BID DOCUMENTS COVER SHEET

CONTRACT DOCUMENTS

FOR

C-4016, Inc. 3, Demo and Abatement of Physical Science and Biological Science Buildings and other Structures

AT

Contra Costa College
2600 Mission Bell Dr., San Pablo, CA 94806

CONTRA COSTA COMMUNITY COLLEGE DISTRICT

Consists of:

VOLUME 2

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November 6, 2021

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SECTION 02 41 13 - SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes all work necessary to successfully complete demolition to prepare site for the phasing and new construction, including the following:

1. Clean line saw cutting of existing asphalt pavement, concrete sidewalks, concrete curb/gutter, etc., as specified herein.
2. Protection from injury or defacement existing building elements to be preserved.
3. Removal of debris and deleterious materials such as rubbish.
4. Removal and stockpile of materials for landscaping use at approved location.
5. Disposal of unwanted or objectionable materials off site.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Disconnecting, capping or sealing, and removing site utilities.
8. Removing above-grade site improvements within limits indicated.

1.2 REGULATORY REQUIREMENTS:

A. No burning shall be allowed.

B. Do not use explosives.

C. Comply with the following California Code of Regulations:

1. Title 8: CAL/OSHA, Chapter, Subchapter 4 – Construction Safety Orders.
2. Title 24: Part 2, California Building Code, Chapter 33, Protection of Pedestrian during Construction or Demolition.
3. Bay Area Air Quality Management District.

1.3 DEFINITIONS

A. ANSI: American National Standards Institute.

B. CAL-OSHA: California Occupational Safety and Health Administration.

C. ANSI: American National Standards Institute.

D. CFR: Code of Federal Standards.

E. EPA: Environmental Protection Agency.

F. NFPA: National Fire Protection Association.

G. Remove: Detach items from existing construction and legally dispose of them off-site unless they indicated to be removed and salvaged or recycled.

H. Remove and Salvage: Detach items from existing construction, prior to demolition, and deliver them to the District.

I. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or recycled.

1.4 SUBMITTALS

A. Follow Submittal procedure outlined in Division 1– General Requirements.

1.5 PROJECT CONDITIONS

A. In all circumstances ensure that demolition work does not adversely affect adjacent water courses groundwater and wildlife, or contribute to excess air and noise pollution.

B. Do not dispose, of waste or volatile materials such as mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.

C. Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

D. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

E. Protect trees, plants and foliage on site and adjacent properties where indicated.

F. Except for materials indicated to be stockpiled or to remain, cleared materials are the Contractor's property. Remove cleared materials from site and dispose of in lawful manner.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Backfill excavations resulting from demolition operations with on-site or import materials conforming to structural backfill defined in Section 31 23 33 Utility Trenching and Backfill.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points during construction.

B. Protect existing site improvements to remain during construction.

C. Provide the following temporary facilities to facilitate the demolition operations, as necessary:

1. Temp Traffic Controls
2. Protection of Persons and Property
3. Protection of Utilities
4. Protection of Trees
5. Noise and Dust Abatement
6. Clear and restore area to their original condition
7. Protect existing site improvements and adjacent structures from removal and damage.
8. Protect and maintain benchmarks and survey control points during construction.

3.2 RESTORATION

A. Restore areas and existing works outside areas of demolition to match conditions to their original condition, as acceptable to the District.

B. Restore damaged improvements to their original condition, as acceptable to the District.

3.3 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or abandoned.

B. Arrange to shut off indicated utilities with utility companies or verify that utilities have been shut off.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by District or others unless authorized in writing by the District and then only after arranging to provide temporary utility services according to requirements indicated.

D. Coordinate utility interruptions with utility company affected.

E. Do not proceed with utility interruptions without the permission of the District and utility company affected. Notify the District and the utility company affected 14 working days prior to utility interruptions.

F. Excavate and remove underground utilities that are indicated to be removed.

G. Securely close ends of abandoned piping with tight fitting plug or wall of concrete minimum 6-inches thick.

H. Adjustment of manhole frames and other castings Caltrans Standard Specifications Sec 15-2.05A.

3.4 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, and gutters, as indicated. Where concrete slabs, curb, gutter and asphalt pavements are designated to be removed, remove bases and subbase to surface of underlying, undisturbed soil.

C. Unless the existing full-depth joints coincide with line of pavement demolition, neatly saw-cut to full depth the length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

D. Remove driveways, curbs, gutters and sidewalks by saw cutting to full depth. If saw cut falls within 30-inches of a construction joint, expansions joint, score mark or edge, remove material to joint, mark or edge.

3.5 SALVAGED IMPROVEMENTS

A. Salvaged Improvements: Carefully remove items indicated to be salvaged and store where indicated on plans or where designated by the District. Avoid damaging materials designated for salvage.

3.6 DISPOSAL

A. Remove surplus obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off the District's property.

B. Remove: Unless items are otherwise to remain or be reinstalled, remove and dispose of items. Do not store removed items that are of value to the contractor on site.

C. Remove and Reinstall: Remove items; clean, service and otherwise prepare for service; reinstall in the same location (or in the location shown on drawings).

D. Unidentified Materials: If unidentified materials are discovered, including hazardous materials that will require additional removal other than is required by the Contract Documents, immediately report the discovery to the District. If necessary, the District will arrange for any testing or analysis of the discovered materials and will provide instructions regarding the removal and disposal of the unidentified materials.

3.7 CONSTRUCTION WASTE MANAGEMENT

A. Separate reusable and recyclable products from contaminated waste and debris in accordance with the General Contractor's Waste Management Plan. Place recyclable and reusable products in designated containers and protect from moisture and contamination.

END OF SECTION

SECTION 02 41 16 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings
2. Abandoning in-place below-grade construction.
3. Disconnecting, capping or sealing, and abandoning in-place site utilities.
4. Salvaging items for reuse by District.

B. Related Sections:
1. Section 024113 "Selective Site Demolition" for demolition of structures and site improvements.
2. Section 311000 "Clearing and Grubbing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.
3. Section 024119 “Selective Structure Demolition” for removal of wood material prior to structure demolition.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to District. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to District that may be uncovered during demolition remain the property of District.

1. Carefully salvage in a manner to prevent damage and promptly return to District.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified refrigerant recovery technician.

B. Proposed Protection Measures: Submit informational report, including Drawings, that indicates the measures proposed for protecting individuals and property. Indicate proposed locations and construction of barriers.

1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.

C. Schedule of Building Demolition Activities: Indicate the following:

1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services.
3. Shutoff and capping of utility services.

D. Inventory: Submit a list of items to be removed and salvaged and deliver to District prior to start of demolition.

E. Predemolition Photographs : Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before the Work begins.

F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be demolished.
2. Review structural load limitations of existing structures.
3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review and finalize protection requirements.
5. Review procedures for noise control and dust control.
6. Review procedures for protection of adjacent buildings.
7. Review items to be salvaged and returned to District.

1.7 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.

1. Provide not less than 2 weeks notice of activities that will affect operations of adjacent occupied buildings.
2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.

a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. District assumes no responsibility for buildings and structures to be demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by District as far as practical.
2. Before building demolition, District will remove the following items:

a. All items not attached to the structure within the building prior to demolition

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by District before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and District. Hazardous materials will be removed by District under a separate contract.

E. Hazardous Materials: Hazardous materials are present in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. District will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.

F. On-site storage or sale of removed items or materials is not permitted.

1.8 COORDINATION

A. Arrange demolition schedule so as not to interfere with the College District's on-site operations

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soils: Comply with requirements in Section 31 23 00 "Excavation and Fill."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Review Project Record Documents of existing construction provided by District. District does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

1. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.

1. District will arrange to shut off indicated utilities when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
4. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

C. Existing Utilities: See plumbing and electrical Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

D. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

E. Salvaged Items: Comply with the following:

1. Clean salvaged items of dirt and demolition debris.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to District.
4. Transport items to storage area designated by District on campus.
5. Protect items from damage during transport and storage.

3.3 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by District and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to District and authorities having jurisdiction.

a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated.

1. Protect adjacent buildings and facilities from damage due to demolition activities.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

E. For removal of wood material prior to structure demolition refer to Section 024119 “Selective Structure Demolition”

3.4 DEMOLITION, GENERAL

A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch during and for at least 4 hours after flame cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.

C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from District and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

D. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Below-Grade Construction: Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending 5 feet outside footprint indicated for new construction. Abandon below-grade construction outside this area.

1. Remove below-grade construction, including basements, foundation walls, and footings, to at least 12 inches below grade.

D. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, to at least 12 inches below grade.

E. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.

F. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within 5 feet outside footprint indicated for new construction. Abandon utilities outside this area.

1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Section 31 23 00 "Excavation and Fill."
2. Piping: Disconnect piping at unions, flanges, valves, or fittings.
3. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

G. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
2. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

3.6 SITE RESTORATION

A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.

B. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials to backfill requirements in Section 31 23 00 "Excavation and Fill."

C. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

3.9 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

1. Clean roadways of debris caused by debris transport.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Stripping and stockpiling rock.
6. Temporary erosion and sedimentation control.

B. Related Requirements:
1. Section 31 10 01 “Plant Protection”
2. Section 329000 “Planting” for soil testing and amending requirements (part of separate specification package).

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and **indicated according to requirements in Section 31 10 01 "Plant Protection."**

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

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

1.5 MATERIAL OWNERSHIP

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

1.6 ACTION SUBMITTALS

A. Soil Analysis Report:
   1. Provide soil analysis report for any top soil to be removed and stockpiled for reuse as planting soil. Soils analysis report to be performed by Wallace Laboratories LLC (310-615-0116), a certified soil analysis laboratory, and include agricultural suitablity analysis and recommendations for amending the soil. **Subsoil will not be approved as planting soil. Refer to** 329000 Planting for soil testing requirements.

1.7 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Use sufficiently detailed photographs or video recordings.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Topsoil stripping and stockpiling program.

C. Rock stockpiling program.

D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.8 QUALITY ASSURANCE

A. Retain this article if topsoil stripping and stockpiling or stockpiling rock is extensive or complex; revise to suit Project.

B. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

C. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.9 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
   1. Do not proceed with work on adjoining property until directed by Architect.

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where approved by owner's representative.

D. Utility Locator Service: Notify utility locator service. Call Before You Dig for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant- and tree-protection measures are in place.

F. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving" and 329000 "Planting"
   1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."

C. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in **Section 015639 "Temporary Tree and Plant Protection."**

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed **or abandoned in place**.
1. Arrange with utility companies to shut off indicated utilities.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Generally retain "Interrupting Existing Utilities" Paragraph below unless there are no existing utilities. Coordinate with requirements in Section 015000 "Temporary Facilities and Controls" for temporary utilities.

E. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Architect not less than **two** days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

Designer Note: Retain one of two paragraphs below. If retaining first, coordinate utility removals with requirements in Section 312000 "Earth Moving." If retaining second, coordinate with earthwork sections; with applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and with Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition."

F. Excavate for and remove underground utilities indicated to be removed.

G. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and in Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition."

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots larger than **2 inches** in diameter, obstructions, and debris to a depth of **18 inches** below exposed subgrade.
3. Use only hand methods or air spade for grubbing within protection zones.
4. Chip removed tree branches and **stockpile in areas approved by Architect**

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

Designer Note: Retain one option for topsoil depth in first paragraph below if depth is known. Delete options if Contractor will identify and determine depth of existing topsoil. Coordinate with topsoil definition retained in "Definitions" Article.

B. Strip topsoil to depth incountered **and no more than 12"** in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

Designer Note: Revise paragraph below if topsoil is to be removed from site. Insert here or indicate on Drawings the quantity of topsoil to be stockpiled or reused, if known.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
   1. Limit height of topsoil stockpiles to **72 inches** .
   2. Do not stockpile topsoil within protection zones.
   3. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.7 STOCKPILING ROCK

A. Revise this article according to the rock types, source locations, and sizes required to be stockpiled.

B. Remove from **construction area** naturally formed rocks that measure more than **1 foot** across in least dimension. Do not include excavated or crushed rock.
   1. Separate or wash off non-rock materials from rocks, including soil, clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile rock **away from edge of excavations** without intermixing with other materials. Cover to prevent windblown debris from accumulating among rocks.
   1. Limit height of rock stockpiles to **36 inches**.
   2. Do not stockpile rock within protection zones.
   3. Stockpile surplus bolders larger than 24" diameter to allow later use by the Owner.

3.8 SITE IMPROVEMENTS

A. Revise first paragraph below and insert specific items to suit Project.

B. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

C. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

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

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 31 10 01 - PLANT PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Preserve and protect existing trees, shrubs and other plant materials to remain, including protecting plants on adjoining properties during site preparation work and construction.

B. Provide tree and shrub pruning and removal in accordance with these Specifications if required by the Contract Documents.

C. Layout and review of utility and irrigation trenches that occur in the Tree Protection Root Zone.

D. Related requirements specified elsewhere include:
   1. Section 31 10 00, SITE CLEARING

1.2 QUALITY ASSURANCE

A. Reference Standards:
   1. Ordinances and Regulations: All local, municipal and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard than is required by the above mentioned codes and regulations, the provisions of these Specifications and Drawings shall take precedence. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.

   2. International Society of Arboriculture, Guide for Plant Appraisal, latest version.

B. Pre-installation Conference:
   1. Conduct conference at the project site. Contractor shall review and identify with the Owner's Representative the limits of Work and extent of plant materials and other improvements to be protected. Notify Owner's Representative of discrepancies between existing conditions and Drawings before proceeding with Work.
   2. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
      a. Tree-service firm's personnel, and equipment needed
      b. Arborist's responsibilities.
      c. Quality-control program.
      d. Coordination of Work and equipment movement with the locations of protection zones.
      e. Trenching by hand or with air spade within protection zones.

C. At the Owner's discretion, an Arborist may represent the Owner to review the work of the Contractor in regards to plant protection. Arborist Qualifications: ISA Certified Arborist licensed to work in the State of California.

D. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work

1.3 PROJECT CONDITIONS

A. Coordination: Coordinate this work with the work of other Sections to avoid delay and interference with other work.

B. Nuisances: Keep dirt, dust, noise and other objectionable nuisance to a minimum. Use temporary enclosures, coverings and sprinkling, and combinations thereof, as necessary to limit dust to lowest practicable level, except do not use water to the extent that it causes flooding or contaminated run-off.

C. Traffic: Conduct work to ensure minimum interference with vehicular and pedestrian traffic, and to permit unencumbered access to site and adjacent properties.
   1. Do not close or obstruct streets, sidewalks, alleys or other public passageways without permission from authorities having jurisdiction.
   2. If required by governing authorities, provide alternate routes around closed and obstructed traffic ways.

D. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Moving or parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

E. Do not direct vehicle or equipment exhaust toward protection zones.

F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

1.4 DEFINITIONS

A. Diameter breast height (DBH): diameter of a trunk as measured at a height 54 inches above the ground line.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and as identified on the drawings or otherwise by a certified arborist.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

E. Structural Root Zone: A circular area with the tree trunk at the center and a radius equal to 3 times the diameter of the tree trunk measured at breast height (4.5 feet above ground line). This zone, where most of the structural roots exist, is based upon tree failure research conducted by E.T. Smiley at the Bartlett Tree Research Laboratory. Any structural (buttress) root, which has been severed or is rotten within this zone, can no longer provide adequate support to the tree and must be considered missing.

F. Dripline: The area of the ground directly beneath the vertical projection (shadow) of the trees foliage canopy.

1.5 SUBMITTALS

A. Product Data: For each type of product.

B. Soil Analysis Report:
   1. Provide soil analysis report for any top soil to be removed and stockpiled for reuse as planting soil. Soils analysis report to be performed by Wallace Laboratories LLC (310-615-0116), a certified soil analysis laboratory, and include agricultural suitablity analysis and recommendations for amending the soil. Subsoil will not be approved as planting soil.

C. Samples: For each type of the following:
   1. Organic Mulch: 1-quart of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
   2. Planting Soil: 1-quart of soil; in sealed plastic bags; for soils to be used within the protection zones.

D. Shop Drawings:
   1. Include plans and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones. Indicate extent of trenching by hand or with air spade within protection zones.
   2. Protection-Zone Signage

E. Qualification Data: For arborist and tree service firm.

F. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

G. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

H. Survey of Existing Conditions: Provide to Owner a Survey of Existing Conditions. Record existing conditions, including underground utilities, etc. on As Built Drawings by use of field measurements and preconstruction photographs. Make permanent record of measurements, materials, and construction details required to make exact reproduction.

I. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
   1. Species and size of tree.
   2. Location on site plan. Include unique identifier for each.
   3. Reason for pruning.
   4. Description of pruning to be performed.
   5. Description of maintenance following pruning.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Approved planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
   1. Type: Wood and bark chips
   2. Size Range: ½'-2"
   3. Color: Natural Brown.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:
   1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with 1-5/8-inch- OD top and bottom rails; with tie wires, hog ring ties, and other accessories for a complete fence system.
      a. Height: 72 inches
   2. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:
   1. Text: "Tree Protection Zone. No Heavy Equipment."
   2. Lettering: 3-inch- high minimum, black characters on white background.

E. Tree Branch & Trunk Protection: for branches trunks exposed to, or at risk of exposure to impact by construction equipment.
   1. 2x lumber
   2. 1/2"-wide steel straps

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas in which work is to be performed. Report in writing to the Owner's Representative all prevailing conditions that will adversely affect the existing plant materials to remain. Do not proceed with work until a solution acceptable to the Owner's Representative has been arrived at.

B. Survey of Existing Conditions: Record existing conditions, including underground utilities, etc. by use of measured drawings and preconstruction photographs.

C. Starting work constitutes acceptance of the existing conditions and the Contractor shall then, at his expense, be responsible for correcting all unsatisfactory and defective work encountered.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain an/or relocated. Tie a 1-inch blue vinyl tape around each tree trunk at 54 inches above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.
   1. Apply 4-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.

D. Install and maintain temporary fencing and other required protective devices and exclude construction activities from tree/shrub zones except as supervised by the Arborist / Owner's Representative.

E. If tree/plant protection zones cannot be protected with fencing, a four inch layer of mulch with minimum 1.25 inch thick, metal strap linked plywood shielding shall be maintained in the tree/shrub zone where heavy equipment will be operated.

3.3 PROTECTION ZONES

A. Protect trees and shrubs against cutting, breaking, skinning and bruising of bark; permit no traffic or stockpiling within drip line.

B. Do not change earth surface within drip line of trees and shrubs except as approved in writing by the Owner.

C. Do not park vehicles or store materials, supplies and construction equipment within Tree Protection Zone.

D. Verify details of protection-zone fencing before retaining last option in "Protection-Zone Fencing" Paragraph below.

E. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
   1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
   2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect. Post may be steel driven type, or self-supporting type.
   3. Access Gates: Install where required; adjust to operate smoothly, easily, and quietly; free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

F. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 20 feet on protection-zone fencing, with signs each facing a different direction.

G. Where tree branches & trunks are exposed to, or at risk of exposure to impact by construction equipment, secure 2x lumber radially around tree branches and/or trunk to prevent damage. Secure lumber with steel strapping.

H. Maintain protection zones free of weeds and trash.

I. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
   1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
   2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION & TRENCHING

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as approved by certified arborist.
   1. Generally cutting of roots two inches or greater shall be avoided. Roots one inch and greater in diameter that must be cut shall be cut cleanly and obliquely with the cut surface facing down.
   2. Exposed and pruned roots shall be covered with light well-drained soil backfill and mulch over. The area shall be kept moist.Retain applicable subparagraphs below.
   3. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
   4. Cut Ends: Do not paint cut root ends
   5. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
   6. Cover exposed roots with burlap and water regularly.
   7. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots 6 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 AIR SPADING:

A. Air spading, or hand removal of soil or tunneling is required for excavation in the Tree Protection Zone of any trees for the installation of infrastructure where roots 2 inches in diameter and larger are encountered. The “critical root zone” is defined as any area around a tree in which a two inch diameter root is encountered. The Arborist / Owner’s Representative shall define the critical root zone and the Contractor shall excavate using a pneumatic excavator (AIR-SPADE or equivalent) as follows:

B. Trenching for utility lines or other infrastructure may be done mechanically outside the Tree Protection Zone. As the equipment operator approaches the canopy radius, or for certain species up to 1.5 times the canopy radius out from the base of the tree (Oaks, Poplars, Redwoods, etc.) the operator shall be assisted by a spotter who shall inspect the excavation for roots. If a root of two inches diameter is encountered the spotter shall halt mechanical excavation and pneumatic excavation shall proceed. If no other two inch or greater diameter root is encountered in an excavation of two feet forward and two feet deep, the single two inch root may be cleanly cut proximal to (on the tree side of) any fracture or torn bark. Mechanical excavation may continue until a two inch diameter root is encountered, and the pneumatic excavation, exploration is then repeated.

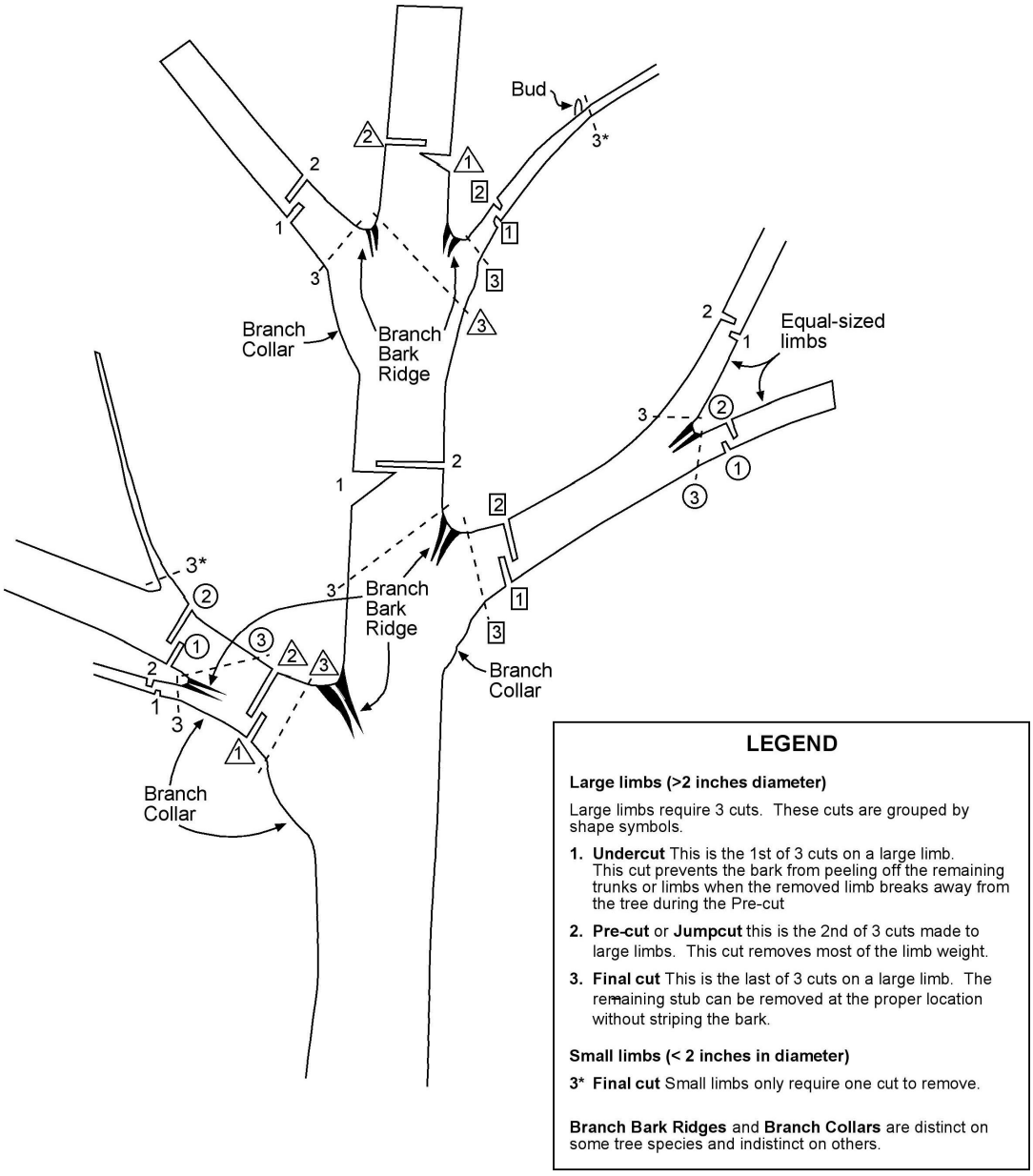
C. The Contractor shall control dust and the spread of soils excavated. The air-spade operator shall moisten the soil to field capacity and to a minimum probe depth of 2.5 feet with a watering needle (hydro-spear) 48 hours prior to pneumatic excavation. The spread of excavated soil shall be contained to the area adjacent to the trench path with upright plywood sheeting.

D. These specifications shall not be considered operating instructions or a requirement to use a specific pneumatic excavation product. It is the responsibility of the Contractor to read and understand the pneumatic excavator operation instructions and safety procedures (including the proper and safe use of air compressor, hoses, excavation tools, etc.) prior to operations.

3.7 TREE PRUNING

A. Obtain specific instruction from Arborist / Owner's Representative for pruning of trees, shrubs, roots or disturbance of soil within spread of tree branches. The Contractor shall utilize protection measures as outlined by Arborist / Owner's Representative, which may include directional drilling, or hand clearing to expose the roots.

B. Provide periodic watering for all planting within Contract limit and any adjacent areas affected by the work. Maintain moisture to a minimum 6" depth, minimum.



C. Using an approved pruning saw, provide selective tree limb pruning as accepted by the Landscape Architect if branches interfere with new construction. Limb diameter shall be limited to 5" diameter and shall be pruned just outside the branch collar in accordance with American National Standards Institute, (ANSI 300) and International Society of Arboriculture, (ISA) standards.

D. Approved branches to be shortened must be cut just above a fork with another living branch which is plus or minus 1/2 the diameter of the removed branch as shown in the pruning figure herein. Branches to be removed which exceed 2" in diameter shall be severed with a 3-step cut to prevent bark peeling. Final cuts must not injure the branch collar or branch bark ridge of the remaining branches and trunk.

E. Prune branches that are affected by temporary and permanent construction.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1)

F. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.

G. Cut branches with sharp pruning instruments; do not break or chop.

H. Do not paint or apply sealants to wounds.

I. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

J. Chip removed branches and stockpile in areas approved by Architect

3.8 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 6inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.9 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.10 TREE & PLANT REMOVAL & REPLACEMENT

A. Field Verification: Before removing non-designated trees, shrubs, stumps, bushes, vines, rubbish, undergrowth and deadwood as shown on the Drawings and as specified, obtain verification from Owner's Representative.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.
1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

C. Backfill and compact areas excavated and open pits and holes resulting from removal operations. Comply with requirements herein and as specified in Earthwork, Section 02300 for backfill materials, compaction and installation methods.

D. Remove all stumps and roots in their entirety. Tree trunks shall be removed minimum depth of 2 1/2 feet below existing grade or finish grade, whichever is deeper. Stump grinding is an acceptable method of removal of roots and stumps of trees and shrubs; however, the chip contaminated soil shall be replace with approved clean planting soil in planting areas and with approved clean fill soil in all other areas.

E. Backfill and compact voids excavated and open pits and holes resulting from removal operations. Comply with Earthwork Specification for backfill materials, compaction and installation methods. Unless required otherwise, in planting areas backfill holes with clean approved planting soil compacted to 90% relative compaction to a minus 12 inches below finish grade and 85% relative compaction for the top 12 inches, except as required elsewhere to a greater degree by Civil or Structural Engineer. In non-planting areas backfill holes with approved fill soil compacted to 95% relative compaction.

F. Remove and replace trees indicated to remain that are more than 25% dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

A. Plant Replacement: Contractor shall replace trees cut or severely damaged due to the Contractor's work as follows:
   1. An ISA Certified Arborist may be retained by the Owner to determine the condition of trees in question as to their ability to survive in a healthy condition and in their original shape, or a pruned aesthetically pleasing shape acceptable to the Owner. Comply with recommendations to rehabilitate as recommended by the Arborist, or to replace in accordance with the requirements below.
   2. Trees size shall be determined by Diameter at Brest Height (DBH). Replacement of trees and shrubs shall also include providing acceptable plant installation, automatic irrigation system and a minimum maintenance period of 120 days. If plant(s) is not acceptably maintained and is not healthy and thriving at the end of the 120 day maintenance period, the Contractor shall continue the maintenance work until such time that healthy tree(s) and/or shrub(s) is achieved.
   3. Replace any damaged planting in kind using "specimen" plants as follows and at no cost to Owner:
      a. Trees up to 3" DBH: Replace with 36" box size.
      b. Trees 3" to 6" DBH: Replace with 72" box size.
      c. Trees 6" to 12" DBH: Replace with 84" box size.
      d. Trees 12" DBH and larger: Tree value shall be determined by Arborist using Council of Tree and Landscape Appraisers (CTLA) method. Replace damaged tree with largest available nursery boxed tree and cash difference between value of damaged tree and nursery stock replacement cost.
      e. Shrubs: Replace with 15-gallon can size.

   4. Plant and maintain new trees as specified

B. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 3-inch uniform thickness to remain.

C. Soil Aeration: Where directed by arborist, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches (300 mm) deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.11 CLEANUP AND DISPOSAL, per Section 01 70 00.

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

B. Clean excess soil may be distributed on site as accepted by Owner's Representative, if it does not adversely affect specified finish grades or percolation of water into planting soil.

C. Upon completion of work under this Section, remove all tools, equipment and temporary protections, enclosures and structures.

END OF SECTION

SECTION 31 11 00 - CLEARING & GRUBBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes all work necessary to successfully complete demolition, clearing & grubbing to prepare site for the phasing and new construction, including the following:

1. Protecting existing trees and vegetation to remain.
2. Trimming tree limbs and roots.
3. Removing trees as designated.
4. Clearing vegetation, debris, trash and other materials within limits indicated.
5. Grubbing of vegetation within limits indicated.
6. Stripping of topsoil within limits indicated.
7. Removing above-grade site improvements within limits indicated.
8. Disconnecting, capping or sealing, and abandoning site utilities in place.
9. Disconnecting, capping or sealing, and removing site utilities.
10. Disposing of objectionable material off site.
11. Clean line saw cutting of existing asphalt pavement, concrete sidewalks, concrete curb/gutter, etc., as specified herein.
12. Clearing and site preparation. Including removal of site vegetation and other root system.
13. Protection from injury or defacement of trees and other vegetation and objects to be preserved.
    a. Removal of surface debris and deleterious materials such as rubbish.
    b. Removal and stockpile of materials for landscaping use at approved location.
    c. Disposal of unwanted materials off site.

1.2 RELATED DOCUMENTS

A. Caltrans Standard Specifications, Section 16, Clearing and Grubbing.

1.3 REGULATORY REQUIREMENTS

A. No burning shall be allowed.

B. Comply with the following California Code of Regulations:

1. Title 8: CAL/OSHA, Chapter, Subchapter 4 – Construction Safety Orders
2. Title 24: Part 2, California Building Code, Chapter 33, Protection of Pedestrian during Construction or Demolition.
3. Bay Area Air Quality Management District

4. San Pablo Water District, Standard Specification and Details.
5. Contra Costa County Public Works Department, Design Guidelines.

1.4 DEFINITIONS

A. ANSI: American National Standards Institute.

B. CAL-OSHA: California Occupational Safety and Health Administration.

C. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2-inches in diameter; and free of weeds, roots, and other deleterious materials.

D. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.5 MATERIAL DISTRICTSHIP

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

1.6 SUBMITTALS

A. Submittal procedure shall be as outlined in Division 1 – General Requirements.

1.7 QUALITY ASSURANCE

A. Do not remove or prune trees without first securing a permit from the appropriate agency.

B. Prune to the standards of the International Society of Arborists and to ANSI 300.

1.8 PROJECT CONDITIONS

A. Except for materials indicated to be stockpiled or to remain the District's property, cleared materials are the Contractor's property. Remove cleared materials from site and dispose of in lawful manner.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store where indicated on plans or where designated by the District. Avoid damaging materials designated for salvage.

C. Unidentified Materials;

1. If unidentified materials are discovered, including hazardous materials that will require additional removal other than is required by the Contract Documents, immediately report the discovery to the District.

2. If necessary, the District will arrange for any testing or analysis of the discovered materials and will provide instructions regarding the removal and disposal of the unidentified materials.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Backfill excavations resulting from demolition operations with on-site or import materials conforming to structural backfill defined in Section 31 23 33 Utility Trenching and Backfill.

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain during construction.

1. Restore damaged improvements to their original condition, as acceptable to the Engineer and/or District. Prior to restoration the contractor shall notify Engineer and /or District of the damaged improvements.

3.2 TREE PROTECTION

A. Erect and maintain temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.

B. Do not store construction materials, debris, or excavated material within drip line of remaining trees.

C. Do not permit vehicles or equipment within drip line of remaining trees.

D. Do not excavate within drip line of remaining trees, unless otherwise indicated.

E. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation edge as possible.

1. Cover exposed roots with burlap and water regularly.

2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3. Coat cut faces of roots more than 1-1/2-inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.

4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

3.3 TREE PRUNING

A. Prune trees to balance the crown, and eliminate hazards. Perform main work to reduce sail effect through thinning, reducing end weights, shortening long heavy limbs, removing deadwood, weak limbs and sucker growth. Prune limbs back to an appropriate lateral branch.

B. Make final cuts at the outer edge of the branch collar in accordance with the arborist's recommendations.

C. Perform pruning work in a safe and proper manner, adhering to CAL-OSHA and ANSI Standards.

3.4 ROOT PRUNING

A. Do not cut tree roots greater than 3-inch in diameter and less than 12-inches below ground level without approval of the District.

B. Cut tree roots cleanly, as far from the trunk as possible, and not underneath any area where walkways are to be constructed. Root pruning shall be to a depth of 18-inches.

C. Tree root prune using a Vermeer root-cutting machine. Obtain the District's approval before using alternate equipment or techniques.

D. Complete tree root pruning prior to any excavation adjacent to the tree.

E. Do not expose tree roots to drying out. Cover root ends with soil or burlap and keep moist until the final backfill is completed.

3.5 TREE REMOVAL

A. Remove trees designated for removal prior to the construction of new improvements.

B. Perform tree removal work in a safe and proper manner, adhering to CAL-OSHA and ANSI Standards.

C. Remove or grind stumps to a minimum of 18-inches below finish subgrade. Remove surface roots to this depth within 24-inches of the tree trunk. Trees, plants and roots that are below proposed building footprint or slabs on grade shall be removed in its entirety.

3.6 RESTORATION

A. Restore damaged improvements to their original condition, as acceptable to the District.

B. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, as directed by the District.

1. Employ a qualified arborist, licensed in jurisdiction where the Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.

2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the District. Clear and grub existing areas only to extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations.

3.7 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or abandoned.

B. Arrange to shut off indicated utilities with utility companies or verify that utilities have been shut off.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by District or others unless authorized in writing by the District, and then only after arranging to provide temporary utility services according to requirements indicated.

D. Coordinate utility interruptions with utility company affected.

E. Do not proceed with utility interruptions without the permission of the District and utility company affected. Notify District and utility company affected 14 working days prior to utility interruptions.

F. Excavate and remove underground utilities that are indicated to be removed.

G. Securely close ends of abandoned piping with tight fitting plug or wall of concrete minimum 6-inches thick. All abandoned piping shall be filled with a cementious material, such as controlled low strength material.

3.8 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

B. Remove trash, debris, logs, concrete, masonry and other waste materials.

C. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

D. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18-inches below subgrade. Trees, plants and roots that are below proposed building footprint or slabs on grade shall be removed in its entirety.

E. Use only hand methods for grubbing within drip line of remaining trees.

3.9 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Remove trash, debris, weeds, roots, and other waste materials.

D. Stockpile topsoil materials designated to remain on site at a location approved by the District at a location away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust. Refer to the SWPPP as required.

E. Do not stockpile topsoil within drip line of remaining trees.

3.10 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, and gutters, as indicated. Where concrete slabs, curb, gutter and asphalt pavements are designated to be removed, remove bases and subbase to surface of underlying, undisturbed soil.

C. Unless the existing full-depth joints coincide with line of pavement demolition, neatly saw-cut to full depth the length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

D. Remove driveways, curbs, gutters and sidewalks by saw cutting to full depth. If saw cut falls within 30-inches of a construction joint, expansions joint, score mark or edge, remove material to joint, mark or edge

3.11 BACKFILL

A. Place and compact material in excavations and depressions remaining after site clearing in conformance with Section 31 23 33.

3.12 DISPOSAL

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

3.13 TEMPORARY FACILITIES

A. Provide the following temporary facilities to facilitate the demolition operations, as necessary.

1. Temp Traffic Controls
2. Protection of Persons and Property
3. Protection of Utilities
4. Noise and Dust Abatement.
5. Clear and restore area to their original condition.
6. Protect survey markers and monuments, existing improvements, and adjacent structures from removal and damage.

3.14 CONSTRUCTION WASTE MANAGEMENT

A. To the greatest extent possible, separate reusable and recyclable products from contaminated waste and debris in accordance with the General Contractor's Waste Management Plan. Place recyclable and reusable products in designated containers and protect from moisture and contamination.

END OF SECTION

SECTION 31 23 00 - EXCAVATION AND FILL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section describes the requirements for earthwork operation, as shown on the Drawings and specified:

1. Excavation and/or embankment from existing ground to subgrade, including soil sterilant, for parking areas, walks, paths, and any other site improvements called for on the Plans.

a. Aggregate base.

b. Lime stabilization.

c. Dispose off-site waste, excess or unsatisfactory material.

1.2 RELATED DOCUMENTS

A. Geotechnical Report: "Geotechnical Investigation Report Campus Center Contra Costa College San Pablo, California."

1. Section 17, Watering.
2. Section 19, Earthwork.
3. Section 24, Lime Stabilization.
4. Section 26, Aggregate Bases.

1.3 RELATED SECTIONS

A. Section 31 11 00 – Clearing and Grubbing

1.4 REGULATORY REQUIREMENTS

A. State of California, Department of Transportation, Standard Specifications 2010 - Section 19

B. Contra Costa County, Standard Specification and Details.

C. ASTM

1. D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
2. D1557-70 for testing in compaction.
3. D 1586, Method for Penetration Tests and Split-Barrel Sampling of Soils.
4. D 2487, Classification of Soils for Engineering Purposes.
5. D 3740, Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

6. D 4318. Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
7. E 329, Specification for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
8. E 548, Guide for General Criteria Used for Evaluating Laboratory Competence.

D. California Building Code, Title 24, Part 2 – California Code of Regulations, Chapter 18 and 18A, Soils and Foundations.

E. CAL/OSHA, Title 8.

1.5 DEFINITIONS

A. Borrow: Approved soil material imported from off-site for use as Structural Fill or Backfill.

B. Excavation: Removal of material encountered above subgrade elevations.

1. Authorized Over-Excavation: Excavation below subgrade elevations or beyond indicated horizontal dimensions as shown on plans or authorized by the District's Representative.
2. Unauthorized Over-Excavation: Excavation below subgrade elevations or beyond indicated horizontal dimensions without authorization by the District's Representative. Unauthorized excavation shall be without additional compensation.

C. Structural Backfill: Soil materials approved by the District's Representative and used to fill excavations resulting from removal of existing below grade facilities, including trees.

D. Structural Fill: Soil materials approved by the District's Representative and used to raise existing grades.

E. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material ¾-cubic yards or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D 1586, exceeds a standard penetration resistance of 100 blows/2-inches.

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

G. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base or topsoil materials.

H. Unsuitable Material: Any soil material that is not suitable for a specific use on the Project. The District's Representative will determine if a soil material is unsuitable.

I. Utilities: onsite underground pipes, conduits, ducts and cables.

1.6 SUBMITTALS

A. Submittal procedure shall be as outlined in Division 1 – General Requirements.

B. Submit material certificates signed by the material producer and the Contractor, certifying that that each material item complies with, or exceeds the specified requirements.

1.7 QUALITY ASSURANCE

A. Conform all work and materials to the recommendations or requirements of the District's Representative.

B. Conform all work to the appropriate portion(s) of Caltrans Standard Specifications, Section 17 and 19, and the appropriate sections of the California Building Code.

C. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM D 1557.

D. Excavate and backfill existing areas only to extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations. Backfill as necessary to achieve rough grade elevations as indicated per plan.

E. Perform excavation, filling, compaction and related earthwork under the observation of the District's Representative. Materials placed without approval of the District's Representative will be presumed to be defective and, at the discretion of the District's Representative, shall be removed and replaced at no cost to the District. Notify the District's Representative at least 24-hours prior to commencement of earthwork and at least 48 hours prior to testing.

F. The District's Representative will perform observations and tests required to enable him to form an opinion of the acceptability of the Project earthwork. Correct earthwork that, in the opinion of the District's Representative, does not meet the requirements of these Technical Specifications.

G. Upon completion of the construction work, certify that all compacted fills and foundations are in place at the correct locations, and have been constructed in accordance with sound construction practice. In addition, certify that the materials used are of the types, quality and quantity required by these Technical Specifications. The Contractor shall be responsible for the stability of all fills and backfills constructed by his forces and shall replace portions that in the opinion of the District's Representative have been displaced or are otherwise unsatisfactory due to the Contractor's operations.

H. Do not mix or place cement treated base when the temperature is below is below 36 degrees F or when the ground is frozen.

I. Finish surface of material to be stabilized prior to lime treatment shall be as specified in Section 24-1.04 of Caltrans Standard Specifications and as required by these Technical Specifications.

J. Finish surface of the stabilized material after lime treatment shall be as specified in Section 24-1.08 of Caltrans Standard Specifications and as required by these Technical Specifications.

K. Identify and protect existing utilities.

L. Finish soil grade tolerance at completion of grading:

1. Paved areas: +0.05

2. Other areas: ±0.10 feet.

1.8 PROJECT CONDITIONS

A. Promptly notify the District and the District's Representative of surface or subsurface conditions

differing from those disclosed in conformance with Division 1 General Requirements.

B. Protect open excavations, trenches, and the like with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.

C. Prevent erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

D. Temporarily stockpile fill material in an orderly and safe manner and in a location approved by the District.

E. Provide dust and noise control in conformance with Division 1 General Requirements.

F. Environmental Requirements: When unfavorable weather conditions necessitate interrupting earthwork operation, areas shall be prepared by compaction of surface and grading to avoid collection of water. Provide adequate temporary drainage to prevent erosion. After interruption, compaction specified in last layer shall be re-established before resuming work.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from on-site excavations.

B. Obtain approval of on-site soil materials and borrow materials to be used for structural fill or structural backfill from the District's Representative.

C. On-Site Structural Fill and Structural Backfill: Soil or soil-rock mixture from on site excavations, free from organic matter or other deleterious substances. On-site structural fill and backfill shall not contain rocks or rock fragments over 3 inches in greatest dimension.

D. Imported Structural Fill and Structural Backfill: Conform to the requirements of on-site structural fill. Material shall also be a non-expansive and predominantly granular soil or soil-rock mixture with plasticity index of 8 or less, has a liquid limit less than 25, and an R-Value of 25 or greater.

2.2 SOIL STERILANT

A. Commercial chemical for weed control, registered by EPA. Provide granular, liquid or wet-able powder form.

2.3 AGGREGATE BASE

A. Material: Caltrans Standard Specification Section 26.

1. Class 2, 1-1/2-inch Maximum: Section 26-1.02A.
2. Class 2, 3/4-inch Maximum: Section 26-1.02A.
3. Class 3: Section 26-1.02B.

2.4 LIME STABILIZATION

A. Lime Treatment Material: Conform to Section 24-1.02 and 24-1.03 of Caltrans Standard Specifications and the Project Geotechnical Report.

PART 3 - EXECUTION

3.1 GENERAL

A. Conform to Section 19, Earthwork, Caltrans Standard Specifications as modified by the Contract Documents.

B. Placement and compaction of material by flooding, ponding, or jetting will not be permitted.

C. The use of explosives will not be permitted.

3.2 CONTROL OF WATER AND DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding the site and surrounding area. Provide dewatering equipment necessary to drain and keep excavations and site free from water.

B. Dewater during backfilling operation so that groundwater is maintained a least two feet below level of compaction effort.

C. Obtain the District's Representative's approval for proposed control of water and dewatering methods.

D. Protect subgrades from softening, undermining, washout and damage by rain or water accumulation.

E. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations.

F. Maintain dewatering system in place until dewatering is no longer required.

3.3 WET WEATHER CONDITIONS

A. Do not prepare subgrade, place or compact soil materials if above optimum moisture content.

B. If the District's Representative allows work to continue during wet weather conditions, conform to supplemental recommendations provided by the District's Representative.

3.4 EXCAVATION

A. Excavate earth and rock to lines and grades shown on drawings as prepared by a licensed professional engineer and to the neat dimensions indicated on the Plans, required herein or as required to satisfactorily compact backfill.

B. Remove and dispose of large rocks, pieces of concrete and other obstructions encountered during excavation.

C. Where forming is required, excavate only as much material as necessary to permit placing and removing forms.

D. Provide supports, shoring and sheet piles required to support the sides of excavations or for protection of adjacent existing improvements.

3.5 REMOVAL OF EXISTING FILLS AND UNSUITABLE MATERIAL

A. Over-excavate areas of existing fills and other unsuitable material encountered during mass grading as directed by the District's Representative.

B. Conform with Division 1 General Requirements.

3.6 GRADING

A. Uniformly grade the Project to meet existing conditions.

B. Finish ditches, gutters and swales to the sections, lines and grades indicated and to permit proper surface drainage.

C. Round tops and bottoms of slopes as indicated or to blend with existing contours.

3.7 SUBGRADE PREPARATION

A. Prepare subgrades under paved areas, curbs, gutters, walks, structures, other surface facilities and areas to receive structural fill. At least 6 inches of select material shall be placed beneath exterior flatwork and extend at least two feet beyond the slab edges.

B. Prepare subgrades for paved areas, curbs and gutters by plowing or scarifying surface at least 9 inches in one lift below final subgrade elevations and 1-foot beyond edge of pavement unless specified otherwise by the District's Representative. Uniformly moisture condition to obtain optimum moisture contents. Break clods and condition surface by harrowing or dry rolling. Remove boulders, hard ribs and solid rock. Prepare earth uniform for full depth and width of subgrade.

1. Surface soil that has a moisture content of less than 22 percent (average, approximate plastic limit of the soil) should be excavated, moisture-conditioned to at least three percent above optimum moisture content, and compacted to between 88 and 93 percent relative compaction to reduce its expansion potential; maximum depth of required excavation for moisture conditioning is about two feet.

C. Protect utilities from damage during compaction of subgrades and until placement of final pavements or other surface facilities.

D. Obtain the District's Representative's approval of subgrades prior to placing pavement.

E. Subgrade preparation will not be required in areas where lime treatment is used.

3.8 PLACEMENT OF STRUCTURAL FILL

A. Obtain the District's Representative's approval of surface to receive structural fill prior to placement of structural fill material.

B. Place structural fill on prepared subgrade.

C. Spread structural fill material in uniform lifts not more than 8-inches in un-compacted thickness and compact.

D. Place structural fill material to suitable elevations above grade to provide for anticipated settlement and shrinkage.

E. Overbuild fill slopes, as required by the District's Representative, to obtain required compaction. Remove excess material to lines and grades indicated.

F. Do not drop fill on structures. Do not backfill around, against or upon concrete or masonry structures until structure has attained sufficient strength to withstand loads imposed and the horizontal structural system had been installed.

3.9 TEMPORARY AND PERMANENT SLOPES

A. Temporary slopes less than 10 feet high should be inclined no steeper than 1.5:1 (horizontal to vertical).

B. Shallow, permanent, cut and fill slopes shall be constructed no steeper than 2:1 (horizontal to vertical).

3.10 AGGREGATE BASE

A. Watering, Spreading and Compacting: Section 26-1.035, 26-1.04 and 26-1.05 of Caltrans Standard Specifications.

3.11 LIME STABILIZATION

A. Performing the stabilization shall conform to Section 24-1.05, through 24-1.09 of Caltrans Standard Specifications and the following:

1. Add lime in the amount specified by the District's Representative.
2. Lime treat subgrade soils from back of curb to back of curb to a depth specified by the District's Representative.
3. Mix in two mixing periods, both with the tines lowered to the same depth. Both mixing periods shall be monitored and verified by the District's Representative. The second mixing shall occur at about 24 hours after the initial mixing.
4. Compact and grade the lime mixed subgrade immediately after the second mixing.
5. Compact the lime treated subgrade to 93 percent as determined by ASTM D1557.
6. After application of the curing seal, do not allow traffic on the lime treated material for a period of 7 days in lieu of the 3 days specified in Section 24-1.03 of Caltrans Standard Specifications.

7. Proof-roll the stabilized subgrade after compacting to confirm that a non-yielding surface has been achieved. Yielding areas, if any, shall be mitigated. Mitigation could consist of over-excavation, utilization of stabilization fabric, or chemical treatment. Each case shall be addressed individually in the field by the District's Representative.

3.12 COMPACTION AND TESTING

A. Do not compact by ponding, flooding or jetting.

B. Compact soils at optimum water content. Aerate material if it is too wet. Add water to material if it is too dry. Thoroughly mix lifts before compaction to ensure uniform moisture distribution.

C. Perform compaction using rollers, pneumatic or vibratory compactors or other equipment and mechanical methods approved by the District's Representative.

D. Compaction requirements:

1. Compact structural fills less than 5-feet thick to 90 percent compaction.
2. Compact structural fill 5-feet thick or greater to 95 percent compaction.
3. Compact the upper 6 inches of subgrade soils beneath pavements, curbs and gutters to 95 percent compaction. Extend compaction 2-feet beyond pavement edges unless specified otherwise by the District's Representative.
4. Compact the upper 6-inches of subgrade soils under walks, structures and areas to receive structural fill to 90 percent compaction.

3.13 SOIL STERILIZATION

A. Apply soil sterilant to areas indicated, such as beneath asphalt concrete pavement, brick pavement, concreter pavement and at grade concrete slabs, including sidewalks, curbs and gutters. Also where indicated apply soil sterilant below expansion and control joints and at areas where pipes, ducts or other features penetrate slabs.

B. Apply soil sterilant uniformly and at the rates recommended by the manufacturer.

C. Apply soil sterilant to prepared subgrade, or after installation of aggregate base as recommended by the manufacturer.

3.14 DISPOSAL

A. Lawfully dispose of all unsuitable and excess or surplus material off-site at no cost to the District.

END OF SECTION

SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section describes the requirements for construction dewatering.

1.2 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water to permit excavation and construction to proceed on dry, stable subgrades.

1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of - excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

1.3 RELATED SECTIONS:

A. Section 31 23 00 Excavation and Fill.

1.4 REGULATORY REQUIREMENTS

A. Final “Geotechnical Study and Geologic Hazards evaluation Ohlone College Academic Core Buildings, Fremont, California” prepared by Frugo Consultants, INC., 1000 Broadway, Suite 400, Oakland, California 94607, Project No. 04.72130054, dated October 2013, supplemental recommendations and amendments.

B. California Regional Water Quality Control Board

1.5 SUBMITTALS

A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.

B. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.

C. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Qualification Data: For qualified Installer.

E. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work as determined by the authorities having jurisdiction.

B. Regulatory Requirements: Comply with governing EPA and California Regional Water Quality Control Board notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Review methods and procedures related to dewatering with the College including, but not limited to, the following:

1. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
2. Geotechnical report.
3. Proposed site clearing and excavations.
4. Existing utilities and subsurface conditions.
5. Coordination for interruption, shutoff, capping, and continuation of utility services.

6. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
7. Testing and monitoring of dewatering system.

1.7 PROJECT CONDITIONS

A. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer.

B. Make additional test borings and conduct other exploratory operations necessary for dewatering.

C. The geotechnical report is referenced elsewhere in the Project Manual.

D. Survey Work: Engage a land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

E. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

F. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by the College or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify the College no fewer than fourteen days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without the College’s written permission.

PART 2 - PRODUCTS:

2.1 Not Applicable

PART 3 - EXECUTION

3.1 PREPARATION:

A. Protect structures, utilities sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Provide temporary grading to facilitate dewatering and control of surface water.

C. Monitor dewatering system continuously and report in a weekly log of dewatering performance.

D. Promptly repair damages to adjacent facilities caused by dewatering to the satisfaction of the Architect and/or College.

E. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 312500 “Erosion and Sedimentation Control” during dewatering operations.

F. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

3.2 INSTALLATION:

A. Install dewatering system to ensure minimum interference with roads, streets, walks and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.

2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 48 inches (600 mm) below surface of excavation.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

F. Contractor shall make provisions for emergency standby equipment available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering

system, restore damaged structures and foundation soils at no additional expense to the College.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations. Submit proposed repair plan to Architect for review and approval.

H. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

3.3 FIELD QUALITY CONTROL

A. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

B. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

3.4 CONSTRUCTION WASTE MANAGEMENT

A. General: Comply with General Contractor's Waste Management Plan and Section 01 74 19 in the Division 1- General Requirements.[4]

B. To the greatest extent possible, separate reusable and recyclable products from contaminated waste and debris in accordance with the General Contractor's Waste Management Plan. Place recyclable and reusable products in designated containers and protect from moisture and contamination.[5]

END OF SECTION

SECTION 31 23 33 - UTILITY TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavation, bedding, and backfill of underground storm drain, sanitary sewer and water piping and associated structures.

B. The CONTRACTOR shall provide all materials, equipment, and labor necessary to perform and complete all utility earthwork as shown on the Drawings and as specified herein.

C. The work of this Section includes all utility earthwork required for construction of the project. Such earthwork shall include, but may not necessarily be limited to, the loosening, removing, loading, transporting, depositing, and compacting in its final location of all materials wet and dry, as required for the purposes of completing the work, which shall include, but not necessarily be limited to, the furnishing, placing, and removing of sheeting, shoring and bracing necessary to safely support the sides of all excavations; all pumping, ditching, draining and other required measures for the removal or exclusion of water from the excavation; the supporting of structures above and below the ground; all backfilling around structures and all backfilling of trenches and pits; the disposal of excess excavated materials; borrow of materials to make up deficiencies for fills; and all other incidental earthwork.

D. Hazardous materials shall be handled in accordance with all regulatory agency requirements. Asbestos cement pipe (ACP) exists within the project area and replacement of existing ACP is anticipated but shall be abandoned in place unless otherwise noted in the plans. The contractor shall make every attempt to protect all asbestos containing items during the execution of this contract. However, there will be instances where ACP or asbestos containing material will need to be removed, handled, cut, disturbed, or disposed of and the contractor shall comply with all local, state and federal regulations regarding construction activities near asbestos containing materials.

1.2 SECTION EXCLUDES

A. Drainage fill material and placement around subdrains.
B. Power, telecommunications, and low voltage scope of work.

1.3 RELATED DOCUMENTS

A. Geotechnical Report: “Geotechnical Investigation Report Campus Center Contra Costa College San Pablo, California.”

A. ASTM:
1. C 33, Specification for Concrete Aggregates.
2. C 150, Specification for Portland Cement.
3. C 260, Specification for Air-Entraining Admixtures for Concrete.
4. C 618, Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
5. D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified

Effort.
6. D 2321, Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
7. D 2487, Classification of Soils for Engineering Purposes.
8. D 3740, Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
9. E 329, Specification for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
10. E 548, Guide for General Criteria Used for Evaluating Laboratory Competence.

B. California Building Code, California Code of Regulations, Title 24, Part 2 - Chapter 18, Foundations, and Retaining Walls, and Chapter 33, Site Work, Demolition and Construction.

C. Caltrans Standard Specifications:
1. Section 19, Earthwork.
2. Section 26, Aggregate Bases.

D. CAL/OSHA, Title 8.

1.4 RELATED SECTIONS

A. Section 31 11 00, Clearing and Grubbing.

B. Section 33 31 00, Sanitary Sewer System.

C. Section 33 41 00, Storm Drain System.

D. Section 33 46 00 Subdrainage.

1.5 DEFINITIONS

A. AC: Asphalt Concrete.

B. ASTM: American Society for Testing and Materials.

C. Bedding: Material from bottom of trench to bottom of pipe.

D. CDF: Controlled Density Fill.

E. DIP: Ductile Iron Pipe.

F. Initial Backfill: Material from bottom of pipe to 12-inches above top of pipe.

G. PCC: Portland Cement Concrete.

H. RCP: Reinforced Concrete Pipe.

I. Springline of Pipe: Imaginary line on surface of pipe at a vertical distance of ½ the outside diameter measured from the top or bottom of the pipe.

J. Subsequent Backfill: Material from 12-inches above top of pipe to subgrade of surface material or subgrade of surface facility or to finish grade.

K. Trench Excavation: Removal of material encountered above subgrade elevations and within

horizontal trench dimensions.

1. Authorized Trench Over-Excavation: Excavation below trench subgrade elevations or beyond indicated horizontal trench dimensions as shown on plans or authorized by the Geotechnical Consultant.
2. Unauthorized Trench Over-Excavation: Excavation below trench subgrade elevations or beyond indicated horizontal trench dimensions without authorization by the Geotechnical Consultant. Unauthorized excavation shall be without additional compensation.

L. Utility Structures:
1. Storm Drain Manholes, vaults, etc.
2. Sanitary sewer manholes, vaults, etc.
3. Water vaults, etc.

1.6 SUBMITTALS

A. Submittal procedure shall be as outlined in Division 1 – General Requirements

B. Product Data:
1. Grading and quality characteristics showing compliance with requirements for the Work.
2. Certify that material meets requirements of the Project.
3. Aggregate for Structural Soil Mix.

C. Samples:
1. If required by the Geotechnical Consultant, provide 40-pound samples of all imported trench bedding and backfill material sealed in airtight containers, tagged with source locations and suppliers of each proposed material. Do not import materials to Project without written approval of the Geotechnical Consultant.
2. Provide materials from same source throughout work. Change of source requires approval of the Geotechnical Consultant and the District's Representative's.

D. Material Test Reports: Provide, from a qualified testing agency, the following test results showing compliance with the project requirements:
1. Classification according to ASTM D 2487 of each imported trench bedding and backfill material.
2. Laboratory compaction curve in conformance with ASTM D 1557 for each imported trench bedding and backfill material
3. Structural Soil Mix Testing: Provide a two-gallon representative sample to laboratories for an analysis of the structural soil mix indicating the following:
   a. Particle size analysis, including the following gradients of mineral content (USDA Designated Size in mm):
      (i) 3" (76mm)
      (ii) 2 ½" – 3" (63-76mm)
      (iii) 2" – 2 ½" (50-63mm)
      (iv) 1 ½" – 2" (37-50mm)
      (v) 1" (25-37mm)
      (vi) ¾" (19-25mm)
      (vii) Fine gravel – 1/8" – ¾" (2-19mm)
      (viii) Sand – 0.05 -2mm
      (ix) Silt – 0.002-0.05mm
      (x) Clay – minus 0.002mm
   (b) Provide manufacturer's analysis of the following:
      (i) Loose and rodded unit weight.
      (ii) Bulk specific gravity and absorbance.
      (iii) Gravel dimension and surface texture description.

(iv) Aggregate soundness and L.A. abrasion.

(c) Sample Collection Procedure:
   (i) Collect a minimum of eight samples to make up the composite sample.
   (ii) Take samples from random locations in the stockpile varying from the top to the bottom and around the stockpile.
   (iii) Take at least half the samples from the lower third of the stockpile into a clean bucket
   (iv) Thoroughly mix material after samples are taken.
   (v) Remove 2 gallon of material from bucket and fill a zip-lock plastic bag.
   (vi) Double bag the composite sample and label the bag with a permanent marker indicating the material name and date sample was taken.

1.7 QUALITY ASSURANCE

A. Provide an independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock definition testing, as documented according to ASTM D 3740 and ASTM E 548.

B. Conform all work and materials to the recommendations or requirements of the Geotechnical Report and meet the approval of the Geotechnical Consultant.

C. Conform all work to the appropriate portion(s) of the Caltrans Standard Specifications, Section 19.

D. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM D 1557.

E. The Geotechnical Consultant will perform observations and tests required to enable him to form an opinion of the acceptability of the trench backfill. Correct the trench backfill that, in the opinion of the Geotechnical Consultant, does not meet the requirements of these Technical Specifications and the Geotechnical Report.

1.8 PROJECT CONDITIONS

A. Promptly notify the District's Representative of surface or subsurface conditions differing from those disclosed in the Geotechnical Report. First notify the District's Representative verbally to permit verification and extent of condition and then in writing. No claim for conditions differing from those anticipated in the Contract Documents and disclosed in the Geotechnical Report will be allowed unless Contractor has notified the District's Representative in writing of differing conditions prior to contractor starting work on affected items.

B. Protect open, trenches, and utility structure excavations with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.

C. Stockpile on-site and imported backfill material temporarily in an orderly and safe manner.

D. Provide dust and noise control in conformance with Section 01 00 00, General Requirements.

E. Areas to receive structural soil mix shall be inspected by the Owner's Representative before starting work.

PART 2 - PRODUCTS

2.1 PIPE BEDDING AND INITIAL BACKFILL

A. ASTM D 2321, Class IA, IB or II.
   1. Clean and free of clay, silt or organic matter.

B. Class 2 Aggregate Base: Conform to Section 26 of Caltrans Standard Specifications, ¾-inch maximum.

C. Sand: Conform to Section 19-3.025B of Caltrans Standard Specifications.

2.2 WARNING TAPE

A. See Section 33 11 66, Water Distribution System.

2.3 SUBSEQUENT BACKFILL

A. Conform to on-site or imported structural backfill in Section 31 23 00, Excavation and Fill.

2.4 CONTROLLED DENSITY FILL (CDF) (IN TRENCHES)

A. Provide non-structural CDF, from bottom of trench to finish subgrade of subbase or base material, that can be excavated by hand and produce unconfined compressive 28-day strengths from 50-psi to a maximum of 150-psi. Provide aggregate no larger than 3/8-inch top size. The 3/8-inch aggregate shall not comprise more than 30% of the total aggregate content.

B. Cement: Conform to the standards as set forth in ASTM C-150, Type II Cement.

C. Fly Ash: Conform to the standards as set forth in ASTM C-618, for Class F pozzolan. Do not inhibit the entrainment of air with the fly ash.

D. Air Entraining Agent: Conform to the standards as set forth in ASTM C-260.

E. Aggregates need not meet the standards as set forth in ASTM C-33. Any aggregate, producing performances characteristics described herein will be accepted for consideration. The amount of material passing a #200 sieve shall not exceed 12% and no plastic fines shall be present.

F. Provide CDF that is a mixture of cement, Class F pozzolan, aggregate, air entraining agent and water. CDF shall be batched by a ready mixed concrete plant and delivered to the job site by means of transit mixing trucks.

G. The Contractor shall determine the actual mix proportions of the controlled density fill to meet job site conditions, minimum and maximum strengths, and unit weight. Entrained air content shall be a minimum of 4.0%. The actual entrained air content shall be established for each job with the materials and aggregates to be used to meet the placing and unit weight requirements. Entrained air content may be as high as 20% for fluidity requirements.

H. Mix design shall meet the Geotechnical Consultant's approval.

2.5 CONCRETE STRUCTURE BEDDING AND BACKFILL

A. Precast Structures: Same materials to the same heights as specified for pipe bedding and backfill, or other material approved by the Geotechnical Consultant.

B. Poured-in-Place Structures:
1. Bedding: Bedding shall meet the approval of the Geotechnical Consultant. In general, bedding is not required, pour bases against undisturbed native earth in cut areas and against engineered fill compacted to 90% relative compaction in embankment areas.
2. Side Backfill: On-site or imported structural fill meeting the requirements given in Section 31 23 00.
3. Structural Soil Mix: TMT Enterprices, 1996 Oakland Road, San Jose, CA 915131; (408)432-9010

2.6 AGGREGATE FOR STRUCTURAL SOIL MIX:
1. Aggregate shall be triangular.
2. Aggregate shall not be limestone or sandstone.
3. Aggregate shall pass a 3-inch screen and be retained on a 2-inch screen.
4. Aggregate dimensions shall not exceed 1.5:1.0 for any two dimensions chosen.

2.7 SOIL FOR STRUCTURAL SOIL MIX:
1. Soil shall be a "clay loam" or "clay" based on "USDA classification system" as determined by mechanical analysis and shall be of uniform composition, without admixture of subsoil.
2. Soil shall be free of stones greater than one-half inch, plants, roots, debris and other extraneous matter larger than one inch in diameter or an excess of smaller pieces of same type materials as determined by Owner's Representative.
3. Soil shall not contain toxic substances harmful to plant growth.
4. Soil shall be obtained from naturally well drained areas which have never been stripped of topsoil before and have a history of satisfactory vegetative growth.
5. Soil shall contain not less than 3%or more than 7% organic matter as determined by organic carbon and total nitrogen on oven-dried samples.
6. Soil shall be the product of a commercial processing facility specializing in production of Structural Soil Mixes for a minimum of 5 years.
7. Mechanical analysis:
   a Textural Class: Based on material passing a 2 mm screen.
   b Gravel: Less than 5%.
   c Sand: 20 – 50%.
   d Silt: 20 – 30%.
   e Clay: 25- 60%.
8. Chemical analysis:
   a pH: Between 6.5 to 7.9.
   b Percent organic matter: 3 – 7% by dry weight.

c Nutrient level:

1 Fertility: The range of the essential elemental concentration in soil shall be as follows.

Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kolgram) dry weight basis.

Phosphorous	10-40
Potassium	100-200
Iron	5-35
Manganese	0.6-6
Zinc 1-8	
Copper	0.3-5
Boron	0.2-1
Magnesium	50-150
Sodium	0-100
Sulfur	25-500
Molybdenum	0.1-2

2 Toxic elements and compounds and excessive nutrients below UC guidelines and soil testing laboratory guidelines. The maximum permissible elemental concentration in the soil.

Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kolgram) dry weight basis.

Arsenic	1
Cadmium	1
Chromium	10
Cobalt	2
Lead	30
Mercury	1
Nickel	5
Selenium	3
Silver	0.5
Vanadium	3

d Soluble salt: Less than 3.0 Millimho per cm in saturation extract.
e Boron: Less than 1 part per million in saturation extract.
f Sodium Absorption Ratio: Less than 4.
g Carbon/Nitrogen Ratio: Less than 15:1.

2.8 STRUCTURAL SOIL MIX

1. Content:
   a 4 parts structural soil aggregate.
   b 1 part soil, treated with polymer.
2. Mixing:
   a Mix polymer (PAM) with soil 48 hours ahead of blending with aggregate to allow for proper bonding.
   b Cure polymer treated soil by allowing the soil to partially dry.
   c Based upon accepted mix design, blend materials off-site in a clean area using an experienced blending operator.

d Uniformly blend materials so that they are even distributed throughout mixtures.
e Maintain adequate soil moisture content during mixing process.
f Soils and mix components shall easily shred and break down without clumping.
g Soil clods shall easily break down into a medium crumbly texture material.
h Do not blend materials that are saturated or contain excessive water.
i Measure and monitor amount of soils moisture at mixing site periodically during mixing process.
j Protect materials and mixtures from contamination prior to, during, and after mixing operations.
k Store mixes in stockpiles prior to shipment to site in clean areas protected from contamination from other materials.
l Reblend the mix if the components have separated.

2.9 FILTER FABRIC

A. Filter Fabric:
1. Filter Fabric: Section 88-1.03 of Caltrans Standard Specifications.
2. Mirifi 140N (Mirifi Inc., Charlotte, NC) (Tel. 800-438-1855) or equal.

PART 3 - EXECUTION

3.1 TRENCHING AND EXCAVATION

A. Existing PCC or AC Areas: Cut PCC or AC to full depth at a minimum distance of 12-inches beyond the edge of the trench.

B. Excavate by hand or machine. For gravity systems begin excavation at the outlet end and proceed upstream. Excavate sides of the trench parallel and equal distant from the centerline of the pipe. Hand trim excavation. Remove loose matter.

C. Excavation Depth for Bedding: Minimum of 4-inches below bottom of pipe or as otherwise allowed or required by the Geotechnical Consultant, except that bedding is not required for nominal pipe diameters of 2-inches or less.

D. Excavation Width at Springline of Pipe:
1. Up to a nominal pipe diameter of 24-inches: Minimum of twice the outside pipe diameter, or as otherwise allowed or required by the Geotechnical Consultant.
2. Nominal pipe diameter of 30-inches through 36-inches: Minimum of the outside pipe diameter plus 2-feet, or as otherwise allowed or required by the Geotechnical Consultant.
3. Nominal pipe diameter of 42-inches through 60-inches: Minimum of the outside pipe diameter plus 3-feet, or as otherwise allowed or required by the Geotechnical Consultant.

E. Over-Excavations: Backfill trenches that have been excavated below bedding design subgrade, with approved bedding material.

F. Comply with the District's Representative's limitations on the amount of trench that is opened or partially opened at any one time. Do not leave trenches open overnight without the approval of the District's Representative.

G. Where forming is required, excavate only as much material as necessary to permit placing and removal of forms.

H. Bottoms of trenches will be subject to testing by Geotechnical Consultant. Correct deficiencies as directed by the Geotechnical Consultant.

I. Grade bottom of trench to provide uniform thickness of bedding material and to provide uniform bearing and support for pipe along entire length. Remove stones to avoid point bearing.

3.2 CONTROL OF WATER AND DEWATERING

A. Be solely responsible for dewatering trenches and excavations and subsequent control of ground and surface water. Provide and maintain such pumps or other equipment as may be necessary to control ground water and seepage to the satisfaction of the Geotechnical Consultant and the District's Representative until backfilling is completed.

B. Dewater during backfilling operation so that groundwater is maintained a least one foot below level of compaction effort.

C. Obtain the Geotechnical Consultant's approval for proposed control of water and dewatering methods.

D. Reroute surface water runoff away from open trenches and excavations. Do not allow water to accumulate in trenches and excavations.

E. Maintain dewatering system in place until dewatering is no longer required.

3.3 BRACING AND SHORING

A. Conform to California and Federal OSHA requirements.

B. Place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; to prevent damage to the pipes and appurtenances being constructed; and to prevent damage to adjacent structures or facilities. Remove all bracing and shoring upon completion of the work.

C. Be solely responsible for all bracing and shoring and, if requested by the District's Representative, submit details and calculations to the District's Representative. The District's Representative may forward the submittal to the Geotechnical Consultant, the Consulting Engineer and/or the California Division of Industrial Safety for their review. The Contractor's submittal shall include the basic design, assumed soils conditions and estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used, and shall be prepared by a civil engineer or structural engineer registered in California. No excavations in trench section or around structures shall precede a response to the submittal by the District's Representative.

D. Be solely responsible for installing and extracting the sheathing in a manner which will not disturb the line, grade, or backfill compaction or operation of the utility being installed or adjacent utilities and facilities.

3.4 PIPE BEDDING

A. Obtain approval of bedding material from the Geotechnical Consultant.

B. Accurately shape bedding material to the line and grade called for on the Plans. Carefully place and compact bedding material to the elevation of the bottom of the pipe in layers not exceeding 8-inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction for sand and 95% relative compaction for fine gravel unless specified otherwise on the Plans or by the Geotechnical Consultant. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Consultant. Jetting or ponding of bedding material will not be permitted.

C. Upon completion of bedding operations, and prior to the installation of pipe, notify the Geotechnical Consultant, who will inspect the bedding layer. Do not commence pipe laying until the Geotechnical Consultant has approved the bedding.

3.5 WARNING TAPE

A. Install in accordance with Section 33 11 66.

3.6 BACKFILLING

A. Obtain approval of backfill material from Geotechnical Consultant.

B. Bring initial backfill up simultaneously on both sides of the pipe, so as to prevent any displacement of the pipe from its true alignment. Carefully place and compact initial backfill material to an elevation of 12-inches above the top of the pipe in layers not exceeding 8-inches in loose thickness. Compact initial backfill material at optimum water content to 90% relative compaction for sand and 95% relative compaction for fine gravel unless specified otherwise on the Plans or by the Geotechnical Consultant. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Consultant. Jetting or ponding of initial backfill material will not be permitted.

C. Bring subsequent backfill to subgrade or finish grade as indicated. Carefully place and compact subsequent backfill material to the proper elevation in layers not exceeding 8-inches in loose thickness. Compact subsequent backfill material at optimum water content to 90% relative compaction, except in areas subject to vehicular traffic shall be compacted to at least 95% relative compaction, unless specified otherwise on the Plans or by the Geotechnical Consultant. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Consultant. Jetting or ponding of subsequent backfill material will not be permitted.

D. Do not use compaction equipment or methods that produce horizontal or vertical earth pressures which may cause excessive pipe displacement or damage the pipe.

E. Utility backfill shall be inspected and tested by the Geotechnical Consultant during placement. Cooperate with the Geotechnical Consultant and provide working space for such tests in operations. Backfill not compacted in accordance with these specifications shall be re-compacted or removed as necessary and replaced to meet the specified requirements, to the satisfaction of the Geotechnical Consultant and the District's Representative prior to proceeding with the Project.

3.7 STRUCTURAL SOIL MIX INSTALLATION

A. Place mix carefully to avoid damage or displacement of other materials such as paving, drain rock, geotextile fabric and irrigation piping.
B. Do not mix subgrade soils on construction materials with mix.
C. Remove soil mix contaminated with subgrade soil, construction materials or debris.
D. Maintain mix in a moist, but not saturated, condition to prevent segregation of mix during placement.
E. Install mix in 6 inch lifts in locations indicated on the Drawings.
F. Compact lifts to 95 percent compaction in compliance with Geotechnical Investigation Report. Schedule the Geotechnical Engineer to perform nuclear density field tests after each lift of mix to confirm compaction.
G. Install final lift of mix to elevations indicated on the Drawings.

3.8 CLEANUP

A. Upon completion of utility earthwork all lines, manholes catch basins, inlets, water meter boxes and other structures shall be thoroughly cleaned of dirt, rubbish, debris and obstructions of any kind to the satisfaction of the District's Representative.

END OF SECTION

SECTION 31 25 00 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section describes the requirements for providing and installing temporary erosion and sedimentation control structures as specified.

1.2 SUBMITTALS

A. Follow Submittal procedure outlined in Section 1 General Provisions.

1.3 REGULATORY REQUIREMENTS:

A. California Stormwater Quality Association (CASQA) “Stormwater Best Management Practice Handbook for Construction”.

B. State Water Resources Control Board (SWRCB) standards.

C. California Stormwater Quality Association “Stormwater Best Management Practice Handbook” for Construction and Industrial and Commercial Development, latest edition.

PART 2 - PRODUCTS

2.1 Furnish and install the products as specified in the Storm Water Pollution and Prevention Plan and as required by the SWRCB required to eliminate potential erosion and sedimentation during construction works. Products which shall be installed, but are not limited to, are the following:

A. Siltation fences

B. Outlet structure, basins, ditches

C. Filter fabric, and/or mesh

D. Hydroseeding

E. Wattle and/or Gravel bags

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor must have Storm Water Pollution Prevention Plan (SWPPP) in accordance with SWRCB requirements created by a qualified QSD/QSP for this project increment and approved before construction can commence.

B. Erosion and sedimentation control measures are to be installed in areas only to extent required by new construction and as indicated or as directed by governing regulations.

C. The Contractor shall provide inspection and repair of established SWPPP applications and prepare maintenance reports of erosion control measures in accordance with approved SWPPP.

END OF SECTION

SECTION 31 50 00 - TEMPORARY EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes temporary excavation support and protection systems.

B. Temporary excavation support performance: Design, furnish, install, monitor, and maintain temporary excavation support and protection system capable of supporting temporary excavation sidewalls and of resisting soil, which will require a back drainage system as to eliminate hydrostatic pressures, and superimposed and construction loads.

1. Delegated Design: Design temporary excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Prevent surface water from entering temporary excavations by grading, dikes, or other means.
3. Install temporary excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to temporary excavation.
4. Monitor vibrations, settlements, and movements.

1.2 RELATED SECTIONS

A. Section 31 23 19: Dewatering

1.3 REGULATORY REQUIREMENTS

A. Final “Geotechnical Investigation Report Campus Center Contra Costa College San Pablo, California”, File No: 112252/PWGEO, dated February 17, 2011.

1.4 SUBMITTALS

A. Shop Drawings: For temporary excavation support and protection system.

B. Delegated-Design Submittal: For temporary excavation support and protection system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Other Informational Submittals:

1. Record Drawings: Identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions.
    a. Note locations and capping depth of wells and well points.

1.5 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary excavation support and protection system including, but not limited to, the following:
    a. Geotechnical report.
    b. Existing utilities and subsurface conditions.
    c. Proposed temporary excavations.
    d. Proposed equipment.
    e. Monitoring of temporary excavation support and protection system.
    f. Working area location and stability.
    g. Coordination with waterproofing.
    h. Abandonment or removal of temporary excavation support and protection system.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by the College or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
    1. Notify the College no fewer than fourteen days in advance of proposed interruption of utility.
    2. Do not proceed with interruption of utility without the College's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer.
    1. Make additional test borings and conduct other exploratory operations necessary for temporary excavation support and protection.
    2. The geotechnical report is referenced elsewhere in the Project Manual.

C. Survey Work: Engage a land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
    1. During installation of temporary excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Furnish and install the following as specified herein and required to eliminate potential erosion and sedimentation during construction works.
    1. Structural steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.
    2. Steel sheet piling with continuous interlocks: ASTM A 328/A 328M, ASTM A 572/A 572M,

or ASTM A 690/A 690M; with continuous interlocks

3. Wood Lagging: Preservative treated Lumber, mixed hardwood, nominal rough thickness of size and strength required for application
4. Shotcrete: Comply with Division 03 Section "Shotcrete" for shotcrete materials and mixes, reinforcement, and shotcrete application.
5. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.
6. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
7. Tiebacks: Steel bars, ASTM A 722/A 722M.
8. Tiebacks: Steel strand, ASTM A 416/A 416M.

PART 3 - EXECUTION

3.1 PREPARATION

A. Contractor to engage surveyor or engineer to survey adjacent existing structures and site improvements before and regularly during installation of temporary excavation support and protection system.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during temporary excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

C. Install temporary excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the College and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

D. Locate temporary excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.

E. Monitor temporary excavation support and protection systems daily during temporary excavation progress and for as long as temporary excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that temporary excavation support and protection systems remain stable.

F. Promptly repair damages to adjacent facilities caused by installing temporary excavation support and protection systems.

3.2 SOLDIER PILES AND LAGGING

A. Install steel soldier piles before starting temporary excavation. Extend soldier piles below temporary excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than tolerances as specified by a qualified professional engineer.

B. Install wood lagging within flanges of soldier piles as temporary excavation proceeds. Trim temporary excavation as required to install lagging. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at locations indicated on Drawings as prepared by a qualified professional engineer and secure to soldier piles.

3.3 SHEET PILING

A. Before starting temporary excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to tolerances as specified by a qualified professional engineer Accurately align exposed faces of sheet piling to vary not more than tolerances as specified by a qualified professional engineer. Cut tops of sheet piling to uniform elevation at top of temporary excavation.

3.4 TIEBACKS

A. Tiebacks: Drill, install, grout, and tension tiebacks. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

1. Test loading shall be observed by a qualified professional engineer or designator responsible for design of temporary excavation support and protection system.
2. Maintain tiebacks in place until permanent construction is able to withstand lateral soil and a backdrainage system is in place as to eliminate hydrostatic pressures.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Architect.
2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and a backdrainage system is in place as to eliminate hydrostatic pressures.|

3.6 REMOVAL AND REPAIRS

A. Remove temporary excavation support and protection systems when construction has progressed sufficiently to support temporary excavation and bear soil and a backdrainage system is in place as to eliminate hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

1. Remove temporary excavation support and protection systems to a minimum depth of 48 inches (1200 mm) below overlaying construction and abandon remainder.
2. Fill voids immediately with approved backfill compacted to density specified in Section 31 23 00 Excavation and Fill."
3. Repair or replace, as approved by the College, adjacent work damaged or displaced by removing temporary excavation support and protection systems.

B. Leave temporary excavation support and protection systems permanently in place as directed by the Architect.

3.7 DISPOSAL

A. Lawfully dispose of all unsuitable and excess or surplus material off-site at no cost to the College.

3.8 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

A. General: Comply with General Contractor's Waste Management Plan and Section 01 74 19 in the Division 1- General Requirements.[1]

B. To the greatest extent possible, separate reusable and recyclable products from contaminated waste and debris in accordance with the General Contractor's Waste Management Plan. Place recyclable and reusable products in designated containers and protect from moisture and contamination.[2]

END OF SECTION

SECTION 33 41 00 - STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Provide and install all appurtenances as necessary to complete the storm drainage system and bioretention system, as shown on the plans, including piping and joints, flexible joints, manholes, catch basins, drain inlets, and area drains.

1.2 RELATED SECTIONS

A. Section 31 23 33, Utility Trenching and Backfill

B. Section 32 05 23, Portland Cement Concrete

1.3 RELATED DOCUMENTS:

A. AASHTO:

1. M 199: Precast Reinforced Concrete Manhole Sections.

B. ASTM:

1. A615/A615M: Deformed and Billet-Steel Bars for Concrete Reinforcement.
2. C 443: Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
3. C 478: Precast Reinforced Concrete Manhole Sections.
4. C 1103: Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
5. C 1173: Flexible Transition Couplings for Underground Piping Systems.
6. D 1785: Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
7. D 2321: Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
8. D 2564: Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
9. D 3034: Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
10. F 477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
11. F 656: Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC)Plastic Pipe and Fittings.
12. F 679: Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.
13. F-1336: Poly(Vinyl Chloride) (PVC) Gasket Sewer Fittings.

C. AWWA:

1. C104: Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. C105: Polyethylene Encasement for Ductile-Iron Pipe Systems.

3. C110: Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm Through 1,219 mm) for Water.
4. C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. C150: Thickness design of Ductile Iron Pipe.
6. C151: Ductile-Iron Pipe, Centrifugally Cast, for Water.
7. C153: Ductile-Iron Compact Fittings for Water Service.
8. M41: Ductile Iron Pipe and Fittings.

D. Caltrans Standard Specifications
1. Section 52 Reinforcement
2. Section 65 Reinforced Concrete Pipe

1.4 REGULATORY REQUIREMENTS:

A. City of Dublin, Standard Specifications and Details.

B. Alameda County Flood Control District, Standard Specifications and Details.

1.5 Definitions

A. AASHTO: American Association of State Highway and Transportation Officials.

B. ASTM: American Society for Testing Materials.

C. AWWA: American Water Works Association.

D. HDPE: High-density polyethylene.

E. NPS: Nominal pipe size.

F. PVC: Polyvinyl chloride.

G. RCP: Reinforced concrete pipe.

1.6 SUBMITTALS

A. Submittal procedure shall be as outlined in Division 1 – General Requirements.

B. Product Data Shop Drawings, etc. for the following:
1. Piping materials and fittings.
2. Special pipe couplings.
3. Joint sealants.
4. Plastic area drains.
5. Cleanout plugs or caps.

6. Precast manholes
7. Precast concrete catch basins, inlets, curb inlets, junction structures and area drains, including frames and grates.
8. Precast clean out boxes and box covers.
9. Bio-retention soil

C. Design Mix Reports and Calculations: For each class of cast in place concrete.

D. Field Test Reports: Indicate and interpret test results for compliance with performance.

1.7 DELIVERY, STORAGE AND HANDLING

A. Do not store plastic structures, pipe and fittings in direct sunlight.

B. Protect pipe, fittings, and seals from dirt and damage.

C. Handle precast concrete pipe, manholes and other precast structures according to manufacturer's written instructions.

D. Protect imported bedding and backfill material from contamination by other materials.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS FOR GRAVITY FLOW

A. PVC Pipe and Fittings: Pipes 12" and smaller in diameter shall be SDR 26 PVC conforming to ASTM D3034 using elastomeric gasket joint in a bell and spigot assembly system or as shown on plans. Minimum 2 feet cover, maximum 15 feet cover.

1. Fittings: Shall conform to ASTM F 1336.
2. Joint Gasket: Shall conform to elastomeric seal, ASTM F 477.

B. Reinforced Concrete Pipe: Pipes greater than 12" in diameter shall be Class III, Type II Portland Cement conforming to ASTM C76 and C150 or as shown on plans.

C. HDPE Pipe and Fittings: (As alternate to PVC only) pipes can be HDPE (High Density Polyethylene Pipe) DR-11 (160 psi), conforming to ASTM F714 and AASHTO designation M-294.

D. Manholes

1. General:
   a. Size, shape, configuration, depth, etc. of manhole and frame and cover shall be as indicated.
2. Portland Cement Concrete and Reinforcing:
   a. Poured-in-Place Portion: Section 03 30 00 – Portland Cement Concrete.
   b. Precast Portion:
      1) Pre-cast Concrete manhole conforming to ASTM C478 and shall be Type II modified cement with a minimum compressive strength of 4,000 psi at 28

days. Iron Castings for manhole covers and frames shall conform to ASTM A48, Class 25

2) ASTM C 478. Rate for AASHTO H20 loading in traffic areas.

3. Frames and Covers: As indicated and in accordance with Caltrans Standard Specification Section 75-1.02.

4. Steps: Manufacture from deformed, ½-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step.

a. Acceptable manufacturers include:

1) Hanson Concrete Products, (Milpitas, CA) (Tel 408-262-1091)

2) Or approved equal.

E. Concrete Trench Drains

1. Modular system of concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include number of units required to form total length required.

2. Include the following components:

a. Channel Sections: Interlocking-joint, precast modular units with end caps. Inside width as indicated with deep, rounded bottom, with built in slope or flat invert as indicated and outlets in number, sizes, and locations indicated. Include extension sections necessary for required depth.

b. Frame and Grate: Ductile iron as indicated. Where drain is located in traffic areas, rate for AASHTO H20 loading.

3. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.

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

a. "Polydrain" by ABT Inc. (Troutman, NC) (Tel 704-528-9806).

b. "ACO Drain" by ACO Polymer Products Inc. (Chardon, OH) (Tel. 800-543-4764).

c. Or approved equal.

F. Cleanouts

1. Piping: Same as storm drain line if possible.

2. Top Plug or Cap: Same material as piping if possible. Plug or cap to be secure but removable, threaded or non-threaded.

3. Box Size: As required to provide access and allow easy removal and reinstallation of plug or cap.

4. Box Types:

a. Non-Traffic Areas: Portland cement concrete box and box cover, light duty.

b. Traffic Areas: Portland cement concrete box and box cover or steel or cast iron cover, heavy duty, both box and cover to be rated for AASHTO H20 loading.

5. Box Cover Markings: "S.D.," unless otherwise specified.

6. Available Manufacturers: Subject to compliance with requirements, box manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
   a. Associated Concrete Products, Inc. (Santa Ana, California) (Tel. 714-557-7470).
   b. Brooks Products Inc. (El Monte, California) (Tel. 818-443-3017).
   c. Christy Concrete Products, Inc. (Fremont, California) (Tel. 800-486-7070).

G. Area drains shall only be used on 6 inch in diameter or smaller storm drain lines.
   1. Area drains shall be polyvinyl chloride.
   2. Grates shall be brass and comply with accessibility requirements.
   3. Rate for AASHTO H20 loading in traffic areas.

H. Catch Basins shall be pre-cast or cast-in-place with 3,000 psi concrete and 1-1/2 inch max aggregate size.

I. Frames, Grates and Covers for Catch Basins: Caltrans Standard Specification Section 75-1.02, 75-1.03 and 75-1.05.
   1. Galvanize steel frames, grates and covers.
   2. Grates and covers shall be non-rocking.
   3. Rate for AASHTO H20 loading in traffic areas.

2.2 Special Pipe Couplings

1. Gravity Piping: ASTM C 1173. Rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined.

2.3 Joint sealant for precast structures and manholes

A. Mortar: Caltrans Standard Specification Section 51-1.135.
   1. Use to seal around pipes at connections to structures and manholes. Also use to seal joints between precast sections of structures and manholes.

B. Gaskets: Preformed flexible rubber or plastic gasket.
   1. Rubber Gaskets: ASTM C 443.
   2. Plastic Gaskets: Federal Specification SS-S-00210 (GSA-FSS), Type I, Rope Form; or alternate standard which may exist.

PART 3 - EXECUTION

3.1 Gravity PIPE INSTALLATION

A. Construct all storm drainage utilities to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations.

B. Install pipe, fittings, and appurtenances utilizing best practices, manufacturer's instructions, and in accordance with Section 6 and 7 of ASTM D 2321 for plastic pipe, Caltrans Standard Specification Section 65-1.07 for reinforced concrete pipe, and chapter 11.3.3 of AWWA M41 for cast iron and ductile iron pipe.

C. Pipe Depth and Trench Configuration: Conform to typical trench section(s) indicated.

D. Excavation, Bedding, Backfill, and Compaction: Section 31 23 33 – Utility Trenching and Backfill

E. Handling: Carefully handle during loading, hauling, unloading and placing operations to avoid breakage or damage. Use strap type slings for lifting and placing; no chains or hooks will be permitted. Comply with manufacturer's recommendations.

F. Laying: Before lowering pipe into the trench, remove all stakes, debris, loose rock and other hard materials from the bottom of the trench. Lay accurately in conformance with lines and grades indicated. Start laying the pipeline at the low end and proceed upstream. Lay bell and spigot pipe with the bell end facing upstream. Lay pipe on a bed prepared by handwork, dug true to grade. Furnish firm bearing for pipe throughout its entire length with bell holes provided at the ends of each pipe length of sufficient size to permit making up the particular type of joint being used. Adjust pipe to line and grade by scraping away or filling and tamping material under the body of the pipe for the entire pipe length and not by blocking or wedging. After final positioning, hold pipe in place in trench with backfill material placed equally on both sides of the pipe at as many locations as required to hold the pipe section in place.

G. Curved Alignment: When necessary to conform to the alignment specifically indicated, lay pipe on a curved alignment by means of asymmetrical closure of joints or bending of the pipe barrel. Use shorter lengths of pipe than the standard length if necessary to achieve curvature specified. Do not exceed the recommendations of the pipe manufacture for deflections at the joints or pipe bending.

H. Closure: Close open ends of pipes and appurtenance openings at the end of each day's work or when work is not in progress.

3.2 SPECIAL PIPE COUPLINGS

A. General: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

B. Installation: Manufacturer's instructions.

3.3 CLEANOUT INSTALLATION

A. General: Install as indicated.

3.4 INSTALLATION OF CURB INLETS, CATCH BASINS, DROP INLETS, JUNCTION STRUCTURES, AREA DRAINS, ETC. AND MANHOLES

A. Excavation, Bedding, Backfill, and Compaction: Section 31 23 33 – Utility Trenching and Backfill

B. Poured in Place Structures: Install as indicated and Caltrans Standard Specification Section 51.

1. Shape bottoms to convey flows as indicated.

C. Precast Structures: Install as indicated.

1. Seal all joints and pipe entrances and exits.

2. Place concrete in bottom and shape to convey flows as indicated.

3.5 CONCRETE TRENCH DRAIN INSTALLATION

A. Excavation, Bedding, Backfill, and Compaction: Section 31 23 33 – Utility Trenching and Backfill

B. Install: As indicated and in accordance with the manufacturer's instructions.

C. Valve shall be installed in accordance with manufacturer's written Installation and Operation Manual and approved submittals.

3.6 TRENCHING AND EXCAVATION

A. Existing PCC or AC Areas: Cut PCC or AC to full depth at a minimum distance of 12-inches beyond the edge of the trench.

B. Excavate by hand or machine. For gravity systems begin excavation at the outlet end and proceed upstream. Excavate sides of the trench parallel and equal distant from the centerline of the pipe. Hand trim excavation. Remove loose matter.

C. Excavation Depth for Bedding: Minimum of 4-inches below bottom of pipe or as otherwise allowed or required by the District's Representative, except that bedding is not required for nominal pipe diameters of 2-inches or less.

D. Excavation Width at Springline of Pipe:

1. Up to a nominal pipe diameter of 24-inches: Minimum of twice the outside pipe diameter, or as otherwise allowed or required by the District.

2. Nominal pipe diameter of 30-inches through 36-inches: Minimum of the outside pipe diameter plus 2-feet, or as otherwise allowed or required by the District.

3. Nominal pipe diameter of 42-inches through 60-inches: Minimum of the outside pipe diameter plus 3-feet, or as otherwise allowed or required by the District.

E. Over-Excavations: Backfill trenches that have been excavated below bedding design subgrade, with approved bedding material.

F. Comply with the District limitations on the amount of trench that is opened or partially opened at any one time. Do not leave trenches open overnight without the approval of the District.

G. Where forming is required, excavate only as much material as necessary to permit placing and removal of forms.

H. Bottoms of trenches will be subject to testing by District. Correct deficiencies as directed by the District.

I. Grade bottom of trench to provide uniform thickness of bedding material and to provide uniform bearing and support for pipe along entire length. Remove stones to avoid point bearing.

3.7 BACKFILLING

A. Backfill per Section 31 23 33: Utility Trenching and Backfill.

3.8 CLEANUP

A. Upon completion of utility earthwork all lines, manholes catch basins, inlets, water meter boxes and other structures shall be thoroughly cleaned of dirt, rubbish, debris and obstructions of any kind to the satisfaction of the District.

3.9 TESTING

A. General: Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
4. Submit separate reports for each test.
5. Where authorities having jurisdiction do not have published procedures, perform tests in accordance with latest edition of the Uniform Plumbing Code (UPC) Section 1109.0, Testing.
6. Leaks and loss in test pressure constitute defects that must be repaired.
7. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

B. Storm Drain Pipe:

1. Storm drain pipe, shall be hydrostatically joint tested, (air test is not to be used), in the field for water-tightness in accordance with ASTM Standard C 1103.
2. Perform test after pipe is bedded but prior to any backfill.
3. Testing may be done by manufacturing pipe with double gasket joints, or by utilizing a joint tester. Contractor shall obtain the District's Representative's approval of details of the Contractor's selected method prior to performing the testing.
4. Inspect all joints for leakage.
5. If the pressure holds, or drops less than 1psi in 5 seconds, the joint is acceptable.
6. After backfill of storm drain, the Contractor shall video inspect the pipeline. The video shall be supplied to the District for review.

3.10 DISPOSAL

A. Lawfully dispose of all unsuitable and excess or surplus material off-site at no cost to the District.

3.11 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

A. Construction Waste shall be managed in accordance with provisions of Standard Construction Waste Management and Disposal Practices. Documentation shall be submitted to satisfy the requirements of that section.

END OF SECTION