

CONCRETE DESIGN CALCULATOR: Quiz-4 Solution Section (3)



Select Strength:	$f_y = 60000 \text{ psi}; f_c = 4000 \text{ psi}$	Select design ρ :	ρ_{max}	Select Load Case:	$1.2D + 1.4L$
$f_y = 60000$	$F_y = 4000$	Design $\rho = 0.0069$		Est $w_s [k/ft] = 1.78$	
$\rho_{max} = 0.0033$	$\rho_{max} = 0.0181$	Design $R_n = 388.79$		$M_u [ft-k] = 227.8$	
$R_n \text{ of } \rho_{max} [psi] = 192.2$	$R_n \text{ of } \rho_{max} [psi] = 952.0$	$b_w d^3 = 7813.549$		$M_u [ft-k] = 253.2$	
		$d = 22.10$		Density [pcf] 150	

Enter Givens & Estimates:

$w_s [k/ft]$	0.55	$b_w [in]$	14	$b_{eff} [in]$	80
$w_s [k/ft]$	0.4	$h [in]$	27	$t [in]$	3
Length [ft]	32	$d [in]$	24	$a [in]$	0.49
Clear Cover [in]	3	$A_s [in^2]$	2.65	β_1	0.85
Est Self Wt [pcf]	400	$A_{s,max} [in^2]$	1.214	$c [in]$	0.57
Actual Self Wt [pcf]	450.00	$A_{s,max} [in^2]$	1.280	e_s	0.1227
		$\phi M_u [ft-k]$	253.36		

Neutral Axis Calculations:

T [kips]	142.2	$z [in] =$	21.60
$A_s [in^2]$	41.8	$z [in] =$	22.50
$A_{s,req} [in^2]$	240	Governing z	22.50

N.A. is in the flange

Select A_s in Tension:

BAR	Qty	$A_s [in^2]$
#8	3	2.37

If $a < ht$

$A_s [in^2]$	2.6496
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If $a > t$	
$A_{s,req} [in^2]$	10.88
$M_{u,max} [k-ft]$	1224.00
$M_{u,req} [k-ft]$	996.16
R_n	1441.20
$\rho_s =$	0.03
$a [in]$	14.64
$c [in]$	17.22
e_s	0.00
$A_{s,req} [in^2]$	13.27
$A_s [in^2]$	24.15

Bar Selection:

BAR	Number of Bars in a Single Layer of Reinforcing													
	2		3		4		5		6		7		8	
	Area	Width	Area	Width	Area	Width	Area	Width	Area	Width	Area	Width	Area	Width
#4	0.39	6.80	0.58	8.30	0.78	9.80	0.98	11.30	1.18	12.80	1.37	14.30	1.57	15.80
#5	0.61	6.90	0.91	8.50	1.23	10.20	1.55	11.80	1.84	13.4	2.15	15.00	2.45	16.70
#6	0.88	7.00	1.32	8.80	1.77	10.50	2.21	12.30	2.65	14.00	3.09	15.80	3.53	17.50
#7	1.20	7.20	1.80	9.00	2.41	10.90	3.01	12.80	3.61	14.70	4.21	16.50	4.81	18.40
#8	1.57	7.30	2.35	9.30	3.14	11.30	3.93	13.30	4.71	15.30	5.50	17.30	6.28	19.30
#9	2.00	7.60	3.00	9.80	4.00	12.10	5.00	14.30	6.00	16.60	7.00	18.80	8.00	21.10
#10	2.53	7.80	3.79	10.40	5.06	12.90	6.33	15.50	7.59	18.00	8.86	20.50	10.12	23.10
#11	3.12	8.10	4.68	10.90	6.25	13.80	7.81	16.60	9.37	19.40	10.94	22.20	12.50	25.00
#14	4.50	8.90	6.75	12.30	9.00	15.70	11.25	19.00	13.50	22.40	15.75	25.80	18.00	29.20
#18	8.00	10.60	12.00	14.10	16.00	19.60	20.00	24.50	24.00	28.80	28.00	35.10	32.00	37.70

Civil Engineering Material Calculation

North Carolina State University



Civil Engineering Material Calculation:

Handbook of Civil Engineering Calculations, Second Edition Tyler G. Hicks, S. David Hicks, 2007-05-23 Table of Contents Preface How to Use This Handbook Sect 1 Structural Steel Engineering and Design Sect 2 Reinforced and Prestressed Concrete Engineering and Design Sect 3 Timber Engineering Sect 4 Soil Mechanics Sect 5 Surveying Route Design and Highway Bridges Sect 6 Fluid Mechanics Pumps Piping and Hydro Power Sect 7 Water Supply and Stormwater System Design Sect 8 Sanitary Wastewater Treatment and Control Sect 9 Engineering Economics Index 1

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Advanced Research on Civil Engineering, Materials Engineering and Applied Technology Helen Zhang, David Jin, X.J. Zhao, 2013-12-23 Selected peer reviewed papers from the 2013 2nd International Conference on Civil Engineering and Material Engineering CEME 2013 December 21 22 2013 Wuhan China The Science

of Construction Materials Per Freiesleben Hansen,2009-09-18 The Science of Construction Materials is a study and work book for civil engineering students It includes a large number of thoroughly prepared calculation examples The book is also suitable for self study for the researcher and practicing civil engineer **Atchley's Civil Engineer's and Contractor's Estimate and Price Book for home or foreign service ... In two parts** W. Davis HASKOLL,1873 Atchley's Civil Engineer's and Contractor's Estimate and Price Book, for Home Or Foreign Service, Etc William Davis Haskoll,1872 Civil Engineering and Disaster Prevention Abhijit Mohanrao Zende,Xin Ren,Qingfei Gao,2023-10-25 Civil Engineering and Disaster Prevention focuses on the research of civil engineering architecture and disaster prevention and control These proceedings gather the most cutting edge research and achievements aiming to provide scholars and engineers with valuable research direction and engineering solutions Subjects covered in the proceedings include Civil Engineering Engineering Structure Architectural Materials Disaster Prevention and Control Building Electrical Engineering The works of these proceedings aim to promote the development of civil engineering and environment engineering Thereby fostering scientific information interchange between scholars from the top universities research centers and high tech enterprises working all around the world Atchley's civil engineer's and contractor's estimate and price book. [4 issues]. William Davis Haskoll,1871 **Life Cycle Analysis and Assessment in Civil Engineering: Towards an Integrated Vision** Robby Caspeepe,Luc Taerwe,Dan Frangopol,2018-10-31 This volume contains the papers presented at IALCCE2018 the Sixth International Symposium on Life Cycle Civil Engineering IALCCE2018 held in Ghent Belgium October 28 31 2018 It consists of a book of extended abstracts and a USB device with full papers including the Fazlur R Khan lecture 8 keynote lectures and 390 technical papers from all over the world Contributions relate to design inspection assessment maintenance or optimization in the framework of life cycle analysis of civil engineering structures and infrastructure systems Life cycle aspects that are developed and discussed range from structural safety and durability to sustainability serviceability robustness and resilience Applications relate to buildings bridges and viaducts highways and runways tunnels and underground structures off shore and marine structures dams and hydraulic structures prefabricated design infrastructure systems etc During the IALCCE2018 conference a particular focus is put on the cross fertilization between different sub areas of expertise and the development of an overall vision for life cycle analysis in civil engineering The aim of the editors is to provide a valuable source of cutting edge information for anyone interested in life cycle analysis and assessment in civil engineering including researchers practising engineers consultants contractors decision makers and representatives from local authorities *A Text-book on Ceramic Calculations* Willie Jackson,1904 **Proceedings** ,1916 Catalogs of Instruments and Materials for Civil Engineering, Surveying and Drawing Manufactured and Sold by this Company May be Found on the Shelves Under the Above Call Number William E. Stieren, **The Rudiments of Civil Engineering** Henry Law,1882 *Structural Engineers' Handbook* Milo Smith Ketchum,1924 Civil Engineering Calculations Reference Guide Tyler Gregory Hicks,Max Kurtz,1987

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Table of Contents Civil Engineering Material Calculation

1. Understanding the eBook Civil Engineering Material Calculation
 - The Rise of Digital Reading Civil Engineering Material Calculation
 - Advantages of eBooks Over Traditional Books
2. Identifying Civil Engineering Material Calculation
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Civil Engineering Material Calculation
 - User-Friendly Interface
4. Exploring eBook Recommendations from Civil Engineering Material Calculation
 - Personalized Recommendations
 - Civil Engineering Material Calculation User Reviews and Ratings
 - Civil Engineering Material Calculation and Bestseller Lists

5. Accessing Civil Engineering Material Calculation Free and Paid eBooks
 - Civil Engineering Material Calculation Public Domain eBooks
 - Civil Engineering Material Calculation eBook Subscription Services
 - Civil Engineering Material Calculation Budget-Friendly Options
6. Navigating Civil Engineering Material Calculation eBook Formats
 - ePub, PDF, MOBI, and More
 - Civil Engineering Material Calculation Compatibility with Devices
 - Civil Engineering Material Calculation Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Civil Engineering Material Calculation
 - Highlighting and Note-Taking Civil Engineering Material Calculation
 - Interactive Elements Civil Engineering Material Calculation
8. Staying Engaged with Civil Engineering Material Calculation
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Civil Engineering Material Calculation
9. Balancing eBooks and Physical Books Civil Engineering Material Calculation
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Civil Engineering Material Calculation
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Civil Engineering Material Calculation
 - Setting Reading Goals Civil Engineering Material Calculation
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Civil Engineering Material Calculation
 - Fact-Checking eBook Content of Civil Engineering Material Calculation
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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