Content Portfolio
Technology Education
Information Sheet

Introduction:
The Content Portfolio prepared by Technology Education Candidates provides documented evidence of the candidates' learning in specific content areas. A collection of best course work and one lesson are presented in the portfolio. During the process of selecting and organizing your portfolios material, candidates are encouraged to think about what they have learned in the content area and present samples that demonstrate mastery of areas of content that they will be expected to teach. One benefit of this experience will cause you to plan, interpret, and draw upon your knowledge of the field and theory that was experienced-based.

Purpose:
The purpose of this Content Portfolio is to demonstrate mastery of Technology Education content and teaching competencies.

I. *Content Section:*
During your plan of study you took courses necessary to become certified to teach Technology Education. The clusters of Communication, Construction, Manufacturing, and Energy and Transportation define the program. Within these clusters you had opportunities to learn about historic technological innovation and invention, impacts of technology on the environment and society, design and problem-solving, and the systems and processes related to Communication, Construction, Manufacturing, and Energy and Transportation.

For each standard on the rubric, select one cluster assignment that bests demonstrates your mastery in that area. (You do not need an artifact for each cluster in each section, just one that is closely related to the Standard). Prepare a short essay –one page MAX-- that describes the selected artifacts. Describe the importance of these projects and why you selected them. Describe how the selected work sample demonstrates your mastery of the assigned standard and how they demonstrate your ability to teach Technology Education topics.

The essay will contain the following items

1. Description of artifacts;
2. Description of how these artifacts show understanding and mastery of Technology Education content;
3. Description of how the artifacts demonstrate your readiness to teach in one of the Technology Education Clusters;
4. How the artifact demonstrates mastery of the assigned standard.

II. Application of Knowledge Section:
You have planned and delivered multiple lessons within our content area at local partnership schools and the HBS Lab School. You will select one lesson from either TECH 407 or TECH 408; the lesson should be your best effort. Citing specific examples from the lesson plan, you will write a commentary that highlights the lesson's goals and objectives, lesson content, and why it was selected, instructional materials, the activities, the strategies used for accommodating for differences in the way students learn, and the ways in which learning was assessed. I have placed a number of ideas for you to think about below.

When you taught this lesson, you might have reflected on instruction, identifying modifications made during the lesson, or those that might be made to the lesson plan in the future. *Therefore, the lesson plan submitted may include handwritten annotations as instruction unfolded.*

A list of information to think about when drafting your essay:

- TEACHING & CONTENT STANDARDS: How were these standards addressed in the lesson and how does the lesson address those standards?

- OBJECTIVES: What will the students know and be able to do as a result of the lesson?

- INSTRUCTIONAL MATERIALS AND RESOURCES: What materials, texts, visuals, etc. are needed? What technological resources (if any) were used?

- INSTRUCTIONAL ACTIVITIES: What activities will the students do and how are they connected to the objectives?

- ASSESSMENT ACTIVITIES: What do the students know and what are they able to do during and as a result of the lesson? How will these be determined? Pre-lesson Knowledge/Post-lesson Knowledge

- LEARNER FACTORS: How does this lesson accommodate different developmental levels or individual differences in approaches to learning? How does the lesson create connections between the subject matter and student experiences?

Lesson Plan Commentary: The essay must be two to three pages long. Here is a format you might like to use.
Describe the lesson and the class it was presented before.
What preparation was made before the lesson?
What were the central concepts of the lesson; Goals and Objectives?
What standards were addressed?
What adjustments were necessary to accommodate all learners?
Explain the approaches you used to accommodate different learners in the classroom.

Explain how the lesson plan demonstrates how well you understand how children learn.
If you have them, show evidence of student work samples.

Describe all formal and informal assessment strategies

How did the lesson plan work?
What was effective?
What changes would be made for tomorrow or the next time this plan is used?

The Nature Of Technology

Technology Content Organizers
Research

Materials-

Alloys-

A Purdue University engineer has developed a method that uses an aluminum alloy to extract hydrogen from water for running fuel cells or internal combustion engines, and the technique could be used to replace gasoline. The method makes it unnecessary to store or transport hydrogen - two major challenges in creating a hydrogen economy, said Jerry Woodall, a distinguished professor of electrical and computer engineering at Purdue who invented the process.

Ceramic materials-

Ceramic fibers comprise a wide range of amorphous or crystalline, synthetic mineral fibers characterized by their refractory properties (i.e., stability at high temperatures). They are typically made of alumina, silica, and other metal oxides or, less commonly, of non-oxide materials such as silicon carbide. Most ceramic fibers are composed of alumina and silica in an approximate 50/50 mixture.

Ceramic fibers are used as insulation materials and are a significant replacement for asbestos. Due to their ability to withstand high temperatures, they are used primarily for lining furnaces and kilns.

Manufacturing-

Discrete Product Manufacturing-

Today, manufacturers with complex, technology-dependent products face intense market demands for documentation that is timely, relevant, and available in a variety of formats. Global competition is continuously driving companies to deliver more products at a faster rate, without compromising product quality. These forces put tremendous pressure on documentation teams, who are delivering a key component of the end-user experience – the documentation that supports the product. Astoria On-Demand provides an unfair advantage to manufacturers by addressing inefficiencies in the creation and management of technical document publishing while improving information quality. Using Astoria On-Demand's dynamic product documentation solution, organizations benefit from a proven, powerful solution for dynamic publishing that solves the most challenging documentation requirements.

Continuous Materials Processing

A continuous flow, rotary processing apparatus for horizontal transport of material at a predetermined rate. Material from an in feed conveyor enters a continuous system including at least one rotary drum operating about a horizontal axis. Each drum has a perforated circumferential wall with lateral lifters to induce flow and tumbling motion to the enclosed material. A flow control mechanism at the discharge end of each drum controls residence time of the material being processed. Material is fed and discharges from each drum through axial openings in which the flow control devices are mounted.

Information and Communications-

Communications

Mark Twain famously invested, and then lost, a fortune on the first typewriter, in 1874. Since then, human-computer interaction has moved beyond basic key-entry (here, the mouse is the most pervasive development), but the keyboard's legacy lives on. We are still using Qwerty, a layout designed to slow down the typist's speed, because the mechanical keys would jam together if pressed in rapid succession.

SIMILAR, a European task force focused on human-computer interaction (HCI), plans to change all that. And it is not taking half measures, either. SIMILAR is not content to just tweak keyboard layouts. Instead, it is going to throw the entire gamut of modern interface devices – from speech, gestures, vision, haptics and even direct brain connections – at the problem. Its aim? Inject some humanity into the computer interaction process. The task force wants interaction to evolve from human-to-computer to more like human-to-human interactions.

Computer Systems

Research in CSL is both experimental and theoretical, traversing many domains: operating systems, computer networking, special architectures, compilers, programming languages, information management, graphics, security, reliability and fault tolerance, system specification and verification, user interfaces, integrated circuit design and special computer architectures. Current research being done in the Computer Systems Laboratory can be viewed at CSL Research or Computer Forum. Technical reports are also available from 1960 to 1990 and for 2000 on. Teaching is formalized in the classroom, but constantly challenged and enriched through the hands-on work of the various CSL project groups and the wider influence of Silicon Valley technology. Of

special interest is the Stanford Electrical Engineer Computer Systems Colloquium which is open to the public. The Colloquium is an ongoing guest lecture series touching on many elements of computer systems, the technologies they employ, and the systems they enable. Outstanding and sometimes controversial speakers are drawn form academia, commercial research labs, and industry. You can review the current program on the Colloquium website and join us for the next talk! Students may enroll in the Colloquium as a class, EE380, and will earn 1 unit of S/NC credit.

Transportation-

Aerodynamics

Aerodynamics is an engineering science concerned with the interaction between bodies and the atmosphere. Technological applications include: General aviation (commercial, cargo, and business aircraft); V/STOL vehicles (helicopters, some military aircraft, tilt rotors); lighter-than-air vehicles (airships, balloons, aerostats); aerodynamic decelerators (parachutes, thrust reversal devices); road vehicles (passenger and racing cars, commercial vehicles, high speed trains); spacecraft, missiles and rockets, low- to high-speed flight (micro air vehicles to hypersonic waveriders), high altitude flight, human powered flight, unmanned flight, gliders, energy conversion systems (wind and gas turbines); propulsion systems (propellers, jet engines, gas turbines).

Avionics and Controls

The digital systems introduced in the 1980s included box-for-box replacements or additions to existing functions. This created a proliferation of black boxes and consequent challenges to system integration, validation, reliability, and cost. There were also many technology developments occurring in other sectors that failed to find their way into aeronautical applications in a timely manner. For example, fiber optics, which have extensive applications in communications, have not yet seen significant application in aircraft. In short, although avionics and control technologies have produced continuous advances in aircraft systems, there is still significant opportunity for greater efficiency, enhanced functionality, and better integration of systems. This is particularly true for systems that reduce the burden on the crew of flying the aircraft and systems that allow for increased capacity of the global air traffic management (ATM) system. It is important, however, that system and component developers include a significant degree of upgrade capability to avoid obsolescence brought on by this rapid pace of technology development

Living Systems-

Biotechnology

In its purest form, the term "biotechnology" refers to the use of living organisms or their products to modify human health and the human environment. Prehistoric biotechnologists did this as they used yeast cells to raise bread dough and to ferment alcoholic beverages, and bacterial cells to make cheeses and yogurts and as they bred their strong, productive animals to make even stronger and more productive offspring.

Medical Technologies

Medical devices, products and technologies are converging to revolutionize home- and self-care health systems in the United States, making it possible for people to play a greater role in maintaining their own health. These systems are geared toward a prevention-oriented, consumer-driven model for health care that includes innovations such as "smart devices" that can "think" for themselves, customized wearable devices, electronic patient records, and wireless Internet-linked systems--all expected to deliver convenient, user-friendly, intelligent health care in the home. For consumers, this could mean convenience in time and travel and reduced health-care costs, and--it is hoped--result in home-care systems that teach people to monitor themselves with gizmos that give timely warnings of illness so that they can turn to their physicians early--when intervention will do the most good. For doctors, it could mean more efficient--and effective--health care driven by patients who take greater responsibility for their own health. William Herman, director of the division of physical sciences in the Food and Drug Administration's Center for Devices and Radiological Health (CDRH), which regulates medical devices, calls home-care systems "the fastest growing segment of the medical device industry."

Energy-

Energy Efficiency

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices. Results are already adding up. Americans, with the help of ENERGY STAR, saved enough energy in 2006 alone to avoid greenhouse gas emissions equivalent to those from 25 million cars — all while saving $14 billion on their utility bills.

Energy Storage, Conditioning, Distribution and Transmission

The alternatives relevant for the electricity supply industries are:

- Superconducting magnet energy storage (SMES)
- Batteries (lead-acid and other rechargeable)
- Hydrogen-based storage
- Flow batteries (VRB, ZBB)
- Pumped storage
- Compressed-air energy storage (CAES)
- Flywheels
- Supercapacitors

Environmental Quality-

Monitoring and Assessment

Monitoring-

ADEQ monitors the ambient water quality in streams, lakes and groundwater throughout the state. Information obtained from ambient monitoring is used to develop water quality standards and to inform the public about Arizona's water quality. Water quantity issues are handled by the Department of Water Resources.

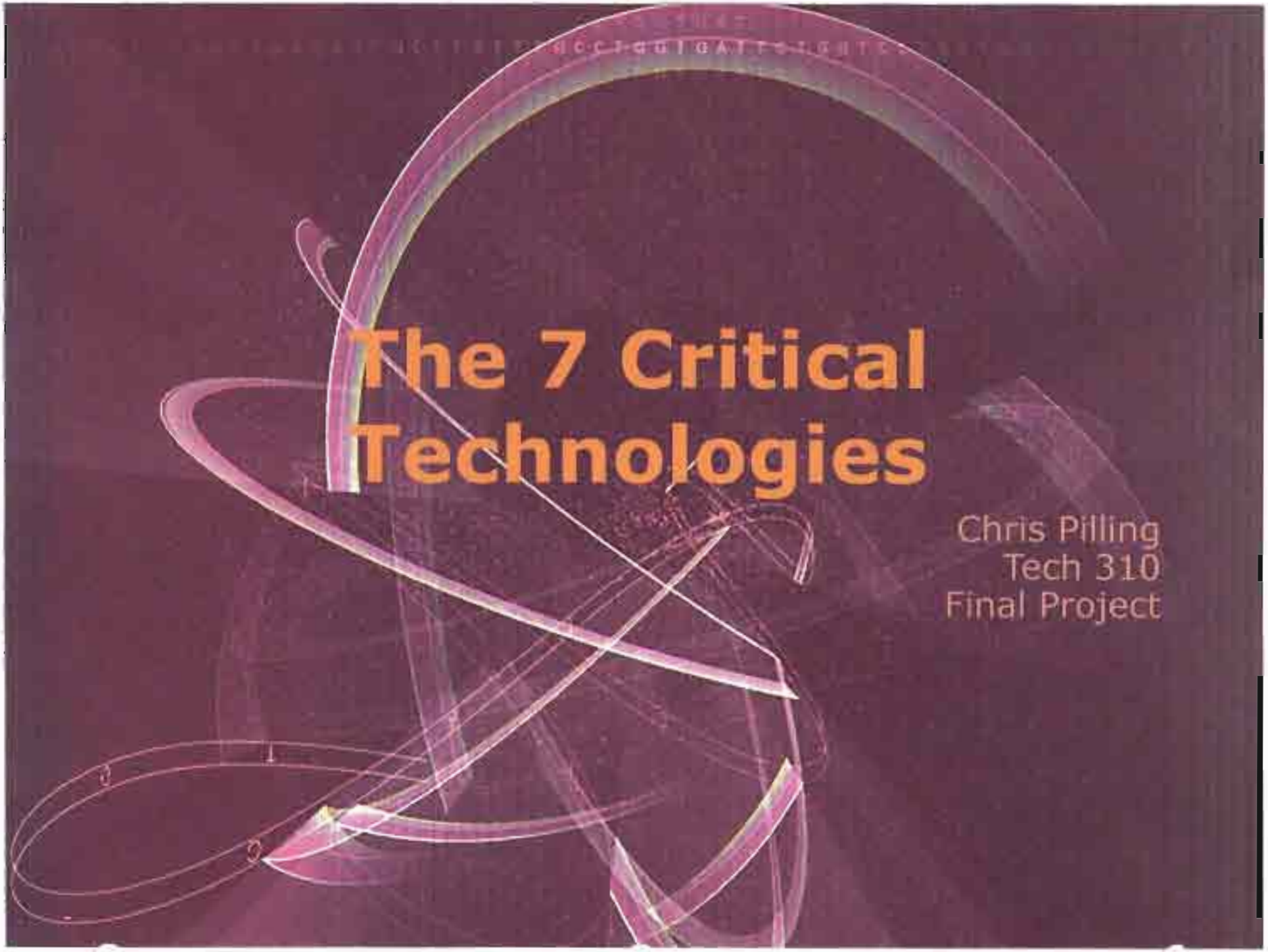
Assessment-

Arizona's Integrated 305(b) Assessment and 303(d) Listing Report describes the status of surface in Arizona in relation to state water quality standards. The report also contains a list of Arizona's impaired surface waters, including a list of surface waters requiring the development of a Total Maximum Daily Load (the 303(d) List). The report fulfills requirements of the federal Clean Water Act sections 305(b) (assessments), 303(d) (impaired water identification), and 314 (status of lake water quality).

Pollution Control

The Pollution Control Department (PCD) is responsible for ensuring that environmental factors are incorporated into land use planning, development and building control of new developments, air and water pollution control, and hazardous substances and toxic industrial wastes control. PCD monitors the ambient air quality and the quality of water bodies in Singapore. It is also responsible for the formulation and implementation of joint programmes on transboundary pollution with the neighbouring countries. The key strategies in managing the environment comprise three elements, viz; prevention,

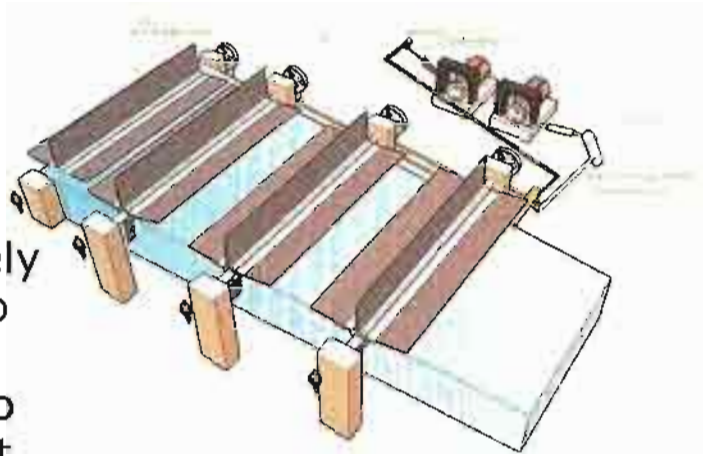
enforcement and monitoring. Prevention of pollution requires proper land use planning and provision of environmental infrastructures. For example, industries that can cause accidental discharge of pollutive and toxic chemicals will not be allowed to be sited within water catchments. Street hawkers had been relocated into properly designed food centres which are served by public sewers and provided with refuse removal facilities.


The 7 Critical Technologies
Chris Pilling
Tech 310
Final Project

- Airless Tires from Michelin
  - Opportunity-
    - No Air
    - Composite materials
    - Multiple spoke tensions for ride comfort
    - Long tread life
  - Threats-
    - High cost
    - Lower gas mileage
  - Innovations-
    - The wheel

Transportation

Hydro-Hydraulic



- Opportunity-
  - Multiple rotors can collectively and actively work to produce electricity using only two generators.
  - The cost of generator claims at least 30 to 40% proportion of Micro Hydro setup cost.
  - Environmentally friendly power.
  - Multiple setups in one row.
  - Job creation in hilly areas.
  - Low cost, higher outputs.
- Threats-
  - Hydraulic components cost and maintenance.
  - Risk factors with regard to the enormous hydraulic pressure.
- Innovations-
  - Water wheel

Energy

Composite Poles

Opportunity-

- Easier to install and handle than concrete, steel and wood poles.
- An environmentally friendly pole.
- Less conductive

Threats-

Less durable
Higher cost

Innovations-

Wood
Steel
Plastic

Materials

- Energy Star Products
  - Opportunity-
    - Lower power consumption
    - Less heat generation
  - Threats-
    - Higher initial cost
  - Innovations-
    - Microwave
    - Range
    - Washer/Dryer

Environmental Quality

- Automation
  - Opportunity-
    - Improving Working Conditions
    - Working Faster
    - Saving
  - Threats-
    - Loss of jobs
    - Can't completely replace humans
  - Innovations-
    - Audio
    - Video
    - Surveillance
    - Networking

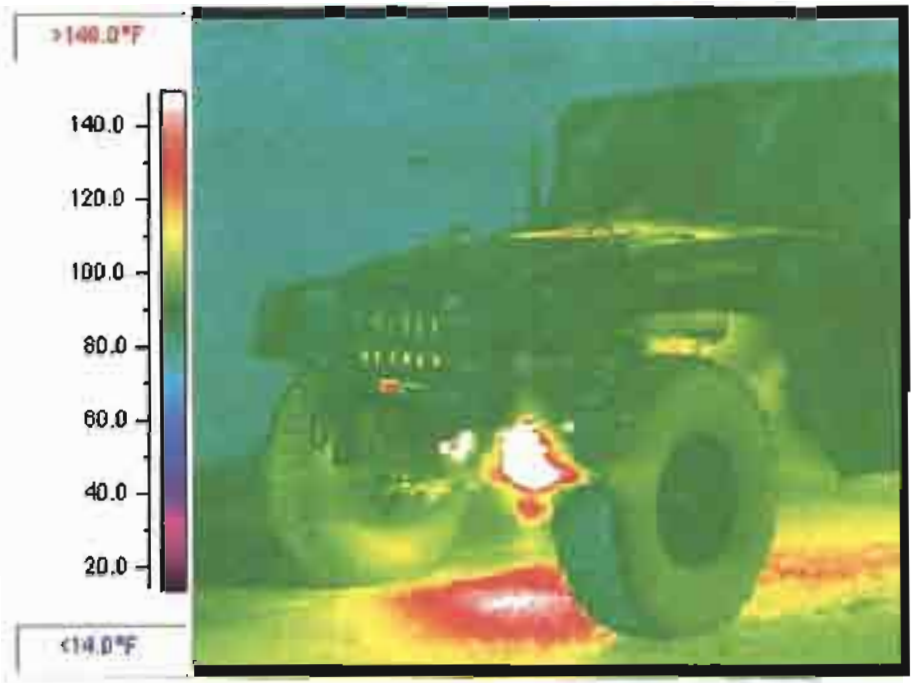
Manufacturing

- Hydroponics
  - Opportunity-
    - Grows crops/plants in area that are less suited for growth
    - Nutrients sent to plants through watering and is recycled and used over again

  - Threats-
    - Only tested in indoor controlled climates
    - Not cost effective
    - Failure if not all parts are always accounted for
  - Innovations-
    - Indoor Farms

Living Systems

- Infrared
  - Opportunity-
    - Low power requirements
    - Simple circuitry
    - High security
    - Portable
  - Threats-
    - Blocked by common materials
    - Short range
    - Slow speed
    - Must have direct line of sight
  - Innovations-
    - Imaging
    - Thermometers
    - Night vision
    - Heating

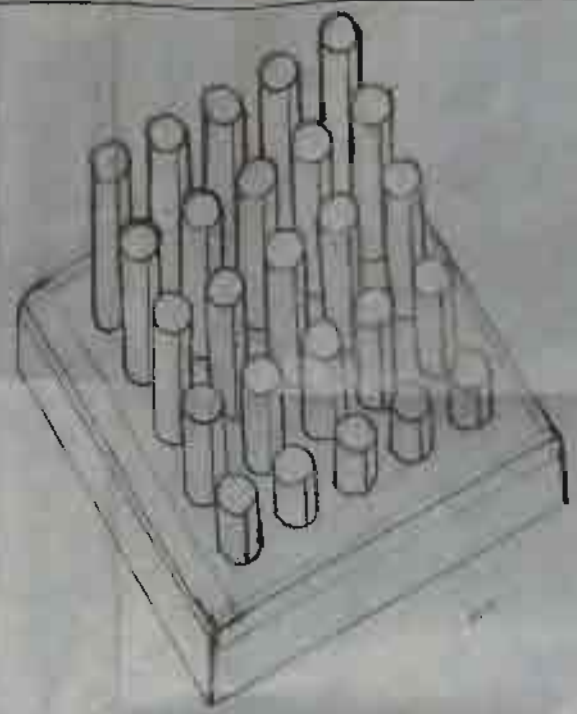


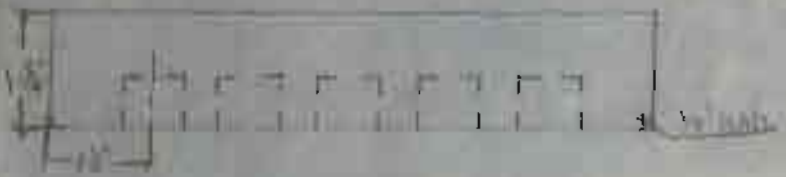
Information and Communication

The Nature of Technology

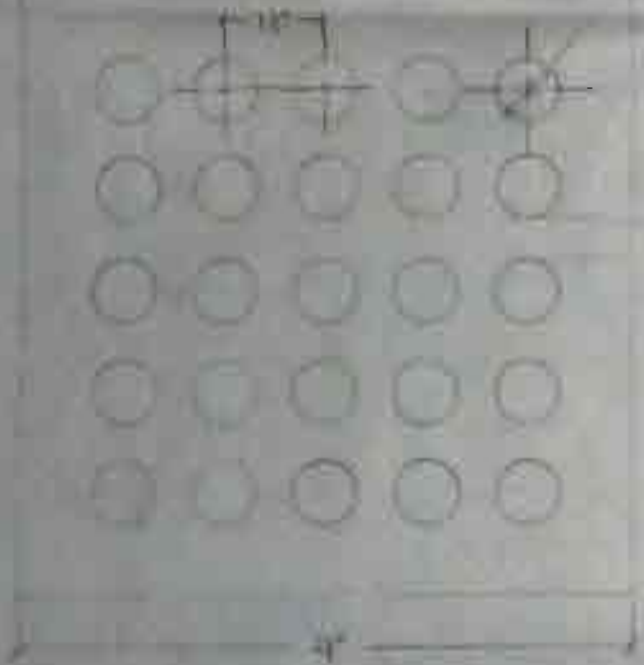
The Seven Critical Technologies span all the clusters of Technology Education and go into great detail what a single aspect of each entail hence the nature of Technology. In the PowerPoint and research that I have included, goes through Transportation, Energy, Materials, Environmental Quality, Manufacturing, Living systems, Information and Communication. Each slide presents one aspect of each Critical Technology/ Technology Cluster dealing with opportunities that each category may present to the world as a whole or community, threats of what are the potential downfalls of the area, and innovations that have happened through the introduction of each area of Technology. All of the areas that are included can be and are closely related to many topics of Technology, each area has many opportunities that tie into each other and work right alongside one another. Doing this project forced me to get comfortable with many areas of Technology, and also required you to do a presentation after all the research. After finishing the presentation you would be asked multiple questions for each section and have to be able to explain yourself quite thoroughly. Doing this broadened my outlook on Technology and also helped me realize what it would take to teach a room full of students. When in the classroom you can be prompted with many questions to go along with what you are teaching, and to be successful you must know the answers to every question that will be presented to you.

Technology
And
Society

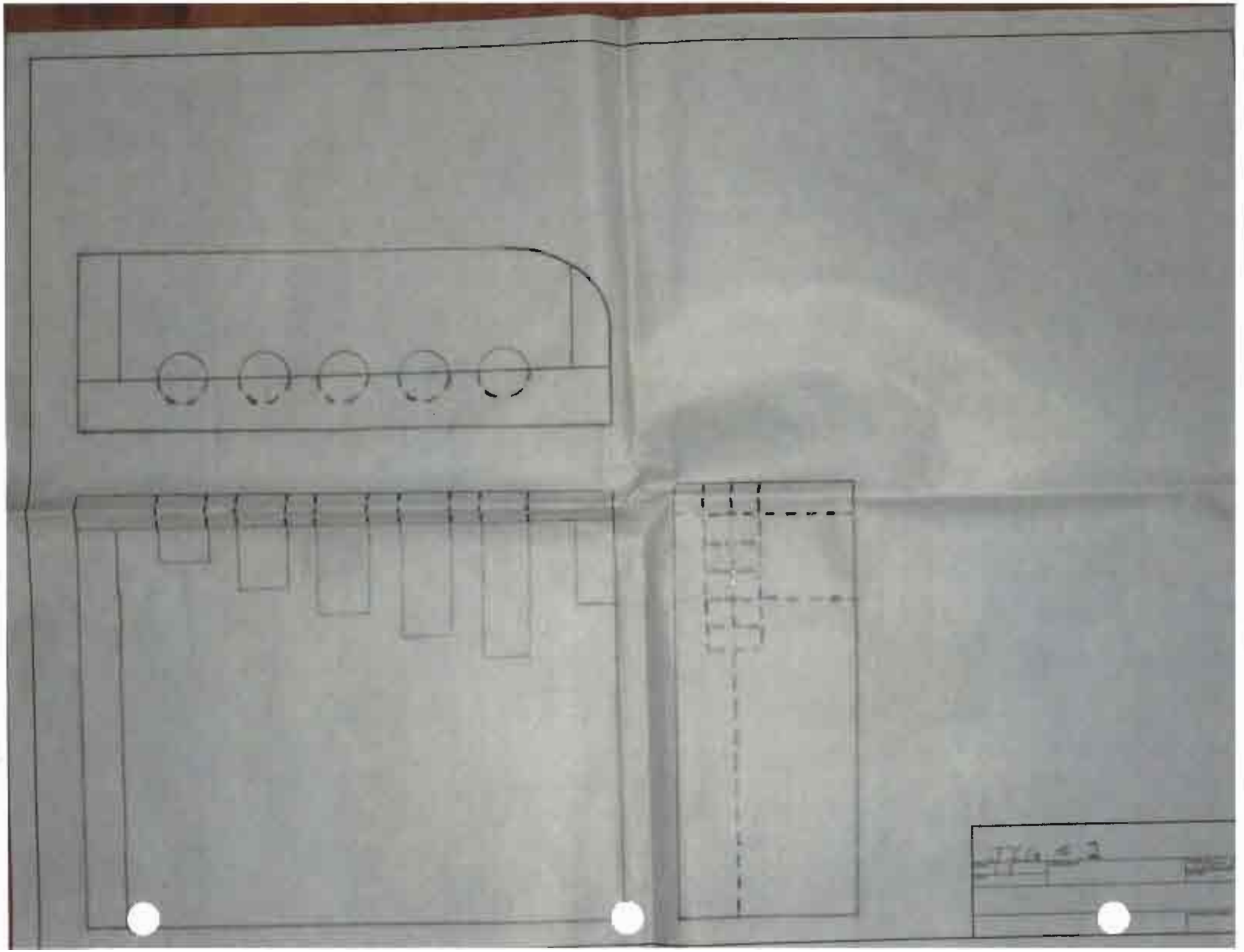


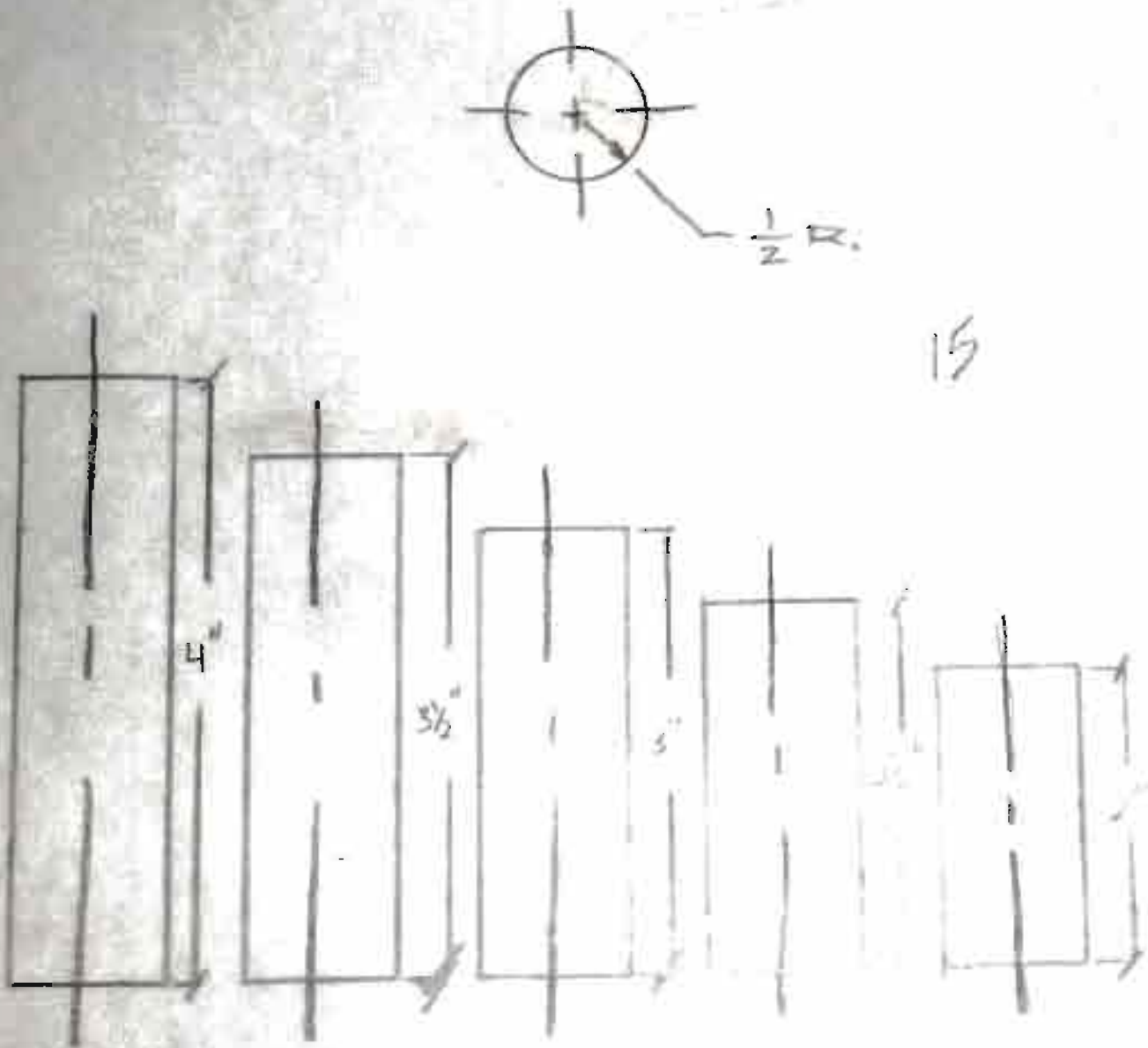


1" DIA.



CUTTING PEG BOARD

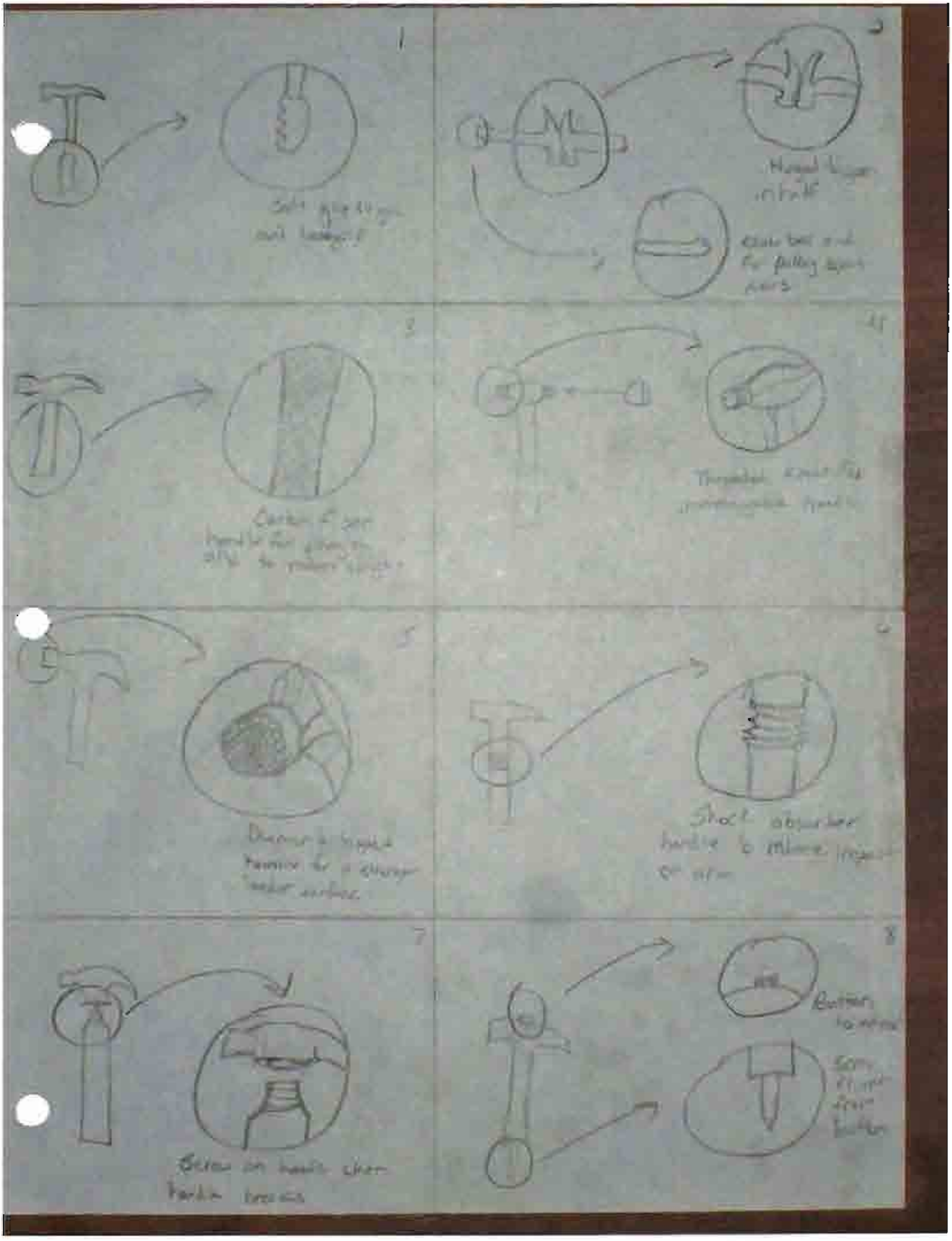



½ R.
15
4"
5½"
5"

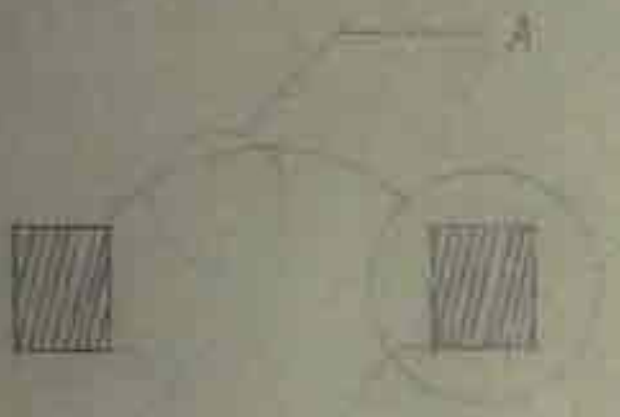
Technology and Society

The project included was incorporated into a production class that was developed for Central Falls Elementary schools that were in need of hands on problem solving tools. This required us as a group of students to make toys that would be useful for young children to develop their motor skills and problem solving skills. Doing so we had to develop detailed drawing plans for the toys, and also any jigs that we would need to develop a mass production facility. Going through brainstorming, planning, designing, building, finishing, packaging, and shipping, this project gave you the real world aspect of what would be required of you in a business atmosphere. It ran through each aspect of exactly what you would do if you were to design a product that would be sold in stores, but unlike the real world you had your hands on every aspect rather than just doing one part and handing it off to the next person. The toy project helped me get very acquainted with all the design skills you need, all the tools that it takes for you to produce a product, finishing which is a very delicate task, and shipping which includes packaging and sorting to fit the most product in the smallest area to save you money. This area of Technology brings real world experience to you in a classroom setting, and helps you enable the students for out of school success after they graduate high school. Being able to give your students a well rounded background in the Technology field is very important, you can give them a little piece of many things, to ensure success.

Design



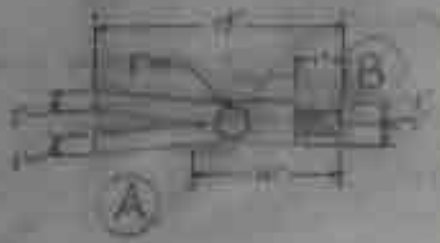
A- STAINLESS STEEL HEAD - FORGED



B- HARDENED STEEL - [illegible]

C- CARBON FIBER BODY FOR REDUCED WEIGHT AND STRENGTH

D- SOFT RUBBER HANDLE TO [illegible] TO ENSURE GRIP [illegible]

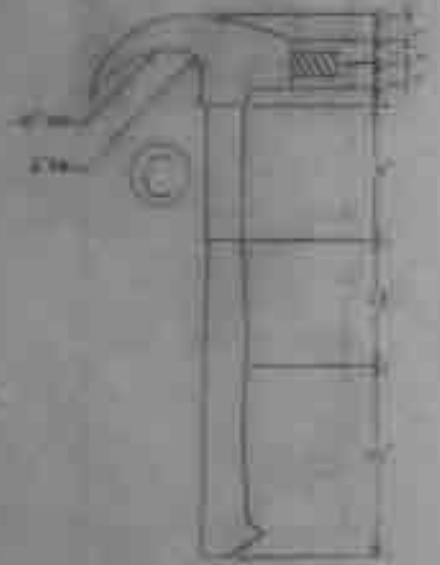


A - HARDFACED STAINLESS STEEL

B - ½" x 14 TPI

C - [illegible] UPPER HANDLE

D - RUBBER LOWER HANDLE




AIR

Design

The project I chose took design and gave it a new meaning, what I was required to do was take an existing product and develop an innovation, and also a prototype. The product I was assigned was a hammer, which at the beginning I thought was the most impossible product to innovate. I had to sketch ideas down on a sheet of paper, and pick an idea. That process is one used quite often in all Technology classes, you have to design what you want to build, or produce before you make a prototype / final product or else you would never be able to make multiple of the same products. After I picked an idea I had to draft plans with full dimensions, to scale, listing all materials used. Having to do this project also is a very useful tool because it gives you a very good background having to do with design, and any part of Technology you always have to begin with designing before you have a product to use in the real world, or to produce in the classroom. From this project I learned that 100% of the time if you plan correctly you will be very successful in what you do, and this goes right along with the classroom. What I mean is that when you go into a classroom as a teacher and have to convey to the students projects and work that they will be required to do, and the best way to do that is have examples of what you expect so that they have little to no question. As a result you become a better teacher, and are more effective and efficient in the classroom.

Abilities for a Technological World

Infrared Technology

Tech 326

Chris Pilling

- Infrared technology uses the basic concept of a laser,
- Invisible to the eye,
- Used in computers, cell phones, and remote controls,
- It sends signal without any wires,
- Used as a heat detector for fire departments.

- Seems to be pretty useful, the scientists of now, believe that Infrared Technology will be the future of networking.

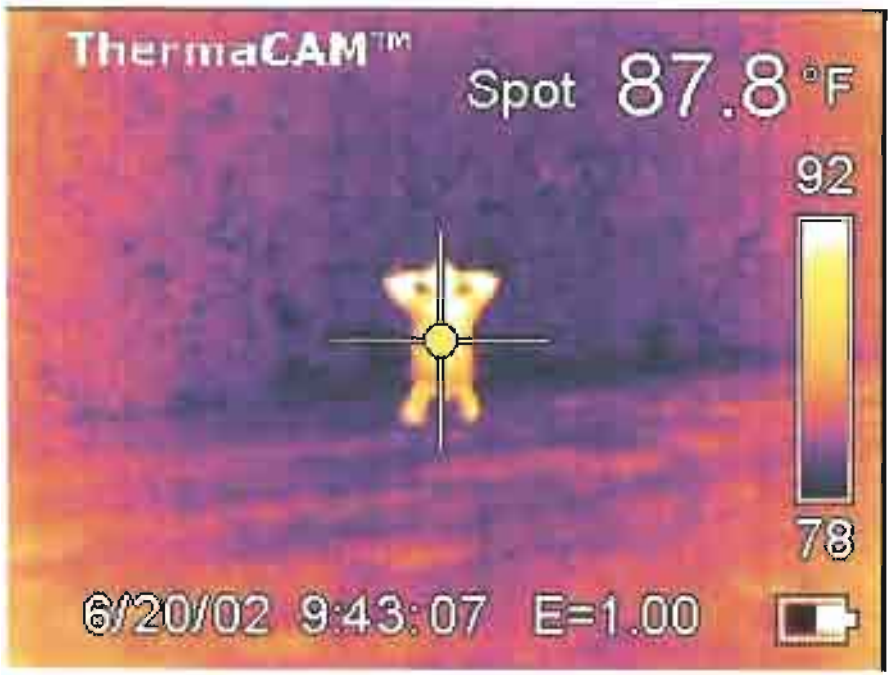
- It will be the same basic concept of a TV remote control, but will not bounce off of everything around like the remote does.

- The speed is about 1,000 times faster than a cable modem.

- In computer terms is 2 gigabytes per second.

Infrared View

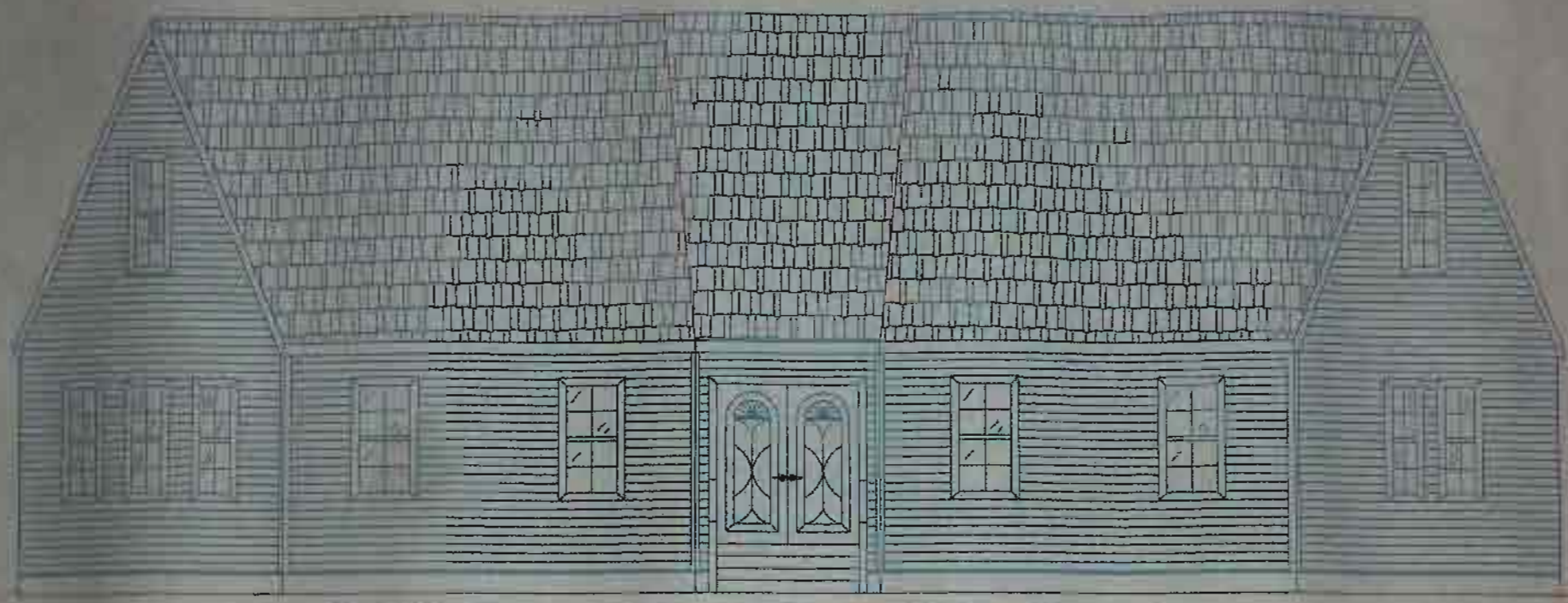
- In most cases you cant see Infrared.
- Fire fighters use it in fires to check for people because with smoke you cant see.
- It follows the spectrum of light depending on how hot something is, the cooler it is the bluer it is and the hotter the redder it is.
- They also have black and white and white is hot and black is cold on those.



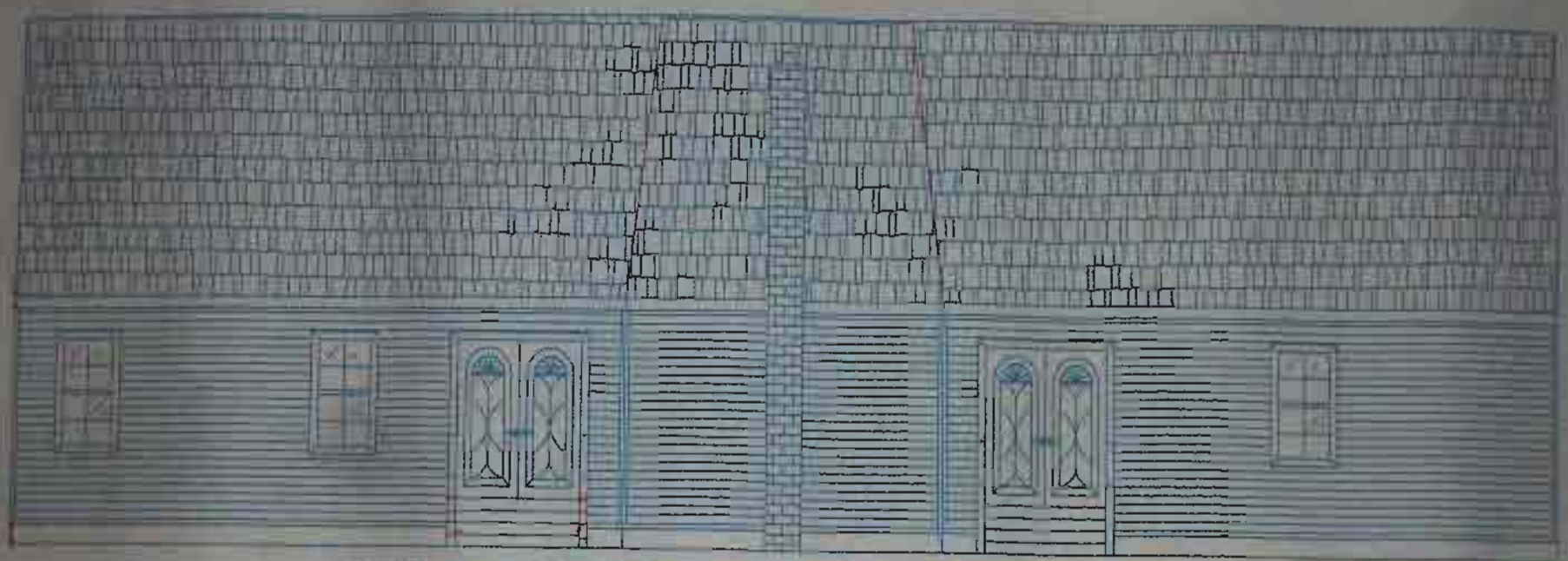
Abilities for a Technological World

Infrared Technology was one of those ideas that were discovered in the early 1800's but was never fully developed until the 21st century. This presentation gave me the option to find a technology that worked with communication, but could also have many other skills. Infrared technology has the ability to transmit information between places using the basic concept of lasers. Doing a presentation on this gave me the skills to talk in front of people, it also made me research and develop a presentation that would better the world one step at a time. Infrared Technology has multiple uses, it is great for communication between two sources because it is 1,000 times faster than anything we have available to the public now, and also can help save many lives with the heat sensing technology that is use in all fire departments around the world. To human life this is a big jump forward, you can now find bodies inside of burning buildings without endangering yourself first, and this can also transmit information between two points extremely fast. This presentation let me develop the skills needed to research, and present my ideas and thoughts. One advantage of this is that when you are a teacher you need the skills of research to keep the classroom new and updated, the problem with a lot of schools is that you walk in and what they teach is outdated and doesn't help the students develop what they need to survive in the real world. In the field of Technology that is the most important thing, Technology changes day to day, and for you to convey the information correctly you will always need to stay updated and with the times to have a very successful career as a teacher.

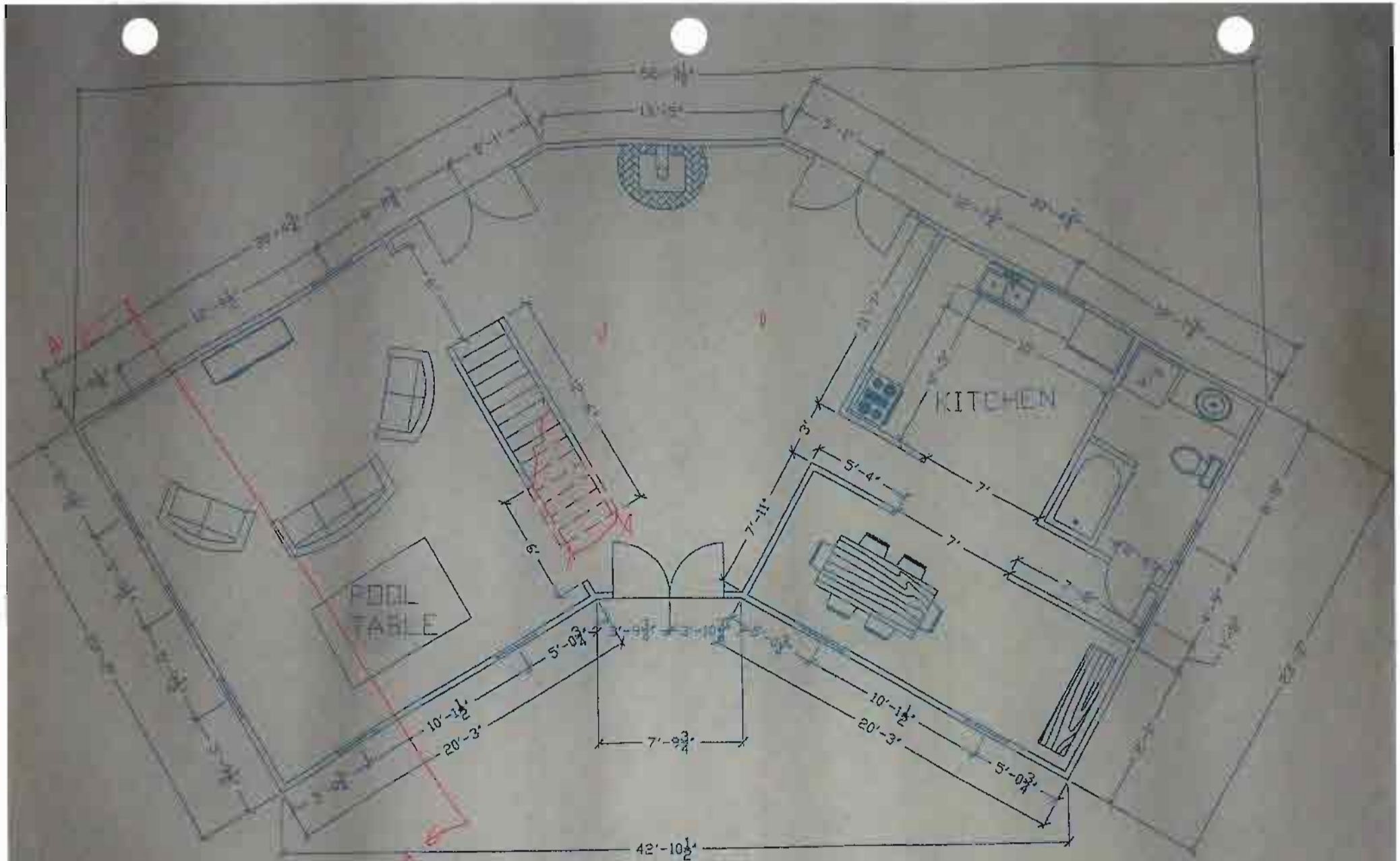
The Designed World



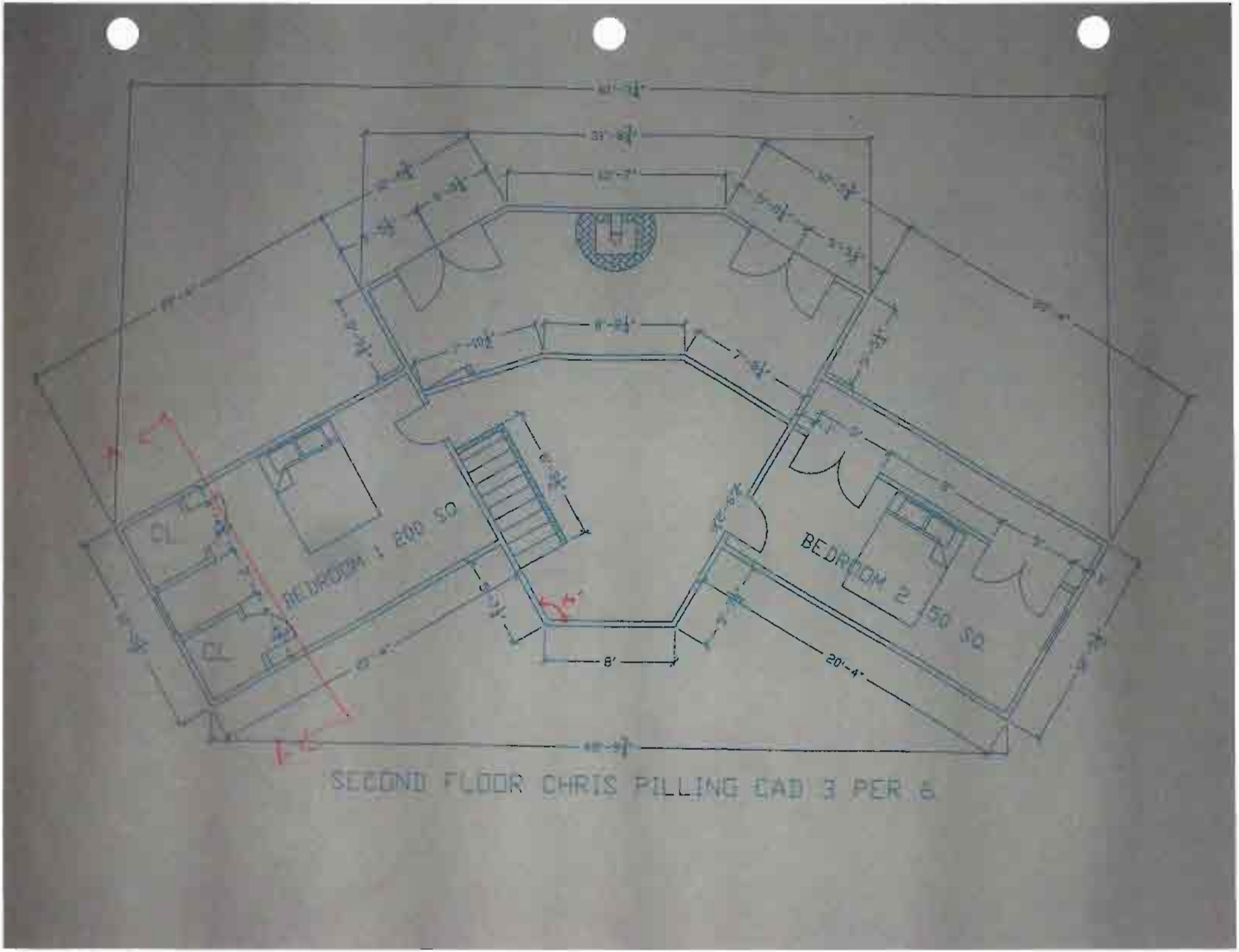
FRONT ELEVATION CHRIS PILLING CAD 3 PER 6



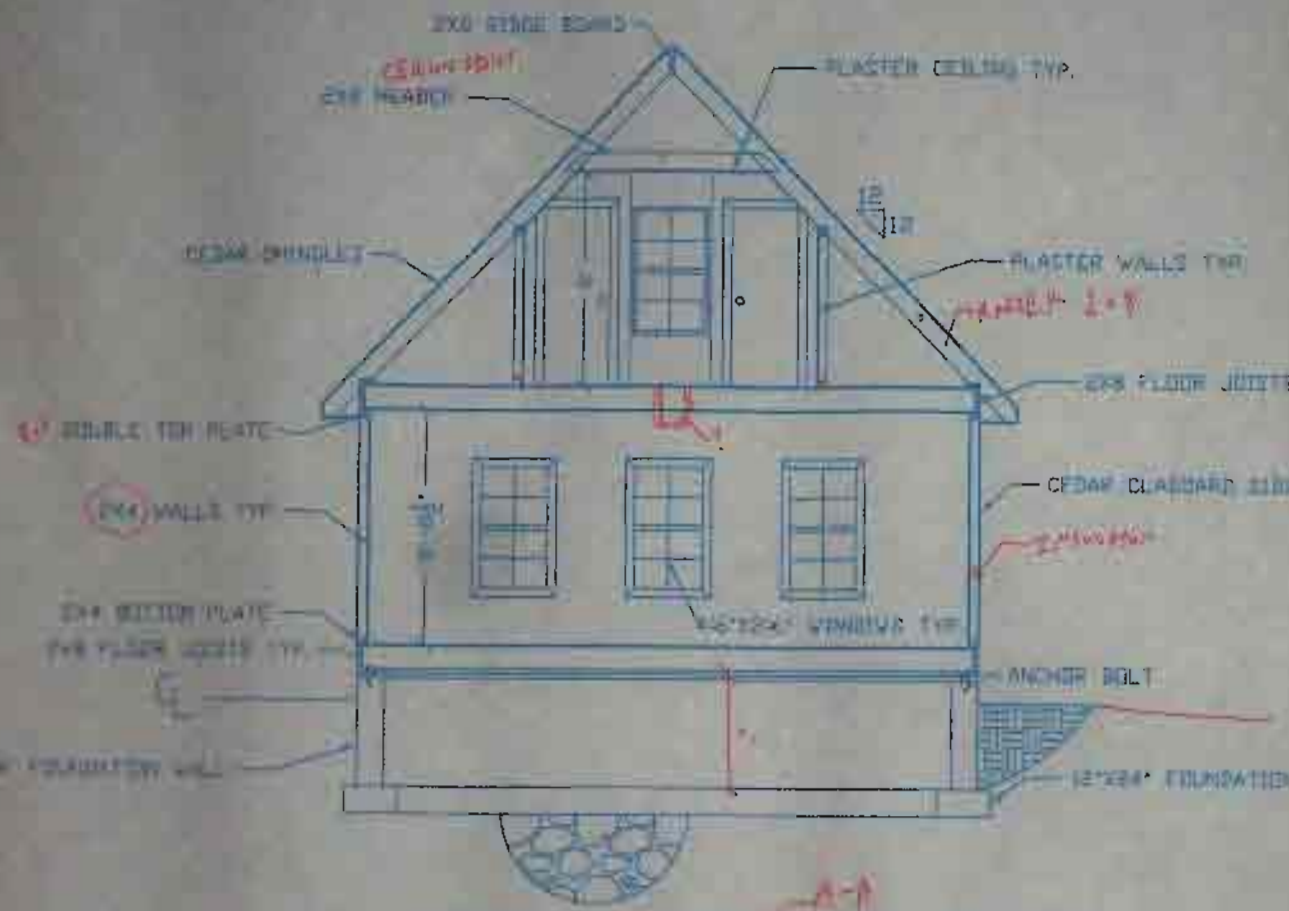
REAR ELEVATION CHRIS PILLING CAD 3 PER 6



FIRST FLOOR CHRIS PILLING CAD 3 PER 6



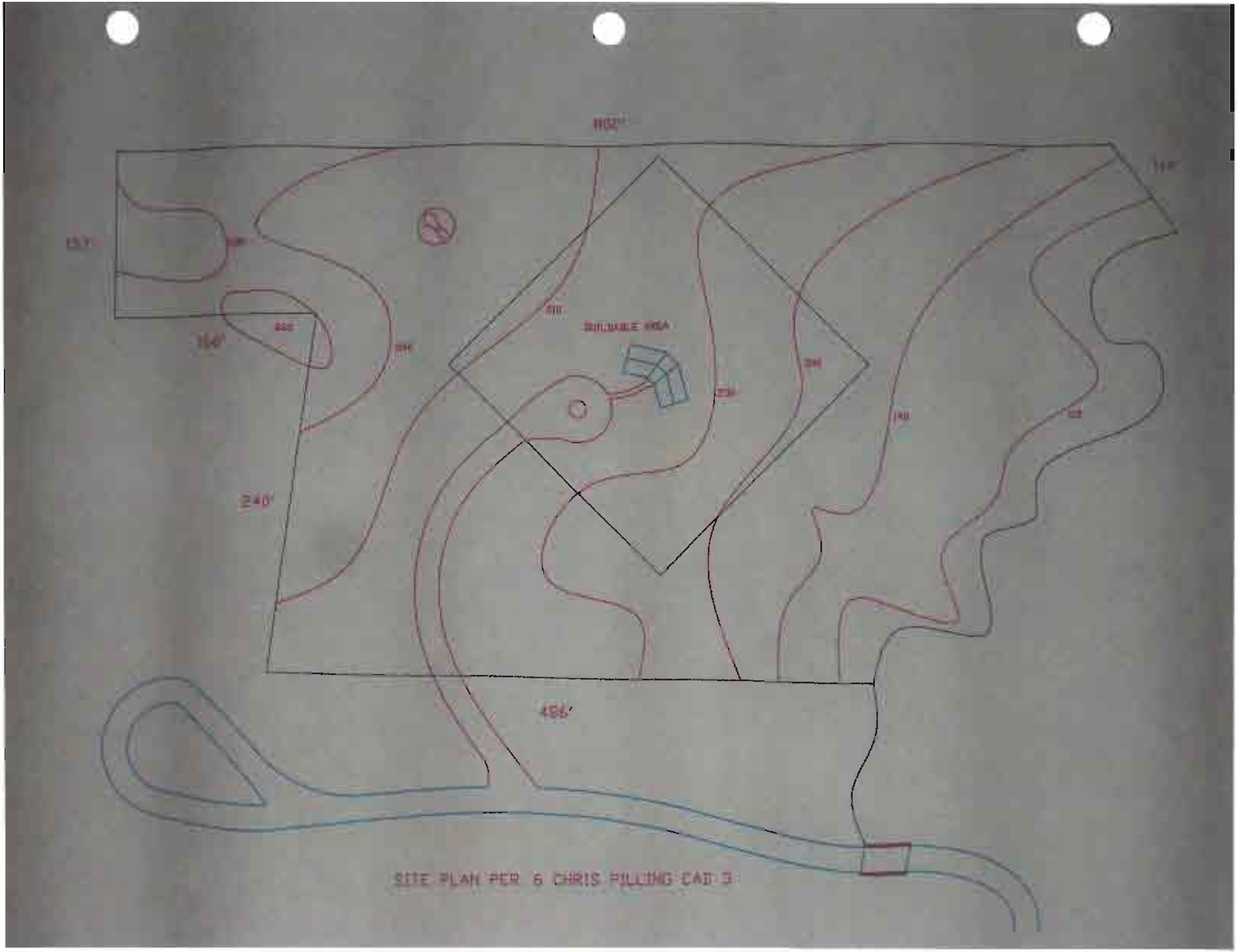
SECOND FLOOR CHRIS PILLING EAD 3 PER 6



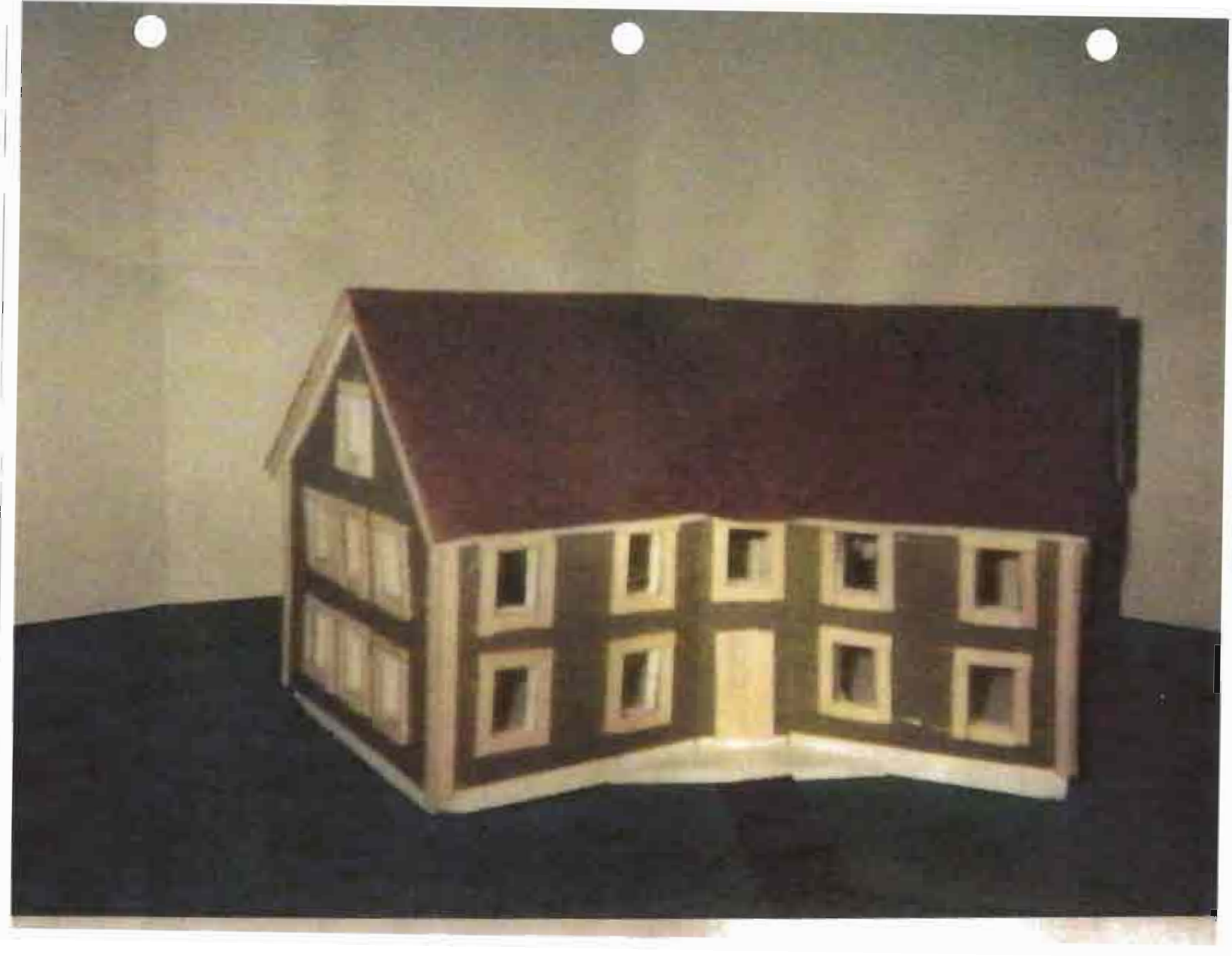
SECTION A-A'

1/2" ANCHOR BOLTS ON SILLS 6'0" O.C.
2X8 FLOOR JOISTS
2X8 HEADER
2X6 RAFTERS
24" X 48" AWNING WINDOW
2'6" X 6'8" DOORS TYP.
CLAPBOARD SIDING TYP.
12"X24" FOUNDATION FOOTINGS
8" X 16" FOUNDATION WALLS
12 PITCH ROOF
RED CEDAR SHINGLES TYP.
36" OVERHANGS
2X4" TYP. WALLS
2X4 TYP. BOTTOM AND TOP PLATES
PLASTER ON CEILINGS AND WALLS TYP.
2X8 RIDGE BEAMS
5X8 PLYWOOD ON ROOF AND FLOORING

CROSS SECTION CHRIS PILLING CAD 3 PCR 6



SITE PLAN PER 6 CHRIS PILLING CAD 3



The Designed World

For this project we were told to design a house and create it using any materials necessary. I took a modern colonial and put a twist on it using specific architectural techniques. During the process I was able to take prior knowledge from classes that I was required to take such as AutoCAD in college for construction techniques, and the base design of the home itself. The house is part of a culdesac community and we were required to set the house on a plot of land that was predetermined with elevation which we had to keep in mind as we placed the house onto the area. After we had the house designed and figured out where the house would go according to building codes, we were required to also make a model of the house and land to as exact specs as we could, in the process I added another floor to the model to cater to the lack of bedroom space in the house. Doing this we learned how each step of the design process was needed to build design and test. From that we were able to take what we learned and base it on a real life situation saying that when they build houses and housing complexes there are many people that need to cooperate in finishing a house, it's not only one person that does it start to finish, and that is why the design process is important as a whole, and to the Technology field. This project broadened my knowledge in the actual process that was needed to build houses, what codes were very important to follow and what the consequences could be. As a teacher, you need to know these rules and building codes because you are training students to possibly go into a specific field of interest and if they do not get the whole picture you set them up for failure. This is why being a Technology Educator is important it teaches you real life situations, along with real world applications that you need after you graduate either high school or college.

Exemplary

Content Portfolio
Content Artifacts Rubric

Students will develop an understanding of **The Nature of Technology**

	Unsatisfactory (1 pts.)	**Emerging (2 pts.)**	**Competent (3 pts.)**	**Mastery (4 pts.)**
Artifacts	The artifacts presented do not demonstrate knowledge of the characteristics and scope of technology; the core concepts of technology; links among technologies and relationship of technology and other fields.	The artifacts presented demonstrate minimal knowledge of the characteristics and scope of technology; the core concepts of technology; or links among technologies and relationship of technology and other fields.	The artifacts presented demonstrate broad base of general knowledge of the characteristics and scope of technology; the core concepts of technology; or links among technologies and relationship of technology and other fields.	The artifacts presented demonstrate an in-depth knowledge of the characteristics and scope of technology; the core concepts of technology; or links among technologies and relationship of technology and other fields.
Communication				
Construction				
Energy/Transportation				
Manufacturing			√	

Students will develop and understanding of **Technology and Society**

	Unsatisfactory (1 pts.)	**Emerging (2 pts.)**	**Competent (3 pts.)**	**Mastery (4 pts.)**
Artifacts	The artifacts presented do not demonstrate knowledge of the cultural, social, economic, and political effects of technology; impacts of technology on the environment; society's role in developing and using technology; and the influence of technology on history.	The artifacts presented demonstrate minimal knowledge of the cultural, social, economic, and political effects of technology; impacts of technology on the environment; society's role in developing and using technology; and the influence of technology on history.	The artifacts presented demonstrate broad base of general knowledge of the cultural, social, economic, and political effects of technology; impacts of technology on the environment; society's role in developing and using technology; and the influence of technology on history.	The artifacts presented demonstrate an in-depth knowledge of the cultural, social, economic, and political effects of technology; impacts of technology on the environment; society's role in developing and using technology; and the influence of technology on history.
Communication			√	
Construction				
Energy/Transportation				
Manufacturing				

Students will develop an understanding of **Design**

	Unsatisfactory (1 pts.)	**Emerging (2 pts.)**	**Competent (3 pts.)**	**Mastery (4 pts.)**
Artifacts	The artifacts presented do not demonstrate knowledge of the attributes of design; rudimentary engineering design; the role of troubleshooting, innovation and invention; and problem-solving techniques.	The artifacts presented demonstrate minimal knowledge of the attributes of design; rudimentary engineering design; the role of troubleshooting, innovation and invention; and problem-solving techniques.	The artifacts presented demonstrate broad base of general knowledge of the attributes of design; rudimentary engineering design; the role of troubleshooting, innovation and invention; and problem-solving techniques.	The artifacts presented demonstrate an in-depth knowledge of the attributes of design; rudimentary engineering design; the role of troubleshooting, innovation and invention; and problem-solving techniques.
Communication				
Construction				
Energy/Transportation				
Manufacturing				√

Students will develop **Abilities for a Technological World:**

	Unsatisfactory (1 pts.)	**Emerging (2 pts.)**	**Competent (3 pts.)**	**Mastery (4 pts.)**
Artifacts	The artifacts presented do not demonstrate knowledge of the design process; use and maintenance of technological systems; and assessment of impacts from products and systems.	The artifacts presented demonstrate minimal knowledge of the design process; use and maintenance of technological systems; and assessment of impacts from products and systems.	The artifacts presented demonstrate broad base of general knowledge of the design process; use and maintenance of technological systems; and assessment of impacts from products and systems.	The artifacts presented demonstrate an in-depth knowledge of the design process; use and maintenance of technological systems; and assessment of impacts from products and systems.
Communication				√
Construction				
Energy/Transportation				
Manufacturing				

Students will develop an understanding of **The Designed World**

	Unsatisfactory (1 pts.)	**Emerging (2 pts.)**	**Competent (3 pts.)**	**Mastery (4 pts.)**
Artifacts	The artifacts presented do not demonstrate knowledge of the selection and use of Energy and power technologies; Information and communication technologies; Manufacturing and Construction technologies.	The artifacts presented demonstrate minimal knowledge of the selection and use of Energy and power technologies; Information and communication technologies; Manufacturing and Construction technologies.	The artifacts presented demonstrate broad base of general knowledge of the selection and use of Energy and power technologies; Information and communication technologies; Manufacturing and Construction technologies.	The artifacts presented demonstrate an in-depth knowledge of the selection and use of Energy and power technologies; Information and communication technologies; Manufacturing and Construction technologies.
Communication				√
Construction				
Energy/Transportation				
Manufacturing				

Chris Pilling
Grade 7
Lesson 7

Construction (Index Card Trick)

Goals

Help the students learn and develop an understanding Construction and how different shapes can support weight in different ways.

Objectives

- Students will develop an understanding of the meaning of Construction.
- Students will develop an understanding of shapes, what strengths and weaknesses that they have.
- Students will develop an understanding of how to use a combination of shapes to their benefit to build a very strong structure.
- Students will take three index cards, and two feet of masking tape and attempt to support weight.

Connections with the Standards for Technological Literacy

- **Standard 8**. Students will develop an understanding of the attributes of design.
- **Standard 9**. Students will develop an understanding of engineering design.
- **Standard 10**. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
- **Standard 20**. Students will develop an understanding of and be able to select and use construction technologies.
-

Rhode Island Beginning Teacher Standards

- **Standard 5.** Teachers create instructional opportunities to encourage students' development of critical thinking, problem solving, and performance skills.

- **Standard 8.** Teachers use effective communication as the vehicle through which students explore, conjecture, discuss, and investigate new ideas.

Content Outline

- Review which shapes will help the students succeed in holding as much weight as possible without breaking.
- Review what will be used to complete the challenge as far as materials that will be allowed to complete the challenge.
- Give the students hints to set them up for success rather than failure during this process.

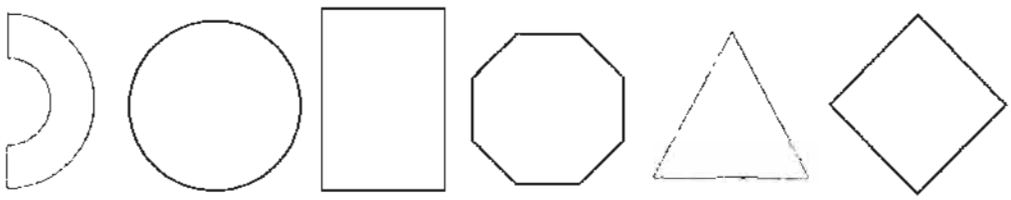
Introduction

- Present ideas about shapes , how certain shapes are stronger than others (Triangles, squares, circles)
- Engage conversation with the students and ideas of what they think will bring them success
- Give a certain time period and only a certain amount of materials
- Explain how the students will need to go about making their support systems

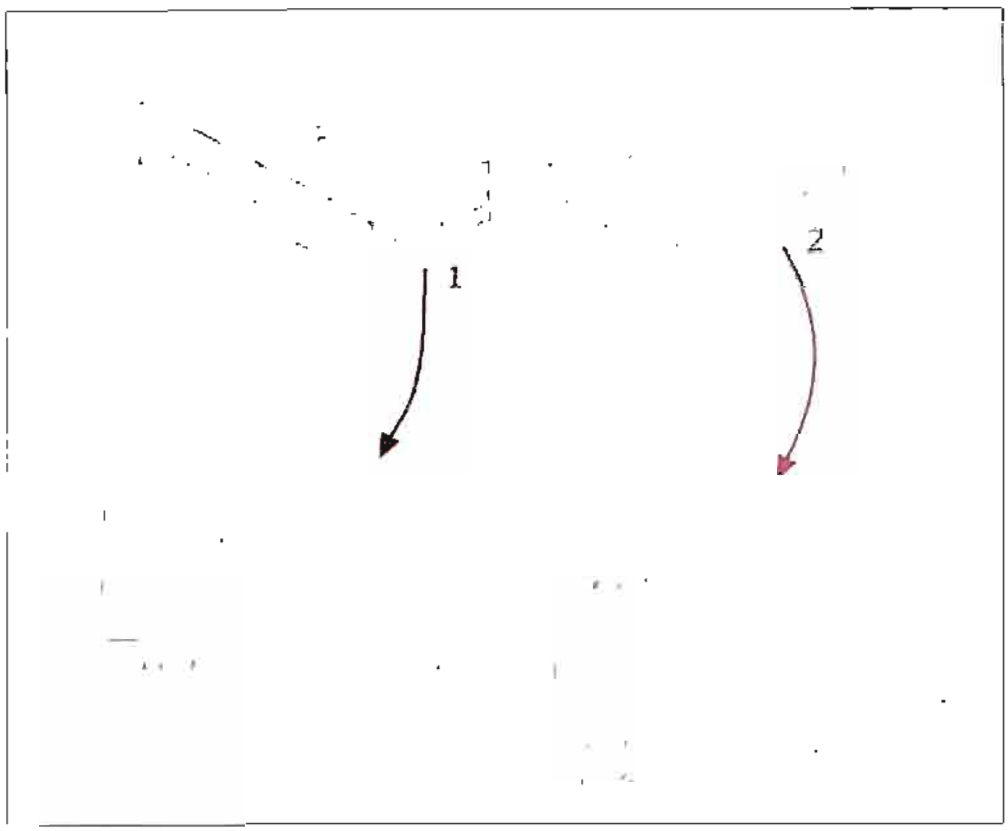
Learning Activity

Have students, either individually or in pairs, research about strengths and weaknesses of materials and shapes. They should follow these steps:

- Create a drawing of the shapes that you think will be effective for holding weight.



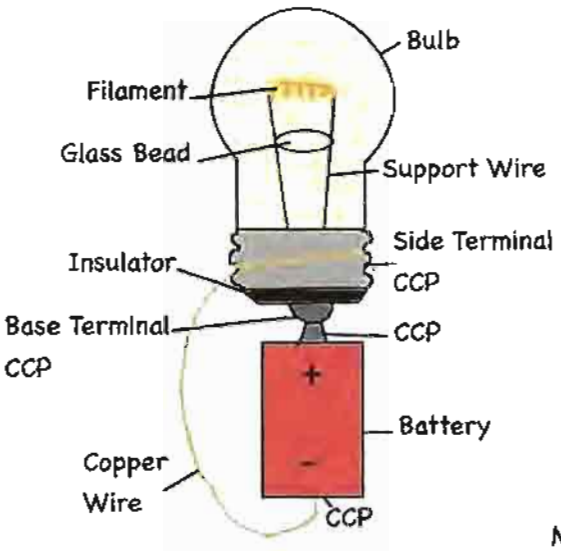
- Label what each part is on the drawing.



- Label which points of the drawing are critical in helping support the weight, and give an example of why you think this.

Example of this below, with a light bulb, it labels all parts and shows what needs to connect to each other for the system to work.

A Complete Circuit



Ms. Shapiro

Time needed

- 1 - 50 minute class period for building and testing purpose

Overview

This lesson has the students review and practice upon their knowledge of shapes and strengths that they have in engineering. They will do a brief challenge with only the materials required, and will be concluded by testing which students design will support the most weight.

Materials Required

- 3- index cards
- 2 feet of tape
- Scissors
- Ruler

Closing

Ask the students to explain what they have learned today, make them think critically on what could have happened differently, and if so what they think could have been better or worse in the process.

Extending the lesson

Teach the students how to apply what they have learned in this challenge to a real world situation. Ask the students to create a specific drawing using what they have learned and fix the design flaws that they had. The drawings should include specific examples of what has been fixed, and why it will be more effective for holding weight. Also to keep in mind that the students will be coming up with bridge projects that will also have to hold a load. With the student's research and the upcoming lecture they should be able to hold a minimum of 50 pounds with their bridge.

Learner Factors

This lesson creates connections visually for the students. This will have the students draw upon their research and knowledge from past lectures, and put it to use in front of their eyes. At the conclusion of this lesson the students will move onto bridge building, and they will have to support weight keeping in mind Tension, Torsion, and Shear pressures that were discussed in a previous lesson. All of the base for bridge building starts with this project and puts the experience in their hands for a very good visual learning experience.

Assessment

The students should be able to hold up at least 5 pounds with their designs this results in a C. Anything between 5 and 15 pounds will result in a B, and anything over 15 pounds will be considered an A. They will be told to think of it as a real life situation, if they were to build this for use of people would a C for a final grade be acceptable? This will keep the standards high for the students and set the knowledge into them that you expect the highest quality work they can put forth.

Technology Competency Rubric (Card Trick)

		Proficiency Level		
Core Competency	**Technology Competency**	**Basic** **C-70-79**	**Proficient** **(All of basic +)** **B-80-89**	**Advanced** **(All of proficient +)** **A-90-100**
Select and use appropriate reasoning and technology resources to accomplish the task.	Problem Solving	Students will use their research and use materials to hold 5 pounds or less.	Students will use their research and use materials to hold between 5-15 pounds, and finish without teachers assistance.	Students will use their research and use materials to hold 15+ pounds, without teachers assistance, and be able to explain the effective use of shapes.

Lesson Plan

Commentary

Christopher Pilling

Technology Education

Rhode Island College

The lesson I planned for Secondary Practicum at North Smithfield Middle School was Card Trick. Prior to the lesson, the students were introduced to bridge building concepts, such as engineering, and the strengths of various shapes, and materials. By giving them this knowledge before presenting the students with the challenge, helped set the students up for success. The students were presented with ideas about shapes and what strengths and weaknesses they have, and they also did research on their own for homework. They were required to present to the class the shapes they found to be in most common engineering and what materials were known to be the strongest. Leading the students into the challenge Card Trick, I presented them with the materials such as scissors, two feet of masking tape, and three index cards. With these materials, and only these materials, the students have to support as much weight as possible with their designs and they were able to arrange the materials in which ever manner they choose. The challenge enables the students to only use a limited amount of supplies and ideas from the research they did prior to the challenge. This is a useful tool to help the students recognize the many shapes, sizes, spans, strengths of materials, and also the waste of materials, which is very important in a real world situation.

As I presented the lesson, the students seemed very excited to get started with the challenge. It took about three minutes for the students to settle down, which left about forty-five minutes for the building and testing of their designs. In their excitement some of the students wanted clarification about some things like; "can we get more materials if we run out?" To end the confusion, I repeated the directions, and specified what the students were able to use for materials, and then I told the students to get to work on their designs, as I walked around to check on the students to see if they were trying to cut corners, or needed help in any way. Many of the students went right to work starting to cut apart the index cards

and arrange them in the manner they designed while others sat there with blank stares. I immediately went to the students who seemed like they were stuck and asked some questions; "why aren't you doing anything? "do you need any help?" and encouraging the students. I tried to encourage the students to give them some incentive, "who ever has a design that can hold the most weight will get the lowest quiz grade dropped." Immediately the students went right to work, and the students that were ready were testing out their designs with books they had around them, and reconfiguring their designs. For about ten minutes the class was silent, not a word was said while the students were working. Then all of a sudden while one of the students was testing out their design, it collapsed and they asked me if they could get new materials. I reminded them that, "These materials and only these materials are what you have to work with, and if you test your work and it collapses, you need to rework your design and keep in mind what happened and go from there, I stated if this was a real life situation you only have one shot at getting it right and I also informed them you have five more minutes to finish your designs before we begin testing." I continued to walk around and check on the students. Some of the work impressed me, with the shapes they were able to make reflecting their research, but others did not show much interest to get anything ready to test with. With about one minute left to the challenge, I commented " If you are done, begin cleaning up your area, if you are not done you have one minute to finish your design or you will not be able to test." This caused the students to work very frantically, trying to put together their designs. As we were finishing I asked the students to move to the second room where the jig was setup for the weights that we were going to test with. I then asked for volunteers, but the students were very reluctant to step up, then one of the students that I personally thought had the best design was willing to go first.

We went through testing without a hitch, and the students were very excited to find out who would be able to get the lowest quiz grade dropped. While going through testing, some of the designs held as little as two pounds, and the highest was thirty-five pounds. After announcing who would receive the lowest quiz grade being dropped, we went back into the classroom and the students began cleaning up before I went over what they would need to do for homework for the next class. I announced to the students that they would need to write a summary of their designs and the final product they ended up with. In the summary they would have to say what could have gone better with their designs now that they saw what their design produced for strength and what they would have changed in the process. As class ended I was pleased with the results of the designs and the students behavior overall. I announced that in the next class I would show them how to hold up to 50 pounds with the same materials referring back to the research they had before the challenge was presented and how this challenge would lead into bridge building.

Overall, I felt that the lesson plan was very effective in getting the students to interact and be enthusiastic about the class challenge. All of the students were very intrigued with the lesson, because they were free to design however they wanted as long as they kept within the guidelines. I personally believe that if you give students some incentive they can do anything, such as the winner's lowest quiz grade being dropped. The lesson was meant to lead the students into bridge building and I feel like it was a very good way to do so. This way they understand why it is important to design before building, and also why different shapes are more effective in engineering than others. If I were to change anything about this lesson I may have had the students work in groups of two, this would have led to more brainstorming of the designs and to overall stronger final products. I have found through experience that

when working in groups of more than two at this young age, many of the students differ in their opinions and will not get anything accomplished, so I feel that if you were to group the students into a group of two the projects will come out with much higher quality and be more of a learning experience for the students.

The way that I was able to assess this challenge is by weight, if the students were able to hold different levels of weight they were awarded different grades. No one could fail because any design they were going to produce could easily hold a pound, but some of the students exceeded their expectations and held a lot more than 15 pounds which was required of them to receive an A. This lesson leads into bridge building like I had mentioned, for that project they would have to use strictly wood and glue, no other materials than that, and they were given very specific guidelines to follow. So knowing this the students would be able to use the knowledge they gained from their hands on experience with the "Card Trick" and that would help them create a better more creative product for the Bridge building portion of this class.

This lesson I found to be very effective to get the students engaged, because not all of the students are book learners, they need something in front of them to help them understand what is going on. Being a visual learner myself I understand where the students come from and constantly try to put myself in their shoes to help ensure a successful lesson like I did with this one. Overall I enjoyed doing this project with the students, but the next time I would do this project I would definitely change around how I assessed it. I feel that the assessment was too easy for the students to just settle for the minimum, therefore setting much higher standards of work for the next time around.

Application of Knowledge Rubric
Lesson Plan

	Unsatisfactory (1 pts.)	**Emerging (2 pts.)**	**Competent (3 pts.)**	**Mastery (4 pts.)**
Content	The lesson plan shows significant errors in technology content knowledge	The lesson plan shows evidence of weak technology content knowledge or inadequate understanding of technological concepts.	The lesson plan is free of inaccurate technology content, but could use further development. √	The lesson plan shows that the candidate possesses solid technology content knowledge and has researched the topic.
Objectives of the Lesson	The instructional objectives are undefined and do not relate to the goal of the lesson.	There are less than three instructional objectives that vaguely defined and loosely relate to the goal of the lesson.	There are at least three instructional objectives that specifically define the goal of the lesson. √	There are at least three or four clearly defined and specific instructional objectives that are progressively sequential, developmentally appropriate and inclusive of all learners.
Activity	Activity is disconnected and not focused on any of the standards.	Activity has vague connection to the standards but disconnected from other aspects of the lesson.	Activity is connected to the standards, but needs to be better developed with other aspects of the lesson. √	Activity is aligned with the content standards, builds upon other aspects of the lesson, and is appropriately paced, and developmentally appropriate.
Materials and Resources	Materials necessary for student and teacher to complete lesson are not complete.	Some materials necessary for student and teacher to complete lesson are listed	Most materials necessary for student and teacher to complete lesson are listed.	All materials necessary for student and teacher to complete lesson clearly listed. √
Procedures	Major lesson activities are not described	Instructions contain some of the steps necessary to complete the activity, but are not detailed enough to insure successful learning	Instructions contain all steps necessary to complete the activity, but more details would be helpful. √	Procedures are clear and detailed, including amount of time allocated for each activity, key questions to be asked to the students, and suggested ways to monitor student learning.

Accommodation	Lesson plan does not accommodate for learning styles nor include adjustments for children with special needs Is not culturally responsive.	Lesson plan attempts to incorporate different learning styles, and makes some adjustments for children with special needs. It makes cursory effort to be culturally responsive.	Lesson plan incorporates different learning styles, and makes several adjustments for children with special needs. It makes a strong effort to be culturally responsive. √	Lesson plan incorporates a variety of learning styles, includes clear plans for children with special needs. It demonstrates understanding of culturally responsive lesson planning
Assessment	Method for assessing student learning and evaluating instruction is missing.	Method for assessing student learning and evaluating instruction is vaguely stated.	Method for assessing student learning and evaluating instruction is present, but needs development. √	Method for assessing student learning align with learning outcomes and accurately measure student learning.

Rating	Level	Description
4	**Mastery**	The candidate demonstrates a deep understanding of instructional planning and connects it to the way students learn. There is great detail in the information provided where the candidate has integrated information and formed connections among the component parts.
3	**Competent**	The candidate demonstrates a solid understanding of instructional planning concept(s) and item(s). All information and items are present; the lesson as planned can be, or is carried out with success. Review of the document reveals that it lacks some detail, specificity and/or the candidate has not fully integrated parts.
2	**Emerging**	The candidate displays emerging skills and generally understands of instructional planning concept(s) and item(s); the lesson plan reveals several gaps in the basic information that may make the reading the document challenging or the plan difficult to implement in a classroom. Assistance of clarification or reminders are needed to support the candidate.
1	**Unsatisfactory**	The candidate does not understand instructional planning concepts and has omitted some elements limiting the effectiveness of the unit plan. Considerable assistance is needed to support is required.