

Construction Management

Subcontractor Scopes of Work



Jason G. Smith
Jimmie Hinze



CRC Press
Taylor & Francis Group

Construction Management

Subcontractor Scopes of Work

Jason G. Smith
Jimmie Hinze



CRC Press

Taylor & Francis Group

Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

Cover photos: Photo of mechanical installation by author and courtesy of Hathaway Dinwiddie Construction Company and California State University Northridge. Photo of curtain wall installation in progress provided by Walters and Wolf, Inc.

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

© 2010 by Taylor and Francis Group, LLC
CRC Press is an imprint of Taylor & Francis Group, an Informa business

No claim to original U.S. Government works

Printed in the United States of America on acid-free paper
10 9 8 7 6 5 4 3 2 1

International Standard Book Number: 978-1-4398-0941-9 (Hardback)

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the author and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors and publishers have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, please access www.copyright.com (<http://www.copyright.com/>) or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. CCC is a not-for-profit organization that provides licenses and registration for a variety of users. For organizations that have been granted a photocopy license by the CCC, a separate system of payment has been arranged.

Trademark Notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

Library of Congress Cataloging-in-Publication Data

Smith, Jason G.
Construction management : subcontractor scopes of work / Jason G. Smith, Jimmie Hinze.
p. cm.
Includes index.
ISBN 978-1-4398-0941-9 (hardcover : alk. paper)
1. Building--Superintendence. 2. Building--Planning. 3. Construction industry--Subcontracting. I. Hinze, Jimmie. II. Title.

TH438.S537 2010
692'.8--dc22

2009036643

Visit the Taylor & Francis Web site at
<http://www.taylorandfrancis.com>

and the CRC Press Web site at
<http://www.crcpress.com>

To my grandfather, George Cooke Freund, who began teaching me how to build things before I could walk. He taught me many things, but never simply how to do them. He would always teach me why things are done the way they are, and from that I was able to gain an applied knowledge, not just a memory of how to do a specific task.

—Jason George Smith

Contents

Preface..... xiii
Acknowledgments..... xvii
Authors..... xix

Module One

Chapter 1 Demolition 3
 Scope of Work Issues Related to Demolition..... 3

Chapter 2 Shoring and Underpinning 7
 Coordination with the Waterproofing System..... 8
 Procuring the Shoring Piles 8
 Scope of Work Issues Related to Shoring and Underpinning 9

Chapter 3 Mass Excavation and Site Grading 21
 Scope of Work Issues Related to Mass Excavation
 and Site Grading..... 22

Chapter 4 Dewatering..... 29
 Scope of Work Issues Related to Dewatering 29

Questions—Module One (Chapters 1–4)..... 39

Module Two

Chapter 5 Below-Grade Waterproofing..... 45
 Scope of Work Issues Related to Below-Grade Waterproofing 46

Chapter 6 Reinforcing Steel 55
 Scope of Work Issues Related to Reinforcing Steel..... 55

Chapter 7 Formwork..... 63
 Scope of Work Issues Related to Formwork 63

Chapter 8	Concrete Placing and Finishing.....	73
	Scope of Work Issues Related to Concrete Placing and Finishing	73
Chapter 9	Shotcrete	81
	Scope of Work Issues Related to Shotcrete.....	83
	Questions—Module Two (Chapters 5–9)	87

Module Three

Chapter 10	Structural Steel	93
	Scope of Work Issues Related to Structural Steel.....	95
Chapter 11	Metal Decking	101
	Scope of Work Issues Related to Metal Decking.....	101
Chapter 12	Miscellaneous Metals	105
	Scope of Work Issues Related to Miscellaneous Metals.....	105
Chapter 13	Expansion Joint Covers.....	117
	Scope of Work Issues Related to Expansion Joint Covers (EJC).....	117
Chapter 14	Spray-Applied Fireproofing	125
	Scope of Work Issues Related to Spray-Applied Fireproofing.....	125
	Questions—Module Three (Chapters 10–14)	129

Module Four

Chapter 15	Above-Grade Waterproofing	133
	Scope of Work Issues Related to Above-Grade Waterproofing.....	136
Chapter 16	Lath and Plaster	139
	Scope of Work Issues Related to Lath and Plaster.....	139
Chapter 17	Precast Concrete	143
	Scope of Work Issues Related to Precast Concrete.....	146

Contents	vii
Chapter 18 Masonry	151
Scope of Work Issues Related to Masonry.....	151
Chapter 19 Metal Panels.....	155
Scope of Work Issues Related to Metal Panels	155
Chapter 20 Roofing	161
Scope of Work Issues Related to Roofing	161
Chapter 21 Flashing and Louvers.....	169
Scope of Work Issues Related to Flashing and Louvers	172
Chapter 22 Glass and Glazing.....	177
Scope of Work Issues Related to Glass and Glazing.....	177
Chapter 23 Caulking and Sealants	183
Scope of Work Issues Related to Caulking and Sealants.....	187
Questions—Module Four (Chapters 15–23).....	191

Module Five

Chapter 24 Framing and Drywall	197
Scope of Work Issues Related to Framing and Drywall	197
Chapter 25 Building Insulation and Fire Safing.....	205
Scope of Work Issues Related to Building Insulation and Fire Safing	205
Chapter 26 Doors, Frames, and Hardware.....	209
Scope of Work Issues Related to Doors, Frames, and Hardware.....	209
Chapter 27 Coiling Doors and Grilles	219
Scope of Work Issues Related to Coiling Doors and Grilles	219
Chapter 28 Casework and Millwork.....	225
Scope of Work Issues Related to Casework and Millwork	226

Chapter 29	Painting and Wall Coverings	231
	Scope of Work Issues Related to Painting and Wall Coverings.....	231
Chapter 30	Ceramic Tile and Stone Flooring	239
	Scope of Work Issues Related to Ceramic Tile and Stone Flooring	239
Chapter 31	Terrazzo and Epoxy Flooring	243
	Scope of Work Issues Related to Terrazzo Flooring and Epoxy Flooring.....	243
Chapter 32	Acoustical Treatment	249
	Scope of Work Issues Related to Acoustical Treatment.....	249
Chapter 33	Carpeting and Resilient Flooring	255
	Scope of Work Issues Related to Carpeting and Resilient Flooring	255
Chapter 34	Wood Flooring.....	259
	Scope of Work Issues Related to Wood Flooring	259
	Questions—Module Five (Chapters 24–34)	265

Module Six

Chapter 35	Miscellaneous Specialty Work	271
	Toilet Partitions and Accessories	271
	Trash Chutes.....	273
	Fire Protection Specialties	277
	Residential Appliances.....	278
	Manufactured Natural Gas Fireplace Units	279
	Loading Dock Levelers and Equipment.....	280
	Metal Lockers.....	282
	Projection Screens.....	284
	Operable Partitions.....	286
	Roof Hatches and Prefabricated Skylights.....	289
	Signage	291
	Window Treatments	293
	Marker, Chalk, and Tack Boards	294
	Corner and Wall Guards.....	294
	Postal Specialties.....	294

Recessed Floor Mats	294
Flagpoles	296
Payphones and Enclosures	297
Summary	297
Chapter 36 Food Service Equipment	299
Scope of Work Issues Related to Food Service Equipment	301
Chapter 37 Elevators	307
Scope of Work Issues Related to Hydraulic and Traction Elevators.....	312
Questions—Module Six (Chapters 35–37)	319

Module Seven

Chapter 38 Plumbing.....	325
Scope of Work Issues Related to Plumbing.....	328
Chapter 39 Fire Sprinklers	337
Scope of Work Issues Related to Fire Sprinklers.....	339
Chapter 40 Mechanical (HVAC).....	347
Scope of Work Issues Related to Mechanical (HVAC).....	349
Chapter 41 Electrical.....	359
Scope of Work Issues Related to Electrical	360
Fire Alarm.....	371
Telecommunications.....	373
Questions—Module Seven (Chapters 38–41).....	375

Module Eight

Chapter 42 Site Utilities	381
Scope of Work Issues Related to Site Utilities	384
Chapter 43 Asphaltic-Concrete Paving	387
Scope of Work Issues Related to Asphaltic-Concrete Paving.....	387

Chapter 44 Site Concrete..... 391
 Scope of Work Issues Related to Site Concrete 391

Chapter 45 Chain Link Fencing..... 395
 Scope of Work Issues Related to Chain Link Fencing..... 395

Chapter 46 Landscaping and Irrigation..... 399
 Scope of Work Issues Related to Landscaping 399

Questions—Module Eight (Chapters 42–46) 403

Module Nine

Chapter 47 Subcontractor Scope Issues 407
 Common Subcontractor Scope Issues 407

Chapter 48 General Contractor Responsibilities..... 421
 General Contractor Responsibilities..... 421
 Ethics 428
 Conclusion 428

Questions—Module Nine (Chapters 47–48)..... 429

Index 431

Preface

My grandfather was a huge influence in my life. Without him, I would not be where I am today. Perhaps the biggest lessons my grandfather taught me were ones he actually had no idea he was teaching. He would never simply show me how to do things; he would always teach me the reason why things are done the way they are, which is the most important lesson of all. By continually teaching me why things are done the way they are, the lessons I learned from my grandfather were exponential. To illustrate, when he taught me to fasten two boards together with a screw he taught me the reason why we were using a screw instead of a nail, namely that the pullout strength of screws is stronger than nails. When he would teach me to place a 2" × 8" joist on end rather than flat, he explained why the board is stronger on end than flat and why it would not bend as much. When we were building things together, from go-carts to cabinets to bunk beds to forts, I did not realize he was teaching me lessons that would impact the rest of my life. We were just pals spending time together.

This is the essence of what I hope readers will take away from this book. Take the knowledge and experience we have written here not simply as a checklist of issues and loose ends to be aware of, but as examples. Approach this book not as teachings on how subcontract scopes of work are written, but as teachings in why subcontract scopes are written the way they are. By applying the varied teachings of this book to the unique challenges of your projects, the knowledge and experience you gain will be exponential.

My love of construction began when I was about six months old and my grandfather gave me my first plastic hammer. While I was not quite sure what to do with it at that early age, as I grew up I figured it out and throughout childhood my passion for building grew. Even in my middle and high school years the shop classes were my favorite learning experiences.

Upon arriving at college there was no better fit for me than the construction management program where, again, I found the curriculum to fit me like a glove. The difference this time was that I began my transition from building things with my hands to managing others in building large-scale projects. This was an exciting challenge that I took on with ambition and passion. As graduation neared, I began sending out resumes to companies that appeared to be leaders in the construction industry and quickly landed my first job with a general contractor whose expertise lay in the high-tech sector. Building bio-technology facilities, clean rooms, and other cutting edge facilities excited me to no end.

When I began my career I was somewhat taken aback to realize what a huge business construction was and that a phenomenal amount of management time was spent doing what seemed at the time to be meaningless paperwork. I will never forget my first week on the job when I was asked by my project manager to send out a submittal with a transmittal on it and I wondered, what the heck is a "mittal" and why are there so many different kinds of them? As my first year in the industry progressed I came

to realize just how complex and intense a major construction project can be. I began to realize the importance of things like submittals and how much money can be lost if something goes wrong. I began to realize the importance of a well-developed schedule and how much money can be lost if a project runs late. I began to realize how important a thorough review of the documents at the onset of construction can be, and again how much money can be lost if every piece of the project is not clearly included in a subcontractor's scope of work or the general contractor's estimate for self-performed work. The latter realization got me thinking the most, and is the genesis of this book.

It was not long into my first project that I noticed how much effort the estimator had put into the financial planning. This consisted not only of developing the estimate itself, but also in allocating each and every element of the project to either a subcontractor or a line item for self-performed work in our project budget. The level of detail was excruciating and I was quite reluctant to accept the necessity for that much paperwork to build a project. I thought it was a complete waste of time—at first. As the project went on, I saw on a daily basis how the bits, pieces, nooks and crannies of the project all came together in a completed facility. Without the estimator's diligent attention to detail, there would surely have been many change order issues. About midway through the project my doubts about the need for the considerable effort our estimator had put into the project turned into a great deal of respect for the job he had done. This was one of the most important lessons I learned in my career, and the first defining moment in the creation of this book.

After learning a great deal about what a large general contractor does and what it takes to pull together a major construction project, I moved on to my next projects with a much greater focus on the ever-important small and tedious details. One of the best things I did early in my career was to set up and maintain a database that I still use today. This database is in an MS Excel® spreadsheet and consists of separate worksheets for each different subcontracted trade. I use this database to keep track of all the subcontractor scope issues I have come across in my career that are likely to occur on future projects. The items in this database come from a wide variety of sources, including items that have become problems on my projects, items that have become problems on other projects that I have heard about, items that I caught before they became problems, and myriad items that have randomly come to my attention in one way or another. This database has now grown to be a tremendous tool for use in allocating subcontractor scopes of work, not to mention outlining this book.

The construction industry is extremely complex, such that no one person could ever learn everything there is to know within their lifetime. Actually, I do not believe any one person could even learn 5% of the intricacies of this industry in their lifetime. This is why we directly employ so many subcontractors, suppliers, and other individual companies for projects, each of whom have an in-depth knowledge and expertise in their respective trade. Most of these directly employed companies will in turn hire multiple material suppliers, manufacturers, sub-subcontractors, professional services firms, and other companies. Once a project is completed, it is not uncommon for nearly 1000 different companies to have been involved from the project's conception, through design, bidding, construction, and eventually completion. With this in mind, it is extremely important for the general contractor to humbly seek

the advice of subcontractors in regard to their trades when it comes to scheduling, allocating the scopes of work, and any other questions that may be best answered by someone with in-depth experience in the subject area. Subcontractors spend their careers concentrating on and learning a single specific trade, whereas a general contractor's personnel will spend their careers learning numerous trades. The general contractor's personnel have only enough time in their lives to learn enough about each trade to effectively coordinate and manage them.

A unique situation in construction is that we are spread out across a region on jobsites. Unlike a business with all of their employees in one building, regular one-on-one contact and coaching from the more experienced executives to the younger people is just not geographically possible. In this industry, a format for knowledge gained by younger people simply by being in the presence of more experienced people is lacking. Secondly, this industry runs at a much faster and more frantic pace than a run-of-the-mill industry, leaving little time in the day for experienced executives to coach, or just sit down and talk to, the younger generation and future leaders of our industry.

Since young project engineers are regularly left to figure things out for themselves, they are forced to repeatedly reinvent the wheel, and make mistakes that with proper coaching could be avoided. With proper instruction, young project engineers or assistant project managers would get a valuable boost to careers. One of the personal missions I have undertaken in the industry is to find ways of bringing this coaching to young construction professionals.

In an effort to further my personal missions of increasing the early project planning efforts throughout the industry and bringing construction experience to the younger generation of builders, I found that textbooks were an excellent vehicle to forge knowledge in the industry. But, just as young project engineers need help in beginning their careers in construction, I needed help beginning my new career as an author. So I sought to find an experienced author with a great deal of educational experience to partner with for the creation of this textbook. After a great deal of research reviewing the work of other published authors in the field I found one experienced author who stood out well above the rest, Dr. Jimmie Hinze, PhD, PE. When speaking with Jimmie we found almost immediately that our missions in the industry were almost identical and after hitting it off, he enthusiastically agreed to partner with me on this project. Henceforth we began the project and are tremendously excited about the knowledge and experience this book brings to the industry.

Since general contractors naturally pair project scope of work issues with which subcontractor will perform the respective scope of work, we have organized this book such that each chapter focuses on a single, specific, subcontracted trade and the work for which that trade is, or is not, responsible. Further, we have grouped the chapters into modules representing the various phases and coordinated systems of a project. This organization not only aids the reader in a classroom setting, but also aids in the use of this manual as a reference book for use throughout a person's career.

This book is quite unique in that it concentrates on the nuts and bolts of a construction project by use of countless real-life examples, rather than on the basic philosophies and concepts of a construction project as most books tend to do. After a great

deal of research I found no other book like it on the market and I am excited to bring this unique project management tool to the industry. Whether you are a young project engineer or an experienced vice president, Jimmie and I truly hope this book provides a boost to your career development and wish you the very best in furthering your exciting career in construction.

I hear... I forget
I see... and I remember
I do... and I understand
(Ancient Chinese Proverb)

Jason G. Smith

Acknowledgments

Amcol International
American Hydrotech, Inc.
Anning Johnson Company
Balco USA
The Bilco Company
Burdick Painting
California Institute of Technology
California State University Northridge
Carpenters Union
Cetco Building Materials Group
Chutes International
City of Santa Monica Fire Marshal
Conco Companies
Construction Analysis and Planning, LLC
Construction Specialties, Inc.
Diversified Fire Products
Douglas Lucas
DriTherm International
Floor Seal Technology, Inc.
Forest City Development
George Donnelly Testing and Inspections
Griffin Dewatering Corporation
Hathaway Dinwiddie Construction Company
Herrick Corporation
Hi-Tech Flooring
Intracorp Companies
Iron Works Union
John Gambatase
LJ Interiors
Los Angeles Department of Building and Safety
Malcolm Drilling
Nancy Holland
Otis Elevator
Plant Construction Company
The Plumbing and Drainage Institute
Q Real Estate Partners
Rafael Vinoly Architects, PC
Regional Steel Corporation
Rite Hite Corporation
Rosendin Electric, Inc.
Si Durney

Stan Westfall
TBD Consultants
Texas A&M University
Thyssen Krupp Elevator
Tishman Speyer
University of Florida
University of Southern California
Viking Drillers
Walters and Wolf, Inc.
Wilkinson Hi-Rise

Authors

With an extensive background as a builder, Jason G. Smith has constructed projects ranging from \$10,000 to \$850,000,000. During his career with a Top Ten general contractor, Jason rose quickly through the ranks to the position of senior project manager on multiple high profile projects. Known for his expertise as a builder, Jason has been welcomed by architects and owners at the forefront of the design effort, bringing expertise in constructability to the team.

As a true leader, he has taken on additional responsibilities of varying capacities as the superintendent, owner's representative, and various other roles. Through these experiences a true understanding and appreciation for the different perspectives of the various project team members have developed.

Bringing together a superior knowledge of construction means and methods and an understanding and appreciation for the different perspectives of the various project team members, Jason founded Construction Analysis and Planning, LLC, the premiere constructability consulting firm in the nation.

Jimmie Hinze, PhD, PE is a professor at the M. E. Rinker, Sr., School of Building Construction and director of the Fluor Program for Construction Safety at the University of Florida. He received a BS and MS in architectural engineering from the University of Texas and a PhD from Stanford University. He was previously a professor of civil engineering at the University of Washington and also at the University of Missouri-Columbia. For more than 30 years, he has conducted research in a variety of construction-related topics, but primarily in the areas of construction safety. He has authored textbooks on construction safety, construction contracts, and construction scheduling. He has written over 100 articles and conference papers on various construction topics.

Module One
