on making
on making

by

Jonathan Foote

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Blacksburg, Virginia

______________________________
Hans Christian Rott               Chairman

______________________________
Hunter Pittman

______________________________
William Galloway

______________________________
Matthew Lutz
This book is dedicated to my mother and father, whose love and support have been unwavering.
acknowledgements

I cannot begin this book without humbly and gracefully thanking several of my classmates and colleagues, whose aid in the completion of this thesis was unconditional. With perhaps a touch of vanity, I undertook a project knowing that its success depended in part on the spirited help and labor of my friends in the studio. For all your assistance I am greatly indebted.

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abstract

This is a project about making, or what it fundamentally means to take part in what seems like such a natural, yet remarkable, human trait: the ability to make. There are countless different types of makers in the world, but it seems that of all of them, the architect occupies a unique position. It occurs to me that, with a few exceptions, the professional architect is one of the only makers who has the handicap of not working directly with the object of his making. A painter or sculptor works without the hindrance of having to translate that which is in his mind to others. Changes can be made without consult, refinement is sought at every movement of the hand, and, in the end, perfection is the only acceptable conclusion.
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“The first criterion of the truth is to have made it.”

‘veri criterium ipse fecisse’

--- Vico
The crossing of the three string-lines in space—x, y, and z—flawlessly and beautifully, this real manifestation of an imaginary system is an incredible juxtaposition with the perfect imperfection of Mother Nature. What anticipation, what creative power is embodied in the precise and unwavering definition of a level line!
This is a project about making, or what it fundamentally means to take part in what seems like such a natural, yet remarkable, human trait: the ability to make. There are countless different types of makers in the world, but it seems that of all of them, the architect occupies a unique position. It occurs to me that, with a few exceptions, the professional architect is one of the only makers who has the handicap of not working directly with the object of his making. A painter or sculptor works without the hindrance of having to translate that which is in his mind to others. Changes can be made without consult, refinement is sought at every movement of the hand, and, in the end, perfection is the only acceptable conclusion.
Ruskin said, “The difference between the spirit of touch of the man who is inventing, and of the man who is obeying directions, is often all the difference between a great and common work of art.” I seek to understand architecture on this level. I believe the dialogue that takes place between a maker and his work is an essential generator of fine architecture. We seem to understand this concept so well in the shops and in the potter’s studio, that a connection must be made with material in order to learn good design. The use of these facilities of making are stressed in an architect’s education because there is a level of knowledge that can only be attained through an execution of design through real material. I am interested in articulating what exactly happens when we make. What kinds of knowledge are only privy to the maker? Can this knowledge be a generator for architecture?
I have held for a long time the conviction that there is a certain poetic faculty involved when we make. Perhaps not surprisingly, in the Greek vocabulary, the word 'poet', or poises, translates into modern English most directly as "maker". To create or to make evident that which was before obscure is the very essence of the poet. "The sign and credentials of the poet," wrote Emerson, "are that he announces that which no man foretold...he is the only teller of news, for he was present and privy to the appearance which he describes." So by our very act of making we are in a sense participating in a kind of poetry. The modern poet makes with words; I am studying making buildings.

To become a maker, or to make, implies a specific activity that is quintessentially human. The faculties required and the judgment exercised in the making are what separates us from the beasts and, perhaps a little less apparent, the machine. Making requires the unyielding use and refinement of our judgment. The maker must be able to simultaneously exercise his judgment on a variety of levels. How does my action affect my immediate task? And how does the result of my immediate task influence the whole? Architects are trained to think on a variety of scales at the same time; they learn to seek the idea and let it inform the details. They can think in plan, section, and elevation concurrently. As the maker of this building, I must consider every brick, but I must also come to know the walls they become.
Architects, however, are makers of a peculiar type. We make, so that others may make; so in our profession there is a certain distance that is always maintained in the work. Some have said it is exactly this distance between the maker and the work that gives us our identity as architects; that, as Rafael Moneo stated once, “Our pleasure lies in the experience of this distance, when we see our thought supported by a reality that no longer belongs to us”. My pleasure, however, has always rested on developing a more direct relationship with the work, one that uses drawing, our principle tool as designers, as a means rather than the end. This distance, this gap between designing and building, is exactly what I seek to close.
Drawing, therefore, becomes central in this discussion. This study focuses on the relationship I develop between what I draw and what I build. I want to know where the limits of knowledge are. Is something only knowable, as Vico writes, by having made it? Or is architecture made only through the use of drawing? When I draw I am also making. I am not making that which I am drawing, but rather I am carefully and meticulously creating a graphic object to be judged—by myself, my colleagues, or professors. Drawing is an act of discovery; it, as architect Carlo Scarpa said, “lets me see”. Making, however, is the pinnacle act of discovery. The precision of knowledge that accompanies the making cannot be substituted. When we make, countless questions are raised, every single one of which must be answered before completion. And every single one is based on and contributes to our refinement in judgment. How many sections do we draw before we know a wall? Two? Ten? One hundred? How many walls must we build before we know it? Only one!
It should be noted that I am not interested in studying the assembling of something. The making elevates assembly into poetry; into the realm where certainty is not so clear. Assembly relies on instructions and recipes; whereas making involves chance and uncertainty. “Poetry,” writes Alberto Perez-Gomez, “results not from an excess of reasoning or intellectual power, but rather a lack thereof; it is, finally, an issue of making in order to know, not of harboring information in order to make.” The maker is always pushing what he knows into the realm of what he does not know; indeed, he thrives on the real possibility of failure, knowing that nothing beautiful is made without risk. Anyone striving to the imposing title of maker comes to understand that the first condition in any act of making is uncertainty.
“Poetry results not from an excess of reasoning or intellectual power, but rather from a lack thereof; it is, finally, an issue of making in order to know, not harboring information in order to make.” — Alberto Perez-Gomez
“If you would know the flavor of huckleberries, ask the cow-boy or the partridge. It is a vulgar error to suppose that you have tasted huckleberries who never plucked them.” -- Thoreau
I am the maker of this building.

I drew the first line, drove the first stake, and laid the last brick.

I conceived of it, designed it, drew it, built it, and surveyed it.

While I built it, I wrote about it, studied it, sketched it, and photographed it.

When it was cold, I worked on it.

When it was hot, I got sunburned on it.

In the warm late afternoons, I napped on it.

I touched every brick in it, once to move it from the cube, and again to place it.

I cut the corner brick and listened to the chisel.

I mixed the mortar and felt the smooth and faultless consistency.

I plumbed the corners and leveled the walls.

I watched small pieces span large openings.

I counted courses and wondered if I would ever be finished.
“…the carpenter’s stretched cord, if you hold your ear close enough, is musical in the breeze.”

Emerson
Remarks on photographs can be found on page 81.
“Who knows but if men constructed their dwellings with their own hands...the poetic faculty would be universally developed...Shall we forever resign the pleasure of construction to the carpenter?”

— Thoreau

surveying
The fieldbook was essential in my study of the making. It recorded the immediacy of the work—it slowed me down and kept me seeing. The maker must learn to close the cycle; he must learn how to reflect on what has been done and use it to re-inform.

The contemplative state is what separates the maker from the builder.

Presented here are selected pages from my book.
On the drawing board, I can cut out a rectangle with a remarkable exactness in about 30 seconds; on the construction site, it took me around 3 hours. What an incredible act to be able to write a 90° angle on the earth! Such a beautiful juxtaposition to observe the geometric correctness of the right angle with the apparent randomness of nature — this I will not soon forget. Perfection of two very completely different types.

Traditionally, the caving or the_corefusence or the breaking of the ground has come to signify the beginning of the long road of construction. It is to the very reason that these acts generally take place. Any kind of ceremony speaks eloquently to the power and anticipation of construction. One might feel the collective presence of... "Ah, here we go..."

Today, we are unceremoniously, I drove the first stake into the ground which is to become the point for the corner of my future building. Already I can feel the exhilaration, as I transcribe what is on paper. This is a revelation that we architects are willingly recognized! To transcribe, to convey, to search for the perfect realization on your image — to drive the first stake and seek its elevation — to know that the lines on the page are merely another tool to help me build — these are concepts that I have not to ever lose!
On Making

Robert Arrives this morning. Weather quite chilly & brisk. Ground will be frozen in a matter of minutes. Last night I began to think about all of the steps I had to take in order to get to this point, and I can’t believe that I’ve got this far. The beginning—The first act—The first act of construction. One must go deep down first before one can build up.

Hand incredibly directive on the site.

Telephones—Digging to the north 6" nose. What the excavator gives me = what it takes away.

What seems like an interesting paradox. In the excavation I am on an elevated platform of excavation with the tools of work by hand. A beginning by hand rather than machine.

What a mess! Everyone列入—to be exact has a whole different set of rules here than what I’m used to. Tolerances measured in inches instead of feet. A clean construction site is measured by how many piles of dirty things there is. Biggest discovery today—to get to beautiful one must undergo a phase of complete ugliness.

Now I draw it.

What I see—Hopefully within this I can contain what I drew.
I visited the site today to inspect the potential holdings of my brick which will arrive tomorrow morning. We had a feeling rain all night last night so I wanted to see if the truck will be able to get up to the site on time. I anticipate tomorrow's arrival like I'm a little kid again, when that semi arrives tomorrow loaded with material it will, for those brief moments, be my own, and I will be able to revel in that sheer joy that comes with the ownership of material — building material which holds the potential of whatever my mind and hands can make of it. Having some is beautiful and unlimited material to build with.

December 15

Eighteen cubes of Old Virginia Rose arrived today as scheduled. It is indeed an incredible quantity of material, now that I see it before me. As usual, however, the anticipation of the delivery was much better than the actual delivery. I breathe more of a sigh of relief more than anything, and I move forward to the next task at hand.

4,500 $1100 4.5$ / brick
2:30 pm: I first corner. Just starting is A weight off my shoulder in itself. Two courses in and I am still square and level. Getting the mortar at the correct mix still seems a challenge.

I am struck by how quickly I am willing to digest from my carefully and meticulously laid out drawings, forget a half brick here? Oh well, make it up on the next one. This would be unacceptable on my readings.

Day one of construction:
- 16 bags sand
- 60% HY bag cement

First day's work.

[Diagram showing construction process]

I was nervous to pour the water into the mix. That was the beginning.

1/8" gap. I think I can make one! This is next course, still below grade.

Complete course. Good level.
Tolerance 1/2" masonry

[Diagram showing completion of course]
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Course 4

How I Drew It!

Three Corbeling Stretches

What is below it is
Three corbeling headers.

I can't build it this way
Three corbeling headers, or the stretch
will consume too much

How I Built It?

Two stretches.

Ok, but now
I need to redo
my corner mudding
so that it is
on a joint instead
of a brick.

It was indeed a moment of poetic sentiment to
stretch equivalent diagonals. I am always
aware of the incredible energy I can summon from
myself to build. These moments like this
here, are encouraging not just in that I am
reassured that I am building correctly, but
perhaps more importantly, my love for
building is reiterated to me. The end goal of
completion isn't my primary force; I love to build.
I have mentioned before about my amazement towards the incredible properties of the toughness afforded in Blue Masonry. These moulded bricks dictate a special challenge with their deformations. They have called them "bad bricks." But perhaps it is the very fact that with these bricks, with all their inconsistency, can be laid square and level to what makes them beautiful. They are taking full advantage of one of the defining qualities of Masonry: its generous tolerance.

Finished course 5 today. Laid my level across the opening and was nice'n level. So - on all accounts of good Masonry so far I am OK - square and level all the way around. The workmanship is still a little sloppy but I'm finding it makes maybe a richer wall.

Having a little trouble keeping the inside wall plumb.
Course 9 almost complete. All I have left is the seat. It has been giving me trouble ever since I haven't been following my drawings. I am no longer designing. I am problem solving; seeing what works. This is where drawing is an activity that yields a higher level of knowing. If I had drawn it correctly in the first place, I'd have a better seat. Not improvisation.
2:00 p.m.: Just completed my first batch of morter. The arch is about 2/3 complete.

This building the arch is amazing. I took time with great care to prevent the centering. I feel like I am participating in a tradition of building which is centuries old, like the builders of antiquity were working next to me. This is porter indeed, watching the fronts of the making ripen until eventually it stands without help.

5p.m.: I cannot think of a more noble occupation than to build an arch. It is truly incredible to see this complete—and it is one hundred folds Morso knowing that I was the builder. That light struck it beautifully! This evening, I suppose that this day will not be matched in its nobility like the last the facade is finished. Every architect should have to build an arch as part of his education. What a remarkable day.
Am I LAYING BRICK NOW LIKE AN ARCHITECT OR A MASON? IT SEEMS AN AD A MASON THINKS IN TERMS OF PATTERN AND SAMOZOES, AN ARCHITECT IN TERMS OF DIFFERENCES AND OPPORTUNITY FOR CHANGE. NOW I THINK - PATTERN - I PROCEED FROM THE KNOWN TO THE UNKNOWN - STILL MAKING SURE THE KNOWN, OR "STUFFING" CONDITIONS ARE RIGHT - BUT "FILLING IN" OR IMPROVING WHAT ISN'T SEEN. WHY THE NON-CHALANCE TOWARD MY CAREFULLY DRAWN COURSES?
March 24th
A.M. Sunny, 65°
P.M. Windy, Rain

Rather than brooding the unconscious construction,
I am in fact looking forward to it now that
I have a new wall! These building days are not
particularly Graham-worthy, and I am now
left to direct my daily attention to the part of
making that isn’t quite as interesting, although
at least as important. They I occupy my days
now for motives with repetition and work: no arch to
build, no scaffolding works to please, no seat to course, bug,
just toppling brick, making walls. Fortunately for
me I still draw energy from these repetitive tasks;
just seeing the wall grow is enough.
March 28th - It's Beautiful

I am having this problem this morning where I have to course over the arch. Of course, I could just throw some mortar down, but it seems there's likely a better way. Seeing on

How I caught out the bricks properly to fit into this space, I suppose masonry might ultimately be my solution.

The construction drawings on the occasion demonstrate an approach more likely to the making, else may maybe I might have proposed another solution. A casting would have been quite nice I think.
Wow what a gorgeous day today. Sooart and in 70's Spring is in the air today. It's amazing. Really, how much the weather affects you. One of the incredible qualities of building, I see, human like nature around us, dealing with the seasons. Having direct for 4 months with the cold and wind, good weather stamps that much more refreshing. All this, I would suppose, is less in the architect's office where design can take place anytime, anywhere.

Each brick represents a balance between judgement and speed.

P.M: I find myself completely exhauster at the end of work today. Sonorous and Hungary, it's time to go home.

Completed 35 and 36
The survey drawing is an important step toward coming to know the work. I'm completing the cycle here of contemplation → action → replace.

or draw

survey → build

Note push back out on corner op B2

Leaves out, but made adjustment at 36

Leans slight out
April 13th

What an extraordinary day. I raised the platform and I now have my first real feel of the interior space. With the leaves out the blocks reveal the wall thickness almost fully. They are right at eye level on the sent.

The light the evening casts a beautiful shadow of the arch on the inner wall. It feels like a tunnel now.

I think there is nowhere more exhilarating to the builder than going higher. I took a giant leap today.

April 14th. Saturday Sun 70°

The weather looks good for the next couple days and I'm rolling on. Yesterday was one of those that make lives for - minutes of execution under everything all at once. Changes. New light conditions. New views. New spaces. Everyday I become more vertical. Everyday more of a tower.
The scaffold blocks remain in place. To position them correctly is no easy task.

Must be:

And

And

And

What I'll draw

What I'll build

The blocks remain. The wall thickness unexplored.
I've heard architects talk about that state of construction when the building has achieved a certain beauty that they fear the finishing of construction might destroy.

The framed house is in some way somehow beautiful as it is, and you wish you didn't have to worry about keeping the rain out. The steel skeleton, in its elegance, pierces the sky.

My building has achieved something of this state—one in which it might appear finished. The proportions of the step-outs signal a certain rickety, so I thought I would pause for a moment to see what I might learn for the next building.
I look forward with great eagerness at the end of my transition to a circle. The question is: how do I keep control of the course of the diagonal?

Diagonal = the corner squinch in along the diagonal.

Bricks as their own jig.
Measuring with all but the most precise instruments is certain disaster. But the crudest construction methods will yield significant accuracy.


Towards I set up a jig to help me keep control. I found my center, defined the point, and am using a line to join points along the corners.

- Constructing the building
- Constructing the drawing I want is lost in the computer.
Today the brick saw sliced through my being with ease and precision. I wondered why I hadn't rented this thing on Day 1 and cut all my corner bricks. It might have been better and faster, but, as Emerson says, with every advance in technology some old habit is lost.

I was glad to have listened to the chisel and learned its nature, although I never really got that good at it. The saw is faster and more precise, but its loud and dusty and not monkey can do learn to do it. The chisel puts the human back into cutting brick, because some people are better than others. I speak about the human not really resolving the conflict, however — I would rather cut my bricks with the saw now. 
Sp. I begin the dome. It is much the same. I am marveled that I ever even got to this point—
and I'm still level and square and plumb by courses complete. Now the fun part. All this
work just to build a dome. The Y is mortared
now but I think will get easier with use.
I'm taking a break between mixes, but I
haven't been this excited about building since
this arch. The curving stops back to building!

6-30 PM. The dome being flawlessly executed.
I wonder what the old builders would think about what I'm doing in this. One thing they probably do use me — how you going to keep the bricks from sliding. Or maybe they wouldn't. Maybe they knew the mortar's secret. I'll say one thing. The current guardian of beautiful building in brick, the BIA, is clueless. Brick as veneer, brick as surface. It's so much more. Why aren't architects really building with brick? They'll all tell you — too expensive. I don't buy it. There's a way. Modern masons need a little higher level of regard for their materials. Bricks are beautiful. I want to see someone making beautiful buildings with brick.
May 24th

I’m finished.
“To the maker of a thing, particularly if in addition to making the artifact, he has also made the material out of which he constructs the thing; and, in addition, has invented the rules in accordance with which he made it, nothing can in principle be opaque.”

-Isiah Berlin, from the introduction to *De Antiquissima*, by Giambattista Vico
“The preamble of thought, the transition through which it passes from the unconscious to the conscious, is action.”

*Reflections*

—Emerson
Completing something is always an extraordinary event. I believe the two most difficult times in any project is beginning it and finishing it. We can think all day about starting it, all the while eager with anticipation, but that point of beginning, of commitment to see it to the finish, always gives moment for pause. Likewise, we can work hard towards its finish, staying alive through the rainy days by the prospect of seeing it completed, but having the privilege to say with pride and certainty—"I’m finished"—is indeed a rare and beautiful moment.
Completion allows for the benefit of comfortable reflection. It is the maker's greatest privilege to survey his work and consider what is good about it and what might be better. The precursor for this occasion is action, the tool by which the maker learns. The sawdust clears; the site is cleaned; the drawing is pinned up—these are the times which are the lifeblood of the maker. It's finished. Let's look at it. How can the next one be better.

Probably there is a proportional relationship between how much work one puts into a task and what one learns in return. During construction I moved close to thirty tons of material; eleven tons of sand for the mortar and about nineteen tons of brick. There are about 8000 brick in the tower, every one of which I touched at least twice—once to move it, and once to place it. During this time, all of about fifteen weeks of daily attendance, I came to know a few things about architecture and about myself.
I wrote early during the project that I found the current way of practicing architecture fundamentally flawed, that the work may only suffer as a result of separating the designer and the builder. Imagine for a minute composing a photograph or painting without the benefit of actually engaging in the work. Imagine having a photographer who does not do his own printing, or a painter who does not do his own painting. Yet this is how we practice architecture. I wanted to know what is gained or lost in this process, and I began the project with a pretty good idea that there was much lost and little gained. Only the maker may fully engage the work in a true dialogue of discovery; only the maker can come to fully come to know the work; only the maker can demand perfection.
Having the privilege of reflection, however, I can say with some certainty that there is truth to how architecture is produced. Interestingly for me, I found there is often a conflict of interest when the designer and builder are the same person. A certain luxury exists when the designer may engage construction disinterestedly, because what is good for the work at that moment is not often in the best interest of the builder. As I worked I made mistakes: mistakes in following the drawings and mistakes in craftsmanship. Sometimes I would correct them; sometimes I would not. Had I let the designer in me take over the project, I would have corrected every mistake and demanded perfection. Death for the builder though is ripping up already completed work. I’m tired so it’s good enough. I want to see it finished so I cut corners.
Every architect draws energy from the designer and the builder at different levels. I must learn to temper my desire to build with my commitment to this building's design. Consider it more. Draw it more. Study it more. There are countless occasions in the completed building where had I just spent more time considering the possibilities, it might have been better. But it was time to build, and the energy I could summon to begin building vastly outweighed my desire to sit at the desk. Action is both the virtue and the fallacy of the builder. Sometimes it is better to think about it.

Perhaps I reflect on this because I am merely a novice maker. Perhaps what we all strive for as makers is the ability to overcome the shortcomings of both the designer and the builder. The ideal maker balances thinking and acting. He pushes the craft but remembers its limits; he struggles, in a world where resistance to change is often incredibly powerful, to find more beautiful ways to build.
Converting how we draw into terms of how we build re-establishes the connection between the designer and builder. The parallel bar is the level line; the triangle is the plumb line. While building I constantly found solace using the virtues of descriptive geometry. These constructive techniques, even in their crudest form, are vastly more effective than the most accurate measurement. The tape measure is sure death; stretch the string line instead.
Building beautifully is critically linked, I believe, with the process of design. In these modern days our building environment has, for the most part, been conquered; meaning, with enough money, just about anything can be built, just about anywhere. We must, however, resist this temptation and always remember the builder. Let the maker leave his mark; let the architecture leave a record of how it was made.

“We are always in these days endeavoring to separate the two; we want one man to be always thinking, and another to be always working, and we call one a gentleman, and the other an operative; whereas the workman ought often to be thinking, and the thinker often to be working; and both should be gentlemen, in the best sense.”

--John Ruskin
photographic notes

“Things more excellent than every image, are expressed through images.” -- Jamblichus

All photographs taken and printed by the author, except where noted.

Plate 1: excavation

The breaking of earth is the first act of construction. This incredibly disruptive activity initially pained me, since it seemed nothing I could build here could ever be more beautiful than this site left alone.

Plate 2: tools

Like the tools of the draughtsman, the tools of the mason are remarkably simple.

Plate 3: the bucket

Often a moment of pause strikes me during the shuffling of construction implements. The mortar bucket carried all of about 13 tons of material. Five gallons at a time.

Plate 4: laying brick

A seemingly cluttered building site clouds the inherent order during the act of construction.

Plate 5: arching

The freshly constructed arch springs from the walls gracefully. I am continually amazed at the beauty of making small pieces span openings.

Plate 6: string line

The mason worships the level line.

Plate 7: hammer

In the hands of a layman, it wields clumsily. The mason, however, breaks bricks with precision and speed.

Plate 8: light wash

Conditions in place during construction often created extraordinary moments. In this case, the working platform shades below it, allowing us to see the sun to perform its magic.
Plate 9: corner against the sky

The corner is the pinnacle moment of any masonry construction. It is the most disruptive, yet also the most beautiful.

Plates 10 and 11: working (negatives taken by Alan Dodson; printed by the author)

The movement of the trained hand makes elegant lines.

Plates 12 and 13: the dome (negatives taken by Timothy Hart; printed by the author)

I could make graceful sketches on film using the movement of the dome jig.

Plate 14: working space

Working space became exceedingly smaller after each course of the dome.

Plate 15: execution

The dome being flawlessly and beautifully executed.

Plate 16: closure

Light falls on my corner transition during the construction of the dome. One can observe the shadow from the radius pole, as well as the unfinished course on its way to being closed.

Plates 17, 18, and 19: completion
selected readings


Vita

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Born: January 22, 1976
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Indiana University, 1994-98
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