

CITY OF ANAHEIM  
DEPARTMENT OF PUBLIC WORKS  
SUBDIVISION SECTION

Grading Design Manual

**A. SOILS REPORTS**

**B. DESIGN CRITERIA**

1. Drainage

2. Slopes

3. Walls

**C. PLAN PREPARATION**

EXHIBITS

A - Inlet Capacity of Grate at SAG - Plate 2.6-0658

B & C - Berm Detail and Top of Slope and Retaining Wall at Property Line Detail

D - French Drain - deleted, see Standard Detail No. 334f

E - Toe of Slope Closer Than 15 Feet From Building Detail  
Slope 30 Feet or Less

**APPENDIX A:**

Preliminary Soils Reports  
Geotechnical Reports  
"As Graded" Soils Reports

**APPENDIX B:**

Table 17-A

**APPENDIX C:**

City Policy 211

**APPENDIX H:** Sample of Sump Pump Design

REFERENCES:

1. Erosion and Sediment Control Handbook by Steven J. Goldman, Katharine Jackson and Taras A. Bursztynsky
2. Manual of Standard for Erosion and Sediment Control Measures by ABAG Association of Bay Area Governments
3. Technical Guidelines for Geotechnical Reports of the City of San Diego.
4. Street Design and Standard Plans of the City of Irvine.
5. Orange County Hydrology Manual.

- 6. Orange County Zoning Code.
- 7. Highway Design Manual of County of Los Angeles.

**A. SOILS REPORTS**

A Soils engineering report shall be prepared for each hillside grading project by a licensed engineer. The soil engineering report shall include, but not limited to, specifying areas, bedrock, location, composition and characteristics of the native soil, certification as to the stability of the existing cut or fill, certification as to the stability of the proposed slopes, results of shearing strength tests and recommendations for the placing of additional fills or performing additional excavations.

See [Appendix A](#) for guidelines of:  
 The Preliminary Soils Reports, The Geotechnical Reports, The "As Graded" Soils Reports.

**B. DESIGN CRITERIA**

**1. Drainage**

a. Flatland Grading

Earth at rough stage	0.5% minimum 21% maximum
Dirt, grass	1% minimum 21% maximum
Fine graded residential lot- dirt (sheet flow away from the building)	2% minimum 21% maximum
Fine graded commercial, industrial site (sheet flow away from the building)	1% minimum 21% maximum
Asphalt, concrete	1% minimum 21% maximum
Concrete gutter in earth area	0.5% minimum
Concrete gutter in paved area:	
Straight section	0.2% minimum
Curved section	0.4% minimum
Parkway culvert, pipe within R/W (only one opening at the location)	2%

Driveway and ramp slope: See [Standard Detail #402](#)

b. Hillside Grading

Earth at rough stage	1% minimum
----------------------	------------

	21% maximum
Earth fine grade (sheet flow away	2% minimum 21% maximum
Earth swale	1% minimum 5% maximum
Asphalt, concrete	1% minimum 5% maximum
Concrete gutter in earth area	0.5% minimum
Concrete gutter in paved area:	
Straight section	0.2% minimum
Curved section	0.4% minimum

Maximum driveway slopes:

1. Whenever access is taken from a street 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 fourteen percent (+14%) or minus six percent (-6%) measured from the property line along the driveway centerline, for a distance not less than eighteen feet (18').
  2. Whenever access is taken from a street or driveway to an off-street parking area serving industrial, commercial or professional use, public or community facilities, or five (5) or more dwelling units shall have the maximum grade as shown on [Standard Detail No. 402](#).
  3. Ramps or driveways providing vehicular access within interior of an off-street parking area located beyond eighteen feet (18') from the ultimate right-of-way line of a street or driveway shall have a maximum grade of plus or minimum twenty percent (20%). When such ramp or driveway slopes exceed plus or minus ten percent (10%), the ramp or driveway design shall include transitions not less than eight feet (8') in length having a slope equal to one-half the ramp slope. When parking provided on ramp, the maximum slope shall not exceed six percent (6%).
- c. Design to carry the water to the nearest practical street, storm drain or natural watercourse. Concentrated flow will not be allowed over sidewalk and curb. Natural watercourses must be protected from increased and concentrated flow.
  - d. Onsite water shall be discharged to the street by pipe or parkway culvert. For single family residential projects water can be sheet flow over driveway approach. Pipe placed within parkway and under sidewalk through curb must be C.I.P. or P.V.C. schedule 80. Only one pipe per location. Pipe through curb: use 3 in. pipe for 6 in. curb; and 4 in. for 8 in. curb. [\(See Standard Detail No 150\)](#).
  - e. All concentrated flow shall be contained within a drainage device.

- f. No common swale for residential lots. High point of lot drainage swale shall be at 0.1 ft. below pad elevation. ([See Standard Detail No 328](#)).
- g. Provide velocity reducers at storm drain outlets. Rip-rap may be used to protect soils from erosive forces of water ([See Standard Detail No. 336](#)).
- h. Drainage shall not flow over the top of any slope; - provide dirt berm ([See Standard Detail No 328](#)), - or provide interceptor drain ([See Standard Detail No. 335](#)), if applicable.
- i. Provide cut of walls at inlet and outlet of paved drains.
- j. Onsite inlet in sump condition shall be designed with Q25 and 25% clogging. Use County of Los Angeles plat No. 2.6-0658 ([See Exhibit "A"](#)) for determining the size of grate inlet.
- k. All buildings shall be protected from flooding per Flood Insurance Rate Map (FIRM). Building finish floor shall be at least one foot (1 ft.) higher than the highest top of curb for area of 500 year flood.
- l. Sump pump shall be designed for Q25. Provide calculations and specifications for determining the sump-pump. Calculations shall include the determination of the total dynamic head (T.D.H. equals the static head plus the friction head) and the float setting in well to satisfy pumps. ([See Appendix H](#)).

## 2. Slopes

- a. Provide set backs ([See Appendix B](#)) as outlined in Anaheim Municipal Code, Title 17.
- b. If slope is less than 30 feet in height, slope can be constructed within 15 feet to a building by providing a retaining wall at a minimum 5 feet from the building. ([See Exhibit "E"](#)).
- c. Drainage shall be directed away from the face of fill and cut slopes and into approved drainage structures. The face of cut and fill slopes shall also be manufactured to control against erosion. The protection for slopes shall be installed after completion of the rough grading.
- d. Provide terrace drains and down drains for all cut and fill slopes higher than 30 feet as outlined in Title 17 ([See Appendix B](#)) and Standard Detail Nos. [326](#) , [327](#) and [330](#) . Down drain shall be constructed at 200 foot intervals.
- e. Concentrated flow discharged down a slope shall be contained within an opened paved drain or a storm drain system.
- f. The surface of all cut and fill slopes more than 5 feet in height shall be permanently protected against damage by erosion as shown on landscape and irrigation plans approved by Planning Department.
- g. French drain to be installed at the base of all slopes adjacent to arterial street and all slopes greater than 30 feet in height to prevent water from leaching from toe of slope. ([See Standard Detail #334](#)).
- h. Recommendations in the soils report, Title 17 and City Council Policy #211 ([See Appendix C](#)) shall be incorporated into the design of any slopes.

## 3. Walls

- a. All walls must conform to [Section 17.06.048 of Title 17](#) and Section 18.46.110.130. The maximum height shall be 10 feet and walls shall be screened by landscaping.
- b. All permits for construction of retaining walls shall be issued by the Building Department. The Grading plan shall identify the retaining walls and heights with a construction note indicating "separate permit required".
- c. All Grading plans with retaining walls shall have the following notice on the plan sheets where the walls are shown:

Approval of this plan does not constitute approval of the structural integrity of retaining walls.
- d. All Grading Plan with crib walls must include the details and specifications for the construction of the crib walls.
- e. Crib wall calculations must be submitted for review prior to approval of the Grading Plan.
- f. Crib walls must be landscaped and constructed with permanent irrigation facilities approved by the Planning Department.
- g. If a wall is to be constructed adjacent to the property line, the setbacks shall conform to those shown on [Exhibit "C"](#).
- h. All walls supporting slopes over five feet high, from tope of wall to top of slope, shall be constructed with a concrete drainage device at the back of the wall as shown on [Exhibit "E"](#).
- i. Concentrated flows along walls shall be contained in a concrete drainage device as shown on [Exhibit "E"](#).

### **C. PLAN PREPARATION**

1. See [Flatland Grading Procedures](#) and [Hillside Grading Procedures](#) for minimum requirements
2. Private storm drain may be shown on grading plan. If the profile is not shown, all information for construction and inspection should be provided on plan.
3. Sewer and water are not constructed per grading plan. They may be shown on grading plan as proposed items.