



# Construction Management: Emerging Trends & Technologies (Go Green with Renewable Energy Resources)

*By Trefor Williams*

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## **Construction Management: Emerging Trends & Technologies (Go Green with Renewable Energy Resources)** By Trefor Williams

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1. The Nature of the Construction Industry Introduction to Construction. Some Statistics About the Construction Industry. Projects and the Construction Industry. Comparison of Construction and Automobile Manufacturing. Construction Project participants. Specialization within the Construction Industry. Emerging Trends in the Construction Industry. Megaprojects. Globalization. The US Transportation Infrastructure Crisis. The Importance of Ethics in the Construction Industry. Careers in Construction. 2. Methods of Delivering Construction Projects. Introduction. Basic Construction Contractual Arrangements. Public and Private Owners: Construction Contract Types. Competitive Bidding. Unit Price and Lump Sum Projects. Steps in the Competitive Bidding Process. Completion of the Design and the Development of the Bid Package. Advertising the Bid. Obtaining the Bid Package. Preparing the Bid. Design Changes During the Bidding Period. Pre-Bid Meetings. Submitting the Bid and the Bid Opening. Award of Contract Notice to Proceed. Bid Security and Bid Bonds. Bid Package Details. Specifications. General Conditions. Special Conditions. The Complexity of Bidding. The Importance of General Conditions During Construction. Change Orders. Time Extensions. The Ethics of Competitive Bidding. 3. Change Orders and Disputes during Construction. Introduction. Change Orders. Changed Conditions. Design Errors and Omissions. Change in Project Design. Negotiating Change Orders. Contractor's Duty to Perform Change Order Work. Issues Related to Time and Delay. Liquidated Damages. Time Extensions. Resolving Construction Disputes. Dispute Resolution Boards and On-Site Neutrals. Arbitration and Mediation. Litigation. Partnering. Value Engineering. 4. Construction Management Contracts: An Alternative to Design-Bid-Build. Introduction. Construction Management Contract Formats. Agency Construction Management. At-Risk Construction Management Contracts. 5. Design Build Procurement: Combining the Designer and the Contractor. Introduction. Potential Benefits of Using Design-Build. The Design-Bid Process. The Request for Proposals: Defining the Project Scope. Competitive Procurement: One-Step and Two-Step Procurement. Preliminary Designs Included in the RFP. Formations of Teams and Consortiums. Additional Legal Risks for Contractors with Design-Build. 6. Emerging Trends in Project Procurement: Public Private Partnerships. Introduction. Reasons for the Emergence of Public-Private Partnerships. The Structure of Public Private Partnerships. Build-Operate-Transfer. Design-Build-Finance-Operate. Examples of Public Private Partnerships. BOT Projects. DBFO Projects. Conclusions. 7. Cost Control, Profitability and Cash Flow. Monitoring costs during construction. Assessing project profitability. Construction accounting and the profitability of the firm. Cash flow during construction. Unbalanced bids. Financing. Using computer software for accounting cost control. The JobView software. Monitoring project profitability using the software. Producing financial documents. 8. A Short Introduction to Scheduling and Planning. The importance of planning. Increasing project complexity. Linear scheduling techniques. Line-of Balance Analysis. Example applications. The Critical Path Method. Introduction. Benefits. History. The Basics of CPM. Activity. Network diagrams. Calculations. Computers and Scheduling. Discussion of available programs. Examples of input and output. Interpretation of output. 9. Managing Project Complexity: Configuration Management. Introduction. Increasing project complexity. The need to manage the effect of changes on project scope. Definition of Configuration Management. The Configuration Management Methodology. Configuration Management Plan. Document Management Process. Baseline Management Process. Contract Change Management Process. Specialized Configuration Management Software. The ccsNet software. 10. Construction Equipment Productivity. Productivity Concepts. What is productivity? How is it measured? Heavy Construction equipment basics. Earthmoving Equipment. Calculating equipment productivity. Calculations of capacity and cycle times. Selecting equipment numbers using the balance point calculation. Emerging Applications of Automation. Automated Earthmoving. Automated paving. Geo-tracking of equipment. Limitations on the adoption of

automation in building construction. 11 Estimating Basics. What is estimating? Different Levels of Estimating. Contract Type and estimate detail. Engineer's Estimates. Bid Estimates. Equipment Costs. Depreciation. Operating costs. Calculation of an hourly charging rate. Labor Costs. Costs from Union agreements. Calculation of fringe benefit cost. Material Costs. Supply chain management. Using estimating reference books. Using the computer to prepare estimates. Solutions for Heavy and commercial contractors. Simple programs for residential contractors. Using the computer for quantity take-off. 12. Construction Labor and Safety. Union and Non-Union Construction. Labor Law. Important legislation. Right-to work states. Important construction unions. Contractor organizations. AGC. Negotiation of union contracts. ABC. Safety. The need to provide a safe working environment. Negative effects of accidents on insurance rating. Other cost of accidents. OSHA regulation. 13. The Emerging Role of Information Technology. Why are computers and the web important in Construction? Definition of Information Technology. Data exchange. Using web-based systems in construction. Computers and PDAs in the field. Computer and Web-based Systems to Manage Projects. Project Web-Portals. Mobile computers for scheduling. Mobile data collection . Field office management. Wireless communications and mobile computing at the Construction Site. Wi-Fi. Mesh Networks. Simple solutions for small contractors. Peer-to-Peer Networking. Weblogs and Wiki. 14. Sustainability in Construction. The importance of sustainability for society. The sustainability of constructed facilities. How sustainability changes residential construction contracting. Commercial Building Sustainability. Changes in methods and materials. Green Roofs. How does consideration of sustainability effect construction? Reusable and recyclable materials. Emissions from construction equipment. Demolition of facilities.

#### About the Author

Trefor P. Williams, Ph.D., P.E., is a Professor of Civil and Environmental Engineering at Rutgers University, and a registered professional engineer in New York and New Jersey. He is the author of Information Technology for Construction Managers, Architects and Engineers, © 2007, Delmar Cengage Learning.

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