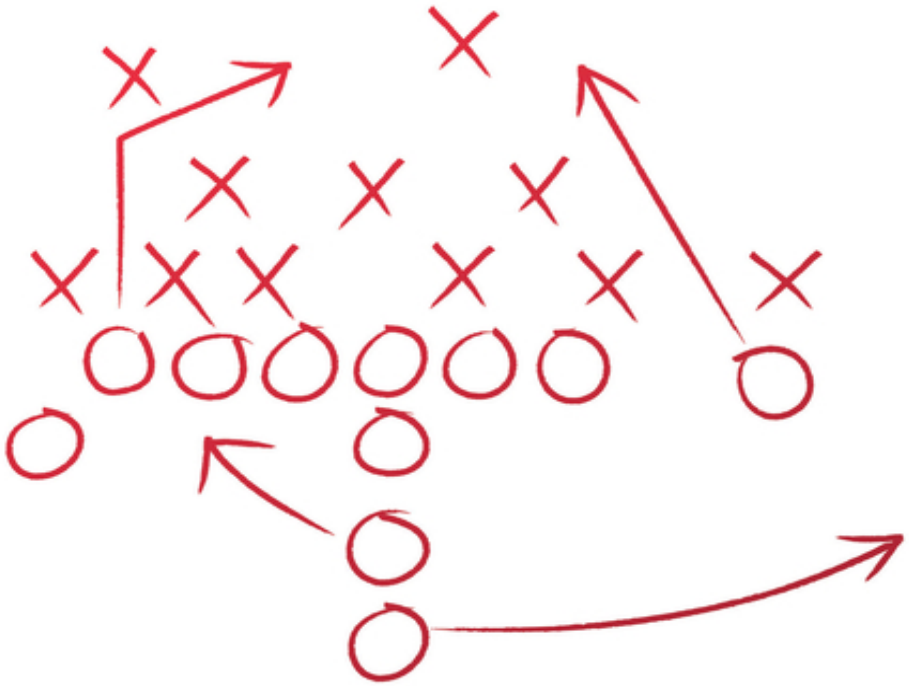
# LEAN ARCHITECTURE

## EXCELLENCE IN PROJECT DELIVERY

MICHAEL F. CZAP, AIA
GREGORY T. BUCHANAN, AIA



WILEY

# Lean Architecture

# Lean Architecture

## Excellence in Project Delivery

Michael F. Czap, AIA
Gregory T. Buchanan, AIA

WILEY

This book is printed on acid-free paper.



Published by John Wiley & Sons, Inc., Hoboken, New Jersey

Published simultaneously in Canada



Library of Congress Cataloging-in-Publication Data

Names: Czap, Michael F., author. | Buchanan, Gregory T., author.
Title: Lean architecture : excellence in project delivery / Michael F. Czap, Gregory T. Buchanan.
Description: Hoboken, New Jersey : Wiley, [2021] | Includes index.
Identifiers: LCCN 2020055853 (print) | LCCN 2020055854 (ebook) | ISBN 9781119686934 (cloth) | ISBN 9781119686958 (adobe pdf) | ISBN 9781119686965 (epub)
Subjects: LCSH: Architectural practice—Management. | Organizational effectiveness.
Classification: LCC NA1996 .C93 2021 (print) | LCC NA1996 (ebook) | DDC 724/.7—dc23
LC record available at https://lccn.loc.gov/2020055853
LC ebook record available at https://lccn.loc.gov/2020055854

Cover Design: Wiley
Cover Image: © filo/iStock/Getty Images

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

# Contents

# Foreword

I had the honor of serving on the American Institute of Architects (AIA) national board from 2002 through 2004. At that time, I was an equity partner in a boutique interior design firm in Atlanta, and frankly I was a bit intimidated about joining this elite group. I imagined that everyone would be very high-powered and that I would be in the shadows. After a short time, though, I realized that these architects from big-name firms were dealing with the same problems I was: low fees, competitive pressures, and erosion of respect for the profession. I met some great people on the board, some of whom remain friends to this day, but I also realized that the profession was facing big challenges in terms of staying relevant in a rapidly changing world.

Later in my career I moved to a larger firm where the stakes were higher, designing more complex architectural and interiors projects. That is where I met Greg Buchanan. Having seen Greg and Michael deliver their Lean Architecture presentation at an AIA convention, I was very impressed with their concepts; and for several years now, I've had the pleasure of seeing Greg provide guidance and inspiration to team members and clients.

Now I will shift gears to why I believe the Lean Architecture approach espoused by Greg and Michael is so important to our profession. I have been fortunate to have a great career, better than I could have expected. Now I am near the end of my career, and what people my age do is look back and try to figure out what it all meant. So here goes.

In my 47 years of architectural practice, I have rarely seen the words *Lean* and *excellence* used together. Most architects equate excellence with bigger, fancier, more expensive buildings, which of course require more time and fee to design. The architectural profession in the US grew out of the beaux arts movement of the late eighteenth century, imported from France by people like Thomas Jefferson. Beaux arts literally means "fine arts," and, for a long time, architects identified themselves as much closer to the arts than to engineering.

That conception of architecture as a fine art worked well for a young country that was striving to catch up with Europe culturally. Building fine buildings like these took as long as it took and cost what it cost. But over the last 7 decades, the sponsorship of major buildings has increasingly become the province of large companies. Even institutional clients such as governments, schools, and cultural institutions have adopted a modern project management approach for their buildings.

We can debate the definition of *value* in buildings, but like many things in the modern world the movement has been inexorably toward driving down cost. The means to drive down cost has often been through technology. Household names like Amazon and Netflix have made goods and services more widely available at lower costs. But there have been unintended consequences to squeezing as much cost as possible out of the system. Air travel is a great example. Multitudes who were flying across the country on $300 tickets before the COVID-19 pandemic complained about crowded flights and dingy airports, not realizing that they had the air travel system they paid for. A more serious example is the healthcare industry. The pandemic has exposed that our US healthcare system is running so tight that,

when unexpected needs hit, there were not enough beds, ventilators, and test kits. Resilience has been value engineered out of a critical system.

The paradox is that the architecture, engineering, and construction (AEC) industry has been remarkably stubborn in resisting the deployment of technology. We thought that adoption of parametric 3D design tools would lead to interactive models of buildings with changes automatically updating throughout the drawing set, but we found that the labor cost of building a complete 3D model of a building was prohibitive given competitive fees. So most firms model the plans in 3D but still produce the details in traditional 2D CAD. Enterprise 3D modeling software has proven to be unwieldy for quick design sketching on the front end, so many young designers bootleg simpler tools to use for ideation, further undercutting the building information modeling value proposition.

On the construction side of the equation, we have only to walk down the street and see tall buildings being built with cast-in-place concrete. Low-paid workers essentially build the structural frame in wood, pour the concrete, rip the formwork down, and then do it all over again on the next floor. Not exactly a high-tech approach, but as long as there are low-wage workers available this method works out to be less costly than steel or other methods.

But despite the fact that the AEC industry lags others in technology-driven efficiency gains, fees for architects remain stuck where they were 20 years ago. During boom times, fees may edge up a bit, but as soon as there's a downturn the race to the bottom on fees returns. Previous gains are wiped out, and we're back where we started. So, low fees, marginal profitability, boom-and-bust market, scarcity of human capital – does this sound like a profession that can invest heavily in technological innovation?

All is not lost! Architects can still succeed if we reimagine the way we work. That's why this book is so important. *Lean Architecture: Excellence in Project Delivery* lays out an approach to what we do that starts from the premise of not doing anything in the design process that doesn't add value to the finished product. Document only what's necessary, and document it one time in one place.

Although adopting a Lean Architecture approach will generate cost savings in producing the work, it would be short-sighted to see it as just a cost-cutting tool. Savings in production time and cost can be reinvested in innovation and design excellence. As a result of tight fees, many architects today bemoan the loss of time for creative wandering in the initial stages of design. Lean Architecture can help us rediscover that time, even with competitive fees. So it's really about a better design at a lower cost, and that would move the architectural profession out of the dark ages, complaining about lack of respect, and into the same kind of lower-cost, better-quality value proposition that has propelled the Amazons and Netflixes of the world to success.

For architects, this is the book we need at the moment we need it. Thank you, Greg and Michael.

Stephen Swicegood, FAIA

# Acknowledgments

A few thanks. Not many people have careers that are not influenced, enabled and shaped by others. Here are some who have affected mine.

Wayne Barger, AIA, is the first person I worked with who effectively modeled what a great project manager does, providing effective leadership while staying out of the way so people could do their work. A good listener, Wayne looked for and promoted good ideas wherever they came from.

Grant A. Simpson, FAIA, combines a colorful character with intellect and keen insight into the realities of architectural practice. We met in 2004, and without asking he signed me up to speak with him at that years Texas Society of Architects annual convention. We found we had quite a lot in common; often, what I could not quite put in words Grant could well summarize while distilling the underlying principles.

My coauthor, Greg Buchanan, AIA, has become a good friend, and I am grateful for his contributions to this book. We each attended the University of Illinois at Urbana-Champaign – about 10 years apart. Greg and I both share a passion for understanding how to produce better projects and to share that with others. We have different approaches but similar ideas, and I believe that strengthens this book.

My parents, Donald and Marion Wilkins, who took in a foster kid and helped him grow up.

My wife, Lynn, loves me no matter what and knows how to put me in my place when needed. She also considers me the best architect around.

Jesus Christ, the Lord, is described in the New Testament as the architect and builder of a city with foundations. It also says that in him are hidden all the treasures of wisdom and knowledge. I have found that my best ideas and insights have often come after asking him for help.

Michael F. Czap

Almost everyone we encounter in our careers helps shape our viewpoints and approaches to problem-solving. I want to recognize several individuals who have been exceptional teachers and mentors to me and acknowledge my family for always being there when needed.

My drafting teacher at Champaign Centennial High School, Edward A. (Al) Boehm, who coached me on the rigor required to excel at technical architectural drafting - skills that are still relevant to this day even though the tools have changed.

Of all my professors at the University of Illinois at Urbana-Champaign, Michael Kyong-il Kim, PhD, AIA, NCARB, inspired a desire in me to question why things are the way they are. His teaching philosophy is of a comprehensive integrative approach that exposes students to the multiple building systems required to act together to become a singular design expression. I admire him for teaching multiple generations of professionals to think beyond the normal.

Kennedy K. (Keddy) Hutson was my first professional mentor. He took a chance on hiring me for my first position in an architect's office as an intern during graduate school. I learned many lessons from him (and others) in the short time I was employed there. After I gave notice that I was leaving to pursue an opportunity out of state, his response was one of support and encouragement to pursue what was best for my future. That lesson has stayed with me and is something I pass along to those I have mentored during my career.

My coauthor, Mike Czap, AIA, for our friendship and collaboration over the years. This book brings our shared passion to fruition, but not the end. Thanks for your insights, perspective, and most importantly the sharing of Lean Architecture.

My wife, Lori. Thanks for your love and support in writing this book. You have always encouraged my pursuits, and I could not have asked for a better person to share my life with – I love you. To our son, Samuel, and daughter, Natalie, I am proud of you both and look forward to seeing you pursue your dreams.

And my parents, George and Valerie, without whom I would not have been able to pursue my dream to be an architect, and a special thanks to my dad for his contribution to chapter 5.

Gregory T. Buchanan

# Preface

The practice of architecture encompasses many things from design to drawing – and now modeling; the use of materials, the creation of places and spaces, and of course the clients who make it all possible. Somewhere amid all of these is the pursuit itself – the passion for excellence in every aspect of the work.

This book is an endeavor to bring attention to a methodology for that pursuit that can withstand the pressure of the times and facilitate the delivery of our work with excellence.

Over the years there have been many resources addressing the mechanics of project delivery such as good drafting practice, the essentials of drawing organization, and graphic standards. In the mid-1980s, as firms began to adopt computer-aided design (CAD), books proliferated on the basics of CAD and how to draw lines and ellipses or to add and name layers. What was missing, though, was a discussion of strategy on how to employ CAD effectively on small, medium, or large projects.

A recognition of the changing landscape started to happen in the mid-1990s as Grant A. Simpson, FAIA, and like-minded colleagues at HKS, Inc., a large Dallas architecture firm, began to rethink architectural documentation. They developed ideas like default scheduling, instructional systems, and working in context, ideas that enabled architects to create documents that were intuitive to prepare and more readily understood – not just to copy information but also to leverage knowledge. They also began to share these ideas at conferences and to write about them.

The design professionals' practice shifted dramatically again in the early 2000s with widespread access to the Internet, globalization, and the use of building information modeling (BIM) software. New books and online resources emerged to address the different processes and modeling techniques and the many possible uses for data-rich models. However, the challenges facing architects before and during CAD resurfaced again in slightly different ways.

Around 2001 Michael F. Czap, AIA, began using the term *Lean Architecture* to describe the thinking and underlying ideas for an approach that not only built upon the architect's tradition of craft and sufficiency but also looked at improving processes to streamline work across a firm (Figure P.1). It included developing a strategic approach that addressed the whole of project delivery and not just our use of technology or how to draw and model. He defined Lean Architecture as:

> The ongoing process of rethinking and improving architectural methodology. It is the pursuit of better work by applying Lean principles to every aspect of practice. It is about smarter information flow and understanding how we perceive and process information in order to become better communicators among ourselves and with the ultimate users of our services.
>
> Lean Architecture is not about skipping important steps, omitting necessary information, or doing less than the standard of care. To the contrary, it is identifying what adds value and reducing or eliminating what does not.

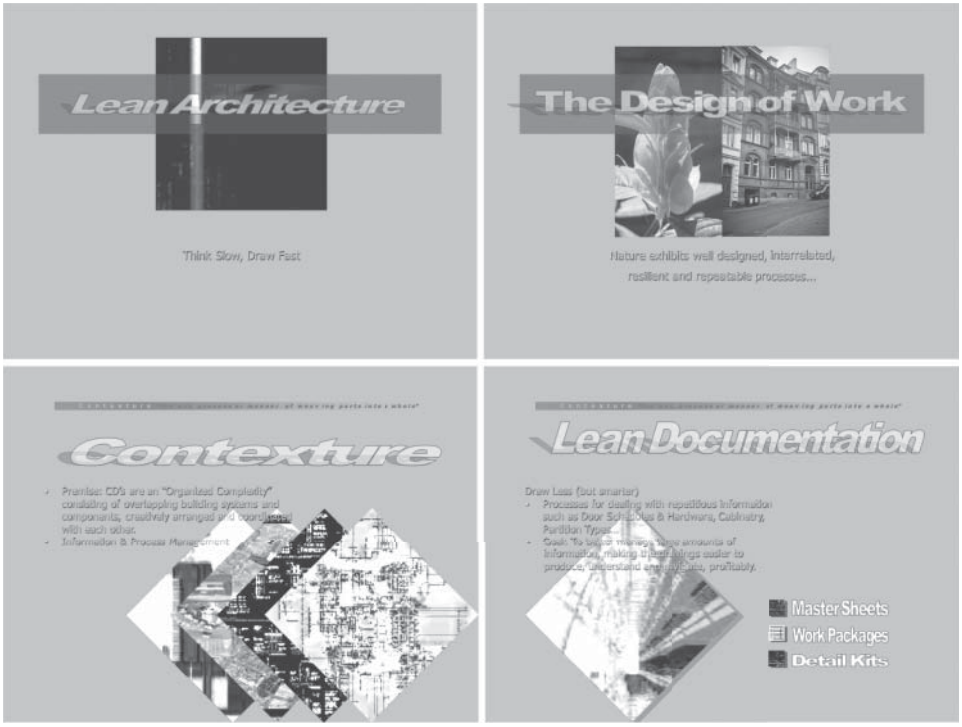



**FIGURE P.1** Early presentation circa 2001.

Why Lean? It is the terminology best associated with advancing process methodology in manufacturing, software development, management, construction, and healthcare. There are other similar approaches out there, several of which we will discuss in this book.

Simpson graciously invited Czap in 2004 to speak with him at conferences, and Czap started to weave in the topic of applying Lean to architectural project delivery. He wrote several articles to support his thinking, including coauthoring with Simpson the chapter on construction drawings in *The Architect's Handbook for Professional Practice*, 15th ed. (2014), which includes a section on Lean Architecture.

In 2011, Gregory T. Buchanan, AIA, joined the effort with Czap and helped to expand the focus to address rethinking how firms work and change for the better. Brought together by a passion to effect project delivery by drawng on the influences of process improvement and Lean thinking, Czap and Buchanan began presenting their shared ideas in 2013 to a broader audience.

Many have asked what resources there are on the topic, and we are aware of none. There is a broadening interest within our profession globally on the application of Lean, and this book is a joint effort to more formally communicate ideas about improving the practice of architecture.

We will attempt to thoroughly address the topic of Lean as applied to project delivery and to intertwine them so that you no longer think of one without the other. We incorporate examples from both within and outside our profession to connect concepts and practices and to share approaches and

solutions that have worked. There is no single path to excellence in project delivery, but we provide insights and share practical applications that we believe will help get you there more quickly.

It is not easy to foster change within an organization, let alone across a profession. We do believe that amid the economic and technological changes, when combined with good financial practices, a passion for client service and design excellence, Lean offers an enabling process methodology for the twenty-first century.

Michael Czap and Gregory Buchanan

# Introduction

## WHO IS THIS BOOK FOR?

Unless you are serious about transformation, implementing Lean across your firm may not be for you. Necessary ingredients include a commitment of time and resources and perhaps most importantly a willingness to try new ideas – to challenge and then change the ways you have worked before. Experience has shown that it is more difficult at the beginning than just doing things the old way. Yes, long-standing practices may be fine now, but are they really moving the needle to higher productivity and improving your ability to deliver projects well? We think not. Competition and fee pressure continue to force firms to do more with less, and the time is always right to become more effective and to employ commonsense approaches that question long-held assumptions and practices. It is radical only because it is different from what you are doing currently. When you experience a Lean approach, you can step back and start to see what is possible, and the concepts become clearer.

When there are profession-shaking events like the Great Recession of 2008 or the global COVID-19 pandemic, major changes occur in the economics of construction and architecture. Projects go on hold or are indefinitely delayed creating an atmosphere of uncertainty and leading to staff reductions or worse outcomes such as bankruptcy or closure. Most of you have experienced a significant change in the world in response to major events, such as the increased security screening at airports following the 9/11 attacks. Major events tend to expose structural weakness in the economy or society at large. They also tear at the fabric of a firm.

It is our observation that most companies do not operate on a level seeking to improve quality and efficiency but are instead concerned with individual project profit, winning the next commission, or earning design awards. We believe it is possible and vital to think about each of these while simultaneously bringing improvement to project delivery. This is who we are writing for.

## WHY DID WE WRITE THIS BOOK?

A Lean approach to architectural or engineering practice offers value when times are good and we cannot find experienced staff to hire, and when times are not so good and we are unable to retain staff. It offers the promise of doing higher-quality work more productively.

To move from abstract concepts and obtain buy-in, Lean must be experienced firsthand by the people doing the work. They know the daily difficulties and recurring issues and are generally receptive to approaches that save them time and provide better outcomes.

We are writing this book because of a mutual commitment to working smarter and achieving better results and with the desire to share that with others. It is a passion we have in common with many design professionals: that great design must be more than just three-dimensional; it should be

delivered well, and, in this increasingly complex world, the clients' and contractors' experience with us should be one where the project flows with as few interruptions as possible.

Like many reading this book, both authors here have changed jobs more than once in their careers. Each time has been an opportunity to learn how a new firm operates and the ways they do their work. While each is unique, once we get settled in and observe how things are run, it has become obvious that the techniques are essentially the same and there is little innovation occurring. Oddly enough, we find that people want to improve but do not know how to and there are few resources available. Many people have inquired where they can learn more about the subject of Lean for design professionals and request more in-depth information about our approaches. This book provides a much-needed response to these queries but is not a fix-all approach or a step-by-step manual. It is written to serve as a resource to help you understand Lean thinking and begin to see how to apply that in your firm.

## ORGANIZATION

The book is broken down into four parts: (1) Building Blocks for a Lean Practice; (2) Areas of Strategic Focus with Applications; (3) Implementing Lean; and (4) Final Words and Advice.

Part I, Building Blocks for a Lean Practice, is foundational and establishes an overall framework for Lean. It explores process management theories, identifies the designer's problem, the primary goal of a design practice, and observes Lean's roots in manufacturing and how that can influence the design profession.

Part II, Areas of Strategic Focus with Applications, explores strategic areas of focus, applying Lean to project management, quality assurance, documentation, and the use of technology.

Part III, Implementing Lean shares common pitfalls and difficulties you are likely to encounter, along with approaches that we have seen work for small, medium, and large firms. We assess the use of technology in general and provide a basic program to help your efforts to rethink firm's practices.

Finally, Part IV, Final Words and Advice, summarizes where we think Lean fits within your firm and provides a number of observations for making it happen.

Throughout the book we use examples from both within and outside the profession to illustrate foundational ideas and concepts. And because they are relevant to more than one area, you will find that the principles and themes recur in multiple places in slightly different forms.

We are inviting you to join us as we learn how to think and work smarter. We concede that some of what we write about in this book will become obsolete over time; however, the principles and the thinking that underly them will not. If you will seek to understand the fundamental ideas, they can be applied to create new methodologies, as industry accepted practice and technology continue to evolve.

# Lean Architecture

PART

# Building Blocks for a Lean Practice

CHAPTER 1

# A Profession Ripe for Change

## AN EVOLVING PROFESSION

Up through the early 1980s, most architectural firms in the United States employed a craft approach where proficiency with the tools of the day – pencils, pens, and instruments such as T-squares, triangles, parallel bars, and compasses – took time to develop. These were used with drafting media such as sheets of vellum (paper) or plastic mylar to create drawings. Along the pathway to mastering the art of drafting, with the requisite line weights and consistent lettering, one learned how buildings were put together and detailed. With some exceptions, firms were generalist in nature and worked on a variety of project types within a limited geographic area (Figure 1.1).

During that same decade, profound changes began to happen driven in large part by the emerging revolution in technology and a little later with globalization. With the ability to both communicate in real time and travel inexpensively, the consolidation of architectural and engineering firms began to occur. Fast-forwarding to the 1990s and beyond, this led to the creation of many large, multinational corporations that offered a global presence, skilled financial management, deep pools of talent, and the resources to market their services. In the United States, organizations of 30–100 people appear to have been the prime targets for acquisition. Sole proprietorships and small firms were mostly spared and to this day still comprise the majority of design practices. They continue to thrive by having the ability to deliver projects less expensively due to a lower cost structure and inherent agility. Lacking the depth of talent and other large firm advantages, many offer boutique and personalized services, while others leverage local and political relationships to compete with medium- to large-sized firms, by whom they are often engaged as local partners.

## WHERE WE ARE TODAY

Professional practice today is quite different and continues to evolve at a rapid pace. Most large practices are organized into one or more specialized market sectors offering a breadth and depth of knowledge in building types such as hospitality, K–12, industrial, retail, higher education, office,

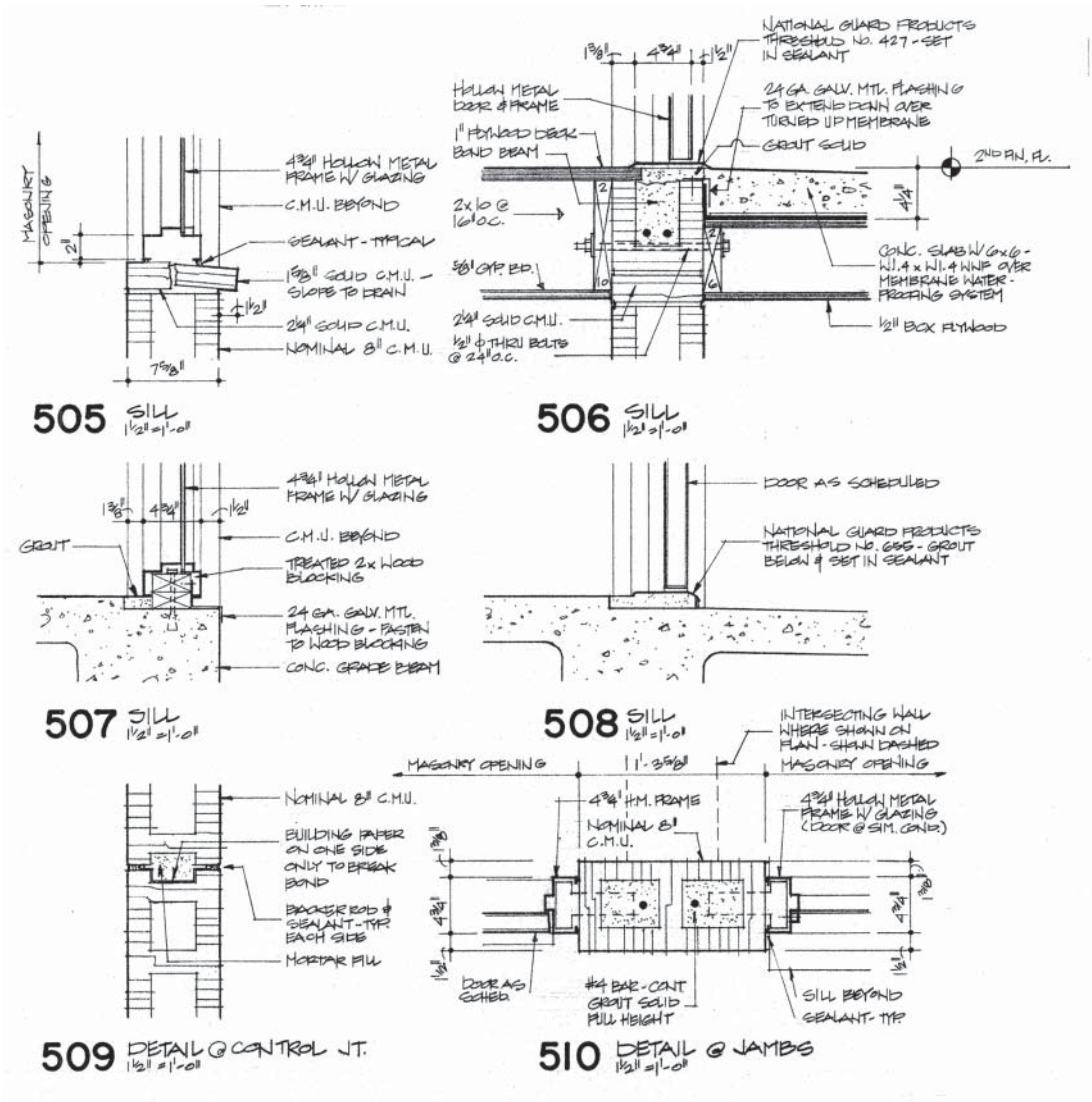



**FIGURE 1.1** Hand-drafted details.

and healthcare. Great value is placed on aesthetic design for its own sake as well as the building's performance relative to its environmental impact and resiliency.

Design-side project delivery has become a more complex endeavor with multiple project stakeholders and varying options for construction. Design–bid–build is no longer the de facto method, with alternatives such as design–build, construction manager at risk, integrated project delivery (IPD), and some other variations commonplace in the United States.