

Solution Manual for Design of Concrete Structures 15th Edition by Darwin ISBN 0073397946 9780073397948

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7KH VSHFLILHG FRQFUHWH VVUHQJWK f'_c IRU D QHZ EXLOGLQJ LV SVL &DOFXODWH WKH UHTXLUHG DYHUDJH f_{cr} IRU WKH FRQFUHWH a LI WKHUH DUH QR SULRU WHVW UHVXOWV IRU FRQFUHWH ZLWK D FRPSUHVVLYH VVUHQJWK ZLWKLV SVL RI f'_c PDGH ZLWK VLPLODU PDWHULDOV b LI WHVW UHVXOWV IRU FRQFUHWH ZLWK f'_c SVL PDGH ZLWK VLPLODU PDWHULDOV SURGXFH D VDPSOH VWDQGDUG GHYLDWLRQ s_s RI SVL DQG c LI WHVW ZLWK f'_c SVL PDGH ZLWK VLPLODU PDWHULDOV SURGXFH D VDPSOH VWDQGDUG GHYLDWLRQ s_s RI SVL

6ROXWLRQ $f'_F = 5000$ psi

D 1R SULRU UHVXOWV

$$\frac{f'_{FU}}{f'_F} \quad \text{SVL} \quad \text{SVL}$$

E SULRU WHVWV IRU FRQFUHWH ZLWK f'_F ZLWKLV SVL RI f'_F RI WKH SURMHFW DQG V_V SVL)URP 7DEOH

N DQG NV_V LV SVL
 %HFDXVH f'_F SVL XVH HTV DQG D

$$\frac{f'_{FU}}{f'_F} \quad NV_V \quad \text{SVL}$$

86 $\left(\frac{f'_{FU}}{f'_F} \right)$ SVL SVL

F SULRU WHVWV IRU FRQFUHWH ZLWK f'_F ZLWKLV SVL RI f'_F IRU WKH SURMHFW V_V SVL DQG N LV

$$\frac{f'_{FU}}{f'_F} \quad V_V \quad \text{SVL}$$

86 $\left(\frac{f'_{FU}}{f'_F} \right)$ SVL SVL

&200(17 LQ FDXVH E DQG F WKH f'_{FU} ZRXOG UHDFRQDEO\ EH WDNHQ DV SVL

7HQ FRQVHFXWLYH VVUHQJWK WHVWV DUH DYDLODEOH IRU D QHZ FRQFUHWH PL[WXUH ZLWK f'_c SVL
 DQG SVL

D 'R WKH VVUHQJWK UHVXOWV UHSUHVHQW FRQFUHWH RI VDWLVIDFWRU\ TXDOLW\ (SODLQ IRXU UHDFRQLQJ

E , f'_{cr} KDV EHHQ VHOHFWHG EDVHG RQ FRQVHFXWLYH WHVW UHVXOWV IURP DQ HDUOLHU SURMHFW ZLWK D VDPSOH VWDQGDUG GHYLDWLRQ s_s RI SVL PXVW WKH PL[WXUH SURSRUWLRQV EH DGMXVWHG" (SODLQ

6ROXWLRQ

- a) For $f'_c = 4000$ psi, the strength results indicate satisfactory concrete quality because (1) no individual test is below $f'_c - 500$ psi = 3500 psi, and (2) every arithmetic average of any three consecutive tests equals or exceeds f'_c .
- b) For $s_s = 570$ psi, for 30 consecutive tests calculate f'_{cr} using equations 2.1 and 2.2a.

$$\frac{f'_{FU}}{f'_F} \quad NV_V \quad \text{SVL}$$

I_{FU} I_F NV_V

SVL

86(I_{FU} SVL

The average of the above tests is (

%HFDXVH WKH DYHUDJH VWUHQJWK LV OHVV WKDQ WKH WDUJHW VWUHQJWK WKH ZDWHU FHPHQW UDWLR PXVW EH DGMXVWHG E\ DGGLQJ FHPHQW RU UHGXFHQJ ZDWHU WR LQFUHDVH WKH VWUHQJWK ,I WKH ZDWHU LV UHGXFHG D ZDWHU UHGXFHU DGPLQXUH ZRXOG EH UHTXLUHG WR PDLQWDLQ ZRUNDELOLW\

7KH VSHFLILHG FRQFUHWH VWUHQJWK f'_c IRU WKH FROXPQV LQ D KLJK ULVH EXLOGHQJ LV SVL &DOFXODWH WKH UHTXLUHG DYHUDJH f'_{cr} IRU WKH FRQFUHWH a LI WKHUH DUH QR SULRU WHVW UHVXOWV IRU FRQFUHWH ZLWK D FRPSUHVVLYH VWUHQJWK ZLWKLQ SVL RI f'_c PDGH ZLWK VLPLODU PDWHULDOV b LI WHVW UHVXOWV IRU FRQFUHWH ZLWK f'_c SVL PDGH ZLWK VLPLODU PDWHULDOV SURGXFH D VDPSOH VWDQGDUG GHYLDWLRQ s_s RI SVL DQG c LI WHVWV ZLWK f'_c PDGH ZLWK VLPLODU PDWHULDOV SURGXFH D VDPSOH VWDQGDUG GHYLDWLRQ s_s RI SVL

6ROXWLRQ $f'_F = 12000$ psi

D 1R SULRU UHVXOWV

f_{FU} f'_F f'_F SVL SVL

E SULRU WHVWV IRU FRQFUHWH ZLWK f'_F ZLWKLQ SVL RI f'_F RI WKH SURMHFW DQG V_V SVL)URP 7DEOH N DQG N_V LV SVL %HFDXVH f'_F ! SVL XVH HTV DQG E

$$f'_{cr} = f'_c + 1.34 k_s = 12000 + 1.34 * 1079 = 13,450 \text{ psi}$$

f_{FU} f'_F N_V SVL

86(f_{FU} 3,450 SVL

F SULRU WHVWV IRU FRQFUHWH ZLWK f'_F ZLWKLQ SVL RI f'_F IRU WKH SURMHFW V_V SVL DQG N LV

f_{FU} f'_F V_V SVL

f_{FU} f'_F N_V SVL

86(f_{FU} SVL