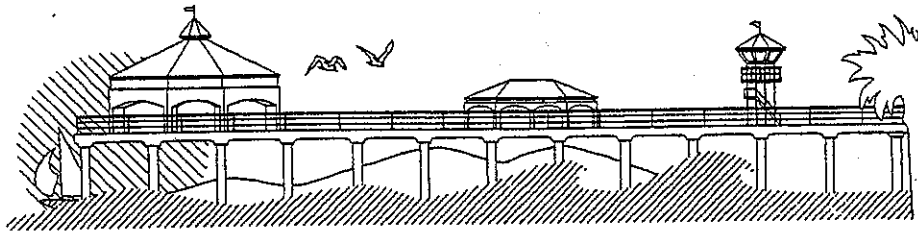
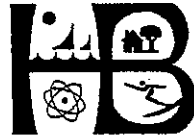


GRADING MANUAL

CITY OF HUNTINGTON BEACH

Department of Public Works

November 1994



Approved By

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This manual is a modified version of the County of Orange, EMA Grading Manual, and was prepared with the assistance of Bruce Crosby, Civil Engineer Assistant and Geneil Dixon, Office Specialist

CITY OF HUNTINGTON BEACH

DEPARTMENT OF PUBLIC WORKS

TABLE OF CONTENTS

<u>Section Number</u>	<u>Section Title</u>	<u>Page</u>
SUBARTICLE 1	GENERAL PROVISIONS	
1.1	Authority	1
1.2	Scope and Purpose	1
1.3	Adoption and Revision	1
SUBARTICLE 2	DEFINITIONS	
2.1	Definitions	1
SUBARTICLE 3	GRADING PERMIT REQUIREMENTS	
3.1	Grading Permit Application	3
3.2	Grading Plan Clearances	3
3.3	Grading Plan Check	3
3.4	Soil and Engineering Geology Report Content	5
3.5	Permit Issuance	7
SUBARTICLE 4	FEES	
4.1	Plan Checking Fee	7
4.2	Grading Permit Fee	8
4.3	Grading Permit Renewal Fee	8
4.4	Reinspection Fee	8
4.5	Refunds	9
SUBARTICLE 5	BONDS	
5.1	Types of Bonds	9
5.2	Bond Amount	9
5.3	Bond Conditions	9
5.4	Term of Bond	9
SUBARTICLE 6	CUTS	
6.1	Cut Slopes	10
SUBARTICLE 7	FILLS	
7.1	Fill Slopes	10
7.2	Preparation of Ground	10
7.3	Fill Material	11
7.4	Compaction	11
7.5	Slope	12
7.6	Utility Line Backfill	12

TABLE OF CONTENTS

(Continued)

<u>Section Number</u>	<u>Section Title</u>	<u>Page</u>
SUBARTICLE 8	SETBACKS	
8.1	Setbacks from Permit Area Boundary	12
8.2	Design Standards for Setbacks	13
8.3	Retaining Walls	13
SUBARTICLE 9	DRAINAGE AND TERRACING	
9.1	Terrace	13
9.2	Subsurface Drainage	13
9.3	Disposal	15
9.4	Interceptor Drains	16
9.5	Pipe Specifications	16
9.6	Area Drain Grates	17
9.7	Conduits Beneath Structures	17
SUBARTICLE 10	ASPHALT CONCRETE PAVEMENT	
10.1	Asphalt Concrete and Untreated Base Standards	17
10.2	Subgrade Compaction	18
10.3	Soil Sterilization	18
10.4	Surface Drainage	18
10.5	Pavement Structural Section	18
10.6	Driveways	19
SUBARTICLE 11	EROSION CONTROL	
11.1	Information on Erosion Control Plans	19
SUBARTICLE 12	GRADING INSPECTION	
12.1	Site Inspection by the Director	20
12.2	Alternate Materials and Methods of Construction	24
SUBARTICLE 13	COMPLETION OF WORK	
13.1	Final Reports	24

**CITY OF HUNTINGTON BEACH
GRADING MANUAL
DEPARTMENT OF PUBLIC WORKS**

SUBARTICLE 1 - GENERAL PROVISIONS

1.1 Authority

The City of Huntington Beach Grading and Excavation Code Section 17.05.030, "Grading Manual", authorizes the Director of Public Works to formulate such rules, procedures, and interpretations as may be necessary or convenient to administer the Grading and Excavation Code. Such rules, procedures, and interpretations, and amendments thereto, shall be referred to as the "City of Huntington Beach Grading Manual".

1.2 Scope and Purpose

The City of Huntington Beach Grading Manual (hereinafter referred to as Grading Manual) is a compilation of rules, procedures, and interpretations necessary to carry out the provisions of the City of Huntington Beach Grading and Excavation Code.

The purpose of the Grading Manual is to assist users of the Grading and Excavation Code by supplementing it with detailed information regarding rules, interpretations, standard specifications, procedures, requirements, forms, and other information applicable to control excavation, grading, and earthwork construction in the City of Huntington Beach. Should any portion of the Grading Manual be found to be in conflict with the provisions of the Grading and Excavation Code, the Grading and Excavation Code provision shall govern.

1.3 Adoption and Revision

The provisions of the Grading Manual, including revisions or additions thereto, shall be prepared by the Director.

SUBARTICLE 2 - DEFINITIONS

2.1 Definitions

The definitions contained in this manual are supplemental to those contained in the Grading and Excavation Code.

As-graded shall mean the surface conditions existent upon completion of grading.

Bedrock shall mean relatively unweathered, consolidated or relatively hard formation that underlies the soil and other unconsolidated material.

Bench shall mean a relatively level step excavated into earth materials on which fill is to be placed.

Fault shall mean a fracture in the earth's crust along which movement has occurred. A fault is considered active if movement has occurred within the last $\pm 11,000$ years (Holocene geologic time.)

Flatland Site shall mean any site which does not fit the definition of a hillside site.

Hillside Site shall mean a site which entails cut or fill grading of three (3) feet or more in vertical height below or above natural ground; or a combination fill-over-cut slope equal to or greater than five (5) feet in vertical height; or where the existing grade is 20 percent or greater; and which may be adversely affected by drainage or stability conditions within or from outside the site, or which may cause an adverse effect on adjacent property. —

Key shall mean a designed compacted fill placed in a trench excavated in earth material beneath the toe of a proposed fill slope.

Keyway shall mean an excavated trench into competent earth material beneath the toe of a proposed fill slope.

Retaining Wall shall mean a wall designed to resist the lateral displacement of soil or other materials.

Slope Stability:

Gross Slope Stability shall mean the stability of slope material below a plane approximately three (3) to four (4) feet deep measured from and perpendicular to the slope face.

Surface Slope Stability shall mean the stability of the outer three (3) to four (4) feet of slope material measured from and perpendicular to the slope face.

SUBARTICLE 3 - GRADING PERMIT REQUIREMENTS

3.1 Grading Permit Application

A grading permit application shall consist of the following items and forms completed and signed by the applicant or representative, unless otherwise specified by the Director:

- a. Application form
- b. Six sets of grading plans
- c. Two copies of a preliminary soil report (if required)
- d. Two copies of a preliminary geology report (if required)
- e. Payment of grading plan check and inspection fee
- f. Three sets of erosion control plans.
- g. Two copies of hydrology and hydraulic calculations, if applicable

3.2 Grading Plan Clearance

The Director shall notify the applicant that, prior to issuance of a grading permit, written clearances will be required from other divisions within the City of Huntington Beach and may be required from other agencies. Depending on site conditions and location, written clearance or permits may be required from, but not limited to, the following agencies:

- a. California Regional Water Quality Control Board
- b. California Department of Fish and Game
- c. California Coastal Commission
- d. California Division of Industrial Safety
- e. City of Huntington Beach Fire Department (fuel modification)

Upon notification by the Director, the applicant shall be responsible for submitting copies of grading plans and information required by those divisions or agencies, and for obtaining required clearances or permits.

3.3 Grading Plan Check

Information on Plans: Plans submitted for plan check shall be drawn to scale upon City of Huntington Beach standard grading sheets available from the Engineering Division, or upon Mylar or linen, using the same format. The plans shall be of sufficient clarity to indicate the nature and extent of the work proposed, and must show in detail that the project will conform to the provisions of this Grading Manual, the Grading and Excavation Code, and all relevant laws, ordinances, rules, and regulations.

The first sheet of each set of plans shall give the location of the work and the name, address and telephone number of the owner, the person by whom the plans were prepared, the project soil engineer, engineering geologist, and when required, the project paleontologist and archaeologist.

a. Rough Grading Permit:

The plans shall include, but not be limited to, the following information:

1. Vicinity map of the site.
2. Property limits clearly labeled or otherwise identified.
3. Prominent existing or natural terrain features, and accurate contours of existing ground and details of terrain and area drainage a minimum of fifteen (15) feet beyond property limits (spot elevations may be used on flatland sites.)
4. Limiting dimensions including setbacks between property lines and top and toe of slopes, elevations of finish contours to be achieved by the grading, proposed drainage devices, and related construction.
5. Details (plan and section) of all surface and subsurface drainage devices, walls, cribbing, dams, and other protective devices to be constructed with, or as a part of, the proposed work, together with a map showing the drainage area and estimated runoff from the area served by any drains.
6. Location of any existing buildings or structures on the property where the work is to be performed, and locations of any buildings or structures on land of adjacent owners which are within fifteen (15) feet of the property, or which may be adversely affected by the proposed grading operations.
7. If the grading project includes the movement of earth material to or from the site in an amount considered substantial by the Director, the permittee shall submit a haul route plan for review and The Traffic Engineer may suggest alternate routes or special requirements in consideration of the which the Director shall prescribe as a condition of the grading permit. There shall be no additional fee for the haul route plan check.
8. Additional plans, drawings, calculations, environmental impact information, or other reports required by the Director.

b. Precise Grading Permit:

The plans shall include the following, in addition to the above items listed for Rough Grading Permits:

1. The footprint or allowable building area of all proposed structures (including appurtenances.)
2. Setback distances between structures and top and toe of slopes.
3. Detailed finish grade and finish floor elevations.
4. Flowlines for lot drainage.
5. Details for building footing and side-yard swale relationship (including extra height of footing.)
6. All proposed concrete flatwork or driveways.

The Precise Grading Plan shall identify all previous rough grading permits issued for the project site. It may include sheets from the rough grading plan which show original topography in lieu of reproducing original contours on the precise grading plan.

3.4 Soil and Engineering Geology Report Content

Two copies of each report required by this Grading Manual shall be submitted as part of the application for a grading permit. Each report shall contain all information applicable to the project.

Recommendations contained in the approved reports shall be incorporated into the grading plans and specifications and shall become conditions of the grading permit.

a. Preliminary Soil Report:

Soil engineering reports shall be required for all subdivision, commercial/industrial, multi-residential, and similar developments involving structures or earthwork for which a grading permit is required. Soil reports shall also be required for grading or building permits on single lot projects when specified by the Director.

The preliminary soil engineering report shall include information and data regarding the nature, distribution, and the physical and chemical properties of existing soils; conclusions as to adequacy of the site for the proposed grading; recommendations for general and corrective grading procedures; foundation and pavement design criteria and shall provide other recommendations, as necessary, commensurate with the project grading and development.

b. Preliminary Engineering Geology Report:

Engineering geology reports shall be required for all developments on hillside sites where geologic conditions are considered to have a substantial effect on existing and future site stability. This requirement may be extended to other sites suspected of being adversely affected by faulting.

The preliminary engineering geology report shall include a comprehensive description of the site topography and geology; an opinion as to the adequacy of the proposed development from an engineering geologic standpoint; an opinion as to the extent that instability on adjacent properties may adversely affect the project; a description of the field investigation and findings; conclusions regarding the effect of geologic conditions on the proposed development; and specific recommendations for plan modification, corrective grading or special techniques and systems to facilitate a safe and stable development, and shall provide other recommendations as necessary, commensurate with the project grading and development. The preliminary engineering geology report may be combined with the soil engineering report.

c. Seismicity Report:

A seismicity report shall be required as a condition for issuance of a grading permit and/or Building Permit for all subdivisions (tracts), and for all sites for critical

structures (fire stations, nursing homes, etc.) and major structures, as determined by the Director. Additionally, sites containing earthquake sensitive earth materials or sites that are located on or near potentially active or active faults shall also require a seismicity report, as determined by the Director.

The report shall be prepared by an engineering geologist, geophysicist, or a civil engineer with expertise in earthquake technology and its application to buildings and other civil engineering works. The scope of the report shall be commensurate with the proposed development and shall reflect the state of art. The seismic report may be combined with the soil and engineering geology reports.

d. Final Reports:

Rough grade and final soil and engineering geology reports shall be submitted in accordance with [Subarticle 13 of this grading manual](#).

3.5 Permit Issuance

A rough grading permit may be issued for a project after approval of a Tentative Map or Tentative Parcel Map, when required, or at any time when a Tentative Map is not required by Code. Grading permits subject to the above subdivision requirements shall not be issued prior to the approval of the Tentative Maps unless otherwise provided in Zoning Regulations or approved by the Director. A precise grading permit may be issued for a project after recordation of a Final Map, when required, or at any time when a Tentative or Final Map is not required by Code, or after approval of a waiver of Final Map.

SUBARTICLE 4 - FEES

4.1 Plan Checking Fees

Plan checking fees on each site shall be based on (1) the volume (cubic yards) of excavation or fill, whichever is greater, and (2) the estimated value of onsite drainage and paving improvements. The amount of the plan checking fee for grading plans shall be as specified by resolution of the City Council.

For the purpose of this Section, onsite drainage and paving improvements shall include, but need not be limited to, pavement surfacing, inlets, outlet structures, subsurface drainage devices, rip rap, curb and gutter, and erosion control facilities.

Asphalt concrete is classified as a secondary drainage device when used for roadway and parking lot surfacing, or other similar uses for the purposes of determining plan checking and permit fees. No separate charge shall be made for public and private street improvements required by administrative condition of approval and inspected the Department of Public Works. No separate charge shall be made for standard terrace drains, down drains, or interceptor drains.

Separate permits or fees shall apply to retaining walls, major drainage structures, and other improvements as prescribed by the Director.

Plans submitted prior to issuance of permit which are substantially incomplete, or changed from a previous submittal, as determined by the Director, and which require additional plan checking shall require an additional plan check fee to be charged by the Director.

The fee for checking substantial revisions to previously approved grading plans for which a valid permit is active, shall be based on the fees computed from the difference of the total new yardage and the previously permitted yardage. The fee increment used shall be the adopted fee in effect at the time the revisions were approved. The fee may be waived if, in the opinion of the Director, it is not warranted due to the minor nature of the changes.

Erosion control plans checked subsequent to grading permit issuance shall be treated as a substantial revision for the purpose of determining plan checking fees.

4.2 Grading Permit Fee

Grading permit fees on each site shall be based on (1) the volume (cubic yards) of excavation or fill, whichever is greater, and (2) the estimated value of onsite drainage and paving improvements. Onsite drainage and paving improvements shall be considered the same as described for plan checking fees in this Section.

The fee for a minimum fee grading permit for inspection purposes only, described in Section 17.05.240, Grading Permits, of the grading code, shall be based on 100 cubic yards of excavation plus the estimated value of onsite drainage improvements to be inspected. The fee(s) for authorizing additional grading work to that under a valid grading permit

including erosion control work shall be computed as specified for plan checking substantial revisions in this Section. No allowance for reduced earthwork volume or valuation shall be permitted.

4.3 Grading Permit Renewal Fee

The fee for renewing an expired or invalid grading permit shall be as specified in Section 17.05.170, Issuance, Expiration and Renewal, of grading code.

4.4 Reinspection Fee

When any reinspection is required due to the negligence of the permit holder, his agent or other responsible persons, or due to the failure of said parties to comply with previous correction instructions, a fee as established by resolution shall be charged by the Director for each such reinspection. The fee shall be paid before any further inspections are made. This Section is not to be interpreted as requiring reinspection fees the first time a job is rejected for failure to comply with the requirements of this Manual, but as controlling the practice of calling for inspection before the job is ready for such inspection or reinspection.

4.5 Refunds

- a. Permit fee refunds will be made in an amount equal to eighty (80) percent where work authorized by said permit has not commenced, except that no refund will be made for less than twenty-five (25.00) dollars, and no refund will be made if one (1) year has elapsed from the date of permit issuance.
- b. Plan check fees are not refundable.

SUBARTICLE 5 - BONDS

5.1 Types of Bonds

In lieu of a surety bond, the applicant may file a cash bond or, if approved by the City Attorney, a letter of credit or Time Certificate of Deposit from financial institutions subject to regulation by the State or Federal government in an amount equal to that which would be required in the surety bond.

5.2 Bond Amount

The amount of the bond shall be 100% of the estimated cost of the total cut and fill volume and 100% of the estimated cost of drainage improvements and erosion control facilities being constructed or installed under the permit. The amount of the bond may be reduced by the Director to the extent that it is determined that potential hazards or the nature of the project do not justify the full amount.

5.3 Bond Conditions

Every bond shall be made on a form approved by the City Attorney, or shall contain the conditions prescribed therein and be approved as to form by the City Attorney.

5.4 Term of Bond

The term of each bond shall begin upon the date of permit issuance and shall remain in effect until the completion of the work to the satisfaction of the Director.

SUBARTICLE 6 - CUTS

6.1 Cut Slopes

Cut slopes shall be no steeper than two horizontal to one vertical (2:1). Recommendations shall be included in the soil engineering or engineering geology report for cut slopes to be steeper than five (5) feet in height. The soil engineer shall consider both gross and surficial stability of the slope and provide a written statement approving the design of slope stability.

SUBARTICLE 7 - FILLS

7.1 Fill Slopes

Fill slopes shall be no steeper than two horizontal to one vertical (2:1).

7.2 Preparation of Ground

The ground surface shall be prepared to receive fill by removing vegetation; noncomplying fill; topsoil and other unsuitable materials; and by scarifying to provide a bond with the new fill.

Where existing slopes exceed five (5) feet in height or are steeper than five horizontal to one vertical (5:1), the ground shall be prepared by benching into sound bedrock or other competent material, as determined by the soil engineer or engineering geologist and approved by the Director. The lowermost bench beneath the toe of a fill slope shall be a minimum ten (10) feet in width. The ground surface below the toe of fill shall be prepared for sheet flow runoff, or a paved drain shall be provided.

Where fill is to be placed over a cut slope, the bench under the toe of the fill shall be at least fifteen (15) feet wide, but the cut slope must be made before placing fill and shall meet the approval of the soil engineer and/or engineering geologist as suitable foundation for fill.

Unsuitable soil is soil which is not dense, firm or unyielding, is highly fractured or has a high organic content, and in the opinion of the Director, civil engineer, soil engineer, or engineering geologist, is not competent to support other soil or fill, to support structures, or to satisfactorily perform the other functions for which the soil is intended.

7.3 Fill Material

Detrimental amounts of organic material shall not be permitted in fills. Except as outlined below, no rock or similar irreducible material with a maximum dimension greater than twelve (12) inches shall be buried or placed in fills.

The Director may permit placement of larger rock when the soil engineer properly devises a method of placement, continuously inspects placement, and approves the fill stability and competency. The following conditions shall also apply:

- a. Prior to issuance of the grading permit, potential rock disposal area(s) shall be delineated on the grading plan.
- b. Rock sizes greater than twelve (12) inches in maximum dimension shall be ten (10) feet or more below grade, measured vertically. This depth may be reduced upon recommendation of the soil engineer and approval of the Director providing that the permitted use of the property will not be impaired.
- c. Rocks greater than twelve (12) inches shall be placed so as to be completely surrounded by soils; no nesting of rocks will be permitted.

7.4 Compaction

All fills shall be compacted to a minimum of ninety (90) percent of maximum density as determined by the Uniform Building Code Standard No. 70-1 or equivalent, as approved by the Director. Field density shall be determined in accordance with the Uniform Building Code Standard No. 70-2, or equivalent, as approved by the Director.

Locations of field density tests shall be determined by the soil engineer or approved testing agency and shall be sufficient in both horizontal and vertical placement to provide representative testing of all fill placed. Testing in areas of a critical nature or special emphasis shall be in addition to the normal representative samplings.

Exceptions:

- a. Fills excepted in Section 17.05.060, Grading Permits, of the Grading Code and where the Director determines that compaction is not a necessary safety measure to aid in preventing saturation, settlement, slipping, or erosion.
- b. Where lower density and very high potential expansion characteristics as defined by Table No. 29-C of the Uniform Building Code exist, lesser compaction may be granted by the Director upon justification and recommendation by the soil engineer.

Fill slopes shall be compacted to the finish slope face as specified above. The soil engineer shall provide specifications for the method of placement and compaction of the soil within the zone of the slope face.

Sufficient maximum density determinations by test method, Uniform Building Code Standard No. 70-1 or approved equivalent, shall be performed during the grading operations to verify that the maximum density curves used are representative of the material placed throughout the fill.

7.5 Slope

Fill slopes shall be no steeper than two horizontal to one vertical (2:1.) In special circumstances where no evidence of previous instability exists and when recommended in the soil engineering report and approved by the Director, slopes may be constructed steeper than 2:1. In no case shall slopes steeper than 2:1 be approved if 2:1 or flatter slopes are required as a condition of approval of any project by the City Council, Planning Commission, or Zoning Administrator, without appropriate revision of said condition by the approving body.

Recommendations in the soil engineering report for fill slopes to be steeper than 2:1 shall be accompanied by a slope stability analysis for all slopes greater than five (5) feet in height.

The soil engineer shall consider both the gross and surficial stability of the slope and provide a written statement approving the slope stability. In addition, the soil engineer shall recommend alternative methods of construction or compaction requirements necessary for surficial stability.

7.6 Utility Line Backfill

Utility line backfill beneath and adjacent to structures, beneath pavements, adjacent and parallel to the toe of a slope, and in sloping surfaces steeper than ten horizontal to one vertical (10:1), shall be compacted and tested in accordance with the Standard Specifications for Public Works construction.

SUBARTICLE 8 - SETBACKS

8.1 Setbacks From Permit Area Boundary

The tops of cuts and toes of fill slopes shall be setback as far as necessary from the outer property boundaries of the permit area, including slope easements, and in accordance with Detail 1 herein.

8.2 Design Standards For Setbacks

The tops and the toes of cut and fill slopes shall be set back from structures as far as is necessary for adequacy of foundation support and to prevent damage of the slopes as a result of water runoff, erosion, or maintenance. Unless otherwise approved by the Director, setbacks shall be no less than shown in Detail 1 below.

8.3 Retaining Walls

Retaining walls may be used to reduce the required setback in accordance with Detail 1 when approved by the Director.

SUBARTICLE 9 - DRAINAGE AND TERRACING

9.1 Terrace

Terraces at least six (6) feet in width shall be established at not more than thirty (30) foot vertical intervals on all cut or fill slopes to control surface drainage and debris, except that where only one (1) terrace is required, it shall be at mid-height.

Swales or ditches on slope terraces shall have a minimum gradient of six (6) percent and must be paved with reinforced concrete, or approved equal, not less than three (3) inches in thickness. They shall have a minimum depth at the deepest point of eighteen (18) inches and a minimum paved width of five (5) feet.

A single run of swale or ditch shall not collect runoff from a tributary area exceeding 13,500 square feet (projected) without discharging into a down drain.

9.2 Subsurface Drainage

Cut and fill slopes shall be provided with approved subsurface drainage as necessary for stability and protection of adjacent properties from the influence of groundwater. The design of such facilities shall be contained in the approved preliminary soil engineering or engineering geology report and shall appear on the approved grading plan pursuant to the approval of the soil engineer or the engineering geologist.

Subsurface drainage facilities shall be installed where natural or artificially introduced ground water affects or is likely to affect the project in a potentially unstable, hazardous, or otherwise deleterious manner.

DETAIL 1

Min. Setback From Adjacent Slope					
H (hgt.) Feet	a	b	c	d	e
0-6	3'	7'	3'	5'	1'
6-14	5'	7'	H/2	5' $\frac{H}{2}$ min.	H/5
14-30	5'	10' $\frac{H}{2}$ min.	H/2	10' $\frac{H}{2}$ min.	H/5
+30	5'	10'	15'	10'	6'

Table A

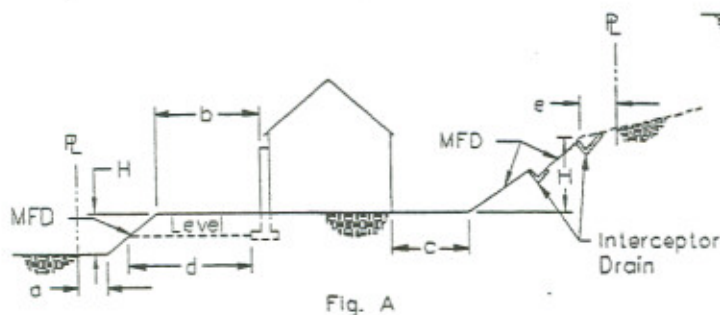


Fig. A

H (hgt.) Feet	Max. Hw	Min. Setback f
0-6	3'	3' min.
6-12	H/2	H/2
12-13	6'	H/2
+30	6'	15'

Table B

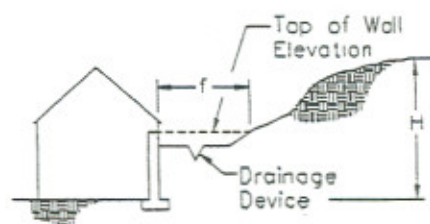
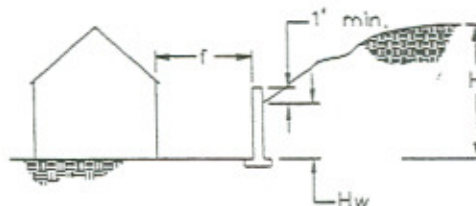


Fig. B

NOTES:

1. PL shall mean permit area boundary and/or property line; MFD shall mean manufactured surface.
2. Setbacks shall also comply with applicable zoning regulations.
3. Table A applies to manufactured slopes and 2:1 or steeper natural slopes. Setbacks from natural slopes flatter than 2:1 shall meet the approval of the Director.
4. "b" may be reduced to 5' minimum if an approved drainage device is used; roof gutters and downspouts may be required.
5. "b" may be reduced to less than 5' if no drainage is carried on this side and if roof gutters are included.
6. If the slope between "a" and "b" levels is replaced by a retaining wall, "a" may be reduced to zero and "b" remains as shown in Table A. The height of the retaining wall shall be controlled by zoning regulations.
7. "b" is measured from the face of the structure to the top of the slope.
8. "d" is measured from the lower outside edge of the footing along a horizontal line to the face of the slope. Under special circumstances, "d" may be reduced as recommended in the approved soil report and approved by the Director.
9. The use of retaining walls to reduce setbacks (Fig. B) must be approved by the Director.
10. "f" may be reduced if the slope is composed of sound rock that is not likely to produce detritus and is recommended by the soil engineer or engineering geologist and approved by the Director.
11. "a" and "e" shall be 2' when PA coincides with arterial or local street right-of-way and when improved sidewalk is adjacent to right-of-way.
12. "e" shall be increased as necessary for interceptor drains.

All drainage facilities shall be designed to carry waters to the nearest practicable drainage way approved by the Director. Erosion of ground in the area of discharge shall be prevented by installation of non-erosive down drains, rip rap, energy dissipaters or other approved devices, and shall provide for a return of flow to a natural sheet flow condition.

Where surface waters are to be conducted or directed onto adjacent property in an unnatural manner, the Director may require the applicant, prior to issuance of a grading permit, to obtain written permission from the owner of said property, accepting the surface waters.

Building sites shall have a sheet flow drainage gradient of two (2) percent from the structure toward approved swales or drainage facilities, unless otherwise waived by the Director. The maximum drainage gradient of an earth swale shall be four (4) percent.

Grading of future building sites under a rough grading permit, for the purpose of lot sales, shall have a sheet flow drainage gradient of two (2) percent toward approved drainage facilities. The Director may reduce this minimum gradient to one (1) percent upon the written request of the applicant or his agent, providing the applicant demonstrates the following:

- a. Finish grades for drainage of building sites can be constructed in accordance with the requirements of this Section without importing additional fill, and
- b. Sufficient approved swales and/or drainage facilities are constructed to prevent water from ponding on any lot supported by a natural slope or cut or fill slope over five (5) feet in height.

Finish grades, other than above, shall conform to the following minimum drainage gradient standards:

	Minimum Gradient
a. Earth swales	1.0%
b. Earth (sheet flow)	1.0%
c. Asphalt pavement (sheet flow)	1.0%
d. Concrete gutter in asphalt paved area	0.25%

9.4 Interceptor Drains

Paved interceptor drains shall be installed along the top of all manufactured slopes where the tributary drainage area flows toward the slope and has a drainage path to top of slope greater than forty (40) feet measured horizontally. Interceptor drains shall be paved with a minimum depth of eighteen (18) inches and a minimum paved width of thirty-six (36) inches measured horizontally across the drain. The slope of the drain shall be approved by the Director.

9.5 Pipe Specifications

Pipe material specifications shall be shown on the approved plans or in the approved soil report by the civil engineer or soil engineer and approved by the Director. The pipe shall conform to the currently adopted Standard Specification for Public Works Construction unless otherwise recommended by the civil engineer or soil engineer and approved by the Director.

Approved pipe includes:

- a. Acrylonitrile Butadiene Styrene (ABS) Solid wall pipe
 - 1. Subdrain
 - (a) ASTM D2751, SDR 35
 - (b) ASTM D1527, Schedule 40
 - 2. Stormdrain
 - (a) ASTM D2751, SDR 35
 - Maximum velocity, 8 feet per second
 - (b) ASTM D1527, Schedule 40
 - Maximum velocity, 15 feet per second
- b. Polyvinyl Chloride Plastic Pipe (PVC)
 - 1. Subdrain
 - (a) ASTM D3034, SDR 35
 - (b) ASTM D1785, Schedule 40
 - 2. Stormdrain
 - (a) ASTM D3034, SDR 35
 - Maximum velocity, 8 feet per second
 - (b) ASTM D1785, Schedule 40
 - Maximum velocity, 15 feet per second

- c. Reinforced Concrete Pipe (RCP)
D-load to be designed and shown on approved grading plans.
- d. Corrugated Steel Pipe (CSP)

Metal thickness to be designed and shown on approved grading plans.
Pipe to be bituminous coated.
- e. Corrugated Aluminum Pipe (CAP)

Metal thickness to be designed and shown on approved grading plans.
Pipe to be bituminous coated.
- f. Non reinforced Concrete Pipe
Pipe shall be extra strength.

The maximum flow design parameters may be exceeded in special circumstances when justified and recommended by the civil engineer and approved by the Director.

9.6 Area Drain Grates

The minimum cross-sectional area of required area drain grates shall not be less than 100 square inches, and shall contain a grate cover having 50% net opening. Additional area drain grates may be of any size or design.

9.7 Conduits Beneath Structures

Drainage conduits placed beneath structures shall conform to the requirements for sewer and waste plumbing. PVC and ABS pipes shall be Schedule 40.

SUBARTICLE 10 - ASPHALT CONCRETE PAVEMENT

10.1 Asphalt Concrete and Untreated Base Standards

When asphalt concrete pavement is proposed for surfacing of private parking lots, private streets, or other similar use, this paving, including the tack coat, seal coat and base course, shall conform to the current Department of Public Works special provisions for asphalt concrete and untreated base materials unless otherwise approved by the Director.

Exception: The provisions of this Section shall not apply when a private asphalt concrete driveway providing access to a single residence is proposed.

Untreated base may require testing by an approved testing agency to insure its compliance with the applicable specifications and special provisions when determined necessary by the Director. Tests may include but shall not be limited to:

- a. Sieve analysis
- b. Sand equivalent
- c. Percent of crushed particles retained by a No. 4 screen.

10.2 Subgrade Compaction

The top 6 inches of the subgrade material shall be compacted to a relative compaction of 90 percent of maximum density as determined by Uniform Building Code Standard 70-1 or approved equivalent, unless otherwise recommended by the soil engineer in the preliminary soil report and approved by the Director.

10.3 Soil Sterilization

Weed killer shall be required on subgrade if no aggregate base is used.

10.4 Surface Drainage

All concentrated drainage in asphalt paved areas shall be carried by approved concrete drainage devices.

10.5 Pavement Structural Section

The project soil engineer or design civil engineer shall determine the pavement structural section(s) for parking lots/service roads and private streets based on: (1) soil tests of the subgrade soil(s) performed by an approved soil testing laboratory; and (2) anticipated traffic and loading conditions. The methods used for soil testing and pavement design shall be those currently in use by the Department of Public Works for construction of public roadways, or methods acceptable to the Director. Unless otherwise specified by the soil engineer, the relative compaction of each layer of compacted base material shall not be less than 95 percent.

When private street improvement plans are required to be approved by the Department of Public Works, the pavement structural section may be determined by the Department of Public Works.

In lieu of a recommended structural section from the soil engineer or civil engineer for parking lots/service roads, the following standards may be used:

- | | | |
|----|---|--------------|
| a. | Parking stall areas | 2" AC/4" AB |
| b. | Commercial driveways, perimeter drives, and loading areas | 3" AC/6" AB |
| c. | Industrial driveways, perimeter drives, and loading areas | 3" AC/10" AB |

10.6 Driveway

Whenever access is taken from a street, alley, or driveway to an off-street parking area serving four (4) or less dwelling units, the driveway or other vehicular access-way shall have a maximum grade of plus fifteen percent (+15%) or minus six percent (-6%), measured from the street, alley, or driveway grade along the driveway center line, for a distance of not less than eighteen (18) feet from the street, alley, or driveway right-of-way line.

Whenever access is taken from a street, alley, or driveway to an off-street parking area serving industrial, commercial, or professional uses, public or community facilities, or five (5) or more dwelling units, the driveway or other vehicular access-way shall have a maximum grade of plus fifteen percent (+15%) or a minus two percent (-2%), measured from the street, alley, or driveway grade along the driveway center line for a distance of not more than eighteen (18) feet from the street, alley, or driveway right-of-way line.

SUBARTICLE 11 - EROSION CONTROL

11.1 Information On Erosion Control Plans

The plan shall include, but not be limited to:

- a. The name and twenty-four (24) hour telephone number of the person responsible for performing emergency erosion control work.
- b. The signature of the civil engineer or other qualified individual who prepared the grading plan and who is responsible for inspection and monitoring of the erosion control work.
- c. All desilting and erosion protection facilities necessary to protect adjacent property from sediment deposition.
- d. The streets and drainage devices that will be completed and paved by October 15.

- e. The placement of sandbags or gravelbags, slope planting, or other measures to control erosion from all slopes above and adjacent to roads open to the public. Use of gravel bags are encouraged over sandbags.

The plan shall indicate how access will be provided to maintain desilting facilities during wet weather.

SUBARTICLE 12 - GRADING INSPECTION

12.1 Site Inspection by the Director

Prior to any grading, brushing, or clearing, there shall be a pre-grading meeting held on the site. Prior to pouring curb and gutter or placement of pavement base material, there shall be a pre-paving meeting held on the site. The permittee, or agent, shall notify the Director at least two (2) working days prior to the meetings and shall be responsible for notifying all principals responsible for grading or paving related operations.

It shall be the duty of the person doing the work authorized by a permit to notify the Director at least one (1) working day prior to the work being ready for the following inspections:

a. Excavation and Fill Inspection

1. Clearing: After all brush and unsuitable material has been removed and an acceptable base has been exposed, but before any fill is placed.
2. Toe Bench and Key: After the natural ground or bedrock is exposed and prepared to receive fill, but before fill is placed.
3. Over-Excavation: After the area has been excavated but before fill is placed.
4. Excavation: After the excavation is started, but before the vertical depth of the excavation exceeds ten (10) feet, and every ten foot interval thereafter. Continuation of this excavation operation need not await the arrival of the grading inspector provided that proper notification has been made to the Director.
5. Fill: After the fill has started, but before the vertical height of the fill exceeds ten (10) feet, and every ten (10) foot interval thereafter. Continuation of this fill operation need not await the arrival of the grading inspector provided that proper notification has been made to the Director.

b. Concrete or gunite drainage device inspection:

1. Alley gutter or concrete device draining asphalt:

- (a) Subgrade (prior to placement of concrete:) Subgrade is to be prepared and required reinforcement placed. The civil engineer shall provide a field memo that line and grade is set in accordance with the approved plans.
- (b) Concrete placement: Concrete placement need not await the arrival of the grading inspector provided proper notification has been made to the Director.

2. Curb and gutter (private property:)

- (a) Subgrade (prior to placement of concrete:) Subgrade is to be made, forms and reinforcement are to be placed. The civil engineer shall provide a field memo that line and grade is set in accordance with the approved plans.
- (b) Concrete placement: Concrete placement need not await the arrival of the grading inspector provided proper notification has been made to the Director.

3. Terrace drains, down drains, brow ditches, and other paved drainage devices:

- (a) Subgrade: Prior to placement of welded wire mesh or reinforcing steel. The civil engineer shall provide a field memo that line and grade is set in accordance with the approved plans
- (b) Reinforcement: Thickness control wire and reinforcing steel or welded wire mesh are to be installed but prior to placement of gunite or concrete.
- (c) Concrete placement: Concrete placement need not await the arrival of the grading inspector provided proper notification has been made to the Director.

4. Sidewalks used as drainage devices:

Subgrade: Prior to placement of concrete, subgrade is to be made and forms are to be in place with the required reinforcement. The civil engineer shall provide a field memo that line and grade is set in accordance with the approved plans.

c. Drainage device other than concrete or gunite inspection:

1. Subdrains:

- (a) After excavation but prior to placement of filter material and pipe. The subdrain pipe and filter material shall be on-site for inspection.
- (b) After filter material and subdrain has been placed but prior to covering with backfill.

2. Storm drain and inlets:

- (a) After placement of storm drains but prior to covering with backfill. The civil engineer shall provide a field memo that line and grade is set in accordance with the plans.
- (b) After placement of inlet forms but prior to pouring concrete. The civil engineer shall provide a field memo that line and grade is set in accordance with the approved plans.

3. Earth Swales:

- (a) Prior to rough grading approval or lumber drop.
- (b) Prior to final grading approval.

d. Rough Grade Inspection:

When all rough grading has been completed. This inspection may be called for at the completion of rough grading without the necessity of the Director having previously reviewed and approved the required reports if the grading was performed under a precise grading permit. Under normal circumstances, all subdrains and slope drains shall be in place and approved as a condition for rough grading approval.

e. Paving Inspection:

1. Subgrade:

After subgrade has been established, tested, and approved by the soil engineer, or his qualified representative. The soil engineer shall provide a field memo of compaction test results. The civil engineer shall provide a field memo that line and grade is set in accordance with approved plans.

2. Untreated Base:

After untreated base course has been placed, tested, and approved by the soil engineer, or his qualified representative, but prior to prime coat and asphalt placement. The soil engineer shall provide a field memo of compaction test results. The civil engineer shall provide a field memo that line and grade is set in accordance with the approved plans. Material invoices may be required.

3. Asphalt:

- (a) During asphalt lay down to verify continuous inspection by the soil engineer, or his qualified representative or a special inspector when authorized. Material invoices may be required. Asphalt placement need not await the arrival of the grading inspector provided that proper notification has been made to the Director.
- (b) Prior to application of seal coat, the paved surface shall be water tested to reveal any irregularities and shall be patched where required. Material invoices may be required after placement of seal coat.

f. Final Inspection:

After all work, including installation of all drainage structures and other protective devices, has been completed and all written professional approvals and the required reports have been submitted. An as-built plan will be required if, in the opinion of the Director, the finished site significantly deviates from the approved grading plan.

g. Siltation Control Facilities (Rainy season: October 15 to April 15):

- 1. After excavation of desilting basins but prior to fill placement. Prefabricated devices are to be available on-site for inspection.
- 2. After fill placement for desilting basins but prior to placement of concrete or other non-erosive materials.
- 3. After completion of an erosion control system in accordance with an approved erosion control plans and the requirements of the Director.

- a. The provisions of this grading manual are not intended to prevent the use of any material or method of construction not specifically prescribed by the grading code or this grading manual provided any such alternate has been approved pursuant to this section.
- b. The Director may approve any such alternate provided he finds that the proposed design is satisfactory and complies with the provisions of the grading code and this grading manual and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in quality, strength, effectiveness, and safety.
- c. The Director shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use.
- d. Whenever there is insufficient evidence of compliance with the provisions of this grading manual or evidence that any material or any construction does not conform to the requirements of this grading manual or in order to substantiate claims for alternate material or methods of construction, the Director may require tests as proof of compliance to be made at the expense of the owner or his agent by an approved testing agency.
- e. Test methods shall be as specified by this grading manual for the material in question. If there are no appropriate test methods specified, the Director shall approve the test procedure. Copies of the results of all such tests shall be retained for a period of not less than two (2) years after the acceptance of the grading.

SUBARTICLE 13 COMPLETION OF WORK

13.1 Final Reports

Upon completion of the rough grading work and at the final completion of the work under the grading permit but prior to the issuance of building permits or release of grading bond or issuance of a certificate of use and occupancy, the Director may require:

- a. An as-graded grading plan prepared by the civil engineer, architect, or other qualified person, which shall include corrected original ground surface elevations if necessary, graded ground surface elevations, lot drainage patterns, manufactured slope inclination, and location of all **drainage facilities and subdrains**.

- b. A written approval by the civil engineer approving the grading as being substantially in conformance with the approved grading plan and which specifically approves the following items as appropriate to the project and stage of grading:
1. Construction of line and grade for all engineered drainage devices and retaining walls (rough and final grading.)
 2. Staking of property corners for proper building locations (rough grading.)
 3. Setting of all monuments in accordance with the recorded tract map (rough or final grading.)
 4. Location of permanent walls or structures on property corners or property lines where monumentation is not required (final grading.)
 5. Location and inclination of all manufactured slopes (rough and final grading.)
 6. Construction of earthen berms and positive building pad drainage (rough and final grading.)

When the approved grading plan is not prepared by a civil engineer, the architect, or other licensed professional who prepared the plan, shall provide written approval of the grading as being substantially in conformance with the approved grading plan.

- c. A soil engineering report prepared by the soil engineer, including type of field testing performed, suitability of utility trench and retaining wall backfill, summaries of field and laboratory tests and other substantiating data, and comments on any changes made during grading and their effect on the recommendations made in the soil engineering investigation report. Each field density test shall be identified, located on a plan or map, the elevation of test and finish grade elevation shown, and the method of obtaining the in-place density described, either Uniform Building Code Standard 70-2 or the approved equal, shall be so noted. The soil engineer shall provide a written approval as to the adequacy of the site for the intended use, as affected by soil engineering factors. The Director may require that the soil tests or testing be performed by an approved testing agency.
- d. A geology report prepared by the engineering geologist, including a final description of the geology of the site including any new information disclosed during the grading, and the effect of same on recommendations incorporated in the approved grading plan. He shall provide a written approval as to the adequacy of the site for the intended use as affected by geologic factors and when required by the Director, shall submit an as-built geologic map.

- e. A statement prepared by the grading contractor describing the volume of excavation and fill moved on the project. In addition, if the grading plan was not prepared by a registered civil engineer or registered professional authorized to prepare grading plans and perform inspections, the grading contractor shall submit written approval that the work was completed in accordance with the approved plans.