 35, as determined by ASTM D4318

H. Imported Fill for Planting Areas: Imported fill for use in planting areas shall be sandy loam weed free soil. Submit analysis from certified Soil and Plant Lab. Coordinate with Landscape Engineer.

J. Pea Gravel: 3/8 inch to ½ inch washed, uncrushed gravel. Use at drainage pipe and at other locations indicated.

K. Filter Fabric: Provide filter fabrics that meet or exceed the listed minimum physical properties determined according to ASTM D4759 and the referenced standard test method in parentheses.
1. Grab Tensile Strength (ASTM D4632): 100 lb.
2. Apparent Opening Size (ASTM D4751): #100 U.S. Standard sieve.
3. Permeability (ASTM D4491): 150 gallons per minute per square foot.

L. Drainage Pipe:
1. Perforated corrugated plastic drainage tubing meeting ASTM F405, with continuous integral nylon filter screen.
2. Acceptable Manufacturers and Products: Advanced Drainage Systems "DrainGuard," Hancor "Agri-Flow."
3. Provide couplings, elbows and other fittings as recommended by pipe manufacturer.

M. Water: Clean and free from deleterious amounts of acids, alkalis, salts and organic matter.

2.2 SOIL STERILANT

A. Soil Sterilant shall be Treflan E.C. or approved equivalent.

2.3 TERMITICIDE

A. Termiticide shall be Permethrin, Denon, or approved equivalent.

PART 3 - EXECUTION

3.1 GENERAL

A. Prior to commencement of earthwork, become thoroughly familiar with site conditions.

B. In the event discrepancies are found, immediately notify the Project Manager in writing, indicating the nature and extent of differing conditions.

C. No earthwork shall be performed without physical presence or acceptance of the Geotechnical Engineer.

D. The Geotechnical Engineer's acceptance is required by these specifications; notify the Project Manager at least 48 hours prior to commencing any phase of earthwork.
   1. No phase of work shall proceed until prior phase has been accepted by the Geotechnical Engineer.
   2. Work shall not be covered up or continued until acceptance of the Geotechnical Engineer shall give written notice of conformance with the specifications upon completion of grading.

E. Compacting:
   1. Compact by power tamping, rolling or combinations thereof as accepted by the Geotechnical Engineer.
      a. Where impractical to use rollers in close proximity to walls, stairs, etc., compact by mechanical tamping.
      b. Scarify and recompact any layer not attaining compaction until required density is obtained.
   2. Compaction by flooding, ponding or jetting will not be permitted, unless specifically accepted by the Geotechnical Engineer.

F. Hazardous Materials
   1. If any materials are encountered that may be hazardous (as defined in Section 25117 of the California Health and Safety Code), inform the Project Manager verbally within 24 hours and in writing within 2 business days. Upon discovery, material is to remain undisturbed until investigation by Project Manager is complete. The removal and disposal of hazardous materials, if discovered, is not part of the scope of work of this Division for this project.

3.2 SITE PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities which are to remain from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. Set up tree protection measures prior to commencing grading or demolition operations.

B. Clearing and Grubbing:
   1. Remove from area of designated project earthwork all improvements and obstructions, including designated concrete curbs or slabs, asphaltic concrete, all tree and shrub roots, any buried utility and irrigation lines, and other matter determined by the Geotechnical Engineer to be deleterious.
      a. In all new planting areas, remove existing base material.
      b. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.
   2. Retain on the site all trees and shrubs, unless otherwise indicated on the plans as

existing trees to be removed.

3. Remove or fill existing basements left from removed structures as appropriate to areas. Compact in accordance with requirements of these specifications.
4. Removed material shall become property of the Contractor and shall be removed from site, unless otherwise indicated on the plans or specified herein.
5. Holes resulting from removal of underground obstructions that extend below finish grades shall be cleared and backfilled with Engineered fill.
6. Existing Trees to remain:
   a. Verify the locations of existing trees to be preserved.
   b. Replace existing trees to remain that are damaged during construction at no additional cost to the District and provide replacement specimens of same species per coordination with the Project Manager.
   c. Carefully make clean cuts at roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction. Paint cuts over ½ inch in size with tree pruning compound.
7. Contact District Arborist 48 hours prior to cutting any trees

C. Topsoil:
1. Strip topsoil to whatever depths encountered in manner to prevent intermingling with the underlying subsoil or other objectionable material.
2. Remove heavy growths of grass from areas before stripping. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to the main root system.
3. Stockpile topsoil in storage piles to freely drain surface water.
4. Cover storage piles if required to prevent windblown dust.

3.3 EXISTING UTILITIES

A. Protect existing utilities that are to remain in operation as specified.

B. Demolish and completely remove from the site existing underground utilities indicated and/or required to be removed in order to complete the work. See Section 02200 – SITE PREPARATION.

C. Movement of construction machinery and equipment over existing pipes and utilities during construction shall be at contractor's risk.

D. Excavation made with power-driven equipment is not permitted within 2 feet of any known utility or subsurface structure.
1. Use hand or light equipment for excavating immediately adjacent to or for excavations exposing a utility or buried structure.
2. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.
3. Preserve and irrigate removed sections of existing turf for salvage and/or replacement and restoration.
4. Support uncovered lines or other existing work affected by excavation until approval for backfill is obtained.
5. Report damage of utility line or subsurface structures immediately to Project Manager

3.4 PREPARATION OF SUBGRADE

A. Expansive soils are anticipated to basement depth.
   1. Review the necessity for overexcavation of expansive soils.

B. Scarify building pad, exterior flatwork and pavement subgrade to a depth of at least 8 inches and work until uniform and free from large clods.
   1. Bring expansive subgrades to 2 to 5 percentage points above the optimum moisture content and compact to 90 percent of the maximum laboratory dry density, in accordance with ASTM D1557.
   2. Bring nonexpansive subgrades to or slightly above the optimum moisture content and compact to 90 percent of the maximum laboratory dry density in accordance with ASTM D1557.
   3. Increase compaction of the upper 12 - 18 inches of pavement subgrades to 95 percent of the maximum laboratory dry density per ASTM D1557 for nonexpansive subgrades.

3.5 DEWATERING

A. Do not allow water from surface drainage or underground sources to accumulate in excavations, unfinished fills, or other low areas.

B. Provide and maintain ample means and devices to remove water promptly and dispose properly of water entering excavations or other parts of the work to prevent softening of exposed surfaces.

C. Dewater by methods which will ensure dry excavation and preservation of finish lines and grades of excavation bottoms.

D. Prior to excavating below ground water level, place dewatering system in operation.
   1. Lower the ground water level a minimum of 2 feet below the bottom of the excavation.
   2. Relieve the hydrostatic pressure in pervious zones below the subgrade elevation to prevent uplift.
   3. Use screens and gravel packs as necessary to prevent removal of fines from the soil.

E. Operate the dewatering system continuously, 24 hours a day, 7 days a week until construction work below existing ground water lever is completed.
   1. Measure and record the performance of the dewatering system.
      a. Perform at the same time each day.
      b. Use piezometers and observation wells.
   2. After placement of initial slabs and backfill, the ground water level may be allowed to rise.
   3. At no time allow ground water to rise higher than 1 foot below the prevailing level of excavation or backfill.
   4. Have a back-up pump and system available for immediate use.

F. Dispose of water away from the work in suitable manner without damage to adjacent property or menace to public health.

G. Do not drain water into work being built or under construction without prior acceptance of the Project Manager.

H. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.

3.6 SITE EXCAVATION

A. General
   1. All supports, shoring, and sheet piling required for the sides of excavations or for protection of adjacent existing improvements shall be provided and maintained by the Contractor. The adequacy of such systems shall be the complete responsibility of the Contractor.
   2. Earth and rock, regardless of character and subsurface conditions, shall be excavated to depths shown on plans and to the neat dimensions of the footings wherever practicable, to permit pouring of footings and grade beams without use of side forms, except at slab perimeters.
   3. Large rocks, pieces of concrete or other obstructions, if encountered during the excavation/scarifying operations, shall be removed and disposed of by the Contractor off the site in a legal manner.
   4. Where footing excavation is too deep, backfill shall be concrete. Where footings are overdug laterally, side forms shall be employed for backfill with rock fill or concrete backfill shall be used (Contractor's option).
   5. Where forming is required, only that excavation necessary to permit placing and removal of forms shall be done.
   6. Bottoms of all footings and foundations trenches shall be subject to testing by the Geotechnical Engineer. Corrective measures as directed by the Project Manager shall be executed promptly.

B. Excavate subgrade as required to allow for finish grades shown on plans, as required for structural fill or otherwise required for proper completion of the work.

C. Remove and replace subgrade materials designated by Geotechnical Engineer as unsuitable.

3.7 FILL AND COMPACTING

A. See Section 31 23 33 – TRENCHING, BACKFILLING, & COMPACTING for fill and compacting requirements.

3.8 MOISTURE CONTROL

A. Do not place, spread or roll fill material during unfavorable weather conditions or when fill material is excessively wet.

B. Do not resume operations until moisture content and fill density are satisfactory to the Geotechnical Engineer.

C. Provide berms or channels to prevent surface water from flooding excavations. Promptly remove water collecting in depressions.

D. Where soil has been softened or eroded by flooding or by placement during unfavorable weather, remove damaged areas and recompact as described for fill and compaction.
   1. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material.

2. Prevent free water appearing on surface during or subsequent to compaction operation.
3. Remove and replace, or scarify and air dry, soil material too wet to permit compaction to specified density.
4. Soil material removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.9 GRADING

A. General: Uniformly grade areas of work including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
   1. All areas covered by the project, including excavated and filled areas and adjacent transition areas, shall be uniformly graded so that finished surfaces are at the elevations established by the plans. Planter areas to receive future topsoil shall be graded below finished grade to allow for such material.
   2. Finished surfaces and surfaces to receive paving and aggregate base shall be smooth, compacted, and free from irregular surface drainage.
   3. Ditches, gutters, and swales shall be finished to permit proper surface drainage.
   4. All surface areas, except paved and sloped embankments exceeding 8:1, shall be hydroseeded.

B. Grading Tolerances:
   1. Excavations shall not exceed 0.10-foot variation from dimensions and elevations shown or noted, unless otherwise approved by Project Manager.
   2. Fill and backfill shall be placed with tolerance of plus or minus 0.10 foot if placed in layers.
   3. Grading shall be done within plus or minus 0.10 foot typically; areas under slabs, walks or pavements shall be graded within tolerance of 0 to 0.10 foot.
   4. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
   5. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
   6. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than ½ inch above or below required subgrade elevation.

C. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.10 SOIL STERILIZATION

A. General: Soil sterilant shall be applied to prepared subgrade or after installation of rock or aggregate base as recommended by the manufacturer. Sterilant shall be applied uniformly at the rate recommended by the manufacturer to all areas beneath asphalt concrete pavement, brick pavement, concrete pavement, or on-grade concrete slabs including sidewalks, curbs, and gutters and areas between the inner and outer security fences. In addition to ground areas treated, sterilant shall be applied below expansion or control joints, and at all areas where pipe, ducts, or other features penetrate slabs.

3.11 TERMITICIDE

A. Termiticide shall be applied to soils as recommended by the manufacturer. Termiticide shall be applied uniformly at the rate recommended by the manufacturer to all areas beneath and around wood frame structures.

3.12 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal of Excess Excavated Material: Excess material shall be removed by the Contractor off the site in a legal manner.

B. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
   1. Perform field in-place density tests according to ASTM D1556 (sand cone method), ASTM D2167 (Rubber Balloon Method), or ASTM D2937 (Drive Cylinder Method), as applicable.
      a. Field in-place density tests may also be performed by the nuclear method according to ASTM D2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D1556. With each density calibration check, check the calibration curves furnished with the moisture gauges according to ASTM D3017.
      b. When field in-place density tests are performed using nuclear methods, make calibration checks of both density and moisture gauges at beginning of work on each different type of material encountered, and at intervals as directed by the Project Manager.
   2. Footing Subgrade: At footing subgrades, perform at least one test of each soil stratum to v verify design bearing capacities. Subsequent verifications and approval of other footing subgrades may be based on a visual comparison of each subgrade with related tested strata when acceptable to the Project Manager.
   3. Paved and Building Slab Areas; At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2,000 square feet or less of paved area or building slab, but in no case fewer than three tests.
   4. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in-place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.
   5. Trench Backfill: In each compacted initial and final backfill layer, perform at least one filed in-place density test for each 150 feet or less of trench, but not fewer than two tests.

C. Number and location of test shall be at option of the Geotechnical Engineer.

D. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

E. After grading is completed and the testing agency has completed observation of the work, permit no further excavation or filling, except as approved by Project Manager.

3.13 PROTECTION

A. Protect newly graded areas from traffic and erosion. Install erosion control mat and straw

wattles as directed by the Project Manager. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

C. Where completed compacted areas are disturbed by subsequent construction operation or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work, including retesting, prior to further construction.

3.14 CLEAN-UP

A. Comply with requirements of Section CLEANING.

End of Document

Section 31 10 00
SITE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. This section describes general requirements, products, and methods of execution relating to site preparation, unless otherwise noted. This section applies to:
   1. Surface and subsurface demolition.
   2. Backfilling of excavations and depressions.
   3. Coordination, demolition and/or relocation of existing utilities.
   4. Prior to start of demolition of facilities, shut-off, disconnect, cut, and cap where required, underground utility services to facilities.
   5. Removal of A.C. pavement driveway and concrete pavement, concrete pads, and A.C. curbing.
   6. Removal of cyclone wire, wood fences and barricades.
   7. Removal of storm drainage piping, catch basins, and manholes.
   8. Removal of vegetation and trees as specified herein.

B. Contractor shall provide labor, material and equipment required for demolishing, cutting, removing and disposing of existing construction as designated and shown on the Plans for the following as required, unless otherwise noted.

C. Related Sections:
   1. Section 31 10 00- EARTHWORK AND GRADING.
   2. Section 31 23 33- TRENCHING, BACKFILLING, AND COMPACTING.

1.2 SUBMITTALS

A. Comply with requirements of Section SUBMITTAL PROCEDURES.

B. Submit all permits and certificates required for the project, for record purposes.

C. Demolition schedule and proposed methods and operations.

D. Permits and notices authorizing demolition.

E. Letter or certificates of severance of utilities services from the affected agencies or utilities.

F. Proposed haul route(s) from the demolition worksite to an authorized disposal site.

G. Permit for transport and disposal of debris.

H. Make arrangements of disposing of waste and excess materials at a legally

licensed landfill/disposal facility outside worksite and pay cost thereof.

I. Photograph existing conditions of existing structure surfaces, equipments, and adjacent improvements that might be misconstrued as damage related to removal operations. File photographs with Project Manager prior to start of work.

J. Submit Proposed dust control measures.

K. Submit Proposed noise control measures.

L. Work Schedule: Submit a proposed schedule of work items to be performed, and a description of how the work is to be accomplished, for the Project Manager's review.

M. Report of inspections conducted with the Project Manager before and after performing work.

1.3 QUALITY ASSURANCE

A. Comply with the following Standards: American National Standards Institute, Inc. "American National Standard Safety Requirements for Demolition" (ANSI A10.6 and A10.8).

B. Regulatory Agencies:
   1. Comply with rules and regulations of State of California, California Code of Regulations, Title 8, Industrial Relations, Chapter 4, Subchapter 4, "Construction Safety Order."
   2. Comply with applicable local and state agencies having jurisdiction.
   3. Comply with governing EPA notification regulations.

C. Secure all required Permits or Certificates for demolition or discontinuance of utilities, prior to beginning the work.

1.4 PROJECT CONDITIONS

A. Disposition of Existing Improvements:
   1. All materials indicated to be removed shall become the property of the Contractor; dispose of these outside the project site.
      a. Do not dispose of removed materials to the general public by sale, gift or in any other manner at the Site.
      b. These provisions shall not be construed as limiting or prohibiting sale or disposal of such materials at the Site to duly licensed Contractors or material suppliers, provided materials are removed from the construction site by the Contractor.
   2. All removal of debris from the site, including removal of inventory to site of storage, is part of this Contract and shall be done by Contractor's employees and no others.

B. Salvage and Reuse:
   1. Where units or items of existing work are designated to be removed and reused in the new work or are to become salvage, remove such units or items carefully.
      a. Use tools and methods that will not damage such units or items.
      b. Protect underlying or adjoining work from damage.
      c. Salvaged items shall be cleaned by the Contractor.

C. Protection:
   1. Erect and maintain temporary bracing, shoring, lights, barricades, except construction barricades for subsequent new construction, warning signs, and guards necessary to protect public, the District's employees, finishes, improvements to remain and adjoining property from damage, all in accordance with applicable regulations.
   2. Wet down areas affected by this work as required preventing dust and dirt from rising.

D. Scheduling:
   1. Coordinate with the District in scheduling noisy or dirty work.
   2. Schedule work at the District's convenience to cause minimal interference with the District's normal operations.
   3. Jackhammering shall be coordinated with the District and College to minimize disturbance of classes.

E. Traffic Circulations: Ensure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities.

1. Do not close or obstruct public thoroughfares without first obtaining the required permit or permission of the responsible jurisdiction.

   2. Where closing of a vehicular or pedestrian traffic circulation route is necessary, provide adequate directional signs to minimize the potential for confusion.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas affected by work of this Section and verify following:
1. Disconnection of utilities as required.
2. That utilities serving occupied portions of buildings on and off the site will not be disturbed or that temporary utility services have been provided.
3. Removal by the District of the District's personal property, movable furniture and equipment items not designated for relocation.

B. Where existing conditions conflict with representations of the Construction Documents, notify the Project Manager and obtain clarifications. Do not perform work affecting the conflicting conditions until clarification of the conflict is received.

3.2 PREPARATION

A. Verify that the area to be demolished or removed has been vacated, or adequate space made available to perform the work.

B. Arrange for, and verify termination of utility services to include removing meters and capping of lines.

C. Lay out cutting work at Job Site and coordinate with related work for which cutting is required.

3.3 DEMOLITION

A. If confirmed or suspected hazardous materials are encountered during operations, stop operations immediately and notify the Project Manager.

B. Perform work in accordance with ANSI A10.6-1969 unless otherwise noted.

C. Provide noise and dust abatement as required to prevent contamination of adjacent areas.
   1. Remove all materials not designated as salvage, in their entirety.
   2. Remove building foundations in their entirety, unless otherwise indicated on the plans.

D. Fill voids in the land left by the removal of existing structures as follows:
   1. In accordance with the requirements of Section 31 00 00 – EARTHWORK AND GRADING. Grade finished remaining surface to the contours shown, or if not shown, to match the existing natural contours.

E. Lower, or remove, heavy structural framing members by hoist or crane.

F. Concrete and Masonry:
   1. Demolish concrete and masonry in sections, less than 3 feet in any direction.
   2. Method of cutting shall be limited to saw cutting and torch.

3.4 CUTTING

A. Make new openings neat.

B. Do not cut or alter structural members and any utilities including appurtenances unless indicated to do so in the Construction Documents, or written approval is

received from the Project Manager.

C. Take care not to damage reinforcing or structural steel scheduled to remain in place.

D. Concrete: Cut new openings in concrete by coring and saw cutting. Saw run-bys will not be permitted.

3.5 PREPARATION FOR NEW FINISH WORK

A. Where demolished surfaces are scheduled to receive new finishes, Contractor shall restore such substrate to a condition ready to receive the scheduled new finishes, including grinding or leveling.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning of demolished materials off District's property in a legal manner.

3.7 FIELD QUALITY CONTROL

A. The Project Manager will accompany the Contractor before and after performance of work to observe physical condition of existing structures or improvements involved.

End of Document

Section 31 23 33
TRENCHING, BACKFILLING AND COMPACTING

PART 1 – GENERAL

1.1 SUMMARY

A. Provide labor, material, equipment, and services necessary to complete the backfilling and compacting as necessary for this project. Section includes, but is not limited to:
   1. Select Backfill Material.
   2. Aggregate Base.
   3. Detectable Tape.
   4. Trench Excavation.
   5. Pipe Bedding.
   6. Trench Backfill.
   7. Trench Surfacing.

B. Work specified in Related Sections:
   1. Section 31 10 00 – SITE PREPARATION
   2. Section 31 00 00 – EARTHWORK AND GRADING
   4. Section 33 30 00 – SANITARY SEWER
   5. Section 33 40 00 – STORM DRAINAGE

1.2 DEFINITIONS

A. Engineered Fill:
   1. Soil or soil-rock material approved by the Project Manager and transported to the site by the Contractor in order to raise grades or to backfill excavations.
   2. Contractor shall provide sufficient tests, and a written statement that all materials brought onto the project site comply with specification requirements.

B. Excavation: Consists of the removal of material encountered to subgrade elevations.

C. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below base.

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

E. Relative Compaction: In-place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure American Society for Testing and Materials (ASTM) D1557.

1.3 SYSTEM DESCRIPTION

A. Requirements:
   1. Comply with the recommendations of the Geotechnical Engineer .
   2. Protect existing trees to remain. No grading is permitted under the drip line of protected trees.

3. Excavations for appurtenant structures, such as, but not limited to, manholes, transition structures, junction structure, vaults, valve boxes, catch basins, thrust blocks, and boring pits, shall be deemed to be in the category of trench excavation.
4. Unless otherwise indicated in the Plans, all excavation for pipelines shall be open cut.

1.4 SUBMITTALS

A. Comply with provisions of Section 01 32 19 – SUBMITTAL PROCEDURES.

B. Test Reports: Submit the following report for import material directly to the Project Manager from the Contractor's testing services:
   1. Compaction test reports for aggregate base.

C. Submit description of compactors proposed for use when requesting placement of base material.

1.5 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. Comply with State of California Business and Transportation Agency, Department of Transportation (Caltrans) latest edition of "Standard Specifications." (CSS).
   2. Comply with State of California Code of Regulations (CCR).
   3. Comply with State of California Construction Safety Orders, Latest Edition (CAL/OSHA).

B. Soil Testing:
   1. District to engage a geotechnical testing agency, to include compaction testing and for quality control testing during fill operations.
   2. Test results will be submitted to the Project Manager.

C. Codes and Standards:
   1. Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.
   2. California Department of Transportation (CDT):
      a. Section 19: Earthwork.
      b. Standard Test Methods: No. 202.
   3. American Society for Testing and Materials (ASTM):
      a. D1556: Density of Soil by the Sand Cone Method.
      b. D1557: Moisture Density Relations of Soils and Soil-Aggregate Mixtures

1.6 DELIVERY, STORAGE AND HANDLING

A. Protect materials before, during and after installation.

B. Comply with provisions of Section 01 51 00 - TEMPORARY FACILITIES AND CONTROLS where necessary to control dust and noise on and near the work caused by operations during construction activities.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.
   2. Protect existing streams, ditches and storm drain inlets during work on this project.

B. Barricade open excavations and post with warning lights.
   1. Comply with requirements of Section 01 51 00 - TEMPORARY FACILITIES AND CONTROLS.
   2. Operate warning lights and barricades as required.
   3. Protect structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout, and other hazards.

C. Protection of Subgrade: Do not allow equipment to pump or rut subgrade, stripped areas, footing excavations, or other areas prepared for project.

D. Transport all excess soils materials by legally approved methods to disposal areas.
   1. Coordinate with the Project Manager.
   2. Any additional fill requirements shall be the responsibility of the Contractor.

1.8 EXISTING UTILITIES

A. Locate existing underground utilities in the areas of work. For utilities that are to remain in place, provide adequate means of protection during excavation operations.
   1. Locating of existing underground utilities shall include but not be limited to pot-holing prior to the start of construction.

B. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult Project Manager, Facilities, and/or utility agency immediately for directions.
   1. Cooperate with the Project Manager and public and private utility companies in keeping their respective services and facilities in operation.
   2. Repair damaged utilities to the satisfaction of the agency with jurisdiction.

C. Do not interrupt existing utilities serving facilities occupied and used by the District or others, except when permitted in writing by the Project Manager and then only after acceptable temporary utility services have been provided.

1.9 SEQUENCING AND SCHEDULING

A. The sequence of operations shall be reviewed by the Project Manager prior to commencement of any work.

PART 2 – PRODUCTS

2.1 MATERIALS

A. General:
   1. Import materials will be subject to approval of the Geotechnical Engineer.

2. For approval of imported fill material, notify the Project Manager at least 7 days in advance of intention to import material.

B. Select backfill material shall be gravel, free of clay or organic matter and shall conform to the following gradation:

Sieve Size	Percentage Passing
1 inch	100
¾ inch	90 – 100
No. 4	35 – 60
No. 200	2 - 9

C. For gas pipe and fuel piping select backfill shall be clean, graded building sand conforming to the following gradation:

Sieve Size	Percentage Passing
No. 4	100
No. 200	0 - 5

D. Water: Clean and free from deleterious amounts of acids, alkalis, salts and organic matter.

2.2 BURIED WARNING AND IDENTIFICATION TAPE

A. Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 75 mm 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.
   1. Warning Tape Color Codes.
      Red: Electric.
      Yellow: Gas, Oil; Dangerous Materials.
      Orange: Telephone and Other Communications.
      Blue: Water Systems.
      Green: Sewer Systems.
      White: Steam Systems.
      Gray: Compressed Air.
   2. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.
   3. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 920 mm 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.3 DETECTION WIRE FOR NON-METALLIC PIPING

A. Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 – EXECUTION

3.1 GENERAL

A. Prior to commencement of work, become thoroughly familiar with site conditions.

B. In the event discrepancies are found, immediately notify the Project Manager in writing, indicating the nature and extent of differing conditions.

C. Backfill excavations as promptly as work permits.

D. Do not place Engineered fill or backfill until rubbish and deleterious materials have been removed and areas have been approved by the Project Manager.

E. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

F. In excavations, use satisfactory excavated or borrow material.

G. Under grassed areas, use satisfactory excavated or borrow material.

3.2 COMPACTING

A. Compact by power tamping, rolling or combinations thereof.
   1. Where impractical to use rollers in close proximity to walls, stairs, etc., compact by mechanical tamping.
   2. Scarify and recompact any layer not attaining compaction until required density is obtained.

3.3 SITE PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, which are to remain, from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.

3.4 EXISTING UTILITIES

A. Identity the location of existing utilities.
   1. Prior to trenching, the Contractor shall excavate at locations specifically indicated on the Plans, if any, and where new lines cross other utilities of uncertain depth and determine the elevation of the utility in question to ensure that the new line will clear the potential obstruction.
   2. The Contractor shall contact Underground Service Alert (USA) at 1-800-227-2600 for assistance in locating existing utilities.

3. If, after the excavation, a crossing utility does present an obstruction, then the line and grade of the new line will be adjusted as directed by the Project Manager to clear the utility.

B. Protect all existing utilities to remain in operation.

C. Movement of construction machinery and equipment over existing pipes and utilities during construction shall be at Contractor's risk.

E. Excavation made with power-driven equipment is not permitted within 2 feet of any known utility or subsurface structure.
1. Use hand or light equipment for excavating immediately adjacent to known utilities or for excavations exposing a utility or buried structure.
2. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.
3. Support uncovered lines or other existing work affected by excavation until approval for backfill is obtained.
4. Report damage of utility line or subsurface structures immediately to the Project Manager.

F. Backfill trenches resulting from utility removal in lifts of 8 inches maximum.

3.5 TRENCH EXCAVATION

A. General
1. Excavation shall include removal of all water and materials that interfere with construction. The Contractor shall remove any water which may be encountered in the trench by pumping or other methods during the pipe laying, bedding and backfill operations. Material shall be sufficiently dry to permit approved jointing.
2. Excavation shall include the construction and maintenance of bridges required for vehicular and pedestrian traffic, support for adjoining utilities.
3. The Contractor shall be responsible to safely direct vehicular and pedestrian traffic through or around his/her work area at all times.
4. The Contractor shall relocate, reconstruct, replace or repair, at his/her own expense, all improvements which are in the line of construction or which may be damaged, removed, disrupted or otherwise disturbed by the Contractor.

B. Existing Paving and Concrete:
1. Existing pavement over trench shall be sawcut, removed, and hauled away from the job. Existing pavement shall be neatly sawcut along the limits of excavations.
2. Existing concrete over the trench shall be sawcut to a full depth in straight lines either parallel to the curb or a right angles to the alignment of the sidewalk.
3. Boards or other suitable material shall be placed under equipment outrigging to prevent damage to paved surfaces.

C. Trench Width:
1. The maximum allowable trench widths at the top of the pipe shall be as follows:

Pipe Type	Trench Width (Maximum)
Copper	Outside diameter of barrel plus 18 inches
Plastic	"
Vitrified Clay	"
Ductile-Iron	"
Reinforced Concrete	"

a. The maximum trench width shall be inclusive of all shoring.
b. If the maximum trench width is exceeded, the State's representative may direct the Contractor to encase or cradle the pipe in concrete at no additional charge.

2. For pipes 3 inch diameter and larger, the free working space on each side of the pipe barrel shall not be less than 6 inches.

D. Open Trench:
1. The maximum length of open trench shall be 300 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is greater. No trench shall be left open at the end of the day.
2. Provisions for trench crossings and free access shall be made at all street crossings, driveways, water gate valves, and fire hydrants.

E. Excavation Bracing:
1. The excavation shall be supported and excavation operations shall be conducted in accordance with the California Industrial Accident Commission and CAL/OSHA.
2. The Contractor shall, at his/her own expense, furnish, put in place, and maintain such sheeting and bracing as may be required to support the sides of all excavations (whether above or below the pipe grade), and to prevent any movement which could in any way diminish the required trench section or otherwise injure or delay the work. The sheeting and bracing shall be withdrawn in a manner such as to prevent any earth movement that might overload the pipe.

F. Excavated Material:
1. All excavated material not required for backfill shall be immediately removed and properly disposed of in a legal manner by the Contractor.
2. Material excavated in streets and roadways shall be laid alongside the trench no closer than 2 feet from the trench edge and kept trimmed to minimize inconvenience to public traffic.
3. Provisions shall be made whereby all storm and wastewater can flow uninterrupted in gutters or drainage channels.

3.6 PIPE BEDDING

A. Bedding Excavation: The trench shall be excavated below the grade of the pipe bottom to the following minimum depths:

Pipe Type	Depth
Copper	6 inch
Reinforced Concrete	6 inch
Plastic: 2 inch diameter and smaller	6 inch
Plastic: over 2 inch diameter	6 inch
Ductile Iron	6 inch

1. Stabilization of Trench Bottom: When the trench bottom is unstable due to wet or spongy foundation, trench bottom shall be stabilized with gravel or crushed rock. The State's inspector will determine the suitability of the trench bottom and the amount of gravel or crushed rock needed to stabilize a soft foundation. Soft material shall be removed and replaced with gravel or crushed rock as necessary.
2. Placement of Bedding Material: The trench bottom shall be cleaned to remove all loose native material prior to placing select backfill material. Sufficient select backfill material shall be placed in trench and tamped to bring trench bottom up to grade of the bottom of pipe. The relative compaction of tamped material shall be not less than 90 percent. It is the intention of these requirements to provide uniform bearing under the full length of pipe to a minimum width of 60 percent of the external diameter.

3.7 TRENCH BACKFILL

A. Initial Backfill:
   1. Prior to trench backfill, the condition of the trench and laying of pipe must be inspected and approved by the Inspector of Record.
   2. Select backfill material shall be used for initial backfill. After the pipe has been properly laid and inspected, select backfill material shall be placed on both sides of the pipe and compacted to final depth as follows:

Pipe Type	Depth
Copper	12 inches above top of pipe
Plastic: less than 3 inches diameter	12 inches above top of pipe
Plastic: 3 inches diameter and larger	12 inches above top of pipe
Ductile Iron	12 inches above top of pipe
Reinforced Concrete	12 inches above top of pipe

   3. Compaction: Initial backfill compaction shall be by mechanical means. The initial backfill material shall be hand tamped in layers not exceeding 4 inches in uncompacted depth and shall be brought up uniformly on both sides of the pipe to avoid bending or distortional stress. After hand tamping, the relative compaction of the initial backfill material shall be not less than 90 percent.
   4. Pipe Detection: In trenches containing pressurized plastic pipes, tracer wire shall be placed directly above the pipe and shall be connected to all valves, existing exposed tracer wires, and other appurtenances as appropriate.

B. Subsequent Backfill:
   1. Above the level of initial backfill, the trench shall be backfilled with non-expansive native material from trench excavation or with imported select backfill material (Contractor's option). Subsequent backfill shall be free of vegetable matter, stones or lumps exceeding 3 inches in greatest dimension, and other unsatisfactory

material. The Inspector of Record shall approve the backfill material prior to placement.

2. Subsequent backfill compaction shall be by mechanical means with backfill material placed in layers not exceeding 8 inches in loose depth. Each layer shall be thoroughly compacted before succeeding layers are placed. The use of machine tampers, except manually held types, shall not be permitted.
3. Subsequent backfill shall be compacted to a relative compaction of not less than 90 percent except the relative compaction shall not be less than 95 percent within 2-1/2 feet of finished permanent surface grade or 1-1/2 feet below the finished subgrade, whichever is greater.

C. Jetting and Ponding:
1. Jetting of trench backfill is not permitted.

D. Compaction Testing:
1. Compaction testing shall be in accordance with California Test Method ASTM D1556 or D1557.

3.8 TRENCH SURFACING

A. Unpaved Areas:
1. In unimproved areas, the trench surface shall be restored to its original condition. No mounds of earth shall be left along the trench. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
2. Where completed compacted areas are disturbed by subsequent construction operation or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work, including retesting, prior to further construction.

B. Temporary Surfacing:
1. Temporary surfacing shall be a minimum of 2 inches of cutback asphalt on 10 inches of Class 2 aggregate base and shall be placed at all trench locations subject to vehicular or pedestrian traffic.
2. Temporary surfacing shall be laid within one day after backfilling (except where the Contractor elects to place permanent surfacing within this time period).
3. Before the trenching area is opened for traffic, all excess dirt, rock, and debris shall be removed, the street surface shall be swept clean and the pavement shall be washed down with a water truck and pressure nozzle.
4. Temporary surfacing shall be maintained to prevent the occurrence of mudholes and prevent the surface from settling below 1 inch or rising more than 1 inch from the existing pavement grade.

3.9 FILL AND COMPACTING

A. General Requirements:
1. Backfill excavations as promptly as work permits.
2. Do not place Engineered fill or backfill until rubbish and deleterious materials have been removed and areas have been approved by the Project Manager.
3. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
4. In excavations, use satisfactory excavated or borrow material.
5. Under grassed areas, use satisfactory excavated or borrow material.

B. After subgrade compaction has been approved by the Geotechnical Engineer , spread the Engineered fill materials in 6 to 8 inch loose lifts and uniformly mixed during the spreading operation.
   1. Bring non-expansive fill materials to or slightly above the optimum moisture content and compacted to at least 85 percent of the maximum laboratory dry density, pert ASTM D1557.
   2. Bring non-expansive aggregate fill materials to or slightly above the optimum moisture content and compacted to at least 95 percent of the maximum laboratory dry density, pert ASTM D1557.
   3. Do not compact the top 12 inches of soil in the planting areas.
   4. Fill sections greater than 5 feet in depth shall be compacted to at least 95 percent.

C. Repeat compaction procedure until proper grade is attained.

D. Rocks generated during site earthwork may be used in fill when conforming to material specifications.

3.10 MOISTURE CONTROL

A. Do not resume operations until moisture content and fill density are satisfactory to the Inspector.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Testing Services: Allow testing agency to test each backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.

B. When testing agency reports that backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

3.12 PROTECTION

A. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operation or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work, including retesting, prior to further construction.

3.13 CLEAN-UP

A. Remove all debris, equipment, tools and materials upon completion prior to final inspections to the satisfactions of the Project Manager.

B. In unpaved areas without landscaping, cover with straw erosion control blanket. Follow manufacturer's recommendations for installation. Provide and place straw wattles or biodegradable fiber logs across the slope at the midpoint and along the downhill edge of site. No soil is to be left uncovered at the completion of construction.

End of Document

Section 32 10 00
DEMOLITION

PART 1 – GENERAL

1.1 SUMMARY

A. Provide labor, material, and equipment required for demolishing, cutting, removing and disposing of existing construction as designated or required to provide for new work.

B. Coordinate all work with capping or sealing of existing utilities.

C. Related Sections:
1. Section 31 10 00 - SITE PREPARATION
2. Section 31 00 00 - EARTHWORK AND GRADING
3. Section 31 23 33 - TRENCHING, BACKFILLING, AND COMPACTING

1.2 SUBMITTALS

A. Comply with requirements of the SUBMITTAL PROCEDURES and GENERAL CONDITIONS.

1.3 QUALITY ASSURANCE

A. Comply with the following Standards: American National Standards Institute, Inc. “American National Standard Safety Requirements for Demolition” (ANSI A10.6 and A10.8).

B. Regulatory Agencies:
1. Comply with rules and regulations of State of California, California Code of Regulations, Title 8, Industrial Relations, Chapter 4, Subchapter 4, “Construction Safety Order.”
2. Comply with applicable local and state agencies having jurisdiction.
3. Comply with governing EPA notification regulations.
4. Comply with applicable state and local regulations regarding dust and noise mitigation during construction.

C. Secure all required Permits or Certificates for demolition prior to beginning the work.

1.4 PROJECT CONDITIONS

A. District assumes no responsibility for actual condition of the site to be altered.
1. Conditions existing at time of inspection for bidding purpose will be maintained by District as far as practical.

B. Disposal of Existing Improvements:
1. All materials removed shall become the property of the Contractor;

dispose of these materials outside the project site.

a. Do not dispose of removed materials to the general public by sale, gift or in any other manner at the project site.

b. These provisions shall not be construed as limiting or prohibiting sale or disposal of such materials at the Site to duly licensed Contractors or material suppliers, provided materials are removed from construction site by the Contractor.

2. All removal of debris from the site, including removal of inventory to site of storage, is part of this Contract and shall be done by Contractor's employees and no others.

C. Salvage:

1. Recycle AC pavement and Class II AB where practical.
2. Recycle concrete where practical.
3. Items indicated to be salvaged shall be removed carefully, cleaned, and returned to the District. Coordinate with the Project Manager.

D. Protection:

1. Erect and maintain temporary bracing, shoring, lights, barricades, except construction barricades for subsequent new construction, warning signs, and guards necessary to protect public, the District's employees, adjacent improvements to remain, and adjoining property from damage, all in accordance with applicable regulations.
2. Wet down areas affected by this work as required to prevent dust and dirt from rising.

E. Scheduling:

1. Coordinate with the Project Manager in scheduling noisy or dirty work.
2. The Project Manager will supply a schedule of days on which no construction will be allowed.
3. Contractor shall take College schedule into consideration during construction.
4. Coordinate and schedule temporary water shut-downs and temporary water service with the Project Manager, Facilities, and the Water Department, and the Fire Department.

F. Traffic Circulations: Ensure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities.

1. Minimize obstruction to thoroughfares by first obtaining the required approval or permission of the responsible jurisdiction.
2. Where closing of a vehicular traffic circulation route is necessary, provide adequate directional signs to minimize the potential for confusion. Provide access at all times for emergency vehicles.

G. Safety:

1. The Contractor shall take all necessary precautions to eliminate the exposure of workers, students, staff, and the public to asbestos fibers, including but not limited to: dust control measures and measures included in Sections 93106 and 93105 of California Code of Regulations, Title 17.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3. 1 EXAMINATION:

A. Where existing conditions conflict with representations of the Construction Documents, notify the Project Manager and obtain clarifications. Do not perform work affecting the conflicting conditions until clarification of the conflict is received.

3.2 PREPARATION

A. Verify that the area to be demolished or removed has been vacated, and adequate space has been made available to perform the work.

B. Lay out saw cutting and coordinate with related work for which saw cutting is required.

C. Contractor shall coordinate and arrange the shut down of utilities serving the site with Facilities, the Fire Department, and the Project Manager.

3.3 DEMOLITION

A. If known or suspected hazardous materials are encountered during operations, stop operations immediately and notify the Project Manager.

B. Perform work in accordance with ANSI A10.6-1969 unless otherwise noted.

C. Provide noise and dust abatement as required to prevent contamination of adjacent areas.

D. Remove all materials not designated as salvage, in their entirety.

E. If unknown items such as human remains are encountered during operations, stop operations immediately and notify the Project Manager.

F. The Project Manager will provide a list of any items to be stockpiled for future use. Stockpile location will be a site on campus determined by the Project Manager.

3.4 DEMOLITION AND REMOVAL OF AC PAVEMENT:

A. Sawcut pavement at edge of demolition area.

B. Break pavement and remove.

C. Remove any base material, gravel, and/or or any other non-native soil.

3.5 SAW CUTTING:

A. Make new openings neat.

B. Take care not to damage existing AC pavement to remain in place.

3.6 UTILITY REMOVAL:

A. Where utility removal is shown on the plans or required for construction, excavate to expose existing utility, demolish and remove the section of pipe or conduit. Cap section of pipe or conduit to remain. Mark end of utility with 12" piece of #4 rebar.

B. Included in demolition are any appurtenances, including but not limited to valves, valve boxes, and irrigation system components.

C. Backfill trench in accordance with requirements of Section 31 23 33 – TRENCHING, BACKFILLING, AND COMPACTING.

3.7 DISPOSAL OF DEMOLISHED MATERIALS:

A. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning of demolished materials is prohibited.

3.8 FIELD QUALITY CONTROL:

A. The Project Manager will accompany the Contractor before and after performance of work to observe physical condition of existing structures or improvements involved.

End of Document

Section 32 12 33
PAVING AND SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes (but is not necessarily limited to):
   1. Asphalt Concrete Paving.
   2. Concrete Paving.
   3. Liquid Asphalt and Asphalt Emulsion.
   4. Aggregate Base.

B. Related work furnished under other sections but conforming to the provisions of this section:
   1. Subgrade preparation.
   2. Aggregate Base installation.

C. Related Sections:
   1. Section 32 00 00 - DEMOLITION
   2. Section 31 17 23 - PAVEMENT MARKING.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. A615: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   2. C150: Portland Cement.
   3. D1557: Moisture Unit Weight Relations of Soils and Aggregate Mixtures Using a 10 lb (4.5 kg) Rammer and 18 in. (457 mm) Drop.
   4. D1682: Breaking Loads and Elongation of Textile Fabrics.

B. California Code of Regulations (CCR): Title 24, Chapter 2-71, Site development Requirements for Handicapped Accessibility.

C. California Department of Transportation (C.D.T.):
   1. Standard Specifications:
      a. Section 26 Aggregate Bases.
      b. Section 37 Bituminous Seals.
      c. Section 39 Asphalt Concrete.
      d. Section 51 Concrete Structures.
      e. Section 52 Reinforcement.
      f. Section 73 Concrete Curbs and Sidewalks.
      g. Section 90 Portland Cement Concrete.
      i. Section 92 Asphalts.
      j. Section 93 Liquid Asphalts.
      k. Section 94 Asphaltic Emulsions.
   2. Traffic Manual.
   3. Highway Design.

D. Institute of Transportation Engineers: Transportation and Traffic Engineering Handbook.

1.3 SUBMITTALS

A. Requirements: Refer to Section SUBMITTAL PROCEDURES.

B. Asphalt Concrete Paving:
   1. Provide two copies of material certificates signed by the material producer and the Contractor, certifying that each material item complies with or exceeds specified requirements.
   2. The Contractor shall furnish a certified weight or load slip for each load of material used in the construction of the asphalt concrete pavement.

C. Concrete Paving: The Contractor shall furnish mill test reports on the cement, reinforcement bars, and aggregates, showing compliance with the respective specifications. The Testing Engineer may make concrete test cylinders and slump tests as deemed necessary to determine compliance with the Specifications.

D. Liquid Asphalt.

E. Pavement Reinforcement Fabric.

F. Tack Coat.

G. Pavement Reinforcement Mesh.

H. Structural Geotextile Fabric.

1.4 PROJECT CONDITIONS

A. Liquid Asphalt and Asphalt Emulsion:
   1. Prime coat, seal coat, and paint binder shall be applied only when the ambient temperature is above 50° Fahrenheit and when temperature has not been below 35° Fahrenheit for 12 hours immediately prior to application.
   2. Prime coat, fog coat, seal coat, and paint binder shall not be applied when base or surfaces are wet or contain excess moisture.

B. Asphalt Concrete Paving: Asphalt concrete surfaces shall be constructed only when ambient temperature is above 50° Fahrenheit and when base is dry.

1.5 GENERAL DESIGN CRITERIA

A. Services Areas: Approach ramps, driveways, and paved work areas in excess of 4 percent slope shall be provided with a rough texture for non-skid surface.

B. Walks and Paths: Concrete exterior slabs (walks, terraces, etc.) shall have a pitch of at least 1 percent.

C. Pavement Markings: All traffic control striping and pavement markings shall conform to the standards illustrated in the C.D.T. Standard Plans Book issued May 2006, General Road Work Section.

PART 2 - PRODUCTS

2.1 PAVING MATERIALS

A. Aggregate Base: Aggregate base shall conform to Caltrans Class 2 (R value 78 min) aggregate base, 3/4" maximum size, as specified in Section 26 of the C.D.T. Standard Specifications.

B. Asphalt Concrete Paving:
1. Paving asphalt to be mixed with aggregate shall be steam-refined asphalt, PG 64-10, conforming to Section 92 of the C.D.T. Standard Specifications.
2. Mineral aggregate shall be Type B mineral aggregate as specified in Section 39 of the C.D.T. Standard Specifications.
3. Maximum aggregate size shall be as follows:

A.C. Thickness	Max. Ag.
a. ¾" - 1½	1/2"
b. 2 & 2½"	1/2"
c. 3" & 4"	3/4"

4. Liquid asphalt for prime coat shall be Grade SC-70 in conformance with Section 93 of the C.D.T. Standard Specifications.
5. Asphaltic emulsion for paint binder, fog coat, and seal coat shall be emulsified asphalt, Type SS-1h, conforming to Section 94 of the C.D.T. Standard Specifications.

C. Portland Cement Concrete:
1. Concrete shall be Class A concrete conforming to Section 90 of the C.D.T. Standard Specifications.
2. Cement shall be Type II cement conforming to ASTM C150 as modified by Section 90 of the C.D.T. Standard Specifications.
3. Aggregate shall be 3/4-inch maximum size conforming to Section 90 of the C.D.T. Standard Specifications.
4. Pedestrian concrete shall have a strength of 3,000 psi.
5. Vehicular concrete shall have a strength of 4,000 psi.
6. Water shall be potable and free of organic matter and injurious amounts of oil, acid, alkali, or other deleterious substances.
7. Reinforcing bars shall be deformed and shall conform to ASTM A615.
8. Filled joints, unless noted otherwise on the Drawings, shall be 1/4-inch thick, the full depth of the concrete section and conforming to Section 51 of the C.D.T. Standard Specifications.
9. Joint filler shall conform to Section 51 of the C.D.T. Standard Specifications for pre-molded expansion joint filler and expanded polystyrene joint filler.
10. No admixtures will be allowed without prior approval of the Project Manager.

D. Pavement Reinforcement Fabric: Pavement reinforcement fabric shall meet Caltrans Section 88-1.02, BP Petromat or approved equivalent.

E. Crack Sealant:
1. Crack sealant shall be rubberized hot-pour type and shall meet ASTM D 3405, Husky 1611 or approved equivalent.
2. Blotting Agent shall be one of: Screened sand, cement, or fly ash.

F. Tack coat: Tack coat shall meet Caltrans Section 39-4.02.

G. Pavement reinforcement mesh: Pavement reinforcement mesh for use in Type 2 Overlay shall be Glasgrid Model 8501 or approved equivalent.

H. Structural geotextile fabric: Structural geotextile fabric shall be Mirafi 500X or approved equivalent.

PART 3 - EXECUTION

3.1 PREPARATION

A. Subgrade and Aggregate Base:
1. Prepare a subgrade and over excavation paragraph reference 3.4 of Section 31 00 00-EARTHWORK AND GRADING.
2. Aggregate base shall be compacted to 95 percent ASTM D1557. Sections 26-1.04B and 26-1.05 of the C.D.T. Standard Specifications shall apply.
3. Soil sterilant shall be applied to prepared subgrade or after installation of rock or aggregate base uniformly at the rate recommended by the manufacturer.

B. Crack Sealing:
1. Before sealing, cracks shall be cleared of dirt, dust, and all other deleterious materials to a depth of 1/4-inch to 1/2-inch.
2. Cracks 1/8-inch in width and greater shall be sealed.
3. Application of crack sealer shall be in accordance with the manufacturer's recommendations unless otherwise directed.

3.2 ASPHALT CONCRETE PAVING

A. General:
1. Asphalt concrete shall be proportioned, mixed, placed, spread, and compacted in conformance with Section 39 of the C.D.T. Standard Specifications.
2. Before placing asphalt concrete on untreated base, a liquid asphalt prime coat shall be applied to the base course in conformance with Section 39 of the C.D.T. Standard Specifications. Prime coat shall be applied at the rate of 0.25 gallons per square yard.
3. Before placing asphalt concrete, an asphalt emulsion tack coat shall be applied to all vertical surfaces of existing pavement, curbs, gutters, construction joints, and all existing pavement to be surfaced, in conformance with Section 39 of the C.D.T. Standard Specifications.
4. Spreading and compacting asphalt concrete shall be performed in accordance with Section 39 of the C.D.T. Standard Specifications.
5. Fog seal shall be applied to all finished surfaces of asphalt concrete pavement at a rate of 0.05 gallons per square yard, in accordance with Section 37 of the C.D.T. Standard Specifications.
6. After fog seal has been applied, ample time shall be allowed for drying before traffic is allowed on the pavement or paint striping is applied.

3.3 CONCRETE CONSTRUCTION

A. General:

1. All concrete shall be mixed in accordance with applicable provisions of Section 90 of the C.D.T. Standards Specifications.
2. Construction of concrete substructures shall conform to applicable provisions of Section 51 of the C.D.T. Standard Specifications. Unless noted otherwise in the Specifications, all exposed surfaces of structure shall have Class 1 surface finish or finished to match existing adjacent paving.
5. No pigment shall be used in curing compounds for construction of concrete curbs, gutters, and structures.
6. All work shall be subject to field inspection. No concrete shall be placed until the Project Manager has approved the forms and reinforcement.
7. Expansion joints on curbs and gutters shall be placed 20 feet on centers, adjacent to structures, and at all returns, and shall be filled with joint filler. Control joints shall be formed 10 feet on centers. The score shall 1-inch deep minimum.
8. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than 6 feet. Spouts, elephant trunks, or other approved means shall be used to prevent segregation.

3.4 FIELD QUALITY CONTROL

A. Asphalt Concrete Paving:
   1. The specified thickness of the finished pavement shall be the minimum acceptable.
   2. Conforms shall form a smooth, pond-free transition between existing and new pavement.
   3. Depressions in paving between high spots are not to exceed 1/8-inch when measured below a 10 feet long straight edged placed anywhere on surface in any direction.
   4. The finished asphalt pavement shall have positive drainage without ponding.

3.6 CLEANUP

A. General:
   1. Surplus material remaining upon completion of paving operations shall become the property of the Contractor, to be removed from the work site and disposed of in a lawful manner.

   2. Surfaces shall be left in a clean, neat, and workmanlike condition, and all construction waste, rubbish, and debris shall be removed from the work site and disposed of in a lawful manner.

End of Document

SECTION 32 16 13

CONCRETE CURBS, GUTTERS, AND WALKS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Specifications for providing portland concrete curbs, gutter, sidewalks, driveways, and island paving, as indicated.

1.02 RELATED SECTIONS

A. Section 32 11 23 - Aggregate Base

1.03 REFERENCES

A. American Concrete Institute (ACI):

ACI 301	Standard Specifications for Structural Concrete
ACI 318/ 381R	Building Code Requirements for Structural Concrete and Commentary

B. American Society for Testing and Materials (ASTM)

ASTM A53	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
ASTM A615/ A615M	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A663/ A663M	Specification for Steel Bars, Carbon, Merchant Quality, Mechanical Properties
ASTM C260	Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C881	Specification for Epoxy-Resin-Base bonding Systems for Concrete

C. County Solano County Construction Standards – Latest Edition

1.04 SUBMITTALS

A. Product Data

Respective manufacturer's product data for manufactured products.

1.05 QUALITY ASSURANCE

A. Tolerances

1. Construct concrete surfaces within 1/4 inch of the indicated elevation, and deviating not more than 1/8 inch from a 10 foot straightedge placed anywhere on the surface.

2. Slab tolerances shall be as specified in ACI 301.

B. Finishes

Slab finishes shall be as specified herein accordance with the requirements of ACI 301.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide Class of Concrete indicated on the Contract Drawings or Construction Drawings.

a. Provide air-entrainment of three percent (± one percent) with admixture conforming to ASTM C260.

b. Nominal size of large aggregate shall be 1".

c. Minimum total cement content shall be 520 pounds per cubic yard of concrete.

d. Minimum strength of concrete shall be 3000 psi.

B. Tie Bars

ASTM A615, Grade 60, of type and size indicated.

C. Dowels

Plain round bars meeting requirements of ASTM A615/A615M, Grade 60, of ASTM A663/A663M, Grade 80, epoxy-coated bars, furnished with approved snugfitting ASTM A53 galvanized pipe sleeve. Provide sleeve with one end closed.

D. Weep Holes

ASTM A53 galvanized pipe of size indicated.

E. Concrete Curing Compound

ASTM C309, Type 1.

F. Epoxy Adhesive

ASTM C881, Type V for load bearing concrete, Grade and Class as determined by project conditions and requirements.

PART 3 - EXECUTION

3.01 PREPARATION OF SUBGRADE

A. Excavate for and prepare the subgrade as specified true to the indicated grade and cross section.

B. Test completed subgrade for correct grade and cross section by means of template supported on side forms.

C. Dampen subgrade and forms just before placing concrete.

3.02 TYPES OF CONSTRUCTION

A. Provide cast-in-place concrete construction, plain or reinforced as indicated. Curbs, gutters, and walks shall be formed accurately to indicated section profile with template screed.

B. Extruded curbs and gutter, placed by an extrusion machine, may be provided where site conditions are suitable and the extrusion process is appropriate for the purpose.

3.03 JOINTS

A. Expansion Joints

1. Construct ½ inch thick expansion joints in the following locations:

a. In curb and combination curb and gutter at the locations of expansion joints in the concrete roadway.

b. In curb or combination curb and gutter, at points where curved and tangent sections join.

c. Between curb or combination curb and gutter, and any drain inlet, or similar structure occurring within the limits of the curb or combination curb and gutter.

d. At corners in sidewalks, following the projections of the building lines from the corner of the building to the curb.

e. Between sidewalks and any permanent structure.

f. Between sidewalk and curb.

2. Construct 1/4 inch thick expansion joints in the following locations:

a. Through sidewalks at intervals not greater than 15 feet.

b. In sidewalks, encircling fixtures more than 12 inches in diameter.

3. Construct expansion joints as specified in UCS, except that load transfer devices will not be required unless indicated. Shape performed filler to cross section of curbs and combination curb and gutter.

B. Contraction Joints

In sidewalks, construct contraction joints in uniform intervals not greater than six feet, by means of a suitable tool which will form a groove 1/2 inch deep and 1/4 inch wide, with the edges rounded to a 1/4 inch radius.

C. Tooling

Finish joints with an edging tool having 1/4 inch radius, leaving joints free of mortar and concrete. In preformed type joints, leave joint filler material exposed for full length of joint with clean and true edges.

D. Joint Sealing

1. Seal to within 1/8 inch of pavement surface all joints in curbs and gutters, including gutter surfaces of combination curb and gutter sections, all joints between curbs and vehicular pavement, all joints between gutters and vehicular pavement, and all other expansion joints. Do not seal other joints unless so indicated.

2. Do not seal joints until concrete curing is complete. Prior to installation of the joint sealing compound, clean the joints of dirt and other foreign material. Joints may be cleaned with compressed air jets provided that the air in such jets is free of oil or water. Do not fill joints when there is any free water in or adjacent to joints. Joint walls and all surfaces to which the sealing material is to adhere shall be surface dry for at least three hours prior to sealing.

3. Apply with approved pressurized equipment. Perform sealing joints to make them impervious to water and to prevent the sealing compound from spreading over the surface of the pavement.

3.04 FORM REMOVAL

A. Remove front curb forms not less than two or more than six hours after placing concrete, but in no case while the concrete is still plastic enough to slump.

B. Remove other forms not less than 12 hours after finishing is completed.

3.05 FINISHING

A. Curb and Combination Curb and Gutter:

1. Trowel the face of curb smooth to a depth of not less than two inches below the flow line, or the flow line of integral curb and gutter, and finish with a steel trowel, all immediately after removal of front curb forms.

2. Finish all curb edges with a radius of 1/2 inch.

3. Provide a final fine brush finish to both top and face of curb with brush strokes parallel to the line of the curb, so that both top and front face present the same uniform appearance.

4. Keep the curb face wet during above finishing operations.

5. Allow no coarse aggregate to show on the finished curb surface.

B. Sidewalk, Island Paving and Ramps

1. After the concrete has been placed, consolidated, struck off, leveled, grooved and edged as specified herein, and in UCS, do not work the concrete further until ready for floating.

2. Provide “floated finish” or light “broom finish” as indicated in accordance with the requirements of ACI 301.

3. For pedestrian and wheelchair ramps, and all other surfaces where the Contract Drawings require a non-slip finish, provide a “non-slip finish” in combination with a “floated finish” or “broom finish” in accordance with the requirements of ACI 301.

4. Broom finish shall be applied perpendicular to the direction of traffic flow.

C. Joints and Edges

As soon as the condition of the work permits, perform joint work, edging and marking. Finish all edges with a radius of 1/4 inch.

3.06 CURING AND PROTECTION

A. Comply with the applicable requirements for curing concrete with liquid membrane-forming curing compound. Do not permit traffic on new concrete pavement until the concrete has cured a minimum period of ten days.

B. Provide damp curing only for concrete slab surfaces indicated to be treated with concrete hardener and dust proofer.

3.07 FIELD QUALITY CONTROL

A. The engineer shall perform inspections and tests. The Contractor shall provide such samples and services to facilitate testing.

END OF SECTION

Section 32 17 23
PAVEMENT MARKING

PART 1 – GENERAL
1.1 SUMMARY:

A. Provide requirements for materials, fabrications, and installation of traffic control and pavement markings.

1.2 SUBMITTALS:

A. Submit manufacturer's product data describing application of products and compliance with VOC requirements.

B. Shop Drawings: Show complete layout and location of pavement markings prior to demolition or obliteration of the existing markings.

C. Submit samples as follows:
1. Traffic paint.
2. Pavement markers and adhesives.
3. Reflectorized markers and posts.

1.3 DELIVERY, STORAGE AND HANDLING:

A. Comply with Division 1 requirements, specifications, and the Project Manager.

B. Deliver and store packaged products in original containers with seals unbroken and labels intact until time of installation.

C. Provide proper facilities for handling and storage of products to prevent damage. Where necessary, stack products off ground on level platform, fully protected from weather.

PART 2 – PRODUCTS
2.1 MATERIALS:

A. Traffic Marking and Symbol Paint: Water-Born, Fast-Dry, Traffic Paint distributed by Fuller-O'Brien Corp. D.J. Simpson (#108-273, White); (#108-280, Blue); or approved equivalent.

B. Handicapped Symbol Background Paint: Blue Color. Glidden Co. "Glid-Guard Lifemaster Finish No. 5200 /series, Color 1/M 79", or approved equivalent.

C. Thermoplastic Stripes and Markings:
4. Thermoplastic stripes and makings shall be hot applied conforming to CSS Section 84 and shall be Cataphote-Catatherm brand, Pavemark thermoplastic brand, or approved equal.
5. Thermoplastic stripes and markings shall have a minimum skid friction value of BPN 35.

D. Pavement Markers and Adhesives:

6. Fire hydrant pavement markers shall be two-way retroflective "Blue" markers and shall conform to the applicable requirements of CSS Section 85.
7. Adhesive for pavement markers shall be standard set epoxy adhesive conforming to the requirements of CSS Section 95-2.05.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine receiving surfaces and verify that surfaces are clean and proper for installation.

B. Do not start work until unsatisfactory conditions have been corrected.

3.2. APPLICATION:

A. Preparation:
1. Clean and prepare surfaces to receive traffic paint in accordance with CSS Section 84-3.05 and these special provisions. Where required, remove existing striping and markings by wet blasting or equivalent method. Do not use dry sandblasting or other dust producing methods.

B. Traffic Paint:
1. Traffic paint shall be machine applied in accordance with CSS Section 84-3.04.

C. Striping Layout:
1. Traffic stripe shall be single and double, solid and broken, and of the color to match existing conditions.
2. Traffic striping shall be placed in patterns to match existing conditions, contractor shall document.

D. Thermoplastic Stripes and Markings:
1. Thermoplastic stripes and markings shall be applied hot in conformance with manufacturer's recommended instructions and the applicable requirements of CSS Section 84-2.06.

E. Pavement Markers:
1. Blue pavement markers shall be installed to delineate the location of fire hydrants along campus roads or as shown on plans. No markers shall be installed until the surface has been approved by the Project Manager and until at least 10 days after the slurry seal on asphalt concrete has been placed. Place markers in accordance with CSS Section 85-1.06.

F. Apply marking paint in accordance with approved manufacturer's recommendations.

G. Density of paint coverage shall hide color and texture of substate.

H. Parking Stripes: Paint four inches wide unless otherwise noted.

I. Symbol Marking: Paint to match existing conditions.

3.3 CLEANING AND PROTECTION:

A. Comply with requirements of Section CLEANING.

B. Upon completion of work, remove surplus materials and rubbish and clean off spilled or splattered paint resulting from this work.

C. Permit no surface traffic until pavement and symbol marking has dried thoroughly.

End of Document

SECTION 32 91 14

BIORETENTION SOIL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Specifications for furnishing, placing, and compacting bioretention soils as indicated.

B. Related Sections:

1. Division 31 – Earthwork
2. Section 32 91 13 – Soil Preparation and Finish Grading

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

ASTM D422 –	Standard Test Method for Particle-Size Analysis of Soils
ASTM D1557 –	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D2434 –	Standard Test Method for Permeability of Granular Soils (Constant Head)
ASTM D5268 –	Standard Specification for Topsoil Used for Landscaping Purposes

1.03 GENERAL REQUIREMENTS

A. Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth.

Bioretention Soil shall be a mixture of topsoil or fine sand, and compost, measured on a volume basis.

Mix A – Topsoil Blend
10%-20% Topsoil
50%-60% Fine Sand
30%-40% Compost

Mix B – Fine Sand Blend
60%-70% Fine Sand
30%-40% Compost

1.04 SUBMITTALS

The contractor must submit to the College for approval:

A. A sample of mixed bioretention soil.

B. Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.

C. Grain size analysis results of the fine sand component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.

D. Quality analysis results for compost performed in accordance with Seal of Testing Assurance (STA) standards, as specified in Section 1.4.

E. Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".

F. A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.

G. Provide the following information about the testing laboratory(ies) name of laboratory(ies) including:

1. Contact person(s)
2. Address(es)
3. Phone contact(s)
4. E-mail address(es)
5. Qualifications of laboratory(ies), and personnel including date of current certification by STA, ASTM, or approved equal

PART 2 - PRODUCTS

2.01 SAND FOR BIORETENTION SOIL

A. General.

1. Sand shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be non-plastic.

B. Sand for Bioretention Soil Texture.

1. Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40, #30, #16, #8, #4, and 3/8 inch sieves (ASTM D 422 or as approved by University), and meet the following gradation:

Sieve Size	Percentage Passing (by weight)	
	Min	*Max*
3/8 Inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40	5	55
No. 100	0	15
No. 200	0	5

Note all sands complying with ASTM C33 for fine aggregate comply with the above gradation requirements.

2.02 TOPSOIL FOR BIORETENTION SOIL

A. General

Topsoil shall be free of wood, waste, or any other deleterious material.

B. Topsoil for Bioretention Soil Texture

The overall topsoil texture shall be loamy sand as analyzed by an accredited laboratory. The overall dry weight percentages shall be 60-90% sand, with less than 20% passing than the #200 sieve and less than 5% clay of the total weight with no gravel.

2.03 COMPOSTED MATERIAL

Compost shall be a well decomposed, stable, weed free organic matter source meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

A. Compost Quality Analysis Before delivery of the soil, the Contractor shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Evaluation of Composting and Compost (TMECC). The lab report shall verify:

1. Feedstock Materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.

2. Organic Matter Content: 35% - 75% by dry wt.

3. Carbon and Nitrogen Ratio: C:N < 25:1.

4. Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable. In addition, any one of the following is required to indicate stability:

   a. Oxygen Test < 1.3 O2 /unit TS /hr
   b. Specific oxy. Test < 1.5 O2 / unit BVS
   c. Respiration test < 8 C / unit VS / day
   d. Dewar test < 20 Temp. rise (°C)
   e. Solvita® > 5 Index value

5. Toxicity: any one of the following measures is sufficient to indicate non-toxicity.

   a. NH4- : NO3-N < 3
   b. Ammonium < 500 ppm, dry basis
   c. Seed Germination > 80 % of control
   d. Plant Trials > 80% of control
   e. Solvita® > 5 Index value

6. Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.

   a. Total Nitrogen content 0.9% or above preferred.
   b. Boron: Total shall be <80 ppm; Soluble shall be <2.5 ppm

7. Salinity: Must be reported; < 6.0 mmhos/cm

8. pH shall be between 6.5 and 8. May vary with plant species.

B. Particle size: 95% passing a 1/2" screen

C. Bulk density: shall be between 500 and 1100 dry lbs/cubic yard

D. Moisture Content shall be between 30% - 55% of dry solids

E. Inerts: compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume

F. Weed seed/pathogen destruction: provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

G. Select Pathogens: Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram

H. Trace Contaminants Metals (Lead, Mercury, Etc.) Product must meet US EPA, 40 CFR 503 regulations

I. Compost Testing. The Contractor will test all compost products within 120 calendar days prior to application. Samples will be taken using the STA sample collection protocol. (The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: 631-737-4931, www.compostingcouncil.org). The sample shall be sent to an independent STA Program approved lab. The Contractor will pay for the test.

PART 3 - EXECUTION

3.01 PLACEMENT AND COMPACTION OF BIORETENTION SOILS

Place the bioretention soil in 8" to 12" lifts. Lifts are not to be compacted but are placed to reduce the possibility of excessive settlement. Allow time for natural compaction and settlement prior to planting. Bioretention soil may be watered to encourage compaction.

END OF SECTION

SECTION 33 30 00

SITE SANITARY SEWERAGE SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Specifications for furnishing, installing, testing the site sanitary sewerage system in the ground and to a point outside the building wall as indicated.

1.02 RELATED SECTIONS

A. Section 31 23 33 - Trenching and Backfilling

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

ASTM D1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D1785	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedules 40, 80, and 120
ASTM D2564	Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping System
ASTM D3139	Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F477	Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

B. American Water Works Association (AWWA)

AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe, four inch through 12 inch for Water Distribution

C. Sanitary Utility District Standards

Note that all work shall be performed and completed in accordance with the jurisdictional sanitary utility district's standard drawings and specifications. The Contractor shall be responsible for obtaining all such standards as applicable.

1.04 SUBMITTALS

A. Shop Drawings showing piping layouts, sizes, types, and cleanouts.

B. Respective manufacturer's product data for manufactured materials and equipment.

C. Equipment manufacturer's printed operating and maintenance instructions consisting of detailed parts list, recommended spare parts list, and complete operation and maintenance procedures.

D. Certified test reports of equipment, as applicable.

1.05 SITE CONDITIONS

A. Excavations shall be dry immediately before and after products are installed. Provide surfaces and structures to, and on, which sewerage products will be installed.

B. Coordinate the installation of the sewerage system with the jurisdictional sanitary district or utility owner.

PART 2 - PRODUCTS

2.01 BURIED PIPE AND FITTINGS

A. Requirements

Provide the types, sizes, and configurations of pipe, fittings, and miscellaneous materials and installation accessories as indicated and required.

B. PVC Pipe and Fittings, Three Inches and Smaller

1. Pipe: Polyvinyl chloride (PVC), ASTM D1785, Schedule 80, Type 1, Grade 1.

2. Fittings: ASTM D1784, socket weld, same material and schedule as pipe.

3. Joints: Socket welded with PVC solvent cement conforming to ASTM D564.

C. PVC Pipe and Fittings, Four Inches and Larger

Pipe: ASTM D3034 (SDR 26), polyvinyl chloride (PVC) water pipe with bell and spigot ends and flexible ring joints.

2.02 CLEANOUTS

A. At grade, cleanouts shall have adjustable sleeve-type housing, threaded brass plug with countersunk slot, and cast iron frame and cover.

PART 3 - EXECUTION

3.01 PREPARATION

A. Excavations shall be free of water and extraneous material immediately before sanitary sewerage products are installed or placed. Bottoms of trenches shall have a six inch sand bed and shall be formed to support the bottom quadrant of the pipe and fittings. Should rock be encountered or should bedding material be unsuitable to support the products at design elevation, continue excavation to an elevation eight inches below the design elevation and backfill with clean sand.

B. Interior of pipe, pipe fittings, valves, drains, and cleanouts shall be cleaned of foreign substances before installation.

3.02 INSTALLATION

A. Install products where indicated. Remove and reinstall products that are disturbed after installation. Ends of products to which future connections will be made shall be either valved, plugged, or capped, and anchored.

B. Connections to existing facilities shall be made with fittings and short bends to suit the actual conditions; connect products in accordance with the product manufacture's installation instructions.

C. Pipe and fittings shall be set to line and grade as shown on the Construction Drawings.

3.03 INSTALLING PIPE

A. Protect pipe and fittings during handling to prevent damage.

B. Place, shape, and compact bedding material to receive barrel of pipe.

C. Start laying pipe at lowest point; lay true to line and grade indicated.

D. Install pipe to bear on bedding material along entire length.

E. Do not place the pipe on blocking material of any type.

F. Do not use wedges while installing the pipe.

G. Install pipe so that bells and grooves are on upstream end.

H. Align each section of pipe with adjoining section with uniform annular space between bell and spigot and so as to prevent sudden offsets in flow line.

I. As each section of pipe is laid, place sufficient bedding and backfill to hold it firmly in place.

J. Apply lubricant to rubber gasket (o-rings) immediately before joining pipe sections.

K. Keep interior of sewer clean as work progresses. Where small pipe sizes make cleaning difficult, keep suitable swab or drag in pipe and pull through each joint immediately after joining is completed.

L. Keep trenches and excavations free of water during construction and until backfilled.

M. When work is not in progress, securely plug ends of pipe and fittings to prevent extraneous matter from entering pipes and fittings.

N. Cut pipe ends which project into a sewer structure flush with the inside face of the structure and cover exposed pipe reinforcement with grout.

O. Where length of stub is not shown, install four foot length and seal free end with brick masonry bulkhead or approved stopper.

P. Obtain Engineer's approval before covering pipe.

Q. Where indicated, place additional bedding material around and over the pipe in lifts not exceeding six inches loose. Compact each lift before placement of next lift.

R. Accomplish compaction by methods which will avoid damage to pipe and which will not disturb its alignment and grade. The use of vibratory rollers is prohibited until compacted cover over pipe has reached three feet or half diameter, whichever is greater.

S. Connect sanitary sewerage system to existing public sanitary sewers in accordance with requirements of the jurisdictional authority.

3.04 PIPE CLEANOUTS

A. Cleanouts shall be the same size as the pipe up to and including four inches, and shall be four inches minimum for pipe sizes six inches and larger. Cleanouts for drainage pipe shall consist of a longsweep 1/4 bend or one or two 1/8 bends extended to the place indicated. Wall or accessible piping cleanouts shall be T-pattern, 90 degree branch drainage fittings having screw plugs. Cleanouts shall be provided at the base of each riser and shall consist of a wye pattern fitting with a screw plug.

3.03 TESTS

A. Testing Requirements

1. Conduct a mandrel test to ensure that the line is free of obstructions subsequent to the placing of intermediate backfill material over the line.
2. Upon completion of the test and determination that the line is free of obstructions, plug, cap or otherwise close the open end or ends of the installed piping to prevent the entrance of debris into the lines.
3. Supply all tools, equipment, and water necessary to make all tests.
4. Flush all sewer lines prior to testing and accumulated materials shall be removed at each manhole and no materials shall be allowed to enter the existing sewer system.
5. The Contractor shall be responsible for making all necessary arrangements with the jurisdictional sanitary utility owner for performing and witnessing the required tests.

B. Sanitary Sewer Pipeline Tests

1. Perform air test on all installed sanitary sewer pipes upon completion of backfill.
2. Perform vacuum test on all manholes.
3. Hydrostatically test all installed sanitary sewer force mains.
4. Test all sewers 24" or less in diameter with low pressure.
5. Sewers with a diameter greater than 24 inches may be tested by visual inspection.

C. Low Pressure Air Test (Gravity Pipe)

1. Clean set sections of pipe to be tested before starting air test.
2. Plug pipe outlets with pneumatic plugs capable of resisting internal testing pressures without requiring external bracing.
3. Immediately following pipe cleaning and wetting, slowly supply air to plugged pipe until internal air pressure reaches 5 psi. Allow at least two minutes for temperature to stabilize before proceeding, except slowly add air to maintain a minimum of 4.5 psig but less than 5 psig pressure. While temperature is stabilizing, spray plugs, pipes, and hoses with soap solution and eliminate air leaks.

4. After temperature has stabilized, measure time required (10 minute min.) for pressure to drop of 1 psig so that the pressure at the end of the test is at least 3.5 psig. If measured time exceeds allowable time, pipe will not be accepted.

5. Time, in seconds, for pressure to drop from 4.5 to 3.5 psig shall be not less than the following; time for intermediate lengths shall be interpolated:

Length	Pipe Diameter, Inches						
Pipe (Ft)	8	10	12	15	18	21	24
25	18	28	40	62	89	121	158
50	35	55	79	126	178	243	317
75	53	83	119	186	267	364	475
100	70	110	158	248	356	485	634
125	83	138	198	309	444	595	680
150	110	165	238	375	510	595	680
175	123	193	277	425	510	595	680
200	141	220	317	425	510	595	680
225	158	248	340	425	510	595	680
250	176	275	340	425	510	595	680
275	194	283	340	425	510	595	680
300	211	283	340	425	510	595	680
350	227	283	340	425	510	595	680
400	227	283	340	425	510	595	680

D. Vacuum Test (Manholes)

1. Clean set manholes to be tested before starting vacuum test.

2. Plug manhole outlets with pneumatic plugs capable of resisting internal testing pressures without requiring external bracing.

3. Vacuum test head shall be positioned at the top of the casing including grade rings.

4. Test shall be 10 lbs for 60 seconds. Measure time required for pressure to drop to 9 lbs. If measured time exceeds allowable time, manhole will not be accepted.

5. Manholes showing greater than the allowable leakage shall be repaired and retested until a satisfactory leakage result is obtained.

6. Time, in seconds, for pressure to drop from 10 lbs to 9 lbs shall be not less than the following; time for intermediate lengths shall be interpolated:

Depth	Diameter		
	48"	54"	60"
<10'	20	23	26
10'	25	29	33
12'	30	35	39
14'	35	41	46

D. Hydrostatic Tests (Force Mains)

1. Force main testing shall be done after intermediate backfill has been placed and compacted but before final paving has been placed.

2. Repair any leaks which may develop resulting from or caused by the tests.

3. Fill lines with water and increase pressure to a 120% of the Total Dynamic Head of the system or fifty (50) psi whichever is greater.

4. Test shall be applied for not less than two (2) hours with zero leakage.

5. Use of air to test force mains is not permitted.

E. Visual Test Method

1. Slowly pull a television camera through sewer and inspect for visual leaks and cracks in pipe. Repair leaks, then re-inspect pipe. Submit tape of entire length of system to owner for approval.

F. Joint Pressure Testing

1. Insert sealing packer with joint testing capability, into sewer line.

2. Place sealing packer around joint and pressure test joint. If a drop in air pressure occurs reseal the joint.

3. Repeat procedure for each joint.

G. Criteria for Acceptance

1. The section of sewer being tested will not be accepted if test results exceed allowable leakage to take less time than minimum holding time. If pipe proves to be unacceptable, immediately repair defective materials and workmanship. The Contractor will not be permitted to change to another test if original test method reveals system has failed.

END OF SECTION

SECTION 33 40 00

SITE DRAINAGE SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Specifications for site and subdrainage and area runoff collection system and connection to existing storm drainage system as indicated.

1.02 RELATED SECTIONS

A. Section 31 23 33 - Trenching and Backfilling

1.03 REFERENCES

A. American Society of State Highway and Transportation Officials (AASHTO)

AASHTO M252M	Specification for Corrugated Polyethylene Pipe
AASHTO M294M	Specification for Corrugated Polyethylene Pipe, 300 1200 mm

B. American Society for Testing and Materials (ASTM)

ASTM F667	Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings
ASTM F405	Standard Specification for Corrugated Polyethylene Pipe and Fittings
ASTM C76	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

C. Solano County Construction Standards – Latest Edition

D. Caltrans Standard Specifications - Latest Edition

1.04 SUBMITTALS

A. Shop Drawings

Detailed drawings that indicate site drainage in plan and section, including relationship to other systems, interfaces, and drainage structures, connections, alignment, grade, bedding and backfill, and other pertinent data.

B. Product Data

Submit manufacturer's product data for pipe and pipe connection materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe Connection Requirements

Ends of pipe shall be bell and spigot, except PVC Perf., to assure continuous alignment of pipe and leakproof joints.

B. Concrete Pipe (RCP)

Reinforced Pipe: ASTM C76, Class III; for pipe 15 inches in diameter and larger. "O" ring rubber gasket (ASTM C443)

C. High Density Polyethylene Pipe (HDPE)

Pipe: HDPE pipe conforming to ASTM D3212, or ASTM 1417 for pipe sizes four inch - 60 inch (ADS N-12 1B WT pipe or equivalent)

D. PVC Pipe (PVC)

Pipe: PVC Pipe shall conform to ASTM D-3034, SDR 26, Bell and Spigot rubber joints for pipe sizes 4" through 8".

E PVC Perforated Pipe (PVC Perp)

Pipe: PVC Perforated Pipe shall conform to ASTM D-3034, SDR 26, solvent weld joints for pipe sizes 4", 6" and 8". Perforations shall be 2 rows of ½" holes on 5" centers,
120° apart.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE

A. Laying Pipe

1. Lay pipe to line and grade indicated. Bell and spigot type, lay bells in cross-cuts cut in trench. Lay pipe with the bell or grooved end uphill.

2. Prevent dirt from getting into pipe joints.

3. Remove pipe which is cracked, checked, spalled, or damaged from the work.

4. Clean interior of pipe of cement, dirt, and extraneous matte as the work progresses.

B. Pipe Joints

1. Pipe joints shall be made secure and watertight.

2. Employ appropriate equipment to draw the sections of the pipe tightly together.

C. Visual Test Method

1. Slowly pull a television camera through storm drain and inspect for visual leaks, separated joints and cracks in pipe and manholes. Repair leaks and joints. Replace cracked pipe. Re-inspect pipe. Submit tape of entire length of system to owner for approval.

D. Backfilling

1. Piping shall not be covered with backfill material, until inspected, and approved by the Engineer.

2. After making up pipe joints, fill space between pipe and sides of trench with backfill material half-way up the pipe. Both sides shall be filled for full width of trench at same time and carefully compacted so as to hold the pipe in its proper position.

3. After pipe has been installed, inspected, and approved, place and compact backfill as specified in Section 31 23 33 - Trenching and Backfilling.

END OF SECTION