

Seismic Site Class Subject to Change Without Notice

SEISMIC SITE CLASS AND BUILDINGS

Introduction

Natural seismic events, or earthquakes, occur when the earth surface moves. The earth movements caused by earthquakes are commonly considered of two types – body waves and surface waves. There are 2 types of body waves and 2 types of surface waves.

Surface Waves

Love Waves (moves ground from side to side) and Raleigh Waves (moves ground is a circular pattern like a wave you would see on the surface of the ocean) relative to the direction of the wave.

Body Waves

Compression Waves (P-Waves) – Compression occurs when a force squeezes material in the direction of the force like when you sit on an exercise ball your weight compresses the ball.

Shear Waves (S-Waves) – Shear occurs when a force slides materials across each other perpendicular to the direction of propagation, like when you lift up and down the edge of a rug in jerking motion, it sends a wave down the length of the rug.

Earthquake Damage

Most of the earthquake damage in buildings is due to surface waves, as most buildings are on and in the surface layers. The earthquake event is assumed to act at the base of the building. The base is taken to be the level at which the earthquake load is transferred from the earth to the building. In most cases the base becomes the ground floor level. For buildings on deep rock, if the soil above the rock is soft and does substantially transfer load to the structure, the base can be the level of the founding surface. For engineering design codes implement the concept of Site Class at the Base to guide the engineer as to the nature of the seismic design for the surface waves. A sample table is below.

Site Class	Soil Profile Name	Average Properties in Top 30 m as per Appendix A		
		Soil Shear Wave Average Velocity, \overline{V}_{s} (m/s)	Standard Penetration Resistance, N 60	Soil Undrained Shear Strength, su
A	Hard Rock	V s > 1500	Not applicable	Not applicable
в	Rock	$760 < \overline{V}_{s} \le 1500$	Not applicable	Not applicable
С	Very Dense Soil and Soft Rock	360 < V _s < 760	N 60 > 50	s _u > 100kPa
D	Stiff Soil	180 < V s < 360	$15 \leq \overline{N}_{60} \leq 50$	$50 < s_u \le 100$ kPa
E	Soft Soil	V _s < 180	N 60 < 15	s _u < 50kPa
E		 Any profile with more than 3 m of <i>soil</i> with the following characteristics: Plastic index PI > 20 Moisture content w ≥ 40%, and Undrained shear strength s_u < 25 kPa 		
F	Others	Site Specific Evaluation Required		

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