

## Lightweight Concrete Properties

115 pcf (light-weight)  
145 pcf (normal-weight)

$$E_c = (40,000(\sqrt{f_c}) + 1,000,000)(w_c / 145)^{1.5}$$

$$E_c = 33(w_c^{1.5})\sqrt{f_c}$$

$$\lambda = 0.75$$

Reference

Eq 2.5 p42 - Design of Concrete Structures - Nilson - 12ed - McGraw-Hill

ACI 8.5 Modulus of elasticity

ACI 8.6 LW Concrete

50% of gross section for computer analysis purposes

115 pcf Nilson 50% Nilson ACI 50% ACI

f <sub>c</sub> (psi)	E <sub>c</sub> (ksi)	E <sub>c</sub> (ksi)	E <sub>c</sub> (ksi)	E <sub>c</sub> (ksi)
3000	2254	1127	2229	1115
4000	2493	1247	2574	1287
5000	2704	1352	2878	1439
6000	2895	1447	3152	1576
7000	3070	1535	3405	1702
8000	3233	1617	3640	1820
9000	3387	1693	3861	1930
10000	3532	1766	4070	2035

145 pcf Nilson 50% Nilson ACI 50% ACI

f <sub>c</sub> (psi)	E <sub>c</sub> (ksi)	E <sub>c</sub> (ksi)	E <sub>c</sub> (ksi)	E <sub>c</sub> (ksi)
3000	3191	1595	3156	1578
4000	3530	1765	3644	1822
5000	3828	1914	4074	2037
6000	4098	2049	4463	2232
7000	4347	2173	4821	2410
8000	4578	2289	5154	2577
9000	4795	2397	5466	2733
10000	5000	2500	5762	2881