

SECTION 7

GRADING (GR)

- 7-1 GENERAL** - Grading improvements shall include: excavation and embankment work for channels, pads and roadways, erosion control measures and retaining walls. These improvements shall be installed in accordance with the approved improvement plans, these Construction Standards, the latest edition of the California Building Code (CBC), and the latest edition of State Standard Specifications.
- 7-2 CONSTRUCTION STAKING** - Construction staking shall be provided by the Developer for all grading improvements as indicated below, including adjacent to wetlands. Cut sheets shall be on-site and shall be furnished to the Public Works Inspector upon request.
- A. Channels** - Channel staking shall provide the station and offset, as well as the cut to the nearest tenth of a foot (0.1 foot). Stakes shall be provided at a minimum of every fifty (50) feet in tangent sections and every twenty-five (25) feet in curved sections.
 - B. Erosion Control Measures** - Erosion control measures shall be staked per the approved plans. Erosion control requirements shall apply to all construction sites regardless of size, which involve disturbed soil. Sites exceeding one (1) acre of disturbed surface area are subject to the State Water Board's Construction General Permit Storm Water Pollution Prevention Plan (SWPPP) requirements. Owner's SWPPP must be accepted by the City prior to the commencement of grading operations.
 - C. Pads** - Pad staking shall provide the station and offset, as well as the cut to the nearest tenth of a foot (0.1 foot). Stakes shall be provided at each property corner, front and rear.
 - D. Retaining Walls** - All retaining walls shall be staked for line and grade to the nearest tenth of a foot (0.1 foot).
 - E. Roadways** - Roadway excavation staking shall provide the station and offset, as well as the cut to the nearest tenth of a foot (0.1 foot). Minimum staking intervals shall be fifty (50) feet in tangent sections and twenty-five (25) feet in curves. Stakes shall also be placed at curve beginnings, ends, points of reverse curvature, points of compound curves, horizontal angle points and at changes of grade.
- 7-3 INSTALLATION** - All grading improvements shall be installed in accordance with provisions in the CBC, recommendations of site specific geotechnical reports and Geotechnical Engineer, provisions in the Caltrans Standard Specifications, the approved improvement plans and per the following specifications:
- A. Channels** - All fill areas in channels shall receive suitable fill material to be compacted to a minimum of 90 percent relative compaction. The Developer's Geotechnical Engineer will determine suitable fill material. Unsuitable subgrade materials shall be removed from the channel and replaced with suitable backfill material based on recommendations provided by a State of California licensed Geotechnical Engineer.
 - B. Storm Water Pollution Prevention Plan (SWPPP)** - If required, a copy of the filed Notice of Intent (NOI) and acceptable SWPPP with WDID number shall be available on site at all times.
 - C. Erosion Control Measures** - Construction sites shall have required erosion and sediment control measures in place between October 15 and April 15, inclusive. All projects adjacent to creeks, wetlands, vernal pools, drainage ditches, and stormwater drain inlets shall have adequate sediment

control measures in place prior to ground disturbance regardless of time of year. The Contractor shall ensure that the construction site is prepared prior to the onset of any storm with all applicable Best Management Practices (BMP's). For stormwater quality compliance information, refer to the latest edition of the Caltrans Construction Site BMPs Manual and the California Stormwater Quality Association Stormwater BMP Handbook, Municipal. Waterways under the jurisdiction of governmental agencies other than the City of Grass Valley may be subject to additional erosion control measures or criteria and is the responsibility of the Developer/Owner. The City of Grass Valley erosion control provisions shall include, but are not limited to:

1. Broadcast Seed - Where required, broadcast seed shall be applied as follows:

Brando Brome	12 lbs/acre
Rose Clover	9 lbs/acre

Areas with sandy, dry soil shall receive:

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

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

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

2. Drainage Areas - All bare areas, regardless of slope, within 50 feet of natural drainages and active stormwater collection systems shall be covered with straw, erosion control blankets, hydromulch, or other types of soil stabilizers suitable for eliminating soil migration. The Public Works Inspector may require additional control measures be installed if deemed necessary.

- a. No grading or trenching, except as required for erosion or sediment control, shall occur within 35 feet from the centerline of perennial and intermittent drainage swales between October 15 and April 15, inclusive, unless approved by the City Engineer, as well as any other governmental agency which may have additional jurisdiction and/or requirements.

3. Dust/Mud Control -

- a. **Construction Access** - Where construction traffic accesses a project, on or off public streets, the Contractor shall have in place prior to the start of grading, construction access conforming to the Caltrans Construction Site BMP Manual. Alternate tracking control measures will be considered provided they are equally or more effective than specified. Construction access locations shall be maintained during the course of construction.
- b. **Adjacent Streets** - Adjacent street frontages shall be kept clean at all times. When tracking has occurred, the Contractor must clean immediately, or as directed by the Public Works Inspector.
- c. **Construction Vehicles** - The Contractor is responsible for cleaning construction vehicles leaving the site to prevent dust, silt, mud and dirt, from being released or tracked offsite. See the Caltrans Construction Site BMP Manual for information on vehicle and equipment cleaning requirements, and instructions concerning concrete washout areas.

- d. Grading Spoils** - Dry stock piles of soil shall be watered, covered with tarpaulins, or stabilized to prevent the generation of airborne dust. Trucks transporting dry soil shall be covered with tarpaulins. Stockpiling of spoils during the wet season, (October 15 to April 15, inclusive), should be avoided. If unavoidable, spoil stockpiles shall be covered with plastic, or adequately stabilized by other BMP's, with a perimeter sediment barrier installed at all times. The Public Works Inspector may require additional control measures depending on the proximity of the stockpile to any sensitive areas and/or drainage systems.
- e. Dust Control** - Water shall be sprayed on all exposed earth surfaces during clearing, grading, earth moving and other site preparation activities. The exposed earth shall be watered throughout the day to minimize dust. Care must be taken to ensure that excessive water use doesn't create a sediment-laden discharge. Water from City hydrants is usually available to supply water; however, a temporary meter from the City of Grass Valley Water Division must be obtained prior to use.
- f. Wind Allowances** - Grading activities shall be restricted or halted when winds exceed 15 miles per hour as deemed necessary by the Public Works Inspector. In addition, Northern Sierra Air Quality Management District may issue enforcement actions for air-borne migration violations, per their guidelines.
- 4. Drain Inlet Protection** - Drain inlet filters must be employed whenever there is risk of sediment-laden water entering the City's storm drain system. This applies to both existing and newly constructed drain inlets. If the storm drain system is active and open to discharges, then immediately following installation, all drop inlets shall be protected with silt and gravel bags until construction no longer poses a risk of sediment laden discharges. Only high flow volume bag type filters, or other devices that have been approved of by the Public Works Inspector shall be used.
- 5. Perimeter Protection** - Silt fences, fiber rolls and straw bales are commonly used as perimeter sediment control BMP's. Proper installation of these is critical for their effectiveness.
- 6. Slope Protection** - Disturbed, exposed slopes pose the highest risk of erosion and shall be protected as required. BMP's such as blown or broadcast straw, erosion control blankets, plastic sheeting, and soil stabilizers shall be employed to minimize or eliminate erosion.
- 7. Straw Bales** - Straw bales should be strategically stockpiled on the site at a rate of 1.5 bales per acre during the "Wet Season" for the purpose of immediate broadcasting prior to storm events. Measures shall be provided to keep straw dry. Refer to the project's SWPPP or erosion control plan for proper stockpiling of BMP's.
- 8. Alternative Control Devices** - Use of alternative sediment control devices will be approved at the discretion of the Public Works Inspector.
- D. Pads** - All pads shall be compacted to a minimum of 90 percent relative compaction. Unsuitable materials shall be removed from the pad areas per the recommendations of the Developer's licensed Geotechnical Engineer. The Developer shall submit a letter from the Geotechnical Engineer stating that the grading was performed in substantial conformance with the geotechnical report (and subsequent updates).

E. Retaining Walls -

- 1. Concrete/Masonry/Rock Walls** - All concrete, masonry, or rock walls shall be installed per the manufacturers' instructions or Design Engineer's recommendations.
- 2. Wood Retaining Walls** - All wood retaining walls shall be installed in accordance with the approved plans and Caltrans Standard Plans and Specifications.

F. Roadways -

- 1. Compaction** - Relative compaction of not less than 95 percent shall be obtained for a minimum depth of 0.5 feet below the subgrade grading plane for the width between the outer edges of shoulders, including curb and gutter areas, whether in excavation, embankment or at original ground level. All other material shall be compacted to a relative compaction of 90 percent or as recommended by the project Geotechnical Engineer.
- 2. Grade Control** - When the next layer to be placed on the subgrade is an asphalt concrete pavement, asphalt concrete base, or asphalt concrete subbase, the subgrade grading plane at any point shall not vary more than 0.05 foot above or below the grade established by the project surveyor.
- 3. Stability Testing** - The Contractor shall proof roll the subgrade areas with a full, 3,000 gallon water truck, prior to placement of aggregate base or aggregate subbase. The Public Works Inspector shall approve the equipment used for proof rolling. The Developer's Geotechnical Engineer shall provide testing for compaction per Caltrans standards.
- 4. Unsuitable Materials** - Any unsuitable material encountered within two (2) feet below subgrade or two (2) feet below original ground shall be removed and replaced with a suitable backfill material.

Suitable backfill materials and methods for placement are to be reviewed and approved by the Geotechnical Engineer. Other methods for subgrade stability may be used upon review and approval of the project Geotechnical Engineer.

- 5. Straw Wattles or Fiber Rolls** - Fiber rolls shall be a premanufactured roll filled with rice or wheat straw, wood excelsior or coconut fiber. Fiber roll must be covered with biodegradable (non-plastic) fiber netting secured tightly at each end. Fiber rolls must be at least 1.1 lb/ft for diameters 8 to 10 inches or at least 3 lb/ft for diameters 10 to 12. Fiber rolls shall have a functional longevity of 1 year and are considered construction materials to be removed upon completion of the project.

G. Trees -

- 1. Removal** - Those trees which are to be removed and disposed of shall be so designated on the plans. A Tree Removal Permit shall be obtained from the Public Works Department, Engineering Division, prior to any tree removal. Prior to the clearing and grubbing operation on a particular property, the Engineer will designate to the Contractor those trees and shrubbery that may be removed.

2. **Protection** - Trees and shrubbery which are not to be removed shall be protected from injury or damage by the Contractor's operations. Tree protection fencing shall be installed around the drip line of all trees to be saved as shown on the Tree Protection detail.
 3. **Preservation** - Trees and shrubs which are to be removed and not specifically designated for disposal, shall be preserved by removing in a ball of natural material and the roots wrapped in burlap and kept moist until the work has progressed enough for the replanting of the tree or shrub. The replanting shall be performed in a careful and professional manner.
 4. **Roots 2 inches to 4 Inches in Diameter** - Roots two (2) inches to four (4) inches in diameter which are severed during the course of the excavation shall be neatly trimmed and coated with a heavy coat of approved tree seal compound. If roots greater than four (4) inches in diameter are severed during the course of the excavation, it shall immediately be brought to the attention of the Public Works Inspector. At the discretion of the Public Works Inspector, the Contractor/Developer may be required to consult with an arborist to determine how best to alleviate the damage.
 5. **Roots Greater than 4 Inches in Diameter** - Roots greater than four (4) inches in diameter encountered in the course of excavation for underground facilities which do not interfere with the pipe grade shall be exposed but not severed and shall be wrapped in burlap and kept moist until the backfilling operation is completed.
 6. **Grading within Driplines** - Grading or excavation within the driplines of trees will not be permitted unless specifically shown on the plans or authorized in writing by the City Engineer.
 7. **Trenching within Driplines** - No trenching whatsoever shall be allowed within the driplines of trees. If it is absolutely necessary to install underground utilities within the dripline of an oak tree, the excavation shall be bored.
 8. **Trimming** - Tree branches which extend over the roadway shall be trimmed to provide a minimum clearance of 14 feet above the shoulder point of the roadbed unless specifically permitted otherwise in writing by the City Engineer. The tree branches or shrubbery branches removed shall be cut off close to the bole of the tree in a smooth, neat, manner, and the cut treated with a heavy coating of an approved tree seal compound. The Contractor shall remove other branches at the direction of the City Engineer in such a manner that the tree or shrubbery will present a uniform, balanced appearance.
- H. Grading Adjacent to Wetlands** - Grading activities adjacent to sensitive wetland or creek areas shall be conducted under the conditions set forth under the Grading Permit. These conditions shall also include:
1. Prior to construction within any phase of the project, high visibility temporary construction fencing, shall be installed along the parcel adjacent to the wetland or creek. Fencing shall be maintained daily until permanent fencing is installed, at which time the temporary fencing shall be removed from the project site.
 2. With the exception of access required for maintenance and/or emergency vehicles, the project shall be designed to prevent vehicle access into the wetland area. Post and cable fencing or other improvements shall be utilized to meet this requirement.

3. Landscaping adjacent to the wetland area shall be California native, drought-tolerant groundcover, shrubs, plants and trees.
4. The pre-construction meeting shall address the presence of the wetland area, the sensitive habitats present and minimization of disturbance to the wetland area. During grading and construction the wetland area shall be avoided and shall not be used for parking, storage, or project staging. The contractor shall remove all trash blown into the wetland from adjacent construction on a daily basis. After construction is complete, the temporary fencing shall be removed from the wetland area, along with all temporary erosion control measures

7-4 MATERIALS -

A. Wetland Preserve Fencing -

1. **Signs** – Signs shall be installed at a maximum of fifty (50) foot intervals on wetland preserve fencing. The size of each sign shall be a minimum of two (2) feet by two (2) feet and shall contain the following language:

WARNING
THIS FENCE SHALL NOT BE REMOVED
OR RELOCATED WITHOUT WRITTEN
AUTHORIZATION FROM THE
CITY OF GRASS VALLEY

7-5 SOIL TESTING PROCEDURES AND FREQUENCIES

A. Field Testing -

1. **Field Density Testing** - Field density testing for earthwork and backfill will be performed by either the Developer's Geotechnical Engineer, or the City's Geotechnical Engineering Consultant, at the discretion of the City Engineer as follows:
 - a. Private property building areas, including the area within 10'-0" outside the exterior building lines, shall be tested by the developer's Geotechnical Engineer with proper written pad certifications submitted to the City Building Official prior to foundation placement.
 - b. All grading operations, which involve revision to existing contours for the purpose of accepting right-of-way improvements, shall require written and stamped certification from a licensed California Geotechnical Engineer.
 - c. The test method shall be in-place nuclear density testing ASTM D2922 (Method B-Direct Transmission), or as recommended by the Geotechnical Engineer, to check conformance with the requirements of the Geotechnical Report, project plans, specifications, and these Construction Standards. In addition to testing, the field technicians shall observe ALL backfill operations to ensure methods consistent with those that achieved minimum required compaction results are used throughout the backfill process. The field technician shall record these observations in their Daily Field Report (DFR). The field technician shall perform additional testing when the operations deviate from proven practices even if testing at the frequencies required below has already been performed. Samples for compaction curves shall be taken at the discretion of the technician or as directed by the Public Works Inspector.

- d. The City expects testing at a higher frequency at the discretion of the field technician or Public Works Inspector if there is any reason to doubt the effectiveness of the operations or the precision of the test results, and when a material change is observed in the soil being compacted. These tests shall be recorded in the DFR.

B. Minimum Reporting Requirements -

1. **Daily Field Reports (DFR)** - All testing and observations shall be recorded in a DFR. The DFR's shall include all field density testing; test tables and/or plans shall show the field-recorded dry density, moisture content, reference laboratory compaction test used, and any moisture offset used, based on supplemental laboratory testing. All test results indicating less than minimum compaction shall be recorded in the DFR along with the observation of corrective operations and retest results. DFR's shall also indicate where observation and soil probing were performed in between nuclear gauge testing.

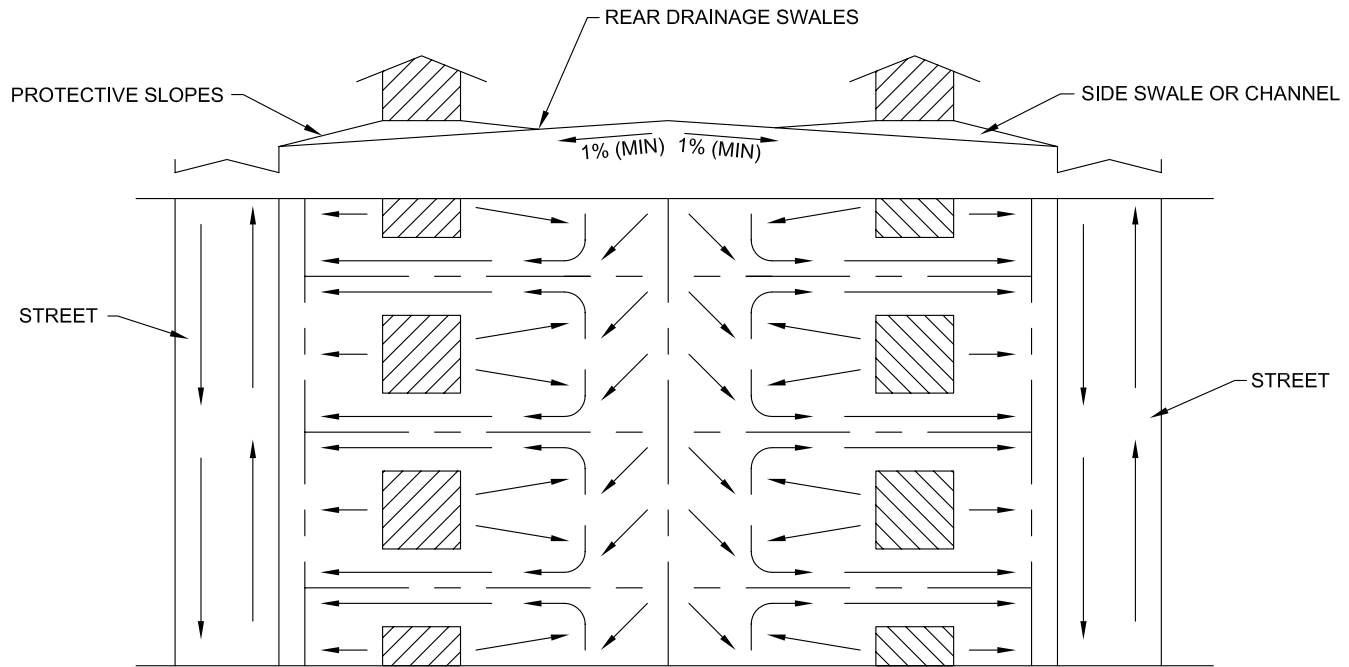
All DFR's shall be made available to the City upon request, within one working day.

2. **Mass Grading Minimum Testing Frequencies** - Density testing for mass grading operations shall consist of one (1) test per 500 cubic yards or each 5,000 square feet of fill, or as required by the City Engineer. A separate compaction certification report is required for testing within the City right-of-way limits.

C. Trench Backfill Testing Frequencies -



1. **Utility Installations** - Observe all bedding, shading, shovel slicing, and filter fabric installation procedures for compliance with City Standards and project plans and specifications. Observations shall be documented in DFR's along with measures taken to correct complaint items.
2. **Compaction Testing** - By Nuclear Gauge Method, tests shall be taken at a minimum frequency of one test per lift per 200 lineal foot of backfill, testing pattern should be staggered such that the location of test varies with each lift of backfill. The testing laboratory shall submit copies of the field technician's DFR's and testing logs on a weekly basis to the City Public Works Inspector for review.
3. **Performance Specification Observation** - (Deep Trenches or Rocky Material), Performance specifications shall be used to verify compaction efforts where vertical cuts or other issues prevent safe entry for nuclear gage density testing. A series of tests shall be performed at the beginning of the backfill operations in a protected area of the trench to determine the minimum number of passes, acceptable equipment, moisture conditioning, and maximum loose lift thickness. Once the procedure is approved, full-time observation will be performed to check that operations comply with the approved performance specifications. The field technician shall require the contractor to provide access for further testing by the field technician if, in the opinion of the Public Works Inspector, conditions change such that observation alone will not suffice to verify compliance or if the material or equipment used to backfill the trench changes such that re-evaluation or compaction procedures are required. Adequate compaction of material containing more than 30 percent rock larger than $\frac{3}{4}$ inch shall be verified via performance specification. The project Geotechnical Engineer shall develop the performance specification, if none exists, and perform full-time observation of the operations to verify compliance. Field observations shall be recorded in the field technician's DFR as described above. The DFR shall clearly reference approximate stations and elevations over which the observation of performance specification was performed.

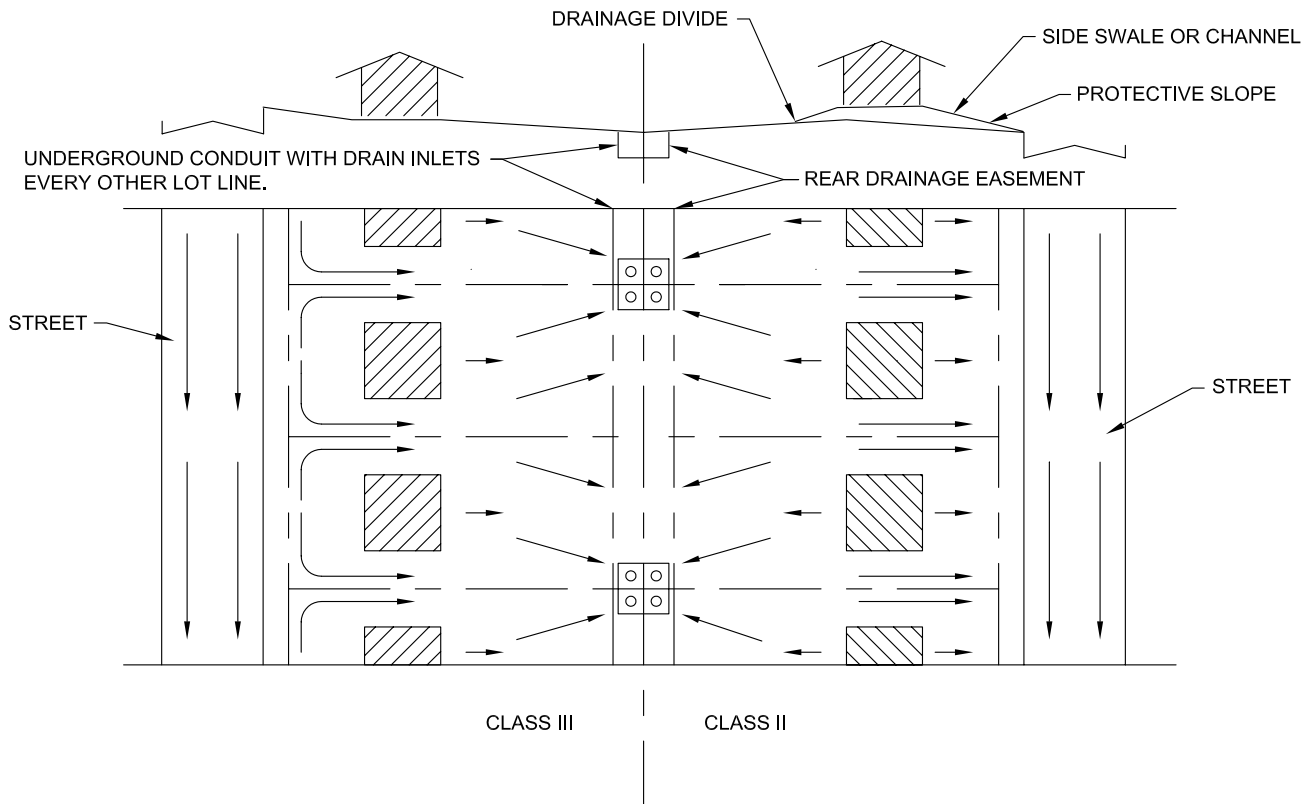
4. **Manholes** - Areas around manholes shall be tested every vertical foot. Testing methods and recordings shall be as described above.
5. **Utility Services to Residences** - Test at least every other lift on a minimum of 50 percent of the services.



NOTES:



1. LOTS CAN BE GRADED AS A PAD WITH A MINIMUM 1% GRADE TOWARD THE STREET
-OR-
2. LOTS CAN BE GRADED FLAT WITH DRAINAGE DITCHES EXTENDING THE LENGTH OF THE SIDE LOT LINE WITH A MINIMUM 1% GRADE TOWARD THE STREET.

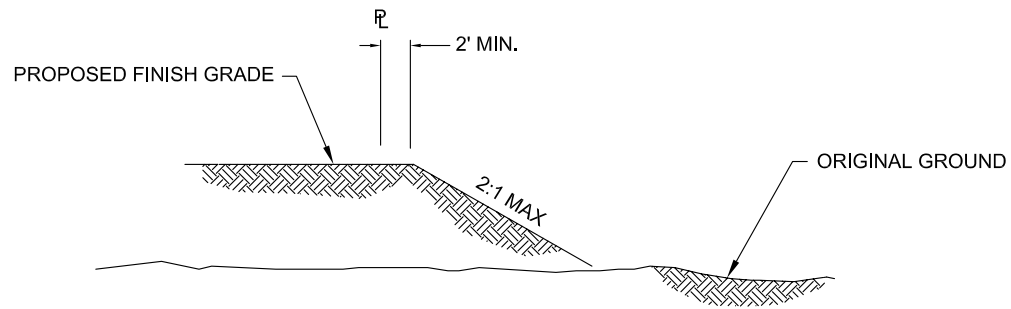
	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	CLASS 1 LOT GRADING	
APPROVED BY:  PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: BPJ	DATE: MAR 3, 2009
		GR - 1



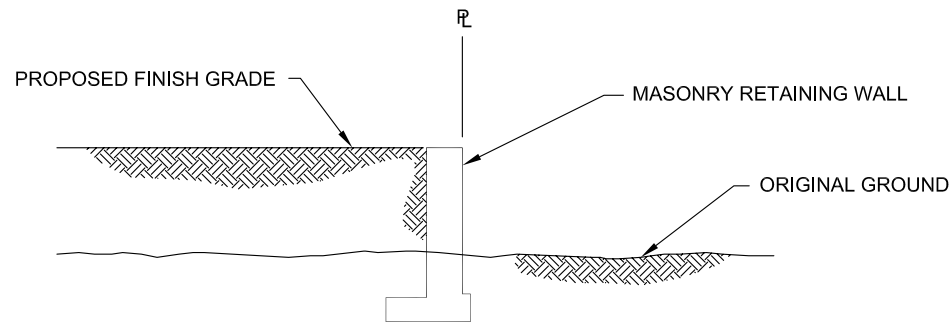
NOTES:

1. THOSE LOTS WHICH DO NOT DRAIN TOWARDS EXISTING OR FUTURE LOTS MAY ELIMINATE THE USE OF REAR LOT DRAINS PROVIDED ADDITIONAL EROSION CONTROL MEASURES ARE IMPLEMENTED SUBJECT TO APPROVAL OF THE CITY ENGINEER.
2. EACH LOT TO HAVE IT'S OWN INLET.
3. STORM DRAIN SYSTEM SHALL BE LOCATED IN A PRIVATE DRAINAGE EASEMENT AND MAINTAINED BY PROPERTY OWNER.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	LOT GRADING CLASS II AND III	
APPROVED BY:		
 PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: BPJ	DATE: MAR 3, 2009
		GR - 2





OPTION 1

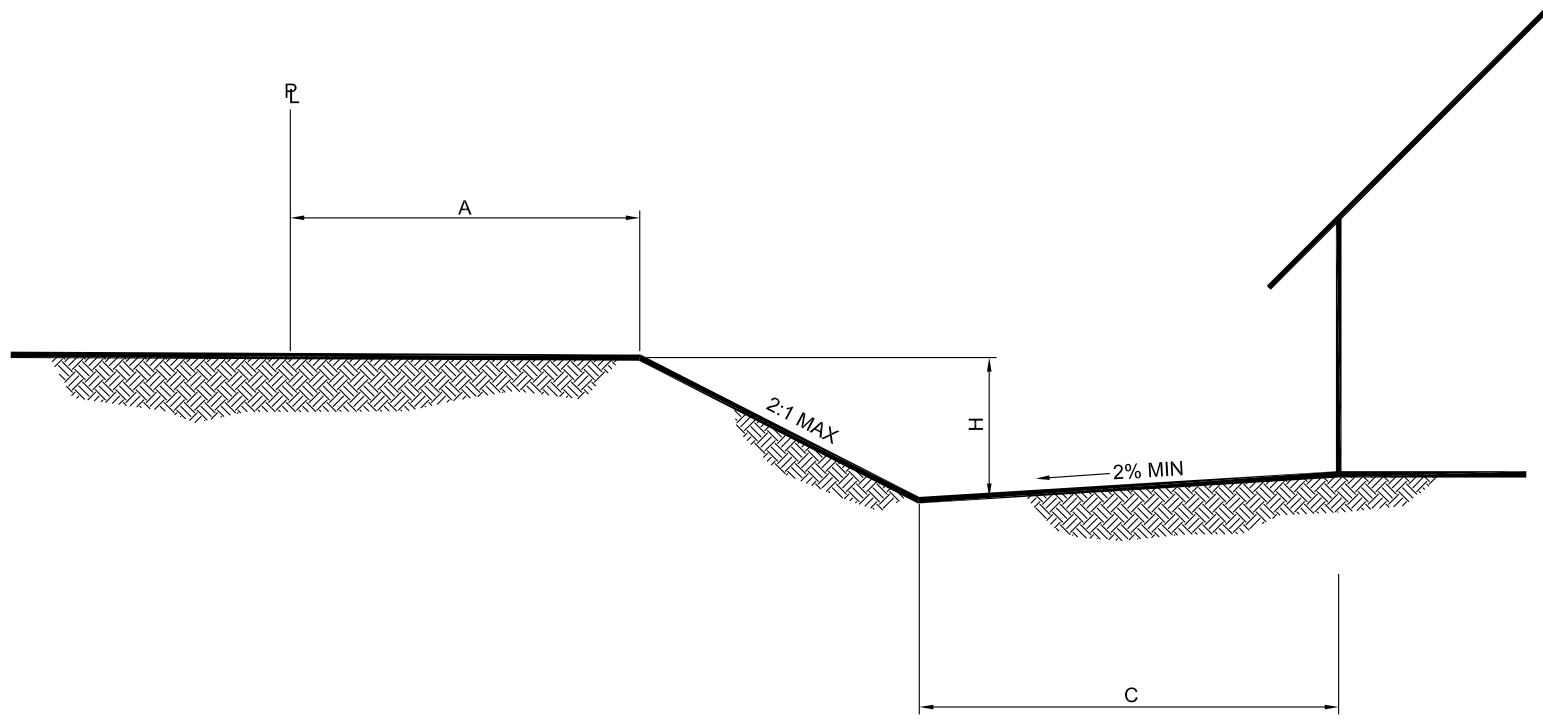


OPTION 2

NOTES:



1. A RECORDED SLOPE EASEMENT IS REQUIRED FROM ADJACENT PROPERTY OWNER FOR OPTION 1.

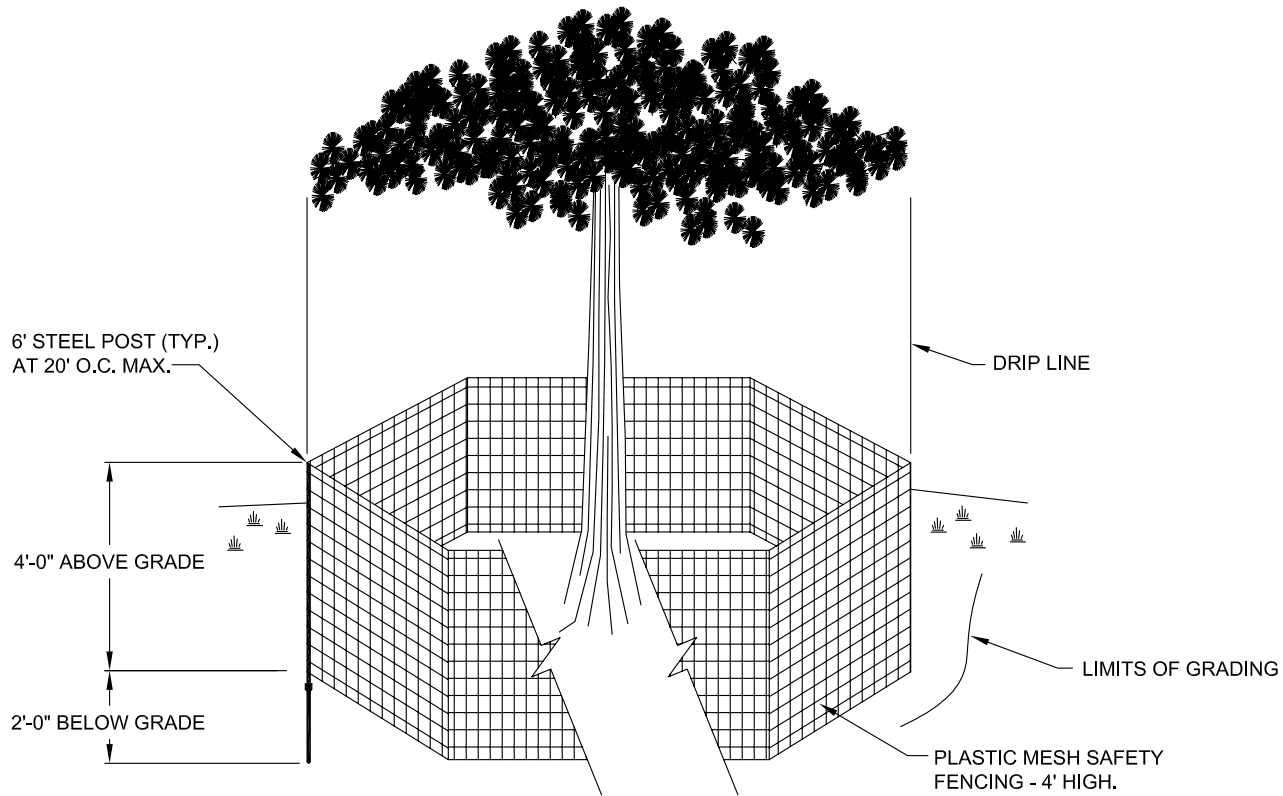
	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	EXTERIOR PERIMETER PROPERTY LINE GRADING	
APPROVED BY:  PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: BPJ	DATE: MAR 3, 2009
		GR - 3



NOTES:

1. WHEN "H" IS LESS THAN OR EQUAL TO 1.0 FOOT, "A" = 1.0 FOOT MIN.
2. WHEN "H" IS GREATER THAN 1.0 FOOT, A RETAINING WALL IS REQUIRED OR A STANDARD LOT SETBACK GUARANTEE PROVIDED. IN SUCH CASE, "A" SHALL EQUAL 2.0 FEET MIN. AND "C" SHALL BE A MINIMUM OF H/2 (3' MIN, 15' MAX).



	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	INTERIOR PROPERTY LINE GRADING	
APPROVED BY:		
 PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: BPJ	DATE: MAR 3, 2009
		GR - 4



NOTES

ALL EXISTING TREES OR GROUPINGS OF TREES SHALL BE FENCED PRIOR TO ANY CONSTRUCTION ACTIVITIES. FENCING SHALL BE AS FOLLOWS:

1. BRIGHTLY COLORED PLASTIC MESH SAFETY FENCING SHALL BE TIED SECURELY TO 6' STEEL POSTS, 15' ON CENTER MAXIMUM.
2. FENCING SHALL BE PLACED AT THE APPROXIMATE DRIP LINE OF THE TREES' CANOPY OR THE LIMIT OF THE GRADING, WHICHEVER IS APPROPRIATE.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	TREE PROTECTION	
APPROVED BY:  PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: BPJ	DATE: MAR 3, 2009
		GR - 5