

# CAD Case Study – Valley View Cabin

## Human-Centered Design

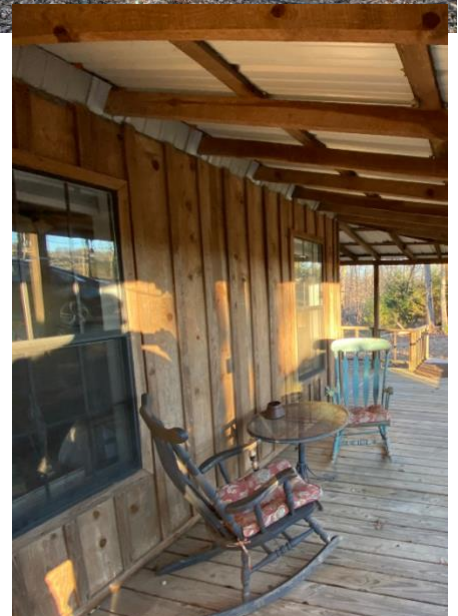
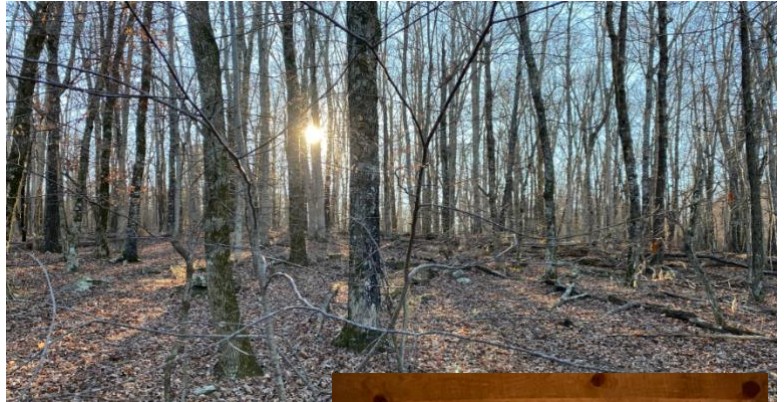
As an architect, I am often approached with a very generic request. For example, a client just recently came to me and said, “I want you to design a cabin”. “A cabin” could take many forms: large, small, rustic, fancy, wood, stone, comfortable, quaint, etc. The job of an architect is to listen, question, and understand what the needs, wants, and problems of the client are. Some questions might deal with the function of the space such as “how many bedrooms do you need?” We ask questions that appeal to the experience or senses of client. Some other questions could be to determine the color and texture of the materials the clients like and what views would the client like to see.

With the Valley View Cabin, a meeting was held on the building site and we discussed orientation, views, levels, approach. I took pictures and detailed notes. I asked questions, but most importantly, I listened. I listened to the desires and the vision of the client.

After our site visit, we visited about 5 cabins the client owned and rented for income. She pointed out the successes and the failures about each of the cabins and pointed to the pieces that she would like in her new cabin. During one of the cabin visits, we looked at some plans of some cabins that she found on the internet and I listened as she described what she liked about the plans.

After the meeting, the client allowed me and my significant other, who is also an Architect, to stay in their favorite cabin. I got to have the renters’ experience! I got to approach the entry, drag in my luggage, check out all the spaces, cook a meal, have a fire, and go to sleep. These experiences helped to further understand the design challenge that laid ahead.

- Pertinent Steps (The Client Interview)
  - Interviewed the client for her needs and wants
  - Asked leading questions to better understand the design
  - Experienced similar spaces
  - Put myself in the end users’ shoes



# Creating Project Definition

In Architecture, the process of writing down the client needs, wants, problems, and any restrictions or constraints is often called 'Programming'. During the Programming phase of architectural design, there are no design drawings, sketches, or models created. Instead, the architect will research any codes or other regulatory restrictions the project may have. The architect may gather information and images of similar buildings that have been completed before. The architect will measure and prepare any documents about the existing conditions of the site or building and note any barriers or constraints. The architect will then develop the program which states the clients need and describe any other variables that may affect the design.

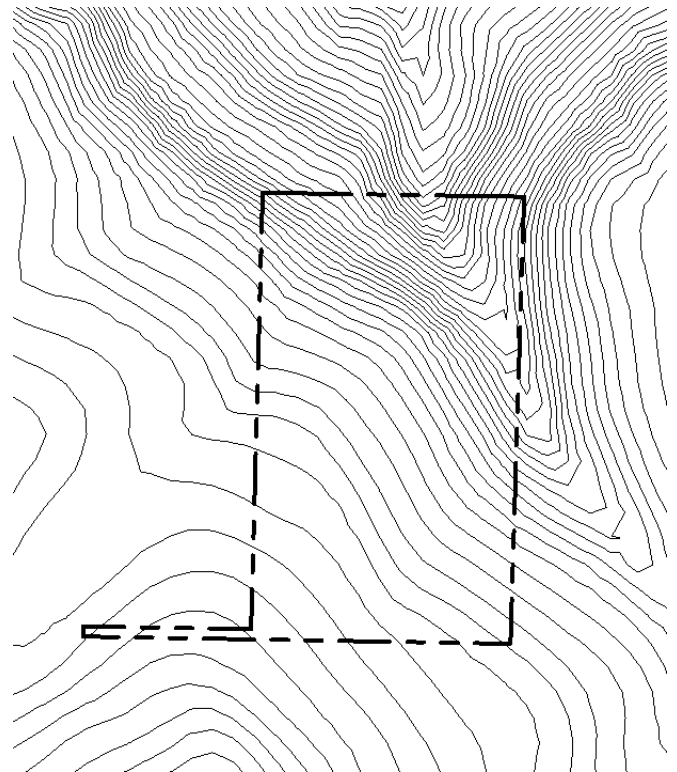
For the Valley View Cabin, I researched if any jurisdiction would have authority for the project. Being outside of any city boundaries, the county would typically have jurisdiction. However, the county did not enforce any codes or regulations and a building permit would not be required to build the project. Generally, an architect will still follow an international code even if the jurisdiction does not enforce one. I noted that I would be following the Arkansas Fire Prevention Code for Residential structures.

During the client Interview, I was able to do a lot research on precedence by experiencing other cabins that the client owned. Back at the office, I perused some books I had on cabins, looked at some information on the internet, and gathered images that I took on site. I even looked at the aerial images on google images to understand the relationship of the valley to the site.

I was able to develop a Site plan including property lines and topography for me to draw on when heading into the next stage of design.

Finally, I developed an email to the client describing in my own words her needs, my intention to use the Fire Prevention Code, and some other imagery she might like. Once she acknowledged my understanding of the project, I was ready to move on to design

- Pertinent Steps (Programming Phase)
  - Research Codes, Ordinances, Restrictions and Covenants
  - Research Precedence
    - Look to History and other examples
  - Observe any Constraints
    - Measure spaces, understand the space
  - Program Statement – A written statement of the problem and any variables that may affect design



# Generating Ideas

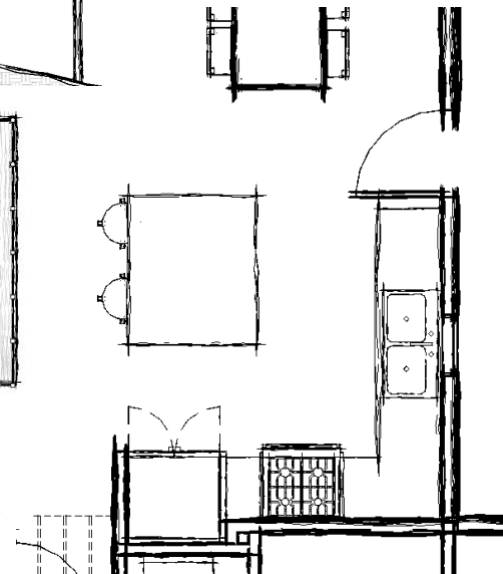
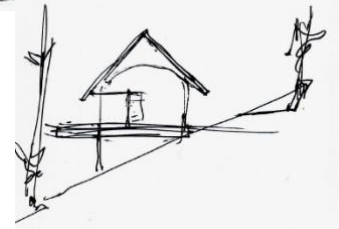
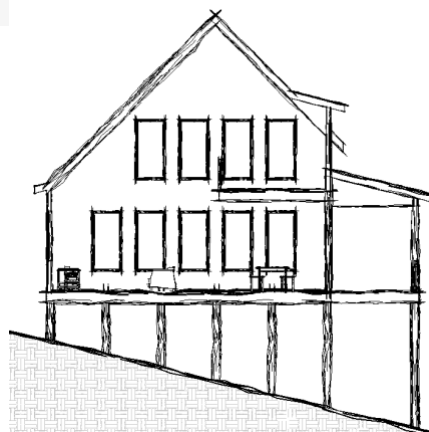
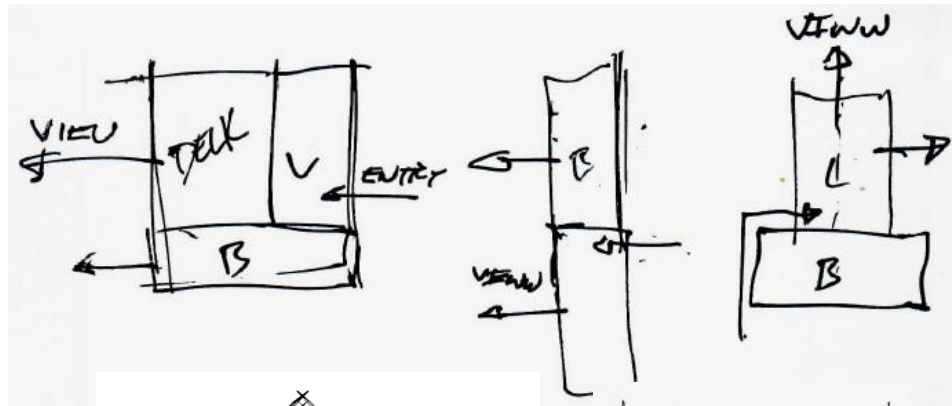
In architecture, Schematic Design is a design phase in which the Architect will create multiple sketches and ideas for the design project. The architect will lay out an organization of spaces and create sketches of the form or shape. These can vary in detail from napkin sketches to realistic renderings. The goal is to quickly iterate ideas to come to a good solution to the design problem. The more iterations the architect does, the better the design will become. It is important to understand that these are loose interpretations of real world dimensions and criteria. These real world dimensions will be accounted for in the next phase of design. To move on to the next phase, you need client approval that you are moving in the right direction.

For the Valley View Cabin, I started with lots of loose sketches looking at the creating bars of program for living, deck, and bedrooms. This process can also be called creating bubble diagrams. Keeping the program simple allowed for many iterations to develop plan organization.

As the design started to progress, sketches start to have more definition and start to come together.

It often cycles between loose and more formal sketches to finally develop concepts that will solve the problem.

- Key Steps ( Schematic Design)
  - Bubble Diagrams
  - Produce Sketches
  - Schematic Plans – Plan Organization





# Rapid Prototyping

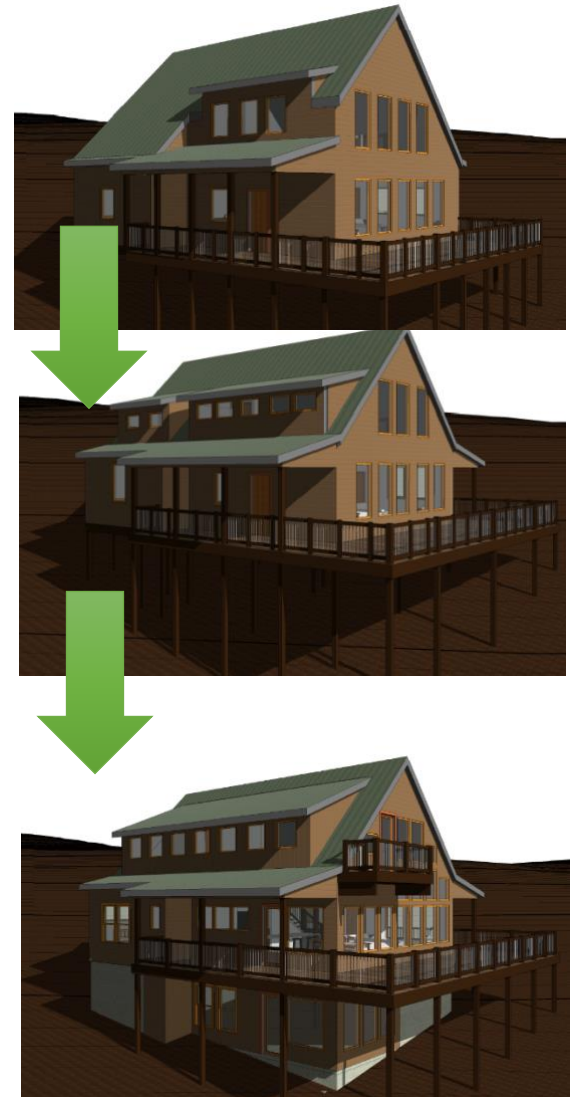
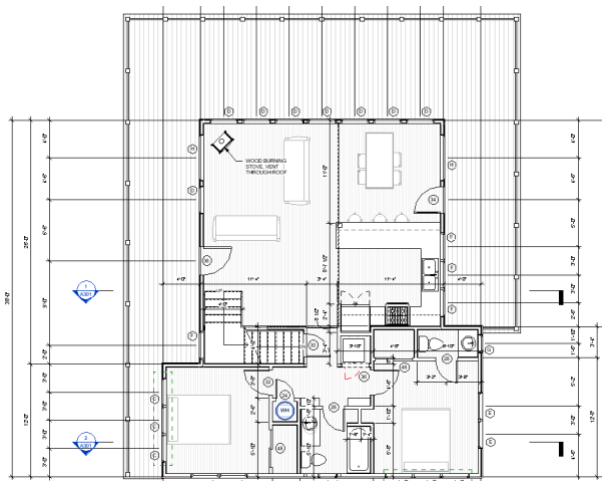
In Architecture, Design Development is a design phase in which the architect will take the ideas and sketches from the Schematic Design Phase and put real world dimensions to the spaces in the form of technical drawings to see if the design ideas will work. During this phase, the design will be edited to accommodate any new discoveries or issues that arise. At the end of the Design Development phase, the design should be completed and will await client approval and then move on the Construction Document Phase where the design is documented in preparation for construction. Before it can go to construction, clients and jurisdictions will have to approve the design to ensure that it meets their specific needs.

For the Valley View Cabin, the sketches completed in the schematic design phase were converted to a digital model in a software called Revit. Applying real world dimensions to the design revealed issues with the sketches. One example was there was not enough headroom to walk under the stairs to the bedrooms.

During this phase of design, the client was given progress drawings and would comment on the design. Of issue was the shed roofs at the east side of the structure; it went through a few more iterations before a good solution was found.

This phase can often get revisited. Even after approval from the client, the contractor was reviewing the drawings and suggested that if wouldn't be too cost prohibitive, to add a walkout basement to the structure. The model was adjusted and then the design was sent back to the client for review and approval

- Key Steps (Design Development)
  - See if spaces will fit within ideas
  - Build Models (Digital/Physical) and Create Drawings
  - Develop Designs to real world dimensions



# Integrating

Buildings are one of the biggest investments that a person will make. It is important to understand whether what has been designed is what you want. It is harder to make changes after the building is constructed. That is why it is important to communicate the design intent before a single piece of dirt is moved. To test the design, the Architect will present the design to the client to see if what has been designed is meeting their particular problem, want, or need that was discussed when the design project began.

For the Valley View Cabin, renderings were produced along with technical drawings to help communicate the final design to the client. The client noticed some items that needed to be addressed and gave the architect a list of changes that needed to be made. It went back to drawing board and once the changes were made, the client once again was asked to approve the project.

For this project, the client even used virtual reality goggles to immerse themselves into the project to understand scale and scope of the project. The client spent time “walking” around and spotted a few more items that still needed to address. In the end, the client was happy with the design and approved the project to move on.

- Key Steps (Approvals)
  - Present and discuss the design to get client feedback and approval for the design project



# ART Case Study – Alma: Doorway to the Ozarks

Project timeline: November 2012-June 2013  
Location: Alma Arkansas  
Client: City of Alma Police Department and Courthouse  
Principal contacts: Chief of Police Russell White and Lt. Jason Peppas  
Artist: Matthew Meers  
Project: “Alma: Doorway to the Ozarks”  
Recycled interior doors and plywood  
26' x 6 ½' x 2"

## Human-Centered Design

Our original discussion took place near the end of the remodeling of the courthouse and police station, which was originally built in the mid-1970s. The changes to the building were largely cosmetic, but updated the dispatch office to reflect the change in technology. When I saw the space, the walls were new and unfinished, lacking paint, trim and new doors. I met with Police Chief Russell White and Lt. Jason Peppas to discuss their expectations for an original artwork for a large blank wall in the main entrance of the police station and courthouse. I took my sketchbook and tape measure to take notes and made a quick study of the space with a technical drawing and photos of the wall.



This is one of the original reference photos of the space showing the relationship of the wall and doorways.

Alma, Arkansas police station and courthouse. 2013

Background of the artist:

Matt Meers-

I worked as an art fabricator for Ralph Irwin Studios from 2002-2008. I watched when Ralph went to a prospective client's house or business to meet and discuss a potential new project, he would skip over many of the design thinking steps that we practice here. While I feel that some opportunities for adding depth and relevance to Ralph's projects were lost, he also had a wealth of experience that allowed him to quickly feel out the best project for the client/company/community. It was the in-the-moment creativity that Ralph modeled with his quick wit that I tried to emulate in my first meeting with the Alma Police Department.

# Creating Project Definition

In our initial meeting we discussed what lead them to commission an artist for an original work, the location of the project, timeline and the budget. When the police department was close to finishing the remodeling work, they started to discuss how to decorate the hallway that joins the police department with the courthouse and serves as the waiting area for those awaiting their court hearing or to speak with an officer. Many of the office workers simply suggest that framed artwork be purchased from Hobby Lobby and hung. Despite the lower cost and ease of buying premade artwork, Police Chief White thought an original work would lend more respect to the space.

Chief White and Lt. Peppas we both open to a variety of possibilities from painted mural, hung painted canvases or drawings. As I was primarily a sculptor, I suggested something that was wall-mounted and three-dimensional. As we spoke, I had the idea of creating something that showed both the history and the tradition of the police department. They initially liked the concept, mainly because the only two listening to the proposal were officers and no one from the court, office staff, dispatch or fire department had weighed in. While I wasn't aware of it at the time, I broke an important rule in the Design Thinking process; make sure your meetings include representatives of all stakeholders.

I secured the project by requiring a separate fee for the design process. The time put into the design process is as valuable as the fabrication process. Asking for compensation on the design portion of the project highlights the importance of the artist's time, skills and knowledge. The "product" that an artist has to sell is not just the finished artifact, but the ideas that powered it. Often contemporary artists and designers do not fabricate their work personally, so the design phase where an artist is most valuable.

## Generating Ideas

Following my former mentor's example, I jumped right to pitching a project idea. My first idea showed the history of the Alma police department through a series of three oversized, three-dimensional badges, with the original badge made of wood, the middle badge made of steel and the contemporary badge made of wood, steel and glass. I wanted to show how history and tradition are things that build and lead into the future with the material choices. I made a 12" x 24" rendering of my idea to present to the Chief the next time we met in pencil and ink.



Reference photo for the badge design.

Badge circa 1960

Revisiting empathy

Discussing the project definition

Defining Project Variables

While Chief White and Lt. Peppas liked the badges, they preferred something that reflected more the community instead of the department specifically. We talked about how Alma is at the crossroads of two major interstate



highways (I-49 and I-40), which makes it well known but not well remembered. I wanted to give more dimension to people's idea of Alma, beyond it being a rest stop or simply a town to pass through on the way to Little Rock, Fort Smith or Fayetteville. I took the idea of Alma being a crossroads town in need of a greater presence back to the drawing board and created a series of sculpted clay samples. The design featured both the curves of the roadways and geometric shapes to create a unique topography of the city boundaries. I wanted to create an abstract representation of the city of Alma as an aerial view. I knew that most of the public art in Alma was rather simple, direct and representational, so I wanted something that was a bit more contemporary, something that required more than a glance to understand.

## Rapid Prototyping

I took a hand-drawn rendering of the proposed mural composition and three sculpted clay panels, which measured about 16" x 36" when puzzled together. I wanted to make a modular, three-dimensional mural depicting the city of Alma as though one was flying over. The clients were unable to recognize Alma from the three abstract shapes I created in clay, but understood them in context of the drawing. I demonstrated that the space I put between the sample shapes represented the roadways bisecting the city. Taken as a whole, the space between the panels become the roads, while the substance of the panels showed the city that was often overlooked by travelers. I reversed the common understanding of Alma as a crossroads, but literally removing the roads and sculpting only the town. The concept was well received and I began to lay out a timeline for project completion for dozens of sculpted, fired ceramic panels to be installed on the wall. The clients were a bit concerned that sculpting so many panels by hand would take too long and make the total cost of the project too high, but I told them that I would make an estimate of the time and cost and let them know before proceeding.

As the meeting ended, we continued to talk when Lt. Peppas noticed the stack of old doors that were replaced during the remodeling of the building. That's when Lt. Peppas mused, "Too bad those can't be used for anything. We have over 20 of them just waiting to go to the dump" We all stopped talking and looked around at the space and one another. Chief White spoke then, "Why not use those old doors on this project? Could you carve then to be similar to what you had in the clay?" The spark of that idea took off in my mind and forged a better path forward.

By keeping an open mind about the elements of the project, I was able to listen to their suggestion and see the potential. By recycling the old doors, I was able to greatly reduce my overhead on the project. For a city that seeks to preserve their history while still progressing into the future, the solution was both practical and conceptual.

I took a couple of doors back to my studio to experiment on and see if I could create something that matched the intent of the sculpted clay panels, but with greater efficiency. I ended up with using only three tools for this project; the jigsaw (saber saw), a compact router (with 1/8" straight bit) and a wood chisel. I made three new panels to take back to the client for review, along with three different wood stain samples to test against the new color scheme of the renovation. I created the final rendering with showed the mural scaled to the wall and existing doorways. Once the prototype, color finish and project scale were approved, we agreed on the cost and timeline or the project.



Mural sample cut from the original doors using a jigsaw, 1/8" router bit and hand-chisel.



# Integrating

I began the fabrication stage of the project after the contract was signed and 50% deposit was made. I completed the work in roughly 300-350 hours over the course of about five months of work, while also working full-time as an instructor for the Art Department at the University of Arkansas in Fayetteville.

The final title, “Alma: Doorway to the Ozarks” brings together the geographical importance as a crossroad, its geological importance as the escarpment of the Boston Mountains and a nice pun that references the recycled material.



Top-left: full-sized paper template

Top-right: stack of carved,  
unfinished pieces.

Bottom-left: completed and  
installed mural.

# CST Case Study – Integrated Design Lab

## Human-Centered Design

### Integrated Design Lab Vision

NWACC's Integrated Design Lab (IDL) is a physical maker space of collaborative design that expresses form and function, art and entrepreneurship, creativity and industry, and a place where passions become career realities. It provides a unique, quality, accessible and affordable educational opportunity for a population of students who wish to both engage their passions and enhance their employability. The space celebrates diversity of thought. Students look at design problems in a new light with the intent to innovate and discover something new.



### Integrated Design Lab Concept

NWACC's new state-of-the-art Integrated Design Lab (IDL) houses classes and dedicated space for students pursuing an education in art and design. The facility has areas for students to learn valuable creative and technical skills in drawing, painting, ceramics, printmaking, construction and three-dimensional design media such as wood and metal, as well as digital tools of design, fabrication and art making. Students are encouraged to test creative entrepreneurial ideas by utilizing the skills learned in various construction, art and design courses.

### The Facility:

The IDL houses the Workforce Development, Communication and Fine Arts, and Business and Computer Science divisions and provides each space and resources to deliver programming and promote entrepreneurship and innovation. The lab is an educational philosophy, actualized through Bauhaus philosophy, as much as it is a metacognitive teaching tool. The structure of the building is a work of art that simultaneously demonstrates, through intentional connection points between the labs, the existence for design-based problem solving to produce maximum impact and inspiration.



The Art department had been working in Burns Hall since the establishment of the department at NWACC. The rooms were cramped and lacked the ideal ventilation and lighting for the broadest use of all media. The Construction department had been working out of Shewmaker Center for Workforce Technology. While the space was nearly adequate, the expansion of further apprentice programs was limited due to space. The Computer Science and Business division did not have a large dedicated space

where they could prototype projects they were designing using digital systems. Additionally, they had limited equipment to support the learning outcomes for these courses. In the fall of 2016, a new Art building was proposed to NWACC's Land Use Committee. The plan was not well received – in fact, the plan received negative feedback. The idea of just an Art building appeared to be a non-starter as an idea. NWACC's leadership challenged those proposing a new building to get together to define a solution that may work for all.



# Creating Project Definition

The key leaders began conducting user groups to gather feedback. They brainstormed ideas and created a variety of concepts finally settling on the idea of combining multiple disciplines to include Art, Construction, and Business Department (Design/Entrepreneurship).



The group then reconvened to brainstorm additional ideas. The final concept was birthed in the office of the President when the Deans from Workforce and Communications and Art presented their idea to Dr. Jorgenson. The concept of the Integrated Design Lab began in the spring of 2017.

To better define what the solution should be, each of the disciplines began to lay out what the needs truly were for each of their areas. The concept of the Bauhaus -- combining industry, art, craft, design, and technology came to the forefront of discussions for this immediate need as well as longer term.

and technology came to the forefront of discussions for this immediate need as well as longer term.

The Communication and Art department were severely limited in Burns Hall. Because of the lack of proper ventilation, oil-based paints could not be used. Oil painting is a foundational skill that was missing in the former space. The ceramics team only had two kilns with minimal space. 3D classes were taught using a variety of media but they could not build anything larger than their immediate work area. Additionally, using wood was not an option due to lack of tools and room. Lighting was not ideal in any of the rooms and appropriate light plays an integral role in the creative process.

The Construction department had room to build in the Shewmaker Center for Workforce Development but was mostly limited to inside projects. Of the projects that were able to be built outside, they were weather dependent. There were times when assignments would go unfinished as the region experienced an unusually wet spring semester. This left the staff responsible for completing these sometimes large tasks with minimal staffing. Tools were adequate for training, but the rooms were lacking appropriate dust collection exposing them to unnecessary risks. Additionally, the classroom space was occupied by the ever growing apprentice program forcing the Workforce team to relocate those classes to other buildings on campus.

The Computer Information and Business Division had a few tools to prototype the products they were designing in their computer aided design classes. Again, as the other disciplines, they were limited based on their space and their current equipment. The 3D printers they had were small and somewhat dated. There was no laser cutter or a CNC router. While the school owned these items, due to space limitations they were not in use. A key part of any design process is the ability to prototype, make adjustments, and ultimately build to scale.

All of the disciplines would like to offer night classes, evening classes, open to the public -- those ideas were not able to be realized due to the limitations previously outlined.



# Generating Ideas

Once the key disciplines were identified, specific needs for each group were explored.

The art team would need increased ventilation in several of their areas to accommodate spraying lacquer and using oil-based paints and heavy metal glazing compounds. Natural lighting was a foundational need for all disciplines but none more important than a soft northern light source for the drawing and painting studios. The drawing studio would also need to provide privacy when drawing the human form. Balancing privacy and adequate lighting has always been a challenge in the past but the proper design would easily provide such a resource.

The construction team needed access to water as they often mix mortar and cement in a variety of lab exercises. A trench drain would also be needed to remove any excess water during. A covered outdoor workspace would allow students to build and assemble projects during inclement weather. Having a large workspace would allow multiples classes to use the space simultaneously. For future course expansion, an overhead crane would allow students to assemble larger iron components indoors. Dedicated anchor points embedded into the floor would also provide a safe solution for these scaled down indoor structures.

A proper maker space would provide great opportunity for the design team. Putting the laser cutter and the 3D printers in a clean room would serve the students well for many years to come. The CNC router would need a permanent home as it's not a mobile piece of equipment and requires dedicated air and vacuum systems.

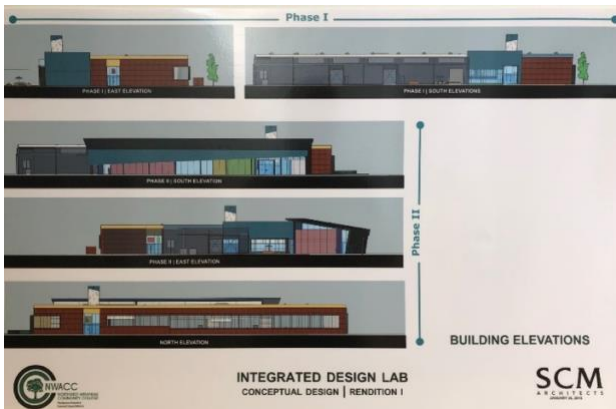
There were also common needs throughout the building: storing, controlling, and disposing hazardous waste, proper plumbing systems to trap materials that may contaminate the sanitary sewer system, adequate and secure storage for tools and materials, classroom audio video systems, a centralized air compressor that would serve all the disciplines whether driving framing nails, cleaning surfaces, or pinning together smaller projects with brads. Several projects required dedicated ventilation at the source – spray hoods, laser cutter fume extraction, 3D printer air flow, and woodworking dust collection.



# Rapid Prototyping

NWACC put forth a request for proposal in order to analyze bids for constructing the Integrated Design Lab. After a competitive selection process, Nabholz was chosen as the contractor and SCM as the architects. Civil, structural, and mechanical engineering firms would round out the building team.

The contractor, architect, owner meetings are a key part of any new construction. As this team began meeting, they brought forth iterations of the design. The team would then expand to include members of the NWACC Land Use Committee (which is comprised of a variety of senior leaders representing multiple disciplines). There were proposals for a Phase II and a Phase III which would further expand the capacity for all the disciplines.

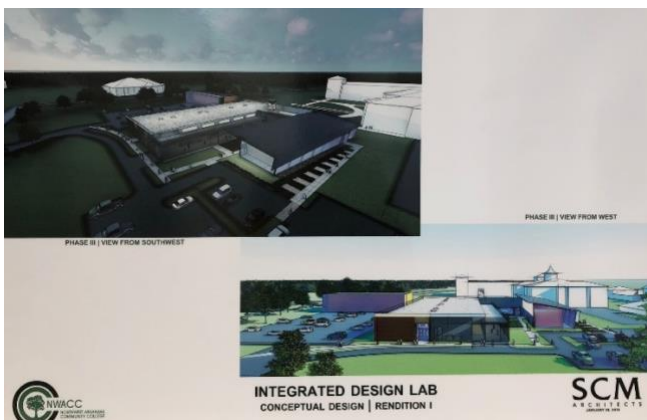


IDL Conceptual Design, Rendition 1  
Phase I and Phase II

IDL Conceptual Design, Rendition 1  
Phase II



IDL Conceptual Design, Rendition 1  
Phase III



There were additional items that could have benefited by deeper customer reviews – the complete air handling system, centralized and point of use dust collection, exhaust port for maker space, and increased ventilation for maker space. Most of these items were not revealed until the Certificate of Substantial Completion was issued and occupants began setting up equipment in the space.

# Integrating

Classes began in the fall semester of 2019. Each of the disciplines enjoyed the open spaces, great lighting and the enhanced ability to collaborate and create.

The art students were able to, for the first time use oil paints! The 3D classes had woodworking and metalworking tools and the ability to create larger pieces of art. The custom made work tables need drawers and teaching the students basic woodwork gave them the skills to make and personalize these drawers. The large open areas provided spaces for students' (and instructors) work to be displayed. The drawing room contains a spray booth for charcoal drawings, particulate ventilation, custom built model stands. The paint room has a fire safe storage and waste disposal, custom built taborets, and ample canvas storage. The print making room has large northern lit windows (as do many of the rooms), large table work surfaces, and two printmaking presses. The ceramics classroom now has three electric kilns, a dedicated glazing area, a porch reach to expand for raku designs, and 18 potter's wheels.

The All-Purpose Lab consists of custom built mobile work tables, a Sawstop table saw, a miter saw table, a drill press, disk/belt sander, band saw, oscillating sander, CNC router, a metal working area with fume extracting "snorkels" and an outdoor fabrication and storage area.

The Construction Lab also has custom built work benches with woodworking vises, a band saw, a drill press, a miter saw, an overhead gantry crane, large overhead door to accommodate moving projects outdoors. The tool room is well sized to accommodate a great variety of hand and power tools.

The maker space contains a variety of 3D printers. Three of them have the ability to be networked – students can submit projects to be printed and they can be held in a virtual queue until the instructor grants printing permission. These high-tech devices even have integral webcams that allows the students and instructors to observe the printing process. The large 18" x 24" 50 watt laser cutter makes fast work of prototyping in a variety of materials from wood to cloth or cardboard. The maker space also has dedicated computers to the room and administrative rights have been granted to the lab manager as rapid changes in software needs are more easily maintained by an instructor.

The common areas of the building have proved to be a great gathering place for students and a great place to display a variety of work done in the building. Most of the rooms have dedicated A/V systems and where they do not, the issue is being addressed. The two formal classrooms have 18 computers in each room that can be signed out to students in the class. They are kept up to date with the latest software required for several of our courses that require specialized programs.

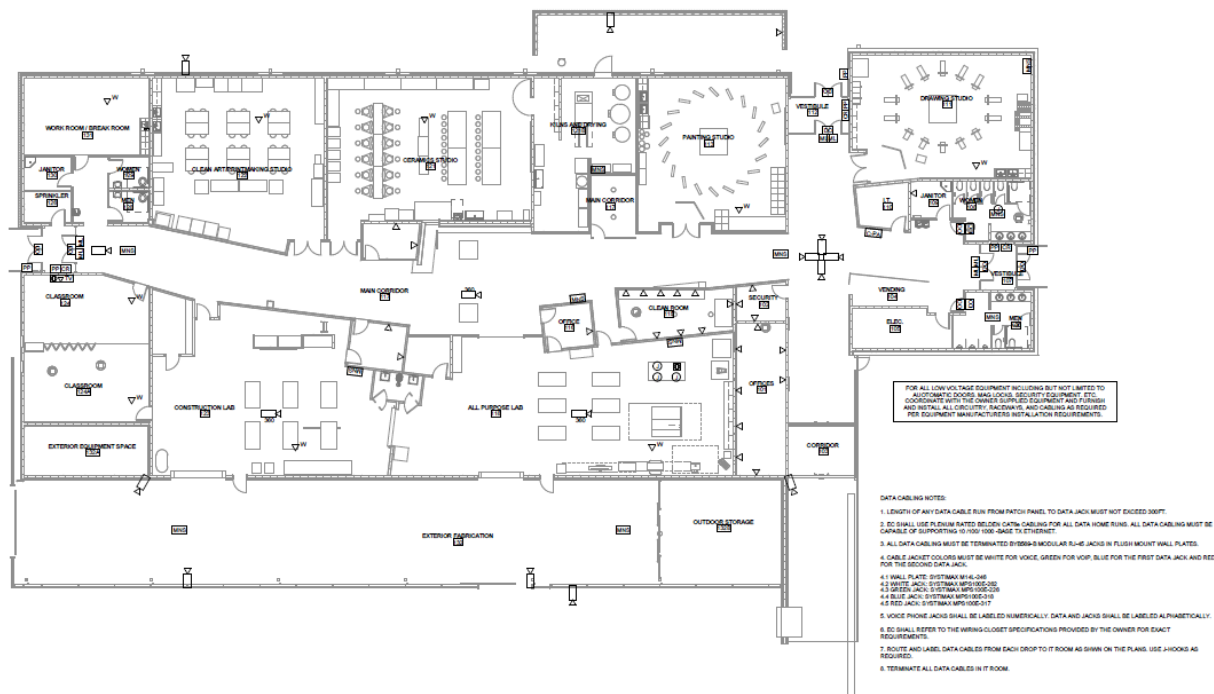
Ventilation took a bit to get dialed in but ultimately proved to be on target. There are still the occasional glitches with the mechanical systems but the Physical Plant team is continuously monitoring. The contractor is still liable for repairs after 12 months of grand opening.

## Summary

The Integrated Design Lab has been a very successful addition to NWACC. While to process took some time to get started, and experienced some bumps along the way, the facility is providing expanded opportunities for all students. In the future, we will see classes opened up to the public and open shop times for students. These ideas are currently under development and will come to life as the resources permit.

Embedding Design Thinking principles into each of our foundational courses will allow students to have a greater understanding of a new, non-linear way of planning and creating. Exposing students to all the disciplines in the building will also further broaden their perspectives.





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