

Houston Architecture: Meeting the Needs of Our Changing Society

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INTRODUCTION

No student is zoned to the middle school where I teach and all undergo a rigorous admission process. It is a middle school with 300 students representing every socio-economic group from every possible part of the Houston Independent School District. Our student population represents 83 nationalities and many of our students are first generation Americans. One characteristic that all our students share is that they are bright and want to succeed in their academic endeavors. Our parent involvement is very good; however, it is often not available to those that need it most. Our students are intelligent, and many parents expect them to be perfect “mini adults” rather than adolescents going through one of the most challenging stages of their lives. We offer a fast paced curriculum and most core courses have homework every night. In art, I try to limit the scope of work to that which we can achieve during class time through individual and group projects. They appreciate challenging projects where their findings can make a difference.

Civic responsibility and community involvement are emphasized in our program. We teach that each student can and does make a difference. Despite the student’s intelligence many of them seldom have the opportunity to see much more of their city than their immediate surroundings. Most class related activities are scheduled during school hours because of after school transportation difficulties. Although we live in one of the most architecturally rich cities in the United States, the students are certainly not aware of this fact.

My curriculum spans a three-year period, and there are no prerequisites to any art class. To accommodate varying levels of art knowledge my curriculum begins in sixth grade delving into projects centered around the “Elements of Design,” focusing on perspective during the second nine weeks of the semester. In the perspective unit, we learn linear perspective skills manually, and then we block a major perspective project on CAD (Computer-Aided Design). The eighth grade program covers twentieth century art with emphasis on acrylic painting and sculpture. During my ten years at our school the second year program has changed many times to accommodate varying art knowledge levels. The second year program needs to be independent of any prior art course and a curriculum to challenge the students academically, historically, and artistically. The students are great, and have a thirst and zest for learning. This vehicle allows discovery, invention, creativity and skill. Throughout the years, the children have shown a love and propensity for model building and hands on projects. This is a terrific opportunity to combine their love of model building and my desire for them to learn about their community. It provides a way to teach the importance of architecture throughout history, reinforce artistic principles and have fun in the process. I want to create pride and lasting

memories regarding the beauty of Houston. With a working knowledge of architecture in general and our city's architecture in particular, each student can gain a perspective on the dynamics of the city. Many positive results will come from this exposure. It is fresh, inviting, and quite a challenge to keep the momentum at an appropriate pace.

The purpose of this unit is multifaceted. I first want to expose students to the history of architecture and how this architectural history relates to our city's architecture, pointing out essential cultural elements all over the city. Seeing their cultural heritage represented in our city buildings helps to personalize our city and bring into being an understanding that no one group of people could have made today's Houston. It took many different types of people to make our city what it is, and it will take future generations to preserve and better our city. In exploring our city, I want them to understand that we are merging many diverse cultural heritages to create a fresh face that better represents our city population. During this semester, we have explored interesting parts of Houston that I have driven by many times and never noticed. I have been amazed at my former attitude toward my surroundings, and can only imagine my students' opinions on such matters. This attitude must change, and this is one way we can work toward that end.

Second, I want them to realize that architecture goes beyond beauty. The architect must design space so that people can efficiently use it. This allows students to investigate current technology and envision technology in the future. We will learn architectural terms and have a working knowledge of our perceptions of "landmark" and "community." We will learn that beauty and art can indeed be functions, and that architecture is that perfect blend of these worlds. This unit will help students to explore and better understand our changing lifestyles.

Several lessons will deal with their own surroundings to get the students more personally involved in the learning process. Completely familiar elements of their lives are put into another realm, creating common bonds among students.

The semester is 18 weeks in duration. Currently I am working to segment the semester into manageable increments. Particular aspects I want to bridge are:

1. Introducing important historical landmarks from around the world.
2. Correlating these famous landmarks with contemporary structures.
3. Building a structure from available materials of a specific locale.
4. Increasing their architectural vocabulary.
5. Incorporating computer science into the learning experience
6. Discovering parts of our city.
7. Understanding the various cultural components evident in our city.
8. Further understanding that our community spans beyond our city limits.
9. Writing and sketching on our fieldtrips to chronicle our thoughts.
10. Gaining an understanding of the beauty around us.

11. Contemplating the evolving complexity of our city.
12. Developing structures for our changing lifestyles.

OVERVIEW

I want to introduce the world of architecture to the students through a historical perspective. We will discuss characteristics of architectural styles from various cultures around the world and make illustrated vocabulary notebooks. We will also create an ongoing architecture time line and investigate architecture throughout recorded history. The emphasis initially is to show that architecture responds to function and uses available materials. We will discuss prehistoric dwellings, West African roundhouses, Egyptian pyramids, Mesopotamian ziggurats, wattle and daub dwellings of the Middle Ages, and Gothic, Romanesque and Byzantine castles and cathedrals. We will discuss other specific architectural construction models. Divided into groups the students will construct a dwelling based on provided criteria.

After this overview, the students will explore specific architectural/cultural heritage sites, which include the ancient city of Pompeii, the Chaco Canyon settlements, the village of Shirakawa, the Old Towns of Djenné, the Sydney Opera House, and Monticello. These sites were chosen to highlight architecture from varying times and diverse geographical locations. The functions of these sites vary greatly also. In the ruins of Pompeii a wide array of Roman public buildings and private homes are readily available. Included in the public buildings are an amphitheater, the Forum of Pompeii, and the Basilica. Private homes are also available and show Roman construction techniques. The students will see similarities between Pompeii constructions and current ones, and how influential Roman architectural style is in construction methods in our current times.

The Chaco culture is native to North America, and the Chaco Canyon is located in the northern part of the state of New Mexico in the United States. Construction in the Chaco Canyon was underway mid-800s and continued until the mid-1100s A.D. There are several excavated sites with the most known being Pueblo Bonito. For this unit, we will investigate the lesser-known settlement of Chetro Ketl. Chetro Ketl and the other settlements in the Chaco Canyon are sacred to many North American Indian tribes. Chetro Ketl has an estimated 500 rooms and 16 kivas, which are large meeting areas. The Anasazi inhabitants of this settlement built huge elevated earthen plazas above the existing landscape. These sites indicate they were a multipurpose trade route settlement, but there is no indication people actually lived in the settlements for long periods of time. These settlements show great building prowess and indicate knowledge of construction methods. Some of the structures rise five stories from the ground and consider many climatic conditions for site selection. We do not know all the functions of these sites, but we clearly see their influences in layout and design of many current building and

planning trends. Discussions and lessons will range from the introduction of basic floorplan reading to comparing and contrasting these places with buildings in today's society.

The village of Shirakawa is located in a mountainous area of Japan. It is a village where people still live and work and is an outstanding example of architectural style on the terraced land of the villages of Shirakawa and Gokayama. The farmhouses in the village are an important part of Japanese heritage and represent Gassho-zukuri style of architecture. The word *gassho-zukuri* literally means praying hands. The roof lines of the houses look like two hands clasped together in prayer. Gassho-zukuri architecture has a sixty degree angled thatched sloping roof that prevents snow from building up on it. This steep roof also helps to keep the temperature of the house pleasant. Many locals make gunpowder in their homes because it is one of the few ways to earn a living in the villages and it has been that way for centuries. Because they do this type of work in their homes, the homes are designed using larger support beams that are put further apart to create larger open spaces. Another feature of gassho-zukuri construction is that no nails, screws, pegs, or dowels are used to construct the homes. This allows the house to move some during a heavy snow and/or during high winds. In these villages, the homes all face north-south because the winds blow north.

The Old Towns of Djenné are located in Mali and have been inhabited since 250 B.C. and was a market center and a link in the trans-Saharan gold trade. Later in the fifteenth century, it became an Islamic spiritual center. Over two thousand houses built on hillocks have withstood seasonal flooding and still survive today. Djenné claims to be the oldest city in Western Africa and is the site of the largest mud structure in the world, the Konboro Mosque. The first mosque was built in the thirteenth century after Djenné's King Konboro converted to Islam, but today's building dates to 1907. It was rebuilt using cultural construction methods under French supervision. The mud mosque is almost 35 feet in height and its interior is about half the size of a football field. The ruins of Djenné-Jeno are in the central Niger valley and are evidence of an urban society founded before the second century B.C. The puddled mud (tauf) foundation constructed roundhouses of Djenné and Djenné -Jeno and later other structures were built using brick cylindrical technology to build the city wall.

The Sydney Opera House is an urban waterfront opera house built between the years 1957 and 1973. The architect is Jorn Utzon, and the facility is located in Sydney, Australia. The Modern Expressionist building has a series of curved spherical sectioned roofs rising to the heavens in harmony with the harbor. It was controversial when constructed, and cost 90 million dollars at the time of construction. This construction was made possible because of contemporary building methods and new age materials.

Monticello is the home of Thomas Jefferson that took 40 years to complete. Mr. Jefferson designed it and redesigned it several times. Many innovations were used at

Monticello. Monticello is the only house in America on the United Nations' World Heritage List of sites that must be protected at all costs.

Using the Roman urban villas of Pompeii, the dwellings of the Chetro Keti settlement of the Chaco Canyon, the village farmhouses of Shirakawa and Gokayama, the mud homes of the Old Towns of Djenné and Djenné-Jeno, or the wattle and daub roundhouses of West Africa as models students, divided into groups, will construct one of these dwellings. Accompanying the model each student learning group will produce a free standing architectural/cultural heritage site display including an introduction with background information including but not limited to:

- a.) Location and date built;
- b.) Architect;
- c.) Building materials;
- d.) Building types;
- e.) Purpose of building;
- f.) Type of construction;
- g.) Interior and layout;
- h.) Its importance; and
- i.) Other sites that have the same use in different cultures and in today's society.

In the displays, the groups will include a bulletin board of architectural textures used at the site. During this phase of the unit, the word "landmark" is frequently used. After addressing this historical viewpoint, the students will begin a multifaceted photographic unit in which each student will be issued a 36 exposure disposable camera.

LANDMARKS

After researching the historical architectural venues, each student will define "landmark" and identify a personal landmark. In this venture the student will develop their own definition of the term landmark, explore places that are special to them, and create an exhibit. They will photograph the personal landmark they have chosen from within their home or neighborhood. Before using the cameras, class time will cover planning, framing, focus, creating images and exhibition of work. The final product is a computer generated photo journal incorporating text with photographs. Also included in the photo journal will be worksheets on a.) choosing a special place, b.) the story the special place has, and c.) telling your place's story. The objectives in this portion of the unit are to broaden their concept of landmarks to include people and ideas that are important to them. In this process, another objective is to learn why landmarks are significant to communities, cities, nations and the world.

On our first tour, we will visit Project Row Houses and the surrounding Third Ward community, the Sixth Ward Historic District and downtown Central Houston with lunch at Sam Houston Park. Our second tour includes the campus of the University of Houston and the Blaffer Gallery at the University of Houston with lunch on the grounds at the

Waterwall located at the Williams Tower. On our third tour, we will divide into two smaller groups. While one group is touring the University of St. Thomas, Rothko Chapel and the Menil Collection the other group will tour Rice University, Broadacres, and the Museum of Fine Arts. Both groups will be together for lunch at the Glassell Sculpture Garden. At each location, the students will be given worksheets to help them answer specific questions about the function of these landmarks, and the stories they have to tell. In addition to visiting these well kept sites we will make time to present areas that have been abandoned or abused and ask the students for their impressions of the locations. During the course of the day, each student will make one drawing of a site in poor condition. One of the worksheets will ask students to determine if an area is of value to the people of the community. For homework each student will take the drawing of the dilapidated building, envision it in its original state, and discuss what influenced the changes. In subsequent days, we will check out one digital camera per group and with worksheets in hand we will investigate our school and the immediate neighborhood making certain to photograph blighted areas. From these photographs the class will determine an area on campus in most need of attention, and the class will petition to see that this area does receive adequate attention to better it.

BUILT IN TEXAS

People have lived on the land we now call Texas for thousands of years and their stories are still found painted on rock walls. Many explorers came to this land and plotted our land and natural resources for pioneers coming to settle the land. The pioneers give us insight into their lives through illustrations, journal entries, and stories passed down from generation to generation. Many Texans are not native to Texas; however, the shared ideas of many different types of people have combined to make Texas the place that it is today. Texas has a great number of cultures represented within its borders.

Native Americans have lived in Texas for thousands of years, and the earliest of these people were nomadic. When these people began hunting smaller animals, they began to travel less and build communities for their tribes. The Caddo Indians of east Texas constructed homes made of wood poles covered in long grasses, and these haystack looking homes were built in one day. The Alabama and the Coushatta Indians built log homes and the Tigua Indians of west Texas built homes of adobe (a mud and dried grasses mixture hardened in the sun) bricks.

Spanish settlers came to what is now Texas in the 1700s and built small homes called *jacales* that were made of upright poles plastered with mud and had a thatched roof. They later built homes of stone and adobe.

In the 1800s Americans of Northern European descent moved into Texas and built log cabins, and yet many others settled in north and west Texas and built dugouts, which are houses dug out of the side of a hill. The people of Norwegian, German, Polish and Czech descent built cabins with steep roofs like those in their native countries while

people of African descent built homes with what they could find. They, like other settlers, had a “make do” attitude so they built their homes out of trees, stone, mud or any other readily available materials.

In the 1900s, 500 Chinese people came to El Paso with General Pershing and built homes and buildings with elements native to their homeland, and during the last portion of the twentieth century many people came from Việt Nam and settled in Texas. People from other parts of the world have also settled in Texas and contribute to our cultural texture. Evidence of immigrants from Asia and the Middle East are apparent in many Texas communities.

The entire seventh grade class will take a trip to San Antonio to learn of the missions and wander the exhibits at The Institute of Texan Cultures. Each student will clearly see the interlocking framework of cultural influences which combined to create our modern day Texas. Most current Texans’ heritage suggests that our ancestors were immigrants, and during our trip to San Antonio we will learn at least one item that each heritage group brought to Texas with special emphasis on architecture. Each student will write in their journals regarding their feelings about the contribution of one ethnic group and visually depict one point of interest from our trip. During class in the days following the trip the art students, using their visual depictions, will produce a relief using air-dried clay. These reliefs will become a part of a Texas display showcased during our *Built in Texas* weeklong celebration. Every discipline participates, whether through art, games, storytelling, crafts, music, food, reading selections, recreations of historical events, discussions on natural resources, dramatic presentations or debates, each teacher’s lesson plans will center on something Texan. This celebration provides the perfect opportunity for art students to display the creations they have made throughout the semester. A committee that includes students, teachers, administrators and parents carefully plans the larger middle school activities and each teacher designs their classroom lessons. The student involvement in the planning is an integral part of the success of the weeks’ events. This week is scheduled at the end of the semester that coincides with the Houston Livestock Show and Rodeo. No other event could better highlight the cultural diversity of our society than the Houston Livestock Show and Rodeo because it draws people from every corner of the world to our city.

Like the rodeo, many cultures are represented in our Houston landscape and we will discuss the cultural influences reflected within our class cultural patchwork. It takes many different types of people to make Houston the great city it is today. It is up to each of us to learn about our past so we can ensure a better future for all Houstonians. The early settler’s visions for our city, combined with ideas that are more recent and cultural representations from many parts of the world, make our city an ever-changing site striving to meet the needs of our society.

LESSON PLAN ONE: WHAT IS ARCHITECTURE?

Subject(s): Architecture, World Cultures

Grade level: 7

Time required: (1) 45-minute class session

Objectives:

1. Outline the scope of work for the semester.
2. Outline grading procedures.
3. Introduce general architecture terms.

Learning experiences:

1. Project recognizable buildings of varied styles and from different historical times.
2. Display a set of plans.
3. Introduce a floorplan.
4. Bring a model of a building for them to observe.
5. Briefly define terms.
6. Begin their class journals.

Materials needed:

Overhead projector, slide carousel with building slides, posters of paintings with famous buildings

Handouts:

Outline of the scope of the semester

Glossary of Terms

Evaluation:

The evaluation for this portion of the course will be at a later time as more terms are added in the student class journal.

Related textbooks:

Inside/Out, National Geographic Society

GLOSSARY OF TERMS

Name _____ Page _____

1. **Architect** – A person who works out the plans for buildings, bridges, etc. and sees that the builders carry out these plans. Many times an architectural firm who employs several architects is referred to as the architect. Many architectural firms specialize in one specific type of building or phase of a project. Within the architectural firm team members are responsible for specific elements of the project. Some of these elements may be the exteriors, the interiors or the landscaping. The architectural firm also is responsible for getting any permits and meeting any city, county, state, and/or federal building codes or regulations. Different types of professionals work on a project and the architect coordinates these contractors to the job's completion.
2. **Architecture** – The science or work of planning and putting up buildings. Architecture can also refer to a specific style or special way of building.
3. **Rendering** – A drawing of the building by the architect or a member of the architectural team that is drawn according to the floorplans and is a visual depiction of the building after completion.
4. **Floorplan** – A technical drawing of the room dimensions and overall dimensions of a building. A floorplan can also show the arrangement of furnishings, equipment and other amenities.
5. **Site** – The building or the location of the proposed construction.
6. **Scale** – The way that the size of a model or drawing compares with the actual size of the building. Building materials in America are not on the metric system so architects usually work on a 1/8" scale or a 1/4" scale, which means that on a plan 1/4" equals one foot, or that every 1/8" equals one foot, dependent on the size scale the architect is using.
7. **General Contractor** – The contractor takes the architect's drawings (plans) and turns them into a building. The general contractor is also responsible for hiring trained specialists to work under him and complete a specific portion of the building. These specialists a general contractor hires are called **Subcontractors**. Electricians, carpenters, plumbers, and framers are some of these specialists. There are many subcontractors on a job site.

LESSON PLAN TWO: LET'S GET PHYSICAL (SCIENCE) INTO OUR ARCHITECTURE, A Working Glossary of Terms

Subject(s): Architecture, Physical Science, Geometry

Grade: 7

Time required: (5) 45-minute class sessions

Activities one through seven take (2) 45-minute class sessions

Activities eight through eleven take (1) 45-minute class session

Activities twelve through fourteen take (2) 45-minute class sessions

Objectives:

1. Introduce the scientific principles required to build a structure.
2. Begin building a working architectural vocabulary.
3. Provide working examples of scientific principles.
4. Show the close relationship of function in the design process.
5. Experiment with materials.
6. Gain insight into the use of geometry in design.
7. Start the "Language of an Architect" notebook.

Learning Experiences:

Using David Macaulay's *Building Big* Activity Guide we will go through a series of smaller hands-on activities to demonstrate the scientific principles acting on a building.

Activity One – Force

- a. Place a chair in a large clearing in your room.
- b. Ask the class if any forces are acting on the chair as it sits there.
- c. Ask one child to gently push the chair about two feet.
- d. Ask the class what force acted on the chair.
- e. Ask a second student to stand to the other side of the chair, and ask both students to gently push on the chair at the count of three.
- f. Ask the class what forces are acting on the chair now.
- g. Seat the students and leave the chair as it was at the activities' beginning.
- h. Ask again if any forces are acting on the chair now.

Activity Two – Load

- a. Define load, dead load and live load for the class.
- b. In table quadrant groupings have the students brainstorm and list loads from within the room that affects the room.
- c. List all the loads on the board and determine if the load is live or dead.
- d. Estimate the room's load establishing certain weights for the ceiling, walls, and other permanent room elements.

Activity Three – Compression

- a. Have students pair up and outstretch their arms putting their palms together gradually leaning in toward each other.
- b. Explain that columns and bridge piers are elements of a construction that are in compression.

Activity Four – Tension

- a. Remaining in pairs have students outstretch their arms with their fingers together in a cupped position.
- b. Have the students interlock their fingers and gradually lean away from each other.
- c. Ask the students how their arms feel.
- d. Explain that cables are examples of elements on a construction that are in tension.

Activity Five – Bending

- a. Provide a soft kitchen sponge for each table grouping. Before class, using a permanent marker, draw lines about 3/8” apart on the top and bottom of the sponge.
- b. Have each student in the grouping bend the sponge into a U-shape.
- c. Ask where the sponge is in compression. Where is the sponge in tension?

Activity Six – Shear

- a. Place a deck of cards at each table grouping. Ask a student from each group to slide a few cards sideways over from the top of the stacked deck
- b. Explain that this shearing stress is what happens on two parts of a structure that are nailed, screwed or bolted together. This shearing can break the bolts.

Activity Seven – Torsion

- a. In pairs have student interlock their outstretched arms holding each other’s right wrists and gently rotate their arms.
- b. Ask them how their arms feel.
- c. Explain that wind blowing on a structure unevenly can cause torsion.

Activity Eight – Arch

- a. Ask two students to stand and face each other. Ask them to outstretch their arms and place the palms of their hands together. Now have them lean into each other and slide their feet back as far as they can without falling. Pushing on their hand ask then where they feel a push or a pull.
- b. Ask a third student to help with the demonstration by gently pulling down on the top of the arch to test its strength. Let them realize that it is not difficult to break the arch.
- c. Through class discussion have the students think of ways two more students could join the arch and make it stronger without breaking up the space under the arch. After discussion if the class does not think of putting the other two people at the outside base of the arch then ask the arch-makers how their legs feel.
- d. Have the additional two students sit with legs crossed at the backside of the two arch-makers legs.

- e. Ask a fifth student to gently pull down on the top of the arch to test its strength.
- f. Compare the arch strength with and without the buttresses.

Activity Nine – Dome

- a. Ask five students to stand facing each other and have each outstretch their arms and place their fingertips on the centered, raised soccer ball. Leaning in toward the center of the circle with their fingertips on the soccer ball have them slide their feet out gently as far as they can comfortably.
- b. Gently apply pressure to the soccer ball and ask the class where the dome could use more support.
- c. Now ask five more students to sit cross-legged at the base of each dome-makers feet.
- d. Ask what forces are in action and what the buttresses are doing to counteract the forces in action.

Activity Ten – Cantilever

- a. Ask a student to come forward and stand with one arm outstretched parallel to the floor.
- b. Place an empty book bag on their arm by their shoulder. Ask the class if they think the arm will support the book bag with a heavy book in it.
- c. Repeat the process but with the book bag placed in the student's hand.
- d. Now repeat the experiment but with the bag placed between the shoulder and elbow.
- e. Ask where the bag is easiest to hold and explain that cantilevers support by bending. Balconies and awnings are examples of cantilevered elements of construction.

Activity Eleven – Truss

- a. Have the students construct a rectangular box using toothpicks and softened Pinto or Navy Beans.
- b. Using the basic rectangular toothpick construction, they have made ask them to think of ways to strengthen the construction by adding toothpicks.
- c. Explain that these added strengthening cross members are called trusses.

Activity Twelve – Testing the Strength of Materials

- a. At each table grouping, have a box with the following items in it. The items to include are string, Popsicle sticks, clay, cloth, raffia, ceramic tile, cardboard, drinking straw, pipe cleaner, pencil, rubber band and paper towel tubes.
- b. On a sheet of paper have one student from each table grouping divide the paper into four vertical columns. At the top of column one write Material, at the top of column two write Tension, Compression at the top of column three and Torsion at the top of column four.
- c. Ask the students to test the strength of each of the items and write the item in the column rating it on a scale from 1 to 10 with 10 being the strongest and 1 the weakest.
- d. Ask for discussion. Were there any surprises in their findings?

Activity Thirteen – Building with Drinking Straws and Paper Clips

- a. Using drinking straws have each student make a square and a triangle. Have each student test the strength by pushing down on the shape from the top.
- b. After they determine that the triangle is the stronger shape, have them make a geodesic dome using the straws with paper clips inserted into the ends so they be easily connected to make the structure.
- c. Determine how much weight the structure can hold.

Activity Fourteen – Toilet paper tube columns.

- a. At the front of the class have a student try to stand on an empty toilet paper tube. Does it support the student's weight?
- b. Put another empty tube on a flat board and fill the tube with sand. Now ask the student to stand on the filled tube.
- c. Ask the class to compare it to the strength of the empty tube.

Evaluation:

1. Each student will participate in class and group activities and write findings in class journal entries.
2. Each student will produce a truss and a drinking straw structure.

Materials needed:

(5) sponges, (5) decks of cards, chair, soccer ball, book bag and heavy book, softened beans, toothpicks, paper, pencils, rubber bands, drinking straws, small paper clips, ceramic tile, pipe cleaners, string, yarn, cloth, paper-towel tubes, toilet paper tubes, clay, Popsicle sticks, sand, flat board

Student supplies:

Class notebook with dividers, pencil

Related textbooks:

Building Big Activity Guide

Handouts:

Glossary of Terms sheet to be added to their class journals

GLOSSARY OF TERMS

Name _____ Page _____

1. **Force** – A push or pull on an object.
2. **Loads** – Create a force on a structure.
3. **Dead load** – The weight of the permanent, non-moveable parts of a structure.
4. **Live load** – The weight of the non-permanent, moveable parts, contents, or users such as traffic. Wind, rain, snow, earthquakes, and other environmental components are temporary live loads also.
5. **Compression** – A pressing force that squeezes a material together.
6. **Tension** – A stretching force that pulls on a material.
7. **Bending** – A combination of forces that causes one part of a material to be in compression and another part to be in tension.
8. **Shear** – A force that causes one part of a material to slide past another.
9. **Torsion** – A twisting that can result from an unevenly placed load.
10. **Arch** – A curved structure that converts the downward compression force of its own weight, and of any weight pressing down on top of it, into a force along its curve. There is an outward and downward force along the sides and base of the arch.
11. **Buttress** – A side support that counteracts an outward pushing force. Buttresses are often used to support the sides of arches and tall walls.
12. **Dome** – A curved roof enclosing a circular space. It is a three-dimensional arch.
13. **Cantilever** – A projecting structure supported at only one end.
14. **Truss** – A skeleton-like structure composed of struts joined to form a series of triangles with some in tension and others in compression.
15. **Struts** – Short straight skeleton-like pieces used in making a truss.
16. **Geodesic dome** – A dome made of triangles.

LESSON PLAN THREE: ARCHITECTURE INTRODUCTION

Subject(s): Architecture, History, Geography

Grade Level: 7

Time required: (5) 45-minute class sessions

Objectives:

1. Demonstrate awareness of historical architectural characteristics.
2. Analyze building styles and materials in regard to geographical location.
3. Familiarize the class with a semester overview.
4. Establish guidelines and allow time for class discussion.
5. Clarify the importance of maintaining their art notebook.
6. Begin student's "Glossary of Terms."

Learning Experiences:

1. Using an overhead projector show transparencies of the buildings and urban villas of the city of Pompeii, the Konboro Mosque and the surrounding homes made of mud, Durham Castle and stone-made homes, a West African roundhouse, a Japanese farmhouse, the pueblos of the Chetro Kettle settlement of Chaco Canyon.
2. Using magazines find examples of the following types of structures:
 - a. West African Roundhouse
 - b. Japanese farmhouse or retreat
 - c. Muslim Mosque
 - d. Northern European mountain home
 - e. North American Anasazi settlement dwelling
 - f. South American ziggurat
 - g. Roman or Greek public building
3. Make line drawings from the magazine photographs.
4. Write your opinion of the influence of geographical location on building styles. Include this in your art notebook.

Evaluation:

Each student will give an oral report using one of their illustrations to explain the effect of geographical location on building styles. The illustration must be matted and backed and have a minimum image size of 8" x 10". With matting the illustration should not exceed 16" x 20".

Materials needed:

Drawing paper, rubber cement, matboard, magazines, take home assignment, notebooks, transparencies, overhead projector, art notebooks, pencils

Student supplies:

(1) 2" three ring binder with (1) set of dividers

Related textbooks:

Great Architecture of the World

Handouts:

Outline of transparencies

Lesson based glossary of terms

Class discussion procedures

Resources/Internet resources:

This lesson plan was downloaded and is substantially intact as downloaded from Big Sky Telegraph.Telnet 192.231.192.1

<http://www.getty.edu/artsednet/>

Glossary of Terms

Name _____ Page _____

1. **Ziggurat** –

2. **Roundhouse** –

3. **Wattle and daub** –

4. **Gassho-Zukuri** –

5. **Minarets** –

6. **Plinth** –

7. **Mortar** –

LESSON PLAN FOUR: CONSTRUCTING SIMPLE STRUCTURES

Subject(s): Architecture, art, geography, earth science

Grade Level: 7

Time required: (5) 45-minute class sessions

Objectives:

1. Produce a simple structure based on a set of given criteria with given materials.
2. Work effectively in randomly selected groupings (4) to a group.
3. Demonstrate the importance of readily available materials to create a building.
4. Plan and execute the group plan.
5. Explain the properties of the various materials used in their structure.
6. Defend the structure's architectural features for the setting.

Learning Experiences:

Materials will be set at each table quadrant. The groupings are established by a random drawing. Geographical items listed are location, climate, construction materials, design of architecture and natural environs. The only materials the group can use are located at each quadrant. The materials groupings are:

Group I: sand, sandy dirt, grasses, glue, water, 16" x 20" corrugated board

Group II: bamboo, small rocks, wood, dirt, reeds, grasses, 16" x 20" corrugated board, white glue, water

Group III: small wooden sticks, pebbles, dirt, foliage, glue, water, 16" x 20" corrugated board

Group IV: larger wooden branches, small stones, foliage, dirt, water, glue, 16" x 20" corrugated board

Group V: stones, dirt, glue, water, 16" x 20" corrugated board

Evaluation:

Each group will report on the structure they built. Included in the report is why they used the materials in the manner they did, the importance of and properties of each of the materials.

Materials needed:

See above.

Additional activities:

Display the structures in the middle school common area.

Handouts:

Glossary of Terms

Glossary of Terms

Name _____ Page _____

1. Anasazi –
2. Masonry –
3. Chaco Canyon –
4. Plaster -
5. Konboro Mosque-
6. Scaffolding -

LESSON PLAN FIVE: VISUAL HISTORIANS**Subject(s):** Art, history**Grade Level:** 7**Time required:** (5) 45-minute class sessions**Objectives:**

1. Demonstrate the use of art and architecture through visual imagery.
2. Introduce the ancient dwelling of Catal Huyuk.
3. Inform students of locations of Prehistoric discoveries.
4. Illustrate the locations of cave and rock art maps.

Learning Experiences:

1. Create an 8' x 20' mural using pictographs telling the history of our school.
2. Decide on a common set of images to depict situations.
3. Effectively tell the story through this method.

Evaluation:

Display the mural in a common area.

Materials needed:

Drawing paper, pencil, brown Kraft paper, adhesive for display purposes, acrylic paint

Additional activities:

Supply the journalism class with a press release on the project.

Handouts:

History of the school

Glossary of Terms

Resources/Internet resources:

Scholastic Art and Man, Prehistoric Man

[Http://www.historylink101.com/prehistory](http://www.historylink101.com/prehistory)

LESSON PLAN SIX: CULTURAL HERITAGE SITES

Subject(s): Art, Architecture, History, Math, Science

Grade Level: 7

Time required: (7) 45-minute class sessions

Objectives:

To introduce the following cultural heritage sites:

- a. Trajan's Roman Forum
- b. Pueblo Bonito
- c. Pyramids of Gila
- d. Notre Dame
- e. Durham Cathedral
- f. Stonehenge
- g. Palace One of Tikal
- h. Sydney Opera House
- i. The Great Mosque
- j. Katsura Villa
- k. Washington, D. C.
- l. Hagia Sophia

Learning Experiences:

1. One student and their selected class partner will investigate one of the "Landmarks" listed above using Internet sources primarily. The students will be given (3) class sessions to find the following information on their "Cultural Heritage Site." Each report must include:
 - a. Background information
 - b. Location of the structure and the date built
 - c. Architect
 - d. Building materials used
 - e. Purpose of the structure
 - f. The type of construction
 - g. The interior layout and the setting of the structure

- h. Why is it important?
 - i. What other sites have the same use in different cultures.
 - j. A minimum of one illustration of the facility
2. Using gathered information each pair will write a report on their facility. Copies will be made so that each class member has a copy of the report.
3. Each pair will make a brochure and each black and white brochure must include original artwork and use spot color for emphasis. 4.25" x 8.5" is the finished size of the brochure. The brochure will be created in class with any required materials provided.
4. Each pair will present their brochure to the class in a five-minute presentation and provide copies of the brochure for inclusion in classmates art notebooks.
5. Each duo will contribute to an Architectural Textures Bulletin Board by providing rubbings of textures found on school grounds which would be similar to those textures found at their Architectural Cultural Heritage Site.

Evaluation:

Brochure accuracy, layout, aesthetics, and completion

Materials needed:

Use of the computer lab, drawing paper, colored pencils

Teacher responsibility:

To make adequate number of copies of reports for each student

Handouts:

Glossary of terms

Layout specifications

Resources/Internet resources:

<http://www.historylink.com/>

<http://www.getty.edu/artsednet/>

<http://ericir.syr.edu/virtual/lessons/art/architecture/arcool.htm>

LESSON PLAN SEVEN: LANDMARKS

Subject(s): Photography, graphic design, civics

Grade Level: 7

Time required: (6) 45 minute class sessions

Objectives:

1. Have each student create his/her own definition of "landmark."
2. Bridge the student's everyday surroundings and historical sites.

3. Explore the thought of what it means to “mark” the “land.”
4. Make connections between these grandiose structures we have studied with “your” own personal landmark(s).
5. Allow each student to think about their own landmarks.

Learning Experiences:

1. In table quadrants create posters that show the ways that you have been thinking about landmarks. Create a conceptual map with the word **landmark** in the center.
2. Include photos, pictures from magazines, drawings, mementos, etc. to create the poster.
3. Answer the following questions to help prepare to select **YOUR** landmark.
 - a. What are some ways we humans “mark” the land?
 - b. What does it mean to preserve a “mark”?
 - c. What is the purpose of a landmark?
 - d. Are landmarks made intentionally to be landmarks?
 - e. Can something be a landmark to only one person?
 - f. Are landmarks always old?
 - g. Can an event be a landmark?
 - h. Can relationships among people be landmarks?
 - i. Can something that happened be a landmark?
 - j. Does a landmark need to be there for a long time?
 - k. What roles might a landmark play within a community?
 - l. Can a landmark help a community?
 - m. Can a landmark be a detriment to a community?
 - n. Do all languages have a word for landmark? Why or why not?
 - o. What might be the difference between landmarks and historic monuments?
 - p. A web search on the word “landmark”. What kinds of things do you find?

Evaluation:

Completion of a thoughtful entry into their art notebooks

Materials needed:

Access to a computer, art notebooks, handout

Handouts:

Handout of questions listed above

Glossary of Terms

Resources/Internet resources:

<http://www.getty.edu/artsednet/resources/landmarks>

LESSON PLAN EIGHT: CELEBRATING YOUR SPECIAL PLACE

Subject(s): Photography, journalism, computer technology

Grade Level: 7

Time required: work to be completed at home within a three-day timeframe

Objectives:

1. To personalize landmarks
2. To introduce photography
3. To create a photo journal using text and photos of each student's special place
4. To tell the story of your special place

Learning Experiences:

1. Display noted photographers' work.
2. Discuss the elements that make the photograph successful.
3. Give a listing of specific areas on school grounds to photograph, and architectural elements to include.
4. Given class time create a photo relief collage with each including text with the photos.
5. Evaluate the elements of your successful photos and discuss what makes them successful.
6. Create a personal photo journal of **YOUR** own special place.

Materials needed:

Use of the computer lab, digital cameras for use at school, disposable cameras for home use

Handouts:

Photography skills

Glossary of Terms

Resources/Internet resources:

<http://www.getty.edu/artsednet/resources/landmarks/>

LESSON PLAN NINE: BUILT IN TEXAS

Subject(s): Texas civics, Photojournalism

Grade Level: 7

Time required: (15) 45-minute class sessions

Objectives:

1. Tour Sam Houston Park, the Project Row Houses, Houston Library Complex.
2. Tour Broadacres, University of St. Thomas, the Museum of Fine Arts, Rice University.

3. Tour the University of Houston campus and Blaffer Gallery, Rothko Chapel, the Menil Collection.
4. Tour the Sixth Ward and Central Downtown Houston.
5. Identify cultural influences evident in our city.
6. Photograph these areas to include later in photo essays.
7. Discuss preservation.
8. Find a location on campus that needs attention, and devise a plan to preserve it.

Learning Experiences:

1. Using the disposable camera each student received earlier photograph the following architectural elements:
 - a. Transom
 - b. Lintel
 - c. Balustrade
 - d. Sidelights
 - e. Frieze
 - f. Bracket
 - g. Wrought iron
 - h. Divided panes
 - i. Pitched roof
 - j. Keystone
 - k. Balcony
 - l. Raveted joint
 - m. Clapboard
 - n. Arch
 - o. Tile roof
 - p. Shingle roof
 - q. Dormer
 - r. Crown molding
2. Before our tours, the students, working in pairs, will find information on the following architects and report their findings to the class in a five minute presentation. The students are responsible for making a copy of their report for each class member. In addition to the written report, photographs of their work must be included. The architects to research are:
 - a. William Ward Watkin
 - b. Kenneth Franzheim
 - c. Philip Johnson
 - d. Ludwig Mies van der Rohe
 - e. Alfred C. Finn
 - f. William Morris
 - g. John F. Staub
 - h. Birdsall P. Briscoe
 - i. Rafael Moneo
 - j. Glenn Murcutt
 - k. Bruno Taut

Evaluation:

1. Create a photo essay depicting and labeling each of these elements. This essay should also include one drawing of a particular location from the Houston downtown fieldtrip.
2. The photo essay will become a part of your art journal.

3. Photograph one site you deem worthy of preservation. Defend your selection.
4. Write biographic essays on one of the architects listed above. Be certain to include their importance within the Houston architectural community.

Materials needed:

Cameras, listing of terms to photograph

Additional activities:

1. After looking at the structures, select one and from the structure alone list five things that the architecture tells you about the inhabitants and their lifestyle.
2. At the Ideson Library, we will discuss the history of the building and the new library building and explore how the building design changed to meet society's needs.
3. Compare and contrast:
 - a. The purpose of the facilities
 - b. The people using the facility
 - c. The security available in each of the buildings
 - d. The materials used in building each facility
4. Upon our return to school in a neighborhood walk around our school block add photos of the following elements:

<ol style="list-style-type: none"> a. An office building b. A multi-unit living community c. A high rise residential building d. A single home dwelling e. Porte-cochere f. Colonnade g. Keystone h. Applied ornamentation i. Masonry work j. Quoins k. Coach light l. Mullion m. Recessed entrance n. Mansard roof o. Balcony p. Arch q. Column r. Window casing 	<ol style="list-style-type: none"> s. Window sash t. Raised panel door u. French door v. Picture window w. Bay window x. Divided pane windows y. Façade z. Louver shutters and/or doors aa. Stationary shutters bb. Operable shutters cc. Steeple dd. Double sash windows ee. Sliding glass door ff. Flat roof gg. Clapboard hh. Grout ii. Arcade jj. Portico kk. Mid-rise building
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Handouts:

Listing of elements to photograph

GLOSSARY OF TERMS

Name _____ Page _____

1. **Basilica** –

2. **Nave** –

3. **Hagia-Sophia** –

4. **Byzantine** –

5. **Romanesque** –

6. **Gothic** –

7. **Buttress** –

8. **Flying Buttress** –

9. **Barrel Vault** –

10. **Groin Vault** –

11. **Arch** –

Draw, photograph, or find photo of a minimum of (3) different types of arches

12. **Dome** –

13. **Latin Cross Style Church** –

14. **Pritzker Prize** –

LESSON PLAN TEN: BUILT IN TEXAS – RECOGNIZING CULTURAL INFLUENCES

Subject(s): Texas history, photography, architecture

Grade Level: 7

Time required: One day in San Antonio and (5) 45-minute class sessions

Objectives:

1. Tour the History of Texan Cultures with emphasis on architectural components provided by the cultures represented in Texas.
2. For students to recognize the importance and contributions of each culture to our Texas mosaic.
3. Identify these nationalities and demonstrate a working understanding of their architectural contribution. Noting (8) cultural influences meets minimum requirements.
4. Tour Mission de San Jose and draw the chapel façade, the rose window, draw the layout of the mission, the doors, the chapel interior, or any other architectural element of particular interest to you.

Learning Experiences:

1. Answer all the questions included in the field trip handout. Illustrate two architectural elements and include in your art journal.
2. Create a façade from one of the missions in San Antonio, or a relief of an element included at one of the missions.

Materials needed:

Suitable drawing surfaces, drawing paper, pencils

Handouts:

Listing of nationalities represented at The History of Texan Cultures

Resources/Internet resources:

<http://www.unt.edu/untpress/>

LESSON PLAN ELEVEN: HOUSTON IN 2025

Subject(s): Architecture, technology

Grade Level: 7

Time required: (25) 45-minute class sessions

Objectives:

1. Discuss the changes we observed in our state, our city and our community.
2. Design a multi-purpose facility for Houston 2025.

3. Produce a group project using elements created by each group member and arrange into working order by an elected group leader.
4. Understand the government codes, permits, and other requirements needed prior to building.

Learning Experiences:

1. Create a facility model including a minimum of four of the following elements
 - a. Research
 - b. Recreation
 - c. Entertainment
 - d. Communication
 - e. Reflection
 - f. Enrichment
 - g. Community involvement
 - h. Public safety
 - i. Commerce
2. Each group member is responsible for creating one portion of the facility manually and on the computer.
3. Each section is correlated with the other designed segments of the facility by the elected group leader.
4. The facility must meet current code, zoning, and permit requirements.
5. A group written report must accompany the project.
6. A set of plans must also accompany the finished project.
7. A rendering of the proposed site must be submitted before building. The rendering may be done manually or on computer. The overall dimensions are 16" x 20".
8. A timeline for completion of the various elements of the project is submitted for approval and filing in the class permit office.

Materials needed:

Poster board, corrugated board, sponges, foam core board, Exacto holders and extra blades, access to CAD, floorplan and blueprint examples, rendering examples, veneers, sand, small stones, dirt, glue (white, rubber, and hot glues), dowels, sticks, grasses, acrylic paint, straight edges, clear acrylic, metal flashing, tools for cutting and sawing

Handouts:

Outline of requirements for project completion
Glossary of Terms

GLOSSARY OF TERMS

Name _____ Page _____

1. **Zoning** –

2. **Building Permits** –

3. **Multi-use Facility** –

4. **Deed Restrictions** –

5. **Building Codes** –

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This book and web site was extremely helpful in learning about early influences in the Texan culture. It was also helpful in establishing areas to consider in the culminating unit. The web site is <http://www.unt.edu/untpress>.

Alanen, Arnold R. and Robert Z. Melnick. *Preserving Cultural Landscapes in America*. Baltimore, Mass.: The Johns Hopkins University Press, 2000.

This book looks into ways of recognizing and preserving national treasures.

Echols, Gordon. *Early Texas Architecture*. Fort Worth, Tex.: Texas Christian University Press, 2000.

This book tells about regional cultural influences in Texas.

Fox, Stephen. "Framing the New: Mies van der Rohe and Houston Architecture." *Cite 45* (Summer 1999): 28-33.

This article gives insight into Mies van der Rohe's influence in our Houston architecture.

Fox, Stephen. "High Victorian Architecture in Texas." *Texas Architect* 36 (May-June 1986): 88-95.

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Fox, Stephen. *Houston Architectural Guide, Second Edition*. American Institute of Architects, Houston Chapter, 1999.

This book gives a complete, concise view of Houston architecture, and is an excellent reference book.

Fox, Stephen. "Shady Character." *Domain* (May/June 1989): 22-25.

This article discusses Broadacres, one of Houston's first master planned neighborhoods.

<http://www.getty.edu/artsednet/resources/maps/sites/index.html>

J. Paul Getty Trust. *Cultural Heritage Sites* on Artsednet website. 1999.

For my purposes, this site was a wealth of information. It clearly defined landmarks and cultural heritage sites. It gives different types of lessons and lesson plans. It also links you to other helpful sources that will be most helpful in our classrooms. It directed me on a clear path to make the information relevant in my student's eyes.

<http://www.getty.edu/artsednet/resources/landmarks/index.html>

J. Paul Getty Trust. *Teaching Landmarks: Middle School Curriculum Unit* on Artsednet website. 1999.

This site gave me the way of personalizing architecture and making landmarks less

monumental. The students now can take a more personal approach to the term. The lesson plans are very thoughtful and meaningful to middle school age students.

Field, William Scott. *The Last of the Past Houston Architecture 1847-1915*. Houston, Tex.: The Greater Houston Preservation Alliance, 1965.

This book has photos of downtown Houston before the first skyscraper. It also tells about the important people in Houston society and in the Houston architectural community.

Macaulay, David. *Building Big Activity Guide*. Boston, Mass.: WGBH Educational Foundation Educational Print and Outreach, 1995.

This book gives practical activities to demonstrate the scientific principles that an architect must consider in building a structure.

National Geographic Society. *Inside/Out*. Washington D. C., 1998.

This book has cutaways and diagrams of many landmark buildings. The illustrations are in color and extremely detailed.

Robinson, Willard B. *Gone from Texas: Lost Architecture Heritage*. Washington, D.C.: Library of Congress in Publication Data, 1981.

This book has photos of structures that are no longer in existence in Houston and information regarding their history is included in the text.

Stanush, Barbara Evans. *Texans, A Story of Texan Cultures for Young People*. San Antonio, Tex.: The University of Texas Institute of Texan Cultures at San Antonio, 1994.

This book discusses the history of the land we now call Texas from its early inhabitants through today with emphasis on the various ethnic groups that found their way to Texas.