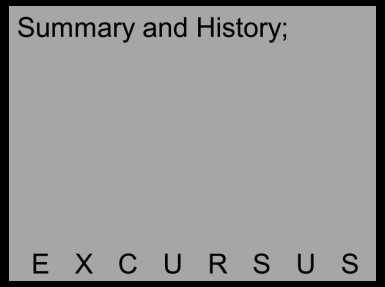
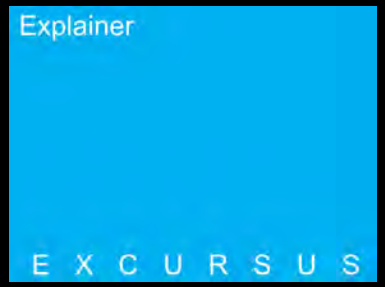
Value Office ™

Lecture Keynotes



At the beginning of each deck, as brief overview or abstract along with a brief history of its origin date, first presentation or generation

Mid deck summaries of the main points for clarity & flow



Mid deck enhanced explanation of the details behind the main points for clarity and flow

E X C U R S U S

Summary and History;

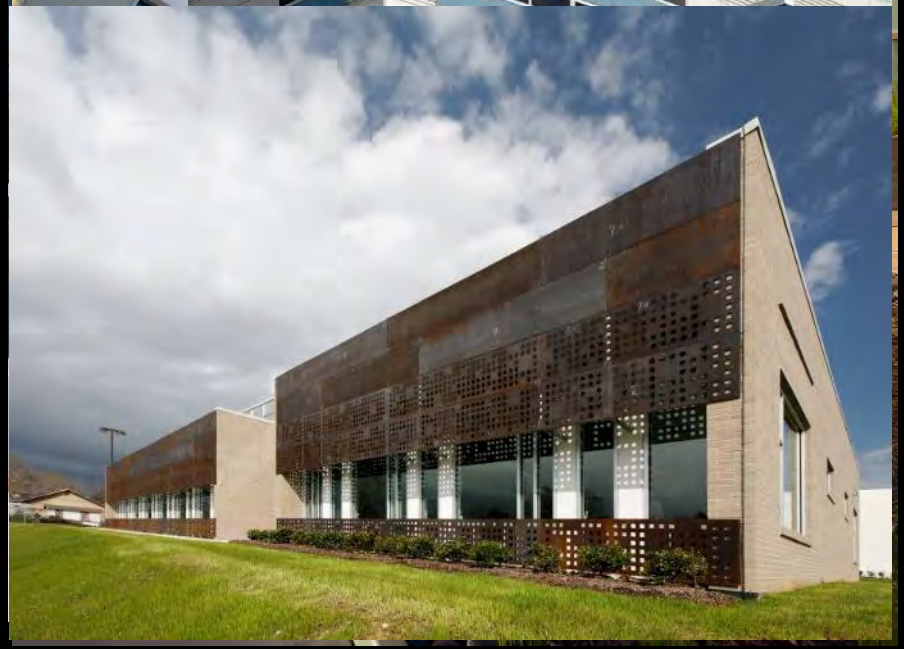
Value Office is a term we've coined for the conversion of a typical conventionally constructed (that is steel or concrete framed perimeter column non-load-bearing wall construction) market office building to tilt wall technology. The original task, one of commodifying the building method through a building type, was an uphill struggle at first. We had to prove to commercial developers that utilization of a low-cost construction technology to build an investment grade office building could compete with the definition of Class A in the market place. The aesthetic flexibility of tilt wall combined with its ability to improve upon the characteristics of typical offices ultimately won a niche for Value Office in numerous national market regions. It improved upon the conventional product as it has no perimeter columns making it more efficient to plan, due to wall strength accepts any exterior cladding material and offers column free all glazed corners to name a few of its ultimately appealing attributes to developers. Most significantly and importantly when combined with the above advantages, it averages $7-$10 per square foot less expensive for the exact project built conventionally in most suburban markets.

E X C U R S U S

Summary and History;

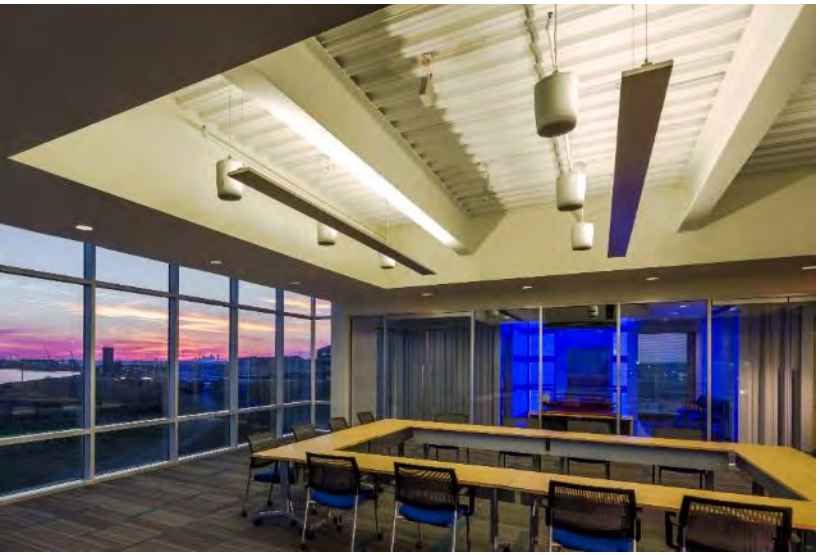
This is no subtlety; it represents a grass roots insurgency on the part of low-cost technology fueled by historic economic forces. It occurs in a space that many architects have occupied – developer work, investment grade commodity architecture – but as contractors and developers have been more open minded regarding adaptations like tilt wall into “high-end product” it inadvertently threatens to leave that area of architectural practice behind if ignored. Our effort has been to engage the economic metrics head on in order to control the possibility of an aesthetic potential in this building type that makes up so much of the everyday suburban landscape

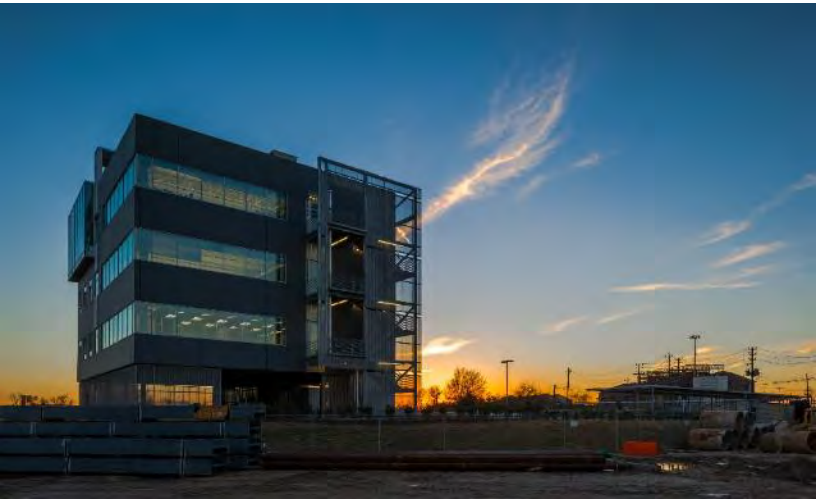
E X C U R S U S



"….In reviewing and studying the works and intentional practice of **Powers Brown Architecture**, an old saying came to mind; *"architecture does not have to be for special occasions".* Powers Brown knows this and has built a practice working in realms that are most often avoided…….In some ways Powers Brown is pioneering a hybrid of critical and commercial practice, striking a balance between the two. It is a young growing firm, moving forward without the prejudice and predetermination that often narrows the field of operation. I expect Joe Powers, Jeffrey Brown and their team will set an example others will eventually follow."

-Michael Rotondi
in preface to NeoArchitecture





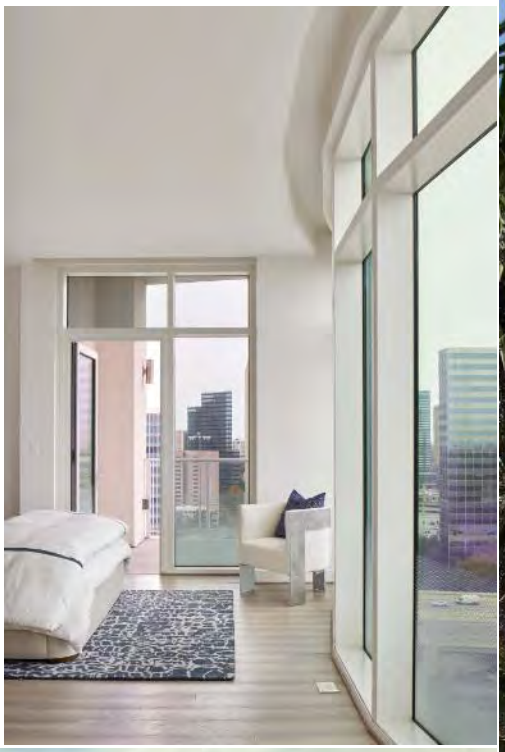
ADVANCE POLYBAG, INC.

ROY KELLY MULTIMODAL TERMINAL

GALVESTON TRANSIT CENTER


METRO
1
2
3
4
5

Arabella Condominium



Thompson Hotel /Condo

DOWNTOWN San Antonio

17-STORY hospitality TOWER

Washington & Jefferson University

Addition / Renovation of Student Rec Center

Location *Washington PA* Cost *$20million*
Area *Rec=27,375 Reno=121,205*
Completion *Fall 2017*

Westchase Long Range Plan

sustainable parcel development

Location *Houston, TX*
Area 4.3 squre miles

Explainer

Research has, in the last ten years, been recovered as territory for architects. The upstream large practices all have institutionalized research initiatives to one degree or another, as do we.

Our effort is organized under the concept of an “Excursus”.

One of the many areas of our research and innovation foci which include Resiliency, and Practice itself is construction technology.

Tilt wall construction has been an area of innovation and development for us since our inception. Even as it continues to be balanced by many other construction types we utilize.

E X C U R S U S

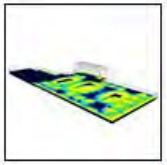
EXCURSUS

excursus
noun [C] formal
US /ɪkˈskɝː.səs/ UK /ɪkˈskɜː.səs/

An excursus is a detailed discussion or explanation of a subject, which is separate from the main subject that is being written or talked about. In our case it is separate from what is being drawn. it is the discursive exploration behind our design work, our innovation and our otherwise presentational explorations. **Writing about design and writing as an act of design constitute our version of architectural research.** Excursus is where all the things we didn't draw or build are explored. Its where the things we did draw and build get analyzed, extended and expanded. Its where the things that cannot yet be designed or built come to life for us. Making architecture for us is a form of conjectures and refutations and we haven't limited our work and contributions to just what we design. The work collected here is a living body of speculations, observations and musings. Some of the writing here covers our technical innovations and the process behind them. Others deal with our commitment to expanding the surface area of architectural practice trough procedures and processes. And some circumscribe what it is we think we are doing differently in our work, where we think we innovated. Presented as articles, lectures, white papers and abstracts we actively collect and organize as well as prompt and challenge our ideas...***Excursus***.

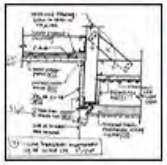
DESIGN

There was an era in architectural education when "design research" was simply doing a building. The advent of design theory in the late sixties' early seventies as a defined and standalone disciple within architecture in turn gave rise to the resurgence of design research inside the discipline of practice.



ENVIRONMENT

Inseparable are the pursuit of human potential, environmental sustainability, and design in the built environment. Powers Brown Architecture endeavors to inform our practice through material research, tool development, services, and programs. We are dedicated to excellence in the financial, human, and environmental success of our projects and our role as citizen architects.



PRACTICE

At Powers Brown Architecture, we strive to be an industry leader in the practice of architecture, and we recognize that practice does not stop with award-winning design – that is just the beginning. The architecture industry has evolved over the past decades – where architects were once the singular agent of design execution, now architects also act as coordinators of a complex matrix of engineers, consultants, trade experts and builders.

Excursus ™

powers brown architecture

In the Tiltwall section of our research we have had numerous milestones…..

- SSB ™
- Largest building- Tilt Wall & 2016
- Tiltwallism- we wrote the book on it
- Tallest panel
- Product Development
- Six story Load bearing Building
- Value Office ™
- Blast / Progressive Collapse

Small Smart Boxes ™

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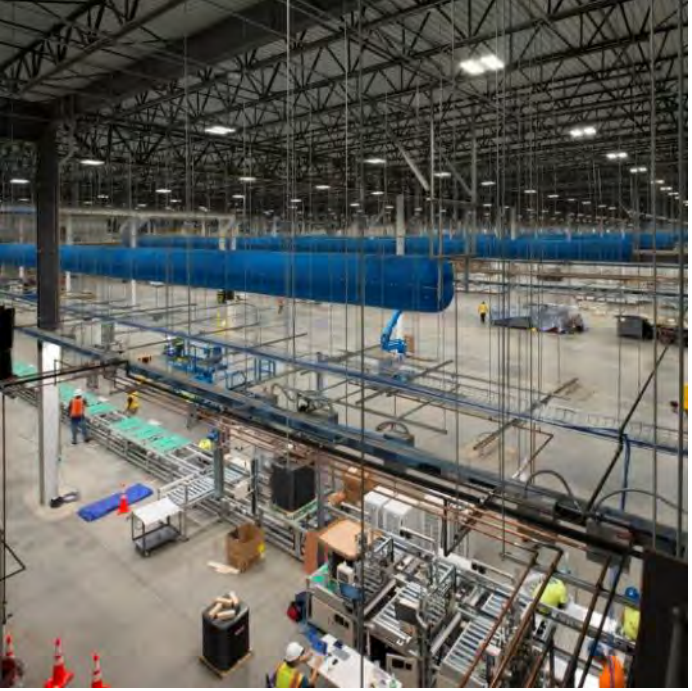
Worlds Largest tilt wall building

4.26 million Square feet

DAIKIN
TX TECHNOLOGY PARK



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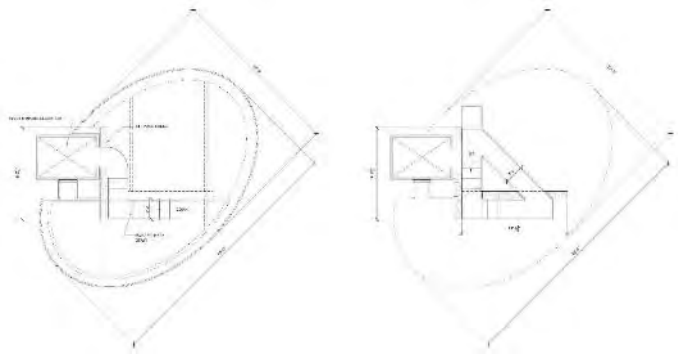
Worlds Tallest Tilt Wall Panel

113’ feet



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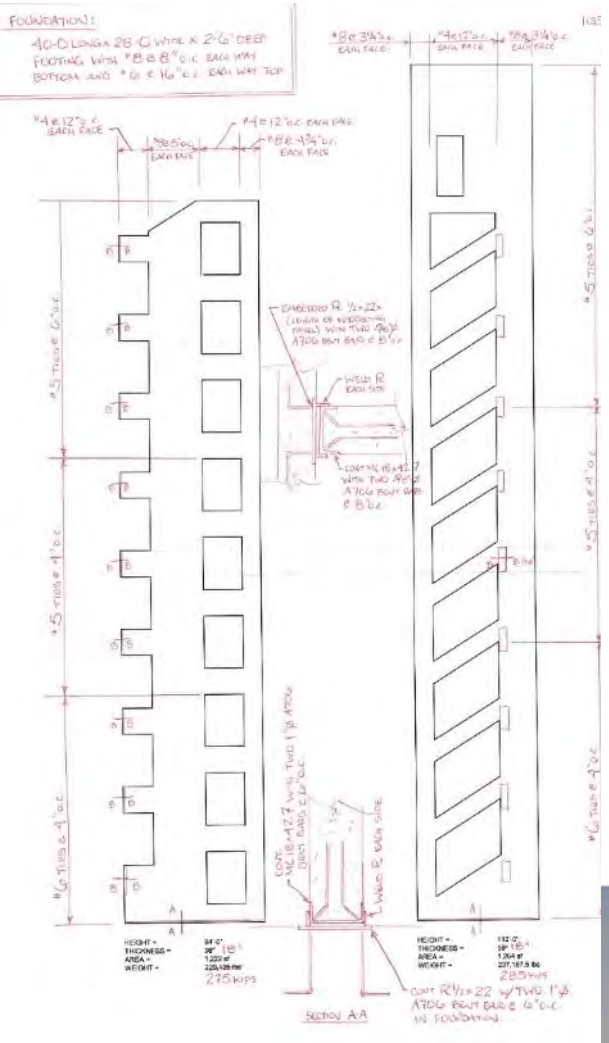
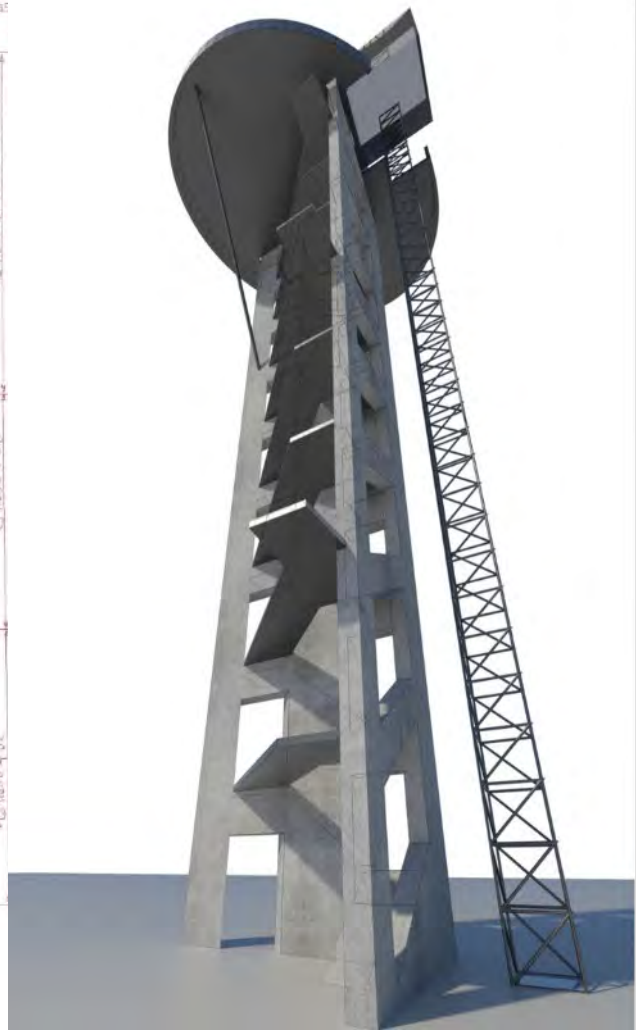
OBSERVATION TOWER:
GENERATION PARK
OBSERVATION TOWER





Worlds First Six story
load bearing
tilt wall building

Sierra Pines II

This research was recently published in

The Construction Specifier, August 2019

.

Worlds first DoD level 4 Blast and Blast resistant / progressive Collapse building

This research was recently published in

The Construction Specifier, August 2011

Protective Design Center (PDC)
Army's center of expertise for engineering services related to force protection and protection design

Lead developer and resources of Security Related UFC Documents

To date, the Progressive Design Council (PDC) has taken no objection to the research.

Tiltwallism-
we literally
wrote the book
on the subject….

Tiltwallism: Potential of Tilt Wall Hardcover – September 1, 2014

by Jeffrey Brown (Author)

Be the first to review this item

Look inside

Flip to back



See all 3 images

See all formats and editions

Hardcover
$41.85

8 Used from $36.57
16 New from $31.81

An introductory resource to architects and an inspiration to contractors, developers and structural consultants who have encountered Tilt Wall construction. Brown provides a full synthetic treatment of Tilt Wall construction, explaining its history, methodology, and relationship to the current architectural approaches to meaning. Inclusion of practical reference and resource sections in the book will appeal to a cross-disciplinary audience.

See the Best Books of the Month
Want to know our Editors' picks for the best books of the month? Browse Best Books of the Month, featuring our favorite new books in more than a dozen categories.

Explainer

As part of this effort we began to see a commodity like product evolve out of our early industrial work and our Office building expertise.

We were doing, in two different studios, two different building types that began to merge through the construction technology of tilt wall.

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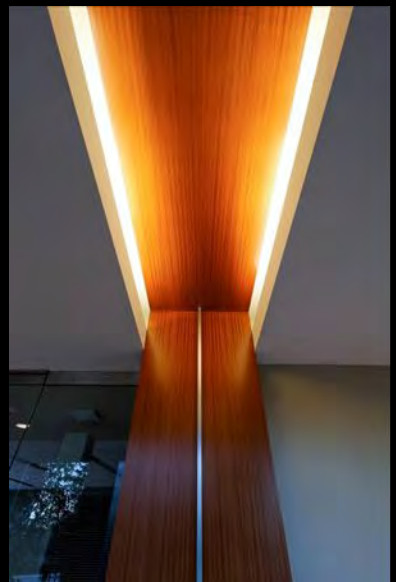
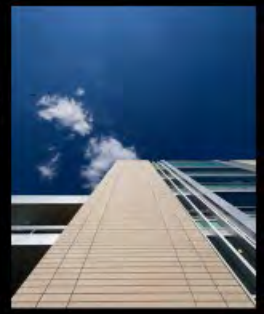
How did we get to the idea of Value Office?
It starts with our expertise as Office building designers in the traditional sense…from masterplans to build to suit & Government agencies



Seismic Exchange

5-story Class A Corporate Headquarters

Location *Houston, TX*
Area 73,000 *sf*
Cost *$23 million*
Completion *May 2009*



outFORMative *inFORMative*

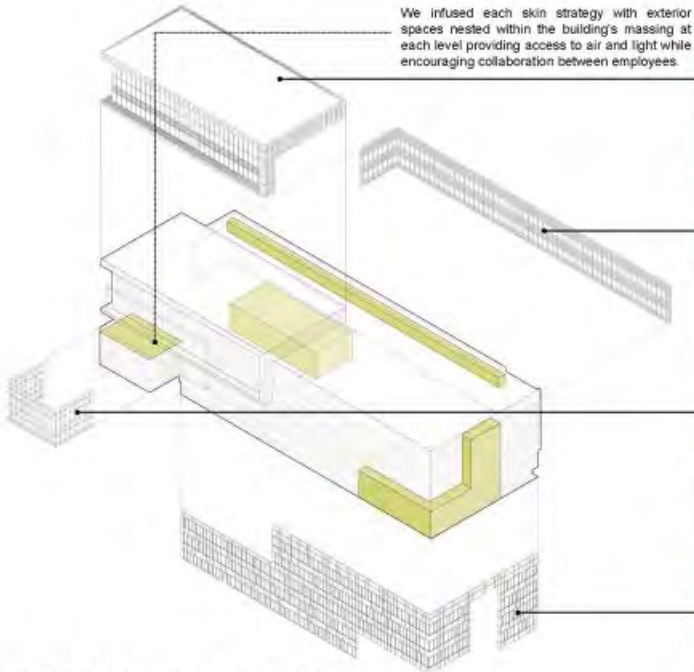
– an outside-in process of place-making utilizing the building façade to inform future, unknown, programming for office spaces within.

Franks International is a 5-level corporate headquarters for a global oil services company based in Lafayette, LA. Our task was to create a core and shell condition with the anticipation of an interior design intent to be provided by the client at a later date. Thus, the challenge we had was creating specificity for the company controlling only a part of the variables.

VIEW OF NORTHWEST CORNER WITH GLASS BOX GALLERY

So we proposed an outside-in process. By strategizing the façade with architectural hierarchies and interstitial spaces that blurred the boundaries between interior and exterior, we were able to inform the unknown future of the building's interior.

VIEW TOWARDS PUBLIC ENTRANCE



We infused each skin strategy with exterior spaces nested within the building's massing at each level providing access to air and light while encouraging collaboration between employees.

CONFERENCE CENTER

SALES & MARKETING - FACING OUTWARD

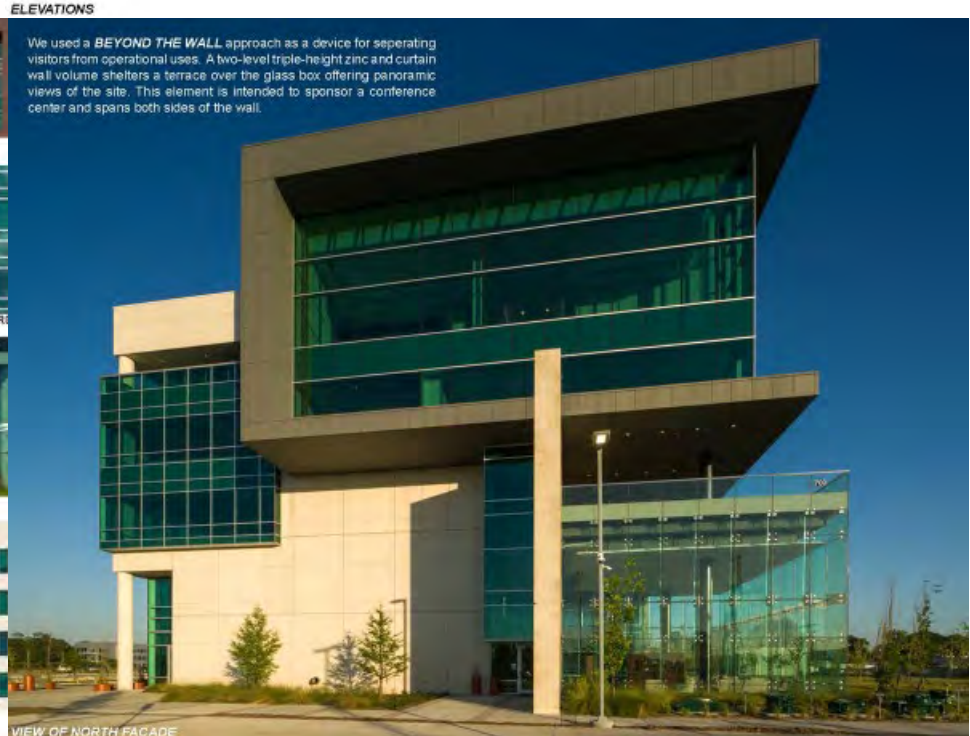
GLASS BOX GALLERY - PUBLIC

ADMINISTRATIVE - FACING INWARD

AXONOMETRIC DIAGRAM - MASSING AND SKIN STRATEGY

ELEVATIONS

We used a ***BEYOND THE WALL*** approach as a device for seperating visitors from operational uses. A two-level triple-height zinc and curtain wall volume shelters a terrace over the glass box offering panoramic views of the site. This element is intended to sponsor a conference center and spans both sides of the wall.



VIEW OF NORTH FACADE


HOTEL AGGIELAND

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ecture

We had completed numerous manufacturing facilities with 50-100k of office requirements, which we laid out like commercial office buildings for cost efficiency

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But built out of Tilt Wall as that was the construction technology the manufacturing plant was built from


VISITORS

A tilt-up construction project begins with job site preparation and pouring the slab. During this phase of the project, workers install footings around the slab in preparation for the panels.

The crew then assembles the panel forms on the slab. Normally, the form is created with wooden pieces that are joined together.

A crane **TILTS UP** the panel from the slab into a vertical position above the footings. Workers help to guide the concrete panel into position and the crane sets it into place.

Month: 1 2 3 4 5 6 7 8

The forms act like a mold for the cement panels.

REPEAT…

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corporate office experience

+

=

VALUE OFFICE PRODUCT

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tilt wall expertise

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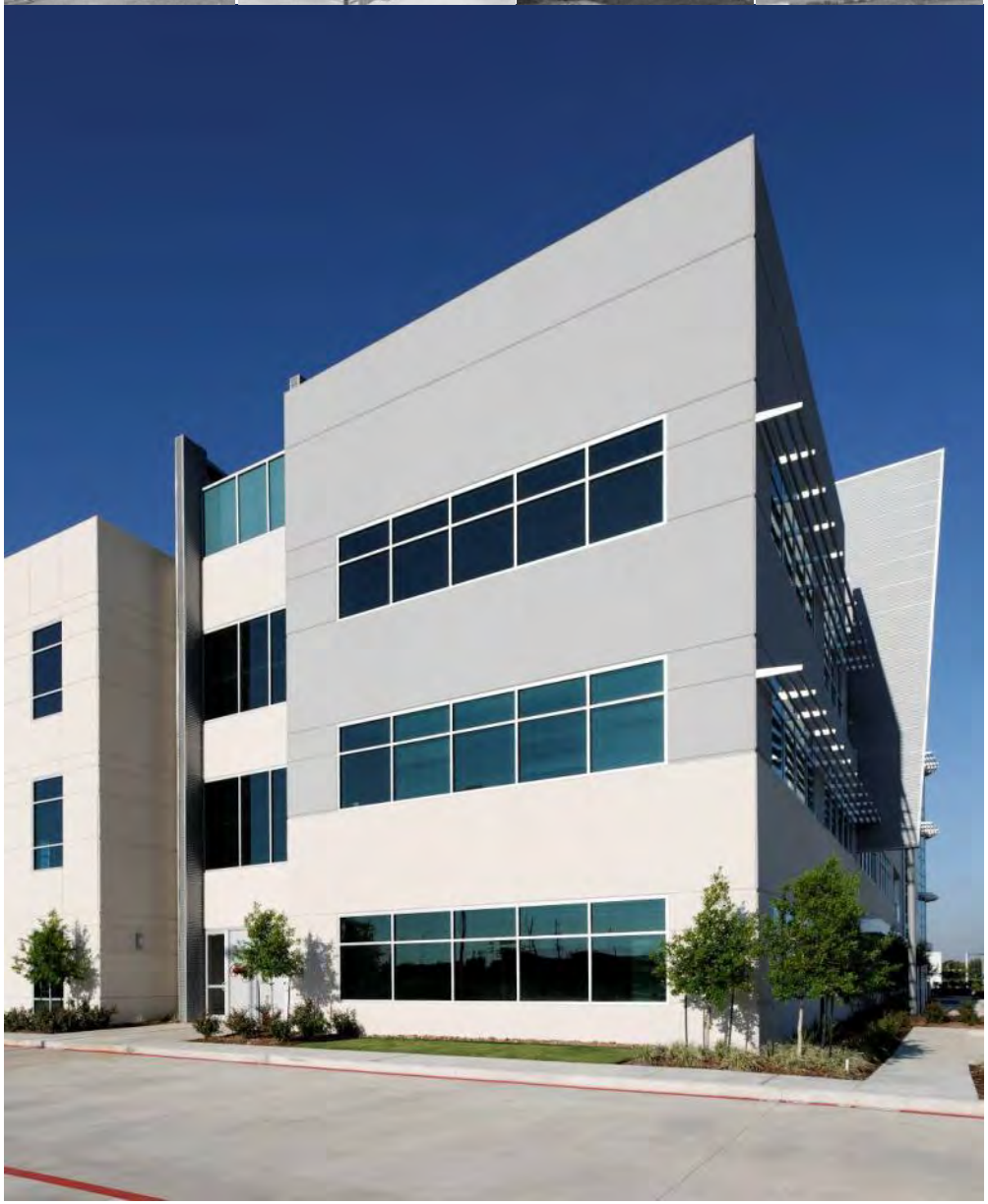
How did we begin to define it in the market place?

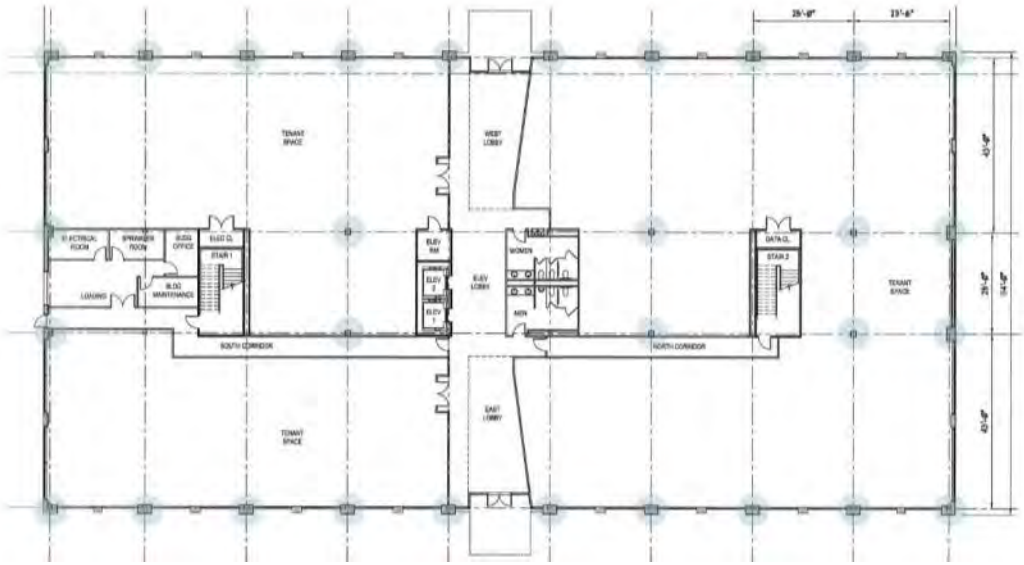


Value Office = ***Suburban*** Class A

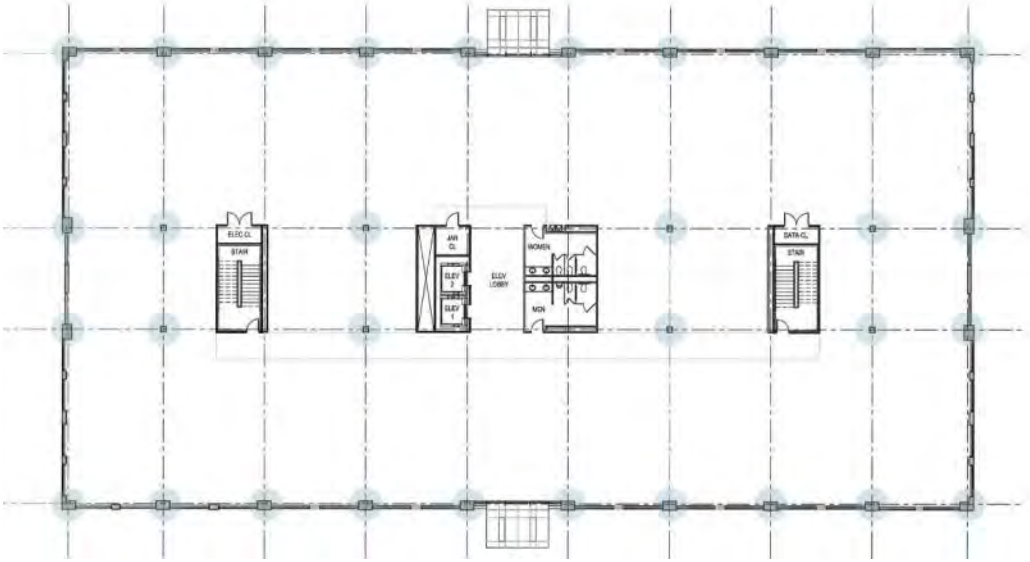
Advantages to **tilt wall** construction include

- **cost**
- **time**
- **finish**
- **experienced contractors available in most markets**

To best illustrate the benefits of tilt wall construction, a case study was completed based on a **typical office footprint of 25,300 sf** utilizing either conventional or tilt wall construction…



ground floor plan



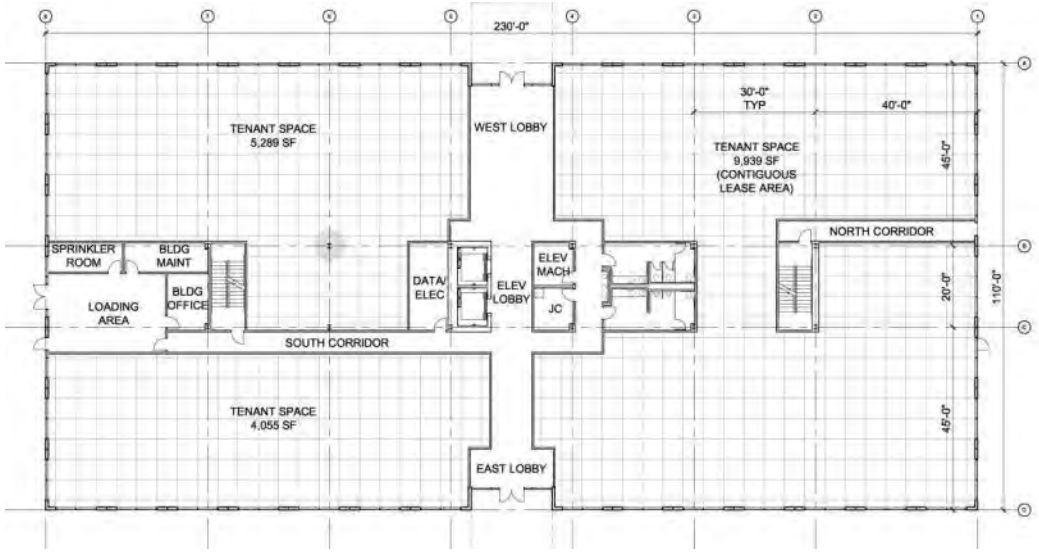
typical floor plan

Conventional Construction

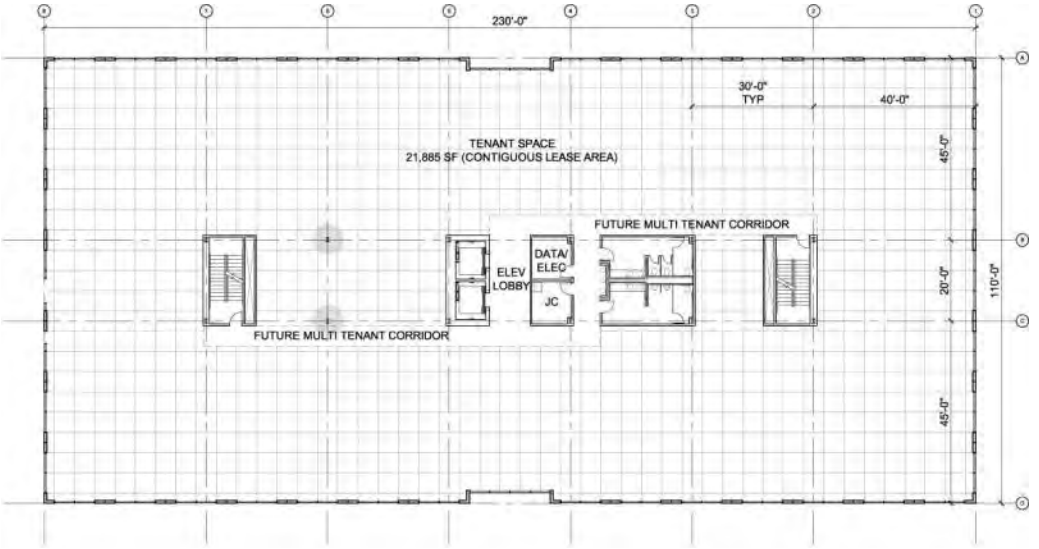
A typical office product based on a 25,300 sf floor plate and constructed conventionally has…

perimeter columns
columns in lease areas
43’-0” deep lease area along perimeter
total columns used = 40

Based on a preliminary pricing exercise completed in May 2007, this floor plate constructed at 4 stories would **cost approximately $10.9 million.**



ground floor plan



typical floor plan

Tilt Wall Construction

By comparison, the same 25,300 sf floor plate built utilizing tilt wall construction has…

no columns at the building's perimeter
5' leasing grid
45'-0" column free lease space along perimeter
centrally located data/electrical rooms
total columns used = 12

Based on a preliminary pricing exercise, this floor plate constructed at 4 stories would **cost approximately $8.8 million…**

- **a savings of $2.1 million over conventional construction.**
- **a savings of 10% in steel tonnage**

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The following is an analysis which isolates the building shell components in order to give a cost of work delta between the two systems. This is based on similar 4 story office building shells. Remember this is only a high level analysis indicative of systems that are substantially different between the two construction methods with all other factors remaining the same.

Division	Steel & Precast	Tilt Wall
Concrete	$9.45	$17.00
This is the cost of precast panels vs the cost of tiltwall panels		
Steel	$30.00	$13.58
This is the reduction of structural steel required at the perimeter of the building		
Sealants	$0.54	$0.36
This is the difference in quantity of panel joints to be sealed		
Subtotal	$39.99	$30.94

As you can see a $9.05/sf delta savings by going with an economical tiltwall system has a large impact on overall project costs. ($724,000 on an 80,000sf building shell)

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Clients asked, Will design innovation suffer at the proposition of less costly methods of building?

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This is what everyone is afraid of…

Actually, tilt wall construction's capacity to instigate and sustain investigation of transformative modalities marks its difference in potential from competing value oriented building technologies. **Balancing high design and technical innovation with form driven construction is unique to tilt wall.**

The big idea here is;

We had formulated a way to make a market based investment grade office building cheaper but equal to a conventionally constructed building on a warm lit shell and core basis.
We didn't use any tricks- we don't make;

- The Lobby
- The MEP systems
- The Finishes
- The internal framing or structure
- The amount of Glass or
- The Overall Quality

of any aspect of the Value Office proposition. It is simply lighter in overall steel weight as there are no perimeter columns yet stronger as the walls are load bearing, requires far less joints and is 6-8 weeks faster thus lowering contractor fees and general conditions.

So simple. So revolutionary.

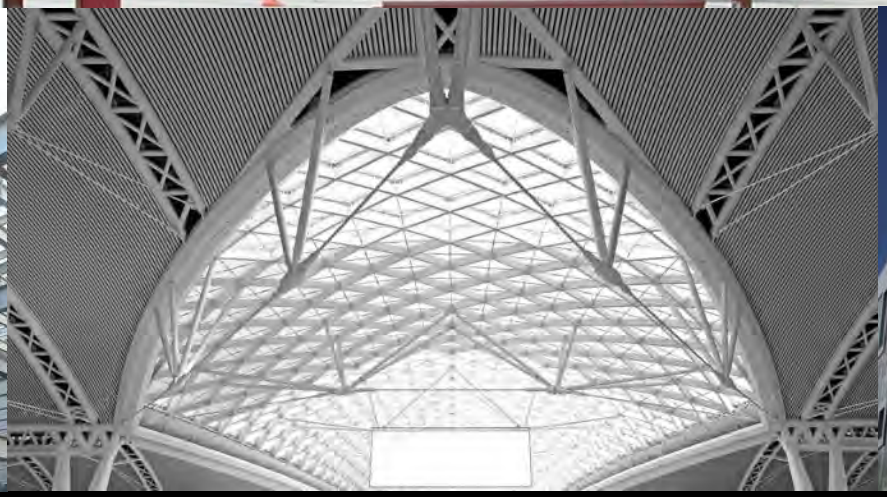
E X C U R S U S

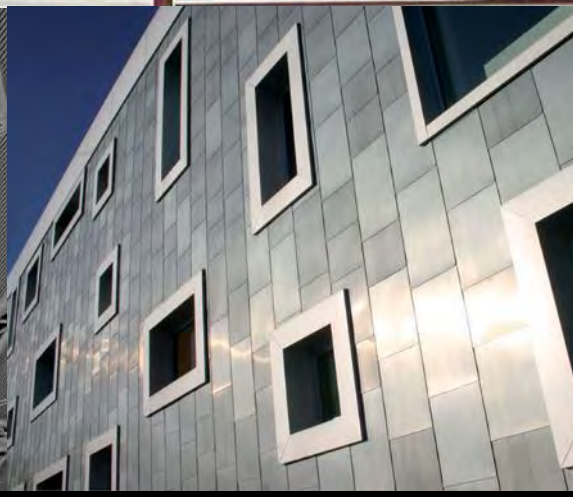
1. Tilt Wall is the ONLY system of building contrived primarily to produce value AND in which aesthetic choices incur no penalty.

2. Office Buildings and Warehouses are undoubtedly treated as commodities by the developer market- they require high design at a low cost.

1. Tilt Wall simultaneously acts as a creative vehicle increasing the commodity value.

Cast in Place concrete does not even have an economical application…..





Steel framing does have an economical application, but it dilutes quality of design

Wood, when used structurally is either too small for commercial or far too expensive…

Tilt wall construction is the only system of construction designed to increase VALUE by lowering construction cost with no limitation on design potential.

Tilt wall construction is the Technology- but we also had to understand the office market and its ecology……

Explainer

Here we transition from the technology of tilt wall to the DNA of an office building.

Subsequent slides talk about the breakdown of the basic office product and illustrate there is neither a difference in conventional offices and tilt wall office nor is there an aesthetic design limitation to the titlwall approach itself

E X C U R S U S

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The perception is that Class A “is what it is” and therefore it has no RANGE. Value Office on the other hand DOES have range so we developed a …….. Rating System.

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VALUE **OFFICE**
Rating System

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archit
ecture

Exterior *finishes*

painted
different textures can be created by paint alone

reveals
relatively inexpensive way to articulate panels

formliner
relatively inexpensive way to texturize panels

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Exterior

painted

punched openings

stacked storefront entry

minimal landscape

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Interior

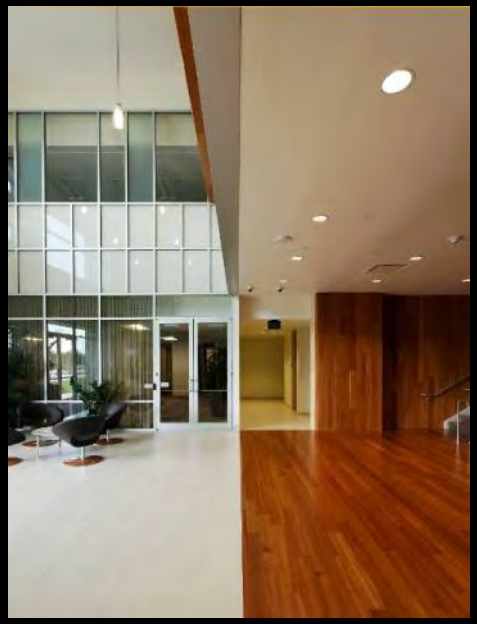
laminate

painted gypsum board

storefront tenant entry

tile goods everywhere

Beltway Corporate Center Phase III



DET Norske Veritas

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Exterior

- upgraded exterior finishes
- curtain wall at entry
  elaborate entry
- upgraded landscape

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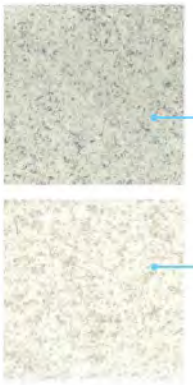

Exterior *finishes*

- textured / speckled paint finishes
  mimics natural stone finish

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Exterior

- curtain wall look on body of building
  glass over tilt wall

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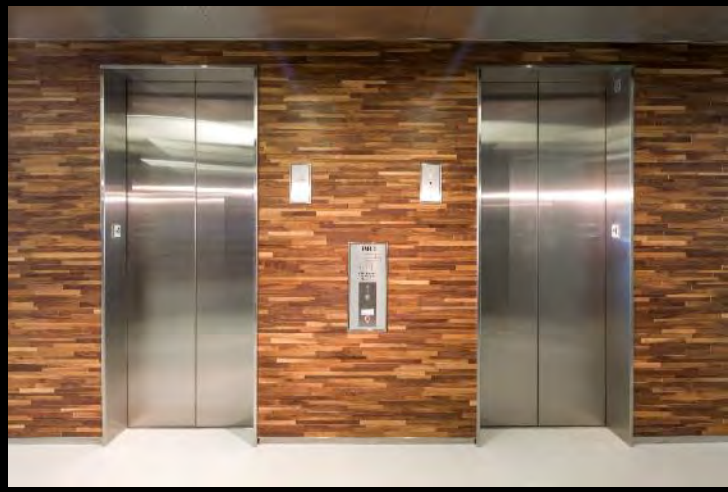
Interior

- upgraded ceiling treatment
- wood veneer
- monument stair
- combination of tile and slab goods and carpet

Sam Houston Crossing – Bldg. 100



DOW Lake Jackson OB

Sentry Gateway

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Exterior

- higher percentage of curtain wall
- natural finish over tilt wall or simulated precast finishes *sand blasted, acid wash…*
- multi-layered skin
- landscape feature areas

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ecture

Exterior *finishes*

- brick

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archit
ecture

Exterior *finishes*

- over pour *precast look*
- bush hammered *precast look*

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Interior

- more elaborate lighting
- slab goods on walls
- multiple slab goods

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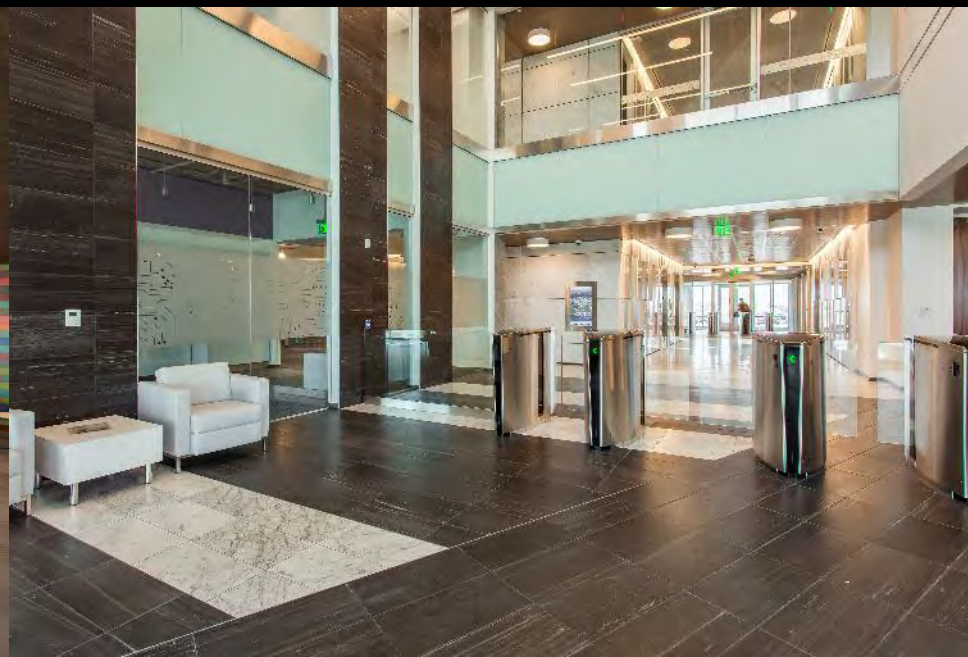
Innova 1&2

5-story Value Office

Area *240,000 sf*
Cost *23,815,000*
Completion *April 2016*



powers
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ecture

What makes Value Office the equivalent of Class A is the DNA it is built on. Said differently- the DNA of conventional office buildings and Value Office is EXACTLY the same.

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DNA Anatomy

structural grid

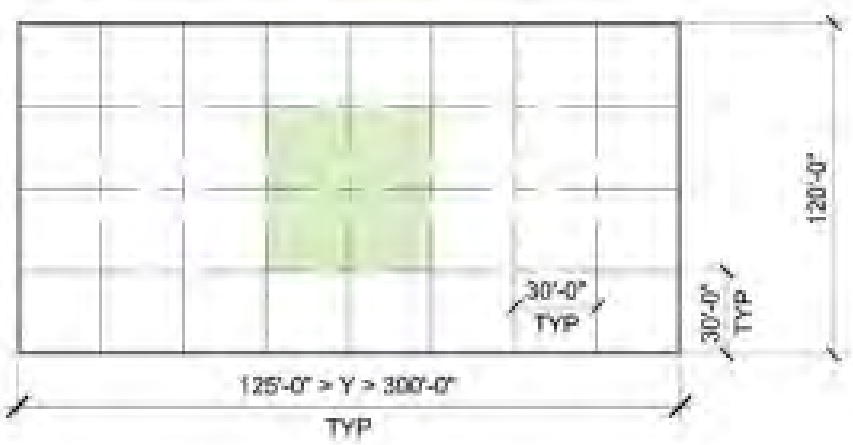
structural strategy

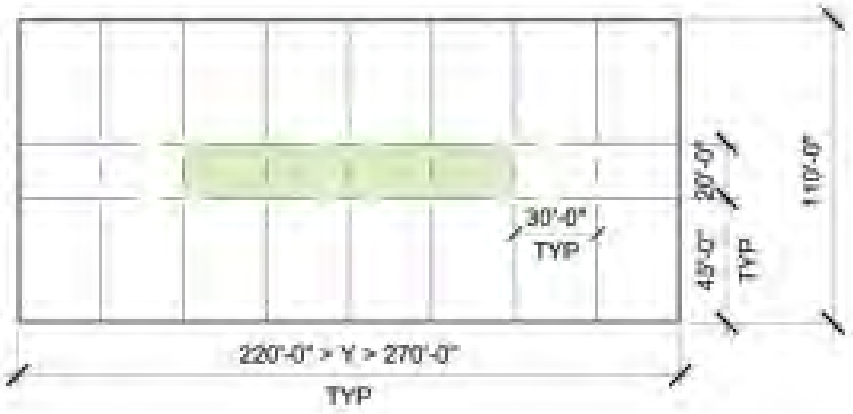
floor plate / core

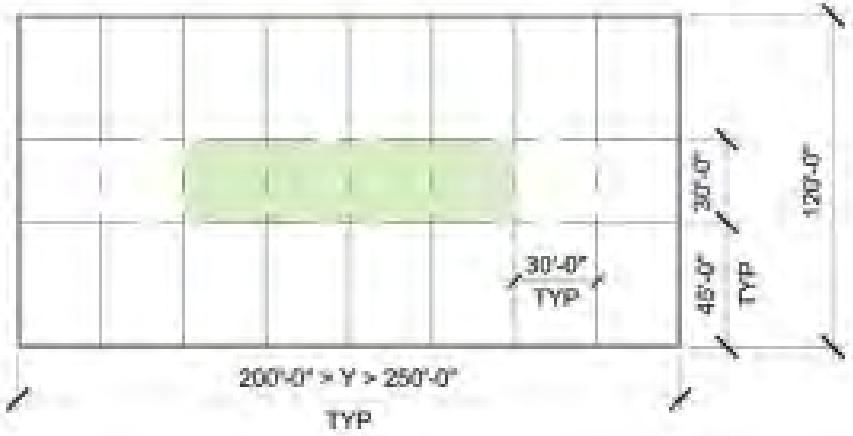
travel distance

BOMA calculations

powers brown architecture







structural grid

pods

120 30/30/30/30

110 45/20/45

100 45/30/45

Explainer

This next series describes the glass line possibilities of load bearing walls and the floor plate typology common to Office and Value Office.

E X C U R S U S

powers
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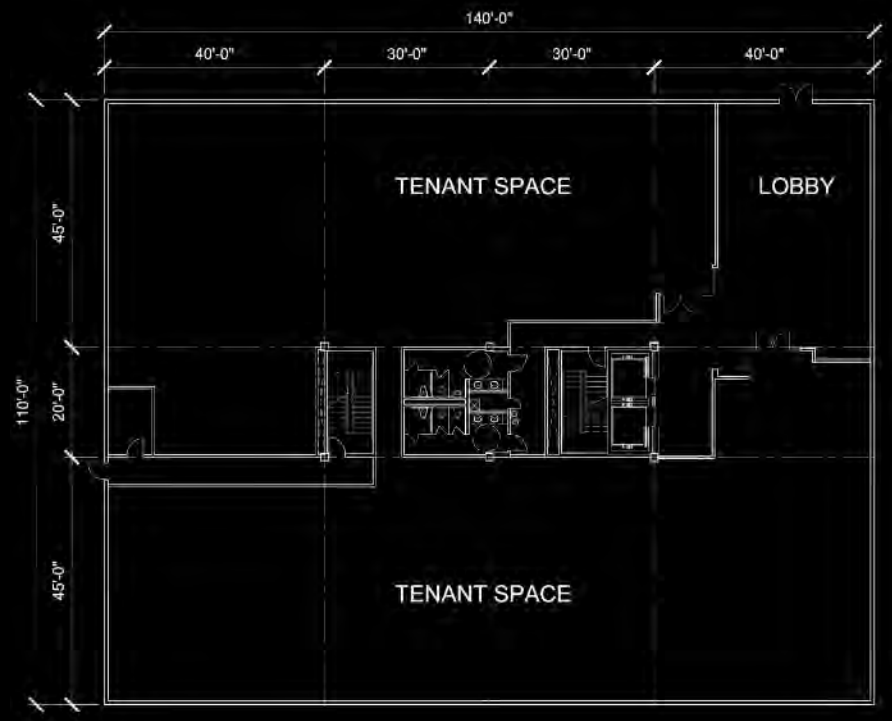
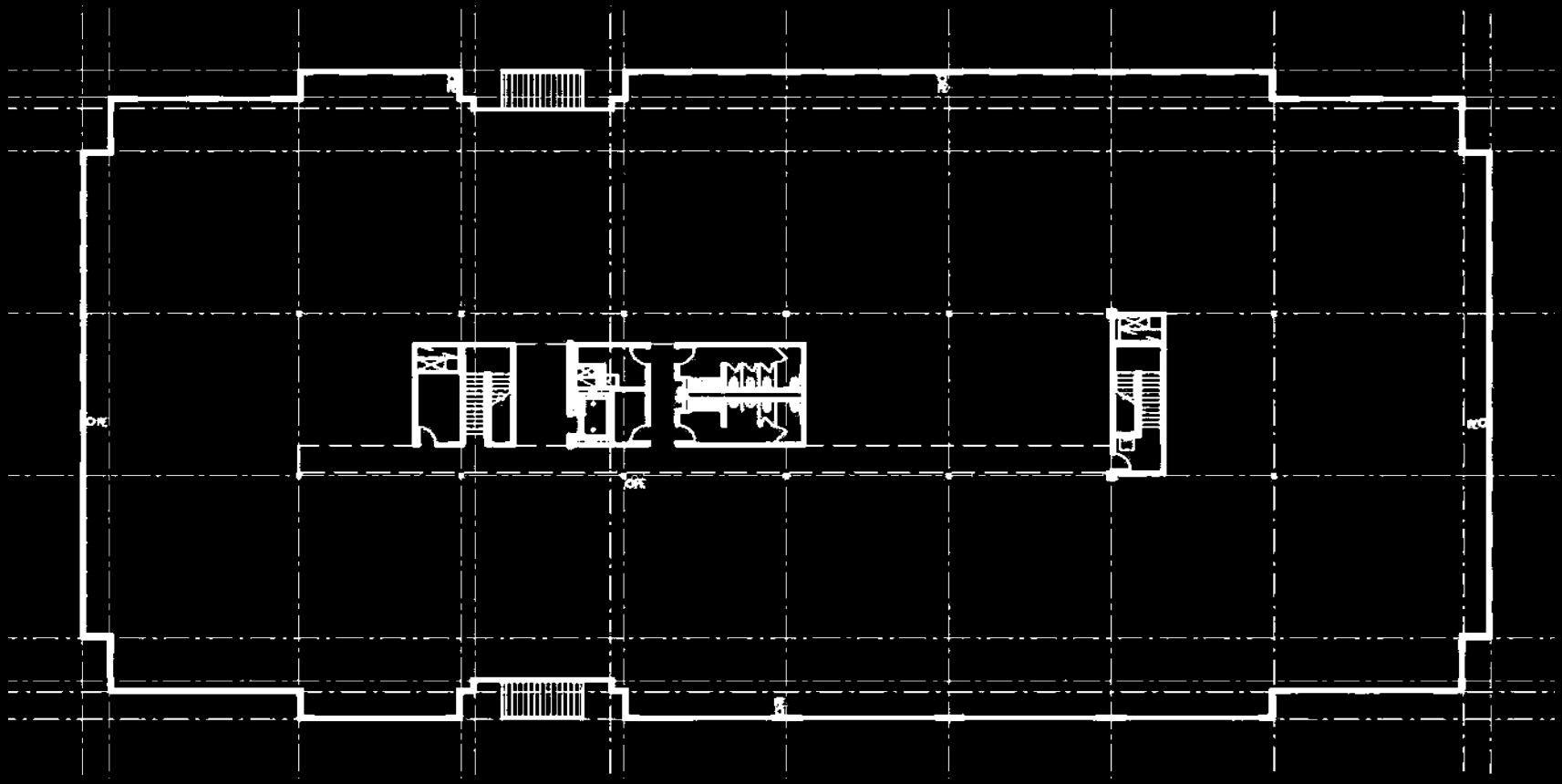
architecture



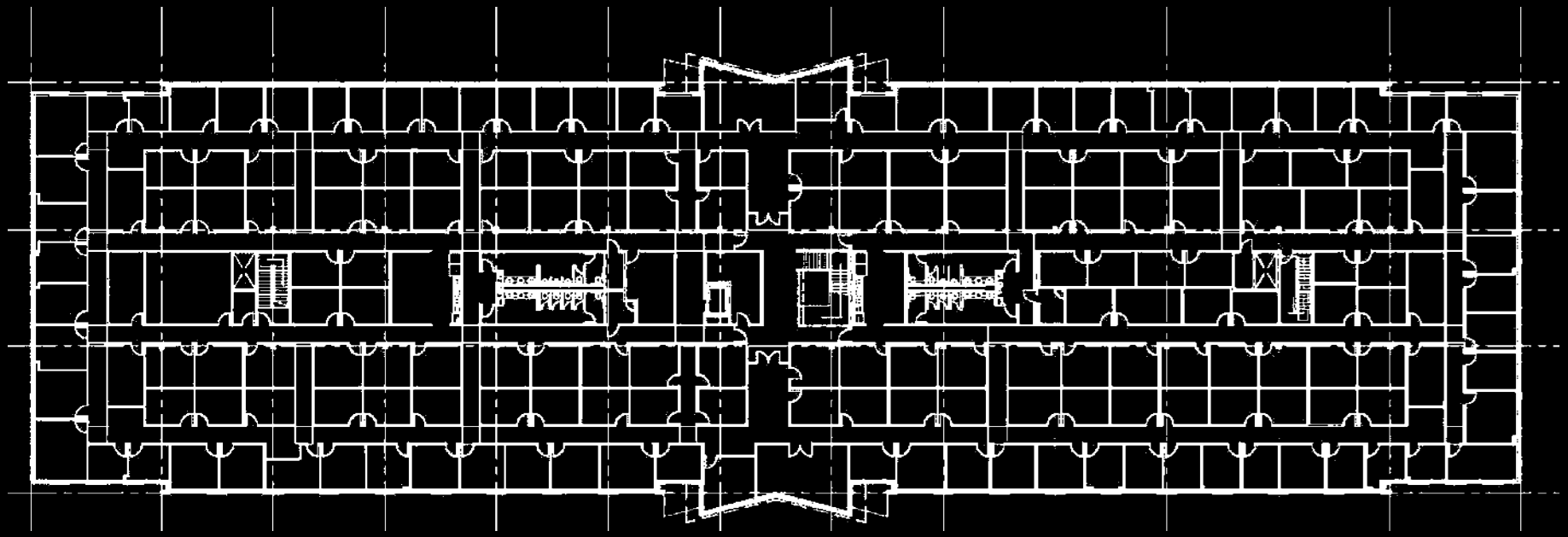
typical floor plan

Cam West



typical floor plan

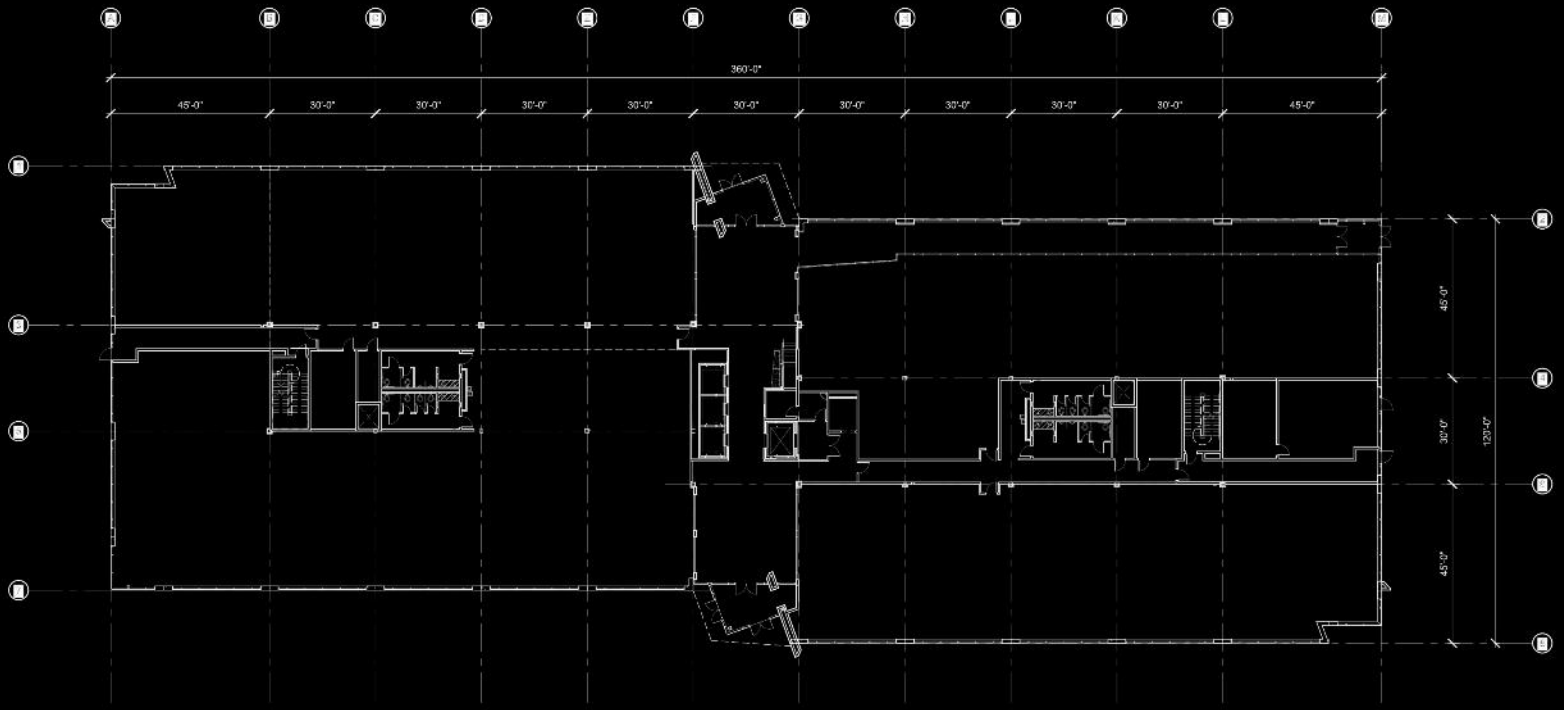
Featherwood



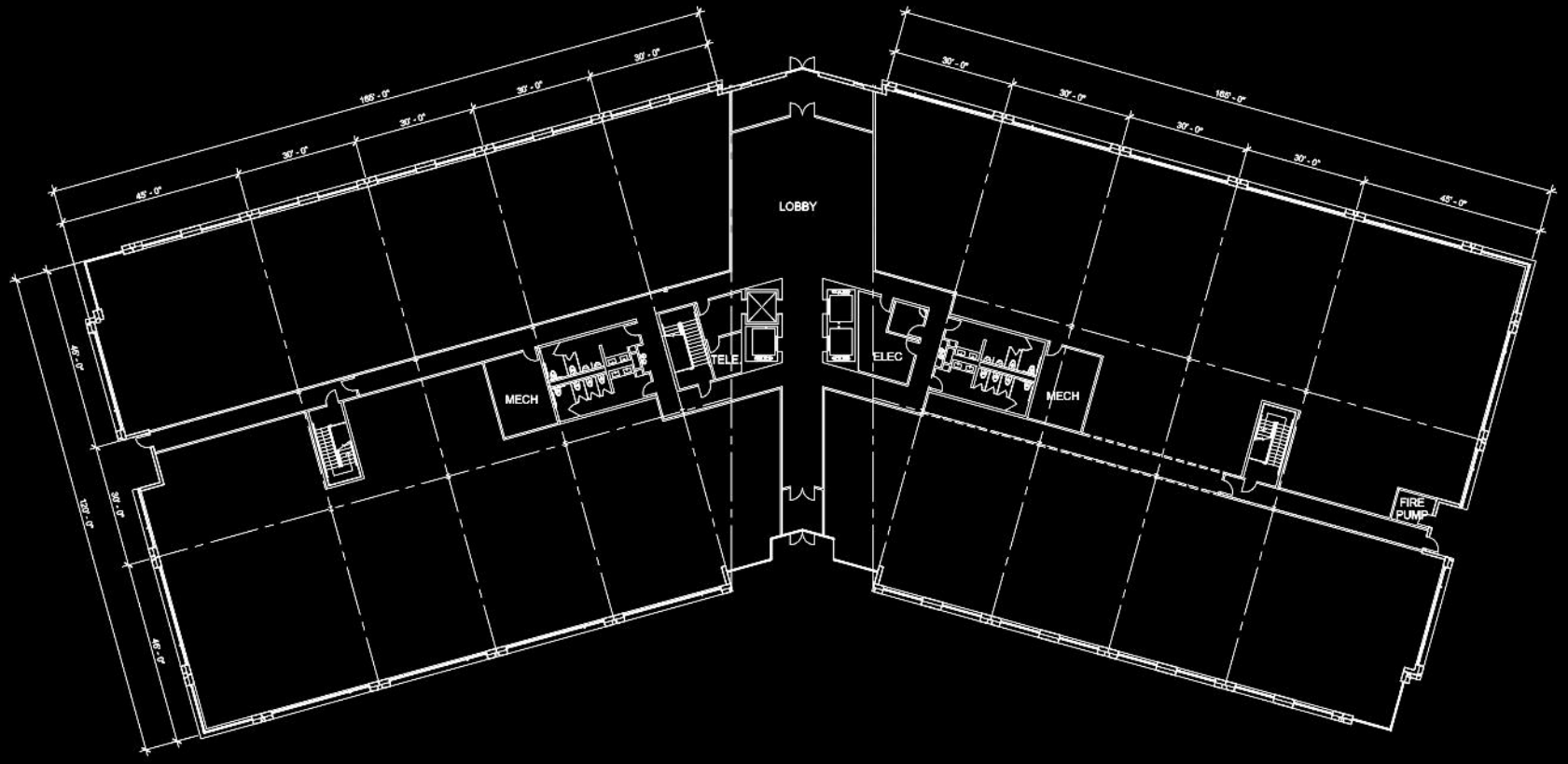
typical floor plan

SAIC Office Building

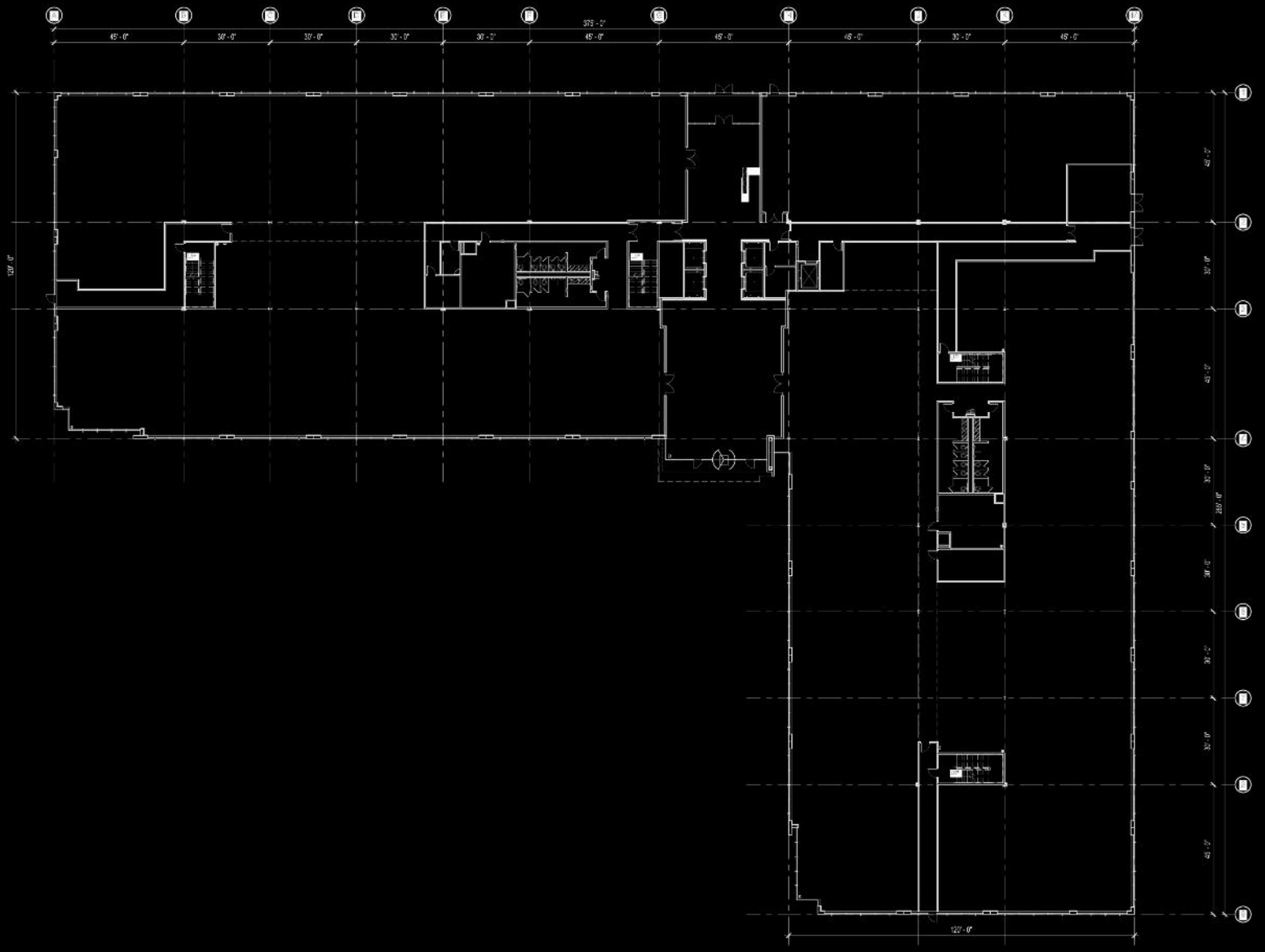
powers
brown
architecture



Liberty Property Trust



Circle Point Office Building



powers
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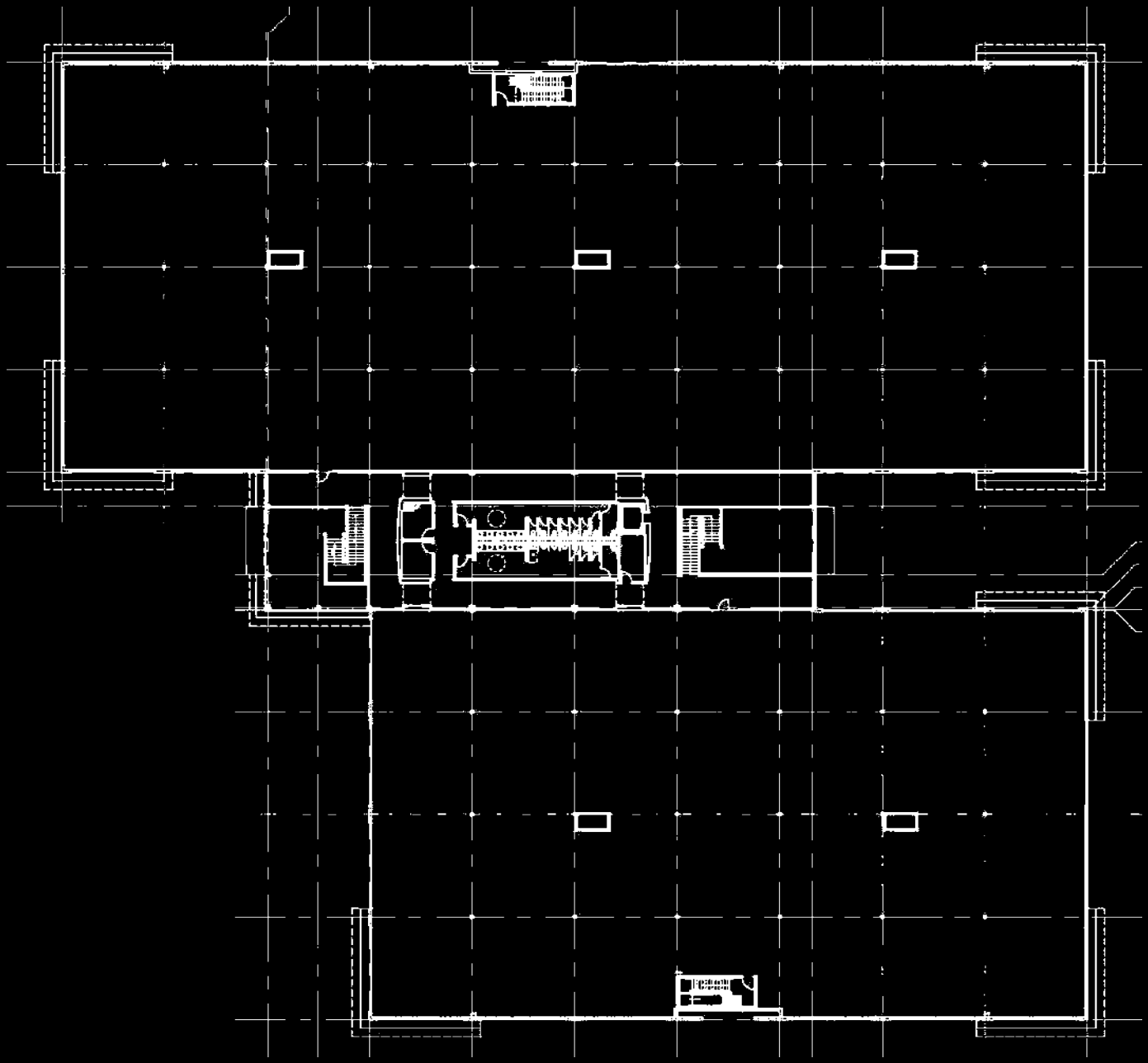
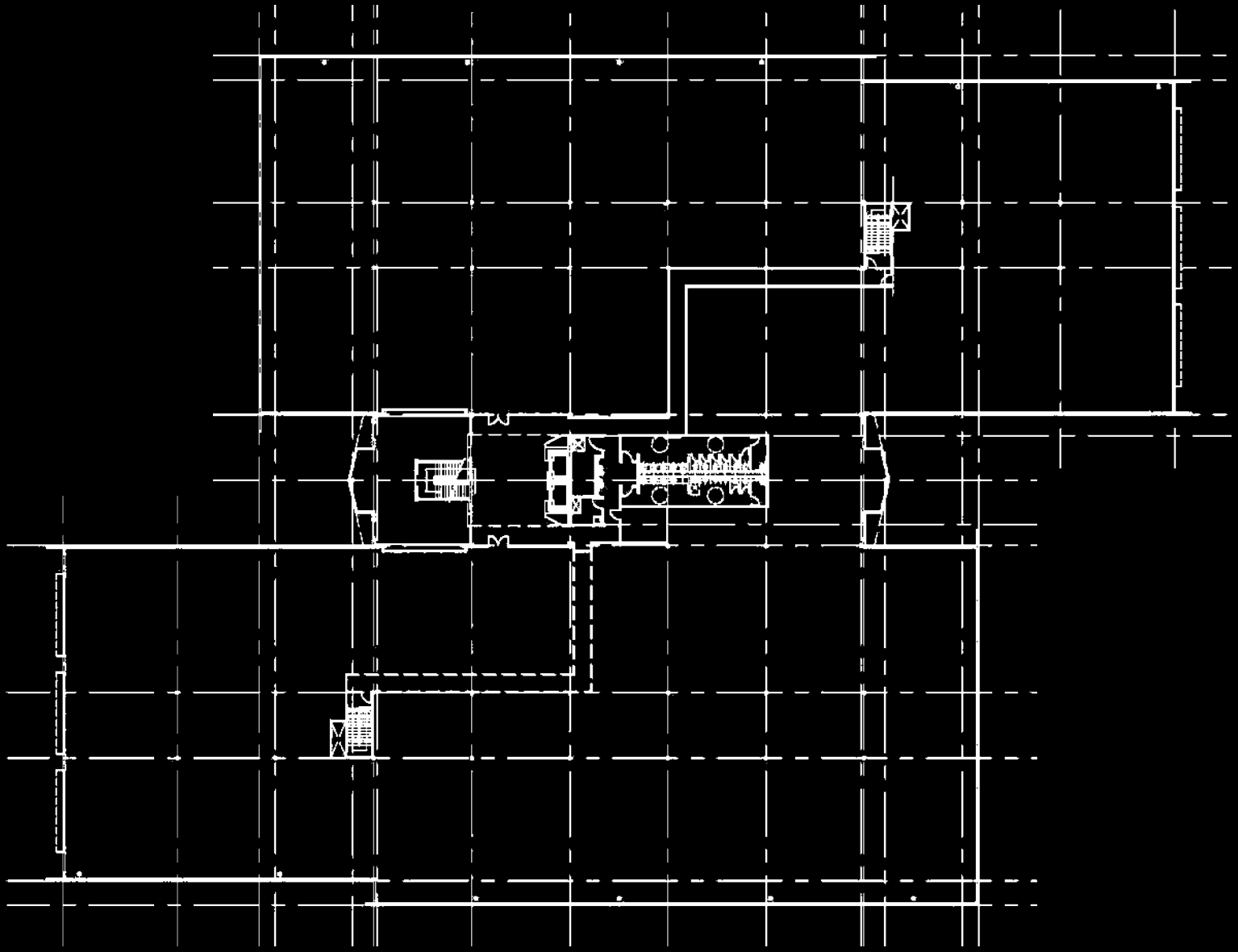


typical floor plan

North Belt 5 Center

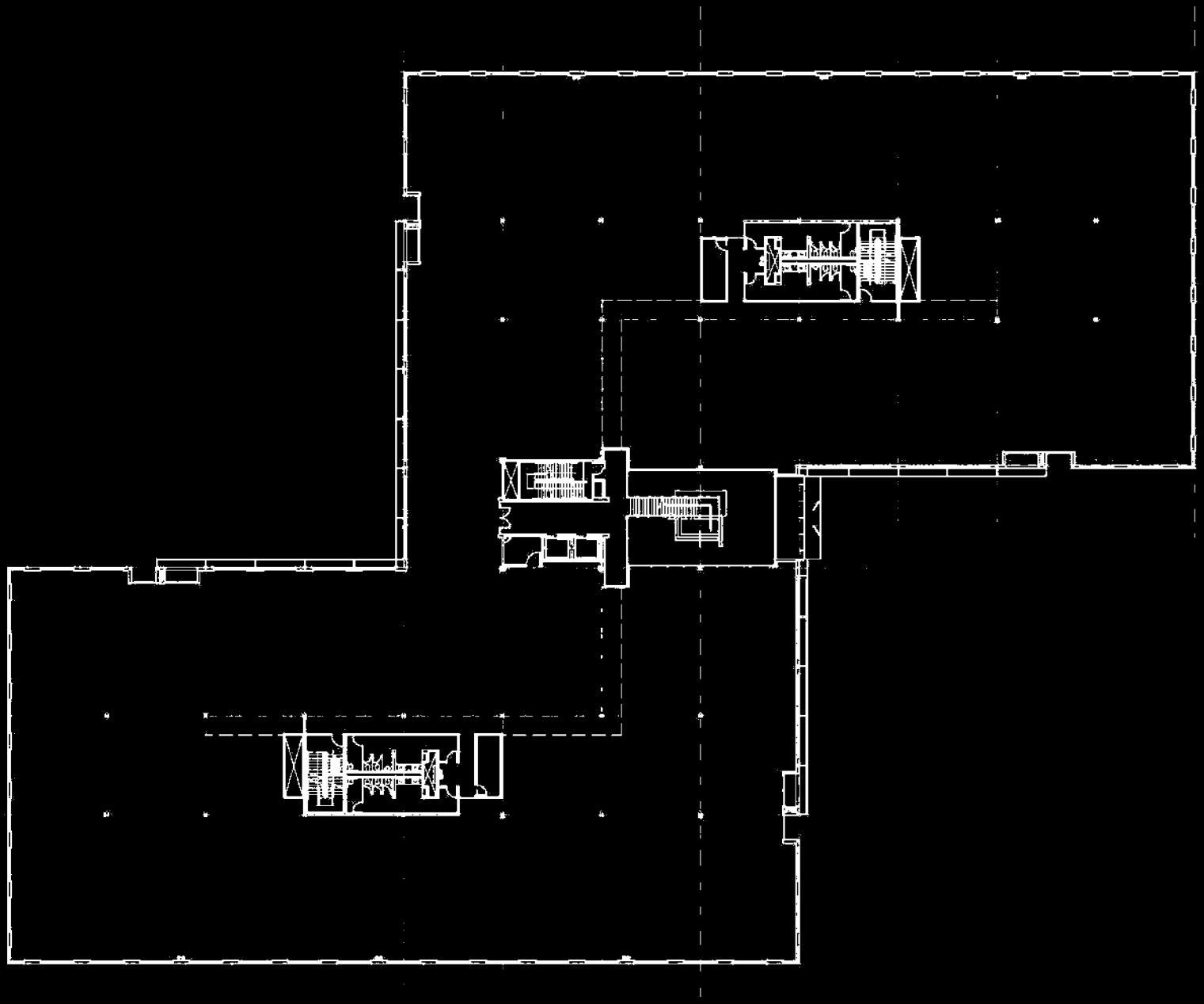


typical floor plan

Beltway Corporate Center Phase III

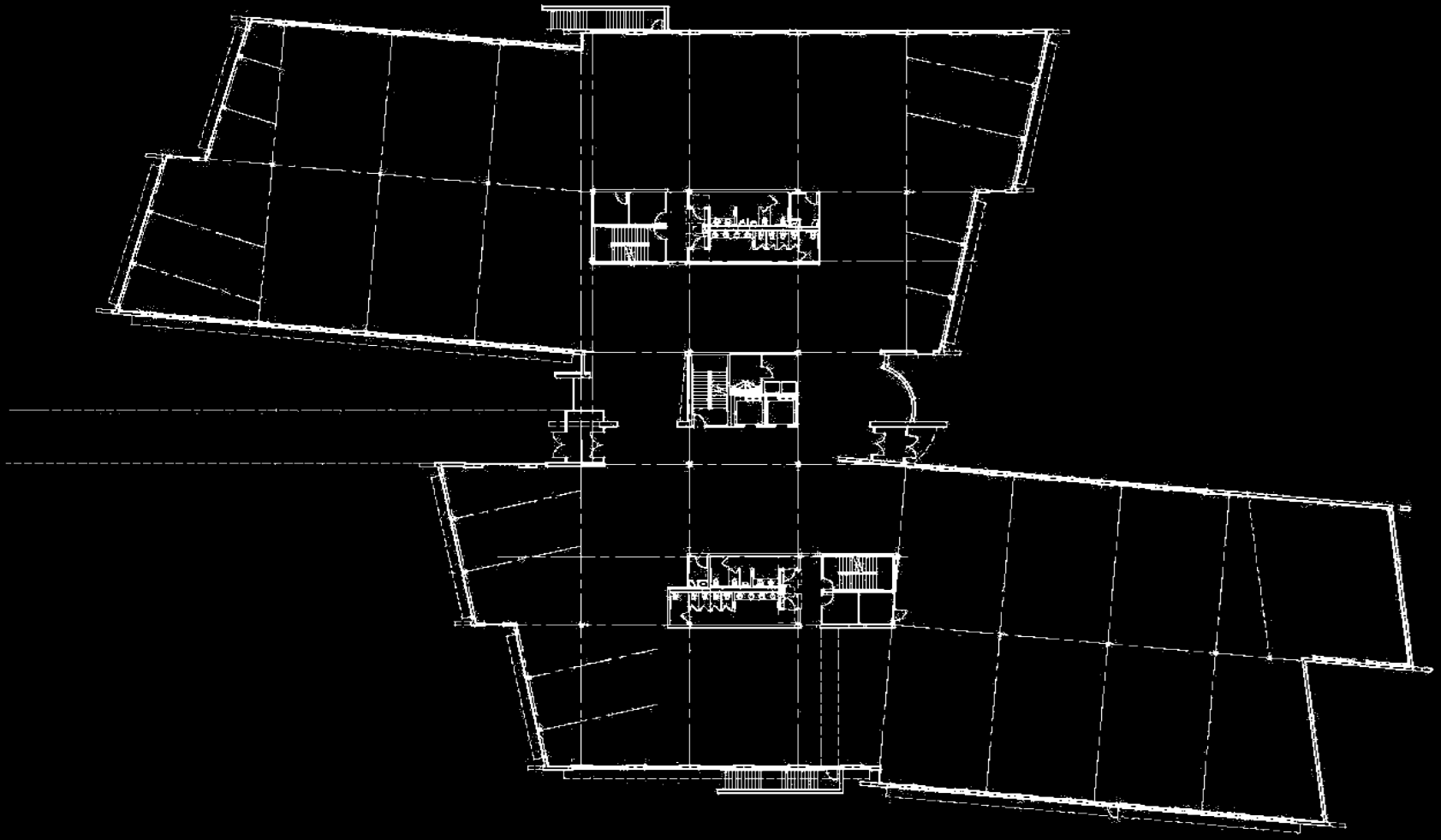
typical floor plan

Annapolis Junction – Lot 6



typical floor plan

The Reserve at Sierra Pines



typical floor plan

Kelsey Seybold Administrative Building

Explainer

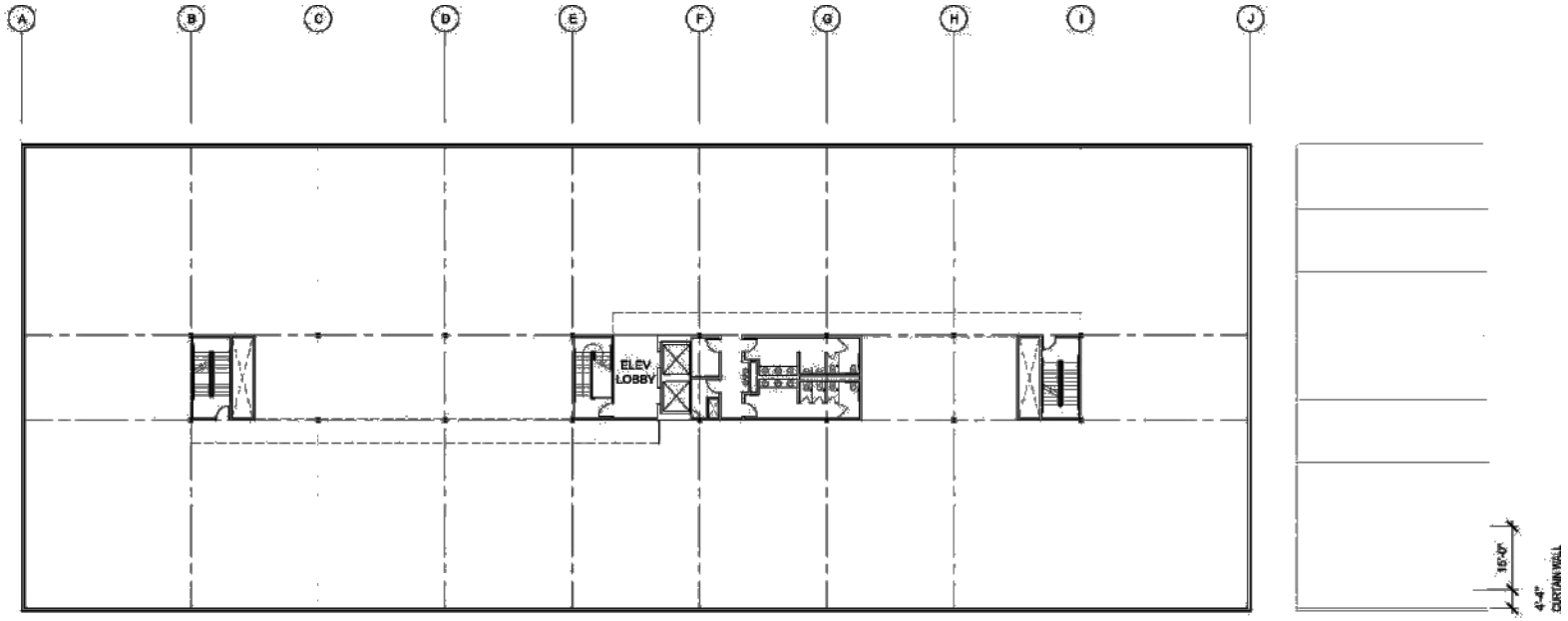
And our integrated approach to uniting aesthetics and value through the technology.

We often say that the work we do up front in pushing the design boundaries while preserving the minimum needs of the tilt wall system to deliver maximum savings is very different than our competitors who design the building and hand it to a structural engineer to convert it to tilt wall.

Something always gets lost in translation that way - often it is a less desirable design and far less savings.

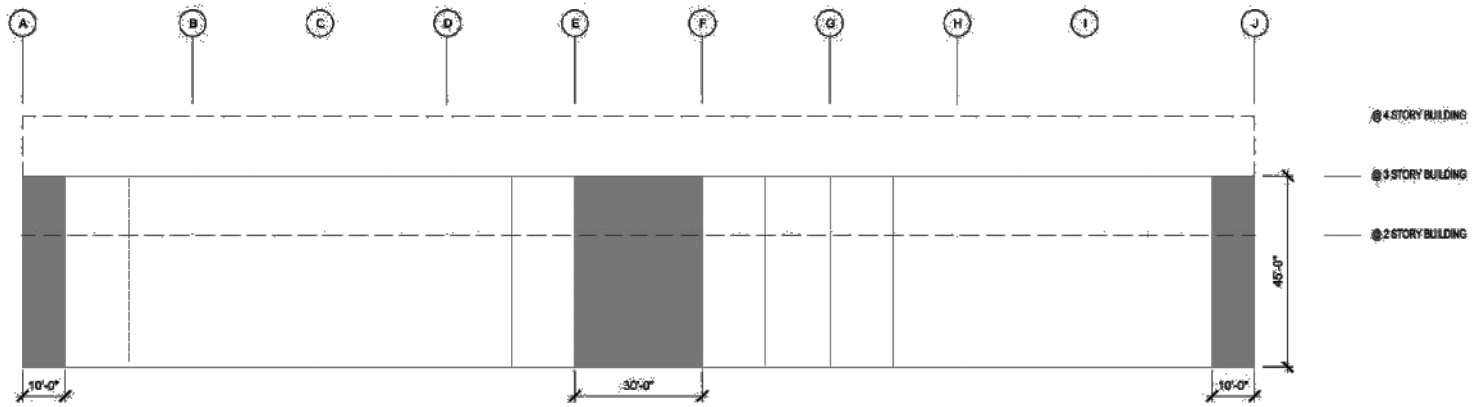
E X C U R S U S

powers brown architecture

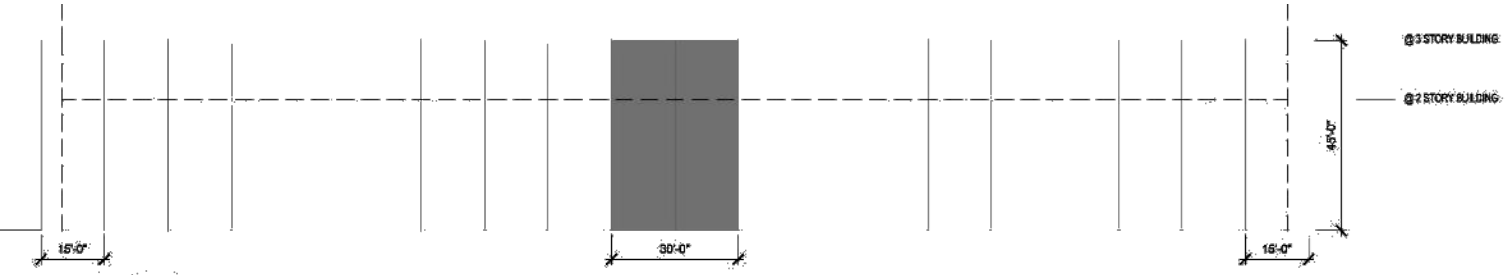


floor plate / core

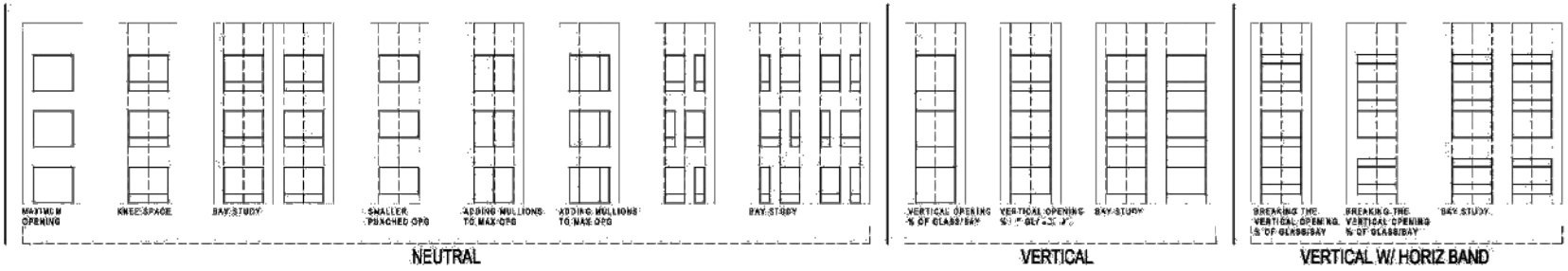
relationship to building skin



powers brown architecture



15'-0" PANELS - FULL PANELS AT EDGE
PUNCHED OPENINGS



PANEL STUDIES - ACHIEVING HORIZONTAL AND/OR VERTICAL USING: reveals / formliners / spandrel

floor plate / core

fenestration

powers
brown
architecture

We started by responding to the the market need for low rise buildings

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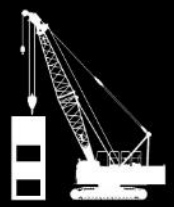
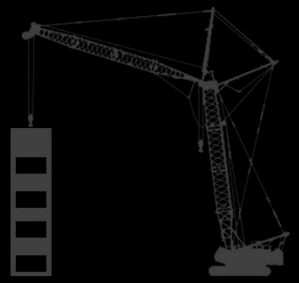
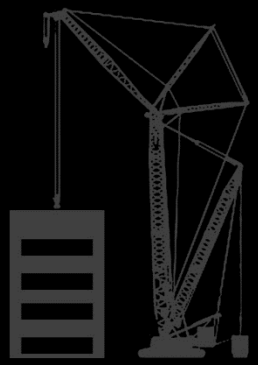
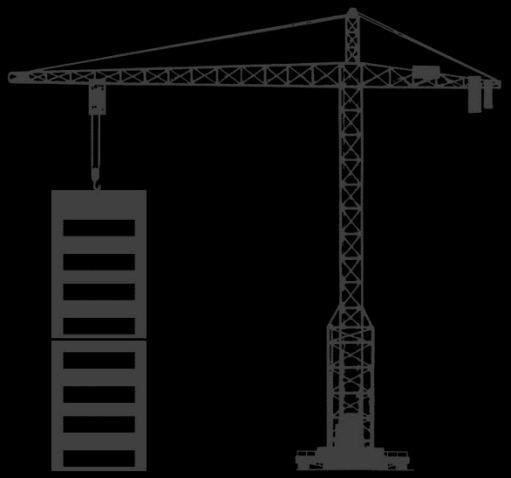
2- story 15’-30’ wide panel










10900


Christian Brothers Automotive


SAIC

American Omni

Corporate Headquarters

Area *16,477 SF*

Cost *$1.15 million*

Completion *November 2012*

Explainer

Along the way we decided to trademark protect the concept.

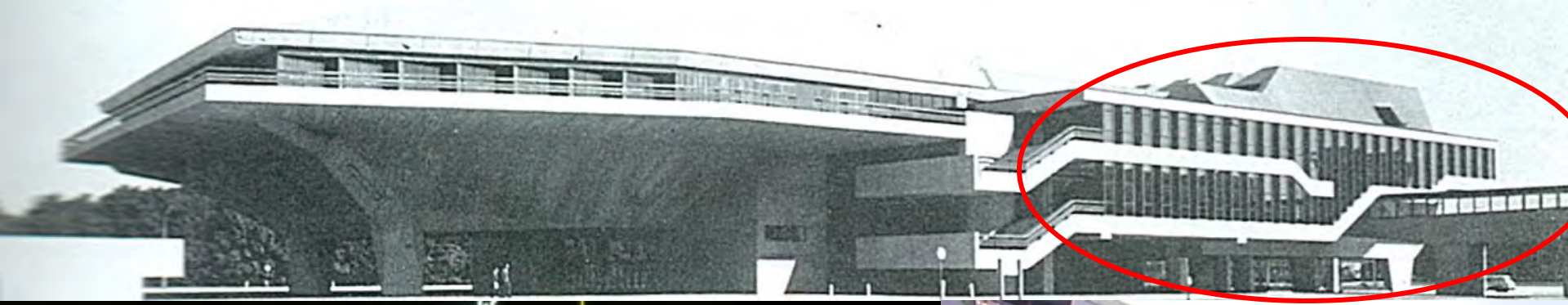
Which also was a discovery we made about ourselves as architects. We realized design and commodification had a nexus point.

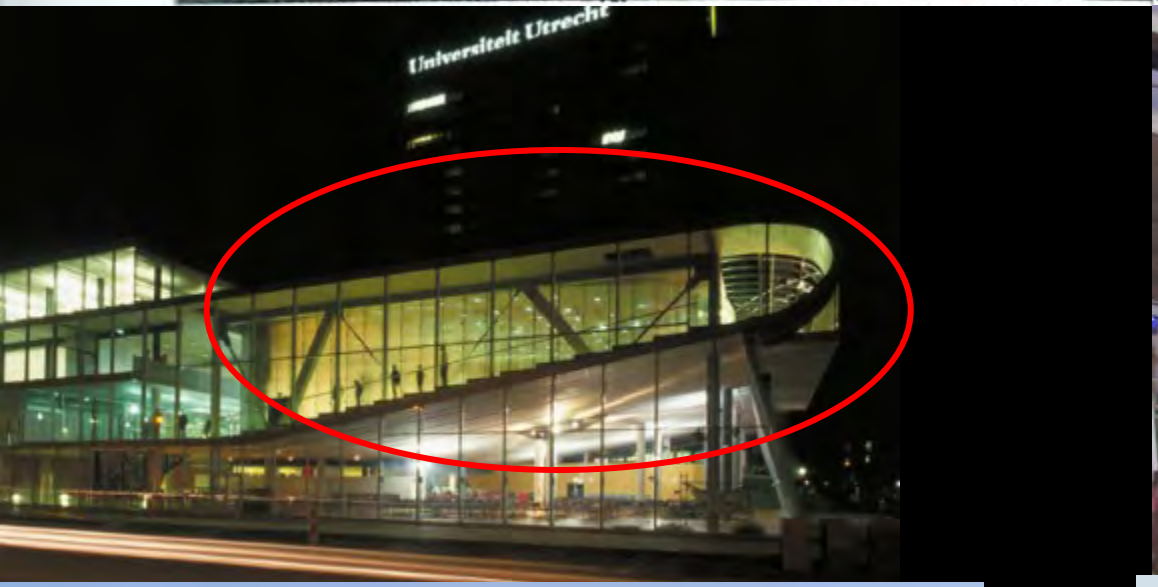
This has always been considered a heresy to architects.

We discovered it is a reality that architects ignore to their own limitation in the greater world of design. iPhone's are both beautiful, functional and a ……commodity. Why not repeat building typologies ?

Frankly the elite architects have been pulling this off without mentioning it for years. Much of what APPEARS to original and cutting edge- and hyped by the press as such is well, commodified.

E X C U R S U S

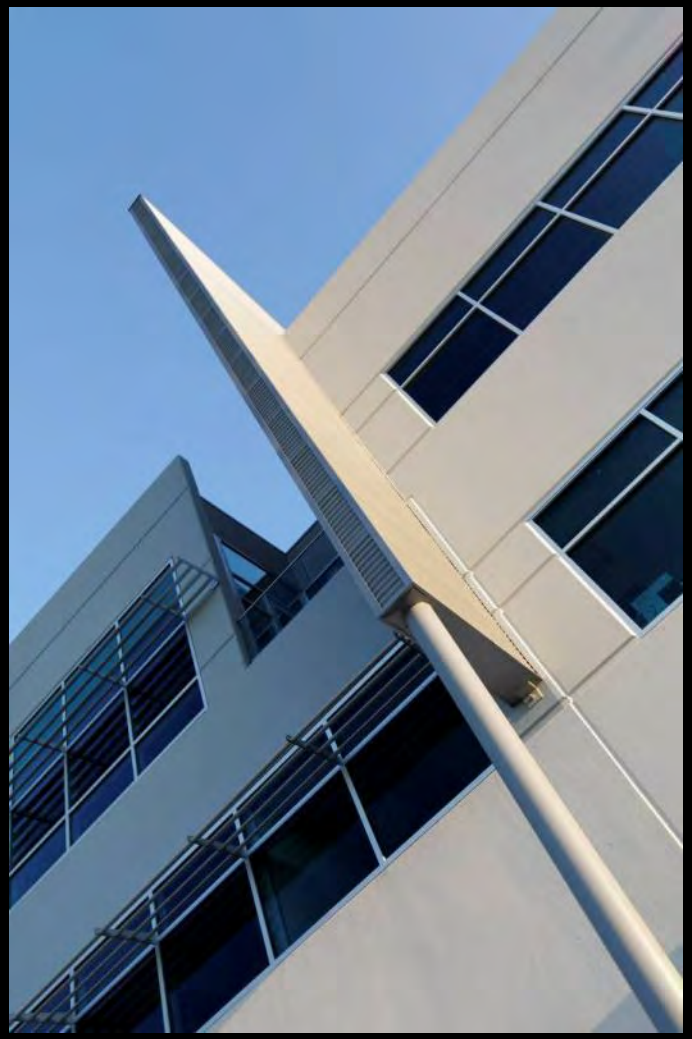



Universiteit Utrecht

Value Office ™

VALUE **OFFICE**

Defined



powers
brown
archit
ecture

What is a commodity
In
Architecture

That is, can Architecture BE a commodity in some way?

Are some TYPE’s of buildings susceptible to being considered a commodity?

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powers
brown
architecture

Is a Museum a “cultural” commodity because it is “consumed” in some way or visited by a large diverse public- while most buildings are not ?

Perhaps.
but

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archit
ecture

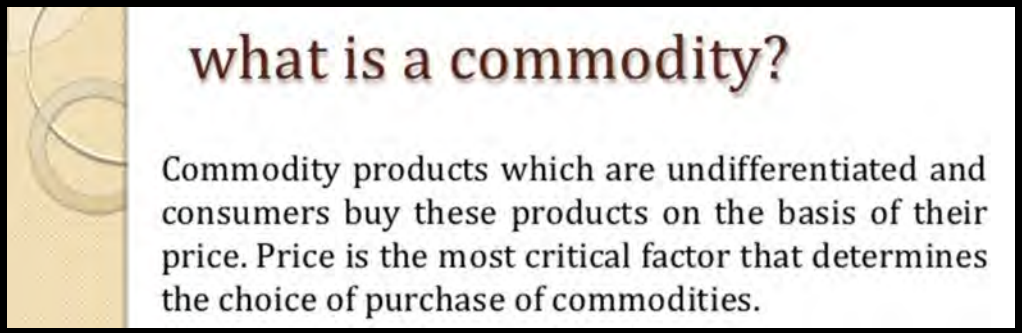
Are certain building types….commodifiable

Perhaps said more potently, are some building types BETTER as commodities.

As in perhaps more ***susceptible to invention*** when considered as such?

So why are tilt wall and the commodifiable building types compatible?

Tilt wall construction is the only system of construction designed to increase VALUE by lowering construction cost.



Explainer

Going back a bit in the timeline of the story here, we now start to look at the Value Office buildings as they progressed over time.

E X C U R S U S

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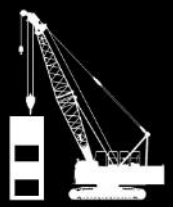
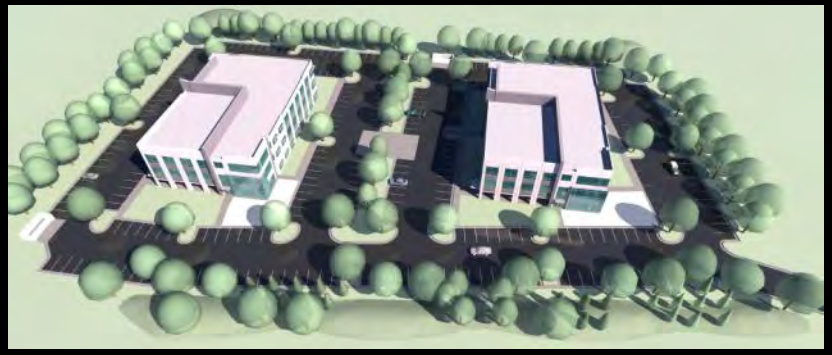
architecture

3- story 15’ wide panel





RDA Office

3-story Value Office

Area *45,000 SF*
Cost *$5 million*
Completion *May 2012*

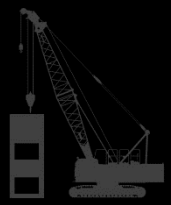
Sam Houston Crossing – Bldg. 100

Sam Houston Crossing – Bldg. 200

The Reserve at Sierra Pines

powers
brown
architecture

4- story 15’ wide panel



Eagle Burgmann

Corporate Headquarters

Area *16,477 SF*

Cost *$1.15 million*

Completion *November 2012*

North Gate Business Park

So we were plateaued in the market with a pretty good product- everywhere but Washington DC….

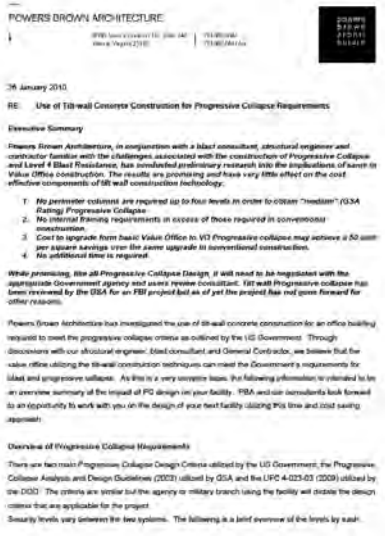
Explainer

At this point we had one of the several major developments in the valuer Office Product line occur.

E X C U R S U S

Where
Competition drove us to research
blast resistant tilt up

In January 2010 we were provoked to explore the potential of adopting the Value Office technology to Blast Resistance and Progressive Collapse Resistance.



POWERS BROWN ARCHITECTURE

26 January 2010

RE: Use of Tilt-wall Concrete Construction for Progressive Collapse Requirements

Executive Summary

Powers Brown Architecture, in conjunction with a blast consultant, structural engineer and contractor familiar with the challenges associated with the construction of Progressive Collapse and Level 4 Blast Resistance, has conducted preliminary research into the implications of tenet in Value Office construction. The results are promising and have very little effect on the cost effective components of tilt wall construction technology.

1. *No perimeter columns are required up to four levels in order to obtain "medium" (GSA Rating) Progressive Collapse.*
2. *No internal framing requirements in excess of those required in conventional construction.*
3. *Cost to upgrade from basic Value Office to VO Progressive collapse may achieve a 50 cent per square savings over the same upgrade in conventional construction.*
4. *No additional time is required.*

While promising, this all-Progressive Collapse Design, it will need to be negotiated with the appropriate Government agency and users review consultant. Tilt wall Progressive collapse has been reviewed by the GSA for an FBI project but as of yet the project has not gone forward for other reasons.

Powers Brown Architecture has investigated the use of tilt-wall concrete construction for an office building required to meet the progressive collapse criteria as outlined by the US Government. Through discussions with our structural engineer, blast consultant and General Contractor, we believe that the value inline utilizing the tilt-wall construction techniques can meet the Government's requirements for blast and progressive collapse. As this is a very complex topic, the following information is intended to be an overview summary of the impact of PC design on your facility. PBA and our consultants look forward to an opportunity to work with you on the design of your next facility utilizing this time and cost saving approach.

Overview of Progressive Collapse Requirements

There are two main Progressive Collapse Design Criteria utilized by the US Government, the Progressive Collapse Analysis and Design Guidelines (2003) utilized by GSA and the UFC 4-023-03 (2009) utilized by the DOD. The criteria are similar but the agency or military branch using the facility will dictate the design criteria that are applicable for the project.

Security levels vary between the two systems. The following is a brief overview of the levels by each

POWERS BROWN ARCHITECTURE

GSA Security Levels

GSA security levels are based on construction type, occupancy type and stand-off distance per table 3.1 of the GSA Progressive Collapse and Design Guidelines. There are three (3) levels of protection; Low/Medium Low; Medium; and Higher. The stand-off distances for Reinforced Concrete construction and precast concrete construction are:

Reinforced Concrete Construction (Shear Wall structure)

Low/Medium Low	25'
Medium	35'
Higher	100'

Precast Construction (concrete frame)

Low/Medium Low	55'
Medium	105'
Higher	155'

Structural analysis must be done to ensure continuity and ductility for the primary structural elements. It should be designed to allow the primary elements (beams & girders) to span two full spans thus allowing the removal of a column. Deformation due to the removal must also be taken into account. It must also be designed to resist load reversals (i.e. gravity vs. uplift). It must also be designed to resist shear failure due to abnormal loading.

DOD Security Levels (determined by Agency or per Table 1-1 in UFC 3-310-01

Categories

Category I:	Low Occupancy Buildings
Category II:	Inhabited buildings less than 50 people
Category III:	More than 500 occupants or more than 300 in one area; facility with high value equipment;
Category IV (V) -	Mission essential facilities; critical communication centers

Design Requirements for Each Category

Category I:	No specific requirements, PC not required
Category II:	Tie forces or Alternate Path for specified wall/column removal Tie Force = Enhanced Local Resistance for 1st story corner and penultimate columns and walls.

POWERS BROWN ARCHITECTURE

Alternate Path = design structure to bridge over the removal of columns, load-bearing wall, or beams supporting columns or walls at specified locations (AP is most practical for load-bearing walls)

Category III- Alternate Path for specified column and wall removal locations; Enhanced Local Resistance for all perimeter 1st floor columns or walls.

Alternate Path = design structure to bridge over the removal of columns, load-bearing wall, or beams supporting columns or walls at specified locations (AP is most practical for load-bearing walls)

Category IV - Tie forces; Alternate Path for specified column and wall removal locations; Enhanced Local Resistance for all perimeter 1st and 2nd floor columns or walls.

Tie Force- the building is mechanically tied together enhancing continuity, ductility, and development of alternate load paths. The horizontal loads carried are longitudinal, transverse and peripheral. Vertical ties are required in load bearing walls and columns.

Alternate Path Method- utilized when a vertical structural element cannot provide the required tie strength to bridge over the deficient element after it has been removed. Also must be utilized in OC III & IV for the removal of specific vertical load bearing elements.

Enhanced Local Resistance- is required for OC II (Option 1, OC III and OC IV. It is provided through the flexural and shear resistance of perimeter building columns and load bearing walls. For OC II, it is applied to the perimeter corner and penultimate columns and load bearing 1st story walls. In OC III it is applied to all perimeter columns and load bearing 1st story walls and OC IV it is applied to the 1st and 2nd.

Progressive Collapse Theory Utilizing Tilt-wall Concrete Panels

Scope

The Facility reviewed will meet stringent technical and security requirements for the DSA. The objectives and challenges for the structural design are:

- "Class A", State-of-the-Art facility
- Maximum flexibility to accommodate programmatic changes.

POWERS BROWN ARCHITECTURE

- Efficiently absorb and dissipate seismic forces
- Operational dependability and low maintenance
- Ability to resist the effects of blast and terrorist attack
- Minimize collapse to the original cause of the load damage

Superstructure:

The building consists of standard 21'-24' deep rolled wide flange composite beams spaced at 15'-0" o.c. in the exterior bays and 10'-0" o.c. in the interior bays, spanning approximately 45'-0" between 20'-0" long 24" to 30" deep girders at the interior and tilt-wall bearing walls at the perimeter. The slabs are 3-1/4" of lightweight concrete (107-115 pcf) over 3" deep, 18ga/20ga. (exterior/interior bays) 40ksi composite floor deck. The roof is 6" deep, 18ga. 40ksi galvanized metal roof deck on the exterior bays and 3-1/4" of lightweight concrete (107-115 pcf) over 3" deep, 20ga. 40ksi composite floor deck at the interior bays. 6x6-W1.4xW1.4 welded wire fabric will typically be provided. 6x6-W4.0xW4.0 welded wire fabric is provided for the outer bays of the second floor. 6x6-W2.9xW2.9 welded wire fabric is provided for the roof. Floor and roof construction is unshored. Long-span beams will be cambered. Columns are standard 12" deep wide flange shapes.

Progressive Collapse System:

The building is designed for the loss of a "column portion" of the tilt-wall (precast) bearing walls at the perimeter for any floor above grade at the building perimeter without progressive collapse. This design incorporates a prudent, effective, and uniform level of resistance to progressive collapse without the loss of exterior load columns. The exterior load bearing panel legs are designed to act as vertical columns and horizontal deep beams.

This design strategy utilizes two different structural response modes to provide resistance to progressive collapse. The first level of progressive design employs Tie Forces, which will be based on a "catenary" response of the structure. This indirect design approach enhances continuity, ductility, and structural redundancy by requiring "ties" to keep the structure together in the event of an abnormal loading. The second level employs the Alternate Path method, in which the structural model will be "removed", as the building must bridge across a removed structural element and that the resulting extent of damage will not exceed damage limits.

The design incorporates both horizontal and vertical tie force capabilities. All multistory vertical load carrying elements will be capable of supporting the vertical load after the loss of lateral support. The

We produced a collaborative white paper that was conducted as a "thought experiment;" the criteria for which was DoD Low Level Blast Resistance.

The following is an analysis which isolates the building shell components in order to give a cost of work delta between the two systems. This is based on similar 4 story office building shells. Remember this is only a high level analysis indicative of systems that are substantially different between the two construction methods with all other factors remaining the same.

Division	Steel & Precast	Tilt Wall
Concrete	$9.45	$17.00

This is the cost of precast panels vs the cost of tiltwall panels

Steel	$30.00	$13.58

This is the reduction of structural steel required at the perimeter of the building

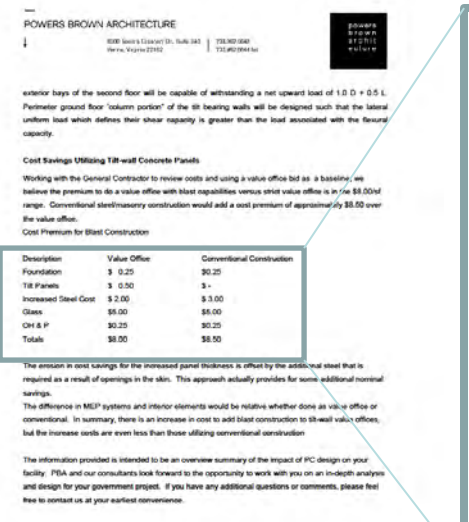
Sealants	$0.54	$0.36

This is the difference in quantity of panel joints to be sealed

Subtotal	$39.99	$30.94

As you can see a $9.05/sf delta savings by going with an economical tiltwall system has a large impact on overall project costs. ($724,000 on an 80,000sf building shell)

Due to the lack of “real” data, we focused on components and materials that appeared to be the driver of most of the adaptations and modifications.



POWERS BROWN ARCHITECTURE

exterior bays of the second floor will be capable of withstanding a net upward load of 1.0 D + 0.5 L. Perimeter ground floor "column portion" of the tilt bearing walls will be designed such that the lateral uniform load which defines their shear capacity is greater than the load associated with the flexural capacity.

Cost Savings Utilizing Tilt-wall Concrete Panels

Working with the General Contractor to review costs and using a value office bid as a baseline, we believe the premium to do a value office with blast capabilities versus strict value office is in the $8.00/sf range. Conventional steel/masonry construction would add a cost premium of approximately $8.50 over the value office.

Cost Premium for Blast Construction

Description	Value Office	Conventional Construction
Foundation	$ 0.25	$0.25
Tilt Panels	$ 0.50	$ -
Increased Steel Cost	$ 2.00	$ 3.00
Glass	$5.00	$5.00
OH & P	$0.25	$0.25
Totals	$8.00	$8.50

The erosion in cost savings for the increased panel thickness is offset by the additional steel that is required as a result of openings in the skin. This approach actually provides for some additional nominal savings.

The difference in MEP systems and interior elements would be relative whether done as value office or conventional. In summary, there is an increase in cost to add blast construction to tilt-wall value offices, but the increase costs are even less than those utilizing conventional construction

The information provided is intended to be an overview summary of the impact of PC design on your facility. PBA and our consultants look forward to the opportunity to work with you on an in-depth analysis and design for your government project. If you have any additional questions or comments, please feel free to contact us at your earliest convenience.

cost premium for blast resistant construction*

Description	Value Office	Conventional Construction
Foundation	$ 0.25	$0.25
Tilt Panels	$ 0.50	-
Increased Steel	$ 2.00	$ 3.00
Glass	$5.00	$5.00
OH & P	$0.25	$0.25
Totals	**$8.00**	**$ 8.50**

We concluded two things- it appeared to be feasible…and that an actual test case was the only way to prove it.

Annapolis Junction – Lot 6

FBI Atlanta

3-story Value Office

Area *120,000*
Cost *8,400,000*
Completion *TBD*

Then we extended that research into progressive collapse resistant tilt up

GOAL:

UNDERSTAND THE DETAILING AND COSTS TO UPGRADE A CONVENTIONAL VALUE OFFICE BUILDING TO MEET PROGRESSIVE COLLAPSE & BLAST RESISTANCE

COMPARATIVE

Sentry Gateway Building 100: a conventional “Value-Office” structure

designed by Powers Brown Architecture. Constructed in 2010 in San Antonio, Texas, the building includes:

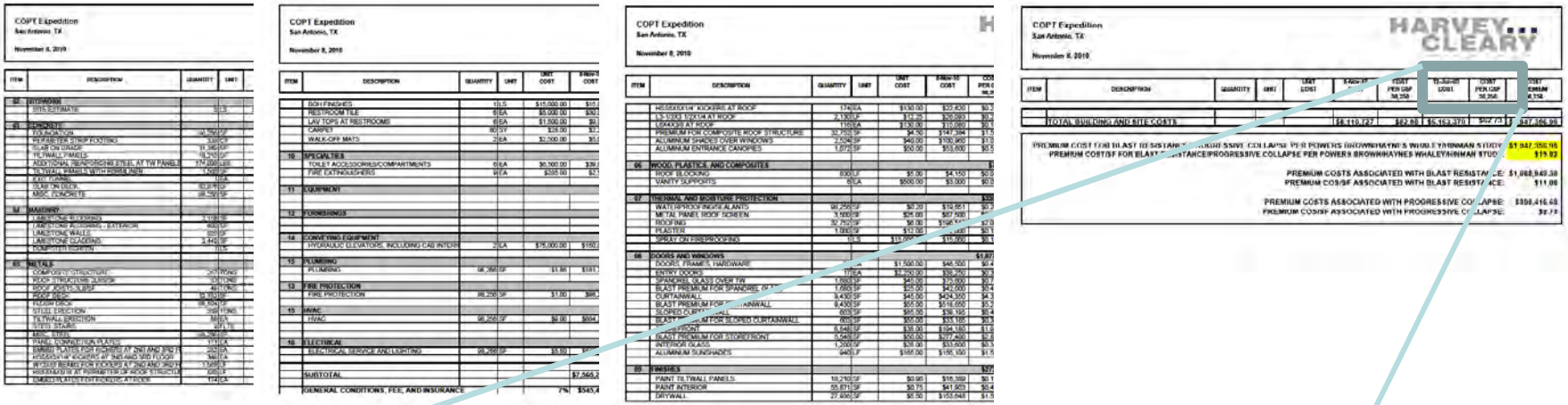
98,250 sf 3-Story value office
32,750 sf floor plate
30’ wide reinforced concrete tilt wall panels
punched aluminum storefront windows
curtainwall entry feature
composite steel and concrete floor deck
steel joist and metal deck roofing structure

The facility also incorporates functioning sunscreens at the storefront windows and is partially clad in Texas limestone at the front and back entry features. All parking is on-site and at grade.

The MEP systems are consistent with conventional office buildings and include blow-down roof top units. These systems do not impact the progressive collapse and blast requirements.

Costs

Based on actual construction costs, this core and shell building cost approximately **$6.2 million.**



12-Jun-09 COST	COST PER GSF
	98,256
$6,163,370	$62.73

For the same value office building to be designed to meet **Progressive Collapse and Blast Resistance** we need to describe the modifications and process**…**

…we actually had to calculate and engineer the modifications based upon a known entity.

Study Parameters

Progressive Collapse Analysis

UFC 4-023-03 (July 2010)
Occupancy Category III per UFC 3-301-01 (Jan 2010)

Blast-Resistance Analysis

Medium Level of Protection
Threats per UFC 4-010-01 (Jan 2007-2010)
Conventional Construction Standoff
148' to Perimeter
82' to Internal Parking

These parameters meet most stringent leasing requirement requests in local markets; therefore, if we meet these requirements, the building can be leased to any DoD entity.

Progressive Collapse Theory

Progressive Collapse is defined in the commentary of the American Society of Civil Engineers Standard 7 **Minimum Design Loads for Buildings and Other Structures** (ASCE 7) as

> *The spread of an initial local failure from element to element, eventually resulting in the collapse of an entire structure or a disproportionately large part of it.*
>
> ***Sustain local damage** with the structural system as a whole remaining stable and not being damaged to an extent disproportionate to the original local damage.*
>
> *Structures are designed to **limit the effects of local collapse** and to prevent or minimize progressive collapse.*

Blast Resistance Theory

Medium Level of Protection
Threats per UFC 4-010-01 (Jan 2007)
Conventional Construction Standoff

148' to Perimeter
82' to Internal Parking

OC III Design Requirement
Two requirements must be satisfied: **Alternate Path** and **Enhanced Local Resistance**. The consequence of collapse is greater for this Occupancy Category, which also increases the probability of a deliberate attack.

Level of resistance to **loss of a column or wall** is provided by the Alternate Path method. Additional protection is provided by minimizing the likelihood of a non-ductile failure of the columns and walls at the building perimeter, in the first story above grade, through the Enhanced Local Resistance requirement.

And found even making these government required upgrades we saved over ten dollars per sf.

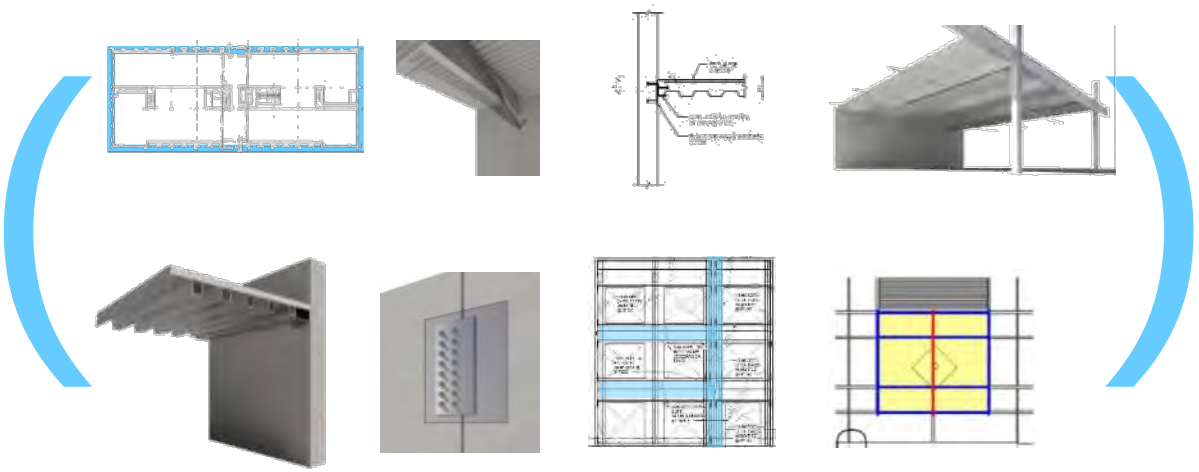
COPT Sentry
San Antonio, TX

November 8, 2010

HARVEY CLEARY
Innovation. Quality. Integrity.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	8-Nov-10 COST	COST PER GSF 98,256	12-Jun-09 COST	COST PER GSF 98,256	COST PREMIUM 98,256
	TOTAL BUILDING COSTS				$8,110,727	$82.55	$6,163,370	$62.73	$1,947,356.95

PREMIUM COST FOR BLAST RESISTANCE/PROGRESSIVE COLLAPSE PER POWERS BROWN/HAYNES WHALEY/HINMAN STUDY:	$1,947,356.95
PREMIUM COST/SF FOR BLAST RESISTANCE/PROGRESSIVE COLLAPSE PER POWERS BROWN/HAYNES WHALEY/HINMAN STUDY:	$19.82
PREMIUM COSTS ASSOCIATED WITH BLAST RESISTANCE:	$1,088,940.30
PREMIUM COS/SF ASSOCIATED WITH BLAST RESISTANCE:	$11.08
PREMIUM COSTS ASSOCIATED WITH PROGRESSIVE COLLAPSE:	$858,416.65
PREMIUM COS/SF ASSOCIATED WITH PROGRESSIVE COLLAPSE:	$8.74



= $19

premium

This research was recently published in

The Construction Specifier, August 2011

Protective Design Center (PDC)
Army's center of expertise for engineering services related to force protection and protection design

Lead developer and resources of Security Related UFC Documents

To date, the Progressive Design Council (PDC) has taken no objection to the research.

So we discovered that a 300+ ton crane was required to lift the 30’ wide panel to solve this government challenge- usually at a cost of less than $1 per square foot


LIEBHERR

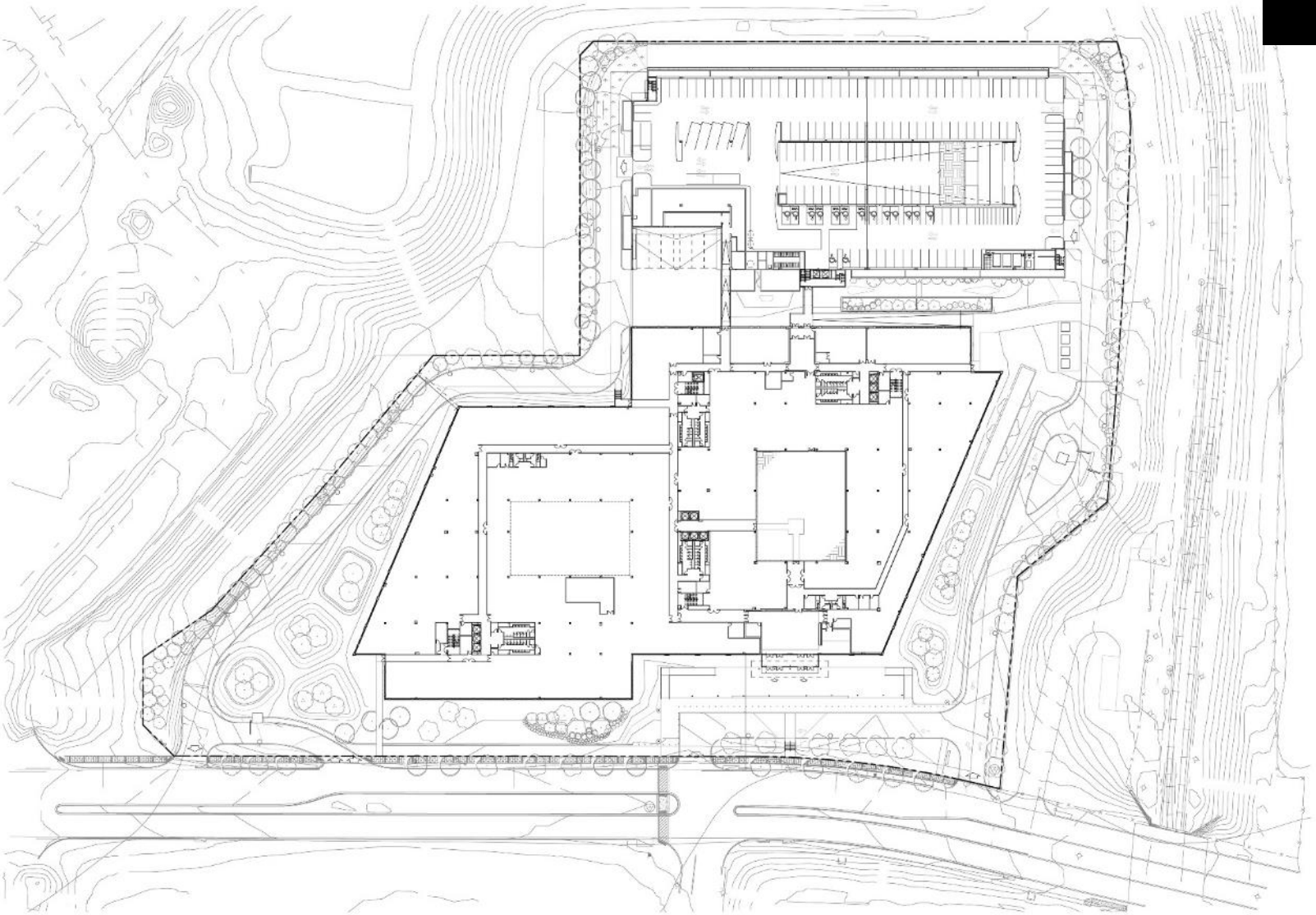
AJBP 7 / 8

4-story Value Office

Area *126,400 SF*
Cost *$85/SF*
Completion *2013 / 2014*

powers
brown
architecture

powers
brown
architecture



powers
brown
architecture

Then we speculated about 30’ wide 3 story panels in the “normal” market- they reproduced the exact glass-line of pre-cast and curtainwall….

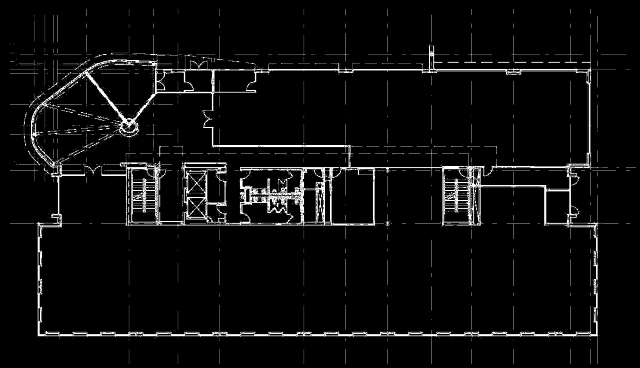
So- we applied this thinking of 30’ panels to our 3 story wheel house market-and created a mini boom with the 25’ glass line…

3- story 30’ wide panel
And no 300 ton crane….at first…

typical tilt wall *column-free exterior walls*

powers
brown
architecture

3- story 30’ wide panel



Midway WYAK Office Building

3-story Value Office

Area *54,600 SF*
Cost *$4.6 million*
Completion *May 2008*

University of Maryland

3-story Value Office

Area *75,000*
Cost *5,625,000*
Completion *TBD*

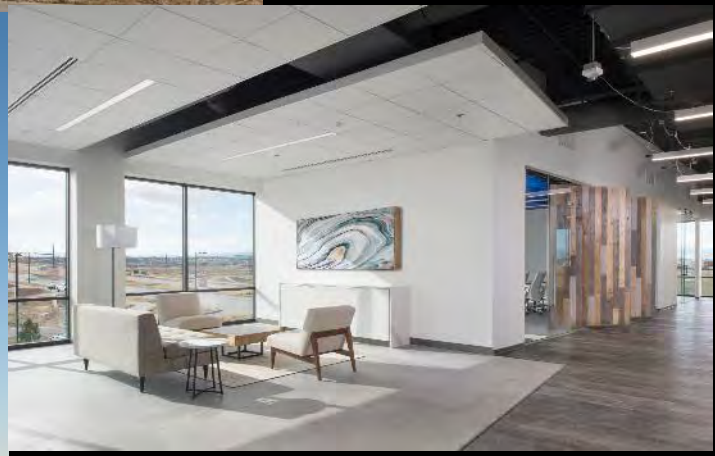
Wallis State Bank

4-story Value Office

Area *68,000 sf*
Cost *$5,100,000*
Completion *March 2014*

Camwest Business Park Phase 1

4 story Value Office
Area *60,000*
Cost *5,460,000*
Completion *fall 2019*



One Central Square

3-story Value Office

Area *60,000*
Cost *5,460,000*
Completion *fall 2017*

Kelsey Seybold Administrative Building

Westway Park

3-story Value Office

Area *135,006 SF*
Cost *$9.8 Million*
Completion *July 2015*

Texas Instruments

3-story Value Office

Area *180,000 SF*
Cost *Undisclosed*
Completion *Summer 2014*

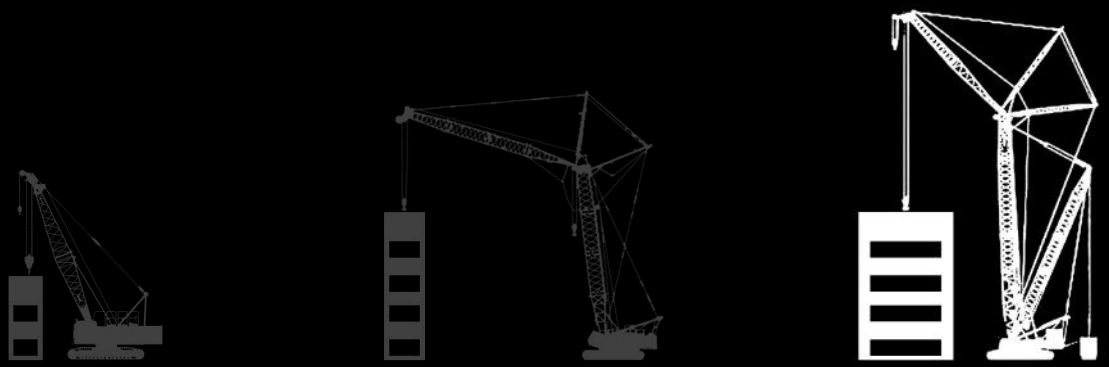
Explainer

The development mentioned in the last “Explainer” slide was this- the government work we had modified the value Office product for alerted us to the 300 ton crane, which when we translated to the commercial market we found were zero addition cast.

This in turm allowed us to move to four stories with 30 foot wide panels. Which again in turn allowed for a 25 foot glassine- the exact same glass line as a curtain wall building with columns every 30”.

This was a game changer in the status of value Office as a serious investment office approach.

4- story 30’ wide panel- which kicked in that 300 ton crane. Which it turns out is no additional cost in many markets….



20 Hebron way

4-story Value Office

Area *146,471 SF*
Cost *TBD*
Completion *TBD*

Connection Park

3.5-story Value Office

Area *146,471 SF*
Cost *TBD*
Completion *TBD*

CORE Parkway Central

WestGate 1, 2 and 3

MMHS MOB

4-story Value Office

Area *102,000 SF*
Cost *$8,845,517*
Completion *Spring 2015*

Dow Lake Jackson OB

4-story Value Office

Area *240,000 SF*
Cost *$21,804,263*
Completion *May 2015*

Milestone Parkway

4-story Value Office

Area *120,000 SF*
Cost *$8,400,000*
Completion *TBD*

Everson Development

4-story Value Office

Area *240,000 SF*
Cost *TBD*
Completion *TBD*

NALCO / ECOLAB

4story Value Office

Area *120,000 sf*
Cost *9,360,000*
Completion *2016*

St. John Development

4 / 5-story Value Office

Area *100-125,000 sf*
Cost *5,625,000*
Completion *TBD*

Explainer

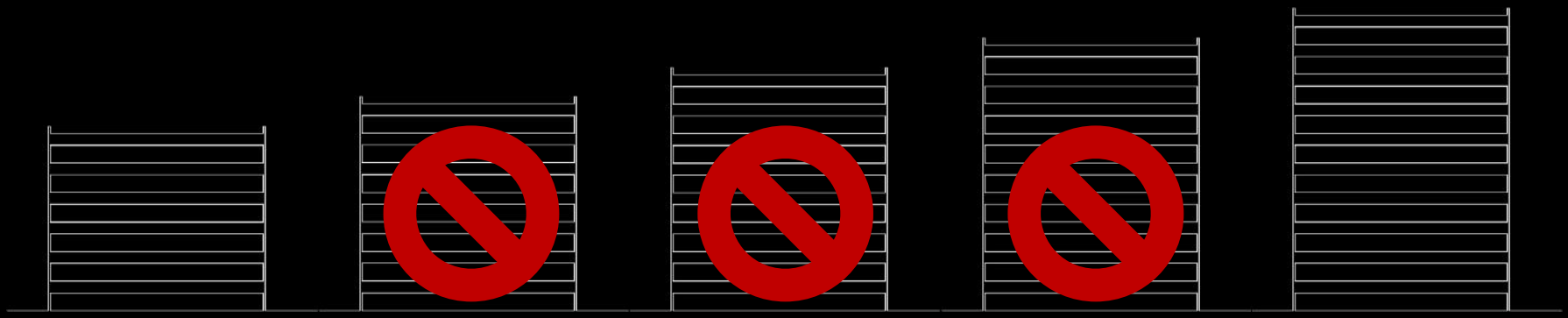
This next section explores the second major market based innovation in the Value Office line, the vertical stacking of panels to max out the low rise potential of the product.

E X C U R S U S

So now we plateaued a second time in the mid-rise commercial office market at 4 stories- But the mid-rise market didn’t plateau….it goes to 6 stories….

powers
brown
archit
ecture

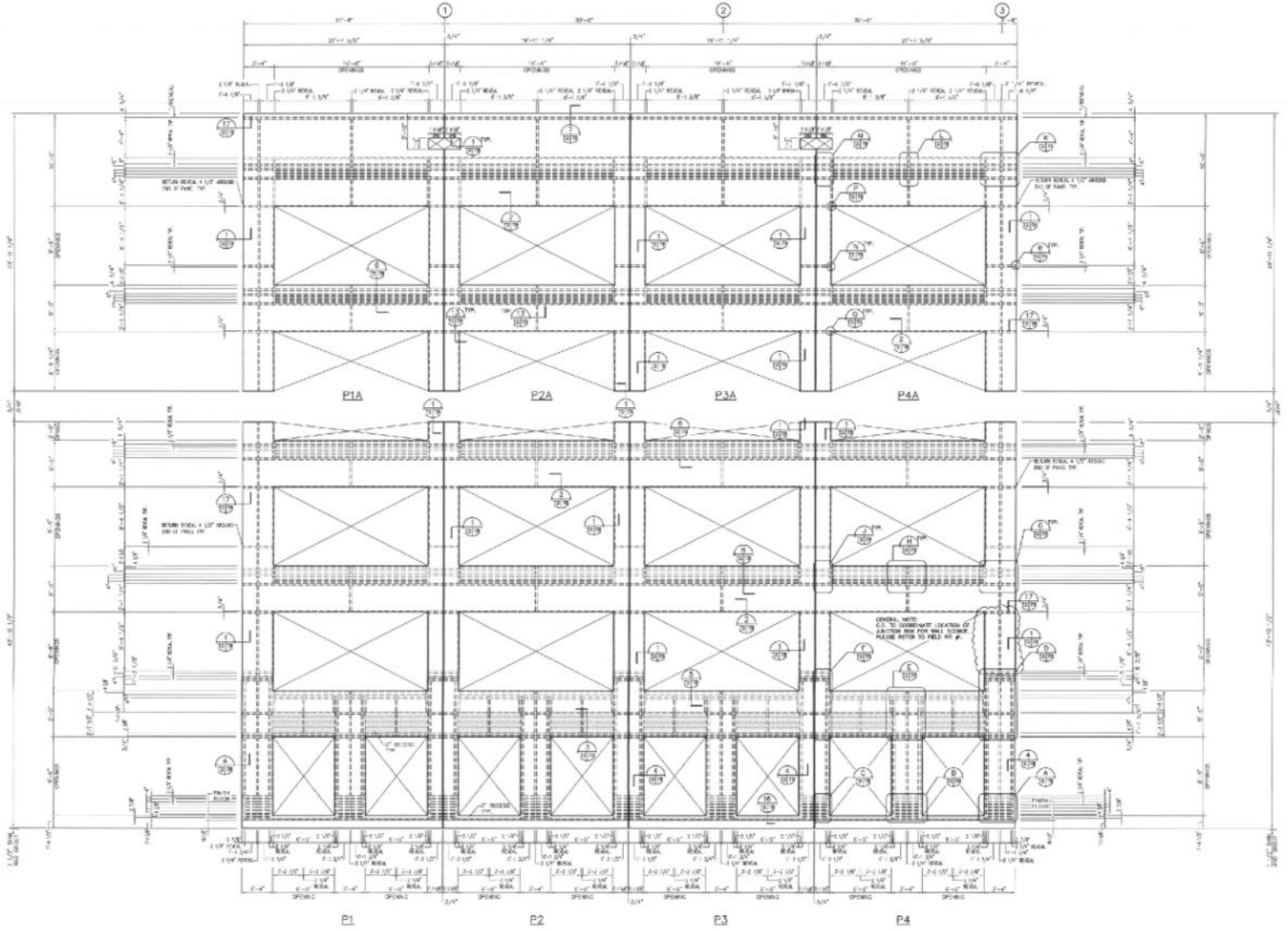
The speculative developer office market has a gap from 6 stories to 10 stories- created by the high-rise code costs. So at 4 stories, we were leaving 2 on the table….


$/SF
$$$$/SF
$$$/SF
$$/SF
$/SF

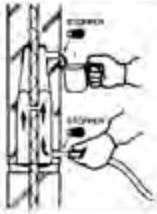
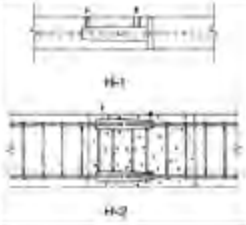
Explainer

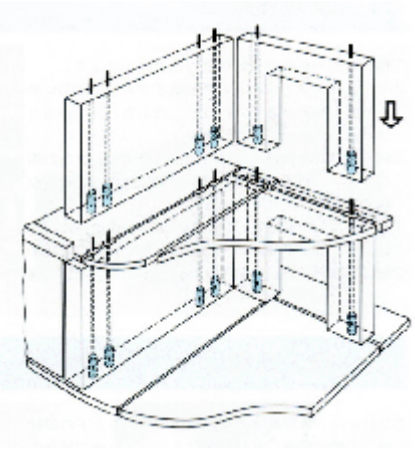
Others had gone to 5 stories but it was difficult and crude to stack and to pick a single panel there is a 20’ wide panel limitation.

We decided to do better.



Large Opening Panel

SYSTEM	PRE-GROUT™ PRE	POST-GROUT™ PG	HORIZONTAL H-1 & H-2
OPERATION			



How It Works

We weren’t the first to stack panels to the level of five stories, but we did re-invent the technology

5- story 30’ wide panel
4 +1 stack
60’ wide top panel

WestGate 1, 2 and 3

typical tilt wall *column-free exterior walls*

St. John Development

4 / 5-story Value Office

Area *100-125,000 sf*
Cost *8,425,000- 10,500,000*
Completion *fall 2017*

WestGate 1, 2 and 3

WestGate 1, 2 and 3

Stream Greenhouse

Stream Greenhouse

Legacy at Fallbrook

5-story Value Office

Area *218,250 SF*
Cost *$16,368,750*
Completion *May 2015*

Legacy at Fallbrook

Westway Plaza

5-story Value Office

Area *323,921 SF*
Cost *$26.4 Million*
Completion *Fall 2015*

Innova 1

5-story Value Office

Area *270,000 sf*
Cost *22,625,000*
Completion *April 2016*

Innova 2

5-story Value Office

Area *240,000 sf*
Cost *23,815,000*
Completion *April 2016*

We were the first in the world to stack panels to the height of six levels however.

6- story 25-35’ wide panel
4 +2 stack

Sierra Pines II

Sierra Pines II

Sierra Pines II

6-story Value Office

Area *162,181 SF*
Cost *$18,000,000*
Completion *December 2014*

Sierra Pines II

Katy Ranch Crossing

6-story Value Office

Area *157,497 SF*
Cost *$12,000,000*
Completion *TBD*

Memorial Herman Cypress

6-story Value Office

Area *157,497 SF*
Cost *$12,000,000*
Completion *TBD*

Confidential

6-story Value Office

Area *252,000 SF*
Cost *TBD*
Completion *TBD*

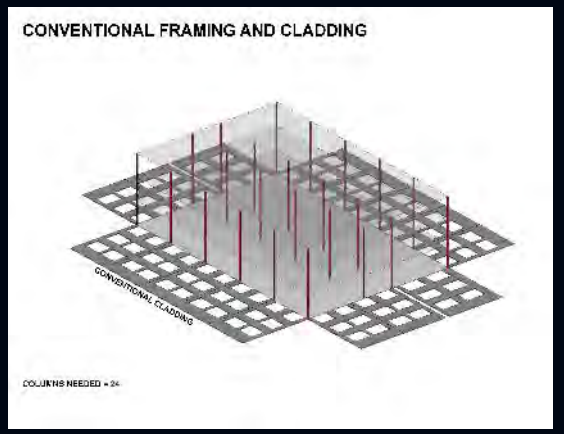
Explainer

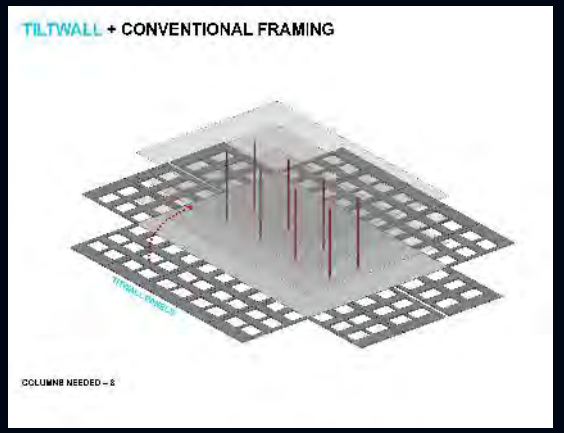
A quick look ahead at what is happening in recent developments for Value Office.

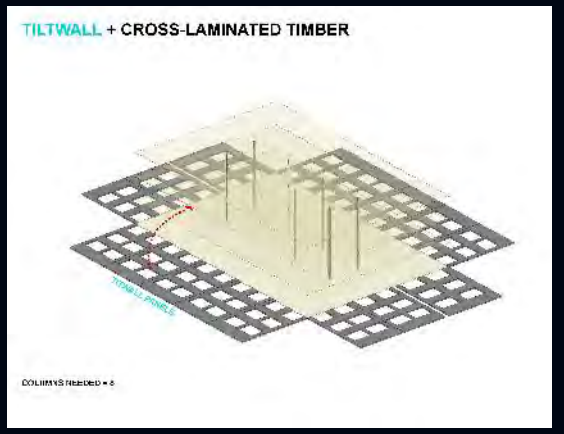
E X C U R S U S

Coming back to our research, we continue to innovate and integrate new technology in the value office product….like CLT

“What if” we accommodated the invasion of the wood industry into tilt wall rather than wringing our hands and bitching about it?


CONVENTIONAL FRAMING AND CLADDING
CONVENTIONAL CLADDING
COLUMNS NEEDED = 24


TILTWALL + CONVENTIONAL FRAMING
COLUMNS NEEDED = 8


TILTWALL + CROSS-LAMINATED TIMBER
COLUMNS NEEDED = 8

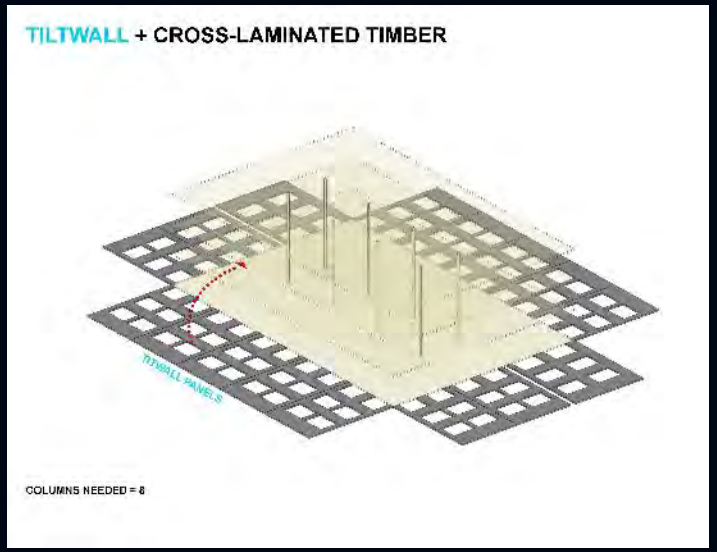

9’ - 0”
10’ - 5-7/8” CLEAR

VO + CLT

Three story, interior timber frame with site cast tilt wall panels		
	CLT	
Foundations	$	3.84
Exterior wall panels	$	19.15
Steel	$	1.15
CLT FLOOR DECK, COLUMNS, BEAMS	$	31.00
Rough Carpentry	$	0.08
Roofing	$	1.72
Caulking and WP	$	0.57
Doors Frames and Hardware	$	1.21
Painting	$	1.98
Millwork	$	0.26
Glass and glazing	$	11.54
Floor finishes	$	6.82
Drywall- Common area partitions	$	7.92
Acoustic ceilings	$	0.35
Thermal insulation	$	1.21
Toilet specialties	$	0.77
Building Specialties	$	0.19
Exterior Canopies	$	1.65
Elevator	$	5.94
Fire Sprinkler	$	1.76
Plumbing	$	6.16
HVAC	$	10.66
Electrical/FA/Temp Power	$	6.93
Common area TI	$	7.70
Contingency	$	3.50
General Conditions, Fees, Ins	$	14.25

Key factor = $65.55

Δ =65.55- 52.90=12.65



Value Office

Three story, interior steel frame with site cast tilt wall panels

	Steel/Tilt Wall
Foundations	$ 3.84
Exterior wall panels	$ 25.15
Steel	$ 16.80
CLT FLOOR DECK, COLUMNS, BEAMS	$ -
Rough Carpentry	$ 0.08
Roofing	$ 1.72
Caulking and WP	$ 0.57
Doors Frames and Hardware	$ 1.21
Painting	$ 1.98
Millwork	$ 0.26
Glass and glazing	$ 11.54
Floor finishes	$ 6.82
Drywall- Common area partitions	$ 7.92
Acoustic ceilings	$ 0.35
Thermal insulation	$ 1.21
Toilet specialties	$ 0.77
Building Specialties	$ 0.19
Exterior Canopies	$ 1.65
Elevator	$ 5.94
Fire Sprinkler	$ 1.76
Plumbing	$ 6.16
HVAC	$ 10.66
Electrical/FA/Temp Power	$ 6.93
Common area TI	$ 7.70
[illegible]	[illegible]
General Conditions, Fees, Ins	$ 16.95

Baseline PSF 86

Key factor = $52.90

Conventional

Three story, steel frame with architectural precast panels

	Steel/Precast
Foundations	$ 3.84
Exterior wall panels	$ 29.03
Steel	$ 18.48
CLT FLOOR DECK, COLUMNS, BEAMS	$ -
Rough Carpentry	$ 0.08
Roofing	$ 1.72
Caulking and WP	$ 0.57
Doors Frames and Hardware	$ 1.21
Painting	$ 1.98
Millwork	$ 0.26
Glass and glazing	$ 11.54
Floor finishes	$ 6.82
Drywall- Common area partitions	$ 7.92
Acoustic ceilings	$ 0.35
Thermal insulation	$ 1.21
Toilet specialties	$ 0.77
Building Specialties	$ 0.19
Exterior Canopies	$ 1.65
Elevator	$ 5.94
Fire Sprinkler	$ 1.76
Plumbing	$ 6.16
HVAC	$ 10.66
Electrical/FA/Temp Power	$ 6.93
Common area TI	$ 7.70
Contingency	$ 3.50
General Conditions, Fees, Ins	$ 19.76

Key factor = $67.27

△ =67.27- 52.90=14.37

Precast + CLT

Three story, timber frame with architectural precast panels

	CLT/Precast
[illegible]	[illegible]
Exterior wall panels	$ 29.03
Steel	$ 4.50
CLT FLOOR DECK, COLUMNS, BEAMS	$ 31.00
Rough Carpentry	$ 0.08
Roofing	$ 1.72
Caulking and WP	$ 0.57
Doors Frames and Hardware	$ 1.21
Painting	$ 1.98
Millwork	$ 0.26
Glass and glazing	$ 11.54
Floor finishes	$ 6.82
Drywall- Common area partitions	$ 7.92
Acoustic ceilings	$ 0.35
Thermal insulation	$ 1.21
Toilet specialties	$ 0.77
Building Specialties	$ 0.19
Exterior Canopies	$ 1.65
Elevator	$ 5.94
Fire Sprinkler	$ 1.76
Plumbing	$ 6.16
HVAC	$ 10.66
Electrical/FA/Temp Power	$ 6.93
Common area TI	$ 7.70
[illegible]	[illegible]
General Conditions, Fees, Ins	$ 17.06

Key factor = $81.59

△ =81.59- 67.27=14.32

VO + CLT

Three story, interior timber frame with site cast tilt wall panels

	CLT
Foundations	$ 3.84
Exterior wall panels	$ 19.15
Steel	$ 1.15
CLT FLOOR DECK, COLUMNS, BEAMS	$ 31.00
Rough Carpentry	$ 0.08
Roofing	$ 1.72
Caulking and WP	$ 0.57
Doors Frames and Hardware	$ 1.21
Painting	$ 1.98
Millwork	$ 0.26
Glass and glazing	$ 11.54
Floor finishes	$ 6.82
Drywall- Common area partitions	$ 7.92
Acoustic ceilings	$ 0.35
Thermal insulation	$ 1.21
Toilet specialties	$ 0.77
Building Specialties	$ 0.19
Exterior Canopies	$ 1.65
Elevator	$ 5.94
Fire Sprinkler	$ 1.76
Plumbing	$ 6.16
HVAC	$ 10.66
Electrical/FA/Temp Power	$ 6.93
Common area TI	$ 7.70
Contingency	$ 3.50
General Conditions, Fees, Ins	$ 14.25

Key factor = $65.55

△ =65.55- 52.90=12.65

$14.37

$14.32

$1.72

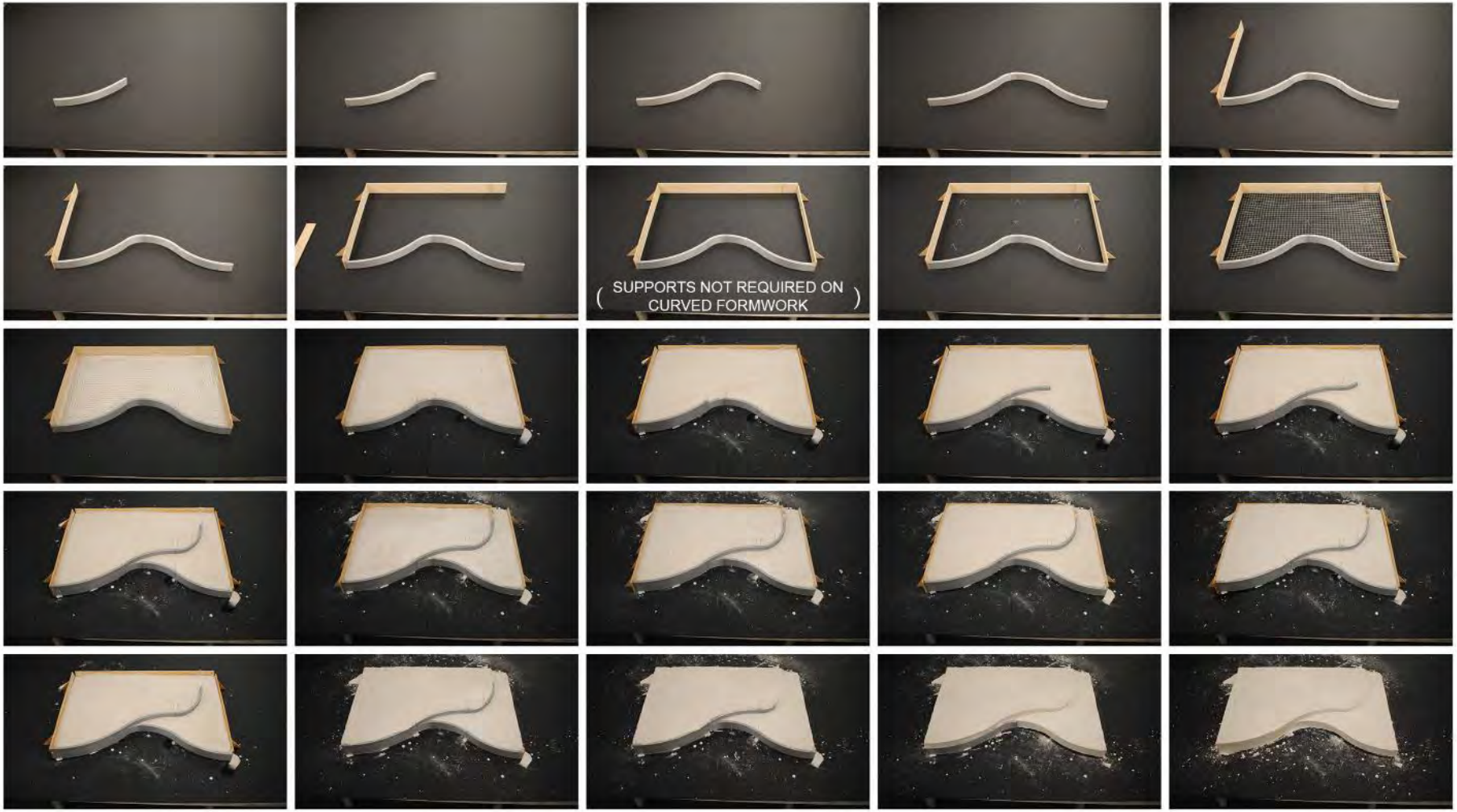
$16.10

CLT is about the same cost as conventional construction

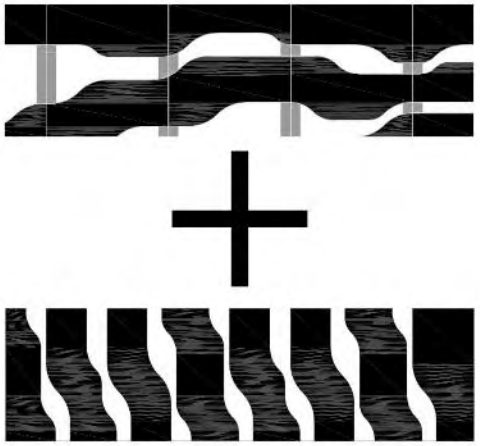
And it is cheaper to convert VO to CLT than Conventional

Product Development

GeoForm



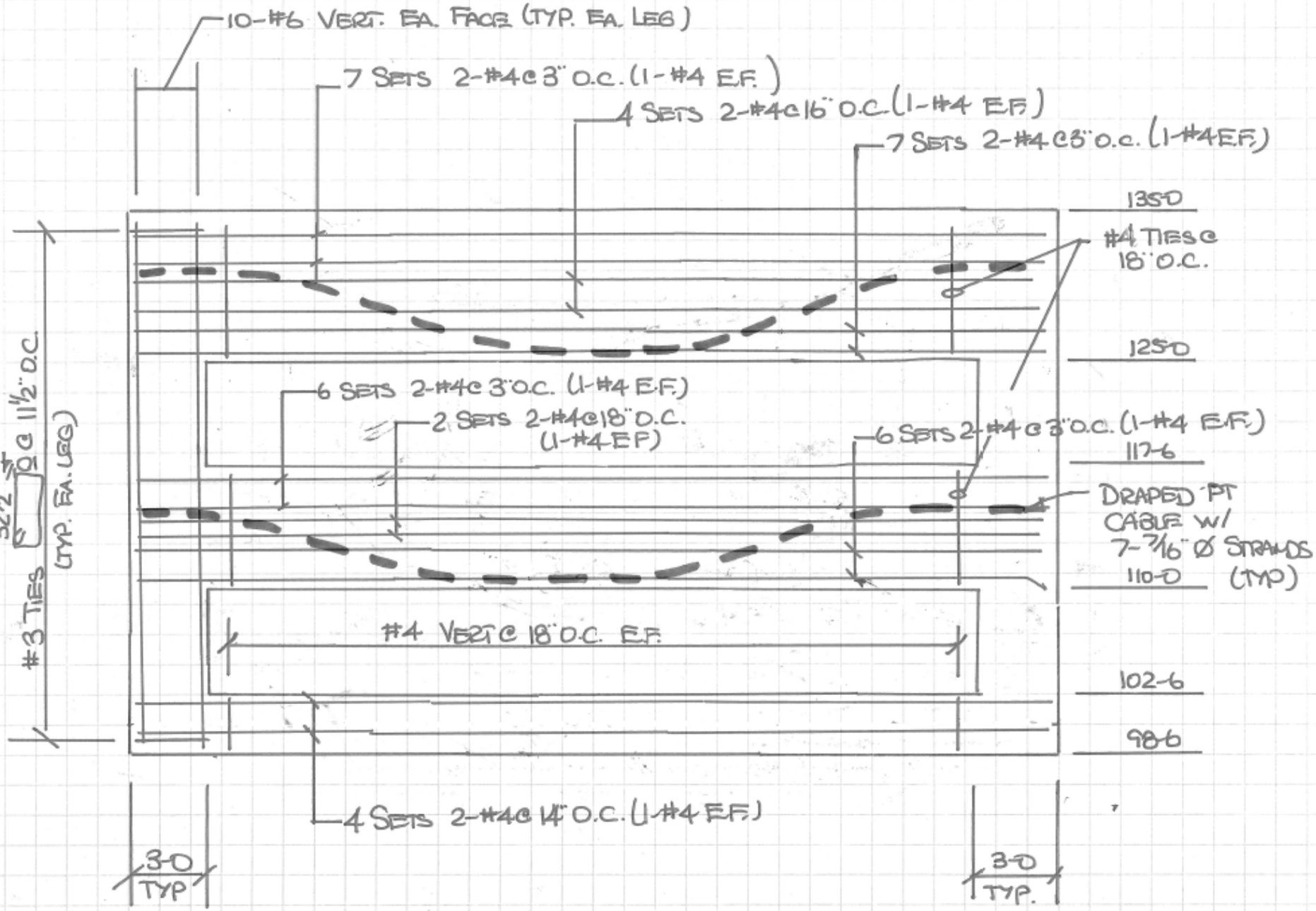
TOP-CAST PANEL INSTALLATION MOCK-UP *(1-1/2" = 1'-0" SCALE)*



*CASE STUDY **01***

And finally just a couple of interesting things underway or just coming into production in the Value Office space…

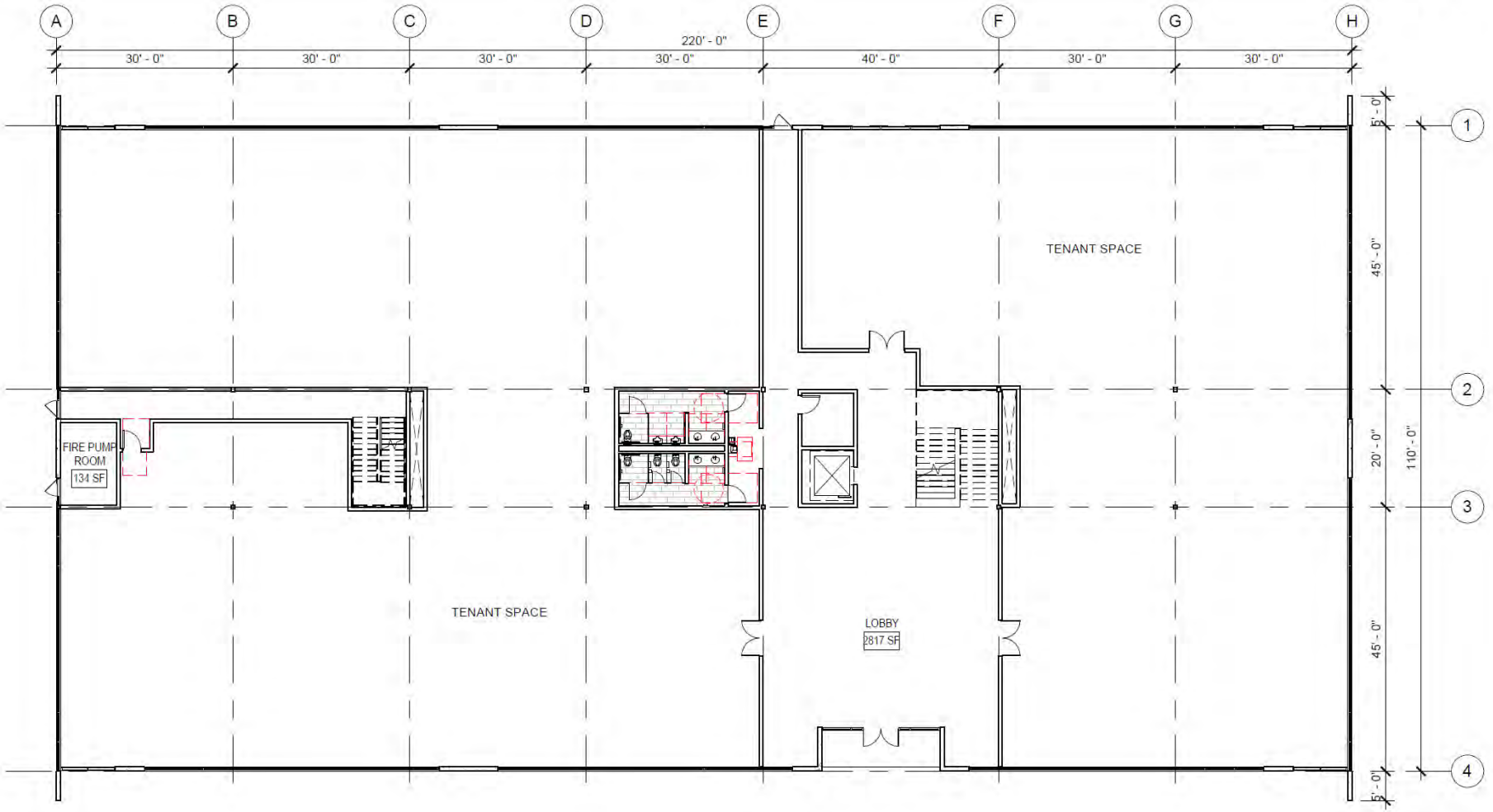
Innovation in Panel design / structure


10-#6 VERT. EA. FACE (TYP. EA. LEG)
7 SETS 2-#4 @ 3" O.C. (1-#4 E.F.)
4 SETS 2-#4 @ 16" O.C. (1-#4 E.F.)
7 SETS 2-#4 @ 3" O.C. (1-#4 E.F.)
135-0
#4 TIES @ 18" O.C.
125-0
6 SETS 2-#4 @ 3" O.C. (1-#4 E.F.)
2 SETS 2-#4 @ 18" O.C. (1-#4 E.F.)
6 SETS 2-#4 @ 3" O.C. (1-#4 E.F.)
117-6
DRAPED PT CABLE W/ 7-7/16" Ø STRANDS (TYP)
110-0
#4 VERT @ 18" O.C. E.F.
102-6
98-6
32½"
#3 TIES @ 11½" O.C. (TYP. EA. LEG)
4 SETS 2-#4 @ 14" O.C. (1-#4 E.F.)
3-0 TYP
3-0 TYP.

FLOOR PLAN

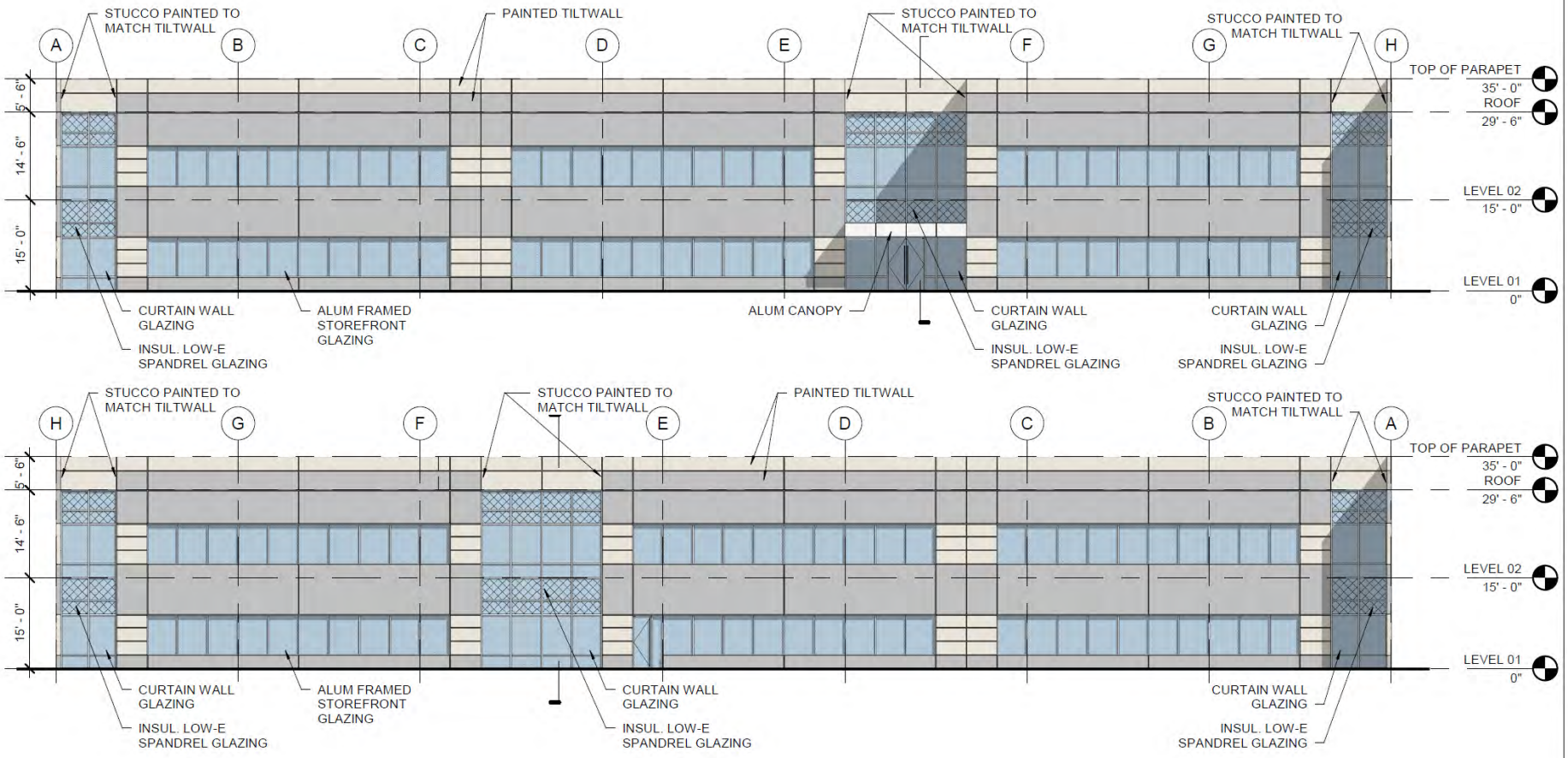
LEVEL 01

SCALE: 1/16" = 1'-0"



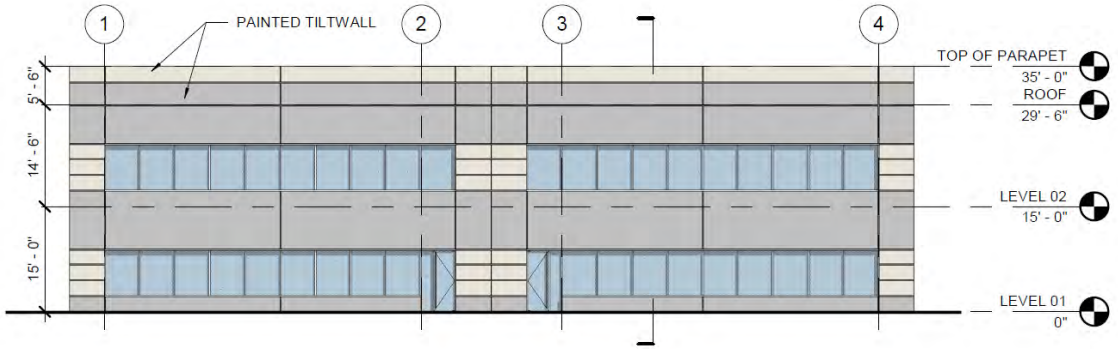
OVERALL BUILDING ELEVATIONS

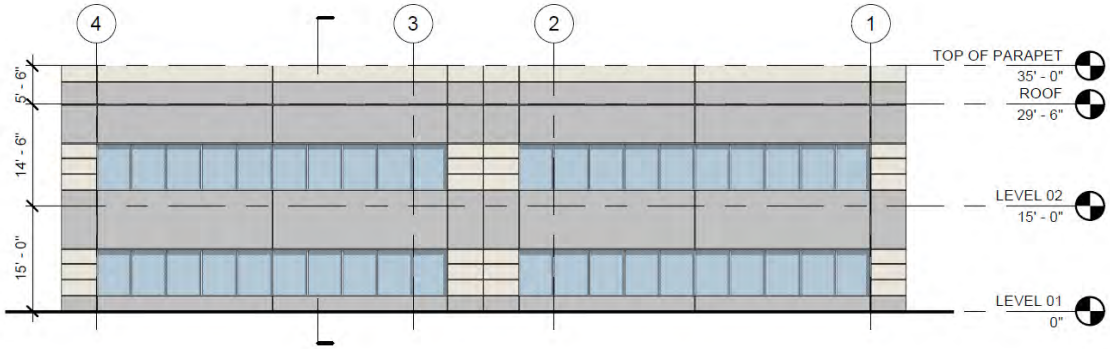
SCALE: 1/16" = 1'-0"



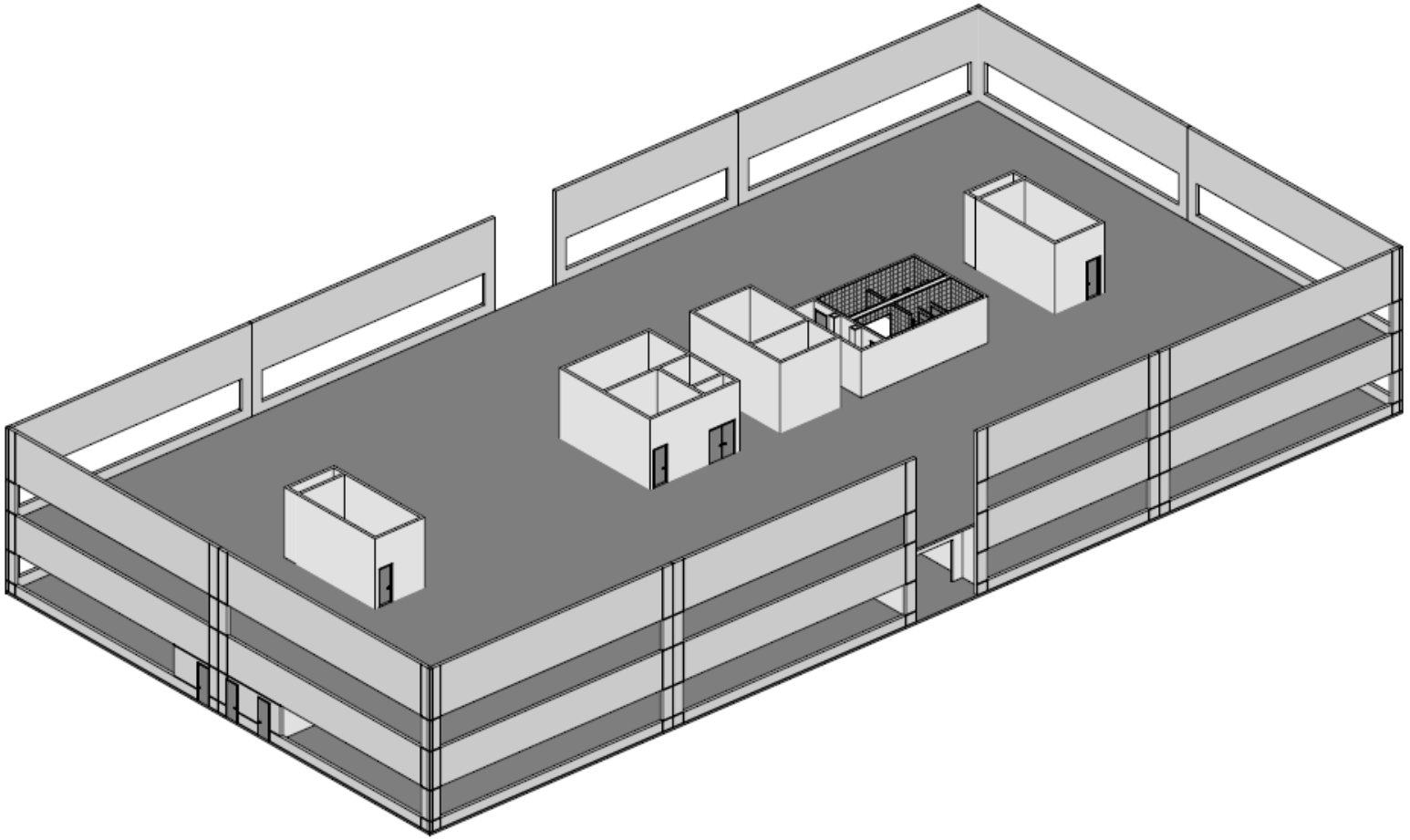
OVERALL BUILDING ELVATIONS

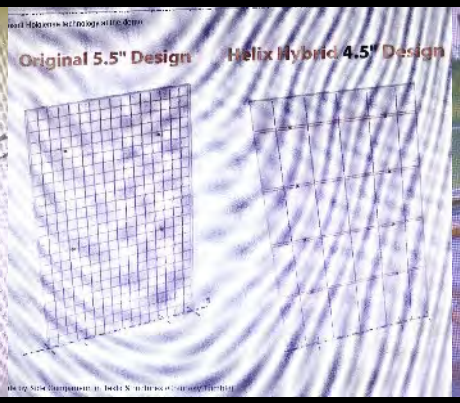
SCALE: 1/16" = 1'-0"





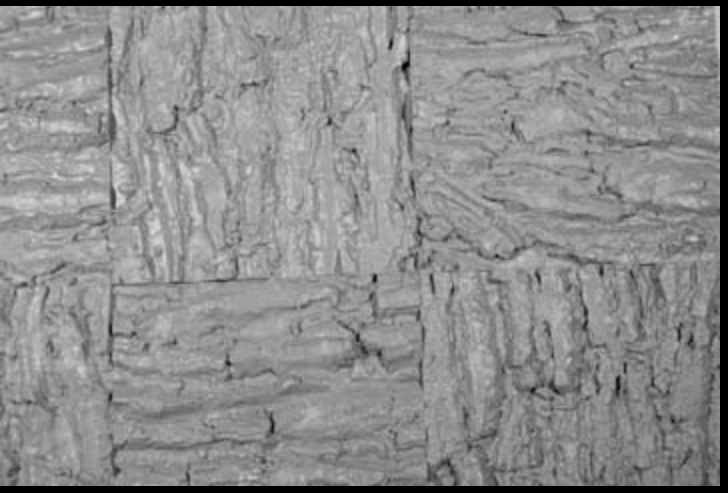
*PRELIMINARY NOT FOR CONSTRUCTION, PERMIT, OR REGULATORY APPROVAL. *RENDERING IS REPRESENTATIVE OF DESIGN INTENT ONLY. IT IS NOT A PHOTOREALISTIC REPRESENTATION OF ACTUAL MATERIALS PROPOSED AND SHOULD BE CONSIDERED PRELIMINARY AT ALL STAGES.
*ALL BUILDING AREAS ARE APPROXIMATE UNTIL BUILDING FOOTPRINT / ENTRY DESIGNS ARE FINALIZED.

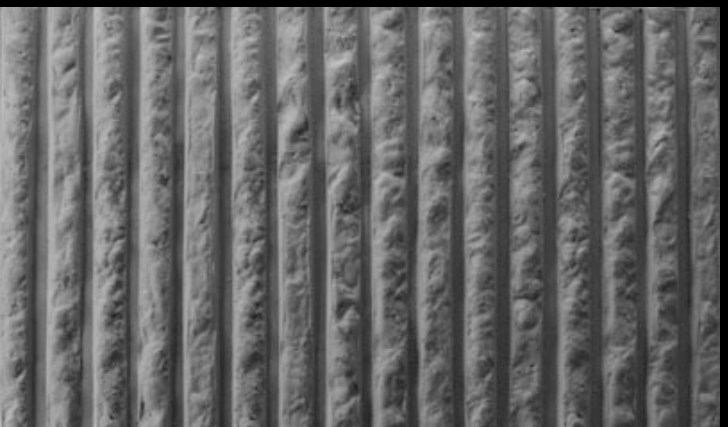


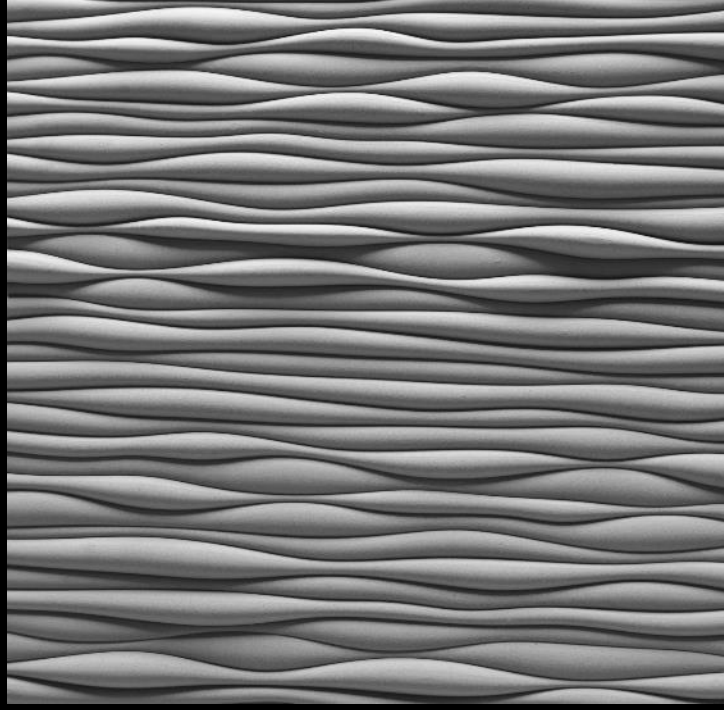


ccessful Erection of 4.5 in thick panel at TCA Demo

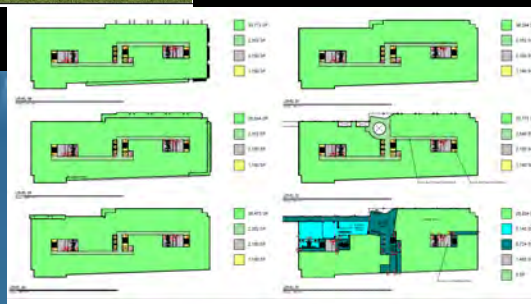
Innovation in Finishes / Single Use Form Liners

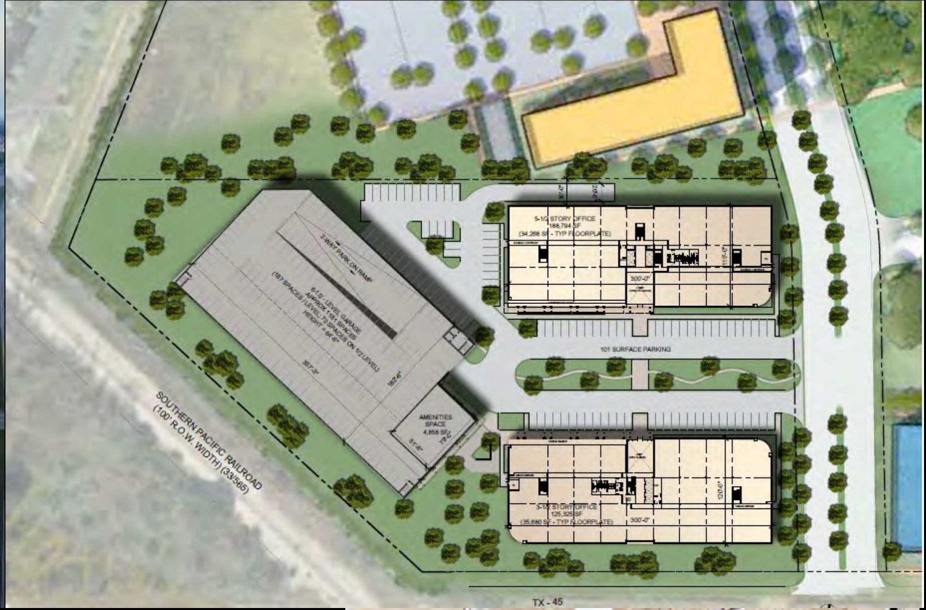







PHASE 1
PHASE 2
PHASE 1
PHASE 2
W LOUIS HENNA BLVD





5-1/2 STORY OFFICE
188,794 SF
(34,268 SF - TYP FLOORPLATE)
2-WAY PARK ON RAMP
6-1/2 - LEVEL GARAGE
APPROX 1161 SPACES
(167 SPACES / LEVEL, 70 SPACES ON 1/2 LEVEL)
HEIGHT = 64'-6"
101 SURFACE PARKING
AMENITIES
SPACE
4,858 SF
SOUTHERN PACIFIC RAILROAD
(100' R.O.W. WIDTH) (33/565)
3-1/2 STORY OFFICE
125,325 SF
(35,880 SF - TYP FLOORPLATE)
300'-0"
TX - 45

The big idea here is;

In conclusion, we have designed and constructed over 50 value office projects for 22 different clients since 2004 when we first realized this was an opportunity.

The idea has gone from a trend that we had to sell to a product universally accepted and which now clients come to us to buy.

E X C U R S U S