Section 312000
Earthwork

PART 1 - GENERAL

1.01 General Requirements

A. The requirements set forth in the General Conditions shall be in addition to the standards provided herein.

B. The requirements set forth in the Supplemental Conditions shall be in addition to the standards provided herein.

C. The standards set forth in the CalTrans Standard Specifications, latest edition, shall be in addition to the standards provided herein.

D. The requirements set forth by CAL OSHA shall be in addition to the standards provided herein.

1.02 Description

A. Provide all labor, operations and materials necessary for earthwork, including, but not limited to, staking and surveying, grading; excavating; installation of facilities necessary to perform excavation and subsequent removal of such facilities upon completion of work; subgrade preparation; backfilling; and other incidental items necessary for a complete project.

B. This project (is a balanced cut and fill project) (requires export of material) or (requires import of material) – select one. The (import) or (export) of material shall be a part of the Contractor's bid price.

C. The intent of the grading plan is to provide positive drainage and to maintain slopes on walkways as required by the Americans with Disabilities Act and California Title 24 throughout the project site. The Project Manager shall be notified immediately of any discrepancies between the Plans and actual field conditions and/or conflicts between the design and code requirements.

1.03 Related Work

A. Section 311000: Clearing and Grubbing

B. Section 330000: Utilities

C. Section 328400: Irrigation System

D. Section 329000: Planting

E. Section 260000: Site Electrical

1.04 Quality Assurance

A. All work shall conform to local codes and regulations, including standards set forth in the Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation (CalTrans), Chapter 70 of the Uniform Building Code and ASTM.

B. Relative compaction shall be the in-place dry density of soil denoted as a percentage of the maximum dry density of the same material. This shall be as determined by ASTM 1557. The optimum moisture is measured by the water content which corresponds to the maximum dry density.

C. Upon discovery of unforeseen subsurface site conditions, the Contractor shall notify the Inspector immediately.

D. Upon discovery of hazardous materials, cease all activity and immediately contact the Fire Department.

1.05 Protection

A. Provide and install all supports, shoring, bracing, underpinning, sheet piling and other methods for the sides of excavations necessary for ensuring safe working conditions for the workmen and to protect adjacent improvements to remain.

B. Provide any and all protection measures necessary to ensure the protection of the workmen, the general public, including children and the project site. These protection requirements remain the Contractor's sole responsibility throughout the duration of the project, including non-working hours.

C. Do not obstruct vehicular, bicycle or pedestrian thoroughfares, unless previously accepted by the City. Provide safe and adequate detours around the construction as required by City and State regulations.

D. Trenches shall be covered at all times when work directly associated with the trenches is not occurring, including non-work hours.

E. During the course of construction, the Contractor shall ensure that surface drainage does not create a nuisance onto adjacent properties.

1.06 Erosion Control Measures

A. Construction sites shall have required erosion and sediment control measures in place as required by the SWPPP. If construction is in progress, the Contractor shall ensure that the construction site is prepared prior to the onset of any storm. At a minimum, erosion control measures shall include:

a) Broadcast seed
b) Drainage area protection
c) Dust/mud control
d) Drain inlet filters
e) Silt fence and straw wattles
f) Slope protection
g) Straw bales
h) Silt controlling devices

PART 2 - PRODUCTS

2.01 Base Rock

A. Class 2 aggregate base per CalTrans Standard Specifications, latest edition.

2.02 Drain Rock

A. Drain rock shall be Class 2 permeable, washed, unbroken stone or gravel. Material gradation shall conform to the following:

2.03 Pea Gravel

A. Pea gravel shall be natural stone, free of clay, shale or organic matter, and shall conform to the following:

Sieve Size	**Percent Passing**
3/8 inch	100
No. 4	47
No. 8	2
No. 16	1

2.04 Fill

A. Structural Fill shall conform to CalTrans Standard Specifications Section 19-3.06 or the accepted site-specific geotechnical report generated for the project.

B. Fill for non-structural areas shall conform to the following standards:
1. Plasticity: ASTM D4318-84

2. Expansion Index: No greater than twenty (20)
3. Testing: UBC 29-9 and ASTM D422-72
4. Particle Size: No greater than one inch (1”)

2.05 Topsoil

A. The top eight to ten inches (8” – 10”) of native soil containing more than three percent (3%) organic material. Topsoil shall be free of rocks no larger than one inch (1”) in diameter, free from subsoil, roots, heavy or stiff clay, course sand, destructive seeds, noxious chemicals, brush, debris, litter and other undesirable materials.

B. For any import soil to be used in turf/planting areas, submit a soils analysis with soil amendment recommendations (for plant growth) for review and acceptance prior to placement on-site.

2.06 Soil Sterilant

A. Sterilizer shall be standard, quick-acting, short-lived and non-selective weed and grass killer, commonly used under roadway/transportation projects. Application of the sterilant shall pose no short or long term health threats to the installer or the general public. Submit analysis for approval prior to applying.

2.07 Sand

A. Granular, fine, free of organic matter, mica, loam or clay material.

2.08 Native Broadcast Seed

A. Where required, broadcast seed shall be applied as follows:

In upland areas down to 3’ above swale bottom

Nasella pulchra (Purple Needlegrass)	9 lbs/acre
Melica californica (Oniongrass)	7 lbs/acre
Festuca idahoensis (Idaho Fescue)	6 lbs/acre
Poa secunda (Native Pine Bluegrass)	5 lbs/acre
Vulpia microstachys (Three Weeks Fescue)	6 lbs/acre
Elymus glaucus (Blue Wildrye)	6 lbs/acre
Elymus multisetus (Squirrel Tail)	4 lbs/acre
Elymus x triticum (Regreen)	20 lbs/acre

In all swale areas to 3’ upslope above water surface level

Carex barbarae (Barbara Sedge)	1 lb/acre
Deschampsia caespitosa (Tufted Hairgrass)	4 lbs/acre

Elymus trachycaulus (Slender Wheatgrass)	9 lbs/acre
Hordeum brachyantherum (Meadow Barley)	9 lbs/acre
Leymus tricticoides 'Yolo' (Creeping Wildrye)	4 lbs/acre
Trifolium obtusiflorum (Creek Clover)	3 lbs/acre
Elymus x tricticum (Regreen)	20 lbs/acre

B. Areas with sandy, dry soil shall receive:

Zorro Annual Fescue	6 lbs/acre
Rose Clover	9 lbs/acre

C. A fertilizer consisting of 16-20-0 shall be applied at a rate of 500 pounds per acre. If hydroseeding/mulching is used, seed quantities shall be increased by 30 percent.

D. Seed for creek banks shall conform to the latest requirements of the California Department of Fish and Game.

PART 3 - EXECUTION

3.01 Construction Staking

A. The layout of all work shall be performed by a California State licensed land surveyor provided by the Contractor.

B. Notify the Inspector immediately of any discrepancies between actual field conditions and the Plans. Minor field adjustments may be necessary in order to fulfill the intent of the Plans.

C. Non-notification of discrepancies between actual field conditions and the Plans by the Contractor, in writing, shall indicate his acceptance of such field conditions. Adjustments/modifications to the construction to accommodate the inconsistencies (without notification) shall be at no additional cost to the City.

3.02 Excavation

A. All excavations shall be as noted on the Plans. Excavations shall include accommodation of base material.

B. Do not over-excavate. Excavations shall provide appropriate space to install shoring, bracing, formwork, etc, as needed to ensure the safe and proper construction of the work.

C. Take every precaution to prevent water from entering, softening, and undercutting excavated areas, including, pits, footings, trenches, etc.

D. Notify the Inspector immediately upon discovery of unsatisfactory soils materials or unforeseen site conditions. Excavation shall include the complete removal of the unsatisfactory material and its legal disposal thereof.

3.03 Site Grading

A. A grading permit is required to be obtained by the Contractor prior to commencing any earthwork.

B. Grading shall include adjacent transition areas, new elevations/contours as shown on the Plans. All subgrade areas shall be graded parallel to the finish grades and contours and shall be uniform in slope. Transition areas shall provide a smooth connection between new and existing grades and shall not create additional drainage or ponding onto adjoining properties.

C. Surface grades shall provide for positive drainage away from structures and footings, and shall be uniformly smooth throughout.

D. Rough grading shall:
   1. Be graded to a tolerance of 0.10 feet, plus or minus for planted and turf areas.
   2. Be graded with a tolerance less than .04' from specified grade and cross section for subgrade in which pavement, curbs and other structural elements are to be placed immediately above.
   3. Provide a subgrade surface free of exposed rocks, stones and boulders.
   4. Provide a subgrade surface free of depressions, pits, etc., with proper backfill and compaction. See paragraph 3.04 below.

3.04 Placement of Fill Material

A. Prior to placement of fill material, the Contractor shall:
   1. Obtain approval of the subgrade surface from the Inspector.
   2. Scarify, dry and compact soft and/or wet areas.
   3. Remove and replace unsuitable subgrade material to the satisfaction of the Inspector.
   4. Take all necessary corrective action.

B. Do not use topsoil as fill or backfill material, unless otherwise accepted in writing.

C. Fill shall be placed in the following manner:
   1. <u>Accepted engineered fill</u> material for structural slabs and areas to be paved shall be placed in six-inch (6") loose thickness, uniform layers over the entire area.

2. Fill material in planted areas shall be placed in twenty-four inch (24") maximum loose thickness throughout the areas to receive fill.

D. Aerate or water each lift to obtain the required compaction rate indicated on the Plans. Thoroughly mix material to ensure proper moisture content for compaction. Repeat the operations until grades, as shown on the Plans, are obtained. Jetting of trenches shall be reviewed and accepted by the Inspector prior to performance of work.

E. Do not place fill when the subgrade is frozen, muddy or wet. Allow conditions to thaw and dry out before resuming operations.

F. Use hand tampers or vibrating compactors around foundations walls, retaining walls and other structural elements. Do not use large equipment in these areas and do not begin compaction operations until the bearing surfaces have reached its design strength.

G. Fill around existing trees to remain shall not exceed twelve inches (12").
   1. Minor fill (6" or less) shall utilize topsoil and shall be placed by hand. Do not cover crown of trunk. Feather grades to the extent possible.
   2. Fills between 6" and 12" shall utilize 3/4" pea gravel on grade, placed up to three inches (3") below finish grade. Apply topsoil, by hand, to meet finish grade elevations. Feather grades to the extent possible.

H. Construct mounds from on-site material. The core of the mound (1' below finish elevations) shall be compacted to 90%. The top twelve inches (12") shall be compacted to 85%. Place topsoil in the top twelve inches (12").

I. Place topsoil in all turf and planting areas a minimum of twelve (12) inches deep. See Section 311000, 3.03-B: Clearing and Grubbing.

3.05 Trenching, Backfilling and Compacting

A. For trenches greater than five feet (5') in depth, submit an OSHA permit related to the work.

B. All trenches shall be straight, true and cut vertical at 90 degrees to the surface plane.

C. For trenches through existing paved surfaces, use a concrete saw or other tool to achieve straight, clean lines. Replace paved surface to the same or better condition as existing prior to cut.

D. Do not over-excavate. Maintain bearing surfaces true, level and undisturbed to the extent possible.

E. Trenches shall be kept dry and frost-free. Do not allow standing water to collect.

F. Do not allow trenches to remain exposed at any time when work directly related is not occurring. Cover all trenches during non-work hours.

G. Bedding for all trenches to receive pipes shall be as follows:
   1. Bedding material shall be consistent with the City of Roseville Design and Construction Standards, latest edition.
   2. Pipe shall lie completely on bedding. Pipe fittings or joints shall not bear weight.
   3. Bedding shall be uniform throughout the length of pipe.

H. Initial backfill for storm drains, sewer lines and electrical conduit shall conform the applicable City standard set forth by the Department having jurisdiction.

I. Backfill beyond the initial operations shall be native soil, placed in twelve-inch (12”) lifts. Compaction for trenched areas shall be 95% for parking lot, driveway and roadway areas; 90% for hardscape (i.e. walkways, picnic pads basketball and tennis courts); and 85% in areas to be planted. Place topsoil over trenches in planted areas. Upon completion, all trenches shall be filled flush with adjacent finish grades.

J. Compaction tests shall be required for trenched areas, hardscape areas and areas where fill over two feet in depth will be placed. The Inspector shall determine the number of tests and the locations. Re-tests shall be the Contractor’s responsibility.

K. Potholing shall be required in areas where existing utilities are indicated. Hand digging may be required.

3.06 Soil Sterilant

A. Soil sterilant shall be applied to areas where paving is to be installed. The worker applying the sterilant shall take every precaution to avoid overspray of sterilant onto areas to be planted. The sterilant shall be placed no further than six inches (6”) beyond the edge of pavement.

B. Soil sterilant shall not be applied in inclement weather and windy days.

3.07 Drainage Areas

A. All bare areas, regardless of slope, within 50 feet of natural drainages shall be covered with straw and pressed in place.

B. No grading or trenching, except as required for erosion or sediment control, shall occur within 35 feet from the centerline of perennial and intermittent

drainage swales between October 5 and April 1 unless approved by the Engineering Division, as well as any other governmental agency which may have additional jurisdiction and/or requirements.

3.08 Dust/Mud Control

A. Adjacent Streets: Adjacent street frontages shall be swept at least once a day to remove silt and other dirt which is evident from construction activities.

B. Construction Vehicles: The Contractor is responsible for cleaning construction vehicles leaving the site on a daily basis to prevent dust, silt, mud and dirt from being released or tracked offsite. Adjacent streets shall be swept clean daily.

C. Grading Spoils: Dry stockpiles of soil shall be watered to prevent the generation of airborne dust. Trucks transporting dry soil shall be covered with tarpaulins.

D. Water: Water shall be sprayed on all exposed earth surfaces during clearing, grading, earth moving and other site preparation activities. The exposed earth shall be watered throughout the day to minimize dust. The Contractor shall obtain a hydrant permit from the Environmental Utilities Department.

E. Wind Allowances: Grading activities shall be restricted or halted when winds exceed 15 miles per hour as deemed necessary by the Public Works Inspector.

3.09 Inlet Filters

A. Drain inlet filters may be employed in lieu of straw bales. Horizontal mesh filters attached to the top of or below the drain inlet grate shall not be allowed. Only high flow volume, bag type filters or others as approved by the Public Works Inspector shall be used.

3.10 Silt Fence and Straw Wattles

A. Silt fences and straw wattles may be employed in lieu of, and are preferred to straw bales.

3.11 Slope Protection/Erosion Control

A. All slopes greater than 10:1 shall be covered with broadcast straw at a rate of 50 bales or 4,000 pounds per acre. Slopes exceeding 4:1 shall have straw pressed in place or a tackifier shall be applied.

B. All slopes along building frontages (from the building setback line to the City right-of-way) exceeding 4:1 shall have erosion netting installed (jute or as approved by the Public Works Inspector).

C. Slopes steeper than 4:1 and adjacent to City of Roseville right-of-way, flood plains, natural drainages, park land or designated open space shall require broadcast seeding and shall be covered with straw matting.

D. Hydroseed shall not be used on slopes where broadcast straw, erosion netting or straw matting are specified above, except as an additional measure to them. Within a site, protection of bare and/or disturbed slopes which are isolated from areas requiring erosion protection shall be addressed on the approved plans. Hydroseeding may be an acceptable alternative in isolated expanses, regardless of slope.

E. From the back of City sidewalk to 25 feet back, all disturbed, bare slopes of less than 10:1 shall be hydroseeded. Broadcast straw as specified above for 10:1 or steeper slopes is an acceptable option.

3.12 Straw Bales

A. Straw bales shall be stockpiled on the site at a rate of 1.5 bales per acre by October 1. Measures shall be provided to keep straw dry.

3.13 Silt Controlling Devices

A. Use of alternative silt controlling devices will be approved at the discretion of the Project Manager.

3.14 Cleaning

A. Thoroughly clean all areas where work has occurred. Remove from the site excess material, debris and rubbish.

B. Take all precautions to protect completed work. Immediately repair or replace all damaged areas due to tire ruts, erosion, compaction failure, etc. Keep all erosion control measures intact.

END OF SECTION