



**Concealing the Mechanism:**  
The Addition and Rehabilitation of Roanoke's  
Norfolk and Western Passenger Train Station

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Thesis submitted to the faculty of Virginia  
Polytechnic Institute and State University in partial  
fulfillment of the requirements for the degree of

**Master of Architecture**

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Michael O'Brien, Committee Chairman

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A special thanks to my family and friends, and especially my parents, for their love, support, and patience.

Acknowledgements



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Few would deny the importance of preserving our natural landscapes. However, the man-made landscape is just as worthy of preservation/reuse. Buildings represent a language from their past, portraying the builder's concerns and values. Buildings express their characteristics in time, space, and social context. Their presence and conversely, their absence, have a direct impact on their surroundings.

Architecture has been continually enriched through change and dialogue, such as additions, interventions, and renovations of existing buildings. Many buildings exist today that have been poorly maintained, abandoned or the building has been demolished. This has led to the slow deterioration of the basic urban fabric and its framework, causing the overall quality and character of the building and/or its surroundings to become depressing and unattractive.

Abstract





By rejuvenating/preserving the total environment, as well as, implementing the current design trends, life and history is restored. The challenge and goal of my thesis is to illustrate the positive effect this transformation cycle has on an urban space.

I propose to renovate the historic Norfolk and Western Passenger Train Station located in downtown Roanoke, Virginia, and design an addition onto the building. The train station will serve as a cultural center for the city of Roanoke. By researching and analyzing the history and formal implications of the passenger train station, a sense of harmony, balance, and unity is achieved with the new function of the old space, and therefore, the quality of the existing building is enhanced.

Abstract



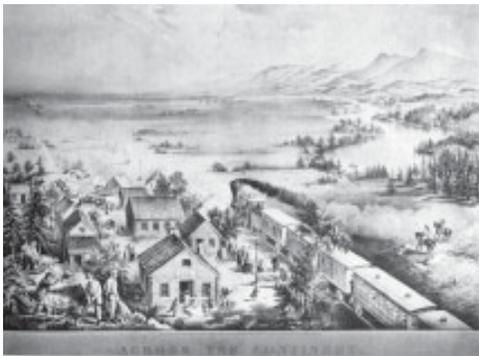


(a)

Memphis, Tennessee,  
Southern Railway

## Part 1: The Decline of the Station

- 1.1 railroads + stations
- 1.2 recycle the station



Across the Continent,  
New York to San Francisco, 1868

(b)



The trial run of the Tom Thumb  
Baltimore to Ellicott City, Maryland, 1830

(c)



(d)

Railroad map of the United States, 1870

Rail transportation has played a key role in the expansion of North American settlements. Prior to the railroad, people would travel either by horseback, covered wagon, or ship. The mechanization of the railroad and its continuing technological advancement, soon proved to be superior over all other modes of transportation. The railroad had the advantage of being faster and more reliable, and had the ability to transport greater volumes of people.

For over a century, the railroad has transported raw materials, finished goods, and people to destinations across the United States. As the railroad expanded across the continent, so did the population growth. As a result, it has been a significant factor in the urbanization of American cities. The main reason for this growth, however, was the railroad station.



Norfolk and Western Passenger Train Station,  
Norfolk and Western Railroad,  
Built in 1905

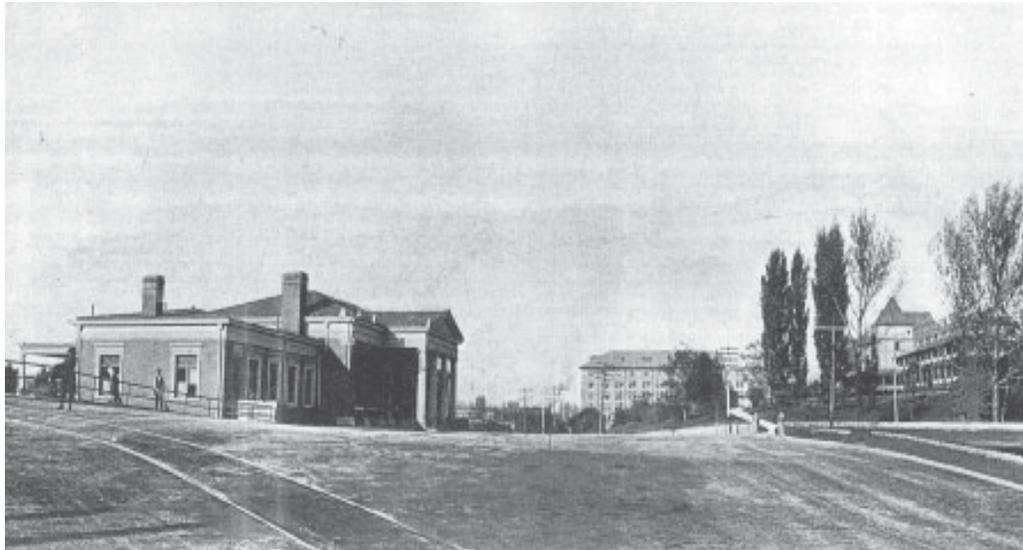
*Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.*



(e)  
Mt. Clare Station,  
Baltimore and Ohio Railroad,  
Built in 1830

The railroad station was the center around which a city grew. It represented an image within the community, portraying to the public the size, social character, and livelihood of the citizens it served. The first railroad station was built in 1830 in Baltimore, Maryland. In the next 120 years, over 40,000 stations were built. Approximately, 20,000 still stand today; however, few are still in use.

The railroad stations represent a part of our American heritage, portraying the history and growth of American cities. The value in preserving and maintaining these structures is both beneficial and economical for the city it served. However, these buildings will probably never function as railroad stations again. Fortunately, these structures were designed with the capability to accommodate many people at one time, and could be re-used to house different types of public activities.



(f)  
Norfolk and Western Passenger Train Station,  
Roanoke, Virginia,  
1905

## Part 2: The Evolution of the Station

- 2.1 a station to remember
- 2.2 tracing the past





(g)



(h)



(i)

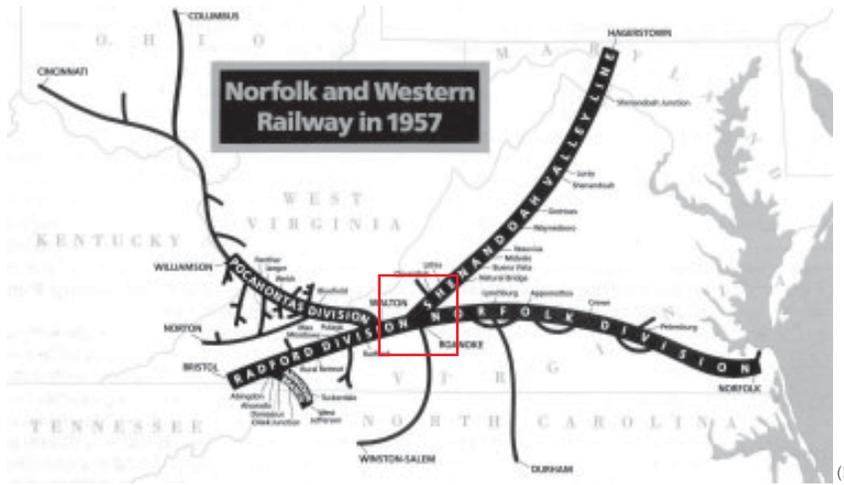


(j)



(k)

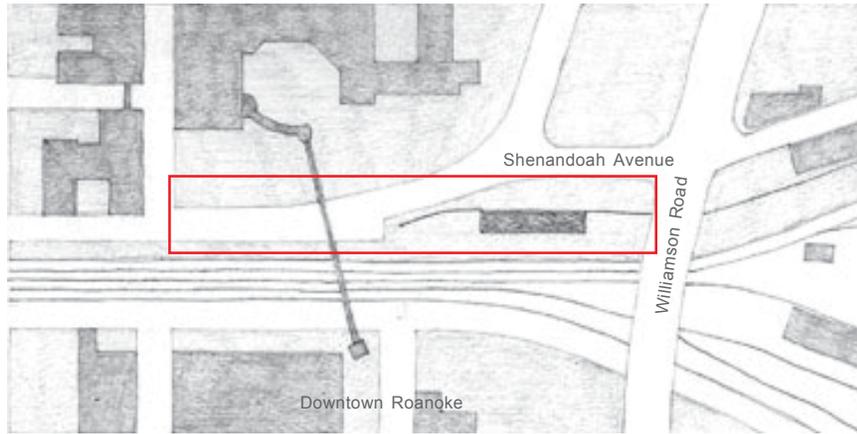
Examples of Virginia Depots along the N&W Railroad,  
(l-r): Bristol, Christiansburg, Lynchburg, Martinsville



Norfolk and Western Railroad map, Routes and Connections, 1957

Roanoke, Virginia, like many cities, owes its growth to the railroad, and currently, has a railroad station in desperate need for rehabilitation. The station is the former Norfolk and Western Passenger Train Station, the headquarters and hub of the Norfolk and Western Railroad.

The Norfolk and Western Railroad was organized in 1881 from the Atlantic, Mississippi, and Ohio Railroad. Initially, it was a rail line that carried agricultural products, but soon grew to be associated with coal transportation and mineral development of SW Virginia and West Virginia. The railroad served up to seven states: Maryland, Virginia, North Carolina, West Virginia, Kentucky, Tennessee, and Ohio. Roanoke was located at the junction from which all the divisions that made up the N&W railroad met, and as a result, became the headquarters for the railroad.



N&W Passenger Train Station,  
Roanoke, Virginia

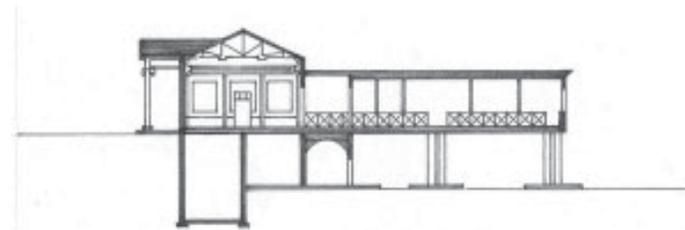




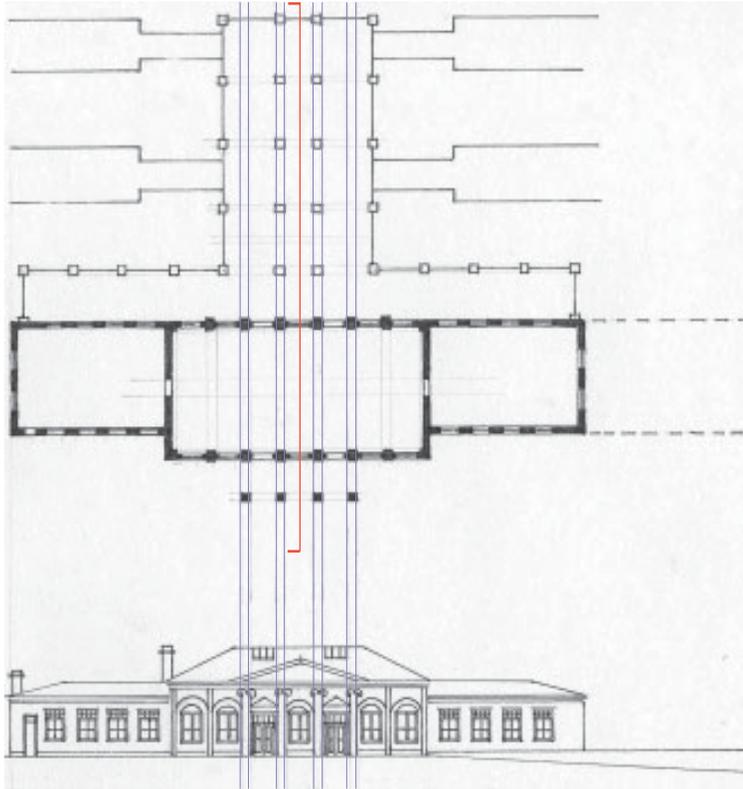
Norfolk and Western Passenger Train Station,  
Classical-with-Greek Revival,  
1905

The Norfolk and Western Passenger Train Station is located just North of downtown Roanoke, on the corner of Williamson Road and Shenandoah Avenue. It was built in 1905 to serve as the headquarters for the N&W railroad. Since its construction, the building has gone through many transformations resulting in subtractions and additions to major architectural components that defined its character. Initially, it portrayed a classical-with-Greek Revival appearance. One of the traditional characteristics was a Greek style portico, which served as the main entrance into the train station. The portico pediment was supported by four columns in Doric order.





Transverse Section, 1905



Plan and Elevation, 1905

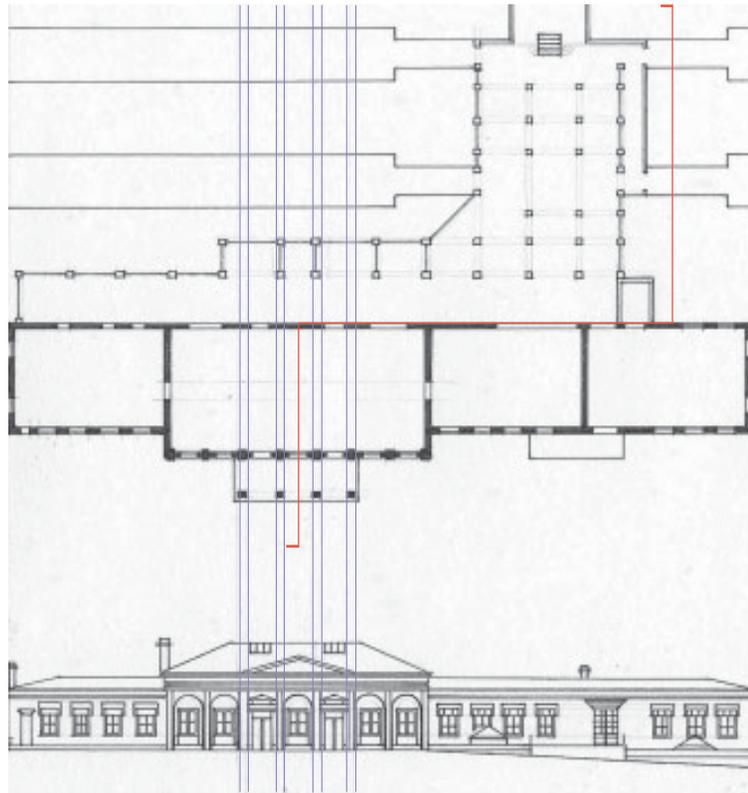


### 1905

The heart of the building consisted of structural concrete masonry units clad in brick veneer. With the exception of the west wing, which was not built until 1932, this portion of the building remained relatively unchanged. The major renovations, however, occurred in the rear of the building. Each change required a unique solution to address the trains and engage the tracks.



Transverse Section, 1932



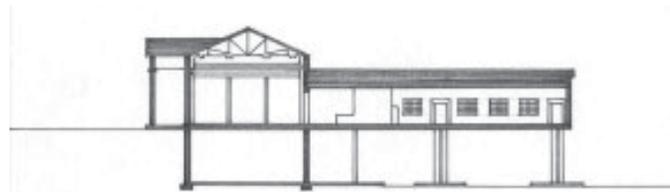
Plan and Elevation, 1932



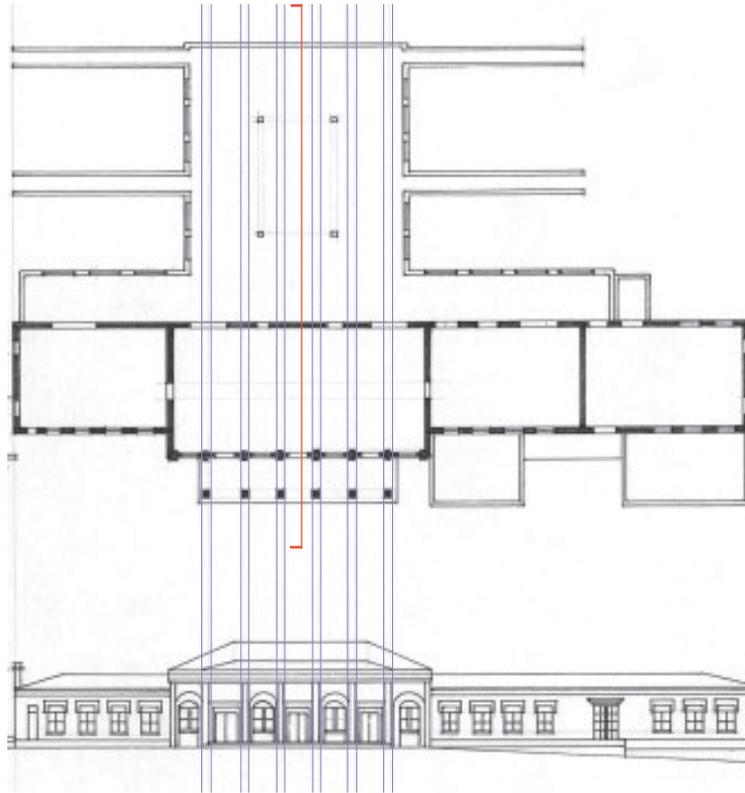
(o)

### 1932

Initially, the rear section of the building was open on both floors. A covered bridge, exposed to the outside, extended halfway across the tracks to allow passengers access to the trains, without having to walk on the tracks. In 1932, the bridge was removed and replaced with a closed concourse. The concourse extended the entire width of the tracks, allowing the passengers not only access to the trains, but also to downtown Roanoke. The character of the building, however, remained traditional.



Transverse Section, 1940

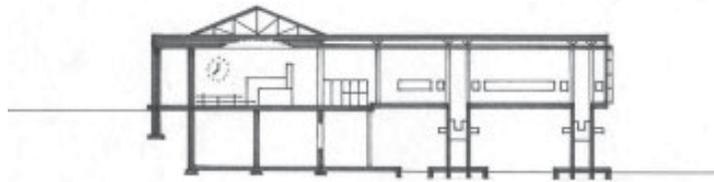


Plan and Elevation, 1940

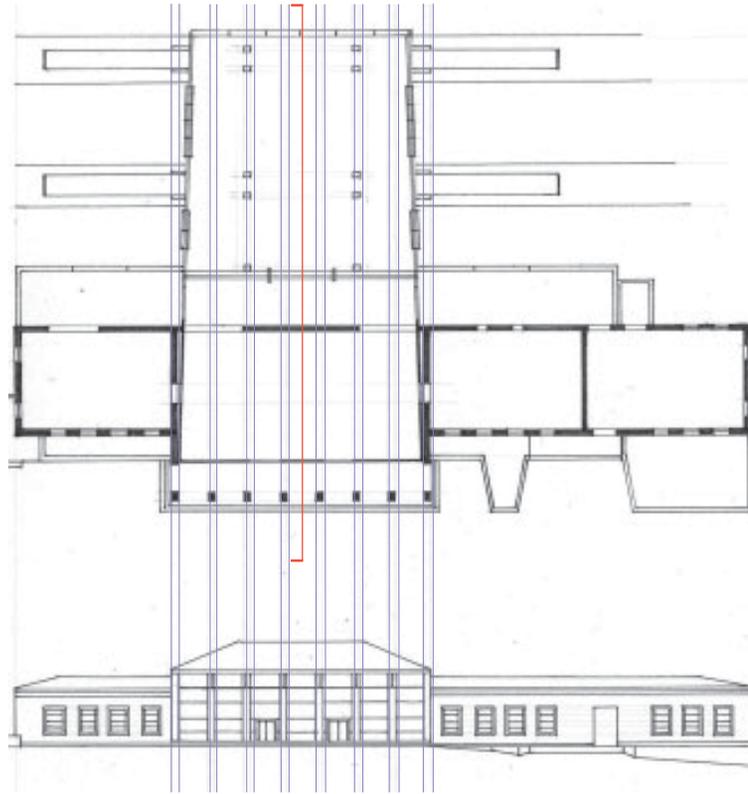


### 1940

The covered bridge remained unchanged for several years, before it was returned to its original central position and extended only halfway across the tracks. The rear section of the bridge was completely closed to the outside, and became part of the interior. At the same time, the entrance condition was altered. The columns increased in number to six, the order of the columns changed to Corinthian, and the roof pitch decreased. However, the essence of the portico still remained the same as the main entrance. The train station stood unchanged until the late 1940s when it underwent one of its most significant renovations.



Transverse Section, 1947



Plan and Elevation, 1947



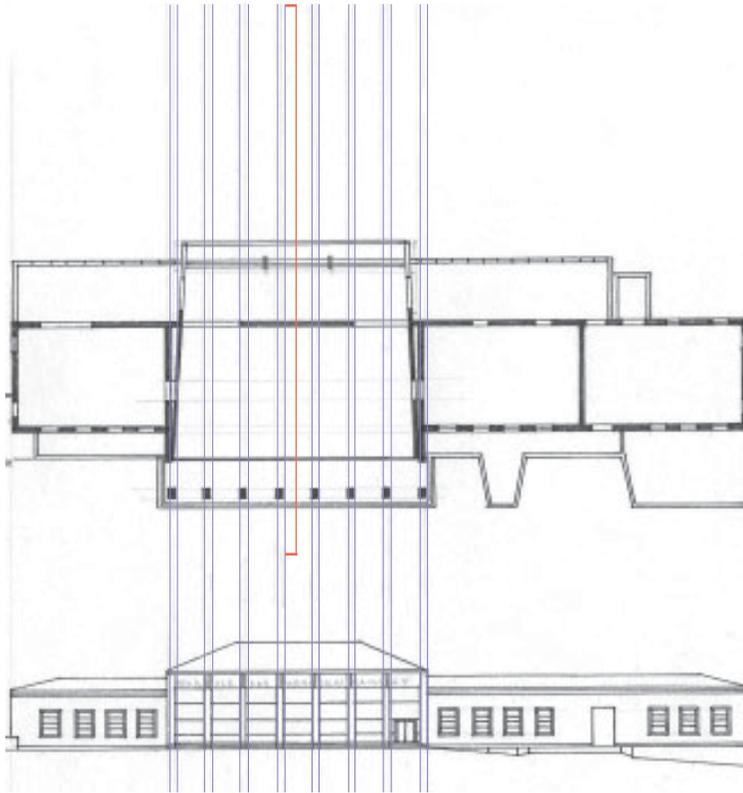
(9)

### 1947

In 1947, the character of the train station transitioned from classical to streamline-industrial. The roof of the Greek-style portico was replaced with a flat concrete roof. The Doric/Corinthian columns were replaced with eight rectangular concrete columns. In addition, all the classical ornamentation that framed the windows and doors were replaced with simple orthogonal outlines. Despite the dramatic change in appearance, the symbolism of the portico was preserved, and still served as the main entrance into the building. The interior was remodeled to reflect the character of the exterior architecture. The main interior walls of the lobby were angled slightly inward, commencing from the entrance of the building and tapering towards the rear of the building. This design created a illusion that subtly directs the passengers towards the rear of the building and eventually to the trains.



Transverse Section, 1987



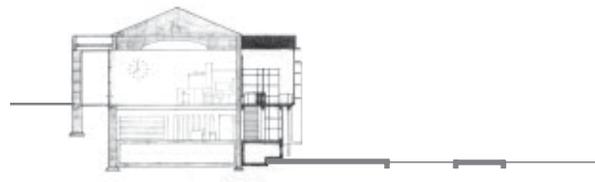
Plan and Elevation, 1987



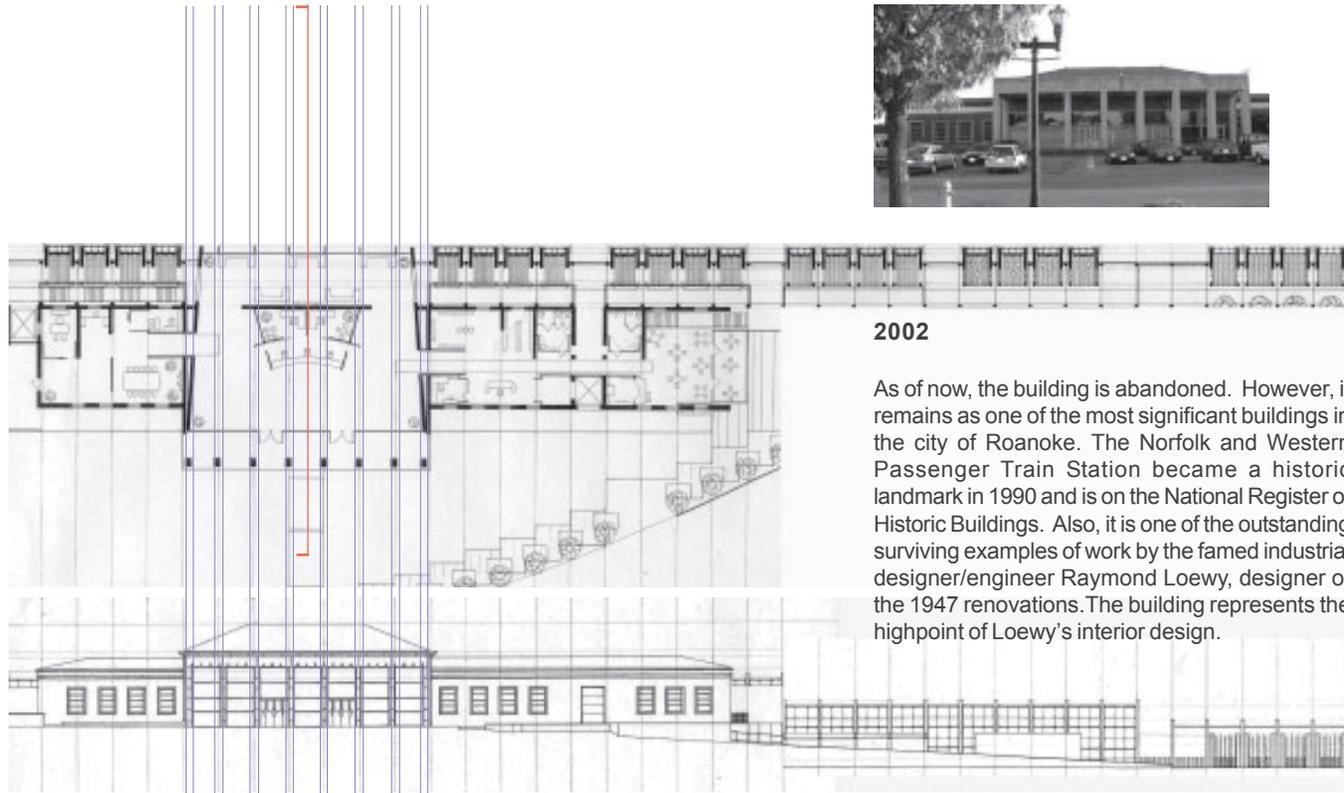
### 1987

The back of the building was modified in accordance to the streamline characteristics. The structural core of the building remained relatively intact. However, as a result of weathering and age, reinforcement was added to the original structural beams.

The building remained in this state until 1987, at which time Amtrak discontinued its N&W passenger train services. As a result, the station was converted to an office building and became the center for the Norfolk Southern Credit Union. The platform and roof were removed almost immediately, and the concourse was demolished to accommodate double-stack container trains. These were the last modifications made to the train station.



Transverse Section, 2002



**2002**

As of now, the building is abandoned. However, it remains as one of the most significant buildings in the city of Roanoke. The Norfolk and Western Passenger Train Station became a historic landmark in 1990 and is on the National Register of Historic Buildings. Also, it is one of the outstanding surviving examples of work by the famed industrial designer/engineer Raymond Loewy, designer of the 1947 renovations. The building represents the highpoint of Loewy's interior design.

Plan and Elevation, 2002



(r)  
Raymond Loewy,  
Pennsylvania S-1 Locomotive,  
1937

### Part 3: The Significance of the Station

- 3.1 Raymond Loewy
- 3.2 streamline
- 3.3 then and now

Some guidelines for today's design:

*“Simplify products, make them more economical, easier to maintain and fail-safe so as not to burden further the consumer’s already hectic life; avoid unnecessary costly annoyances and irritations; do not indulge in “yearly model” changes unless they are justified by sound functional, technological, and/or costly advantages.”*

~ Raymond Loewy



(s)



(t)



(u)



(v)



(w)

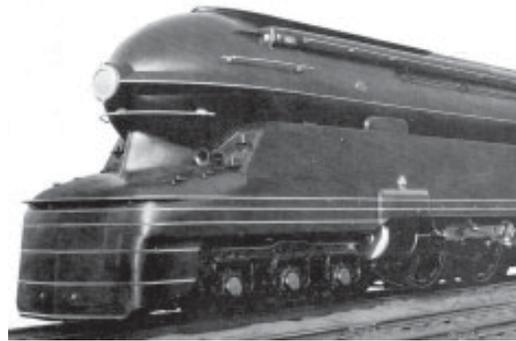
Raymond Loewy is recognized as one of the founders of industrial design. He was the director of one of the largest and most highly respected industrial design studios in the world, Raymond Loewy-William Snaith, Inc. The studios were located in New York, Chicago, and London and employ over 150 designers, architects, and draftsmen. In addition to providing services such as graphic design, packaging, interior design, specialized architectural design, and marketing research, the company's reputation was also built upon their creation of a wide range of consumer products.

Some examples of Loewy products include the Studebaker Starlight Coupe (s), the Coca-Cola bottle and dispenser (t), the Raymond Loewy chair (u), a motor coach for the Greyhound Corporation (v), and the Lucky Strike Green cigarette package (w).



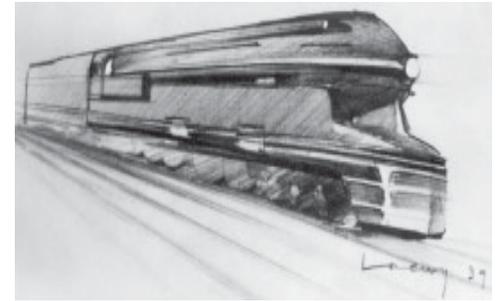
Norfolk and Western J-Class

(x)



Pennsylvania S-1 Class

(y)



Loewy's sketch of the Pennsylvania S-1

(z)



Streamline vs. Traditional,  
photographer: O.Winston Link

(aa)

Throughout his career, Loewy has taken a keen interest in the field of transportation design, in particular, the locomotive. His designs dealt mainly with the steam locomotive, although, he has created designs for the diesel and electric locomotives, as well. Loewy is known for completely transforming the appearance of the traditional steam locomotive, by applying his streamlining concepts. Streamlining became the vogue in the 1930s and 1940s. It was based on the scientific knowledge that smooth surfaces with unbroken corners offer the least resistance to air currents, and therefore, allow the locomotive to travel faster.

Loewy is best known for his design of the Pennsylvania Railroad S-1 locomotive, as well as, our own, Norfolk and Western J-Class locomotive. The N&W J-Class was built in Roanoke at the Roanoke Machine Works factory, "the greatest car and locomotive manufacturing plant in the south."

Compared to the aerodynamics of the streamline steam locomotive, the traditional steam locomotive's design lacks form, style, and grace. Its design is strictly utilitarian, exposing a clutter of auxiliary apparatus. This appearance portrays a look as though the skin has been ripped away from the mechanical body to reveal all of its articulated organs inside exposing an elegant density of mechanical layers.



(bb)



(cc)

#### Characteristics of a Traditional Steam Locomotive:

- conventional flat-front
- sharp corners and edges
- cluttered utilities
- light angular prow
- low wedge front
- steel side rods, valves, and domes
- exposed piping
- nickel silver bell
- bonnet shaped stack
- inconsistent proportions



(dd)

#### Characteristics of a Streamline Steam Locomotive:

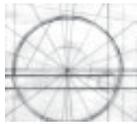
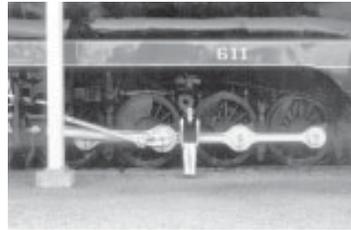
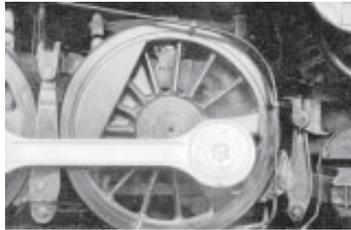
- prow front (ajax)
- smooth, tapered locomotive
- stark simplicity
- conical torpedo-like nose
- curved glass windshield
- tapering tail
- perpendicular sides
- straight, projectile shape shell
- no visible stack
- uniform proportions



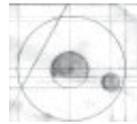
(ee)

In contrast, the streamline locomotive stresses the purity of form and the beauty of line in a clean and functional way. The outer shell is round and smooth and functions as its skin enclosing all the apparatus inside. The shell is designed to avoid air current disturbances and enables the locomotive to travel at faster speeds. Far from being an impediment to the locomotive's design, the large pilot light became an important design component, supplying the bold, forceful, and rather grand facade needed for a long and thin machine.

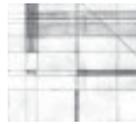
The locomotive's shell forms an enclosure around the apparatus of the train. An overlap results from the shell providing a shelter that conceals the upper half of the apparatus, while exposes the lower half. This relationship portrays the idea of an interlock connection .



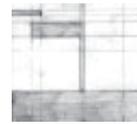
Extension of primary lines in the photograph



Study of the primary forms in the photograph



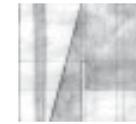
Extension of the primary lines in the photograph



Extension of the primary lines in the photograph



Reverse study of figure and ground in the photograph



Study of the lines and grey masses on the photograph

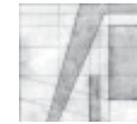
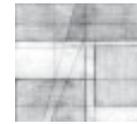


Diagram and study of a section through the locomotive

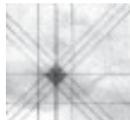


Abstraction of the various greys on the photograph

Subsequent studies reveal the idea of overlap and interlock



Illustrated on the left is the N&W 611 J-Class streamline locomotive, which is on display at the Virginia Museum of Transportation in Roanoke. The pictures portray a study to distinguish the size, scale, and proportion of the locomotive based on the human scale. The drawings portray an abstract investigation that focuses on the lines produced by the connection of the components on the locomotive and the various shapes and forms that they may produce.



Study of the primary lines in the photograph



Study of the primary textures in the photograph

When Loewy renovated the train station in 1947, he introduced a whole new character to the building by implementing his streamline ideas architecturally. The Loewy features that need to be preserved/restored include the plate glass window front (ff), the center back wall of windows that are encased in white aluminum (gg), the expansive ticket counter with an open semi-circular design of brown and Tuscan red formica, as well as, the 28'-0" system map mounted behind the ticket counter and the circular recessed ceiling (hh), the terazzo floors with the N&W symbol (ii), the marble trimmed walls and columns (jj), and finally, the angled wall partitions that are a symbolic representation of the streamline idea (kk).

At present, most of the exterior detail associated with Loewy's design remains. The interior of the building, however, has been visibly altered from its 1947 appearance. Therefore, the majority of the history will need to be preserved in the interior, particularly, the lobby space.



(ff)



(gg)



(hh)



(ii)



(jj)



(kk)





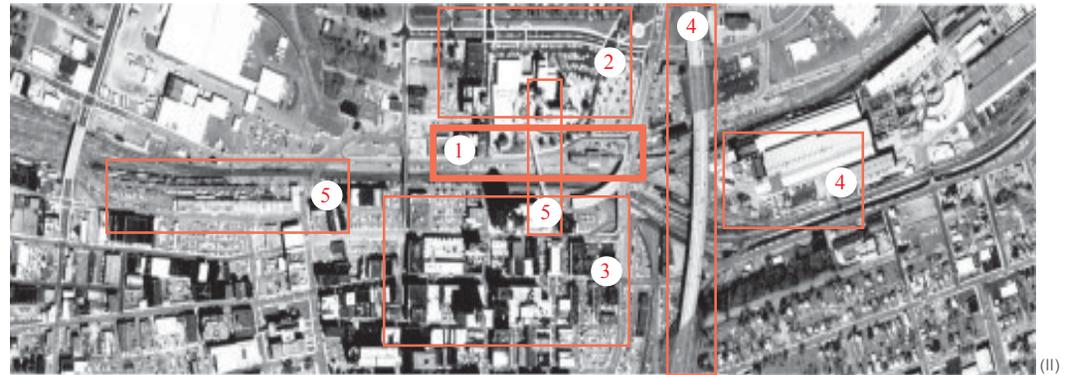
Norfolk and Western Passenger Train Station,  
2002

#### Part 4: The Presence of the Station

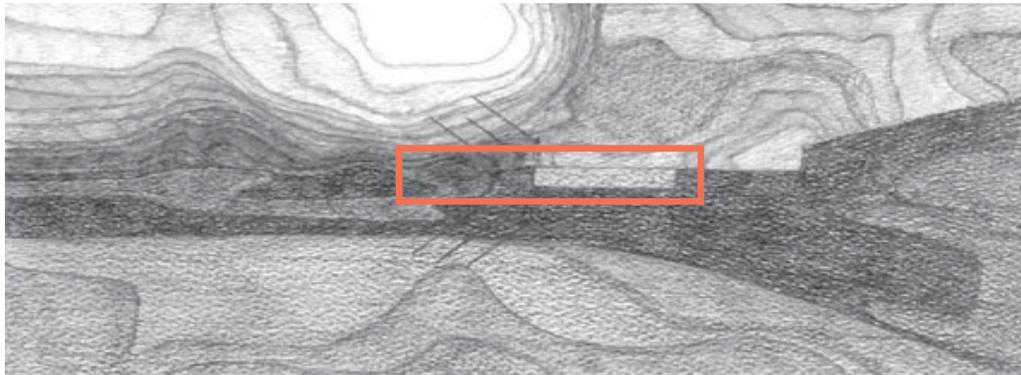
- 4.1 site analysis
- 4.2 proposal

The building is situated on a site that is approximately 4.5 acres, extending from east to west (1). As it is located in a dense urban environment, the surrounding building designs and traffic conditions vary sharply. To the North, is the Hotel Roanoke and Convention Center and its parking lots (2). To the South, is downtown Roanoke and four active railroad tracks (3). To the East, is a high-traffic vehicular bridge, and under that, a rail/maintenance yard (4). To the west, is a pedestrian bridge and beyond that is the Virginia Museum of Transportation (5).

This site has the potential to attract many people, however, currently, the station has a very industrial and unpleasant atmosphere, which does not attract public interaction. The site lacks a sense of unity between culture and nature, and therefore, has created an uncomfortable setting for the public.



Aerial photo of the site and the surrounding areas



The topography varies throughout the site and surrounding areas. To the North, it is high and hilly, whereas, to the South, the land is low and flat. There is an 18'-0" retaining wall that extends about a third of the way across the site and slopes downward. Currently, the site contains no vegetation, as the ground surface is completely covered in asphalt. However, there are several varieties of trees that grow along the sidewalk across the street and on the hillside surrounding the Hotel Roanoke.



Topography and transverse section of the site



The site looks untended and is showing signs of deterioration. As a result of its desolate appearance, not many people come to this area of Roanoke. They would only come if they were visiting or staying at the Hotel Roanoke, or to park their cars, as this site is currently being used as a free parking lot for the downtown employees of Roanoke.

The site needs to be refurbished to improve the overall quality of the area. By adding more pedestrian-friendly elements to the site, such as trees, a courtyard, a sidewalk, or even places to sit, more people will be enticed to visit the area. As for the building, there are so many attractive and pleasurable features that are worthy of preservation. Roanoke needs to be reminded that this important building was the source of its existence.



South Elevation



Present Conditions of the Site,  
2002



North Elevation

Therefore, I propose to renovate the passenger train station and restore the Loewy character, as well as, design an addition onto the building. The building will serve as a cultural center. The main building will house a museum in honor of Raymond Loewy, and the addition will be designed as a photo gallery dedicated to the works of a locomotive photographer, O. Winston Link.



Present Conditions of the site,  
2002





(mm)

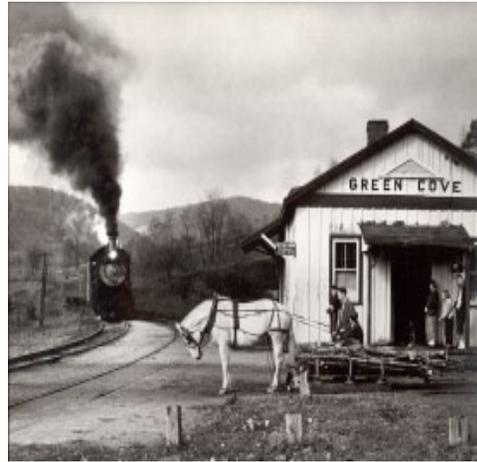
## Part 5: The Addition to the Station

5.1 O. Winston Link

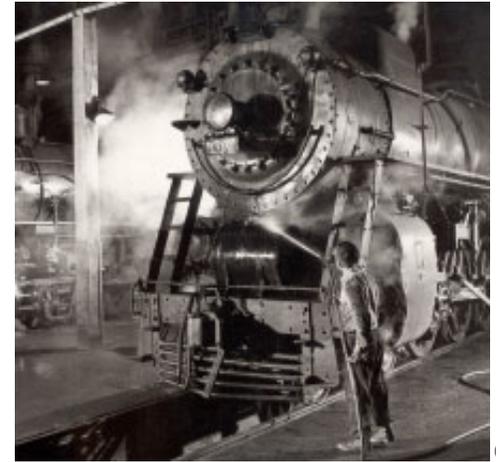
photographer: O. Winston Link



(nn)



(oo)



(pp)

Photographs by O. Winston Link,  
Norfolk and Western Railway



(qq)



(rr)

O. Winston Link was a successful commercial photographer who spent several years of his career documenting the last years of the steam-powered locomotive along the N&W Railway, the last major railroad to abandon steam for diesel power. Link's photographs documented the locomotive in contemporary settings. His thoughts were to preserve the drama and mystery of the locomotive, but also, to portray a small vignette of American life, at that time, around the railroad.



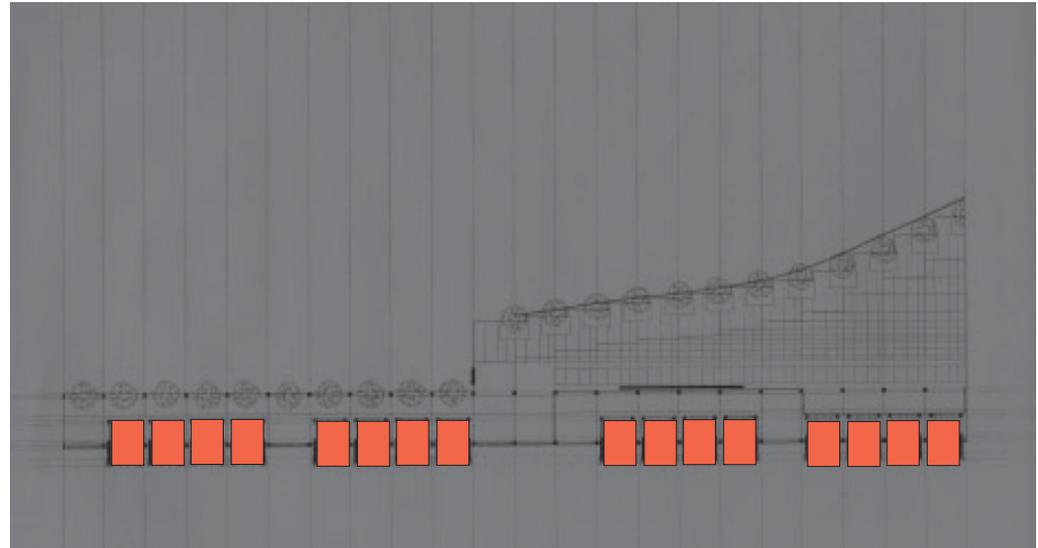


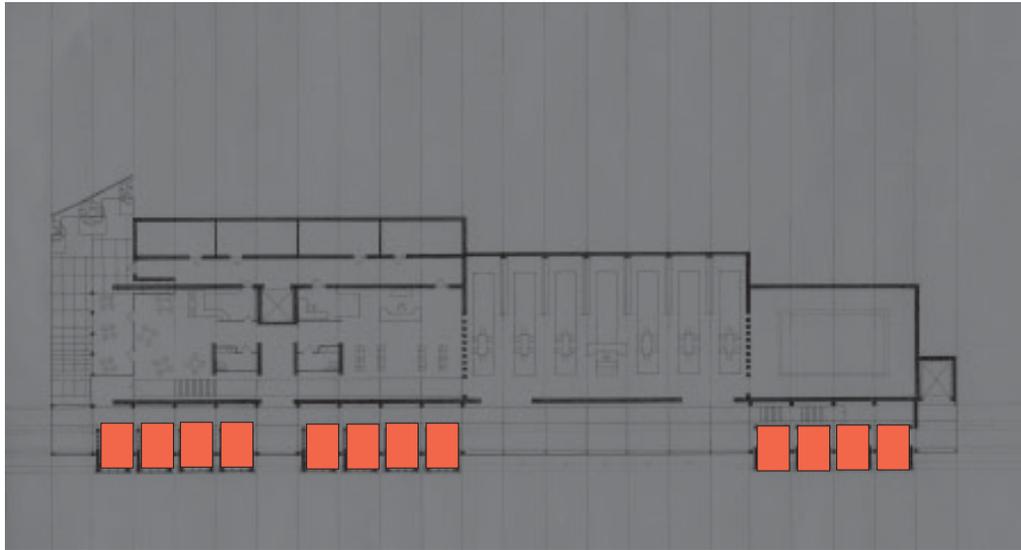
## Part 6: The Transformation of the Station

- 6.1 addition
- 6.2 interlock
- 6.3 the gallery
- 6.4 the program

The gallery spaces

An addition was designed for the Norfolk and Western Passenger Train Station. After reviewing the history of the train station, it was noted that all the major renovations occurred in the back of the building, with each one requiring a unique solution to address the trains and engage the tracks. Therefore, the natural choice for the location of the gallery addition should be in the rear. The motif for positioning the addition in the back to address the trains will remain unchanged, however, now the trains will be addressed by engaging/viewing photos of them.



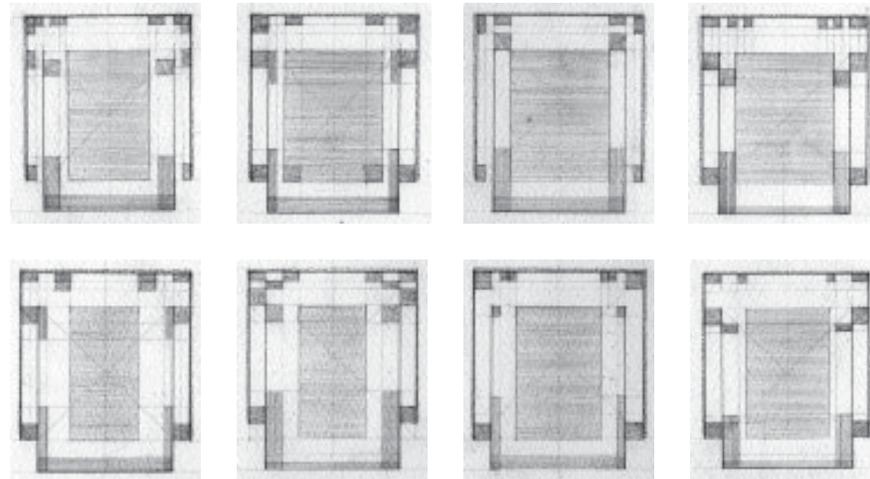
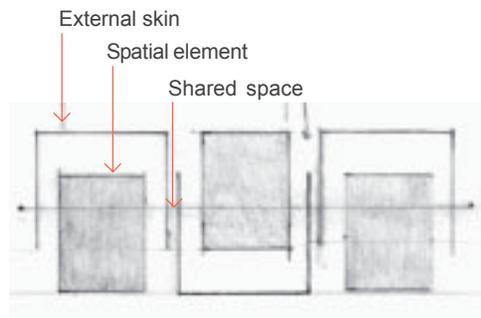


The addition was positioned in the rear of the building, along the E-W axis, to take advantage of the extreme linearity of the site. The concept behind the addition is similar to a locomotive comprised of a chain link of individual cars. A sequence of individual gallery units is repeated throughout the length of the site. Each unit is relatively equal, and is repeated every 12'-0". The 12'-0" increment is based on the original sustaining structural rhythm of the train station. Each primary beam is repeated every 12'-0". This rhythm continues the length of the site and becomes the basis for the layout of the addition.

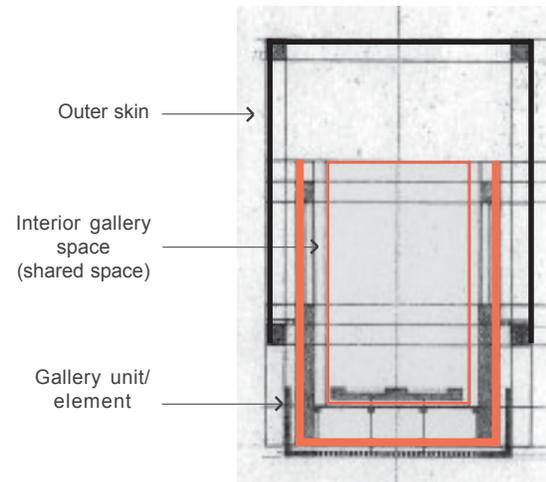
Linear configuration consisting of almost identical units that are aligned



An interlock connection results from the overlapping of two spatial elements and the emergence of a zone of shared space is formed.



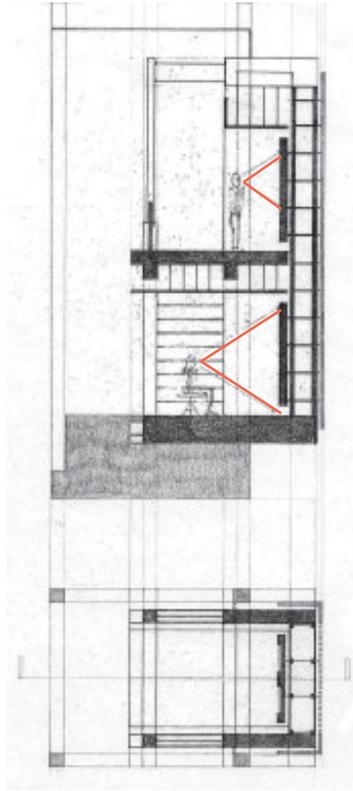
Investigating the constructed relationship between the various interlocking elements that enclose each gallery



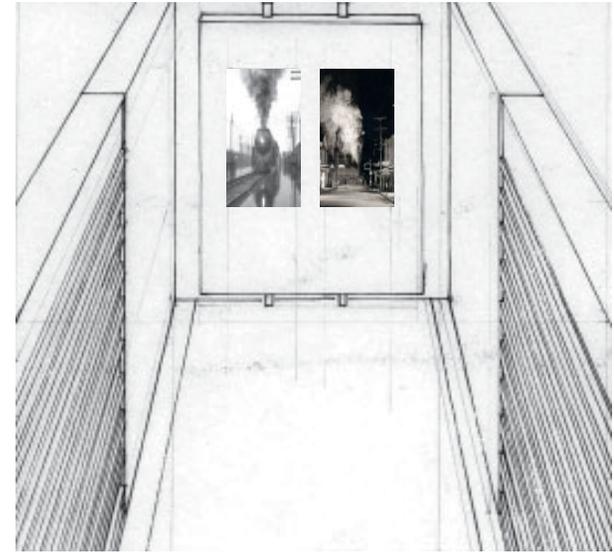
Gallery unit

The shape of each gallery unit represents the nature of the interlock connection. As is true in the shell of a Streamline locomotive, the function of the outer layer of the gallery unit is to conceal the interior space, thus forming an intimate relationship between the art and its architectural container. The dimensions and proportions of the interior gallery space, in relation to the structural enclosure, were studied to determine the amount of constructed assembly needed to adequately portray the interlock concept. The amount of personal space required was also factored into the decision making.

Each gallery unit was designed so that visitors could fully appreciate Link's photography. There are two types of galleries, a moving gallery for people to stand and view the photos and a sitting gallery for people to sit and view the photos. Each gallery space contains two of Link's photos that are 24" x 36" in size. Whether a visitor is sitting or standing, the photos are placed at a height that will be comfortable to view. By choosing a 30/60 degree tilt to be a desired range to view the photographs, an ideal condition is established to best see and contemplate the art.



Optimal positions to sit/stand

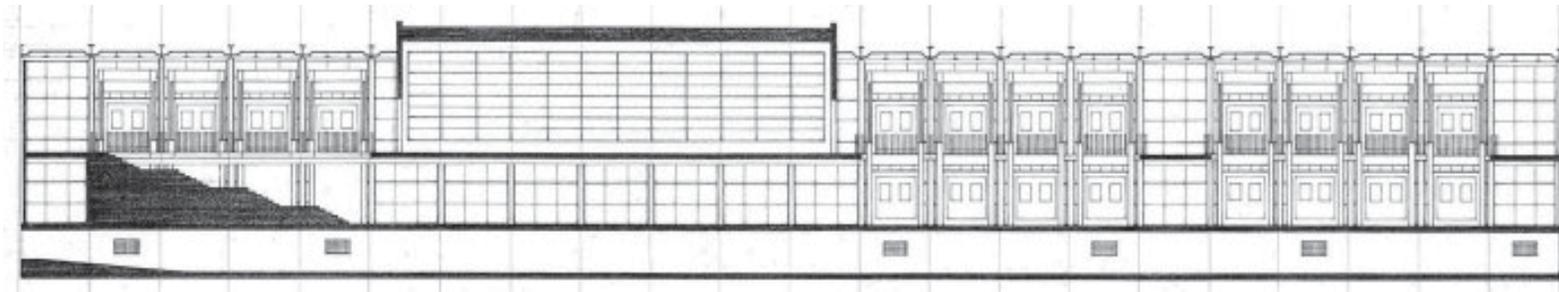


A perspective view of a sitting gallery



A gallery of photographs

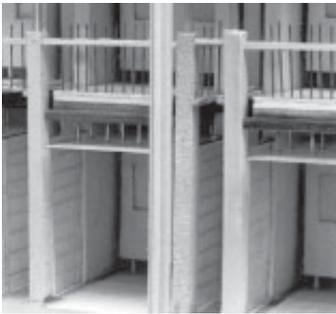
To further enhance the intimacy of the space, each gallery has a drop ceiling consisting of translucent frosted glass. By locating the lighting above the ceiling, a soft white glow is produced on to the space below. The galleries are viewed in combination with artificial light, as well as, natural light to make sure the space is evenly lit.



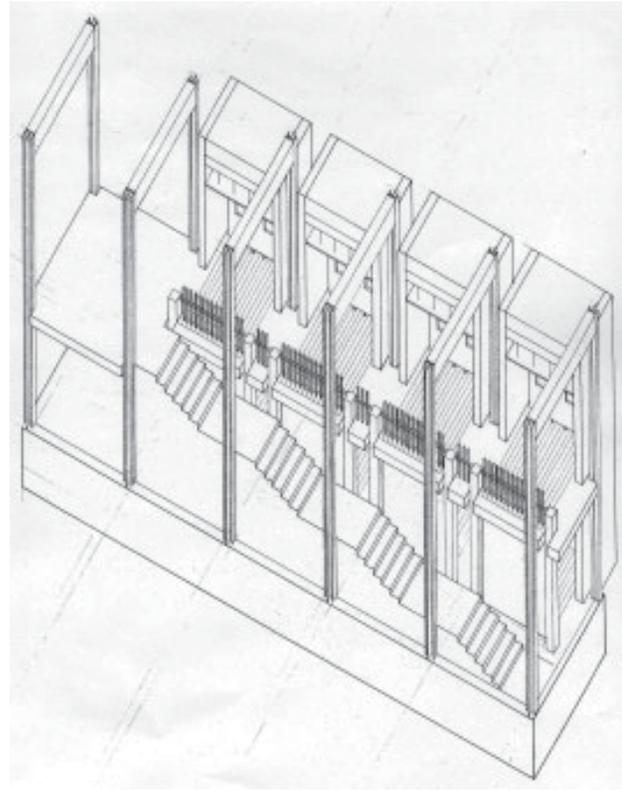
Longitudinal section through the atrium displaying the two floors of gallery spaces and the central restored Loewy section



Top floor: standing galleries



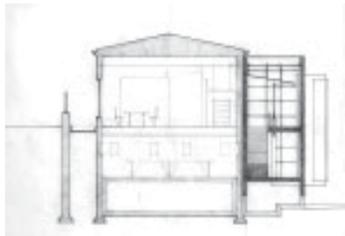
Bottom floor: sitting galleries



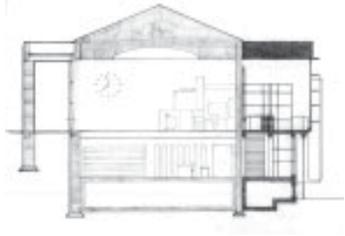
Stair links upstairs galleries to the downstairs galleries

The addition is comprised of two floors. The upper level is a mezzanine that houses the standing galleries, the Loewy museum, and a secondary walkway. The lower level consists of the sitting galleries, a common area/lookout space, and a narrow atrium walkway. The atrium is open to the upper level and is the main walkway for the addition. It resembles the major axis of the building and reinforces the linear movement of the site.

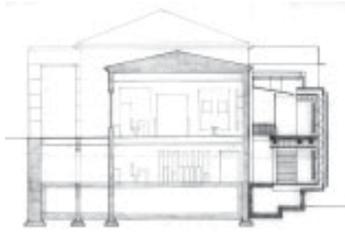




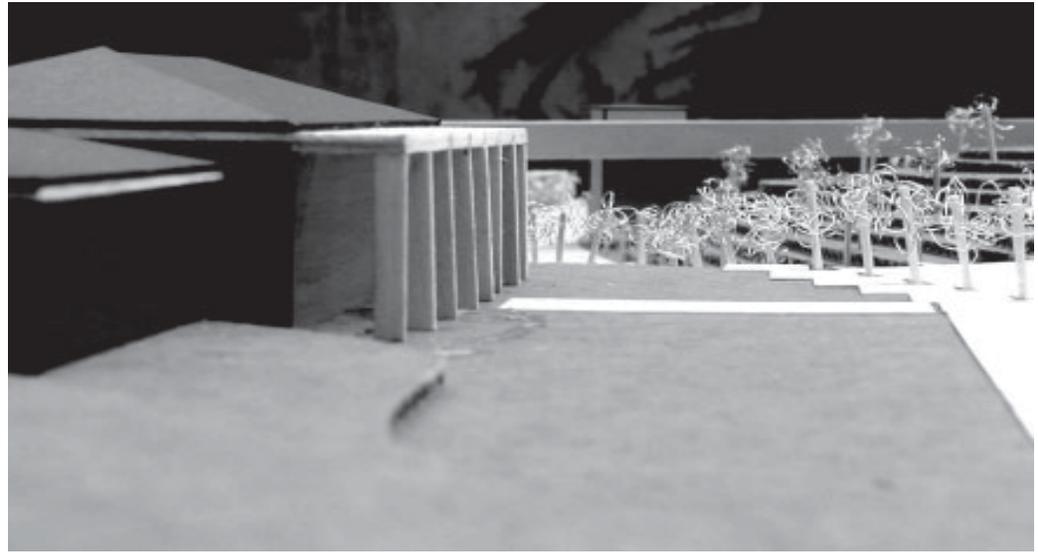
(a)



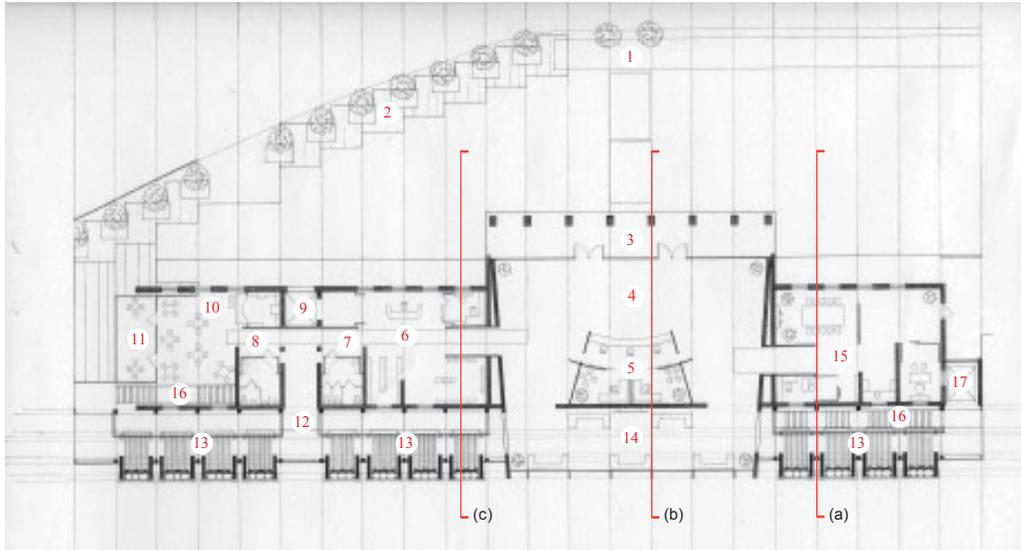
(b)



(c)



Entrance condition



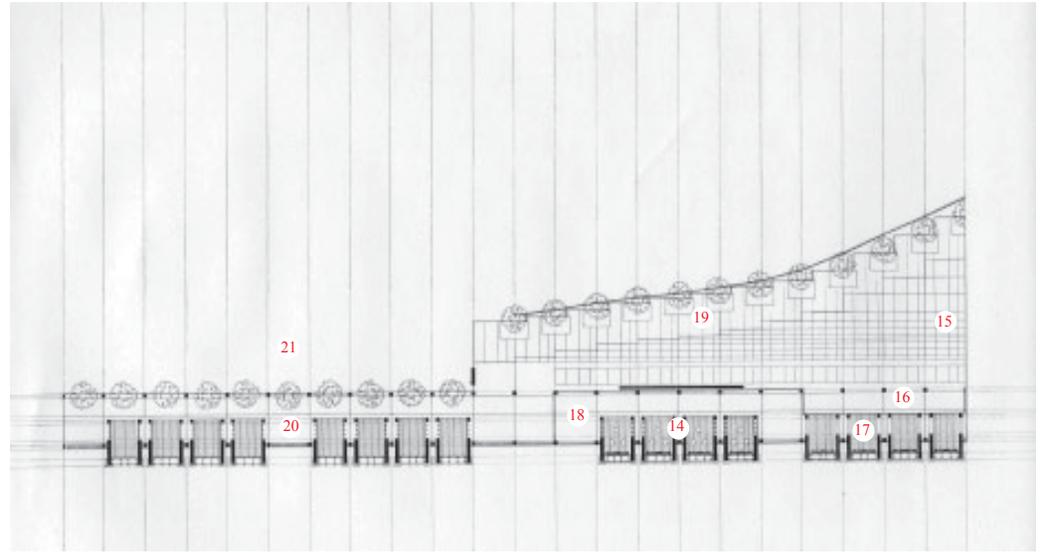
Key

- 1: Entrance Sidewalk
- 2: Public Sidewalk
- 3: Entrance Portico
- 4: Lobby
- 5: Ticket/Information Counter
- 6: Gift Shop
- 7: Women's Restroom
- 8: Men's Restroom
- 9: Service Elevator
- 10: Bar/Restaurant
- 11: Look-Out Balcony
- 12: Bridge to Galleries
- 13: Moving Galleries
- 14: Loewy Museum
- 15: Offices/Conference Room
- 16: Public Stairs
- 17: Public Elevator

Entrance floor plan



Courtyard Space





Ground floor plan

Key

1. Public Elevator
2. Public Stairs
3. Lounge
4. Look-Out Space
5. Model Train Room
6. Library
7. Sculpture Gallery
8. Unisex Restroom
9. Service Elevator
10. Service Corridor/Storage
11. Mechanical Room/Storage
12. Coffee Bar
13. Atrium
14. Sitting Galleries
15. Public Courtyard
16. Outdoor Patio
17. Moving Gallery
18. Exit
19. Public Sidewalk
20. Public Sitting/Viewing Areas
21. Shenandoah Avenue

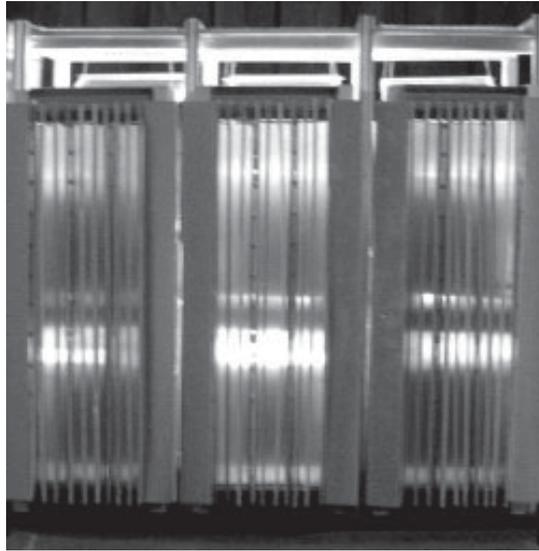
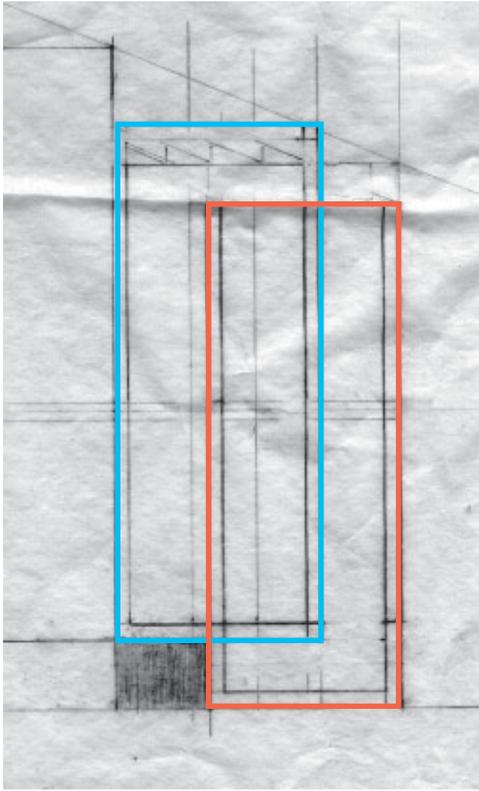


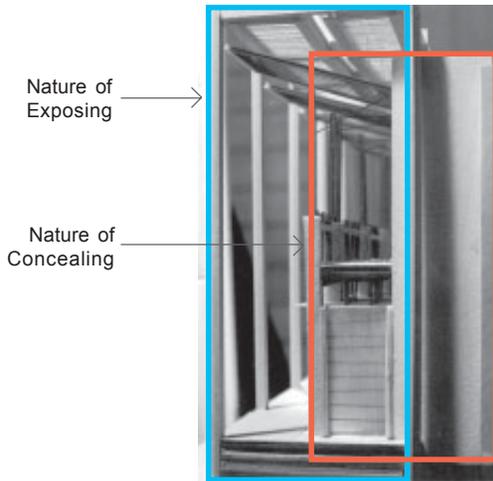
Photo displaying the galleries lit up during the night

## Part 7: The Structure of the Station

- 7.1 exposing vs. concealing
- 7.2 structure
- 7.3 mechanics



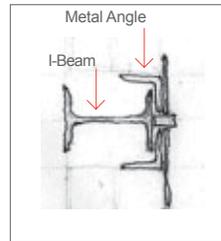
Initial sketch of two volumes forming an interlock



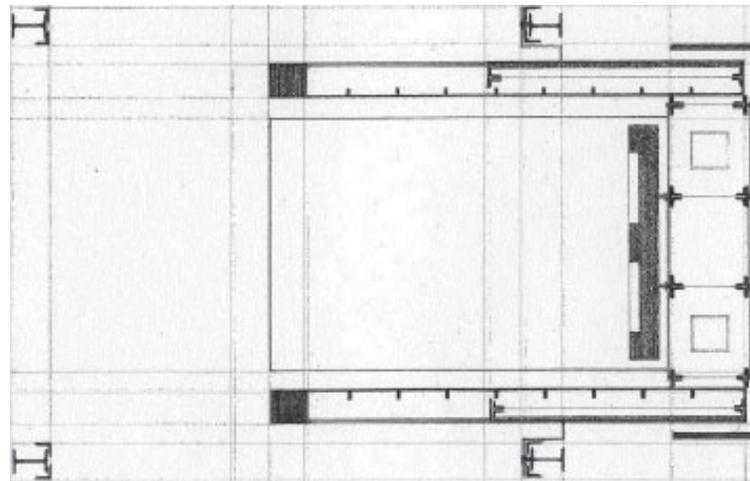
The addition is composed of two volumes that interlock.  
 One volume exposes the architectural elements (public space).  
 One volume conceals the architectural elements (private space).

The theory that every space within a building should have a purpose/function, also applies to a structural element. It is by keeping the design simple and eliminating redundant features, that an efficient interlocking form is created.

The interlocking connection is comprised of two volumes. The first volume (public walkways) represents the characteristics of the traditional steam locomotive and portrays the nature of exposing. The second volume (private galleries) represents the characteristics of a Streamline steam locomotive and portrays the nature of concealing.



Interlock connection composed of an I-beam and two metal angles



Detail floor plan of the construction of each element

The 'nature of exposing' is expressed by revealing the structural integrity (or mechanics) of the addition, and is most clearly seen in the columns and beams. The primary structure for the addition is a series of columns and beams that is repeated every 12'-0" on center and extends the length of the site. The steel columns and beams are on public display. The column is built up from an I-beam and two metal angles. The metal angles are hung on top of the I-beam, one on each side. This connection forms a subtle relationship between the two and reinforces the interlocking concept within the addition. A transparent glass-panel system encloses this structure. This glass will allow the structural integrity of the building to be seen from the outside. The glass panels will contain solar control properties, and each panel is connected to the next by a glass-bolt connector to a cast "spider" element.



Continuous framework of columns and beams

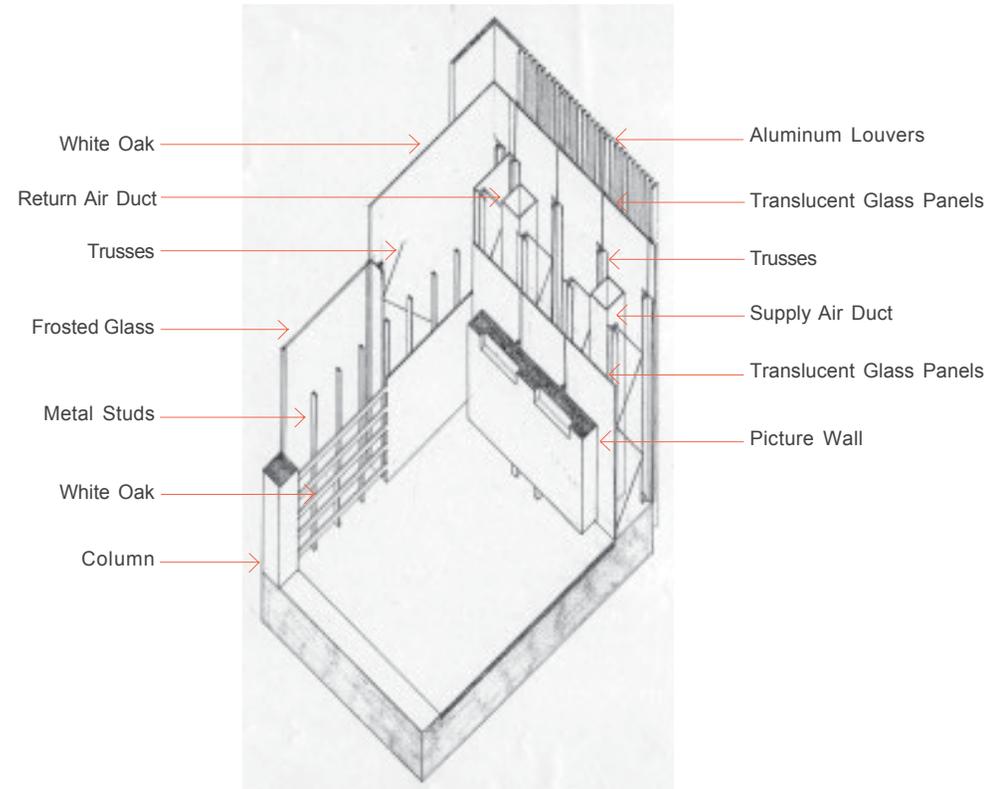


Linear directionality of repeating columns and beams throughout the length of the site

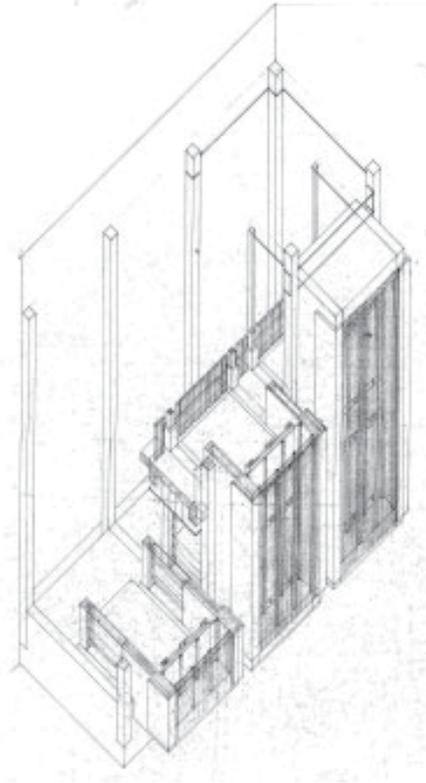
The 'nature of concealing' is expressed as layers that make up the gallery units. By choosing to conceal the structure/mechanics within the gallery spaces, the photographs will be protected from any damaging exposure to direct sunlight. Also, the gallery environment will feel serene and quiet, so that more attention can be placed on enjoyment of the photographs.



Like the streamlined locomotive, concealing the raw mechanics of construction with layers has more than an aesthetic purpose. Each layer has a significant purpose/function. White aluminum louvers are located on the outside of each gallery unit. This layer of louvers acts as a shading device to shade/diffuse/screen harmful ultraviolet sunlight from entering the gallery space. I propose that the material be recycled from the original material of Raymond Loewy's addition. Below the louvers is a layer of translucent frosted glass panels that contain solar control, low-e properties with an insulated assembly consisting of a laminated external glass pane for acoustics and two chambers of argon gas fill separated by a mylar interlayer for thermal control. Its function is to block the harmful ultraviolet radiation in from entering the interior, reduce heat gain in the gallery spaces, reduce external noise transmission to the gallery as well as, to provide a nice glow within the gallery space. The glass panel encases four 2'-0" wide trusses that extend vertically the height of the two-story gallery unit. The trusses aid in enclosing and, thereby, defining the space for the mechanical ductwork. The mechanical units are located in between the trusses, providing a space for the return air and supply air ducts. A translucent frosted glass panel conceals the mechanics from the interior. The translucent panel, however, reveals a shadow of the ductwork behind it.



Exploded axonometric of a gallery unit



Axonometric-section of three gallery units



Walls form an enclosure around the gallery units

A 9'-0" high picture wall is located in front of the glass panels, which extend the entire height of the two story gallery unit. The 9'-0" wall has a white oak interior finish, to provide the least amount of distraction from the 2'-0" x 3'-0" wide black and white photographs it displays.

The two outer walls that enclose the gallery units are completely opaque and consist of precast concrete panels on the exterior and white oak paneling on the interior. The two types of paneling extend the entire height of the two story gallery unit. The walls are hollow to allow for a 5'-0" wide truss to extend vertically from ground to roof. The truss will help to reinforce the wall and stabilize the gallery unit. The top and bottom floors are welded to the truss with steel angles. The ground floor, however, will also be reinforced and attached to the concrete base to aid in the stability of the gallery unit.



Screens aid to direct the air flow towards the return air duct. Ducts are located above each gallery unit on the top floor.

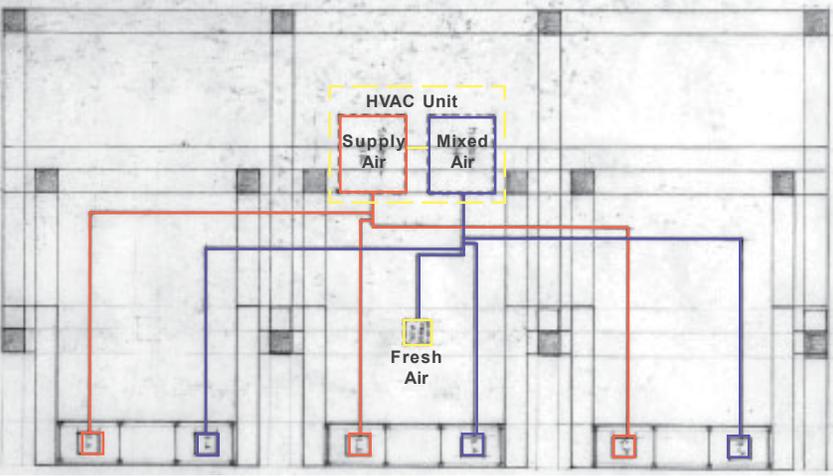
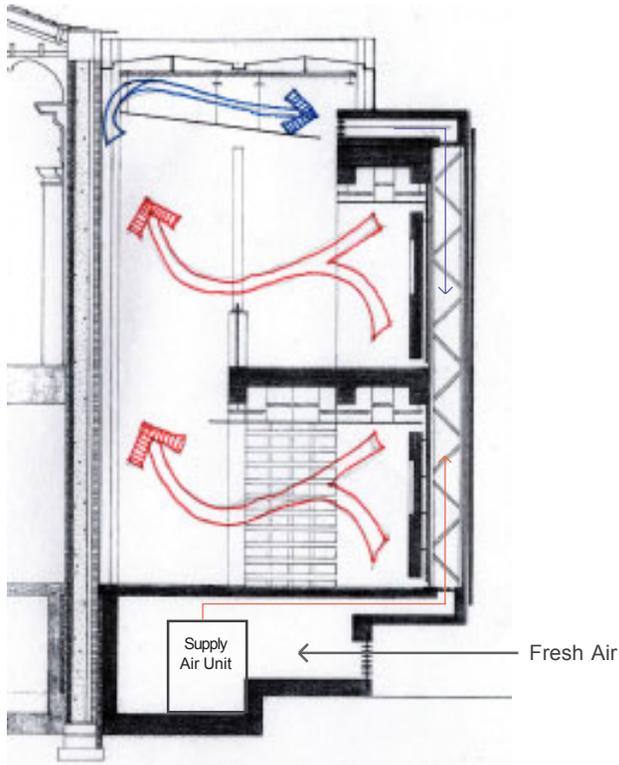


Diagram of the location of air ducts

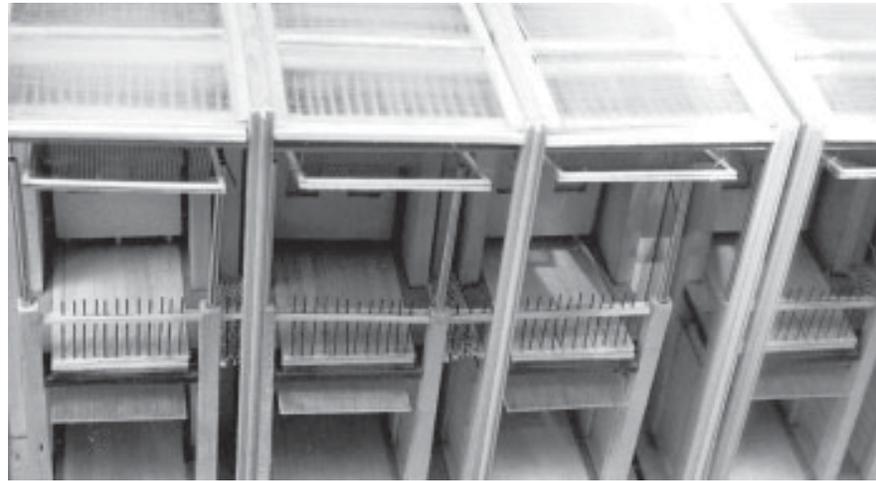


Detail construction section displaying the air flow through the building.  
 Red arrows signify the direction of the supply air.  
 Blue arrows signify the direction of the return-mixed air.

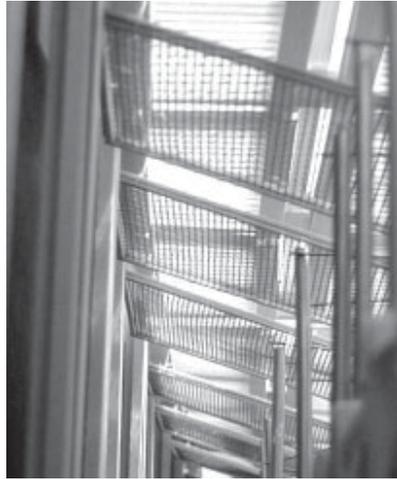
Photographs and other works of art require stable temperatures and humidity to prevent environmental damage. Air flows through the building in a loop. Fresh air flows into the building through an opening that is located below every third gallery unit. The fresh air is then mixed into the supply air unit. The fresh air is mixed with supply air and circulates upward through the ducts. Supply air is distributed through the building via vented inlets located above and below each picture wall. As the supply air mixes with the air in the space, it becomes warm and starts to rise. Once the air rises, it is drawn behind a screen that is hung from the ceiling. The screen directs the circulation of airflow towards the return air duct, as well as shading the space below. The warm air in the top of the space is removed thus reducing the need to cool the space. The mixed air then is drawn through the return air duct and enters the heating and cooling unit to complete the cycle of air change.



View down the atrium  
Drop ceilings aid to screen the upper and lower  
walkways from any direct sunlight.

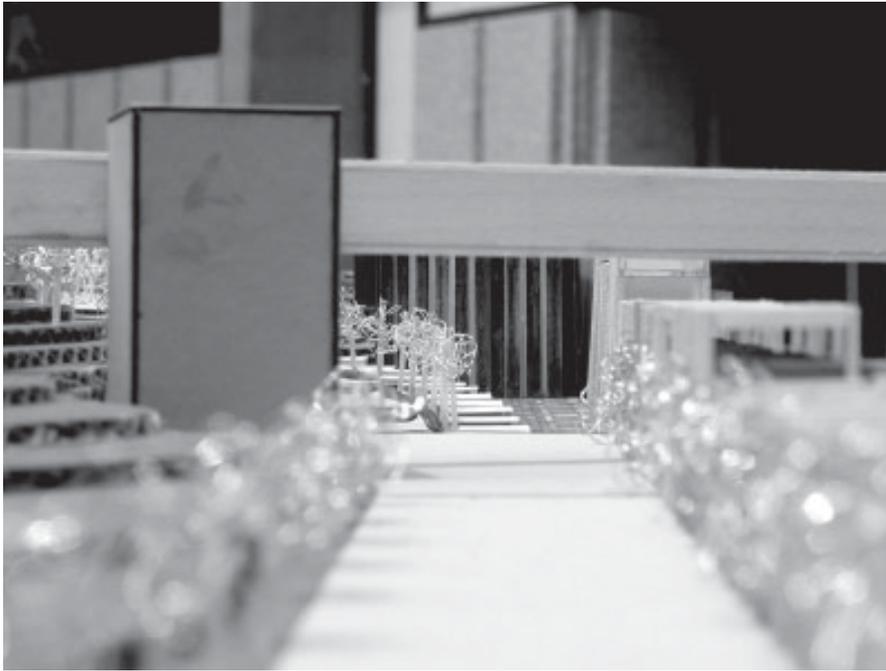


Sunshades are located just below the exterior laminated glass roof.



Upward view of the roof displaying the array of translucent glass dropped ceilings

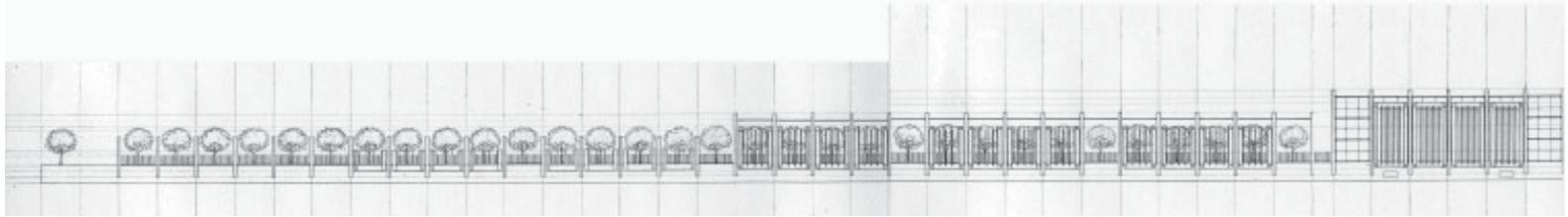
The roof is assembled with multiple layers designed to modulate the amount of light entering the space below. The roof is constructed from laminated frosted glass, and slopes to allow excess water to drain to the gutters located at the perimeter of each module. Inevitably, an all glass roof will allow significant thermal transmission, however, by adding two chambers of argon gas fill separated by a mylar interlayer along with solar control, low-e properties, the glass will deter direct sunlight, diffuse incoming light, and still provide a highly visible ceiling for the addition. Sunshades are located below the glazed roof to further control the amount of direct sunlight. The sunshades are obscured from the interior view by a translucent glass dropped ceiling hung from secondary framing located between the main columns and beams. The drop ceiling functions to screen any excess sunlight from entering the space below, as well as, to direct the circulation of airflow.



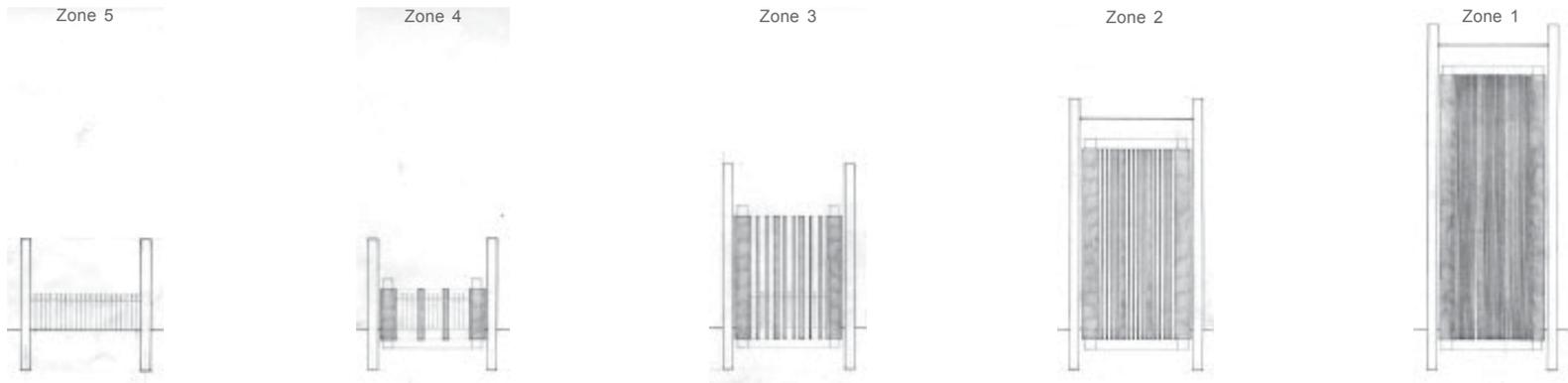
Trees are placed every 12'-0" to accentuate the idea of repetition and linearity within the site

## Part 8: Site Improvements to the Station

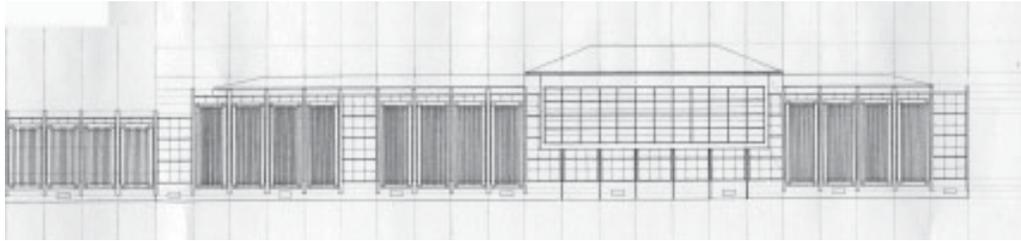
- 8.1 indoor/outdoor zones
- 8.2 courtyard space



South Elevation of the addition along the entire site



The louvers symbolize the aperture of a camera; opening and closing of the lens to control the amount of light that enters.



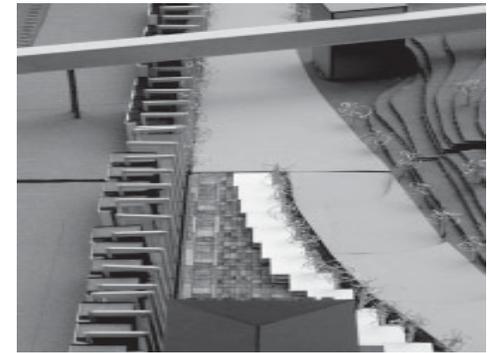
Perspective of the south elevation displaying the various zones

The extreme linear qualities of the site are an asset in enabling the length of the addition to extend out in the East-West direction. The addition is divided into five zones that provide either interior or exterior spaces. The interior zones (1 and 2) are connected to the cultural museum. As the spatial structures are completely enclosed, they provide a more quiet and uninterrupted atmosphere for visitors to enjoy the photographs. The exterior zones (3, 4, and 5) are designed to entice pedestrians to enter into the area. The spatial structures become more exposed as one travels from zone 3 to zone 5. This creates a more open and public area to sit, relax, and/or enjoy the scenery. The extent of enclosure or exposure of each zone is directly related to where one's attention should be placed. Outdoor louvers are also used to direct and accentuate the focus of each space. These louvers envelop the south side of each zone, and help to distinguish them. The interior zones have closer spacings to draw the focus to the photographs. The exterior zones have wider spacings so visitors can enjoy the view of the active railroad, as well as downtown Roanoke and the mountains beyond. By creating both interior and exterior spaces within the design of the addition, a positive connection is created on the site that will visually attract more people into the area.

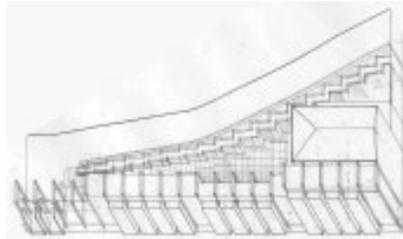


Existing retaining wall that encloses the north side of the courtyard

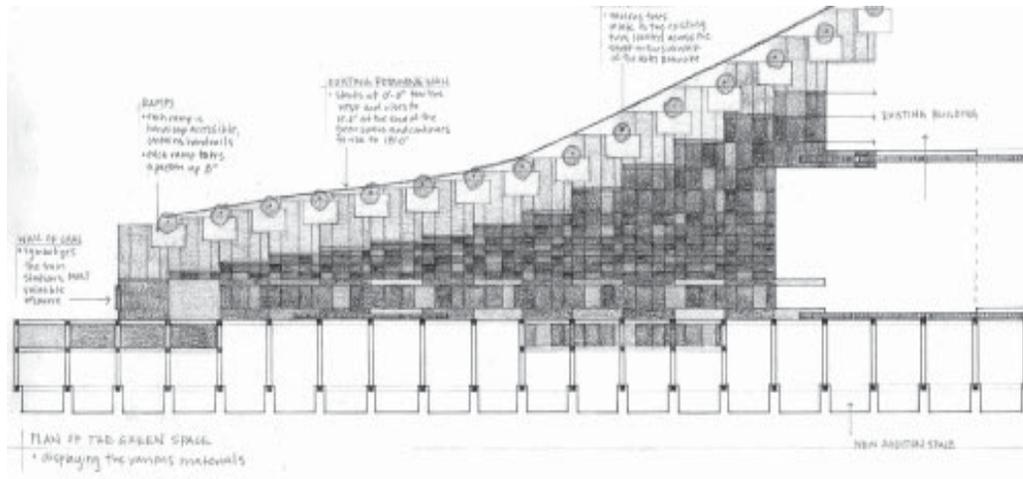
The design for a green space/courtyard arose from the need to entice pedestrians into the area. The green space will be nestled in a spot west of the train station and north of the new addition. Most of the green space to the north will be enclosed by an existing retaining wall. The wall starts at 0'-0" on the flat terrain and rises to a height of 18'-0" at the highest end. The actual green space, however, will be flat. The retaining wall, the original train station, and the addition will all define the green space. This will create a 'feeling of enclosure' and belonging. These three structures will also shield the green space from the fumes, noise, and distracting movement of the surrounding motor traffic and train movement, which will also create a more pleasurable experience for its visitors. By working around the landscape and its limitations, the green space will have the capability to bring beauty and security to the area.



Various views displaying the courtyard and the new sidewalk



Axonometric of the courtyard



The courtyard plan displays the various materials that make up the floor pattern.

The design of the green space will be focused on a matrix of different scaled geometries, governed by the architectural qualities of the site and the surrounding area. The primary geometry relates to the structural rhythm of the train station and its addition. This is expressed every 12'-0", by the use of varying green colored grass pavers. These pavers accent the longitudinal axis and path leading into the main building, as well as, enliven the area with color. Another method to represent the primary layer is the organization and design of a new accessible sidewalk located alongside the existing retaining wall. As the primary lines meet the retaining wall, perpendicular lines are made that are directed towards the train station. This creates the secondary layer and is characterized by a system of less formal pathways. The pathways are covered with an assortment of flat-topped stones with varying muted brown tones. The pathways help to express the extreme linear proportion of the actual site, as well as, enhance the desired movement in the East-West direction.

The transformation of a historic building is a positive response to the changing expectations of buildings and their relationships to the surroundings. Revitalizing the Norfolk and Western Passenger Train Station and its site, creates a strong connection between the station, the Hotel Roanoke and downtown, as well as to the addition and its linear directionality to the Transportation Museum and the railroad. This connection will unify, and therefore attract more people to the area, as well as to the surrounding region.

conclusion

This project shows the importance of structure and mechanics to the overall concept of design. A building cannot survive without structural support and mechanical systems. Although the structure and mechanics are crucial components to a building, the architectural potential of their features are often ignored or included at the end of the design phase as an afterthought. By incorporating the structure and mechanics as significant design elements within the initial concept of the architectural design, their function and presence are enhanced, and are celebrated throughout the spaces of the building. The degree of celebration is dependant upon the scale of the structural/mechanical body and features that are concealed/exposed as they relate to its specific situation and environment. It is by integrating the structural and mechanical components of a building into the overall design concept, that a unified design is created.



One of the architect's most important skills is the ability to reconsider questions that seem obvious to many. This project provoked the reconsideration of what a roof and a wall are in a time when construction gets progressively lighter and thinner while trying to appear traditional or neutral.

The walls and roof of a building are considered to be the most essential elements in architecture. Each is comprised of two sides. The exterior side functions to enclose the building, to give protection against adverse weather conditions, such as wind, rain, or snow, to filter incoming light, and to reduce noise transmission. The interior side's function is usually not visibly apparent, as it is compressed into a minimum thickness, that conceals its functions, and also provides minimal architectural quality. To maximize the architectural presence, each function is designed as a separate layer. The layers are offset, overlapped or interlocked to preserve the presence of each of the layers, shading, enclosure, structure, mechanics, and finish. This creates a pattern of lines and features that reveal the wall's function as an architectural component of the building. Exposing each layer to the interior, promotes a better understanding of the method of construction, and at the same time, creates a unique quality of light, sound, and texture in the building.

conclusion





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- (m) Virginia Railway Depots, p. 89
- (n-q) <http://www.imagebase.lib.vt.edu>
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\*\* All other photographs are taken by the author

Illustrations cited



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