

PPG#6 CONSTRUCTION COST ESTIMATING, 3RD EDITION

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- 13. Production Rates for International Projects in Asia, Dr. Enno (Ed) Koehn, PE; Moin U. Ahmed, Cost Engineering Journal, 1999
- 14. International Projects Cost Estimating, Allen C. Hamilton, CCE, AACE Transactions, 1998
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- 16. Finding Building Product and Construction Cost Data Internationally, Hugh T. Sharp, Cost Engineering Journal, 1997
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- 18. Inter-American Construction Costs, Leopoldo G. Varela, CCE; Roger J. Grant, AACE Transactions, 1997
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- 14. *Definitive Estimating for Construction Projects at Remote Sites, Bennett W. Cleveland, PE CCE, Cost Engineering Journal, 1995*
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- 16. Water-Supply Distribution-System Cost-Estimating, RG Eilers, AACE Transactions, 1992
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- 3. *Measuring and Managing Cost Escalation,* Peter Morris; William F. Willson, **AACE Transactions,** 2006
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- 7. Owner Caused Delay Field Overhead Charges, Matthew J. Lankenau, CCE, Cost Engineering Journal, 2003
- 8. Analysis of Change Order Markup Allowances on Stipulated Price Building Contracts, Aminah Robinson Fayek; Moses Y. Nkuah, Cost Engineering Journal, 2002



- 9. Improving Productivity With Short-Interval Scheduling, Walter J. Strutt, AACE Transactions, 2001
- Optimized Scheduling for Highway Construction, Khaled El-Rayes; Osama Moselhi, PE, AACE Transactions, 1997
- 11. Matrix Scheduling for Repetitive Residential Construction, Neil D. Opfer, CCE, AACE Transactions, 1996
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- 13. Duration Analysis, Andrew Sipos, PE, Cost Engineering Journal, 1992

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- 4. *Bid Markup Methodologies,* Dr. Kwaku A. Tenah; Dr. Carleton Coulter III, PE, **Cost Engineering Journal,** 1999
- 5. Competitive Bidding System, Dr. Ali A. Shash, Cost Engineering Journal, 1995
- 6. How to Relate a Construction Cost Estimate to the Prevailing Bid Market for Government and Institutional Projects, Nissim Zelouf, CCE, Cost Engineering Journal, 1995
- 7. Cost Effective Bid Packaging for Building Construction, Nyal E. Nelson. CCE, AACE Transactions, 1980

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- 3. Cautions of Computerized Estimating, Barrett L. Richards, CCC, AACE Transactions, 2005
- 4. Best Value IT Procurement for Construction Organizations, Srinath Perera; Gayani Karunasena, AACE Transactions, 2004
- 5. Exploring Data to Detect Project Problems, Mark D. Steele, PE CCE; William A. Huber, AACE Transactions, 2004
- 6. Benefits of Expert Estimating Systems, Waymon D. Lofton; Michael D. Monteith, AACE Transactions, 2003
- 7. Implementing Estimating Software, Stephen C. Burgan, AACE Transactions, 2002
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- 9. *Preliminary Cost Estimation of Highway Construction Using Neural Networks,* Hashem Al-Tabtabai; Alex P. Alex; Maha Tantash, **Cost Engineering Journal,** 1999
- 10. Guidelines for Purchasing Software, Kevin Miller, Cost Engineering Journal, 1998
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- 12. Implementing a Database Estimating System, Robert H. Harbuck, PE CCE, AACE Transactions, 1996
- 13. *Electronic Bidding: The Future is Now,* William C. Epstein, PE; Dr. Ralph D. Ellis, Jr., PE, **AACE Transactions,** 1995



- 14. Cost Estimation of Timber Bridges Using Neural Networks, Dr. Robert C. Creese; Li Li, Cost Engineering Journal, 1995
- 15. Computerized Databases for Reliable Cost Estimates, Keith G. Decker, **AACE Transactions**, 1993
- 16. CAD Estimating for Design-Builders, Peter L. Haines, CCE, AACE Transactions, 1992
- 17. Database Development and Computerized Cost Estimating, Joseph F. Galluzzo, PE CCE, Cost Engineering Journal, 1991

Chapter 17: Estimating Using Building Information Modeling

- 1. *Underdeveloped and Underutilized: Cost Estimating in BIM,* Tamera L. McCuen, **AACE Transactions,** 2010
- 2. The Quantification Process and Standards for BIM, Tamera L. McCuen, AACE Transactions, 2009
- 3. Constructability Assessment Using BIM/4D CAD Simulation Model, Wissam Hijazi; Sabah Alkass, P.Eng.; Tarek Zayed, **AACE Transactions**, 2009
- 4. Scheduling, Estimating, and BIM: a Profitable Combination, Tamera Lee McCuen, AACE Transactions, 2008
- 5. Challenges in Estimating Costs Using Building Information Modeling, William E. Kraus, PE CCE; Steve Watt; Philip D. Larson, CCE PSP, **AACE Transactions**, 2007
- 6. Estimators' Functional Role Change with BIM, John Jeffrey Hannon, AACE Transactions, 2007

Chapter 18: Estimating Life-Cycle Costs

- 1. Infrastructure Asset Life Cycle Cost Analysis Issues, Douglas D. Gransberg, PE CCE FRICS; Eric Scheepbouwer, **AACE Transactions**, 2010
- 2. *Life Cycle Cost Analysis for Transportation Projects,* Robert H. Harbuck, PE CCE CEP, **AACE Transactions,** 2009
- 3. Whole Life Cycle Cost for Chicago Type Bascule Bridge, Yingchun Zhang; David A. Novick, PE; Ahmad Hadavi, PE; Raymond J. Krizek, PE, Cost Engineering Journal, 2008
- 4. Estimating Uncertainty for a Life-Cycle Cost Management Program, Dan Melamed, CCC; Bryan Skokan, PE; Mathew Zenkowich; Dan Kocher, Cost Engineering Journal, 2008
- 5. Ratio of Operating and Maintenance Costs to Initial Costs of Building Services Systems, Shaomin Wu; Derek Clements-Croome, Cost Engineering Journal, 2007

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