

FROM THE GROUND UP

by
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DEDICATION

Thanks to my parents, family, and friends for their support and tolerance. Special thanks to Mr. Idleman, without who's friendship and support this book would not have happened. To my dog, who has reminded me that enjoying the small things in life is important and chasing a squirrel doesn't hurt either.

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ABSTRACT

This thesis studies the relationship between the internal characteristics of the site, based on an existing set of artifacts, abandoned concrete railroad trestles, and external views of them. The project establishes orthogonal and non-orthogonal geometries in re-developing this urban site creating buildings that relate to the site, surroundings, and themselves. The physical, structural connections and spatial relationships reconcile the superimposition of geometries. Ultimately every decision in the project returns to the analysis of the site allowing for different buildings, people, and environments to interact as a single entity.

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PROLOGUE

The idea for this project began more than a year ago on a trip to central Pennsylvania to visit family. I was beginning to think about what a thesis was and what I wanted my thesis to be. I had time to wander around the town I grew up in and attempted to look at the town objectively. In the nine years since I moved away I only had short one or two day stays in the area and rarely ventured into town. So while nothing had really changed, many of the things I'd forgotten about were reintroduced to me. From the perspective of my education I was interested in how the town developed into its current state and how it could transform through time.

I was amazed to find a green field in the center of town behind a row of buildings lining Market Street. Lining the edge of the green field to the north and east were stuccoed, sitecast concrete railroad trestles, abandoned fifty years ago, radiating from the south to the west. I began thinking about this site and how it could be developed removing the trestles from obscurity and making them visible from Market Street. But more importantly questions were raised concerning how my previous studies in architecture could be thought about in the project's development. I had been studying public and private spaces leading to the question of how a site integrates these two divergent spaces into a symbiotic relationship. The question of how vernacular materials and typologies could be reinterpreted to respond to the context and challenge the standards adopted by the town. The development of this site could become the focus of a reorganization of connections between the town and local university and offer a different style of living to the area.

This site offered a platform for investigating many questions in one location. The resulting book is a survey of the most important questions uncovered throughout the development of this project.



TOWN HISTORY

Lewisburg, Pennsylvania is a small college town on the western shore of the Susquehanna River approximately one hour's drive north of the Pennsylvania capital of Harrisburg. The downtown district lies between the river to the east and U.S. Route 15 on the west. Buffalo Creek is the northern border, while Bucknell University forms the southern boundary.

Market Street is Lewisburg's main street with street-level restaurants and businesses with apartments above. One block off Market street is residential housing with most of the local population living north of Market and south between the river and Third Street. A majority of housing south of Market Street is rented to university students.

Lewisburg incorporated in the late eighteenth century as a manufacturing and transportation town. Utilizing the river, a canal was built in the early nineteenth century leading the town to prosper, and most of the town's early architecture lies within four blocks of the river. In 1846 Bucknell University was founded on a hill south of town. In 1855, nine years after Bucknell's incorporation, the town became the county seat of Union County. In 1869, a rail line came into town from Harrisburg, following the canal. By the 1870's Lewisburg had become the political, cultural and educational destination in the region. Market Street became the dominant east-west axis and Third Street developed into the main north-south axis, terminating in the south at Bucknell. The rail line formed the western border near Fifth Street.

The north-south railroad was a heavily used line, shipping goods and passengers from Philadelphia and Baltimore. The line was intersected by an east-west rail line one block north of Market Street used for bringing agricultural supplies to market. The line was heavily used until the mid-1950's when The Pennsylvania and Reading Railroads discontinued service, and U.S. 15 was improved. This led to the eventual abandoning of a southern connection from the east-west line.

Throughout the twentieth century Lewisburg prospered and reoriented itself with Bucknell becoming the town's focus, serving the university community and students' families. While the surrounding towns have suffered significantly from recent recessions, Lewisburg has been buffered from substantial financial hardship.

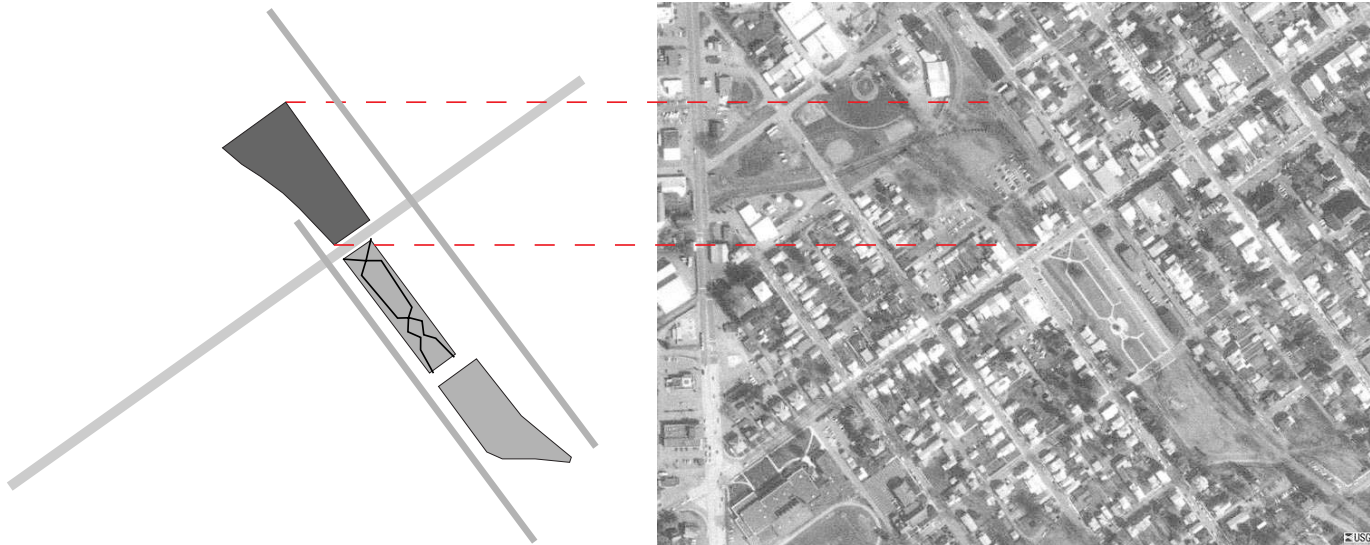
While Lewisburg has managed to prosper and grow, it has sustained setbacks. Throughout the years the town has been flooded by river waters that crept into town via its tributaries including Bull Run Creek which runs along the edge of the site of this project. The worst flooding in the history of the town happened in 1972, flooding all but the highest points of downtown. Along Bull Run Creek many buildings required demolition including one building on the site of this project. While many neighboring buildings on the North side of Market Street survived, but sustained damages that have ultimately compromised their integrity.



View of the Fifth Street Railroad Station, circa 1921, one block south of the thesis site. (1)

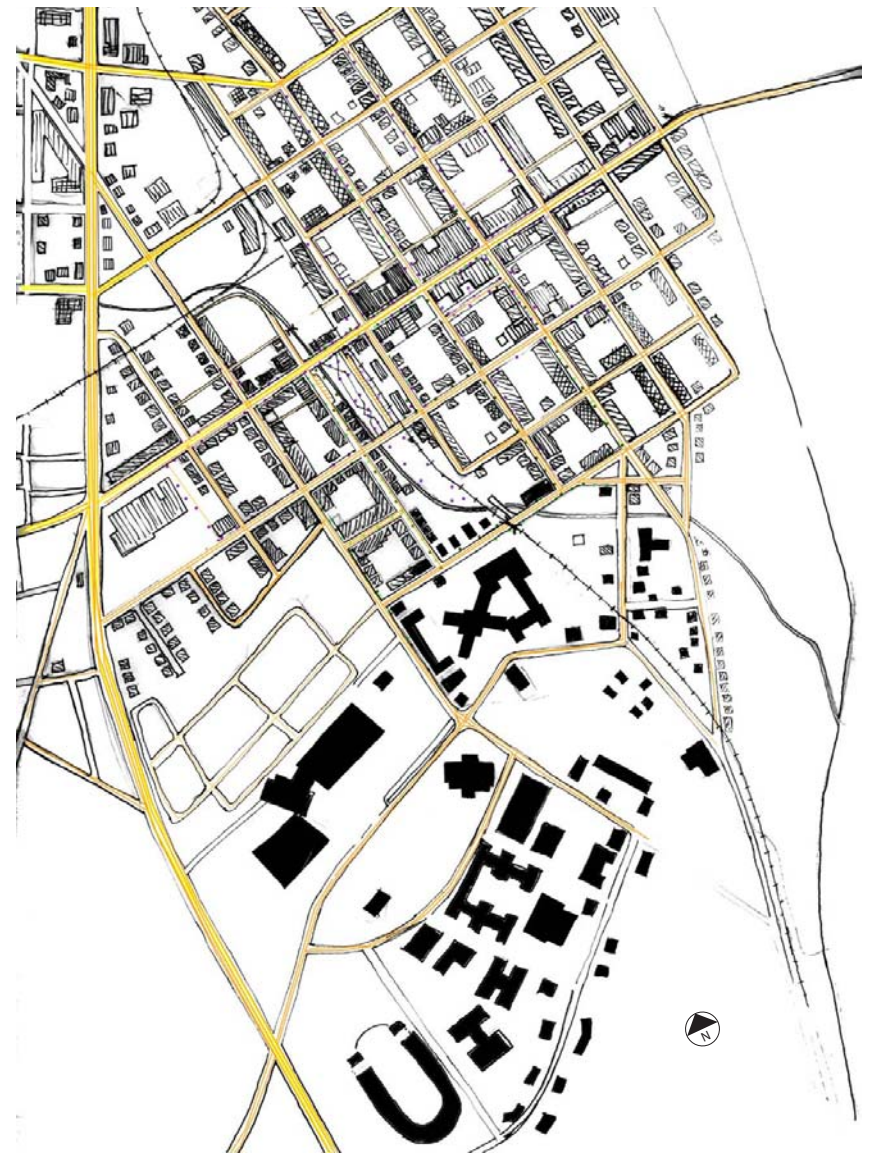


Stereograph of the 1889 taken of Sixth Street, adjacent to thesis site. (1)



Following the 1972 flood the Army Corps of Engineers deepened and widened the creek's bed to control erosion. The buildings on the south side of Market Street on the block of Fifth to Sixth Streets were razed. In the years since this tract of land was developed into a civic park with public parking. On the block south of the civic park a recreational park was added in the mid-eighties. Ultimately what has become the town's center is the complex of parks between Fifth and Sixth Streets.

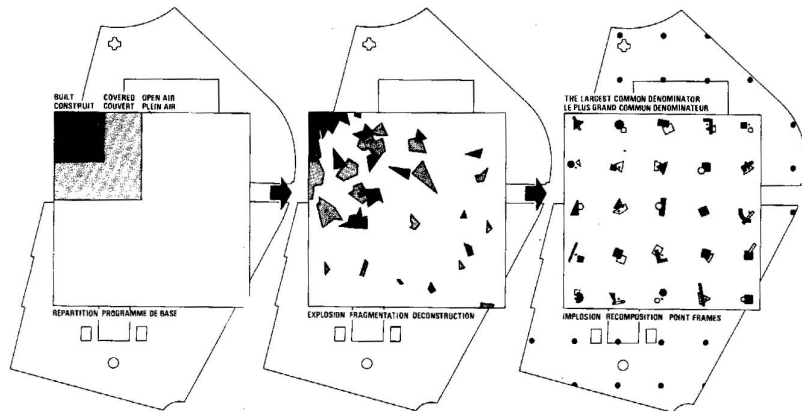
Illustrated in this study a majority of traffic, both vehicular and pedestrian, interacts with the block of Market Street, whether it is university pedestrian traffic walking on Sixth Street; commercial traffic on Market Street and local parking along the civic park. Yet the north-end of this block, bordered by the rail line and Bull Run Creek contains the potential for another park and the redevelopment of the shops along Market Street. This proposal involves the removal of the current buildings and demolishing the lingering damage from the 1972 flood.



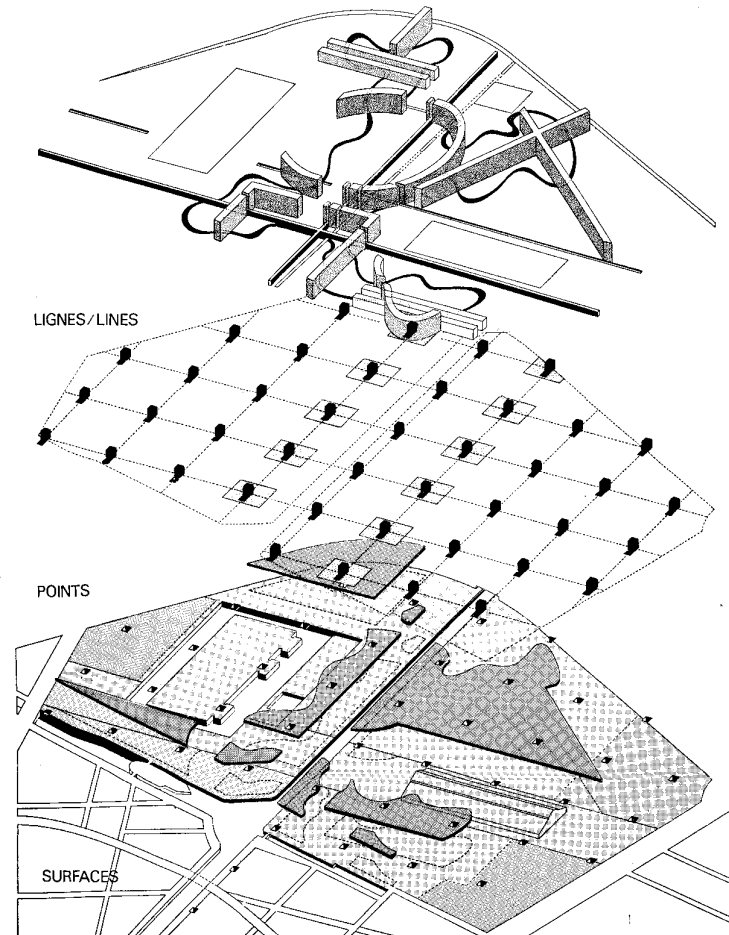
SITE DESIGN PRECEDENTS

During the initial stages of looking at the site I looked at a project by Bernard Tschumi and another by Peter Eisenmann.

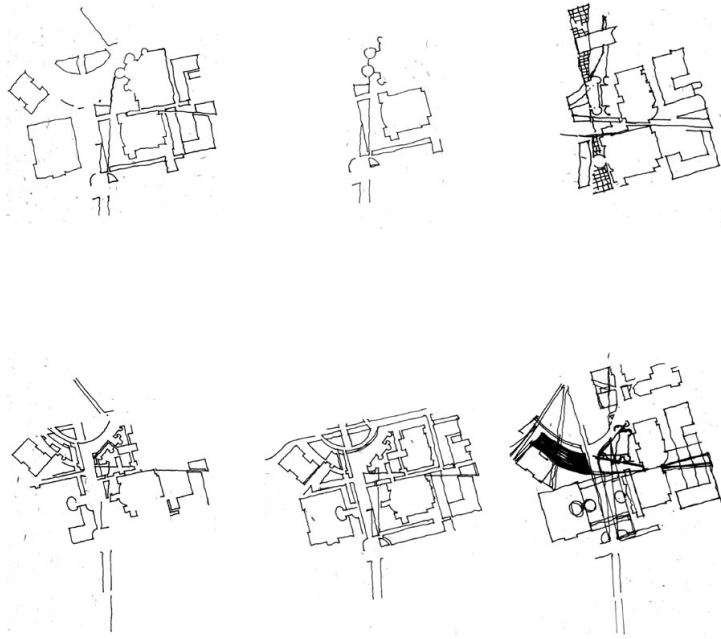
Tschumi, in developing his winning entry for the Parc de La Villette in Paris divided the site into three "systems" of points, lines, and surfaces. These independent entities were merged together, in what Tschumi refers to as "superimposition." Furthermore, the parts were compiled into a single area then exploded throughout the site as built and unbuilt environments. On this page are two drawings from the monograph of the project illustrating the superimposition and buildable areas. (2)



A SIMPLE STRUCTURAL SOLUTION: EXPLODING PROGRAMMATIC REQUIREMENTS THROUGHOUT THE SITE ONTO A REGULAR GRID OF POINTS OF INTENSITY (A MARK, A TRACE). HENCE THE DIFFERENT TYPES OF ACTIVITIES ARE FIRST ISOLATED AND THEN DISTRIBUTED ON THE SITE, OFTEN ENCOURAGING THE COMBINATION OF APPARENTLY INCOMPATIBLE ACTIVITIES (THE RUNNING TRACK PASSES THROUGH THE PIANO BAR INSIDE THE TROPICAL GREENHOUSE)



THE SUPERIMPOSITION OF THE THREE SYSTEMS (POINTS, LINES, SURFACES) CREATES THE PARK AS IT GENERATES A SERIES OF CALCULATED TENSIONS WHICH REINFORCE THE DYNAMISM OF THE PLACE. EACH OF THE THREE SYSTEMS DISPLAYS ITS OWN LOGIC AND INDEPENDENCE



Peter Eisenman looked at the macro setting of Columbus, Ohio in developing the geometries used in The Wexner Center for the Visual Arts at The Ohio State University. One axis was derived from the campus grid, set "arbitrarily" at 12.25 degrees off the town grid by Olmstead. The other axis came from the Columbus city grid seen in the aerial photograph. In greater scale the original surveys of the state of Ohio also played a part in the site's design. (3)

SITE

(...the architecture has a cartesian grid at its base and is overlaid by a geometry similar to a flyfishing line cast through the air...)

A description of Morphosis architecture by Thom Mayne during a lecture on the Federal Courthouse, Eugene Oregon at the University of Virginia, Fall 2002.

Site is too often ignored by architects. Typically the cursory and mandatory responsibilities are met, but integration of a building with the site is uncommon. Many architects make pretty objects that are plopped onto a site ignoring the environmental and contextual issues and civic responsibilities. Regarding this viewpoint, I have strived to design a site and buildings that work together to complete the ideas of the project and my personal convictions. I was asked at the beginning of this project during analysis of the site "whether I wanted to be an urban planner and not an architect?" No, is my answer, but an architect needs to be an urban planner or at least have an understanding of planning issues that make an impact to design good architecture.

In the design of any building, and especially a group of buildings, the site is essential in the development, beyond the position of the building(s) on the site. In an urban environment the site has many responsibilities that a rural site does not necessarily have to respond to, but both settings have to respond to views. In the case of the site in Lewisburg the railroad trestles on the north end of the site became the desired view and the focus of building orientation.

The human density in an urban condition is more integral to developing a site than in a rural setting, where individuals besides the owners may typically have little interaction. Dealing with the human condition is essential to architecture, and pulling the surroundings into the architecture creates a stronger architectural result. In the case of a site with several buildings, the analysis can unify the project more concretely to the surroundings.

It is with this basic philosophy that the development of this thesis began. The site analysis is tied to every facet of the project: building positioning, structural location, and material choices.



Top: View of the northside of the 500 block of Market Street with current buildings.
Bottom: View of the civic park across Market Street from the site

SITE DESCRIPTION

The development of the site began with consideration of the concrete rail trestles on the site and how they could interact with the street and the other elements of the town: the university, its residential neighborhoods, commercial zones, and pedestrian pathways.

Lying between Fifth and Sixth Street is the site itself, bordered on the east by railroad tracks, on the west by a small stream known as Bull Run Creek and the previously mentioned rail trestles. The dimensions of the site are 190 feet in the east-west axis and 600 feet in the north-south axis.

The slope of Market Street drops approximately ten feet from the east end of the site to the west end of the site.

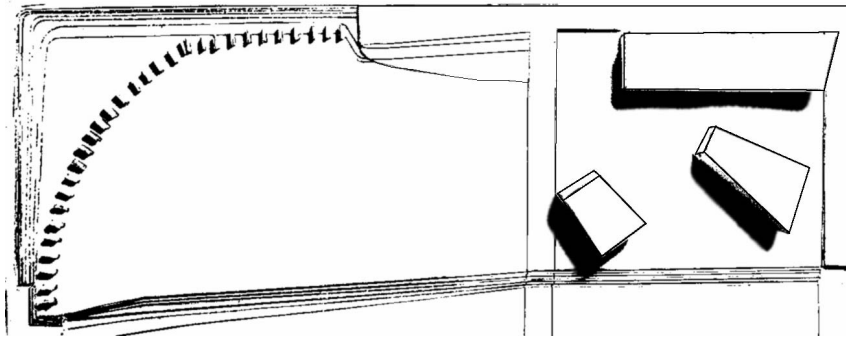


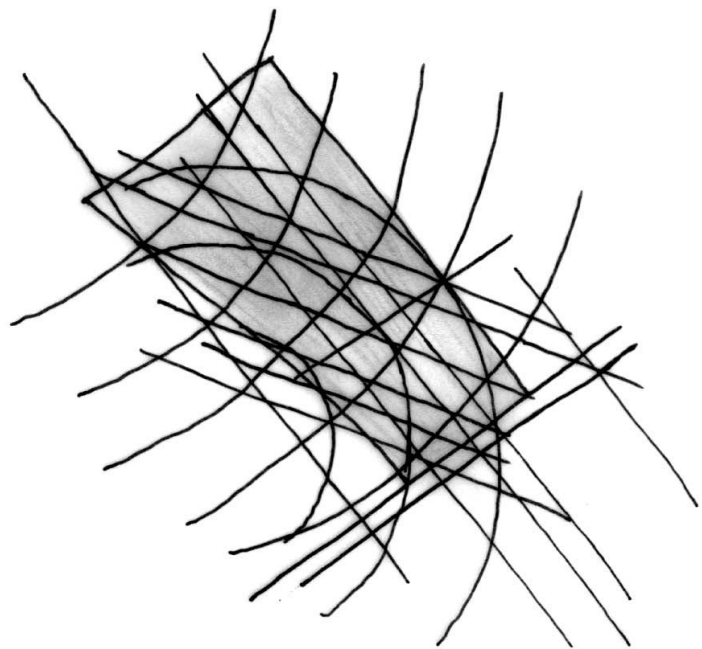
LINES OF FORCE

The techniques employed by Tschumi and Eisenman pointed towards an analysis of the project site in the center of Lewisburg. The analysis of the site began with the study of geometric lines that pull through the site both orthogonally and radially. The result of this study was the construction of a series of drawings that brought together potential building placement and sizes according to the geometric forces.

Three or four solutions that had certain qualities made them strong candidates for exploration. The most important quality was visual access through the site from multiple positions on the street. Another quality was the tension between the building positions that would respond to the street and each other in a fashion that would result in exterior spaces that would provide a place for human interaction.

The next step in this process was the development of a small site model with three dimensional blocks with the trestles, yet for the scale of the site there was not a governing system that tied the "buildings" together.







SUPERIMPOSITION OF GEOMETRIES

This study led to the development of an idea of where things go and a view geometry through the site. A different geometry had to bring order to the site. In this case an orthogonal grid would do the job. The grid developed from the site and its immediate surroundings.

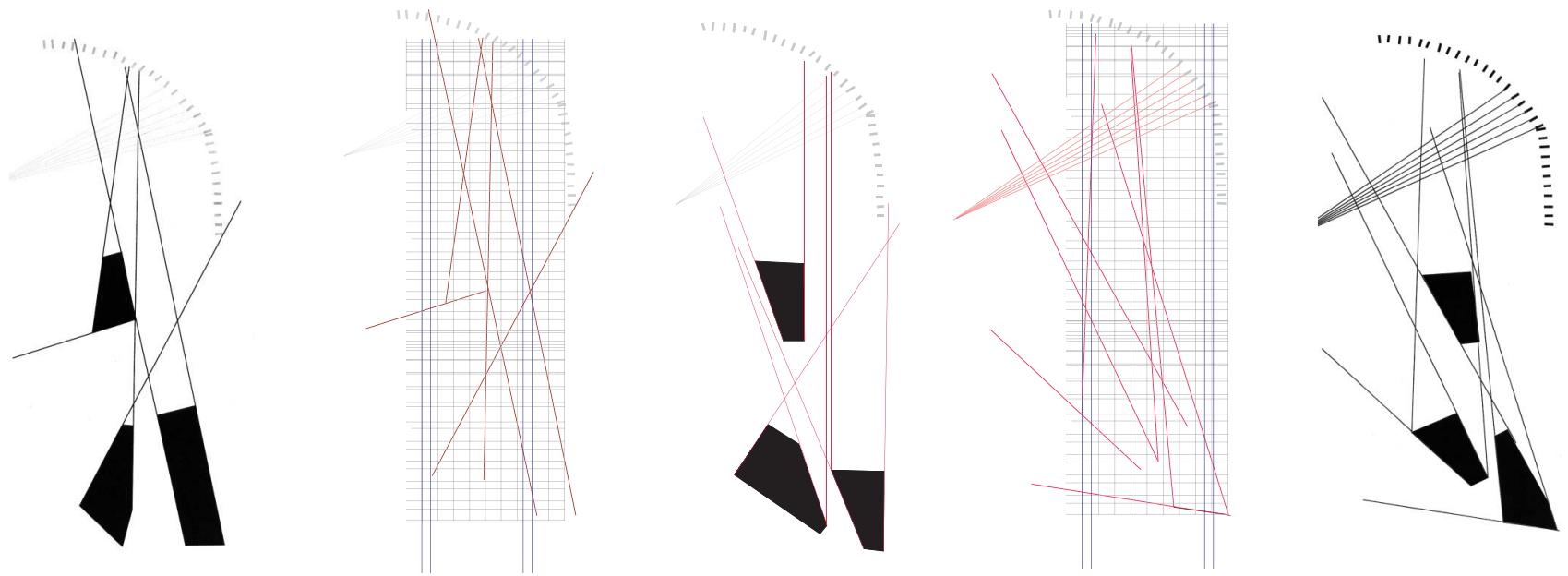
To create a structure for the site, a grid was developed according to the surrounding physical markers of the site. On the west runs Bull Run Creek and on the East the former Pennsylvania and Reading rail line. The rail line's easement is approximately eighteen feet on either side, and the width of the creek bed is also about eighteen feet. Finally, the parallel parking spaces on the street are eighteen feet. So eighteen feet became the east-west dimensions of the grid.

The north-south dimension was established by the study of the railroad trestles on the site. Running from the southeast to the northwest corner in a radial pattern the trestles have a strong presence on the site and needed to be included in the grid. In order to have the trestles exist on the grid their presence had to be translated to an orthogonal geometry.

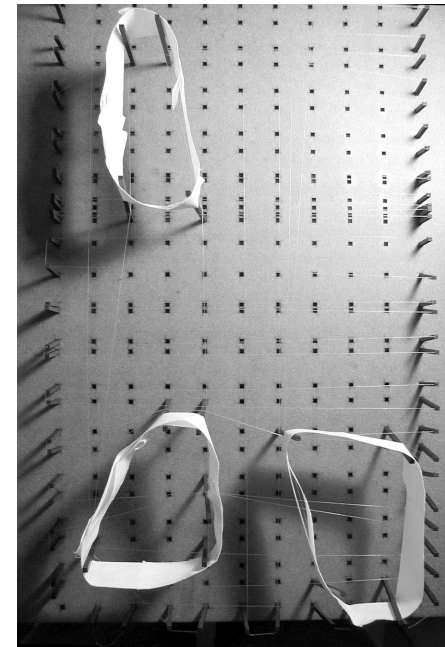
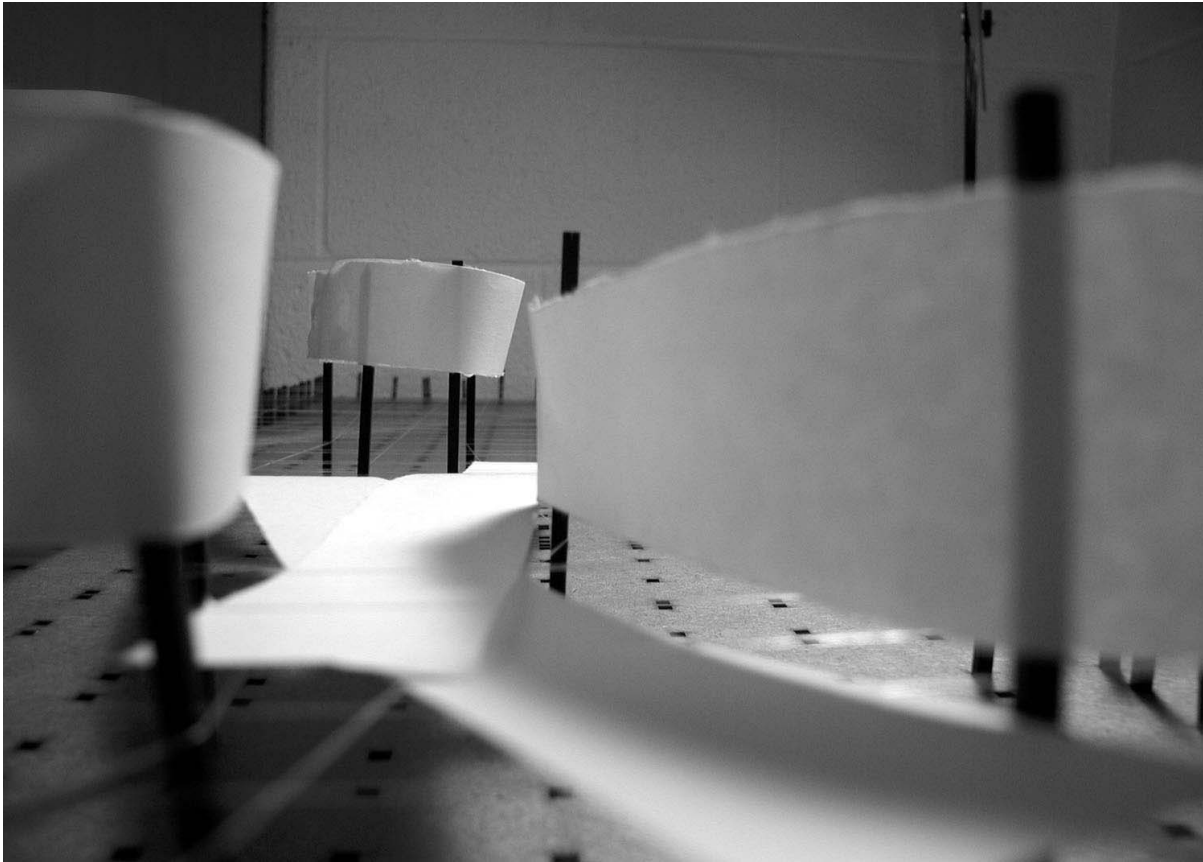
Translating the trestles to the grid occurred through the measurement of the northeast corner of the preceding trestle to the southwest corner of the next trestle. Since the trestles radiate, the dimension between these two points change, creating an irregular spacing until the trestles are in the same line.

The regular grid dimension and the irregular dimension overlaid the site creating a base. On top of the base the view geometry and building positions were again studied resulting in a fixed position for the buildings on the site. To strengthen the condition and the view that results, a model was created where every intersection of the grid became a point and the edges were lined with pegs connected by fishing line. Where the building positions are oriented a peg was inserted into a grid point and the fishing line stretches around the peg. Wrapped in paper, the top of the pegs became an approximate location of walls. This model confirmed the best location for buildings on the site.

The final configuration is three buildings; two on the street and one closer to the trestles. The two street buildings were programmed as mixed use, commercial on the ground level and residential above. The third building was programmed as residential, due to its proximity to the trestles that would become a green space for the town ending the line of parks in downtown.



Above: Diagrams of physical placements of buildings with insertion of view lines and the introduction of the grid geometry onto the model.



This Page: Photographs of a site survey. The survey was the placement of pegs on a board at every intersection of the grid. The resulting information showed the concentration of views through the site. The photographs are of the plan and the initial thoughts of looking between the buildings.

The programming of the residential building resulted in a shift of the building form to provide a longer face to the trestles. The physical size of the footprint does not change, but the exterior geometries do change. The result is a more complex structure, but a structure better suited to the site.

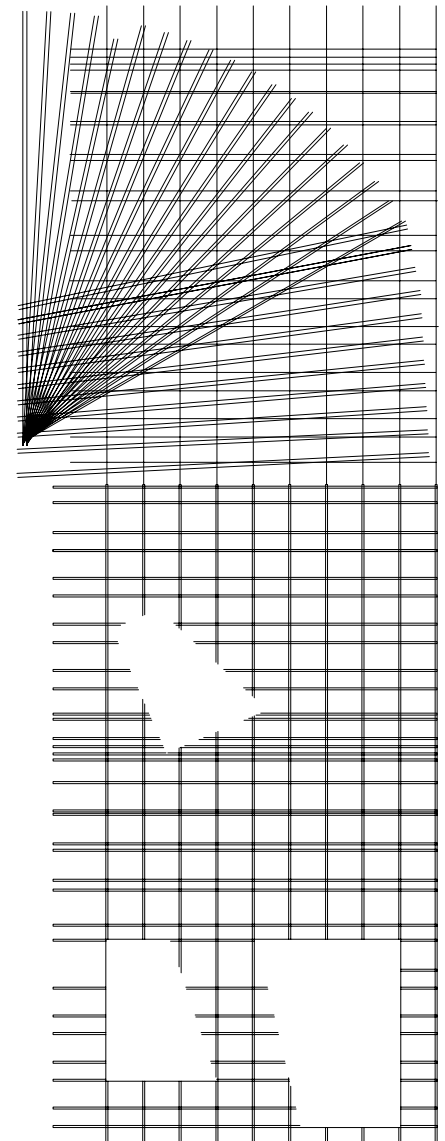
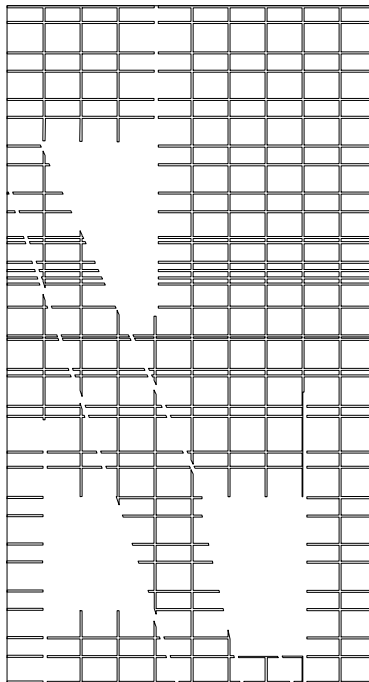
Right: Original configuration of three buildings.

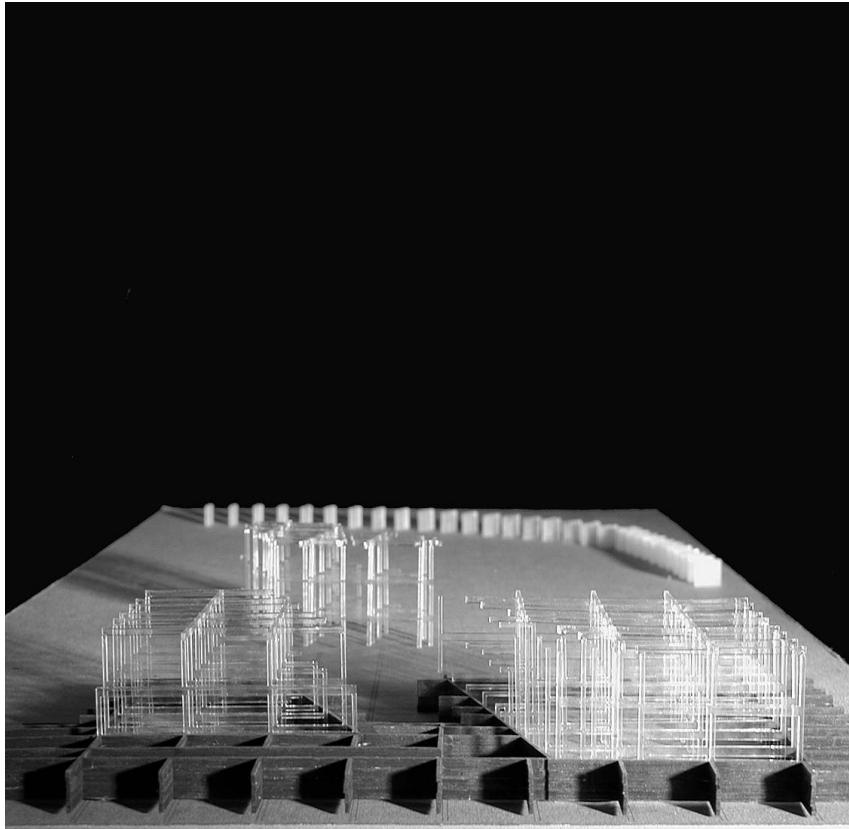
Far Right: Final configuration with the rotation of the residential building form to face the trestles.

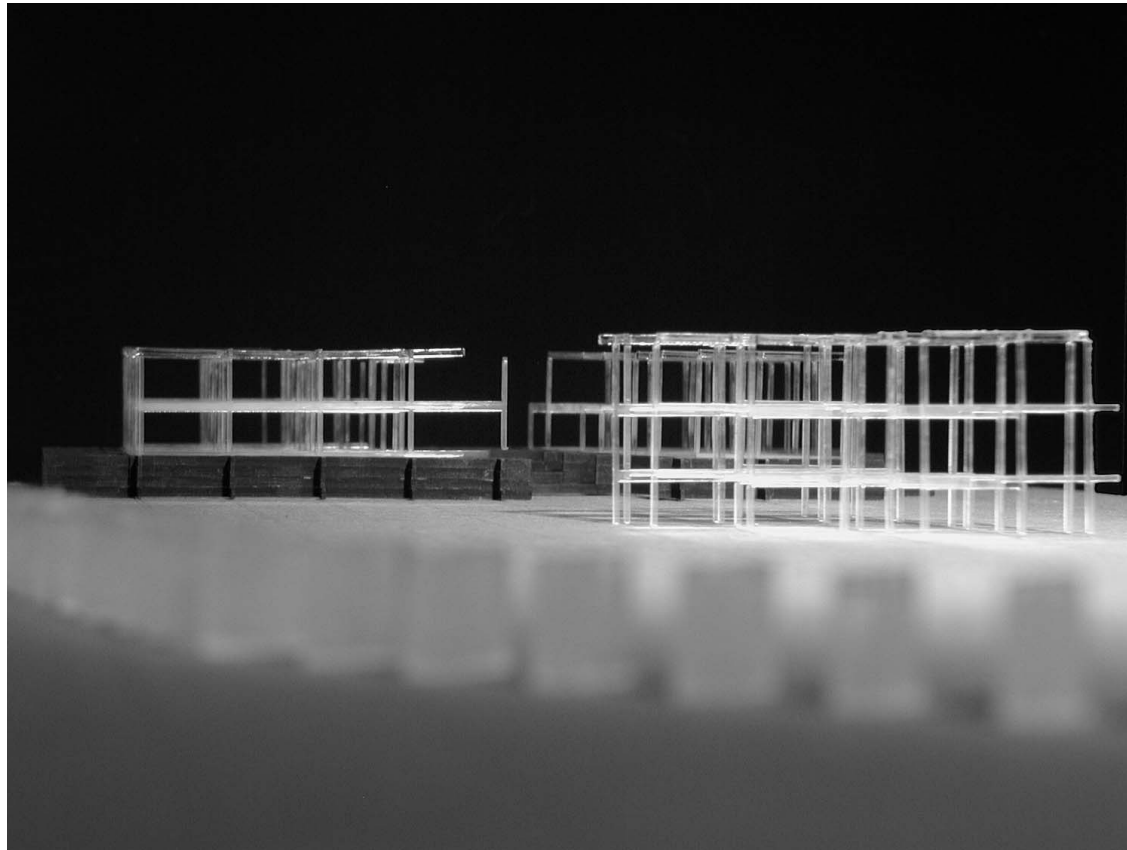
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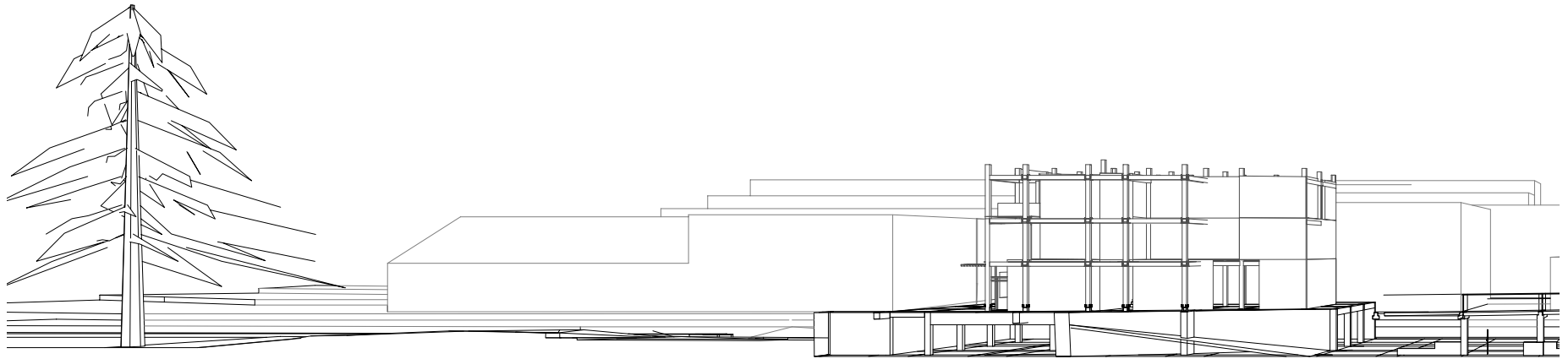
Left: View from south of the site with street level base still viewed as walls and the emergence of a ramp allowing pedestrian traffic movement from the street to the park beyond the residential building.

Right: View from the northeast from behind the trestles.









SITE HORIZON

In tandem to the ground plan development, the site was looked at in section. The change in topography on the edges of the site and the stream condition resulted in the development of an artificial ground plane.

The site exists next to a small stream known as Bull Run. The stream empties into the Susquehanna River approximately one mile from the site. When the river floods the stream also floods. At its highest level one half of the site has historically flooded but the waters have never covered the top of the trestles.

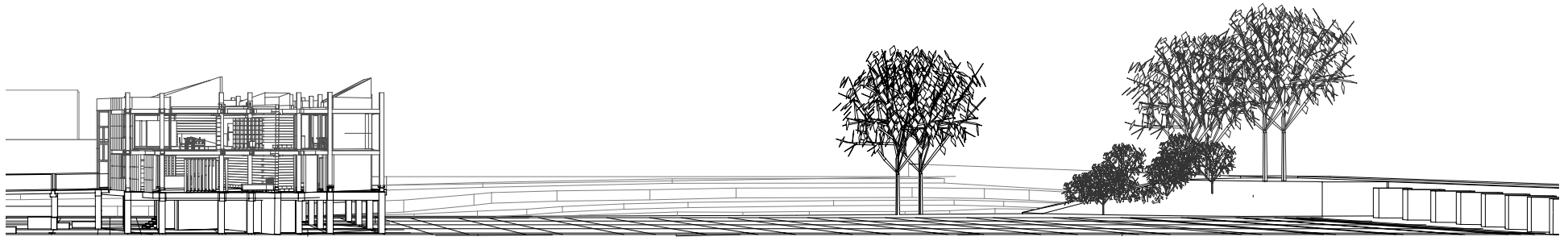
The western side of the site along Bull Run is approximately twelve feet above the stream bed, but the east side is ten feet above the west side. The trestle tops are also ten feet above the site floor. In accordance with this information an artificial ground plane was established at a height of ten feet above the site floor.

This artificial ground plane is considered the site horizon; a datum dividing permanent construction from impermanent construction, derived from the need for a strong connection to the ground.

In looking at the trestles once again, the base is concrete and the ties and rails were wood and steel. These three materials are included in the development of the project. Materiality of existing conditions informed the rules for the project. Below the horizon line, everything must be permanent, so a site-cast reinforced concrete is the primary material. Above the horizon line everything must be able to be disassembled, so the primary structure is glulam columns and beams with steel connections, designed for easy disassembly of the building.

The pervading idea during the horizon development was the thought of removing the buildings and leaving behind a visual reminder of the geometries that makes up the site and creating a contemporary view like the ancient view of columns and building remnants in Rome.

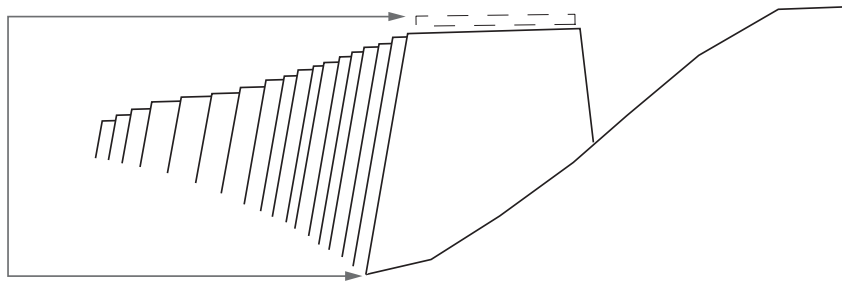
In the development of the horizon, the question of tectonics emerged.



Above: Longitudinal view of the site while looking west. Notice the height of trestles on the right and the height of the building columns above the ground.

Below: Diagram of trestles and the eastern slope.

Right: Detail of the existing site-cast concrete trestles.



COLUMN TO COLUMN CONNECTIONS: Assembly of the permanent to impermanent.

The glulam columns and beams of the impermanent construction could never directly touch the concrete below the horizon, so a connection had to be designed that would mediate between the two materials. The mediation is for finer structural control of the glulam and to reinforce the horizon. In the case of the column to column connection a steel connection was designed that would allow the intersection of the site horizon to meet. This connection becomes tantamount to the idea of a datum of the site horizon.

The connection on this page consists of a steel plate elevated above the concrete column for the fine tuning of the column into plum. The connection to the glulam is bolted through on two sides while all four sides are held in place by four flanges.

The connection on the facing page illustrates the separation of materials with a tube of an inner dimension equal to approximately eleven inches allowing light and view under the columns. The ability to lift the column lightly makes a useful space and a powerful visual expression of the separation. On the exterior conditions, this is a place for artificial lights to be incorporated resulting in lighting at a passerby's feet. This condition also minimizes up-lighting. On the inside the space makes a place for utility placement

CONNECTIONS

EXPANSION (FLEX.)

PARTS (DECLINATION)

