



EL DORADO COUNTY

DESIGN AND IMPROVEMENT STANDARDS MANUAL

Volume III: Grading, Erosion and Sediment Control (Implementing standards for Chapter 15.14 of the County Code.)

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Section A: DEFINITIONS

Unless the particular provision or the context otherwise requires, wherever the following terms are used in this Volume, they shall have the meaning ascribed to them in this section:

1. **"Adverse geotechnical conditions"** means unstable soils as determined by the design professional, such as landslides, thick colluvium soil layers, expansive soils, soil creep, low bearing pressure, unsupported planes of weakness, or potentially saturated soils.
2. **"Agricultural operation"** means an activity involving the use of land for farming, dairying, pasturage agriculture, horticulture, floriculture, viticulture, animal and poultry husbandry when conducted on agriculturally zoned or designated lands.
3. **"American Society for Testing and Materials (ASTM)"** is a membership society that is recognized as the foremost United States source of information on the specifications and testing of materials.
4. **"Back structural element"** means the rearmost component of a retaining wall where it contacts the ground underneath, which would be the back of the footing at its interface with soil for a gravity or cantilevered wall, or the back of the geogrid reinforcing at the footing plane elevation for a mechanically stabilized earth wall
5. **"Bedrock"** means the solid undisturbed rock in place either exposed at the ground surface or beneath superficial deposits of unconsolidated sediment, soil, landslide debris, or decomposed or weathered material derived from the underlying undisturbed rock. It also refers to all consolidated rock in its place of formation, including volcanic cap rock.

6. "**Bench**" means a nearly level step excavated into sloping natural ground upon which engineered fill or embankment fill is to be placed. (Note: For purposes of this Volume, "benches" are located under a fill and "terraces" are located on the face of a constructed slope.)
7. "**Borrow**" means earth material acquired from an off-site location for use in grading on a site.
8. "**California Building Code**" means the building code adopted by the State of California, as modified by county ordinance, which is in effect at the time of permit application.
9. "**Civil Engineer**" means a professional engineer registered as a Civil Engineer by the State of California.
10. "**Civil engineering**" means the application of the knowledge of the forces of nature, principles of mechanics and the properties of materials to the evaluation, design, and construction of civil works for the beneficial uses of mankind.
11. "**Compaction**" means the increase of density of a soil or rock by mechanical means.
12. "**Complex configuration or construction**" means terraced or tiered retaining walls (closer than twice the retained height of the lower wall), retaining walls with multiple tiers or anchors, slopes greater than (2:1) at toe of wall, or as otherwise determined by the design professional or the Director.
13. "**Cut**": See "Excavation".
14. "**Dam**" means a structure used to store or detain water that is either more than six feet high, as measured from its lowest point (toe) to the spillway elevation, or has the capacity to impound more than fifteen acre-feet of water.
15. "**Depth of fill**" means the vertical dimension from the exposed fill surface to the original ground surface at the fill's deepest point, generally at the hinge point.
16. "**Depth of cut**" means the vertical dimension from the exposed cut surface to the original ground surface at the cut's deepest point, generally at the hinge point.
17. "**Director**" means the Director of the Department of Transportation, the Director of the Development Services Department, or the Agricultural Commissioner, or their designees, for enforcement of their designated areas of responsibility as defined in Section 15.14.120 of the El Dorado County Grading, Erosion and Sediment Control Ordinance.
18. "**Drainage Manual**" refers to the current edition of the County of El Dorado Drainage Manual.
19. "**Earth material**" means any rock, natural soil or fill and/or any combination thereof.
20. "**Embankment**" (fill) means a deposit of soil, rock or other materials placed by man.
21. "**Encroachment permit**" means a written permit issued by the Director authorizing certain work within a maintained public right-of-way.
22. "**Engineered fill**" means any fill designed by a Civil Engineer for its intended use and placed with appropriate inspection and documentation.
23. "**Engineering Geologist**" means a licensed Professional Geologist certified as an Engineering Geologist by the state of California.
24. "**Engineering geology**" means the application of geologic knowledge in the investigation and evaluation of naturally occurring rock and soil for use in the design of civil engineering works.
25. "**Environmental Health Specialist**" means a person registered as an Environmental Health Specialist (REHS) by the State of California.

26. "**Erosion**" means the wearing away of earth material as a result of the movement of wind, water, or ice.
27. "**Excavation**" (cut) means the removal of earth materials by mechanical means. This term may also refer to the topographic depression or other change in the topography of the land resulting from the removal of material.
28. "**Excessive settlement**" means an amount of settlement after construction which could cause damage to future structures built behind a retaining wall.
29. "**Existing grade**" means the elevation of the ground surface at a given point prior to any proposed or unpermitted excavating or filling.
30. "**Expansive soil**" means soils that undergo substantial volume changes (shrink or swell) in response to changes in moisture content.
31. "**Exposed wall face**" means the vertical distance measured from the finish grade (consolidated soil or rock) at the toe of a retaining wall to the top of the wall.
32. "**Fill**": See "Embankment, Engineered Fill, and Landscape Fill".
33. "**Finished grade**" means the topography of the site after the excavation or placement of fill in conformance with the approved final grading plan. The finished grade is also the grade at the top of a paved surface (final grade).
34. "**Geologist**" means a person licensed by the State of California as a Professional Geologist.
35. "**Geologic hazard**" means any condition in naturally occurring earth materials which may endanger life, health or property.
36. "**Geotechnical Engineer**" refers to a Civil Engineer who holds a valid authorization to use the title "Geotechnical Engineer," as provided in the State of California Business and Professions Code. The terms "Geotechnical Engineer", "Soils Engineer" and "Soil Engineer" are deemed to be synonymous.
37. "**Geotechnical Engineering**" means the investigation and engineering evaluation of earth materials including soil, rock, groundwater and man-made materials and their interaction with earth retention systems, structural foundations and other civil engineering works. The practice involves application of the principles of soil mechanics and the earth sciences, and requires knowledge of engineering principles, formulas, construction techniques and performance evaluation of civil engineering works influenced by earth materials. The terms "Geotechnical Engineering", "Soils Engineering" and "Soil Engineering" are deemed to be synonymous.
38. "**Geotechnical Report**" means the documentation of a study or investigation made by a Geotechnical Engineer or Civil Engineer of the earth materials (See "Geotechnical Engineering") at the proposed development site. This documentation shall include an engineering evaluation of the properties of the encountered earth materials and recommendations for their disturbance, removal, modification, or replacement to prepare the project site for its proposed use. The terms "Geotechnical Report", "Soils Report" and "Soil Report" are deemed to be synonymous.
39. "**Grade**" means the vertical location (elevation) of the ground surface, either natural or man-made.
40. "**Grade, rough**" means the stage at which the grade approximately conforms to the approved plan.
41. "**Grading**" refers to any land excavation or filling, or combination thereof, or the installation of required drainage and erosion control facilities.
42. "**Grading, general**" means grading that is unrelated to the construction of any structure or associated vehicular way. Typical general grading would include

dams, ponds, level areas for horse arenas, additional parking areas and access roads. "General grading" does not include the construction of a building pad or driveway for a future structure.

43. "**Grading Ordinance**" refers to the El Dorado County Grading, Erosion and Sediment Control Ordinance, Chapter 15.14 of the County Code.
44. "**Grading plan**" means a plan prepared in accordance with this Volume showing grading and related work.
45. "**Height of Fill**" means the vertical dimension from the toe (hinge point) of the fill slope to the top (hinge point) of the fill slope.
46. "**Height of Cut**" means the vertical dimension from the toe (hinge point) of the cut slope to the top (hinge point) of the cut slope.
47. "**Inspection**" means the evaluation, by County staff or a County-authorized agent, of the conformity of construction with established standards of materials and workmanship, applicable ordinances and policies of the County General Plan, and the conditions of approval of all applicable permits.
48. "**Keyway or key**" means a special backfilled excavation which is constructed beneath the toe area of a planned fill slope on sloping ground to improve the stability of the slope.
49. "**Landscape Architect**" means a Landscape Architect licensed by the State of California or otherwise qualified as determined by the Director.
50. "**Landscape Fill**" means a non-structural fill intended solely to support plant growth.
51. "**Land surveyor**" means a professional land surveyor licensed by the State of California.
52. "**Lot**": See "Parcel".
53. "**Mass pad grading**" (mass lot grading) means the grading or disturbance of the surface of any lot or parcel more than the percentage specified below for the size of the lot or parcel in question:

Percentage (%) of land area disturbed	Parcel size (Square feet)
80	Less than 6,000
60	6,000-19,999
50	20,000-43,559
30	43,560-87,120
20	Greater than 87,120

54. "**Natural Resource Conservation Service**" refers to an agency of the United States Department of Agriculture acting as staff for the Resource Conservation District.
55. "**Owner**" means the person identified as the legal owner of the property by the office of the County Assessor.
56. "**Parcel**" (lot) means a legally separate unit of land area that was created by an approved subdivision or parcel map or was validated by an issued Certificate of Compliance or other documentation acceptable by the County.
57. "**Permit**" means an approved grading permit issued pursuant to the Grading Erosion and Sediment Control Ordinance (Chapter 15.14 of the County Code) that authorizes specific grading activities.
58. "**Permittee**" means any person to whom a permit is issued pursuant to the Grading Erosion and Sediment Control Ordinance (Chapter 15.14 of the County Code).

59. **“Project Engineer”** means the licensed Civil Engineer designated by the owner as the Engineer of Record responsible for oversight and coordination of project design activities, including the monitoring of construction and the provision of recommendations to the owner and the Director to insure compliance with the approved plans and specifications.
60. **“Public Agency”** means an organization governed by decision-makers elected in a general public election such as a utility or recreation district, a municipal or County government, the State of California or the Federal government. For purposes of this Volume, the term “public agency” does not include organizations such as home owners associations or infrastructure maintenance districts.
61. **“Rainy season”** means the period of the year during which there is a substantial risk of rainfall. For the purpose of this Volume, the rainy season is defined as beginning on October 15th and ending on May 1st, inclusive.
62. **“Retaining wall”** means walls constructed to withstand lateral earth and/or fluid pressures, including any live and dead load surcharge, the self weight of the wall, and earthquake loads in accordance with accepted engineering practice. This definition also applies to free standing swimming pool walls.
63. **“Sediment”** means any material transported or deposited by water, including soil debris or other foreign matter.
64. **“Significant surcharges”** means any one of the following lateral forces or moments acting on a retaining wall from live, dead, or earth loads defined as follows:
 - a. Backfill sloped greater than (2) horizontal to (1) vertical.
 - b. Lateral pressure exerted by structures founded within a horizontal distance equal to one and one-half times the retained height, measured from the back structural element of the wall to the closest element of the adjacent structure.
 - c. Vertical loads (traffic, pedestrian, snow, other live and dead) greater than 250 pounds per square foot (psf) applied within a horizontal distance equal to the retained height, measured back from the back structural element of the wall.
 - d. Lateral loads imposed by vehicular guardrails and solid fences greater than (6) feet in height within a distance equal to one and one-half times the height of the wall, measured from the back of the wall.
65. **“Site”** means any lot or parcel of land or combination of contiguous lots or parcels of land, whether held separately or joined together in common ownership or occupancy, where grading is to be performed or has been performed, except within county rights-of-way. A “site” can also be a portion of a lot or parcel defined by permit limitations.
66. **“Slope”** means an inclined ground surface. The inclination of this surface may be described as the ratio of horizontal distance to the corresponding vertical distance. The ratio may be expressed by integers (Example 3H:1V) or by percentage (Example: 33%).
67. **“Soil”** means all unconsolidated earth material of any origin that overlies bedrock. Soil may include the decomposed zone of bedrock which can be excavated readily by mechanical equipment.
68. **“Soil Capability Report”** means a report on the potential agricultural capability of topsoil that utilizes the classification system presented in the Natural Resources Conservation Service soils survey of El Dorado County.
69. **“Soil Engineer”**: See Geotechnical Engineer.
70. **“Soil engineering”** See Geotechnical Engineering.
71. **“Soil Report”** See Geotechnical Report.

72. "**Soil Scientist**" means a professional Soil Scientist certified by the American Registry of Certified Professionals in Agronomy, Crops and Soils (ARCPACS)
73. "**Stockpile**" means a temporary accumulation of soil, whether compacted or uncompacted.
74. "**Storm Water Management Plan**" (SWMP) means the approved plans, reports, procedures, and facilities required pursuant to the County program to reduce the discharge of pollutants associated with storm water drainage systems. It identifies how the County will comply with the provisions of the National Pollutant Discharge Elimination System (NPDES) permit issued by the California State Water Resources Control Board (SWRCB).
75. "**Structure**" means anything constructed or erected that requires location on the ground excluding fences less than six feet high.
76. "**Tahoe Basin**" means the area of the county which is tributary to Lake Tahoe and subject to the regulations and policies administered by the Tahoe Regional Planning Agency.
77. "**Terrace**" means a relatively level step constructed on the face of a graded cut or fill slope surface for drainage, maintenance or other purposes. (Note: For purposes of this Volume, "benches" are located under a fill and "terraces" are located on the face of a constructed slope.
78. "**Terrace rounding**" means the minor excavation of the edges of a cut slope to provide a more contoured transition with the adjacent natural slope.
79. "**Tiered wall or walls**" means a condition where the upper and lower walls are close enough that a 1.5H:1V plane projected from the closest structural element of the upper wall intersects any portion of the lower wall. In the case of reinforced or mechanically stabilized earth walls, the walls are considered tiered if a 1.5H:1V plane projected from the closest structural element of the upper wall intersects any portion of the lower wall, including the reinforced zone behind the lower wall.
80. "**Vehicular way**" means any public or private roadway or driveway designed for or used by vehicles (as defined by the California Vehicle Code).
81. "**Unstable slope**:" A slope that does not meet the established standards of stability described in the current edition of Special Publication 117 of the Department of Conservation, State of California.
82. "**Watercourse**", for purposes of this Volume, means any natural or human-made channel in which water flows on a continuous or intermittent basis. The term watercourse also includes facilities used to hold or delay the release of storm water runoff. (Note: It is recognized that the definition of a "watercourse" in the El Dorado County General Plan excludes human-made channels, ditches, and underground drainage and sewer systems. These facilities are not subject to the stream and creek setback policies of the General Plan that are intended to protect natural resources. This Volume addresses the adequacy of drainage facilities to convey estimated runoff volumes.)

Section B: DESIGN AND CONSTRUCTION STANDARDS

1. **Mass pad grading:** Due to the severe terrain encountered in the county, grading may be required to create adequately-drained, near-level building sites and to provide for adequate access to these sites. The volume of grading shall be limited to that necessary to accomplish the proposed development. It is the intent of this section, consistent with the El Dorado County General Plan, that all grading shall reflect, to the greatest extent possible, the natural gradient and contours of the site. Grading shall be designed to minimize the creation of extensive, artificial banks or terraces which may be visible from public streets or other public views. Grading shall conform to the design standards provided in this Volume unless demonstrated through adequate analysis and report to the satisfaction of the Director that an alternate design can provide a stable slope that avoids severe erosion and other hazards.
2. **Excavation – cut slope standards:** Cut slopes shall be constructed in a manner that does not create unstable conditions or induce severe erosion. Unless recommended otherwise in a Geologic Report or Geotechnical Report accepted by the Director, the following minimum design standards are required by the County to assure the stability of permitted cuts:
 - A. **Slope steepness:** No excavation shall be made with a cut face steeper in slope than two horizontal to one vertical (2:1), exclusive of required terraces and roundings described herein. (*The face of cut slopes between terraces shall be no steeper than two horizontal to one vertical.*) The Director may permit a cut with a steeper slope if the applicant demonstrates through engineering, geotechnical engineering and engineering geology reports that the underlying earth material is capable of standing on a steeper slope. Alternately, the Director may limit a cut slope to a steepness less than a 2:1 gradient due to the presence of earth materials that would potentially be unstable at such a slope angle.
 - B. **Unsupported foliation or bedding planes:** No slope shall be cut at an angle steeper than the bedding/foliation planes or orientation of the principal joint sets in any formation where such planes or joints dip toward the proposed cut face. A cut slope with this underlying condition (i.e. downslope-dipping bedding planes or joint sets) may be permitted by the Director if the applicant demonstrates through engineering, geotechnical engineering and engineering geology reports that the slope would be stable at a steeper angle.
 - C. **Terrace requirements:** For cut slopes up to 60 feet in height, terraces at least 8 feet (2.4 meters) in width shall be established at not more than 30-foot (9.1 meters) vertical intervals on all cut slopes to control surface drainage and debris except that where only one terrace is required, it shall be at midheight. For cut slopes greater than 60 feet (18 meters) and up to 120 feet (37 meters) in vertical height, one additional terrace at approximately midheight shall be 12 feet (3.6 meters) in width. Terraces shall slope a minimum of 5 percent gradient toward the hillside and be accessible for maintenance. Terrace widths and spacing for cut slopes greater than 120 feet (36 meters) in height shall be designed by the

Civil Engineer and subject to review and acceptance by the Director. Suitable access shall be provided to permit proper cleaning and maintenance.

- D. **Terrace rounding:** Cut slopes shall be rounded into the existing terrain to produce a contoured transition from cut face to natural ground.
 - E. **Adjacent structure protection:** Footings which may be affected by an excavation shall be underpinned or otherwise protected against settlement, and shall be protected against lateral movement. Fills or other surcharge loads shall not be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by such fill or surcharge.
3. **Fill construction standards:** Completed fills shall be stable masses of well-integrated material bonded to adjacent materials and to the materials on which they rest. Fills shall be competent to support anticipated loads and be stable at the design slopes shown on the plans. Unless recommended otherwise in a Geotechnical Report accepted by the Director, the following minimum design standards are required by the County to assure the stability of permitted fills. (Note: Standards B through E below do not apply to non-structural fills intended for agricultural cultivation.)
- A. **Ground preparation for fill placement:** The natural ground surface shall be prepared to receive fill by the removal of all unsuitable material such as vegetation, top soil, landslide deposits or other unstable earth material and existing fill not installed in conformance with this ordinance. For non-structural fills intended for agricultural cultivation, material such as topsoil suitable as a growth medium need not be removed prior to fill placement. Where natural or pre-existing underlying slopes are five horizontal to one vertical (5:1) or steeper in gradient, keys and benches at least ten (10) feet wide shall be placed into competent earth material in a manner determined to be adequate by the Director.
 - B. **Placement of fill:** Fills shall be constructed in layers. The loose thickness of each layer of fill material before compaction shall not exceed eight inches.
 - C. **Fill compaction:** All fills shall be compacted throughout their full extent to a minimum dry density as determined by ASTM test method D-1557 (or a successor standard adopted by the County), as follows:
 - 1. Landscape fills: 85 percent
 - 2. Fills intended to support structures: 90 percent.
 - 3. Fills intended to support vehicular ways: 90 percent with 95 percent in the top one foot.
 - 4. Temporary fill stockpiles: Compaction is not required unless it is determined by the Director that:
 - a. Compaction is necessary to prevent instability or erosion of the fill as determined by the Director.
 - b. The fill is proposed to remain in place for six months or more, or would remain in place beyond a different time limit if specified by the Director.

- D. **Fill Density (Compaction) Testing:** The number and distribution of tests required during construction to determine the density of compacted fills shall be determined by the following criteria:
1. A minimum of one test for each two feet of vertical lift is required.
 2. A minimum of one test for each one thousand (1,000) cubic yards of material placed is required.
 3. A minimum of one test for each one thousand (1,000) square feet in slope surface, including at least one test for each ten vertical feet of slope height, is required. These tests shall be conducted on a point one foot below the fill surface.
 4. Test locations shall be uniformly distributed within the fill or along the fill slope surface to the extent feasible.
 5. Except for the tests required for the fill surface under item 3. above, testing may be waived by the Director for fills comprised of more than thirty-five percent (35%) rock by weight upon certification by a Geotechnical Engineer or Civil Engineer that the fill will be inspected continuously during construction for adequacy of compaction and that testing is not feasible in the subject material.

Results of the density (compaction) testing and the distribution of test locations shall be presented in the periodic and final reports. Compaction may be less than ninety (90) percent of maximum density, within six inches of the slope surface when such surface material is placed and compacted by a method acceptable to the Director for the planting of the slopes.

- E. **Fill composition:** Earth materials shall be used which have no more than minor amounts of organic substances, as determined by the Director in consultation with the Project Engineer, and have no rock or similar irreducible material with a maximum dimension greater than twelve inches. The placement of larger rock may be permitted with a rock disposal plan prepared by a Geotechnical Engineer or Civil Engineer that includes the following elements:
1. Delineation of potential rock disposal areas on the grading plan.
 2. Placement of rocks greater than twelve inches in maximum dimension a minimum of two feet below grade
 3. The avoidance of "nested" rock disposal sites
 4. Placement of rocks in a manner such that all voids are filled with fines.
 5. Continuous inspection of the rock placement by the responsible licensed professional.
 6. Certification of the stability of the fill by the responsible licensed professional.
- F. **Slope steepness:** No fill shall be constructed with a face steeper in slope than two horizontal to one vertical (2:1), exclusive of required terraces described herein. (*The face of fill slopes between terraces shall be no steeper than two horizontal to one vertical.*) The Director may permit a fill with a steeper slope if the applicant demonstrates through engineering, geotechnical engineering and engineering geology reports found adequate by the Director that the proposed fill material, including any proposed reinforcement, and the supporting native ground would form a stable slope. Construction of a fill with a surface slope flatter than a

two horizontal to one vertical may be required if determined necessary by the Director to assure stability and safety.

- G. **Terrace requirements:** For fill slopes up to 60 feet in height, terraces at least 8 feet (2.4 meters) in width shall be established at not more than 30-foot (9.1 meters) vertical intervals on all fill slopes to control surface drainage and debris except that where only one terrace is required, it shall be at midheight. For fill slopes greater than 60 feet (18 meters) and up to 120 feet (37 meters) in vertical height, one additional terrace at approximately midheight shall be 12 feet (3.6 meters) in width. Terraces shall slope a minimum of 5 percent gradient toward the hillside and be accessible for maintenance. Terrace widths and spacing for fill slopes greater than 120 feet (36 meters) in height shall be designed by the Civil Engineer and subject to review and acceptance by the Director. Suitable access shall be provided to permit proper cleaning and maintenance.

4. Drainage

- A. **General requirements:** Drainage structures and facilities shall be designed and constructed in accordance with the standards included in this Volume, other applicable sections of the Design and Improvement Standards Manual, the County Drainage Manual, the California Building Code, Natural Resource Conservation Service guidelines, and other documents as determined by the Director.
- B. **Disposal Requirements:** All drainage facilities shall be designed to convey surface runoff and subsurface waters to the nearest available street, storm drain, watercourse, detention basin or other disposal point adequate to accommodate the estimated flow from the proposed development as determined by the Director.
- C. **Water accumulation:** All graded areas shall be designed and constructed such that water is conveyed from the site in a non-erosive manner. Water shall not pond or accumulate in graded areas except where engineered storm water detention systems are available. The conveyance of water shall not adversely affect the stability of any cut or fill slope or any building or structure.
- D. **Protection of adjoining property:** When surface drainage is discharged onto any adjoining property, it shall be discharged in a manner that it will not cause erosion or endanger any cut or fill slope or any building or structure. Runoff water shall not be conveyed to offsite property in a concentrated manner unless directed to an existing watercourse or established drainage easement
- E. **Acceptance of historic runoff:** All grading projects shall be designed to convey the runoff water historically delivered to the site from offsite property to an adequate storm drain or existing watercourse.
- F. **Drainage control on cut and fill slopes:** Cut and fill slopes shall be provided with surface and/or subsurface drainage as necessary for stability and the prevention of increased groundwater seepage onto down-gradient properties. Drainage facilities and terracing for cut or fill slopes steeper than three horizontal to one vertical (3:1) shall conform to the following standards:

1. **Terrace swales or ditches:** Drainage facilities on terraces shall have a gradient of 5 to 12 percent and must be paved with reinforced concrete not less than 3 inches (76 mm) in thickness or an approved equivalent paving. The longitudinal terrace slope and the slope of the ditch or swale shall be equivalent. These facilities shall have a minimum depth at the deepest point of 1 foot (0.3 meter) and a minimum paved width of 5 feet (1.5 meters). A single run of swale or ditch shall not collect runoff from a tributary area exceeding 13,500 square feet (1254.2 sq meters) (projected) without discharging into a down drain. The Director may approve an alternate design prepared by a Civil Engineer.
 2. **Interceptor (Brow) Ditches:** Interceptor ditches shall be provided above all cut slopes exceeding ten feet (10') in height if the tributary drainage area above the cut slopes toward the cut and has a drainage path greater than forty feet (40') measured horizontally. Interceptor ditches shall be designed to accommodate the flow volume and velocity of runoff estimated for a 100-year storm event as determined in a County-accepted drainage report prepared by a Civil Engineer. They shall have a minimum depth of twelve inches (12") and a minimum width of thirty inches (30") measured horizontally across the drain. The Director may approve an alternate design prepared by a Civil Engineer.
 3. **Down drains:** Down drains, drainage outlets and erosion protection for terrace and interceptor ditches shall be designed to accommodate the flow volume and velocity of runoff estimated for a 100-year storm event as determined in a County-accepted report prepared by a Civil Engineer.
- G. **Drainage control on building pads:** Unless waived by the Director, building pads shall have a drainage gradient of two (2) percent toward approved drainage facilities, or a one (1) percent gradient if all of the following conditions exist throughout the permit area:
1. No proposed fills are greater than 10 feet in maximum depth.
 2. No proposed finish cut or fill slope faces have a vertical height in excess of 10 feet.
 3. No existing slope faces steeper than 1 unit vertical in 10 units horizontal (10% slope) have a vertical height in excess of 10 feet.

5. Vehicular ways

- A. **General requirement:** Vehicular ways shall be constructed in accordance with the requirements of Volume II of this manual and applicable California Fire Safe Standards.
- B. **Drainage control:** Vehicular ways shall be graded and drained such that the adjacent slope will not be subject to erosion, flooding or instability. Surface discharge onto adjoining property shall be controlled in such a manner that it does not cause erosion or endanger existing improvements. Drainage shall be directed only into facilities designed to convey the estimated runoff.

- C. **Watercourse crossings:** Bridges and culverts installed in watercourses shall be designed by a Civil Engineer to ensure structural and hydraulic adequacy in accordance with the standards presented in the County Design and Improvement Standards Manual and the County Drainage Manual. A standard County design may be utilized if approved by the Director.

6. Setbacks

- A. **General requirement:** Cut and fill slopes shall be set back from permit area boundaries in accordance with this section. Setback dimensions shall be horizontal distances measured perpendicular to the permit area boundary. For purposes of this section, the terms "permit area boundary" and "site boundary" are synonymous. These boundaries may be property lines or the edge of a specific permit area within a parcel delineated under the terms of an applicable use permit.
- B. **Grading Setbacks:** Cut and fill slopes shall be set back from permit area boundaries in accordance with this section. Setback dimensions shall be horizontal distances measured perpendicular to the permit area boundary. Setback dimensions shall be as shown in the Figure 1.
1. **Top of Cut Slope:** The top of cut slopes shall not be made nearer a permit area boundary line than one fifth the vertical height of cut with a minimum of two (2) feet and a maximum of ten (10) feet. The setback may need to be increased for required interceptor drains.
 2. **Toe of Fill Slope:** The toe of the fill slope shall not be made nearer to the permit area boundary line than one half the height of the slope with a minimum of two (2) feet and a maximum of twenty (20) feet. Where a fill slope is to be located near the permit area boundary and the adjacent off-site property is developed, special precautions shall be incorporated in the work as the building official deems necessary to protect the adjoining property from damage as a result of such grading. These precautions may include but are not limited to: a) additional setbacks, b) provision for retaining or debris walls, c) mechanical or chemical treatment of the fill slope surface to minimize erosion, or d) provisions for the control of surface waters.

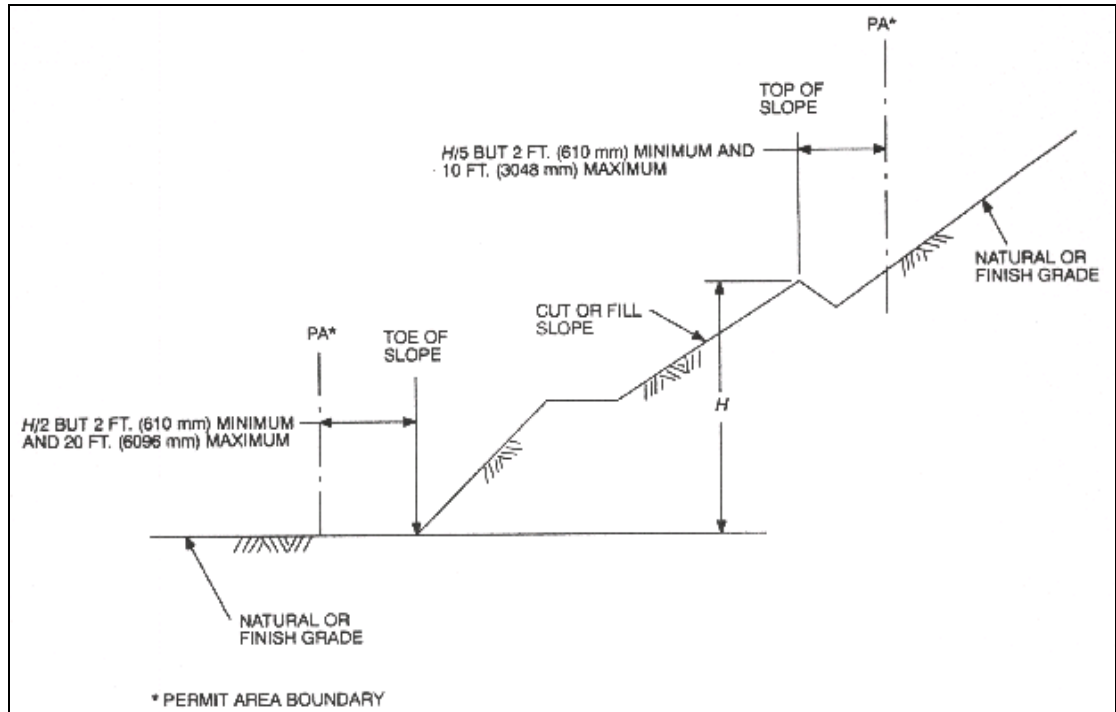


Figure 1: Setback dimensions for graded slopes.

C. **Building Setbacks from Slopes:** Buildings shall be set back from the edge of graded and natural slopes in accordance with this section. Setback dimensions shall be horizontal distances measured perpendicular to the edge of a graded slope. Setback dimensions shall be as shown in the Figure 2.

1. **Top of Descending Slope:** Foundation footings on or adjacent to slope surfaces shall be founded in firm material with an embedment and setback from the slope surface sufficient to provide vertical and lateral support for the footing without detrimental settlement. The setback dimensions indicated in Figure 2 below are deemed adequate, except where the adjacent slope exceeds 100 percent gradient (i.e. greater than 1:1). In the case of slopes that exceed 100 percent, the required setback indicated in Figure 2 below shall be measured from an imaginary plane projecting upward at a 45-degree angle from the toe of the slope.
2. **Toe of an ascending slope:** The setback dimensions indicated in Figure 2 below are deemed adequate, except where the adjacent slope exceeds 100 percent gradient (i.e. greater than 1:1). Where the adjacent slope exceeds 100 percent gradient, the required setback shall be based on the following parameters: The toe of the slope shall be assumed to be at the intersection of a horizontal plane drawn from the top of the foundation and a plane drawn tangent to the slope at an angle of 45 to the horizontal. Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope.

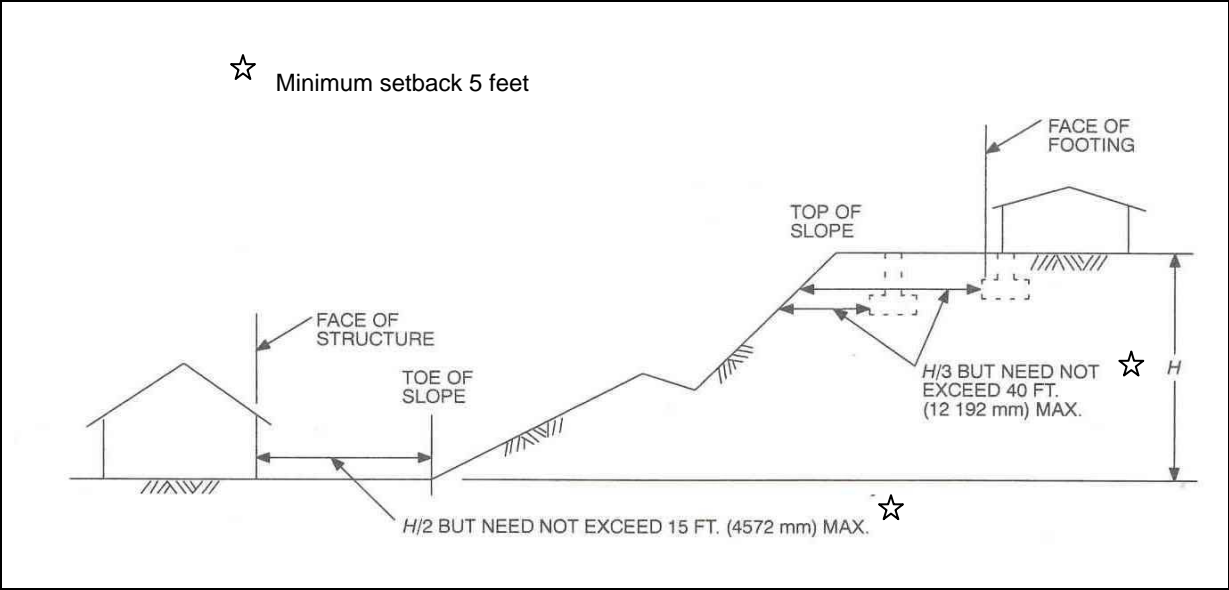


Figure 2: Setback dimensions for buildings from graded and natural slopes.

D. **Modification of Slope Location:** The Director may approve alternate slope setbacks that are consistent with the property line setbacks specified in the County Title 17 Zoning Ordinance. The Director may require an investigation and recommendation by a qualified engineer or engineering geologist to demonstrate that the intent of this section has been satisfied. Such an investigation shall address the height of slope, slope gradient, load intensity and erosion characteristics of the material. Provided below are diagrams that illustrate approved alternate building and accessory structure setbacks for slopes modified with the installation of a retaining wall(s). Such walls require design and analysis by a Civil Engineer and must incorporate surface and subsurface drainage facilities (not shown in diagrams below). Refer to Section C of this volume for retaining wall design standards.

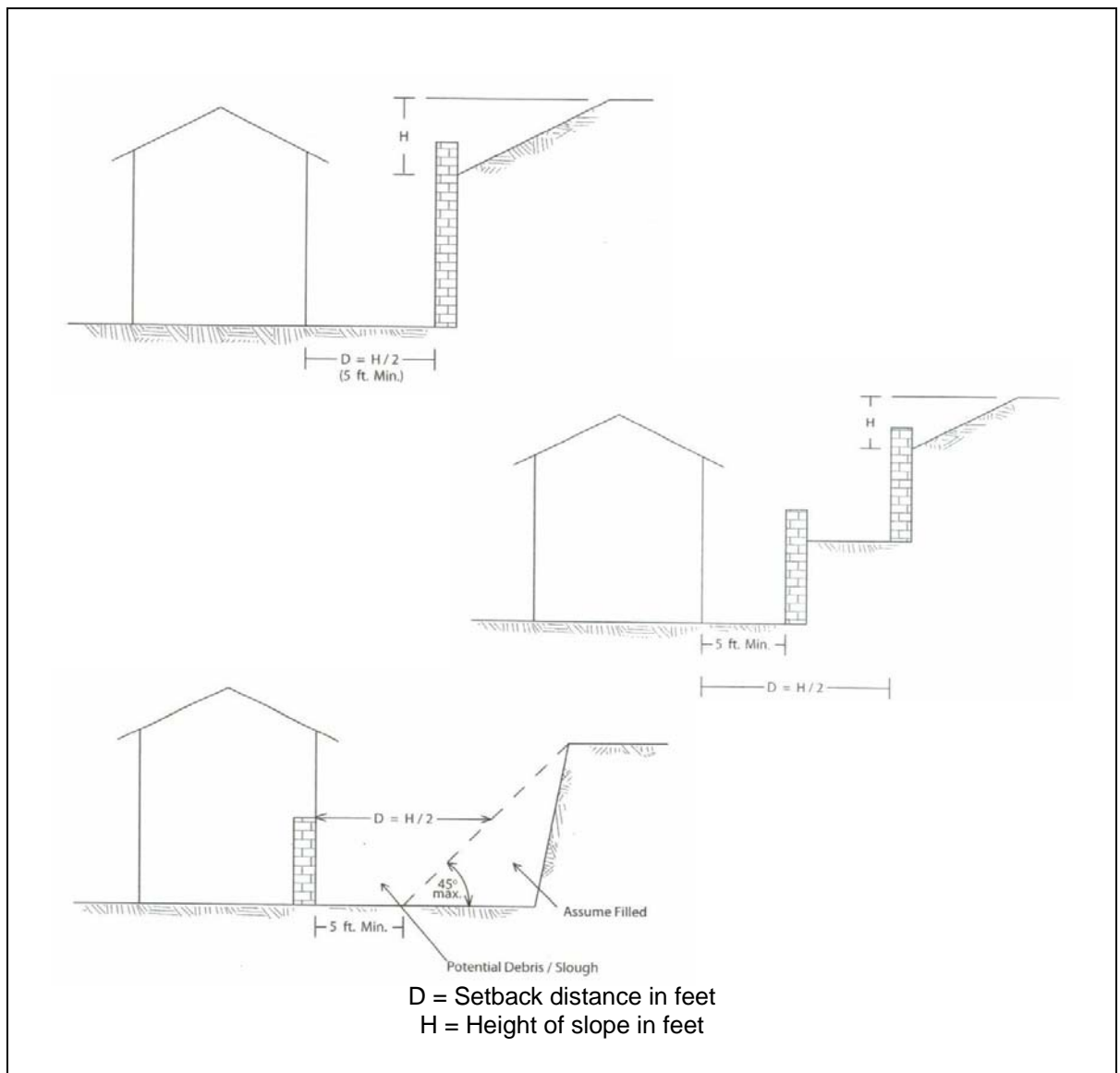


Figure 3(a): Alternate approved setback dimensions.

Section references corrected

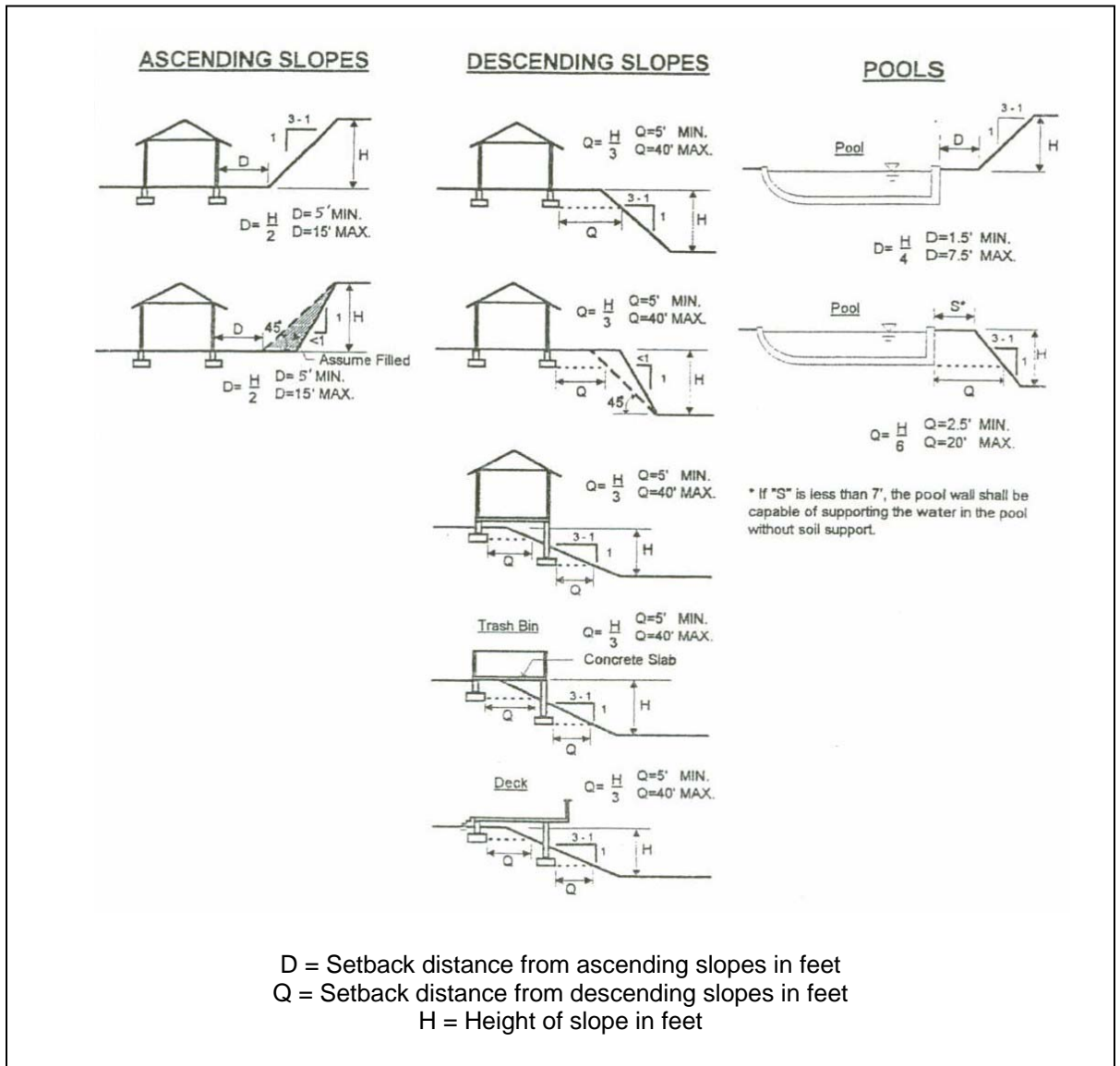


Figure 3(b): Alternate approved setback dimensions.

Section C: RETAINING WALL STANDARDS

1. Overview

For the purposes of this Section, retaining walls are classified into three general categories, each representing retaining walls of similar height of retained earth or similar loading conditions. The definitions which follow should be read carefully before determining a retaining wall's category. After the retaining wall has been categorized, the design requirements of information to be included with the calculations or plans submitted for permit can be obtained from the "requirement" table which follows. Category "I" walls are exempt and do not require a building permit. Otherwise, the following information is applicable to the design and construction of all retaining walls in El Dorado County. Example engineering drawings are shown at the end of this document to illustrate typical retaining wall construction details to be included in the plans. (Note: Retaining walls are subject to the setback and other requirements of the County Title 17 Zoning Ordinance and the County General Plan.)

2. Retaining Wall Categories

- A. **Category I:** Retaining walls exempt from permit that retain less than four feet of earth measured from the bottom of the footing, have a finish grade sloping less than (5) horizontal to (1) vertical above and below the wall, and do not support a surcharge or impound class I, II or III-A liquids.

Exempt retaining walls built on the property line or within a distance equal to the exposed wall face height, measured perpendicular from the property line, shall not be constructed of wood.

- B. **Category II:** Walls retaining between 4 feet and 10 feet of earth (including tiered walls retaining a combined total of no more than 10 feet of earth) that do not support a significant surcharge, and Category I walls on a property line that support a lateral load imposed by a 6 foot high solid fence (now or proposed for the future).

C. **Category III:**

1. Walls that retain more than 10 feet of earth, support a significant surcharge, or are affected by adverse geotechnical conditions.
2. Retaining walls and retaining wall systems designed with complex configuration or construction, including segmental, stacked, and "rockery" walls, walls designed with geogrid soil reinforcing, and tiered walls that retain more than 10 feet of earth. This category also includes unconventional walls where ICBO or ICC approval requires special inspection or other construction review.
3. Walls located within a public road right-of-way.

3. Design Requirements

Design requirements for the non-exempt categories of retaining walls are outlined in the following table and described below. Any required geotechnical documents shall address the type of retaining wall(s) proposed, loading condition(s) and justification of soil parameters.

Requirements	A	B	C	D	E	F	G
Category II		X	X	X	X	X	X
Category III	X			X	X	X	X

- A. Geotechnical report:** A geotechnical report shall be prepared consistent with Section D.4.A of this Volume of the Design and Improvement Standards Manual by an engineer qualified to address all applicable geotechnical issues.
- B. Site Observation:** A site observation shall be made, or equivalent information obtained, by the wall designer (i.e. a licensed professional, or landowner as allowed under Section ~~D.6~~ ~~D-5~~ of this Volume) to determine the site conditions for which the wall is designed. The wall designer shall document the observations in a report to the Director which shall attest that: 1) visible or known adverse geotechnical conditions and design issues identified in Section C.2.C above are not present and 2) the assumptions used in the wall design are adequate and appropriate for the observed conditions. A geotechnical report may be submitted in lieu of a site observation.
- C. Minimum Equivalent Fluid Pressure:** In the absence of recommendations from a geotechnical report, the design may utilize the parameters provided in Table I below.

Table I: Allowable foundation and lateral pressure values.

Classification of Material	Allowable Foundation Pressure PSF	Lateral Bearing PSF/ft of depth	Coeff. of lateral sliding	Total Unit Weight of Soil γ_{tot} (lb./cu. ft.)	Unit Weight of Equivalent Fluid γ_w (lb./cu. ft.)	
					Level Backslope	2:1 Backslope
1. Massive Crystalline Bedrock	4000	1200	0.70	100	30	50
2. Sedimentary and Foliated Bedrock	2000	400	0.35	100	30	50
3. Sandy Gravel and/or Gravel (GW and GP)	2000	200	0.35	100	35	60
4. Sand, silty Sand, clayey Sand, silty Gravel, and clayey Gravel (SW, SP, SM, SC, GM, GC)	1500	150	0.25	80	40	65
5. Clay, sandy Clay, silty Clay, and clayey Silt (CL, ML)	1000	100	TBD	90	70	90

- Cantilevered walls** may be designed for equivalent fluid pressures indicated in Table I for the soil type present and having a depth equal to that of the retained earth. Any surcharge shall be in addition to the equivalent fluid pressure. Surcharges due to sloped backfill, (2) horizontal to (1) vertical (2:1) and flatter, may be accounted for by increasing the equivalent fluid pressure to the Table I value.
- Restrained walls** (buttresses or restrained near the top of the wall only) that retain drained earth may be designed based upon calculations provided by an engineer or qualified designer. In lieu of such calculations, the wall may be designed using the cantilever wall pressure distribution defined above in addition to a uniform distribution, with a magnitude of (10) times the retained

height (10xH), superimposed. Any surcharges shall be in addition to this composite pressure distribution.

3. **Alternatively**, the lateral earth pressure imposed onto the cantilevered or restrained retaining walls may be determined by using Rankine (assumes no wall friction or soil cohesion) or Coulomb or other generally accepted theory.

D. Earthquake (Seismic) Loads: Seismic forces shall be specifically addressed:

1. If the wall is supporting a structure or the surcharge from a structure, except structures defined by the UBC for use by group R division 3 and group M occupancies.
2. If the wall is protecting a structure, except structures defined by the UBC for use by group R division 3 and group M occupancies.
3. If the exposed wall face is over 12 feet.
4. If the wall is protecting a required exit or is part of a structure defined by UBC Table No. 23-K Occupancy Categories: I. Essential facilities, II. Hazardous Facilities or III. Special Occupancy Structure.
5. If the wall is a "rockery" wall.
6. If required by the design professional or the Director.
7. At the discretion of the design professional, the seismic thrust may be evaluated with the pseudo-static Mononabe-Okabe equation. Alternatively, walls may be designed using the approximated value of the resultant seismic force = $14H^2$ positioned 0.6H above the top of the footing or base, where "H" is the retained earth height.
8. In addition, Mechanically Stabilized Earth wall designs shall include the horizontal inertia force of the reinforced fill. The Mononabe-Okabe inertia force equation may be utilized. Alternatively, walls may be designed using the approximated value of the inertia force = $20HL$ positioned 0.5H above the base, where "H" is the retained earth height and "L" is the depth of reinforced fill.

E. Analysis and Design:

1. **Design Professional:** Retaining walls shall be designed by an engineer or architect registered in the State of California in accordance with the Business and Professions Code.
2. **Design:** Retaining walls shall be designed to withstand lateral earth and or fluid pressures, including any live and dead load surcharge, the self weight of the wall, and earthquake loads in accordance with accepted engineering practice, the UBC and all applicable ICBO reports.
3. **Backfill and drainage:** Drainage behind walls should be provided by a 12-inch-wide (minimum) continuous blanket of free-draining granular material such as Caltrans Class 2 permeable material or equivalent extending from the base of the wall to within 1 foot of the ground surface. The top 1 foot of backfill shall consist of material capable of reducing the potential for surface water to enter the wall drain. Water collected behind the wall shall be drained by weep holes, open joints or rigid perforated pipes (perforations down) placed at the base of the wall within the permeable material. Pipes should be sloped to maintain positive drainage, and be connected to solid pipe at the ends of the wall to convey drainage to daylight, storm drain or other suitable location for disposal. Additional drains shall be placed wherever water can be impounded by the construction facilities.

4. **Material restriction:**
 - a. Retaining walls built on the property line or within a distance equal to the height of the exposed wall face, measured perpendicular from the property line, shall not be constructed of wood. These walls shall also be designed to support the lateral load imposed by a (6) foot high solid fence (new or future).
 - b. Chinking shall not be used on the exposed face of rockery walls.
 - c. The minimum weight of cap rocks on rockery walls shall be 200 pounds.
5. **Temporary shoring:** Restrained walls shall not be backfilled until restrained connection and supporting elements are completed or temporary shoring is in place.
6. **Safety factors:** Walls shall be designed for the following minimum factors of safety. Factors of safety against sliding and overturning failure under combined loading (seismic load included) may be reduced to 75% of the static safety factors.

External Stability Criteria	
Failure Mode	Factor of Safety
Soil Bearing Capacity	2.0-3.0
Sliding	1.5
Overturning	1.5
Overturning of MSE* walls	2.0
Supporting elements of a restrained wall	1.5
Global stability	1.5

* Mechanically Stabilized Earth system

7. **Minimum concrete strength:** Concrete retaining walls designed to resist earthquake loads shall be constructed of concrete with a minimum strength of 3000 pounds per square inch (psi).
8. **Sliding failure mode:** Friction force and passive soil pressure shall not be combined to resist sliding unless technical justification is provided and approved. Passive soil pressure within the top 12" or above the frost line must be neglected.

F. Engineered drawings:

Plans submitted for permit shall be drawn to scale with sufficient detail to describe the nature and extent of the work proposed. They shall include a site plan showing the location of the proposed wall with respect to existing structures and property lines and easements, a plan view of the wall itself with top of wall and bottom of wall elevations and finish grade contours, cross section(s). An elevation view(s) shall be provided if the wall has a complex configuration with steps, differing lengths and locations of steel reinforcing or wall thickness, or if the wall has varying geogrid layer locations and lengths. Information on these plans shall be complete and legible to help facilitate the review and inspection process. Required or desired special inspections and structural observations shall be noted on the plans together with compaction and other soil test requirements. These drawings shall be approved, stamped and wet signed by the design professional. Examples of typical drawings illustrating various wall types and materials and plan information to

be shown are included at the end of this section, as follows:

Typical Retaining Wall Drawings	
Drawing #1	Pictorial glossary of retaining wall types
Drawing #2	Cross section of a Category A exempt retaining wall
Drawing #3	Cross section of a restrained retaining wall constructed of reinforced concrete
Drawing #4	Cross section of a cantilevered retaining wall constructed of reinforced masonry
Drawing #5	Cross section of a gravity and Mechanically Stabilized Earth retaining wall with segmental wall face
Drawing #6	Elevation of a stepped segmental wall with grid layers
Drawing #7	Cross section of terraced wall system
Drawing #8	Plan view of retaining wall
Drawing #9	Retaining wall type: Rockery Typical Section
Drawing #10	Retaining wall type: Rockery Partial Typical Profiles

G. Inspections: The following schedules give an abbreviated description of the minimum inspections required for retaining walls:

1. Inspections by County staff:

a. Reinforced Concrete retaining walls

Inspection	Scope of Inspection
1 st	Footing pad and size, key size, reinforcement, soil condition at toe. Discuss special inspection procedures (if applicable).
2 nd	Prior to concrete pour. Wall forms and reinforcement (must be accessible). Anchor bolts and hardware placement.
3 rd	Drain(s), wall waterproofing, restrained support or temporary shoring per design professional. Discuss drain rock and backfill compaction procedures.
Final	Drain to daylight. Weep holes, restrained support, erosion control, backfill compaction report, special inspection report.

b. Block (Masonry) retaining walls

Inspection	Scope of Inspection
1 st	Footing pad and size, key size, reinforcement, soil condition at toe. Discuss special inspection procedures (if applicable).
2 nd	4 foot lift, prior to grout pour. Block, mortar joints, reinforcement and grout cells
3 rd	Top lift, prior to last grout pour. Block, mortar joints, reinforcement and grout cells. Anchor bolts and hardware placement.

4 th	Drain(s). Wall waterproofing. Restrained support or temporary shoring per design professional. Discuss drain rock and backfill compaction procedures.
Final	Drain to daylight. Weep holes, restrained support, erosion control, backfill compaction report, special inspection report.

c. Segmental or MSE retaining walls

Insp ection	Scope of Inspection
1 st	Footing/leveling pad. Batter (if any). Discuss Special Inspection procedures (if applicable), drain(s), and backfill compaction.
2 nd	Lowest layer of grid or third course of modules. Permeable drain material. Batter. Backfill compaction report. Grid, type, length, taut.
3 rd	Mid layer of grid or mid course of modules. Permeable drain material. Batter. Backfill compaction report. Grid, type, length, taut.
Final	Drain to daylight. Cap layers, batter, erosion control, backfill compaction report, special inspection report.

d. Rockery retaining walls

Inspection	Scope of Inspection
1 st	Footing/leveling pad. Batter (if any). Discuss Special Inspection procedures (if applicable), drain(s), and backfill compaction.
2 nd	Mid-height of wall. Permeable drain material. Batter. Backfill compaction report
Final	Drain to daylight. Cap layers, batter, erosion control, backfill compaction report, special inspection report.

2. **Special inspections:** After excavation, the following special inspections shall be performed by the designer or a certified inspector acceptable to the Director; and testing shall be performed by a qualified testing agency acceptable to the Director.

Special Inspection and Testing		
Item	Continuous	Periodic
Soil Compaction		X
Reinforced Concrete	X	
Structural Masonry	X	
Shotcrete	X	
Segmental or Rockery Wall placement		X
Grids and Tie Backs		X
ICBO/ICC Report Criteria	As Specified	As Specified
Structural Observation	As Specified	As Specified

- a. **Compaction testing** of soil backfill (excluding self-compacting drain rock) shall be per the engineer's specifications but not less than every 24" of lift and every 50 lineal feet of length
- b. **Segmental or Mechanically Stabilized Earth (MSE) walls** shall be constructed under the observation of the designer, and shall include review of the footing pad, base course and geogrid placement, face batter, wall facing cavity (if any) backfill, review of compaction testing, and overall compliance with the plans.
- c. **Rockery walls** shall be constructed under the observation of the designer, and shall include review of the footing pad, rock and backfill placement, review of compaction testing, and overall compliance with the plans.
- d. **Soil condition observation:** Soil characteristics shall be observed by the designer to confirm that they are consistent with the assumptions used in wall design.
- e. **Inspection reports:** Compaction and Special Inspection or Structural Observation reports shall be provided at the time of inspection by the County. Reports not prepared by the designer shall be reviewed and approved or found acceptable by the designer before being provided to the County. All final observation reports shall be provided prior to final inspection by the County.

Section D: GRADING PERMIT APPLICATION SUBMITTAL REQUIREMENTS

1. Grading plans: Grading plans submitted to the County in support of a permit application shall be prepared by qualified individuals as discussed in Section D.5 below and shall include the following:

- A **Certification**: The signature and professional stamp of a Civil Engineer except as provided in Section D.5 ~~C.5~~ of this volume.
- B **Plan size**: Plans shall be submitted on sheets 24 inches by 36 inches unless an alternate paper size has been approved by the Director.
- C **Number of copies**: A minimum of three complete sets of grading plans shall be submitted.
- D **Title block**: Plans shall be entitled "Grading Plan" and state the purpose of the proposed grading. The name of the engineer responsible for plan preparation and the Project Engineer (as defined in Section A.59 ~~A.54~~ of this Volume) shall be listed. The title block shall be located at the lower right corner or along the right edge of the plan sheet.
- E **Topographic features**: Accurate contour lines drawn at intervals not greater than two feet of elevation, unless an alternate interval has been authorized by the Director, depicting topographic features and drainage patterns and the configuration of the ground before and after grading in the area proposed to be disturbed and immediately adjacent areas, relative to a bench mark established on-site. Topographic maps shall be prepared by an engineer, surveyor or other qualified person.
- F **Limits of grading**: The plans shall clearly delineate the boundaries between areas of cut, areas of fill placement, and areas that would remain at natural or pre-existing grade.
- G **Property boundaries**: Property lines and easements shall be clearly marked.
- H **Construction details**: Construction details for roads (including structural pavement sections), man-made watercourses, culverts, bridges and drainage devices, retaining walls, cribbing, dams, and other improvements existing or to be constructed, together with supporting calculations and maps as required.
- I **Cross sections**: Cross-sections, profiles, elevations, dimensions and construction details shall be provided based on accurate field data.
- J **Erosion control**: A detailed erosion and sediment control plan prepared consistent with the standards listed in Section D.2 ~~C.2~~ of this Volume.
- K **Landscape plan**: When required by the Director, a landscaping plan, including temporary erosion control plantings, permanent drought-resistant slope plantings, replacement of temporary groundcover, and irrigation facilities. (Not required for an Agricultural Grading Permit.)
- L **Material volume estimate**: An estimate of the quantities of excavation and fill, adjusted for anticipated swell or shrinkage.
- M **Stockpiles and borrow sites**: The location of any on-site stockpile, borrow site, or location for storage of surplus material.
- N **Project Engineer**: The name and contact information of the Project Engineer, as defined in Section A.59 ~~A.54~~ of this Volume, shall be identified on the plans.

- O **Certificate block:** A Certificate block (i.e. signature block for licensed professionals) as required by the Director, shall be provided on the cover sheet of the project plans.
- P **Cost estimate:** The applicant shall submit a detailed cost estimate covering the proposed work, except if the project is limited to the grading associated with a single family dwelling.

2. **Erosion and sediment control plans:** Erosion and sediment control plans prepared pursuant to this Volume shall comply with the adopted County Storm Water Management Plan (SWMP) and all of the following:

A **General requirements:**

1. Erosion and sediment control plans shall be designed to prevent increased discharge of sediment at all stages of grading and development from initial disturbance of the ground to project completion and shall be consistent with all local, state, and federal rules and regulations.
2. Plans shall be designed with long-term erosion and sediment control as a primary consideration. Every feasible effort shall be made to ensure that site stabilization is permanent.
3. Plans shall indicate the timing of each erosion control measure proposed relative to the stage of construction.
4. Short-term and long-term erosion control measures must be included in all plans. Implementation of short-term measures, however, may not be necessary based on the timing of completion of grading operations.
5. Runoff shall not be discharged from the site in quantities or at velocities substantially above those which occurred before grading except into drainage facilities found by the Director to be adequate to convey the estimated increase in runoff.

B **Criteria for when an Erosion Control Plan is required:** An erosion and sediment control plan shall be required whenever:

1. The graded portion of the site includes more than ten thousand (10,000) square feet of area for a non-agricultural grading project or more than one acre of area for an agricultural grading project.
2. There is a significant risk that more than two thousand five hundred (2,500) square feet will be unprotected or inadequately protected from erosion during any portion of the rainy season.
3. Grading will occur within twenty feet of any pre-existing watercourse.
4. Grading would occur within the 100-year event flood plain.
5. The Director determines that the grading could potentially result in significant erosion or sediment discharge.

C **Depiction on plans:** The erosion and sediment control plan need not be a separate sheet if all facilities and measures can be shown on the grading sheets without obscuring the clarity of either the grading plan or the erosion and sediment control plan.

D **Revegetation:** Erosion and sediment control plans shall include an effective revegetation program to stabilize all disturbed areas which will not be otherwise protected. All such areas where grading has been completed between May 1st and October 15th shall be planted and stabilized as soon as possible after the completion of grading but in no case later than by October 15 or at the

recommendation of the Resources Conservation District or the Natural Resource Conservation Service. Graded areas disturbed at other times of the year shall be planted within fifteen days after the completion of the work. If revegetation is infeasible or cannot be expected to stabilize an erodible area with assurance during any part of the rainy season, additional erosion and sediment control measures shall be required as appropriate to prevent increased sediment discharge. During the rainy season, the smallest practical area of erodible land shall be exposed at any one time. Adequate provision shall be made for long-term maintenance of permanent erosion-control vegetation.

- E **Professional recommendations:** Erosion and sediment control plans shall comply with the recommendations of the Civil Engineer, Geotechnical Engineer, Engineering Geologist, or Landscape Architect as incorporated in the approved grading plans.
- F **Engineered facilities:** The structural and hydraulic adequacy of all storm water containment or conveyance facilities shown on the erosion and sediment control plans shall be certified by a Civil Engineer through stamp and signature on the accepted plans. Sufficient calculations and supporting material to demonstrate such adequacy shall accompany the plans when submitted. Adequate provision shall be made for long-term maintenance of permanent erosion-control and sediment-control structures.
- G **Site conditions:** Erosion and sediment control plans shall be designed to address the soil, geologic and precipitation field conditions that can be anticipated during the proposed construction season.
- H **Topsoil salvage:** No topsoil shall be removed from the site unless otherwise directed or authorized by the Director. Topsoil overburden shall be stockpiled and redistributed within the graded area after rough grading to provide a suitable base for seeding and planting. Runoff from the stockpiled area shall be controlled to prevent erosion and resultant sedimentation of receiving water.
- I **Inspection and repair:** Erosion and sediment control plans shall provide specific procedures for inspection and repair of all erosion and sediment control facilities at the close of each working day during the rainy season and for sediment cleanout and vegetation maintenance.
- J **Compliance:** Erosion and sediment control plans shall comply with any and all standards and specifications adopted herein for the control of erosion and sedimentation on grading sites. Vegetation establishment practices shall be in general compliance with the current edition of the *Vegetation Establishment Guidelines for the Sierra Nevada Foothills and Mountains* published by High Sierra Resource Conservation and Development Council.

3. Technical reports-Criteria for submittal: Certain technical reports may be required as part of a grading permit application. The types of reports, the qualifications of the report preparer and the circumstances under which a report is required are discussed below:

- A. **Geotechnical Report:** A geotechnical report prepared under the direct supervision of and signed by a Geotechnical Engineer or qualified Civil Engineer shall be submitted at the time of application if:
 1. Such a report is required by the Director to be included in the application.
 2. Expansive soil or other condition is present that could adversely affect the proposed project. The Director may require specific provisions be made in

project design and construction to safeguard against damage due to soil expansiveness or other condition.

3. Slopes are proposed to be constructed at a gradient exceeding 50 percent (2H:1V).
4. Proposed fills would be comprised of more than 35 percent rock by weight.
5. Such a report is required by the California Building Code due to the scope of the project.

B. Geologic Report: A geologic report prepared under the direct supervision of and signed by a Certified Engineering Geologist or qualified Professional Geologist shall be submitted at the time of application if:

1. Such a report is required by the Director
2. The project is located in an area of known geologic hazards such as unstable slopes, collapsible soils, severe erosion, rockfall or seismically-induced ground failure.

C. Drainage Report: A drainage report prepared by a Civil Engineer in conformance with the design criteria provided in the County Drainage Manual is required with all grading permit applications unless:

1. The requirement is waived by the Director for minor projects where a study is not required by another regulatory agency.
2. The project involves development of a single family dwelling. (The Director may require a drainage study due to special circumstances or the requirements of another regulatory agency.)

D. Soil Capability Report: A report on the agricultural capability of the topsoil based on the Natural Resources Conservation Service soils survey of El Dorado County shall be submitted at the time of application for an agricultural grading permit if:

1. It is required by the Director.
2. More than 500 cubic yards of topsoil are proposed to be disturbed.

4. Technical Reports-Required content: The technical reports required by the County shall be prepared as follows:

A. Geotechnical report: The geotechnical study report shall be based on observations and tests of the material exposed by exploratory borings or excavations and inspections made at appropriate locations. Additional studies may be necessary to evaluate soil and rock strength, the effect of moisture variation on soil bearing capacity, compressibility, expansiveness, stability, and other factors. The report shall contain all of the following components that are applicable to the proposed work:

- 1 A plot plan showing the location of all exploratory borings and excavations.
- 2 Descriptions and classifications of the materials encountered.
- 3 Elevation of the water table, if encountered, and a description of other moisture conditions observed.
- 4 Recommendations for foundation type and design that address bearing capacity, the potential for liquefaction, and the effects of expansive or weak soils.
- 5 Recommendations for retaining wall type and design, including measures to address the effects of any adjacent loads.

- 6 Expected total and differential settlement.
- 7 A vicinity map showing the regional setting of the site.
- 8 Laboratory test data pertinent to the evaluation of the nature, distribution and strength of existing soils.
- 9 A general description of the geology of the site.
- 10 A description of the geotechnical study techniques employed.
- 11 A log for each exploratory boring and excavation showing the elevation at ground level, the depths from which samples were recovered and the depth of each soil or rock strata.
- 12 An evaluation of the stability (including potential soil creep) of any proposed cut and fill slopes and proposed retaining walls.
- 13 Recommendations for grading procedures and specifications, including excavation and fill placement.
- 14 Recommendations regarding drainage and erosion control.
- 15 Recommendations for pavement design.
- 16 Recommendations for testing and inspection during construction.
- 17 Recommended seismic design parameters.
- 18 Geotechnical Design Criteria:
 - a. Unit weight of the soil.
 - b. Cohesion of the soil.
 - c. Angle of internal friction of the soil (Phi).
 - d. Equivalent fluid pressure.
 - e. Allowable bearing pressure of the soil.
 - f. Earth pressure from expansive or unstable soils.
 - g. Freeze/thaw depth.
 - h. Friction factor for resistance to lateral loads.
 - i. Passive pressure for resistance to lateral loads.
 - j. Drain rock/filter fabric requirements.
 - k. Erosion protection and maintenance requirements.
- 19 The signature and professional stamp of the Geotechnical Engineer or qualified Civil Engineer.

B. Geologic Report: The soil or geologic study report shall contain all of the following as they may be applicable to the subject site.

- 1 A vicinity map showing the location of the site relative to known cultural features such as towns and roads.
- 2 A topographic map of the site upon which the location of all borings, trenches and other exploratory excavations are marked.
- 3 A description of the geology of the site and geology of the adjacent areas that may affect or be affected by the proposed development. This description shall include a discussion of the character of each rock unit exposed and the structural geology of the site.
- 4 A geologic map of the site drawn on an accurate topographic base map that delineates the distribution of rock units and structural features (bedding, faults, landslide deposits, etc.).
- 5 Geologic cross-sections that accurately depict the rock structure underlying the site.
- 6 A description of any groundwater encountered in exploratory excavation or observed to discharge on the site.
- 7 A description of the study techniques employed.

- 8 A written description and a scaled graphic log of each boring, trench and exploratory excavation.
- 9 An evaluation of the stability of natural slopes that could affect or be affected by the proposed development. The source of the material strength parameters used in the evaluation of slope stability shall be documented in the report. The scope of any required slope stability analysis shall be determined by the Director.
- 10 Recommendations regarding drainage and erosion control;
- 11 Recommendations for the mitigation or avoidance of identified geologic hazards. Pursuant to Section 6835 of the Geologists and Geophysicists Act, the report and all maps, plans, specifications, and other graphic materials shall be signed or stamped by the Professional Geologist or Certified Engineering Geologist responsible for the work.

C. Drainage Report: All drainage reports shall be prepared under the direct supervision of, and signed and stamped, by a Civil Engineer in conformance with the guidelines and design criteria provided in the County of El Dorado Drainage Manual, as currently adopted by the Board of Supervisors. These reports shall contain, at a minimum, the following:

1. A vicinity map showing the location of the site relative to known cultural features such as towns and roads.
2. A topographic map of the site upon which the location of all watershed boundaries and watercourses are marked.
3. Calculations that estimate the pre-project and post-project runoff.
4. Recommendations for placement and design of any necessary drainage facilities.

D. Soil Capability Report: Soil Capability reports shall be based upon the Natural Resources Conservation Service soils survey of El Dorado County and shall include the following components:

1. A plot plan of the subject property with a vicinity map.
2. Descriptions and classifications of the materials encountered.
3. A description of the hydrology of the site, including the elevation of the water table.
4. Recommendations for tillage and erosion control practices.

5. **Qualifications of plan preparers:** In accordance with State Law, the preparers of site grading and drainage plans are required to meet certain licensing qualifications as outlined below.

- A **Topographic surveys:** Surveys of existing grades for the purpose of preparing a site grading and drainage plan shall be performed by either a Land Surveyor or any Civil Engineer.
- B **Grading and Drainage Plan:** Preparation of a site grading and drainage plan must be prepared by a Civil Engineer, except as otherwise allowed under Section D.6 of this Volume.
- C **Driveway profile:** The preparation of a profile for a driveway shall be prepared by either a Land Surveyor or any Civil Engineer.
- D **Plot plan:** Plot plans indicating the location of all structures relative to property lines must be prepared by a licensed Land Surveyor or a Civil Engineer licensed

before January 1, 1982 if the work includes the determination of property boundaries. A Civil Engineer licensed after January 1, 1982 may prepare a plot plan as described above provided that the property boundaries have been delineated on the site by a licensed Land Surveyor (or a Civil Engineer licensed prior to January 1, 1982) in accordance with Section 8726 of the Business and Professions Code. For minor projects that do not involve new buildings, the Director may accept for permit processing alternative information that meets the intent of these requirements.

- E **Plan of existing conditions:** Site plans indicating “existing” drainage and access improvements are considered topographic surveys and must be prepared by a Land Surveyor or Civil Engineer.

6. Waiver of the requirement for engineer prepared plans: The requirement that grading plans submitted for County review be prepared, signed and stamped by a Civil Engineer may be waived by the Director if all of the following conditions are met:

- A The proposed grading would not endanger public health, safety or welfare.
- B Cuts and fills do not exceed a combined total of five hundred (500) cubic yards.
- C The grading does not involve an access road serving three or more existing or potential residences.
- D A fill intended to support structures is not proposed;
- E All proposed cuts or fills would be designed to avoid adverse affects on any adjacent structure or property;
- F The construction of drainage or sediment-control structures, culverts or facilities would not be required.
- G The alteration of an existing drainage course would not occur;
- H An unstable slope condition would not be created..
- I The grading would not affect the channelized flow of the 100-year storm event.
- J The plan is prepared by the property owner of record for the subject parcel as allowed under Section 6744 of the Business and Professions Code.
- K The submitted plans meet all other requirements of the County Design and Improvement Standards Manual.

7. Distribution and use of approved plans: Two sets of approved plans and specifications shall be retained by the Director and one or more sets of approved and dated plans and specifications shall be provided to the applicant or his engineer.

Section E: GRADING PERMIT PROCESSING PROCEDURES

1. Review of permit applications: The design of proposed grading projects shall be reviewed for consistency with the El Dorado County General Plan, the County Zoning Ordinance, the California Building Code, conditions of approval from discretionary actions by the County, the requirements of Chapter 15.14 of the County Code (i.e. the County Grading Ordinance), the County Drainage Manual, this manual and other applicable regulations. Only grading projects found consistent with all applicable design standards, laws and regulations, and conditions of approval may be issued a grading permit.
2. County review of technical reports: Any engineering, geotechnical or geologic study report shall be subject to the review and acceptance of the Director. As part of the Director's review of the submitted report, supplemental reports and data may be required prior to report acceptance. Reports may be found inadequate for County use by the Director based on inaccurate description of the conditions on the project site, failure to address the technical issues identified by the County, failure to meet established standards of professional practice, the lack of clear professional recommendations, or the lack of an original signature and stamp affixed by the licensed professional responsible for the work. Recommendations included in reports accepted by the Director shall be incorporated in the final plans and specifications.
3. Compliance with CEQA: The California Environmental Quality Act (CEQA) may require the preparation of environmental documents concerning a proposed grading project. In such event, El Dorado County may function as the lead agency or a responsible agency. The Director will advise the applicant as to any additional information required with the permit application. The applicant shall be required to pay all costs associated with the preparation and processing of an environmental document. The County shall decide whether to prepare the document itself or retain a consultant(s) to prepare the document.
4. Public Right-of-Way: No person shall perform any grading work, place obstructions of any semi-permanent nature, or place permanent structures within the right-of-way of a public road or street, or within a public easement under the jurisdiction of the county of El Dorado, without prior approval of the Director.
5. Standard conditions of approval:
 - A **Compliance with Ordinance and the General Plan:** Natural features, including vegetation, oak trees, watercourses, wetlands, steep slopes and similar resources shall be preserved consistent with the policies of the El Dorado County General Plan, any applicable Specific Plan, the requirements of the County Zoning Ordinance, the conditions of approval of any applicable subdivision map or discretionary permit, the Oak Tree and Wetlands Preservation standards included in Volume IV of this manual, and the requirements of the grading permit under which the work is conducted. Notwithstanding any other requirement, these natural features shall be preserved to the extent feasible.

- B Consistency with County design standards:** The proposed grading shall conform to the design standards established in this manual.
- C Follow-up to a discretionary approval:** Where a proposed grading project would implement a discretionary permit approval (ie., special use permit, subdivision of land, etc), no grading permit shall be issued prior to approval of the discretionary use by the applicable planning authority.
- D Compliance with terms of approval:** The permit shall be limited to work shown on the grading plans as approved by the Director. In issuing a permit, the Director may impose any condition of approval deemed necessary to protect the health, safety and welfare of the public, to prevent the creation of a hazard to public or private property, and to assure proper completion of the grading, including but not limited to:
1. Mitigation of adverse environmental impacts disclosed in any environmental document.
 2. Reconfiguration of any existing graded surface to comply with the standards of this Volume;
 3. Installation of fencing or other protective devices to avoid work site hazards or environmental damage.
 4. Requirements for dust, erosion, sediment and noise control, hours of operation and season of work, weather conditions, sequence of work, access roads and haul routes;
 5. Requirements for safeguarding watercourses from deposition of sediment or debris in quantities exceeding natural levels;
 6. Requirements for safeguarding areas reserved for on-site sewage disposal;
 7. Demonstration by the applicant, through adequate engineering or geologic analysis and report, that the site of the proposed grading activities is not subject to unstable slopes, substantial settlement, erosion, flooding or seismic hazards or that such hazards are adequately mitigated by the design recommendations included in the submitted report(s).
 8. Demonstration by the applicant of compliance with State or Federal regulations. A Grading Permit issued by a department of the County of El Dorado shall not relieve the permittee of responsibility for securing other permits or approvals as required by other County agencies or agencies of the State or Federal government.
- ~~**E. Location of property lines:** Whenever the location of a property line or easement or the title thereto is disputed during the application process or during a grading operation and Lis Pendens has been filed, permit application processing and grading operations shall be suspended. The Director may require specific measures to be immediately implemented to ensure stabilization of the site. A survey by a licensed Land Surveyor or qualified Civil Engineer, or resolution of title by a decision of the courts, all at the expense of the applicant, may be required by the Director prior to permit issuance or the resumption of the grading operation. [This section deleted by the Board of Supervisors on 3-13-07.]~~
- F. Changed conditions:** Where conditions encountered in the grading operation deviate from that anticipated in the geotechnical and geologic study reports, or where such conditions warrant changes to the recommendations contained in the original studies, revised reports may be required by the Director.

- G. Safety:** Excavations shall not endanger life or property. Access to any temporary or permanent excavation that constitutes a potential safety hazard, as determined by the Director, shall be restricted by fencing or other barrier as long as such hazard exists. Excavation safety measures shall conform to any applicable CAL-OSHA standards.
- H. Setbacks:** Grading and other development shall be set back from property boundaries, established easements, creeks or other water bodies, steep natural slopes and other resources as required by the El Dorado County General Plan, the County Zoning Ordinance, the conditions of approval of any applicable subdivision map or discretionary permit, and the California Building Code. Setback distances may be increased based on a recommendation included in a geotechnical or geologic report found adequate by the Director. Any request for a reduced setback would require similar documentation and would be reviewed for consistency with the General Plan, Zoning Ordinance and other applicable regulations.
- I. Protection of Levees:** No person shall excavate or remove any material from, or otherwise alter, any levee required for river, creek, bay, or local drainage control, without prior approval of the local governmental agency responsible for the maintenance of the levee.
- J. Obstruction of storm waters:** Grading activities that obstruct, divert, impede or interfere with the natural flow of storm waters within man-made channels or natural watercourses are prohibited unless it is demonstrated to the satisfaction of the Director that all of the following are true:
1. The proposed activities will not cause flooding or exacerbate an existing flooding condition as documented in a County-accepted drainage report conforming to the requirements set forth in the County of El Dorado Drainage Manual.
 2. The proposed activities would not result in severe or ongoing erosion.
 3. The applicant is in compliance with applicable sections of the State of California Water Code, State of California Fish and Game Code, The National Clean Water Act, the county Storm Water Management Plan, and other applicable local, state, and federal laws.

6. Tahoe Basin special conditions of approval:

- A. General:** All grading projects shall conform to the rules and regulations of the Tahoe Regional Planning Agency (TRPA).
- B. Grading season:** Grading shall be prohibited during the period from October 15th through May 1st unless otherwise provided by this Volume. The County requires complete winterization of any project by October 15th pursuant to Section 64.2 of the TRPA Code of Ordinances.
- C. Other agencies:** All grading work shall conform to any restriction required by other federal, state, or local agencies.
- D. Applicability:** Except for Section ~~15.14.140~~ ~~45.44.150~~ (Exemptions), the provisions of the County Grading, Erosion and Sediment Control Ordinance, Chapter 15.14 of the County Code, shall apply to grading activities in the Tahoe Basin.
- E. Permit waivers:** The Director may waive the requirement for a grading permit if the work complies with all the following conditions:

1. The excavation does not exceed five (5) feet in vertical depth at its deepest point measured from the existing ground surface, there is not a reasonable possibility of interception of a water table, and the volume of earth moved does not exceed three (3) cubic yards.
2. The fill does not exceed three (3) feet in vertical depth at its deepest point measured from the original ground surface and the fill material does not exceed three (3) cubic yards per site.
3. Disturbance, injury, or removal of vegetation has been authorized by a TRPA project approval in accordance with Section 65.2 of the TRPA Code of Ordinances.

7. **Grading plans for stockpiles:** Plans submitted for a stockpile permit application must comply with the application requirements listed in this Volume. The plan must also contain all of the following:

- A The estimated date the stockpile will be removed from the site. This date shall not exceed one year from the date of initial placement. At the discretion of the Director, an extension of time may be granted for good cause shown.
- B A prominent note stating that the final inspection shall not be complete until all of the stockpiled material has been removed from the site, or utilized as part of a permitted development project, and that all required permanent erosion control devices and materials are in place.
- C A written statement signed by the landowner that acknowledges and accepts the following:
 1. The landowner authorizes the placement, temporary storage and removal of earth materials on the subject property as specified in the approved grading plans.
 2. The landowner is solely responsible for the stockpile and for compliance with the terms and conditions of approval included in any relevant permit.
 3. The person (named) submitting the permit application is acting as an agent of the landowner.

8. **Modification of approved plans:**

- A Requests for modifications of an approved final plan shall be submitted to the County for review and written approval by the Director.
- B All necessary geotechnical and geological information, as determined by the Director, and all design details shall accompany any proposed modification.
- C The proposed modification shall be consistent with any applicable subdivision map or use permit conditions of approval.

9. **Transfer of professional responsibility prior to permit issuance:** If the civil engineer, the geotechnical engineer, or the engineering geologist of record (i.e. the professional responsible for project design) is changed prior to permit issuance, it shall be the duty of the permittee to notify the building official in writing of such change and to provide documentation that a replacement(s) has agreed to accept responsibility within the required area(s) of technical competence. The permit shall not be issued until such documentation is provided.

10. Water Impoundments

- A. **DSOD-Regulated:** Water impoundments involving a dam greater than twenty-five feet in height or storage of more than fifty acre-feet of water (or other design thresholds currently adopted by the State) are under the jurisdiction of the State of California Department of Water Resources, Division of Safety of Dams (DSOD). The height of a dam shall be measured from the lowest elevation of the outside limit of the dam to the maximum possible water storage elevation (i.e. the spillway elevation). Such reservoirs require a grading permit issued by the County with engineering review and approval by DSOD. The grading permit can only be issued if the project is found in conformance with County regulations, including the El Dorado County General Plan.

- B. **Non-DSOD Regulated:** Construction of any dam or obstruction to water flow shall require a grading permit pursuant to Section 15.14.130 of the County Code and this Volume. Design and construction standards for non-jurisdictional dams are established in the County of El Dorado Drainage Manual. The construction of dams shall follow the current practices of the California Department of Water Resources, Division of Safety of Dams as set forth in the *“Guidelines for the Design and Construction of Small Embankment Dams.”*

Section F: INSPECTIONS AND CONSTRUCTION REQUIREMENTS

1. Inspections:

A. Construction schedule: When required by the Director, a project schedule shall be provided that includes, as a minimum, the dates of:

1. Commencement of work.
2. Start and finish of rough grading.
3. Completion of drainage facilities.
4. Completion of work in any watercourse.
5. Completion of erosion and sediment control facilities.
6. Completion of hydro mulching and other drought-resistant landscaping. If rough grading is proposed between October 15th and May 1st, a more detailed schedule of grading activities and use of erosion and sediment control facilities may be required (final schedule to be provided after the grading permit is issued prior to the beginning of construction).

B. Regular Inspections: The Director may inspect any work done under the authority of a permit granted pursuant to the Grading Erosion and Sediment Control Ordinance (Chapter 15.14 of the County Code). No permittee shall be deemed to have complied with this Ordinance until a final inspection of the work has been completed by the County and the Director has determined in writing that the work has been completed in accordance with all requirements and conditions of the permit. The permittee shall provide adequate access to the site for inspection by the Director during the performance of all grading work and for a minimum period of one year after the final inspection of all improvements.

C. Violation and abatement inspections: Pursuant to Section D.1 below, the Director may require site inspections to investigate an alleged violation of the Grading Erosion and Sediment Control Ordinance (Chapter 15.14 of the County Code), or inspections necessary to document the abatement of a verified violation of this Ordinance.

D. Special Inspections:

1. Criteria for special inspections: As a condition of any permit, or as part of the investigation or abatement of a violation of Chapter 15.14 of the County Code, the Director may require the permittee to provide periodic or continuous monitoring of the construction activities under the direction and responsibility of a Geotechnical Engineer, Civil Engineer or Engineering Geologist within their area of expertise and licensure. The permittee shall contract for such services and be responsible for the payment of all costs. Continuous or periodic observation and reporting by a Geotechnical Engineer, Civil Engineer and/or Engineering Geologist shall include, but not be limited to, the following situations:

- a. During the preparation of a site or the placement of fills which exceed three feet in depth on slopes which exceed ten percent.
- b. Fill placement for vehicular ways shall be continuously inspected when fills exceed ten feet in height.
- c. During the preparation of a site for the placement of any fill and during the placement of such fill which is intended to support any building or structure.
- d. During the installation of subsurface drainage facilities.

The use of a licensed professional for inspections or observations shall not preclude additional inspections by representatives of the County as deemed necessary by the Director.

2. Special Inspection reports: Reports filed by the Geotechnical Engineer, Certified Engineering Geologist or Civil Engineer regarding a special inspection shall state in writing a professional opinion, based on personal knowledge, that adequate inspection has been performed and the work accomplished during the period covered by the report has been completed in substantial accordance with the approved plans and specifications.

E. Progress reports: When required by the Director, periodic progress reports as required by the Director shall be provided under the direction of the Project Engineer that address the following:

1. Laboratory test results
2. Slope stability
3. Placement of materials
4. Retaining wall installation
5. Installation of drainage facilities
6. Installation of utilities
7. Compliance with special permit or plan requirements.
8. Other technical issues identified by the Director.

F. Final technical reports: Upon completion of grading work, the Director may require a final report(s) that addresses geotechnical, geologic, drainage or engineering issues and includes, but is not limited to the following:

1. A complete record of all field and laboratory tests including location and elevation of all field tests.
2. A professional opinion regarding slope stability, soil bearing capacity, and any other pertinent information.
3. Recommendations regarding foundation and roadway design, including soil bearing potential, and building restrictions or setbacks from the top or toe of slopes.
4. A declaration of professional opinion by the Geotechnical Engineer, Civil Engineer, or Engineering Geologist, in the format required by the Director, as to whether the work was done in substantial accordance with the recommendations contained in the accepted soil or geologic reports and in conformance with the approved plans and specifications, including but not limited to, line, grade and drainage design.

- G. As-built plans:** When required by the Director, permittee shall submit an "as-built" grading plan following completion of grading operations in a format deemed acceptable by the Director.

2. Construction site requirements:

- A Protection of Existing Utilities:** The permittee shall take all reasonable measures, as determined by the Director, to prevent or avoid damage to existing public utilities or services. The permittee shall be responsible for the cost of repair of any damage to facilities resulting from the grading activities performed under the authority of the permit.
- B Protection of Adjacent Property:** The owner of record of the property upon which the grading permit is issued is responsible for any damage to adjacent property resulting from the grading activities. All persons shall take all reasonable measures, as determined by the Director, to prevent or avoid damage to any adjoining public street, sidewalk, alley or other public or private property.
- C Advance Notice:** The permittee shall construction-stake the site and notify the Director at least forty-eight hours prior to the start of work.
- D Grading Limits:** Limits of grading shall be clearly defined and marked in the field to prevent damage by construction equipment. Wetlands and oak trees shall be protected from construction activity as described in Section E.5.A ~~D.5.A~~ of this Volume.
- E Minimization of exposed area:** During the rainy season, the smallest practical area of erodible land, as determined by the Director, shall be exposed at any one time during grading operations and the time of exposure shall be minimized.
- F Erosion and Sediment Control:** The permittee shall take all reasonable measures, as determined by the Director, to prevent or avoid:
1. Discharge of sediment from the site, in quantities exceeding State Water Resources Control Board standards, to any watercourse, drainage system, or adjacent property.
 2. Damage to watercourses and adjacent properties in the form of erosion, flooding, or deposition which may result from the permitted grading.
 3. Sediment deposition onto public or private vehicle ways.

Implementation of erosion-control and sediment-control plans shall be based on the season of the year and the stage of construction at forecasted periods of rainfall. The permittee shall employ all measures necessary to prevent or abate offsite sediment discharge during storm conditions consistent with the county Storm Water Management Plan (SWMP). Erosion and sediment control plans shall allow for possible changes in construction scheduling, unanticipated field conditions, and relatively minor changes in grading. Modifications to plans may be required by the Director after initial plan approval. Permittee shall use Best Management Practices (BMPs) during construction.

E. **Approved plans:** One (1) set of approved plans and permit shall be retained on the site and made available for use by the County inspector at all times during the work.

3. Transfer of professional responsibility after permit issuance: If the civil engineer, the geotechnical engineer, or the engineering geologist of record (i.e. the professional responsible for project design) is changed, the work shall be stopped until the replacement has agreed in writing to accept responsibility within the area of technical competence for approval upon completion of the work. It shall be the duty of the permittee to notify the building official in writing of such change prior to the commencement or recommencement of such grading or associated work. *(Modified from Section 3317.8 of the 2001 California Building Code)*



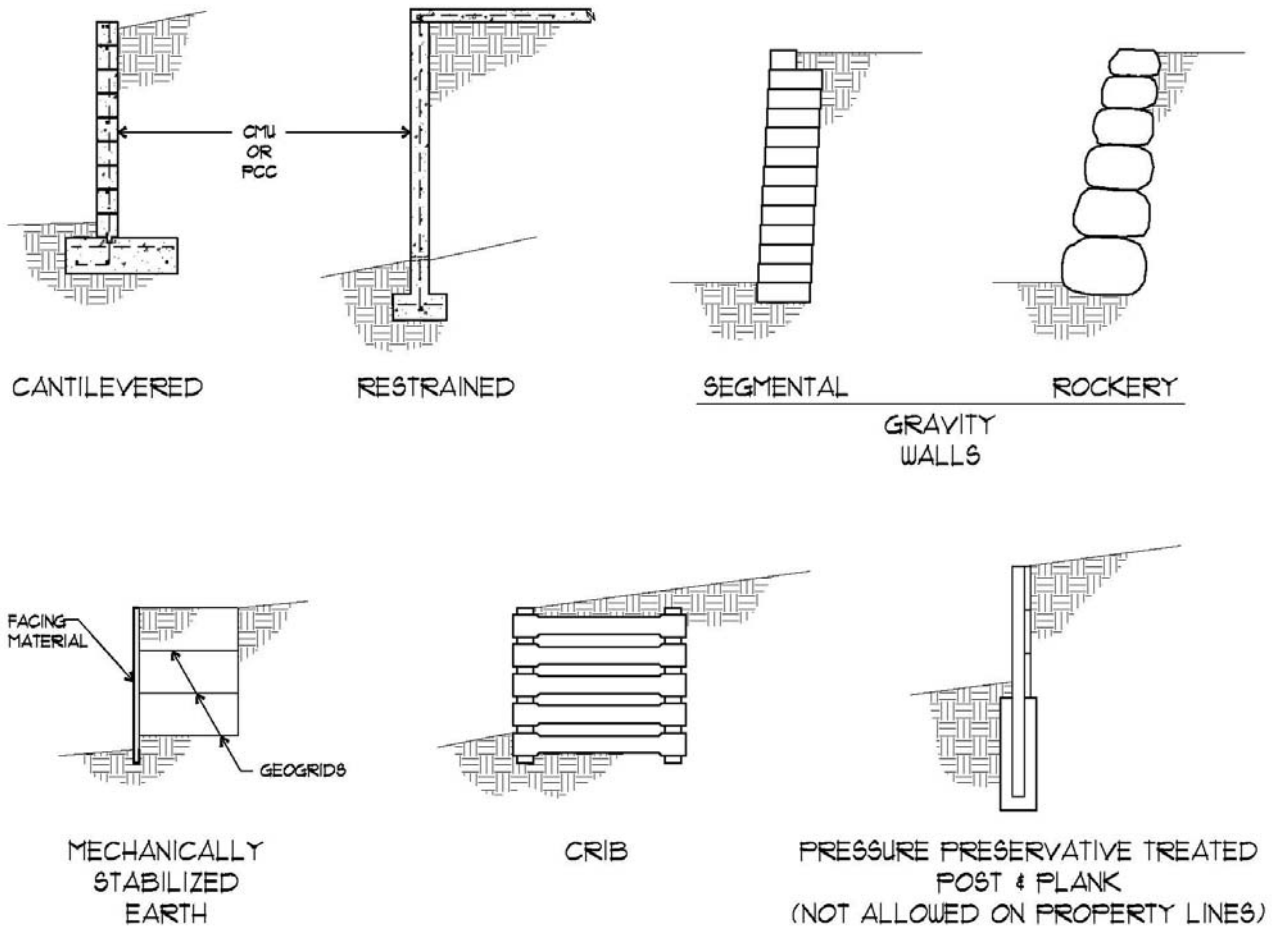
APPENDIX 1

Retaining Wall Design Details

**EL DORADO COUNTY
DESIGN AND IMPROVEMENT STANDARDS MANUAL
Volume III: Grading, Erosion and Sediment Control
February 5, 2007**

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DRAWING #1
PICTORIAL GLOSSARY OF RETAINING WALL TYPES
 NOT TO SCALE

CHECKLIST OF INFORMATION TO BE PROVIDED FOR PERMIT

The drawing details which follow on pages A3 through A12 are intended primarily to illustrate many of the different types of retaining walls which may be designed for a particular site. These details show most, but not all, of the information required to be detailed on plans or calculations submitted for permit. The following is intended to assist the designer in preparation of a complete permit application, but is not intended to replace the independent judgment of and analysis by the wall designer:

Signatures: All calculations, reports, and plans included in applications for permit shall be stamped and wet-signed by the preparer.

Design parameters: An analysis of site conditions is required for the design of all retaining walls. This may be in the form of a Geotechnical Report or a site visit by the Designer or an authorized representative. If the design parameters are determined by the Designer, a statement by separate letter or included in the design calculations shall be submitted that describes the site conditions encountered and justifies the selection of design parameters.

Global Stability: The Designer shall address the possibility that slip plane failure may affect walls constructed on slopes. The calculations provided as part of the permit application shall document that the wall will meet established standards of stability.

Construction Plans: The wall construction requirements determined by the design analysis shall be clearly shown on the construction plans. If engineering features are described in the calculation report, they shall be shown on the plans or the plans shall have a prominent reference to the location of this description. If a Geotechnical Report was prepared by an engineer other than the wall Designer, a letter from that engineer confirming that the design parameters used in the wall design are consistent with the recommendations in the Report is required to be submitted with the permit application.

Wall profile elevations shall be included where the walls are constructed on undulating terrain or where different reinforcing schedules or geogrid lengths or types are required to accommodate varying wall heights.

Site Plans drawn to scale shall be included with the construction plans and shall show the location of the wall(s) with respect to easements, property lines, and structures. Top of wall elevations and finish grade elevations shall be shown at appropriate intervals or steps along the length of wall.

Special Inspections, structural observations: Prominent notes shall be placed on the plans detailing special inspection and/or structural observation requirements.

Compaction requirements: The plans shall clearly show the geometry of backfill material to be installed adjacent to the wall. The placement method and the requirements for the density testing of this material shall be described on the plans. Mechanical compaction is required of soils and gravels.

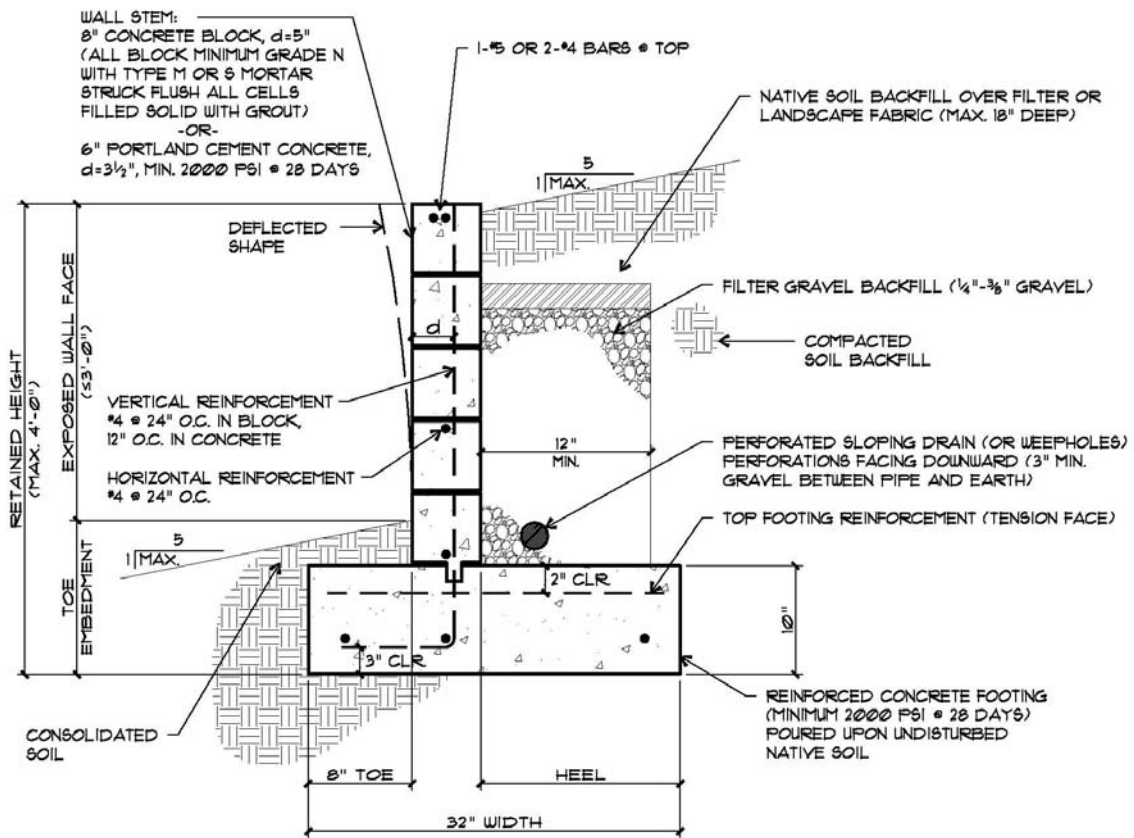
Concrete: The plans shall specify the required concrete strength (2500 psi minimum) and any applicable special mixing requirements. Concrete strengths of 3000 psi and greater require onsite testing.

Concrete Masonry Units: The plans shall show the type of concrete masonry units to be utilized (e.g., Grade N), the type and strength of grout and how it is struck, the design strength of the wall (f'm), and whether or not special inspection is required.

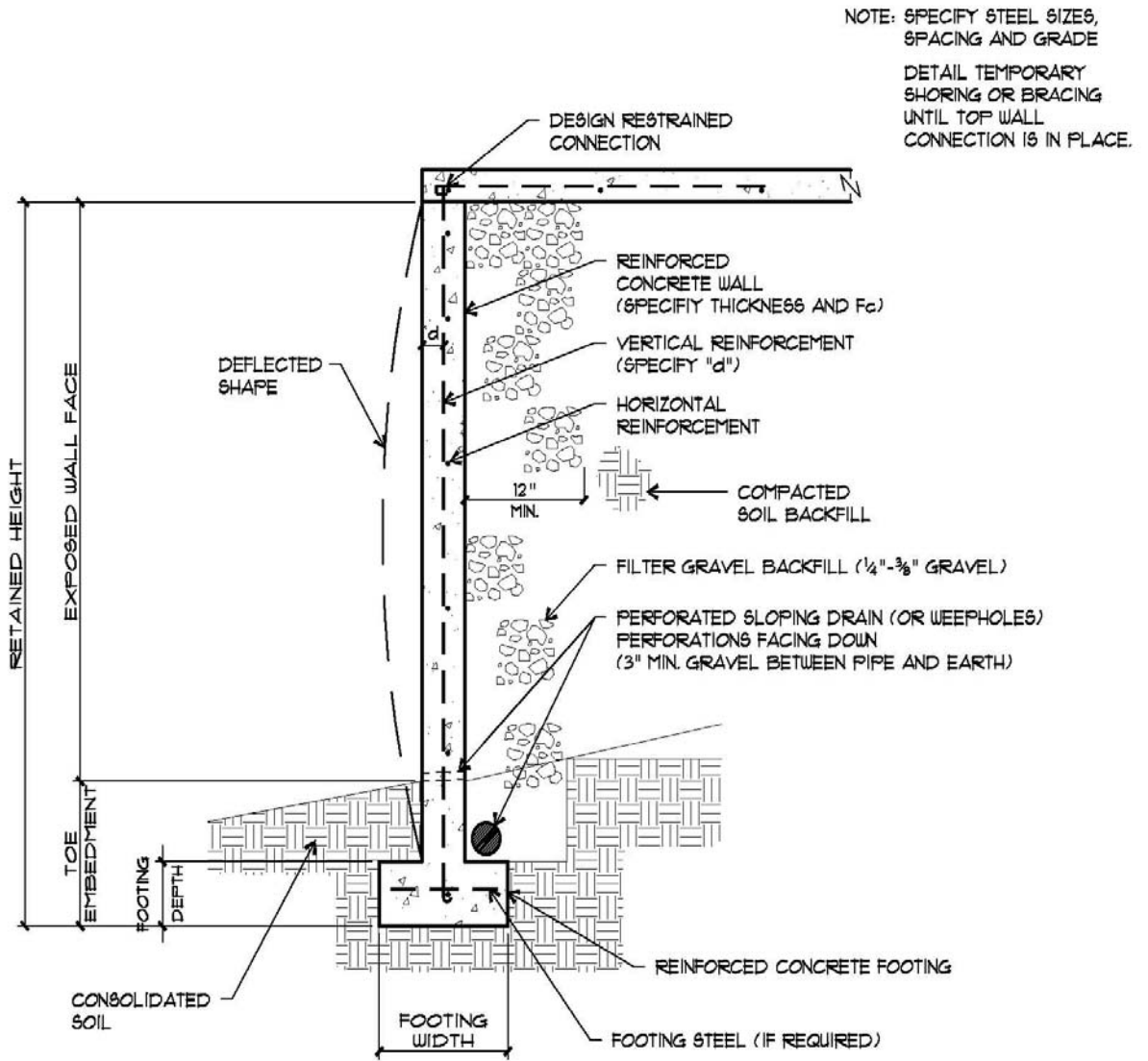
Reinforcing Steel: The plans shall show the strength and size of reinforcing steel, and its placement relative to the edges of wall stems and footings.

Mechanically Stabilized Earth: Plans submitted as part of a permit application shall include the identity of the manufacturer, the type of geogrid material to be used, and the placement locations of these geogrid materials. Proprietary facings, typically have special Code approvals for their use. The designer shall incorporate the requirements of any applicable Code approvals for propriety facings (i.e., special inspections) on the plans.

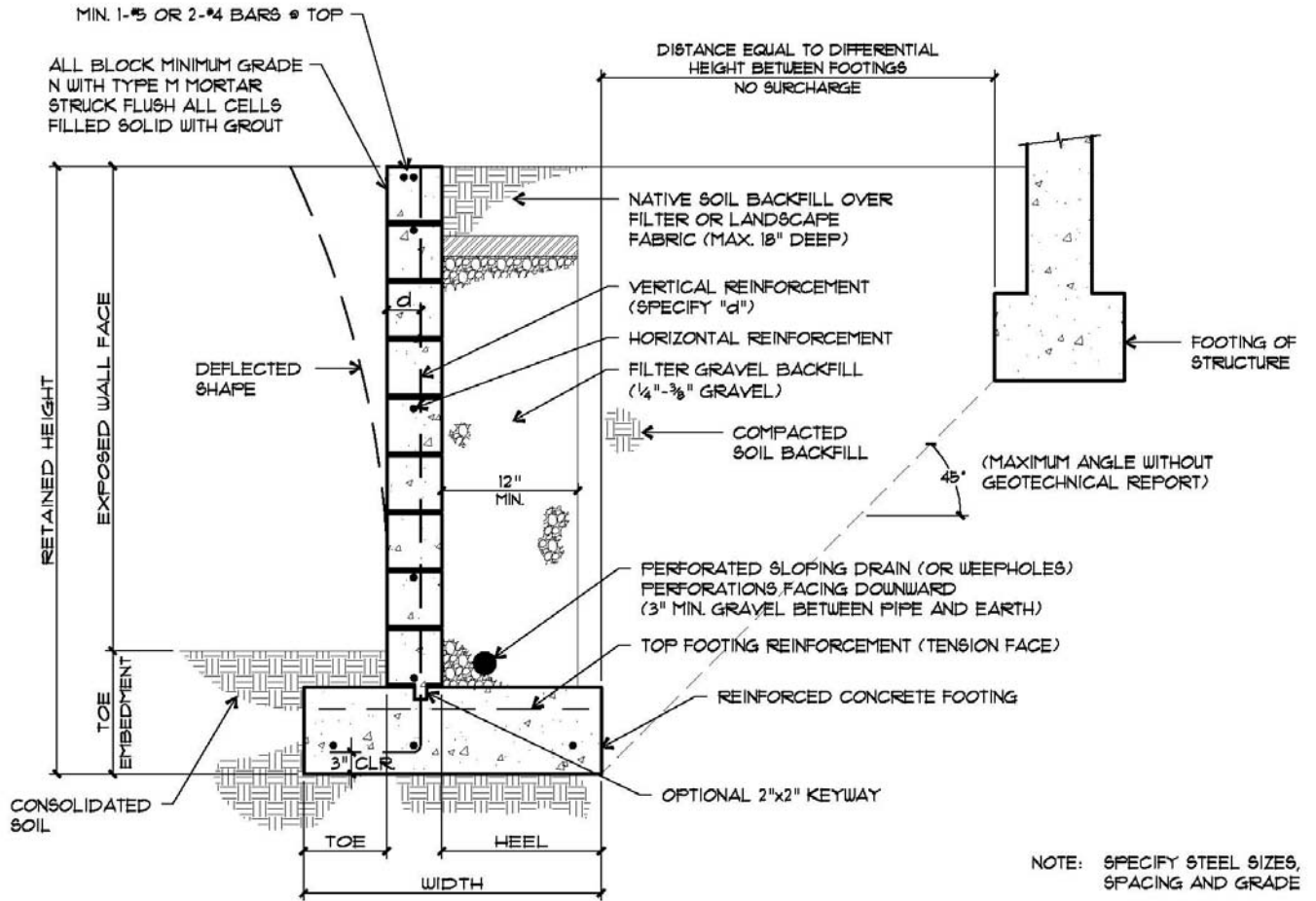
Rockery Walls: The El Dorado County requirements for Rockery Walls shall be included on the plans. These requirements include a minimum cap rock size of 200 pounds, no chinking on exposed faces, seismic design analysis, and special inspection or structural observation of the wall construction by the Designer.



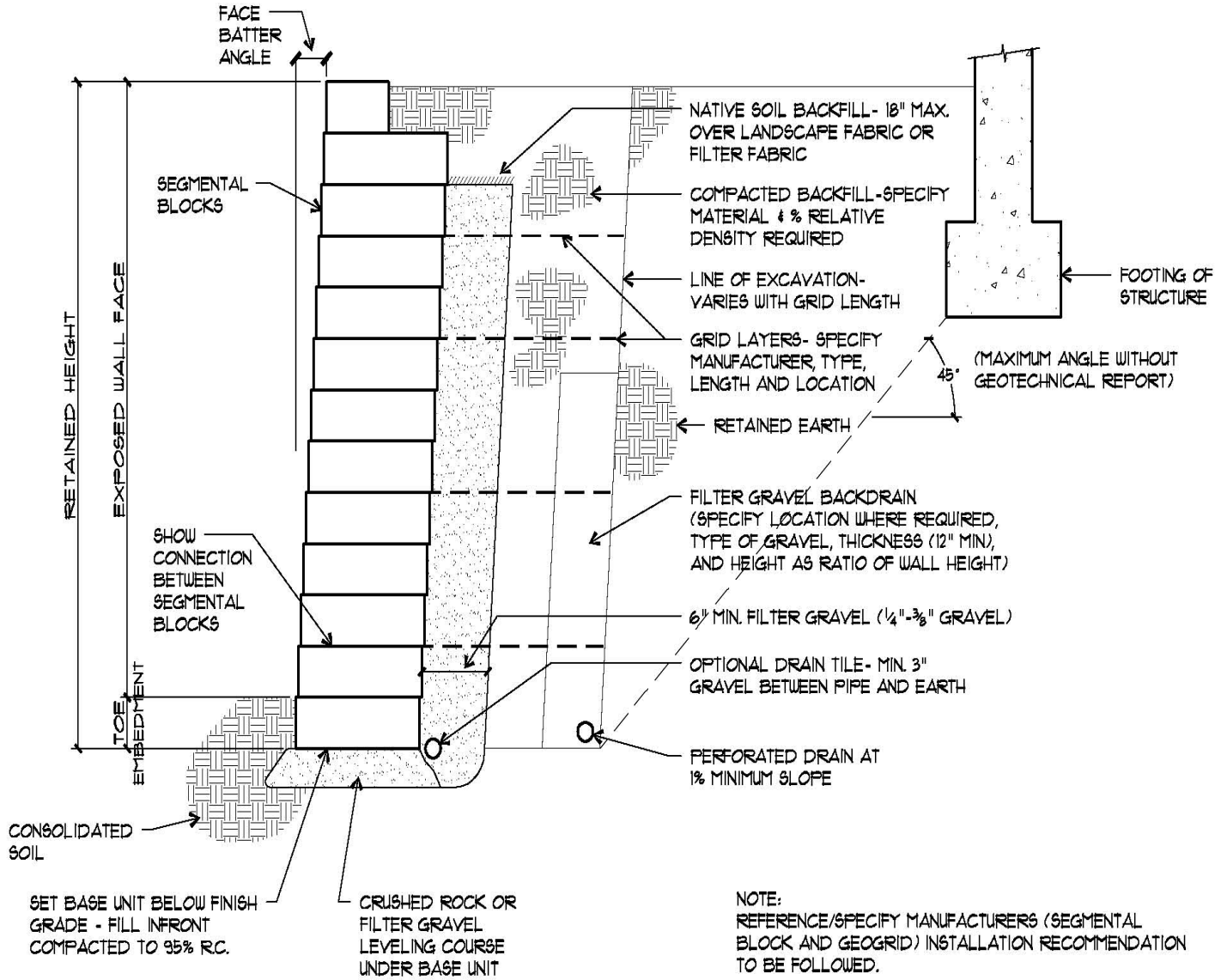
DRAWING #2
CATEGORY A, EXEMPT WALL
 NOT TO SCALE



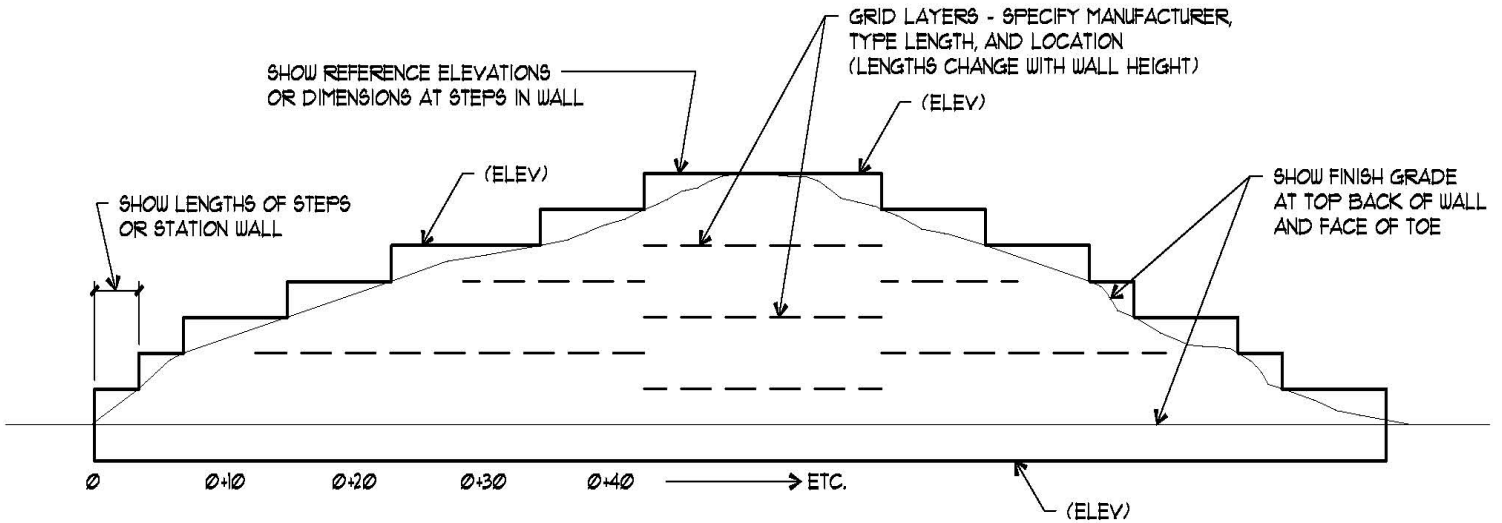
DRAWING #3
RETAINING WALL TYPE: RESTRAINED
MATERIAL: REINFORCED CONCRETE
 NOT TO SCALE



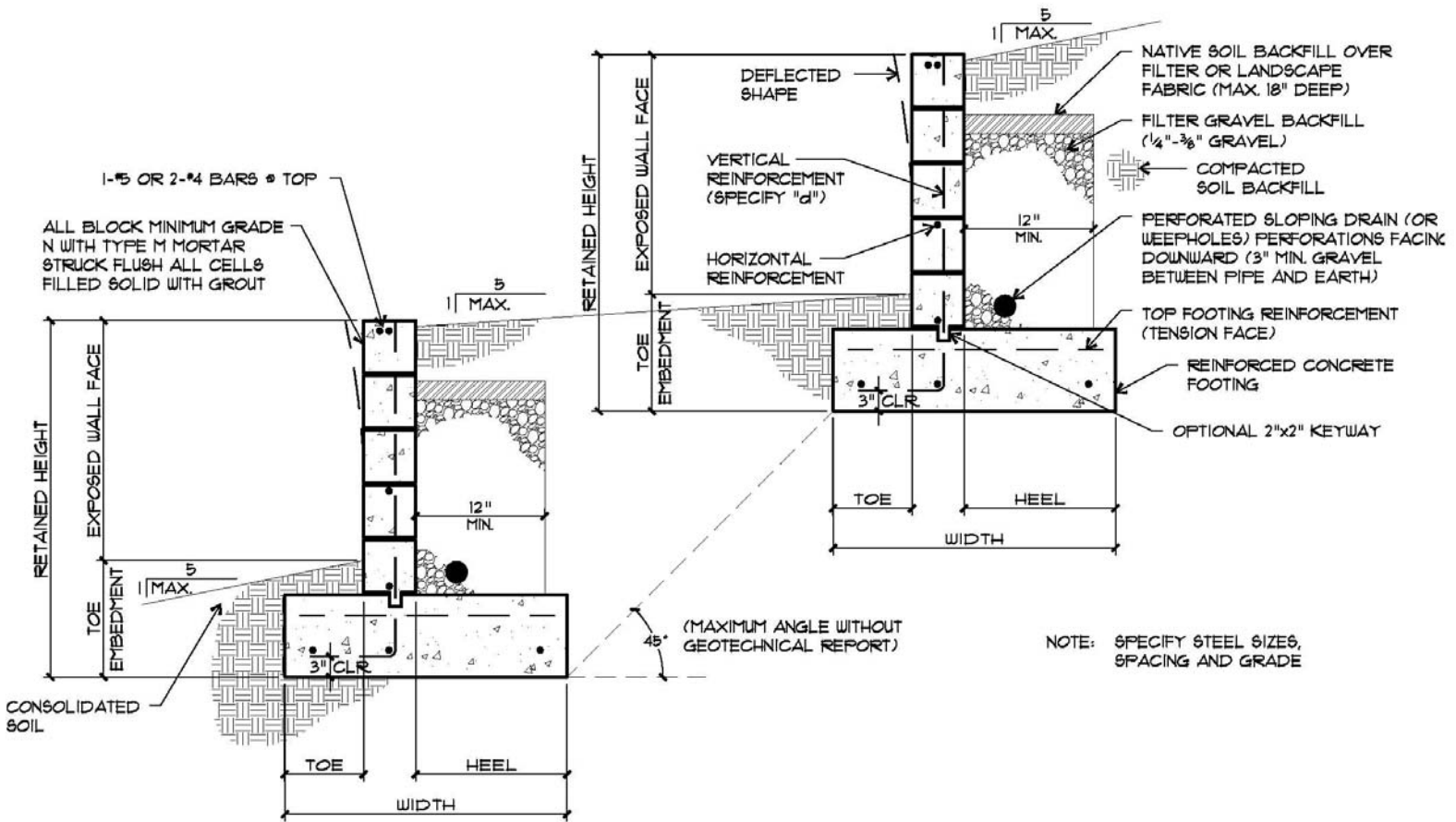
DRAWING #4
RETAINING WALL TYPE: CANTILEVER
MATERIAL: STRUCTURAL MASONRY
 NOT TO SCALE



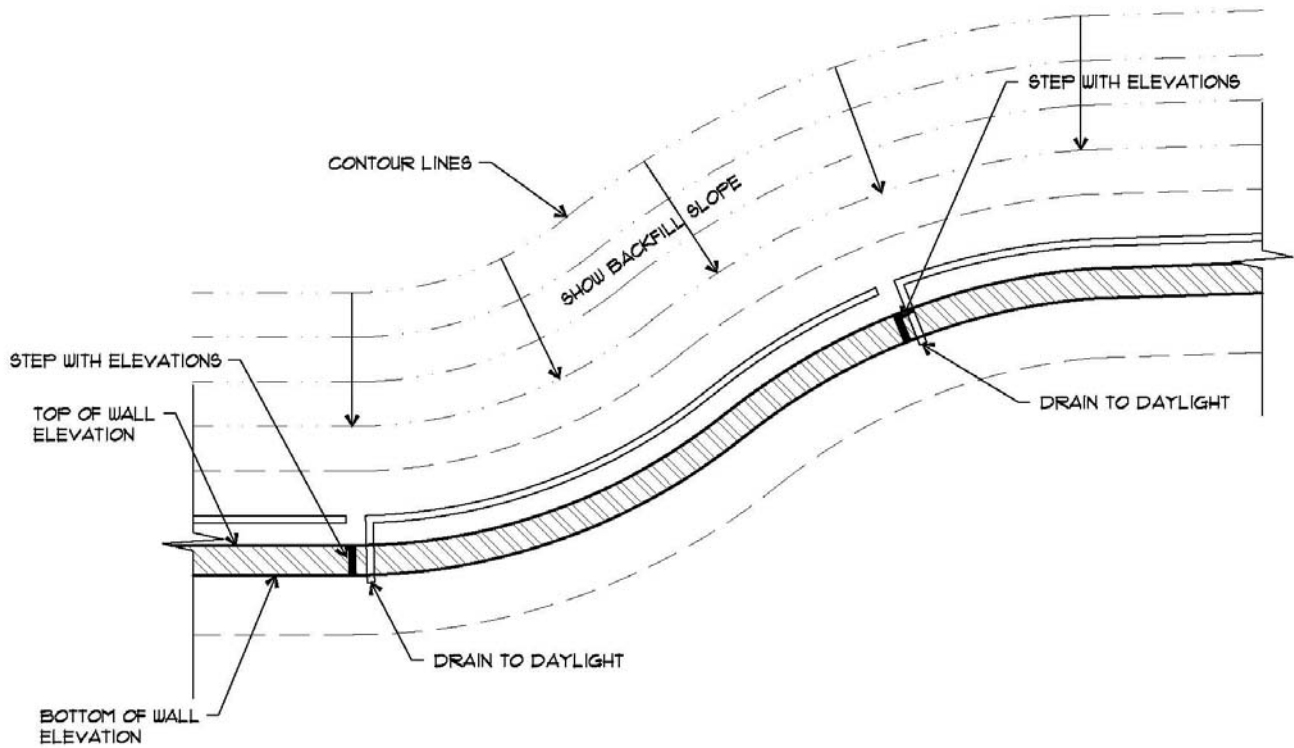
DRAWING #5
RETAINING WALL TYPE: MECHANICALLY STABILIZED EARTH WITH
SEGMENTAL WALL FACE
 NOT TO SCALE



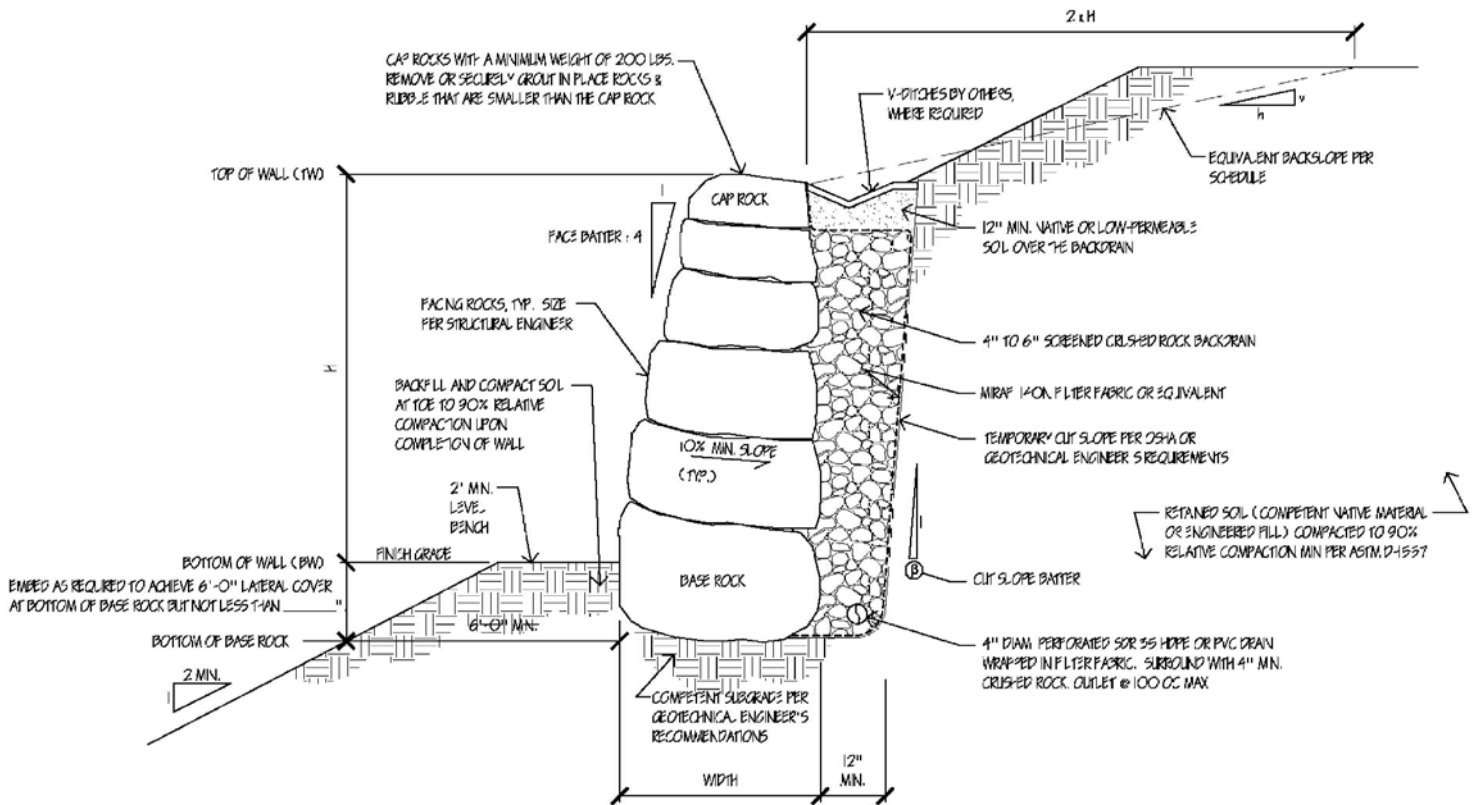
DRAWING #6
ELEVATION OF A STEPPED
SEGMENTAL WALL WITH GRID LAYERS
NOT TO SCALE



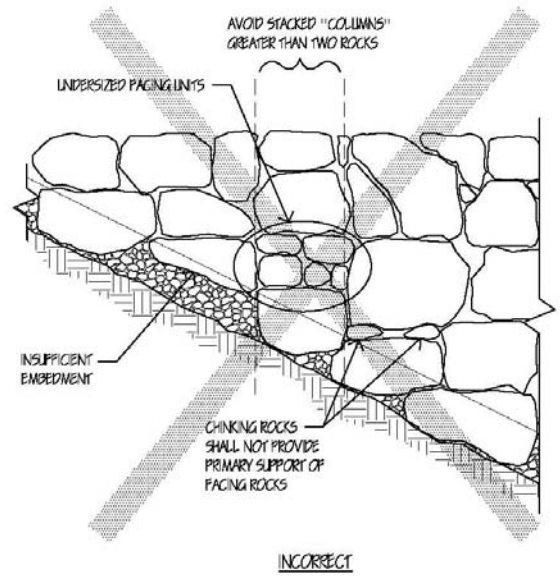
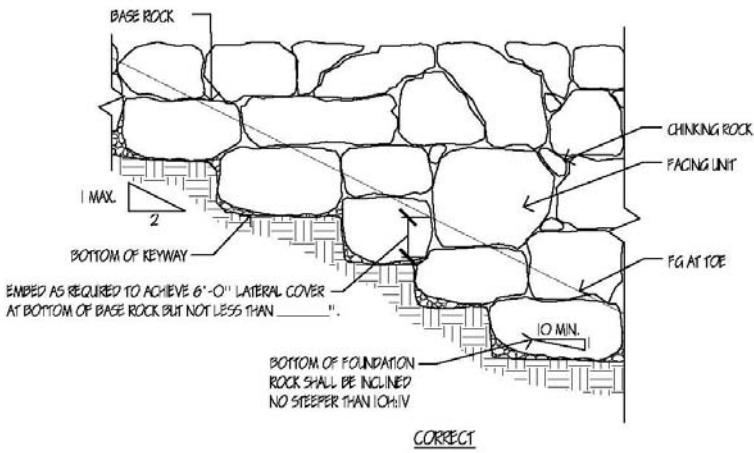
DRAWING #7
TERRACED WALL SYSTEM
 NOT TO SCALE



DRAWING #8
PLAN VIEW OF RETAINING WALL
NOT TO SCALE



DRAWING #9
RETAINING WALL TYPE: ROCKERY
TYPICAL SECTION
 NOT TO SCALE



DRAWING #10
RETAINING WALL TYPE: ROCKERY
PARTIAL TYPICAL PROFILES
 NOT TO SCALE