music and architecture

a house for an artist:
the context of sound

may 1992
music and architecture

a house for an artist:
the context of sound

bachelor of architecture degree program
thesis design

thesis design committee

doctor daniel doz  professor of architecture  studio critic

john mccreery  professor of architecture  thesis critic

doctor julie eflin  professor of philosophy  thesis critic

© 1992 jonathan peiffer
Thanks To:

Thank you to all the individuals that have encouraged and supported my ideas through the thesis and my five years at Ball State. Without the guidance and assistance of these individuals, my work would not have achieved the same level of quality.

Special Thanks To:

My Thesis Committee
Julie Eflin: For the other angle or point of view that is missing from this college.
John McCreery: For allowing me the freedom to explore my ideas.
Daniel Doz: For allowing me to do my own thing and be my own person in studio.

Also:
Carlos Casuscelli: For staying out my way the final weekend of design and not requiring me to put up any exhibits. For encouraging me to stay out of the 'blah - blah' group and do a real piece of architecture.
Cleve Scott: For expanding my musical horizons and seeing the beauty of noise.
Andy Tershak: For his ideas and radical points of view.
Anyone else who I may have forgotten...

dedications
<table>
<thead>
<tr>
<th>Introduction</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Study of Music</td>
<td>2</td>
</tr>
<tr>
<td>Sound / Site Studies: Context</td>
<td>8</td>
</tr>
<tr>
<td>A House for an Artist: Program</td>
<td>13</td>
</tr>
<tr>
<td>Design Development: Original Music</td>
<td>17</td>
</tr>
<tr>
<td>Final Design Solution</td>
<td>25</td>
</tr>
<tr>
<td>Conclusions</td>
<td>34</td>
</tr>
<tr>
<td>Bibliography</td>
<td>35</td>
</tr>
</tbody>
</table>

**Contents**
Like any of the creative, artistic disciplines, architecture and music have many similarities. Both deal with the design issues of harmony, melody, rhythm, progression, etc. However, these sets of issues are dealt with in different ways and as a result, produce two very different products. The purpose of this thesis is to take a look at both of the fields of music and architecture and develop a common language that can be used for both.

Architecture and music are both artistic expressions, each rendered in different media. All architecture creates sound, or its own type of music. The sounds are a key way of determining the function or the configuration of a space. Therefore, there exists the possibility of generating musical compositions from architecture.

Likewise, music creates space. The emotion of a passage of music can inform the listener with spatial qualities such as depth, emotion, and character. One could also apply the form of music to architecture. For example, in a classical symphony there are four part divisions of the piece known as movements. Each movement could be thought of as a space with its internal form relating to the internal structure of the space. The first movement is typically in sonata form, which refers to the inclusion of a double exposition, development, and recapitulation of a theme. In terms of architectural space, this could refer to an entry, the main portion of the space, and a portal to the next space. Other movements of the symphony could be looked at in the same way.

By listening to the sounds that are present in architectural spaces, a vocabulary of abstract sounds can be generated that can be translated into music and architecture at the same time. The idea of an interchangeable vocabulary for both allows for many opportunities to create something new and different.

Over the period of the semester, the elements of music, sound, and architecture were applied towards the development of a house and studio for an artist. The design process started with transformations of existing music compositions into built form. From there, the process progressed from a study of the specific site and the music it created to the final design studies and the original composition of music. Overall, the process allowed for a look at the very general while progressively becoming more and more specific to the final design.

As a result, the thesis project allowed me to blend my interests in music and architecture. By developing an interaction between the two, I have also been able to clearly see how my design process works for the first time. This book is a map to that process from concept to realization.
a study of music

two
After a poor first attempt at doing some music concrete, I have temporarily decided to try another direction with my music explorations. In order to accustom my ear to the sounds and ways of translating sound, I have decided to look at a piece of music a day and to build study models based on the song.

25 January 1992

The thesis began with a look at music. Having studied architecture for five years and not having studied music formally, I decided it would be necessary to build up my musical background. Not having the facilities or the background during this point of the project for making my own music, looking at existing compositions of music was used as an alternative. The process allowed me to sensitise myself to the elements of sound and music and how they could be interpreted architecturally. Study models were built to represent the structure and the emotion of the music. The styles ranged from rock to classical to jazz.

I found that I reacted foremost to the rhythms of the pieces; the sequencing, the patterns, and the overall flow. The parts of the music were looked at as a series of events, and the models were built likewise. In the end, the models themselves were not as much spatial as they were a sequence of patterns and episodes and how they interacted. The four most successful interpretations included music by Rush, Iron Maiden, Big Country, and Aaron Copland. Each of these compositions had elements that I found useful architecturally.

As a beginning, this stage of development was essential to the genesis of the project as a whole. Without it, the final design would most likely have evolved differently. However, the process of the way the music was interpreted had some severe limitations and was abandoned as the project progressed to the next stage of development.

a study of music
three
**rush 'where's my thing?''**

This was the first song studied and the first to be modeled. One of the appeals of the music of Rush is its structural perfection and high energy. This particular piece, an instrumental, had all of the elements of a well-crafted Rush song, but it also had an edge that gave the song much more 'feel' than previous works. I saw this song as six parts, four of which were very prominent. Those six parts were used in a sequence of four sections that included: an introduction, a body, a bridge, and an ending. This became the sequencing for the study model. Emotionally, the song suggested the presence of a high energy source that started out slowly, building to a climax, and then fading out as the energy was spent. The emotion materialized into the shapes of the parts of the model and the interaction between the individual elements.

---

**a study of music**

**four**
Iron Maiden "The Trooper"

In this song, the highly regular rhythm created a strong contrast to the chaotic nature of the lyrics. Structurally, this was again a six part song and was in the standard rock form of introduction, verse, chorus, verse, chorus, bridge, verse, chorus, and conclusion. The song is about a charge in a battlefield, probably from one of the Napoleonic wars. The musical feel of the song suggests the constant drive of the war machine and portrays war as a very ordered, controlled act. However, the lyrics and the bridge section suggest something entirely different. The lyrics tell a tale of utter chaos and the effect of war on the common man. Overall, I felt that this song nicely represented how something can appear normal at first glance, but upon further inspection there is definitely something wrong or unexpected. In the study model the overall layout of elements is very ordered, but the subtle changes in shape and placement of parts suggest an underlying chaos. The idea of chaos out of order later became a strong element in the final design.

A Study of Music
Five
Aaron Copland, "Fanfare for the Common Man"

In this well known fanfare, the number three was a strong organizing element. The structure was very simple with only three parts of which the third part was only used as the conclusion. At first the piece seemed overly simple, but upon closer inspection, the music had a subtle complexity that was not clear at first. The music went back and forth between the main instrumental theme and percussion fills. In each phrase the power of the music became fuller and stronger until a final climax, where the song ends. The tilted circular form was intended to symbolize a single theme rising in power while the number three was used in the other elements of the model.
big country 'porrohman'

This was another piece of great subtlety. This particular piece was attractive because it is one of the closest approaches to minimalism from a mainstream rock group. Again this suggested subtle complexity in a seemingly simple piece. The song has two themes where a series of repetitive events occur during the first half of the song, while the second portion of music has its own different set of themes. The sequence that I focused on was the first section because of its wonderful plays on a single theme. The theme starts as a single melody line and small parts are added until the piece builds in force over a period of three minutes, where there are no lyrics. Overall, the theme repeats a total of thirty two times in the introduction before a single verse is sung. The line of columns growing in size across the length of the model represent the building of the music while the other elements represent the rest of the song imposing its own order upon the original theme. Overall, this is a very powerful piece of music and its transformation helped me in later stages of the project.
sound / site studies: context eight
The chosen site is very dynamic. It is even richer in its sound selection than I first expected. You can feel the rhythmic low rumble of the factory creating a play with the natural sounds of the ambient environment. The section of track between the walls allows for natural reverberation and amplification of the sounds of the site.

28 January 1992

After looking at music, I turned to a specific site to listen to its “music”. The site is located on a portion of the white river near the point were East Jackson crosses the river in Muncie. The context is a highly industrial area and contains many different types of industry, working and abandoned. I chose this particular site because of the intense variety of contextual issues, its challenging configuration, and its accessibility for study. For those reasons, I found this site to be ideal.

Immediate contextual issues include a steel fabricator along the West side of the site, railroads on the North and East, the river to the East, and a junkyard and residential subdivision to the South. All of these elements have their own vocabulary of sounds and they all effect the site in different ways. The site itself had many interesting elements that also made it an attractive site for a design project, the most interesting being a 350 foot flood wall that bisected the entire site from North to South. Other elements included the various railroad bridges and a slope change from the Conrail siding to the CSX mainline.

Looking at industry has been a sub-theme throughout my projects during the last two semesters. The idea of industry manifested itself in this project as more than simply a study of the wonderful timbres of machinery. As a type, the architecture of American manufacturing is a symbol of a period of development in the United States that allowed the country to achieve the status it now has. However, now that the once great factories have become out of date, they are considered eyesores. In the thesis project, the major elements that were taken from industry were the sounds, the materials, and the sometimes brutal siting of elements. In taking these ideas and applying them to A House for an Artist, it was a goal to take elements that are considered negative by mainstream culture and transform them into something positive. The result is a historical link to an American prototype that represents a period of history during which a majority of Muncie was built.

sound / site studies: context nine
The study of sounds did not limit itself to industrial timbres, although they were the most prominent sounds of the site. Being a long narrow site, there are many pockets of localized sound. The most interesting section for sound on the site is the section of CSX track just south of the Conrail bridge. The parallel walls act as a natural reflector and amplifier. Sounds of the site, specifically trains and machinery, can be heard clearly without being directly seen. On the opposite side of the floodwall, facing the river, the sound of the river and nature are most prominent, with the machinery barely perceptible above the sound of running water. On the southern most tip of the site, the sound of the subdivision and its related activities are the most intense.

During this stage of studying the site, some very preliminary schemes for various designs were done. One such study proposed an industrial musical instrument that made use of sound reflectors, water, and machinery as a huge sound sculpture. Although not very practical, this study allowed me to look at the ideas of vocabulary and sound without committing myself to a specific program that had not been yet developed.
sound / site studies: context
eleven
a house for an artist: program thirteen
By translating the buildup and decay of relative layers of sound and applying them to a house for an artist, I have finally gotten to the starting point for the architectural piece. Having something to work with, I have been able to score the first composition of music.

13 February 1992

Now that I had a feel for the site and its sound components, I diverted my attention to a specific program of spaces. I felt it necessary at this point to deal with real issues for a while and give my theoretical ideas a break. In my original thesis proposal I called for the project to be a house for a musician. However, as some of my ideas started to take shape during the early part of the semester, I felt that simply a house for a musician would be too generic to effectively design. As a result I patterned the client more or less on myself as an individual with many artistic interests that are not clearly related on the surface. As a result, I generated a program for an artist that would take into account many interests.

Using the site for an artist's residence seemed to be the most logical. The richness of the site in terms of its materials, sounds, and variety would be an excellent source of inspiration for an artist. The siting of the house could be very useful for someone who is a "contextual artist" using the elements around them to inspire/generate ideas. In addition a creative person would be more likely in reality the even consider living on a site such as this in the first place.

The program was intentionally kept small and simple. It was my thought that by keeping the program small in a one semester thesis, I could start to think about the issue of detail in more depth than I have ever previously. In keeping the project manageable in scale, I was able to explore many schemes before I arrived upon a final one. As a result, the program was developed around a basic residence, which contained all of the necessities of living, and a studio that contained a design studio, a photographic darkroom, and a music studio. This allowed for artistic expression in a variety of media.

Once again, preliminary design studies were done to continue to develop design ideas. In this phase, a small artist's studio was designed that made use of the flood wall as a structural and expressive element. Although too small, and not very well refined, the studio was a good starting point for thinking about a real program and real spaces. In addition, many later ideas grew out of this study, and the first piece of original music was scored off of this house.

a house for an artist: program fourteen
LIVING ~ ORGANIC
- LIVING SPACE
- DINING
- KITCHEN
- BATHROOM
- BEDROOM X2

WORK ~ MECHANIC
- DARKROOM / PHOTO LAB
- MUSIC STUDIO
- ART/DESIGN STUDIO
- OFFICE
- STUDY

a house for an artist: program fifteen
a house for an artist: program
sixteen
design development: original music seventeen
With a site, a program, and a few design studies, attention was turned to the development of an original composition of music. In conjunction with my music engineering class, I wrote and recorded an original piece of music concrete*. In addition, I used the progress gained from the music as a method for evaluating and refining the architectural ideas. Through this process of design, evaluation, and refinement, I was able to put together a kit of parts of important elements that were finally realized in the final design.

Music concrete* is a form of music developed in France in the 1950's coincident with the development of the tape recorder. It is a style of music where natural sounds are recorded on tape and through a process of editing the tape, an entire composition of music is recorded. Operations possible with this type of music include: tape splicing, tape delay, reversal, speed changes, and overdubbing. For a study of sound and its relation to architecture, I found music concrete* to be ideal. The process of editing a tape and a sound can be looked at as another type of study model.

*design development: original music eighteen
For the composition of music a pipe and a handrail in a stairwell in the architecture building were used as samples. Although samples from the site would have been better, it was impossible to get high quality, editable samples from the actual site. However, the sounds used closely approximated the sounds that I first experienced on the site, and ended up being more than adequate for the piece.

The composition of music evolved into a journey from the natural to the industrial as one moved from East to West across the site. The sound of the pipe was edited to a simple tone to represent an abstraction of the regular soothing sound of the water. As the piece builds in power, tape loops of pounding rhythms start to fade in, at first slow, and then growing in intensity and speed until the entire composition becomes a buzzing sound of utter chaos. As tension builds to its maximum point, the entire piece breaks and the fading tone of the original melody fades out. At two points in the piece, splices of a slowed down guitar were edited in to represent the breaks in the journey that would occur from passing each of the living units of the house. Overall, the piece became a musical abstraction of the final design of the residence.

While the music took its form, the final elements of the architectural design began to take shape. The elements most heavily used were the Conrail bridge, the flood wall, the river, and the lines of the railroad tracks. All of these elements became materialized in the various schemes in one way or another and all ended up as elements of the final design.

design development: original music
nineteen
music
The graphic scores for the music are loose notations of how the music is to be recorded. Each part of the score represents a passage of music and the rendering style shows the character or nature of the sound. Like any score for music, these graphics are open to many interpretations by the musician. Someone else could use the same score and produce an entirely different piece of music. However, being the composer and the performer in this case, the technique worked well and was a quick way for me to keep track of my thoughts.
r i v e r
A major contextual issue on the site is the river. The White River determines the
gometry of the site more than any other feature. Not only does it control the
East edge, it also determines the location and the angle of the flood wall and
the CSX railroad. In the design process, the various refinements became
bolder in their treatment of the river as a site feature, at first encroaching on
the shore, and at one point damming the entire river. Likewise, spaces
started to progressively move out into the river until a majority of spaces were
located to the East of the flood wall.

design development: original music
twenty-one
railroad
As a sonic event, the railroad could not be ignored. The passing of trains was
looked at as one of the many cycles of the site. Early schemes were placed
in close proximity of the railroad, but did not interact with it in any strong
manner. As design progressed, the different schemes became more closely
associated with the railroad. The regular passing of trains became a marker
of time. The process of walking across the railroad was looked at as a method
of integrating the user into the site. Physically crossing the railroad was like the
crossing of the two railroads on the Northern edge of the site.

design development: original music
twenty-two
flood wall
The flood wall was the most expressive element on the site. Only one foot wide and eight feet tall, the wall stretched for a total of 350 feet down the site. Various design schemes used the wall to ground the project and more closely link the project to the site. The wall also served as a way of relating the cutting of the site by the river, railroad, and wall to the cutting of the architecture by those same elements. In the dam schemes of crossing the river, the wall figured into the long narrow circulation spine that crossed the river. A long, narrow passage, open at the top, similar in appearance to the wall, was intended to create the same natural amplification and reflection while cutting off views to the outside world.

design development: original music
twenty-three
bridge
As the designs ventured into the river, the Conrail bridge was used as a starting point for a transformation into the circulation spine of the project. While some schemes proposed damming the river, a bridge was seen as more practical and closely related to the immediate context. Various bridge schemes studied the best methods for creating a new bridge and how it fit into the project and the context as a whole.

Design Development: Original Music Twenty-Four
Through a fusion of my compositional ideas and studies, the light/sound reflector is one of the first truly inspirational ideas of the semester. An episode in my kitchen at home of sound reflecting off the refrigerator door inspired the idea, while the concrete's music gave the element its form and character.

19 March 1992

In the final design the elements of river, railroad, flood wall, and bridge all came together with the musical themes to produce the final product. The residence/studio maintains its close relationship to the context without simply copying it. The final house is two individual units, one a studio and the other the residence, connected by a circulation bridge/spine. One enters the house from a stairway between the Conrail siding and the CSX mainline. The walkway leads to the studio, the residence, and finally to a lookout point over the edge of the East shoreline.

The materials used are reflective of ones that are found in the context. The bridge structure is made out of steel with the piers made out of concrete; just like the Conrail bridge to the North. The studio, having a close relationship with the steel fabricator is made of glass and steel with the support towers cast in concrete. The residence, which shares a closer relationship to the woods towards the East, is made of wood with a concrete pier to anchor it to the White River.

As an entire composition, the house and studio are an extension of the historical precedent set by the development of the factory and outlying subdivisions and their aesthetic in Muncie. As a result, the final piece is a musical expression as well as a physical expression of the context of Southeast Muncie and a majority of Mid-Western manufacturing towns.

river
The river is brought into the project by placing the residence in the water. By doing so, the river is intended to acoustically cushion the residence through the sound of water running through and around it, and help the residence maintain a more natural feel. The river is also used as a sculptural landscape element. Many rivers, especially the White River, have been historically treated as open sewers by industry. Many industries are located near the river and have a physical connection to the river, however the connection has typically been a means of removing waste from the plant or factory. A House for an Artist takes the historical connection of industry to water and turns into something positive and sculptural.

final design
twenty-six
railroad
The residence/studio is integrated with the railroads through its connection to them. Like the crossing of the CSX and Conrail tracks, the user must cross the CSX track to get to the residence. The open fire escape floor of the circulation bridge allows sound to freely pass through. With each passing of a train, the user sees a portion of the train, while the sound is amplified and reflected in the circulation structure to acoustically intensify the event.

flood wall
The flood wall bisects the foundation of the studio in a manner similar to the bisection of the site. The wall acts as support for the studio portion and a privacy device. As a sculptural element, the long axis of the wall broken by a portion of the studio is intended to emphasize the almost brutal siting of the entire piece. The studio imposes its order on the wall and the wall imposes its order on the site.

bridge
The circulation spine is the Conrail bridge transformed into a sculptural and functional element of the residence. While it remains faithful to the original bridge in terms of function and materials, the departure begins with the radical treatment of the steel, and its use as a giant sound reflector. Both sides of the bridge have a gentle arc to passively catch sound and reflect it. The complex curve of the North side is used to reflect sound towards the living spaces on the outside and to reflect the sounds of the activity below into the structure of the bridge. Sound reflected off steel gains a metallic character due to the nature of the material, and it is intended that the naturally processed sounds would be more pleasing than a true, faithful reproduction of sound.

music
The final composition of music is an abstraction of the quality and character of the sound one would hear as they travel across the bridge from East to West. In reality the music of the architecture would be a constantly changing set of timbres that would relate to the cycles of the site; the season, the time of day, or the time of the week. In addition to being a tool for design, the music is intended to represent a specific instant in the life of the project.

final design
twenty-seven
a house for an artist: the context of sound
As a process, the thesis project was very beneficial to my development as a designer. Never before have I had such a clear record of how I worked and how ideas came together. With more time, I feel very confident that I could have worked out a majority of the unresolved design issues. Music and sound can be used and do make a difference in the approach to designing architecture. The sound aspect opened a whole new area for creative design, and with more development, sound could provide as many ideas as literature or film.

The process that I took during the course of the semester seemed to be clear once it was complete, although I was not always sure where it was going. I started by looking at music, then the site and its music, and finally my specific project and my music. Each stage of development made efficient use of the information gained from the previous one and allowed me to build upon ideas over the course of the semester. Looking back on previous projects, I have found that this is my design process. It is a process of design, evaluation, and redesign making use of all relevant issues that evolve out of each design phase. Perhaps in the future I will be able to design more efficiently now that I can see how my designs evolve.

I feel the final project was successful overall. Although I did not have the time to complete everything the way I would have liked, I strongly feel that all unresolved issues do have a solution that could easily be found with more time. Most lacking in the final project were the details of how the living areas would finally be worked out. I feel as if I had good control over the general aspects of the final design, but the living areas needed to be better resolved. As mentioned above, more time would have allowed me to generate the solutions to those problems.

The information gained from a research into this area of design will be very useful to me in the future. I have found a great deal of inspiration from sound and specifically the sounds and forms of industry. This year has allowed me to look at and listen to the factory, refinery, and railroad yard in a new way. Although eyesores now, these types of things can be very beautiful and very elegant if used properly in a design investigation. The thesis has been a vehicle for me to discover the beauty in industry and noise and how it can be applied to architecture in new and different ways.

conclusions
thirty-four
book references


musical references


paper references

