REFLECTING DIFFERENCES IN BUILDING FUNCTION THROUGH ARCHITECTURAL FORM AND MATERIALITY

A Multi-Use Mid-Rise Tower for downtown Indianapolis, Indiana

Ball State University
College of Architecture and Planning
Department of Architecture
5th year architectural thesis report

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Additional thanks to:

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My brother David Runkel
My father and mother-in-law, Bill and Mary North

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Above all, I would like to thank my wife Kelly. You have made all of the success I have had thus far possible. Thank you so much for all of the sacrifices that you have made during the past four years and the continued support you have given me throughout my academic career.

I LOVE YOU.
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INTRODUCTION
The thesis issue that I have explored over the last several months is that of reflecting differences in building function through architectural form and materiality. Many of our buildings today are designed in such a way that becomes repetitious and mundane to the common person or passerby. More often than not, different functions within a building are of the same overall form and materiality and offer no sense of distinctiveness or respect to typology. We as architects/designers have ever more imperative and crucial responsibilities to the public. One of these responsibilities is to design buildings that serve the client purpose and respect their surrounding context. The other responsibility is to respect the known typology of the building while still creating a unique and individual sense of identity, through the creative use of architectural form and materiality.

The real issue that I have with our current designs for mid-rise towers, is that they are almost all designed as rectangular masses which consist of facades that change very little if at all through the height of the entire building. The reason for this “lack of architectural design”, is a combination of economics and ease of construction. Though this thesis project, I intend to explore and develop subtle ways to push the envelope of the thought to be “norm” of mid-rise towers.
The project that I have chosen to explore my thesis issue of reflecting function through architectural form and materiality is that of a multi-use mid-rise tower. The design of a multi-use mid-rise tower will help bring life and revitalization to the downtown of Indianapolis. Multi-use buildings have and will continue to contribute to the gathering of diverse people in a common area. By including multiple different components in the same building, people of varied backgrounds, ethnicity and purpose for being in the downtown area will be forced to congregate and use the same building. The building components of retail, office/commercial, and residential will all contribute to bringing different people together on a daily basis. People that will use the retail component of the building will consist of regular, occasional, and new customers/shoppers everyday. The office/commercial component will bring employees and occasional visitors/clients together on a daily basis. Finally, the design of the residential component will play an important role in creating relationships between tenants and any occasional guests.
PROJECT OBJECTIVES

- To design a building that reflects the differences in function of the users and activities inside by using architectural form and materiality.

- To design a building that respects and responds to the surrounding context, yet still has its own unique identity and character.

- To design a building that adheres to the existing building codes, regulations and set backs, but still attempts in small ways to push the envelope of the thought to be “norm” of mid-rise towers.
PROGRAM

RETAIL COMPONENT:

Sales Floor  (1) @ 5,000 s.f. = 5,000 s.f.
Managerial Office  (1) @ 110 s.f. = 110 s.f.
Stock Room  (1) @ 1,000 s.f. = 1,000 s.f.
Delivery/Receiving  (1) @ 450 s.f. = 450 s.f.

Net Assignable Area = 6,560 s.f. per retail outlet

6,560 s.f. / .60 = 10,933 s.f. Per outlet x 2 outlets x 3 levels = 65,598 s.f.

RETAIL GROSS SQUARE FOOTAGE TOTAL = 65,598 s.f.

OFFICE COMPONENT:

Private Offices  (3) @ 350 s.f. each = 1,050 s.f.
Conference Rooms  (2) @ 360 s.f. each = 720 s.f.
Employee Breakroom  (1) @ 200 s.f. = 200 s.f.
Office Space Cubicle  (80) @ 72 s.f. each = 5,760 s.f.

Net Assignable Area = 7,730 s.f. per retail outlet

7,730 s.f. / .65 = 11,892 s.f. Per office x 1 per level x 10 levels = 118,920 s.f.

OFFICE GROSS SQUARE FOOTAGE TOTAL = 118,920 s.f.
RESIDENTIAL COMPONENT:

ONE BEDROOM APARTMENT:

<table>
<thead>
<tr>
<th>Room</th>
<th>Quantity</th>
<th>Area (s.f.)</th>
<th>Total (s.f.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dining Room</td>
<td>(1)</td>
<td>@ 200</td>
<td>= 200 s.f.</td>
</tr>
<tr>
<td>Living Room</td>
<td>(1)</td>
<td>@ 450</td>
<td>= 450 s.f.</td>
</tr>
<tr>
<td>Kitchen</td>
<td>(1)</td>
<td>@ 175</td>
<td>= 175 s.f.</td>
</tr>
<tr>
<td>Master Bedroom</td>
<td>(1)</td>
<td>@ 280</td>
<td>= 280 s.f.</td>
</tr>
<tr>
<td>Private Balcony</td>
<td>(1)</td>
<td>@ 110</td>
<td>= 110 s.f.</td>
</tr>
</tbody>
</table>

Net Assignable Area = 1,215 s.f. Per apartment

1,215 s.f. / .70 = 1,735 s.f. Per apartment x 28 apts. = 48,580 s.f.

ONE BEDROOM APARTMENT GROSS SQUARE FOOTAGE = 48,580 s.f.

TWO BEDROOM:

<table>
<thead>
<tr>
<th>Room</th>
<th>Quantity</th>
<th>Area (s.f.)</th>
<th>Total (s.f.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dining Room</td>
<td>(1)</td>
<td>@ 200</td>
<td>= 200 s.f.</td>
</tr>
<tr>
<td>Living Room</td>
<td>(1)</td>
<td>@ 450</td>
<td>= 450 s.f.</td>
</tr>
<tr>
<td>Kitchen</td>
<td>(1)</td>
<td>@ 175</td>
<td>= 175 s.f.</td>
</tr>
<tr>
<td>Bedroom</td>
<td>(1)</td>
<td>@ 150</td>
<td>= 150 s.f.</td>
</tr>
<tr>
<td>Master Bedroom</td>
<td>(1)</td>
<td>@ 280</td>
<td>= 280 s.f.</td>
</tr>
<tr>
<td>Private Balcony</td>
<td>(1)</td>
<td>@ 110</td>
<td>= 110 s.f.</td>
</tr>
</tbody>
</table>

Net Assignable Area = 1,365 s.f. Per apartment

1,365 s.f. / .70 = 1,950 s.f. Per apartment x 16 apts. = 31,200 s.f.

TWO BEDROOM APARTMENT GROSS SQUARE FOOTAGE = 31,200 s.f.
## PROGRAM

### THREE BEDROOM:

<table>
<thead>
<tr>
<th></th>
<th>Quantity</th>
<th>Area</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dining Room</td>
<td>1</td>
<td>200 s.f.</td>
<td>200 s.f.</td>
</tr>
<tr>
<td>Living Room</td>
<td>1</td>
<td>450 s.f.</td>
<td>450 s.f.</td>
</tr>
<tr>
<td>Kitchen</td>
<td>1</td>
<td>175 s.f.</td>
<td>175 s.f.</td>
</tr>
<tr>
<td>Bedroom</td>
<td>2</td>
<td>180 s.f.</td>
<td>360 s.f.</td>
</tr>
<tr>
<td>Master Bedroom</td>
<td>1</td>
<td>300 s.f.</td>
<td>300 s.f.</td>
</tr>
<tr>
<td>Laundry Room</td>
<td>1</td>
<td>75 s.f.</td>
<td>75 s.f.</td>
</tr>
<tr>
<td>Private Balcony</td>
<td>3</td>
<td>110 s.f.</td>
<td>330 s.f.</td>
</tr>
</tbody>
</table>

Net Assignable Area = 1,890 s.f. Per apartment

1,890 s.f. / .70 = 2,700 s.f. Per apartment x 20 apts. = 54,000 s.f.

### THREE BEDROOM APARTMENT GROSS SQUARE FOOTAGE = 54,000 s.f.

### RESIDENTIAL SUB-TOTALS:

<table>
<thead>
<tr>
<th></th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE BEDROOM APARTMENTS</td>
<td>48,580 S.F.</td>
</tr>
<tr>
<td>TWO BEDROOM APARTMENTS</td>
<td>31,200 S.F.</td>
</tr>
<tr>
<td>THREE BEDROOM APARTMENTS</td>
<td>54,000 S.F.</td>
</tr>
</tbody>
</table>

RESIDENTIAL GROSS SQUARE FOOTAGE TOTAL = 133,780 S.F.

### PRIVATE SUBTERRANEAN PARKING GARAGE:

Assuming 3 parking spaces per apartment x 64 apartments = 192 spaces required.

Parking Space     | (192) @ | 300 s.f. each | 57,600 s.f. |

PRIVATE PARKING GROSS SQUARE FOOTAGE = 57,600 s.f.
PROGRAM

SUB-TOTALS OF GROSS SQUARE FOOTAGES:

<table>
<thead>
<tr>
<th>Component</th>
<th>Footage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail Component</td>
<td>65,598</td>
</tr>
<tr>
<td>Office Component</td>
<td>118,920</td>
</tr>
<tr>
<td>Residential Component</td>
<td>133,780</td>
</tr>
<tr>
<td>Private Parking Component</td>
<td>57,600</td>
</tr>
</tbody>
</table>
---|---|---|---|
| Gross Square Footage            | 375,898 |

UNASSIGNED SQUARE FOOTAGES:

<table>
<thead>
<tr>
<th>Component</th>
<th>Footage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrium</td>
<td>21,600</td>
</tr>
<tr>
<td>(2,400 s.f./level at 9 levels)</td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>18,794</td>
</tr>
<tr>
<td>(5% of gross area)</td>
<td></td>
</tr>
<tr>
<td>Public Toilets</td>
<td>5,638</td>
</tr>
<tr>
<td>(1.5% of gross area)</td>
<td></td>
</tr>
<tr>
<td>Janitor Closets</td>
<td>751</td>
</tr>
<tr>
<td>(0.2% of gross area)</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>1,127</td>
</tr>
<tr>
<td>(0.3% of gross area)</td>
<td></td>
</tr>
<tr>
<td>Walls, Structure</td>
<td>26,312</td>
</tr>
<tr>
<td>(7% of gross area)</td>
<td></td>
</tr>
</tbody>
</table>

---|---|
| Unassigned Gross Square Footage | 74,222 |

TOTAL GROSS SQUARE FOOTAGE TOTAL: 450,120 S.F.

ESTIMATED COSTS:

<table>
<thead>
<tr>
<th>Cost</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Cost</td>
<td>$47,262,600</td>
</tr>
<tr>
<td>Fixed Equipment</td>
<td>$3,308,382</td>
</tr>
<tr>
<td>Site Development</td>
<td>$2,363,130</td>
</tr>
<tr>
<td>Total Construction Cost</td>
<td>$52,934,112</td>
</tr>
<tr>
<td>Site Acquisition</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Movable Equipment</td>
<td>$9,452,520</td>
</tr>
<tr>
<td>Professional Fees</td>
<td>$1,417,878</td>
</tr>
<tr>
<td>Programming</td>
<td>$1,417,878</td>
</tr>
<tr>
<td>Architecture</td>
<td>$2,835,756</td>
</tr>
<tr>
<td>Interiors</td>
<td>$1,890,504</td>
</tr>
<tr>
<td>Contingencies</td>
<td>$9,452,520</td>
</tr>
<tr>
<td>Administration Costs</td>
<td>$1,417,878</td>
</tr>
</tbody>
</table>

Total Budget** $80,401,168

* Cost per square foot derived from weighted average of the parking, retail, office and residential building components

** Estimated cost is in November 2003 United States Dollars
DESIGN CONCEPT

The overall concept of the thesis project will be to reflect differences in building function through the creative use of architectural form and materiality. The goal of the project is not to define function from the exterior, but to reflect that there are differences in function throughout different areas of the building. Architectural form and materials that can be utilized to reflect differences in function will drive the decisions of the design process. Differences in the structure and facade, such as exposed versus concealed and angled versus orthogonal will be used to achieve the desired exterior visual difference in the building's function.

The multi-use mid-rise tower will be designed and organized in such a way that provides the appropriate amount of access and or privacy that each of the three different components require. The retail component will be located on the first three levels. This location will give pedestrians easy access to the different retail outlets and help reduce pedestrian traffic throughout the rest of the building. In addition to convenience for customers, the first floor location of the retail will also allow easy delivery of the everyday shipments of retail stock. The office component will be located in the middle floors of the building. This location will provide the adequate privacy or separation that may be desired from the busy downtown streets. Finally, the residential component of the building will be located on the upper levels to take advantage of the multiple different views of downtown Indianapolis.
CONTEXTUAL/SITE ANALYSIS
The site for the multi-use mid-rise tower is located in downtown Indianapolis, Indiana on the corner of Washington and Illinois Streets. Currently the site is being utilized as a small inner-urban park, which is primarily used by people on their lunch hours. Washington and Illinois Streets are both major one-way vehicular thoroughfares of downtown Indianapolis. While these streets serve as vehicular circulation, they also serve as major components of the pedestrian circulation system of Indianapolis. Located only one block southwest from Monument Circle and directly across the street from Circle Centre Mall, the site serves as a major node of pedestrian circulation during the workweek as well as the weekend.

The context of the downtown area around the intersection of Washington and Illinois Streets must be thought of and respected while designing the thesis project. Many of the buildings in this area of downtown do not respect the surrounding context. The Indianapolis Arts Garden, which is a structure that hovers over the intersection of Washington and Illinois Streets and is located directly adjacent to the thesis site, is a prime example of a building that does not respect its context in either aspect of form or materiality. While serving as a connection between the site and the adjacent context of Circle Centre Mall, the contemporary Arts Garden, poses a difficult design challenge. The challenge will be that of connecting to the contemporary Arts Garden and still respecting the surrounding context.
CONTEXTUAL/SITE ANALYSIS

CIRCLE CENTRE MALL
SPORTS FACILITIES
PARKS AND RECREATION
IUPUI CAMPUS
IU MEDICAL CENTER
WHITE RIVER
VEHICULAR CIRCULATION
THEESIS SITE

CONTEXTUAL MAP OF DOWNTOWN INDIANAPOLIS
SCALE: GRAPHIC
CONTEXTUAL/SITE ANALYSIS

RCA DOME

VIEW OF CANAL

WHITE RIVER GARDENS

CONSECO FIELDHOUSE

CAPITAL BUILDING

INDIANA STATE MUSEUM

VICTORY FIELD

CAPITAL BUILDING

EITELJORG MUSEUM

NORTHWEST VIEW

NORTH NORTHWEST VIEW

NCAA HALL OF CHAMPIONS

SOUTHERN NIGHT VIEW OF DOWNTOWN

SOUTHERN NIGHT VIEW OF DOWNTOWN
CONTEXTUAL/SITE ANALYSIS

MONUMENT CIRCLE  NIGHT VIEW OF SITE  ARIAL PHOTOGRAPH OF SITE

- CIRCLE CENTRE MALL
- PARKS AND RECREATION
- INDIANAPOLIS ARTS GARDEN
- EXISTING BUILDINGS

IMMEDIATE CONTEXTUAL/SITE ANALYSIS
NOT TO SCALE
PROCESS

PROCESS #1

PROCESS #2

PROCESS #3

PROCESS #4

PROCESS #5

PROCESS #6

PROCESS #7

PROCESS #8
FLOOR PLANS

FLOOR PLANS ARE ALL REFERENCED TO BUILDING SECTION ON PAGE 30.

1 SUBTERRANEAN PARKING PLAN

SCALE: GRAPHIC

CIRCULATION
MECHANICAL SPACE
SUBTERRANEAN PARKING

ENERGY CONVERSION SPACE

NORTH
FLOOR PLANS

6 MECH./RESIDENTIAL PLAN (LEVEL 9)

SCALE: GRAPHIC

CIRCULATION
BUILDING SERVICES
MECHANICAL SPACE
ONE BEDROOM RESIDENTIAL
OPEN TO BELOW

REFLECTING DIFFERENCES IN BUILDING FUNCTION
THROUGH ARCHITECTURAL FORM AND MATERIALITY
FLOOR PLANS

REFLECTING DIFFERENCES IN BUILDING FUNCTION THROUGH ARCHITECTURAL FORM AND MATERIALITY

8 RESIDENTIAL PLAN (LEVELS 17-20)

SCALE: GRAPHIC

CIRCULATION
BUILDING SERVICES
MECHANICAL SPACE
ONE BEDROOM RESIDENTIAL
TWO BEDROOM RESIDENTIAL
THREE BEDROOM RESIDENTIAL

NORTH
FLOOR PLANS

CIRCULATION
BUILDING SERVICES
MECHANICAL SPACE
ONE BEDROOM RESIDENTIAL
TWO BEDROOM RESIDENTIAL
THREE BEDROOM RESIDENTIAL
ROOF TOP GATHERING/LEISURE SPACE

9 RESIDENTIAL PLAN (LEVELS 21-24)
SCALE: GRAPHIC

REFLECTING DIFFERENCES IN BUILDING FUNCTION
THROUGH ARCHITECTURAL FORM AND MATERIALITY
CONTEXTUAL SECTION/ELEVATION
NOT TO SCALE
SCHEMATIC BUILDING SECTION (S-1)
NOT TO SCALE
SECTIONS

OFFICE/COMMERCIAL DETAILED SECTION RENDERING ‘B’
NOT TO SCALE

RESIDENTIAL DETAILED SECTION RENDERING ‘B’
NOT TO SCALE
SECTIONS

OFFICE/COMMERCIAL DETAILED SECTION RENDERING 'C'
NOT TO SCALE

RESIDENTIAL DETAILED SECTION RENDERING 'C'
NOT TO SCALE
ELEVATIONS
ELEVATIONS

WASHINGTON STREET (SOUTH) ELEVATION
NOT TO SCALE

ILLINOIS STREET (WEST) ELEVATION
NOT TO SCALE
DAYLIGHT STUDIES
Daylight studies have been completed to show the affect that the new multi-use mid-rise tower will have on the immediate site and the surrounding context. For the fall, winter, and spring an "original" study has been provided to show the new shadow that will be cast over Monument Circle. As the studies show, the new multi-use mid-rise tower has little affect on Monument Circle during the fall and spring months and no affect on the Circle during the winter months due to the fact that it is already entirely covered by shadow. The "original" study for the summer months has been excluded due to the fact that the new multi-use mid-rise tower has no affect on Monument Circle.
DAYLIGHT STUDY (FALL)

1:00 P.M. SEPTEMBER 21

3:00 P.M. SEPTEMBER 21

5:00 P.M. SEPTEMBER 21

ORIGINAL

1:00 P.M. SEPTEMBER 21

3:00 P.M. SEPTEMBER 21

5:00 P.M. SEPTEMBER 21

NEW
DAYLIGHT STUDY (WINTER)

1:00 P.M. DECEMBER 21

3:00 P.M. DECEMBER 21

5:00 P.M. DECEMBER 21

ORIGINAL

1:00 P.M. DECEMBER 21

3:00 P.M. DECEMBER 21

5:00 P.M. DECEMBER 21

NEW
DAYLIGHT STUDY (SPRING)

1:00 P.M. MARCH 21

3:00 P.M. MARCH 21

5:00 P.M. MARCH 21

ORIGINAL

1:00 P.M. MARCH 21

3:00 P.M. MARCH 21

5:00 P.M. MARCH 21

NEW
renderings
VIEW FROM I-65 (EAST SIDE OF DOWNTOWN)
NOT TO SCALE

VIEW FROM I-70 (SOUTH SIDE OF DOWNTOWN)
NOT TO SCALE
SOUTHEASTERN AXONOMETRIC
NOT TO SCALE
A view while walking north on Illinois Street. From this vantage point, pedestrians as well as motorists can visually connect with all of the different functions of the building. Circulation, office and residential functions can all be seen and experienced from here.

VIEW FROM ILLINOIS STREET
NOT TO SCALE

During the evening hours, the building will transform into a beacon of light that continues to draw the eye of the passerby.

NIGHT VIEW FROM ILLINOIS STREET
NOT TO SCALE
A view while walking west on Washington Street. This view illustrates the effect that the reflective architectural panels, which have been used on the office/commercial and residential components, have on the appearance of the building. Depending on the view the user has and the time of day, the building will appear to be a different colors. This relates back to the concept of an ever changing function within the building. Refer to page 46 for to see the visual difference that has been accomplished.
A view of all four functions. The angled facade is office/commercial, the orthogonal facade is residential, the lower glazing system is vertical circulation and the upper glazing system is horizontal circulation.

A view of the residential elevator shaft. Every time residents arrive to or leave their apartments they will get to experience a bird’s eye view of the city by traveling up and down the elevator. The elevator shaft consists of an exterior glazing system to allow tremendous views of the downtown area.
This view shows how the facade of the office/commercial component of the building is stepped back within an angled/orthogonal exposed structural steel system.

A view of the angled facade system (office/commercial), orthogonal facade system (residential) and the vertical circulation which is reflected by a glazing system.
A view of the office roof top viewing platform. This is a space that employees within the building or the general public can use on a daily basis. Access to the roof top platform is provided via the main atrium. Here, the user begins to really interact, understand and comprehend how massive the structure of the building really is.

VIEW FROM THE OFFICE ROOF TOP
NOT TO SCALE

A view of the private parking entrance and retail facade (first three levels). As people pass by the building throughout the day they will be forced to interact with the primary structural component of the building, 4'-0" x 3'-4" structural steel columns.

VIEW OF PRIVATE PARKING ENTRANCE
NOT TO SCALE
From inside the main atrium, multiple different views of the city are provided for the user.

Upon entering the main atrium space from either the street level or from the adjacent Arts Garden, the user is greeted by a grand space that is nearly 150' tall.
VIEW FROM THE PENTHOUSE APARTMENTS

VIEW OF MONUMENT CIRCLE
NOT TO SCALE

VIEW OF CONSECO FIELDHOUSE
NOT TO SCALE

VIEW OF RCA DOME
NOT TO SCALE

VIEW OF CAPITAL BUILDING
NOT TO SCALE
CONCLUSION

The issue of reflecting differences in building function through architectural form and materiality has truly enlightened me in several different ways. There are several different reasons why I chose to explore this issue of reflecting differences in building function. The first reason is that we as architects/designers have ever more imperative and crucial responsibilities to the public. One of these responsibilities is to design buildings that serve the client purpose and respect their surrounding context. The other responsibility is to respect the known typology of the building while still creating a unique and individual sense of identity, through the creative use of architectural form and materiality. Most of the current designs for mid-rise towers in our country today, are designed as rectangular masses which consist of facades that change very little if at all through the height of the entire building. Before I started designing my thesis project I knew that the reason for this thought to be “lack of architectural design”, is a combination of economic feasibility and ease of construction.

Through this thesis project, my idea that there is a “lack of architectural design” has somewhat changed throughout the process. The reason why mid-rise towers are merely rectangular masses with little or no change in facade is truly because of ease of construction. If one were to take the approach of designing a mid-rise tower as I did, i.e. the far majority of the floor plans are different and unique, it would be an absolute nightmare to construct for the contractor. This “inconsistency” or lack of repetition in design would ultimately cause the
construction to be lengthened considerably. Therefore, the building would cost more for the owner to construct and would not be as economically feasible.

Overall, I think the thesis project was a huge success. At the beginning of the design process I thought that I could accomplish the goal of reflecting function by adhering to the traditional orthogonal form of mid-rise towers and simply push and pull the facade to achieve the concept. As I got deeper into the design process, it became clear that more drastic measures must be undertaken to achieve the thesis objectives. By merely sloping a few structural members, using exposed and concealed structural systems, and using reflective architectural panels, the final building design has portrayed differences in function through architectural form and materiality.

In conclusion, by designing this thesis project, I have honestly reiterated something that I already knew. Buildings that are lacking in form and/or usage of materiality are designed that way because of economic feasibility and ease of construction. Even though we as architects/designers are posed with the challenges of designing for the owner, economic feasibility and ease of construction, we must strive to design buildings that are unique in form and materiality and have their own individual sense of identity.


