Overlap

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Abstract

This is a study of how literal and phenomenal transparency inform the development and the understanding of a design ordered by two overlapping reference systems. A mixed-use building serves as the project to resolve the complexities of overlap that result from rotation, and to explore ideas of transparency.
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I dedicate this book to my wife, whose unending love and support made this possible.
I thank my parents for always encouraging me. I would also like to thank several of my classmates whose interest and criticism of my work have served to improve it.

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And I thank my committee advisors for helping me to better see and understand my work.
The site is located in Morgantown, West Virginia, situated in the foothills of the Appalachian Mountains, along the Monongahela River. Morgantown evolved from a quiet residential community into a center for industrial growth with the arrival of the railroad in 1886. Between 1890 and 1900 the production of gas, oil, and coal sparked an economic boom that doubled Morgantown’s population. It was at this time that the downtown began to shift from a residential area into a business district, linked to surrounding residential neighborhoods by streetcar.

Planned on a grid parallel to the river, the downtown area continued to evolve into a commercial district, much as it is today. Residential properties were renovated to provide street level retail shops with living space above. Today these mixed-use buildings continue to activate the downtown area by maintaining a large resident population. Downtown Morgantown has survived the “malling of America” and remains a dense urban center due in large part to the proximity to West Virginia University. Parking garages located along the periphery of the downtown grid support commuters to the downtown area, while the addition of the PRT (personal rapid transit), an elevated transit system added in the 1980’s, transports people into the downtown area today, much the same as the first street cars did in the early 1900’s.
While the downtown area has undergone many changes throughout its history, the city center has maintained a strong urban density. The location of mixed-use buildings along High Street and Spruce Street has created a desirable location for many to live and work. To engage this population, the city has worked to maintain a delicate balance between public and private spaces. While the sidewalks serve as pedestrian conduits, they also mediate between the street and buildings. In many instances public buildings carve out a space for the sidewalk to become small exterior rooms within the thresholds. One element missing in this urban setting is the effective use of the open spaces for the public. Very few of these spaces have been created to address the need for semi-private zones within the city. These areas would become moments of pause to stimulate the interaction between city residents and pedestrians.
Overlap

The concept of overlap as a generator for design requires a clearly defined understanding of the ordering devices and methodology for employing them. The desire on my part to explore non-orthogonal arrangements in plan developed into a study to understand the effects and inherent possibilities within the resulting spatial arrangement. The juxtaposition of two grids, two materials, or two ideas becomes the basis from which overlap discovers the architecture.

When two or more solid objects overlap the result is a simple layering of material. However, the introduction of literal and/or phenomenal transparency as a quality and an organizer creates new possibilities in the design and presents unique complexities of spatial depth for the observer. Literal transparency can be described as the inherent quality of a substance to transmit light, and thus enhances one's perception of depth. Phenomenal transparency concerns one's experience and ability to understand a space. As one moves through the overlapping spaces and becomes engaged, it is then possible to read and understand the spatial organizations of the architecture.

Overlap as an organizer and tool for design makes it possible to shape this experience. Understanding the phenomenological experience of overlap in the design process allows the various layers and varying degrees of overlapping and transparent constructs to be explored critically. Superimposing layers of drawings was a practical method for ordering the two reference systems. This overlapping method of drawing allowed me to see and develop the ever-changing thoughts on paper. These overlays subsequently led to an understanding of the design in the third dimension. Experiential drawings and models constructed from the build up of these plans, sections and sketches allowed me to explore spatial arrangements within the design. The result is a transparency of the two systems that allows the observer to simultaneously read the spatial organizations of the two systems.

“Beyond the physicality of architectural objects and the necessities of programmatic content, enmeshed experience is not merely a place of events, things, and activities, but a more intangible condition that emerges from the continuous unfolding of overlapping spaces, materials, and detail.”

Steven Holl, Parallax
The introduction of rotation into this project developed from pragmatic considerations. The decision to orient the apartments toward the alley created a need to enter each living unit from the rear. This required a long narrow corridor between the apartments and the adjacent building. By rotating the corridor wall 3 degrees, the hallway widens as it grows longer, and establishes a new ordering grid. The impact of the rotation in the hallway leading to the apartments ripples through the building and emerges in the pedestrian street. From the beginning of this project, it was my intent to activate the transient space of the pedestrian path and bring new life to the alley. This is accomplished through the creation of a new outdoor room for the city, a space that is both of the city, and sheltered from the congestion and traffic that are present in it. Movement along the pedestrian street is maintained, however the rotation engages the path to create a plaza. The plaza is an elevated plinth to overcome existing topographical conditions. The juxtaposition of the new plaza space against the long line of the alley creates a new spatial sequence along the path. The use of two non-orthogonal ordering devices creates moments of overlap when the two systems collide. The treatment of this overlapping space creates a third, more complex arrangement of spatial overlap.
Chipboard massing models constructed to study paths of movement within the building.
Given that the building would be influenced by rotation, computer models of the site were created to study the effectiveness of a courtyard within the alley. This tool provided accurate data for setting the effective angle of the building’s rotation. The studies shown here represent a sample of the results throughout the course of one day in May.
The Building

The project is a mixed use building in downtown Morgantown, West Virginia. The site fronts High Street, the “main street” of the city, and is situated at the mid-point of a pedestrian alley that bisects the primary axis of the city grid. An existing structure on this site has fallen into disrepair and is scheduled for demolition. A new building at this location offers the challenge of addressing an existing urban street wall, as well the opportunity to develop the back portion of the site along the pedestrian street.

The layout of this infill site suggests that two facades would be appropriate. The front has more typical urban considerations, while the side facade is open to new interpretations. In both the front and side, this building will contain retail business on the first level and loft living spaces above. A semi-transparent glass skin wraps the corner above the street level. The presence of the dynamic facade turning the corner marks an entry point of a new pedestrian street and the departure from automobile traffic. While this composition deviates from traditional elevations, basic elements of the facade weave it into the surrounding street wall. The rear portion of the new building rotates to create a semi-private room and a moment of pause along the alley.

As in the front, an exterior skin wraps the upper levels to form a buffer for the residential balconies while enhancing the visual experience of the newly created plaza.
THIRD FLOOR PLAN

1. LIVING ROOM BELOW
2. BEDROOM
3. BALCONY BELOW
Photo collage of a 3-D model in the existing site
Phenomenal Transparency
Spatial overlap arises where two or more systems of reference exist in the same space. Anthony Ames recognized that this “in-between” region of space could be developed into something more than leftoverspace. For Ames, this region reads as poche in plan. In his work, Ames provides a transition space for the two systems collide where he creates opportunities in a dense, thickened wall of non-orthogonal space. Rather than allow the two systems to dissolve into each other, he carves into the mass, making a new space within the overlap. Understanding transparency in the design process permits him to maintain the integrity of each system.

In the essay “Transparency” Colin Rowe and Robert Slutzky study the concepts of transparency. They discuss the differences between literal and phenomenal transparency, explaining that literal transparency deals with the material properties of a substance to transmit light, while phenomenal transparency exists when complex spatial organizations can be read simultaneously. Phenomenal transparency allows the observer to continually see himself in relation to one of the reference systems. Seen in Ames’ work, one system serves as the datum to inform the observer and allow him or her to read the two systems simultaneously.

“The pattern generated by one system is superimposed on, and informed by, the pattern generated by the second system. The plan is charged with a dynamism, or tension, that would not exist otherwise because we are asked to “read” both systems simultaneously.” Anthony Ames
The concept of transparency, as a tool for study, makes understanding and evaluation possible. Transparency enables the intellectual ordering of form during the design process.” Peter Eisenman

The architecture of Peter Eisenman in the mid-1980s represents an exploration into site-generated ordering devices. As image, they create unexpected and stimulating formal overlays. In most of these cases he seeks topographical and historical landmarks to establish his ordering devices. “The interaction of perceivable coordinates and conceptual geographical alignments serve to generate the collage of intersecting “lay-lines” on which the building is based.”

In the plan for the Wexner Center in Columbus, Ohio, Eisenman establishes two grids based on the existing grid of the campus, and the street grid of the city. From the Columbus street grid, he ordered the site with a steel scaffold to align with the pedestrian path through the building. The building itself aligns with the campus grid. The two opposing grids overlap to create a collage of spatial structures through which people pass daily. This construct indicates a transition between the path and the building, and establishes a link between the city and the campus.
The primary stair for the residential units is located along the pedestrian street. The entry is set back from the facade and the retail spaces to establish a separation from the public space. This is further reinforced by downplaying the facade, where in contrast the retail bays, there is minimal glazing and a low overhead canopy at the entry. The primary stair for the apartment level is formed by the rotation of the rear section from the front. This space offers a cross section through the epicenter of the two overlapping reference systems, and displays the forces exerted on the building. As the rear portion of the building rotates toward the pedestrian street, the stair deforms in order to connect the two levels and mediates between the two systems. A meshing of the systems within the two-story lobby space forms the knuckle of the building. The impact of rotation on this space creates a dynamic sequence of views that unfold as one enters the building and ascends the stair. The materials for this space were chosen to offer a visual reference to the transparent arrangement of grids. The surface characteristics of the walls in this space follow the rules established to order the collision. The differing physical characteristics of the two systems also help to provide a transparent reading of the overlap.
To reinforce the experience, the observer is provided with visual cues to help understand the meshing of the ordering devices. Throughout the project rules were established to dictate the expression of building elements. These rules help to identify one’s orientation throughout the building and clarify the complex arrangement of planes and spaces. The materials and forms associated with the rotated system express surface and planar qualities. In contrast, elements aligned with the city grid read as individual parts that combine to form an element. For example, the skylight in the lobby begins as a plane on the floor, which extends up the wall before changing into a glass skylight plane across the ceiling.
Interior stair perspectives looking up
Plan/Section collage through the stair looking North
Exploded axonometric of the stair separates the two systems.
Axon view of the stair from above

Axon study of the stair assembly

Diagramatic study of building rotation at the stair
Early study of overlapping element within the stair

Sketch book studies of the stair elevation and plaza design

3-D model looking towards the stair entrance
Moving further into the building, the juxtaposition of the two reference systems becomes apparent at a different scale and from a new perspective. The hallway leading to the apartments is created within an expanding joint between the new rotated structure and adjacent building. This joint is primarily expressed through a skylight that runs the length of the hall. A lowered soffit placed over the rotated wall forms a gutter for the skylight. The soffit is aligned with the existing city grid to contrast the new wall as it shifts onto the rotated grid, and creates a tapering ceiling plane.

The character differences between the two systems continue in the corridor. The rotated wall in the corridor is a smooth concrete plane that folds in at the point of each opening. A recess in the wall recognizes the apartment entry and creates a threshold to transition into the apartment. The wall aligned with the city grid is composed of a series of columns supporting horizontal members that bridge the skylight. Individual bricks of the adjoining party wall make up the textured backdrop for the columns. The tiled floor creates a literal grid through the hall, which serves as a datum against which the rotation is magnified. The result of phenomenal transparency in this corridor elevates the experience of the overlapping grids.
Developmental sketches of the hall

Diagramatic studies of the hall configuration
Plan & Sections through the hall at the second floor
above: Sketches of apartment entry from the hall
left: Axon of elements within the hall

above: Perspective looking down the hall
right: Enlarged plan of hall at apartment entry
Plan of the hall & 3-D view looking down the hall
Perspective view of hall at apartment entry
Entering the apartment from the rear and through the thick rotated wall begins another transition in scale and orientation. The threshold is contained within this space of the overlapping grids. Beginning at the wall and extending into the apartment volume, the overhead plane goes through a series of reductions in height and the floor becomes more refined. Stepping onto the raised wooden floor of the apartment completes the transition from the public space of the hallway to the private interior of the apartment. The apartment is a double height loft, with the sleeping loft, kitchen and bath grouped in a freestanding unit at the rear of the apartment. This arrangement creates a compression of space as one enters, before exposing the double height volume of space.

The loft unit is orientated on the city grid, which counters the larger rotated volume of the apartment. This object-field relationship results in a dynamic arrangement that allows the loft unit to engage the large volume of the apartment space. The character differences of the two systems strengthen this transparent reading.
The transparent organization of the apartment interior employs an object-field relationship between the two overlapping reference systems. This becomes apparent when studying the rotation of the wooden floor under the loft. Further understanding of the ordering principles within this space is communicated through the character differences within the apartment.

The volume of the apartment belonging to the rotated system reads as a container for the loft. Early studies of the interior apartment layout explored the wall as a generator for ordering spaces. Conceptual schemes for the apartments pushed the idea that the partition walls between apartments can act independently from the grid of structural columns. Since the steel stud walls are free of the columns, their level of engagement within the living space can vary while the primary form of the wall maintains alignment with the rotated grid of the apartment. This freedom of movement creates niches and protrusions that engage and order the space.

The walls yield to the loft at the point of collision between the two systems. Following the character rules for the city grid, the loft is a compact unit designed to articulate the pieces of its light framed construction.

Diagram of the impact of two ordering systems on the apartment layout
Series of developmental plans for the apartment layout
Images of the apartment interior from a 3-D model
Plan / Section collage through the apartment looking North
Plan / Section collage through the apartment looking South
HALL
ENTRY
LIVING AREA
KITCHEN
LOFT
RETAIL SPACE BELOW
Images from the section model

Sketch studies of elements within the apartment
right: Exploded axon of the apartment interior
left: Sketched of the loft structure
far left: Axon view of loft looking up
The inner facade wall of the apartment is made up of a large window, divided horizontally and vertically by structural members. A series of mullions further subdivide the glazing to create transparent frames to the city. Because the inner and exterior facades were developed independently, the system of frames capture the random pattern of the translucent screen, creating a dynamic composition of light and shadow.

The balcony exists within the layers of the facade. The outermost facade is a tight wire mesh that is hung from a structural frame, and supported on pipe columns. The wire mesh was chosen to decrease the level of separation between the apartments and the alley, while providing adequate privacy. The semi-private exterior space is recognized on the pedestrian street by a horizontal separation in the wire skin that runs the length of the building. The literal transparency of the facade reveals the complexity of overlapping material and spatial depth.
Literal Transparency
The exterior facade of this building is a study of literal transparency and the resulting composition and perceptions of depth. Transparency as described by Colin Rowe is “a simultaneous perception of different spatial locations.” Considering the qualities of literal transparency he defines transparency as “an inherent quality of substance, as in a glass curtain wall.” Artist Gyorgy Kepes explored the composition of transparent field in his painting. He said, “The figures are endowed with transparency; that is they are able to interpenetrate without an optical destruction of each other. Transparency means a simultaneous perception of different spatial locations.” When considering precedence for the study of transparent organizations through overlap in the composition of the facade I looked at the work of Peter Eisenman. In his project for Berlin Housing, he sought to expose the history of the site, and to acknowledge the Berlin of today as a crossroads to “every place, and no place.” Eisenman superimposed the Mercator Grid, a conformal 17th century map of the globe, onto the trace remains of an eighteenth century wall, and then on an artificial reconstruction of a nineteenth century wall that no longer exists. This layered grid of varying heights was finally laid on the axis of the Berlin Wall. This grid of overlapping layers forms a complex arrangement of planes and spatial relief within the facade. Rather than complete literal transparency, these facades convey an intricate phenomenal transparency that allows the observer to explore the composition.
This project has allowed me to study and explore the ideas of facade, and the level of communication that is possible in a surface that wraps the building. The facade of a building is typically a layer of material that mediates between the exterior and the interior. Inherently, this material has some translucent qualities to present a view and or allow light and air to pass through. This layer can be the thickness of a pane of glass or a space deep enough to inhabit. This project has two distinct facade conditions. The facade facing High Street is a face that has a relationship to the street and to the city, as it contributes to the urban street wall. The role of the facade on the pedestrian street is to mediate between the space of the alley and the interior of the apartments. The conditions of this long narrow site do not afford views from the rear apartments. As a result, the facade becomes an element of design to be viewed from the interior and the exterior.
Studies of screen wall elevation and composition
The front facade presents an opportunity to express the ideas of overlap through transparent layers. The role of the exterior facade is to address the formal street wall and give a face to the city. A separate interior facade is free of the exterior to create a frame from which the city can be seen.

The exterior facade is a translucent glass skin to control the light that penetrates. Bands of transparent glass are composed within the field of frosted glass to provide clear views of the city. The composition of this plane is free of influence from the interior spaces. An operable window extending to the exterior facade establishes a point of connection between the two layers, and provides access to the outside by the resident.
Collage image of building in context looking East

Collage image of building in context looking West

Section through front facade
above: 3-D model view of alley facade
right: Exploded axon & section model of alley facade
below: alley facade elevation
Perspective of building and screen wall looking up the alley
Overhead view of model looking into the alley

3-D model view looking West

3-D model view looking East
3-D model image of alley and rear facade
“The edges, contours, and surfaces of the structures that define urban spaces are revealed in dynamic perception and in light. Mere geometry or the idea of “facade” is too limiting. The experience of urban space generated by the slight rotation of individual planar walls is inseparable from the parabola of sunlight grazing its boundaries. City spaces at night embrace us with ellipses of projected light, glowing glass facades, and transformations induced by mists and rain. A dense complex of blocks, cut by a canyon street by day, is redefined by night as a shimmering prism of lights in a chiaroscuro of projected shadows.”

Steven Holl, Parallax
The role of the translucent screen wall facade serves as both canvas and filter. Light passing through the elongated openings of the screen falls onto the adjacent existing wall and surface of the pedestrian street in ever changing patterns and intensities. The light hitting the wall projects the overlapping layers of the translucent facade. Instead of a reflection, you see an interpretation of the spatial depth contained within the screen wall. The existing wall has been collecting light from the day it was built, but only now does it become apparent. The play of light is now a focal point within the city, and a definer of this space.
Conclusions

The introduction of rotation in this project created the design possibilities that are explored in this thesis. However, it was important that the use of rotation would be considered for opportunities beyond simply increasing the level of complexity in the design. Superimposing the ordering devices allowed for the critical exploration of these inherent complexities. The resulting overlap of two ordering systems set-up a framework from which questions arose and decisions were contemplated. Overlap became more than just an idea for design; it influenced the way I designed. Layering the series of drawings and sketches as I worked became a practical methodology for developing the design and helped me to better understand literal and phenomenal transparency. The desire was to reveal the importance of each decision, and to see its effect on subsequent decisions. The true experience of Architecture occurs as one recognizes their interaction within a space. Understanding the Architecture through transparent overlap provides an opportunity for this experience.
Bibliography


Photographic Credits

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