ARTIST'S WORK/ARTIST'S VOICE: LOUIS I. KAHN

A Guide for Educators

Department of Education at The Museum of Modern Art

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A NOTE TO EDUCATORS

Artist's Work/Artist's Voice is a series of guides for educators devoted to artists and architects in The Museum of Modern Art's collection. Rather than exhaustive monographs, these guides consider key examples of an artist's work in relationship to his or her social and cultural context. Written with the guidance of Peter Reed, Senior Deputy Director of Curatorial Affairs at The Museum of Modern Art, and William Whitaker, Archivist at the Louis I. Kahn Archive at the University Of Pennsylvania, *Artist's Work/Artist's Voice: Louis I. Kahn* features the architect's drawings, writing, models, and architectural renderings from MoMA's collection in dialogue with works from the Louis I. Kahn Archive and other key institutions.

The guide is informed by issues posed by selected works in a variety of mediums, but its organization and lesson topics are created with the school curriculum in mind, with particular application to social studies, visual art, history, and language arts. Lessons are accompanied by writing, research, and hands-on, art-based activities that encourage students to make connections between the visual arts and other disciplines. The goal of this guide is to introduce students to Kahn's work. Through guided discussions and supplemental activities, students will draw parallels between their own ideas and experiences and those of one of the twentieth century's most prominent architects.

The guide's purpose is not just to explicate works of art, but also to demonstrate how images and historical information can be integrated into numerous subject areas and skill bases taught in the classroom. Students will be introduced to significant ideas in art and culture. By comparing a variety of mediums and artistic styles, students will be able to practice observation, articulation, and discussion skills, and to further develop their visual literacy.

USING THE EDUCATOR GUIDE

The six lessons that compose this guide—**What is Architecture?, The Power of Drawing, The Process of Design, Form and Function, The Spirituality of Matter,** and **Designs for Urban Life**—may be used sequentially or as independent units. An introduction to the key principles of each lesson is followed by a close examination of each work, including its historical context and biographical information on the architect. Discussion questions based on this information lead students through formal analysis of the work and seek to create connections between information and visual evidence. The activities that conclude each lesson encourage students to synthesize what they have learned about each work and carry the lesson into the broader curriculum or relate it to skills they are practicing in the classroom.

IMAGES

All of the questions, discussions, and activities in this guide are based on the images on the accompanying CD-ROM. Carefully examine each image prior to showing it to your students. If your classroom is not equipped with a computer and LCD projector, you may also print images from the CD-ROM to transparency paper for overhead projection.

ACTIVITIES

The Activity sections are intended to encourage students to make connections between their own experiences and the concepts presented in the lessons. Through these activities, students will begin to develop a language for discussing and looking at architecture and art. Please feel free to tailor the activities to the age level of your students.

FOR FURTHER CONSIDERATION AND SELECTED BIBLIOGRAPHY AND RESOURCES

This section contains suggestions for additional discussion questions, research projects, and field trips. A bibliography and a resources list has been provided for teachers and students to use in conducting research. The resources recommended in these pages provide further information on the artists and artworks in this guide and on general historical topics and offer additional classroom activities.

GLOSSARY

A glossary of architectural and art-historical terms (bolded upon first mention in each lesson) is included at the end of the guide.

IMAGE ONE: Masonic Temple, Broad and Filbert Streets, northeast corner, Philadelphia, Pennsylvania, c.1902. The Print and Picture Collection, The Free Library of Philadelphia

IMAGE TWO: Cathedral of Saints Peter and Paul, 18th Street at Logan Square, Philadelphia, Pennsylvania, c. 1902. The Print and Picture Collection, The Free Library of Philadelphia

1. LOUIS I. KAHN: ARCHITECT, ARTIST, AND PHILOSOPHER

> *Architecture is the thoughtful making of spaces. It is the creating of spaces that evoke a feeling of appropriate use.*
>
> —Louis I. Kahn

Louis I. Kahn (1901–1974) believed strongly in the value and importance of architecture in society. Kahn felt that well-designed buildings could influence and improve people's lives. He is known for his monumental building projects and also for his role as an artist, teacher, and philosopher of architecture. At first glance, Kahn's work appears simplistic in its form and program. Upon closer investigation, however, layers of incredible programmatic complexity and design innovation become apparent. Kahn ("Lou," to his friends and close colleagues) was resolute in his philosophy that architecture is the thoughtful making of spaces whose design can and should simultaneously reveal the story of their construction and meet the aesthetic and functional needs of the people who inhabit them. He believed strongly that architecture should appeal not only to practical and aesthetic needs but also to the humanistic needs of the people and communities it serves. He was continually striving to create spaces that evoked a sense of spirituality, a sense he felt was lacking in the built environment of that time. With every project, Kahn's starting place was the same. Whether he was designing a place of worship, a school, a private residence, or an art museum, he

Epigraph. Louis I. Kahn, quoted in Jean France's untitled essay in the architecture brochure distributed to visitors at First Unitarian Church of Rochester, in Rochester, New York, 2006.

always asked himself questions, trying to define and articulate the unique qualities embodied by that institution. But how does one translate those qualities, which are immaterial and immeasurable, into a material and measurable building? This was the root of Kahn's quest. His desire to elevate architecture from the design of utilitarian forms to meaningful and important spaces, coupled with his rigorous attention to programmatic detail and construction and his interest in the inspirational and transcendendent quality of architectural spaces, set him apart from other architects of his time.

Kahn earned a bachelor's degree in architecture from the University of Pennsylvania in 1924. He studied closely under Paul Cret, an architect educated at the **École des Beaux-Arts**, who advanced a classical approach to design. Kahn and Cret balanced classicism with a democratic approach, allowing for designs that addressed the differing requirements of each project. Upon graduation, Kahn worked as a **draftsman** at a Philadelphia architecture firm, where he applied his fine-tuned drawing skills. Eventually, after working at several firms, he established his own office in Philadelphia in 1935. Kahn was inspired by the work of many modern architects, including Le Corbusier, Frank Lloyd Wright, and Ludwig Mies van der Rohe, and was equally drawn to classical and ancient forms of building. He synthesized old and new building styles by designing monumental forms that spoke of the past but employed current construction and design solutions.

To plan and execute his ideas, Kahn worked collaboratively with a team of consultants and architects in his own office. Together they used basic building materials such as concrete, brick, steel, glass, and marble, combining them with technical innovations in ways that in some cases had never been attempted before. Kahn was a perfectionist and often worked for several years on a project, seeking an ideal solution. In addition to his work designing buildings, he wrote about architecture and lectured at universities throughout the United States and abroad. He was also a professor of architecture at Yale University and at the University of Pennsylvania, where he taught until his death in 1974. Kahn was a devoted teacher who felt he often learned more than he taught. He said, "A good question is always greater than the most brilliant answer," and, "The right thing done badly is always greater than the wrong thing well done."[1] Kahn's work is now part of the canon of architecture history, and it serves as a source of inspiration in postmodern and contemporary building.

Kahn, like many architects, looked to the structures of the past for inspiration. Have your students compile some images of ancient architecture by searching the Great Buildings Web site at www.greatbuildings.com. On this site you can browse through images of pyramids, cathedrals, and Greek temples, among many others. Next, have your students go on an "eye spy" tour of their neighborhood, looking for buildings that might have design elements that remind them of the past. These could be **domes** or **cupolas**, classical **columns**, or Grecian **pediments**.

- **Ask your students to consider why architects designed the buildings as they did. Have them consider the aesthetic and functional possibilities. Next, have your students research the architectural style of their school and its relationship to history. You can use the information from both exercises to create a visual timeline of architecture based on your school and the surrounding neighborhood.**

2. IN THE BEGINNING

Louis Isadore Kahn was born in 1901 on the Baltic island of Osel, Estonia (a country in northern Europe that borders Latvia to the south and Russia to the east). At the age of four, Kahn moved with his family to Philadelphia, Pennsylvania. Kahn's father was a glass painter and his mother worked in the textile industry. Shortly after their arrival in Philadelphia, his

1. Louis I. Kahn, quoted in Wilder Green, "Louis I. Kahn, Architect: Alfred Newton Richards Medical Research Building," *Museum of Modern Art Bulletin* 28(1) (1961): 3.

father became unable to work and the family was supported solely by his mother. Kahn attended public schools and supplemented his education with art classes at the local industrial art school, where he focused on drawing. He excelled in his studies and earned a place in a prestigious public high school, where he was introduced to architecture through the study of world history. He continued to attend art classes throughout his high school career. Despite his family's financial hardships, Kahn flourished in Philadelphia, a city that he loved and continued to live in as an adult. An acquaintance of Kahn has related this anecdote: "Once he was asked why he didn't move to New York City where obviously fame and fortune would more readily be his and Lou answered quickly, *why would he want to be a Philadelphian living in New York City?*"[2]

- **Show your students the photograph of Philadelphia (Image One), and ask them to describe what they see. To help students explain what they are seeing, it may be useful to introduce them to the terms *foreground, middle ground,* and *background*. In this image there is a monument in the foreground, there is a street with carriages, a trolley car, and pedestrians in the middle ground, and there is a large building in the background.**

- **Next, ask your students to think about what it might be like to be in this place. What might they hear, see, and smell? Next, have your students focus on the buildings in the photograph. Ask them to consider what these buildings might be used for. Do they see a school, a home, or some type of business? Ask them to provide visual evidence to support their assertions.**

- **Next, show your students the photograph of 18th Street at Logan Square in Philadelphia (Image Two). Ask your students to compare the two places. How are they the same? How are they different? Ask your students to describe what they see in the foreground, middle ground, and background.**

- **Inform your students that these are photographs of the neighborhoods Kahn experienced growing up.**

- **Next, read out loud the following quote from Kahn: "A city is the place of availabilities. It is the place where a small boy, as he walks through it, may see something that will tell him what he wants to do his whole life."[3]**

- **Inform your students that Kahn was implying that a city is made up of things that are available to its inhabitants. These availabilities could be places, people, or ideas. Next, ask your students if there is anything in their environment that has ever inspired them to do or learn more about something.**

- **Ask your students to imagine what it would be like to live in a place like Philadelphia. Have your students compare life on the street in Philadelphia with their own communities. How are they similar? How are they different?**

Have your students document their neighborhoods in drawing, photography, or collage. Ask them to include elements that represent important personal narratives. This could be the dance school where they take classes, the soccer field where they play sports, or the shop where they work. Have your students write one- or two-sentence artist statements that encapsulate their ideas.

2. Richard Saul Wurman, *What Will Be Has Always Been: The Words of Louis I. Kahn* (New York: Rizzoli, 1986), introduction.
3. Louis I. Kahn, quoted in John Lobell, *Between Silence and Light: Spirit in the Architecture of Louis I. Kahn* (Boston: Shambhala Publications, 1985), 44.

LESSONS

LESSON ONE: What is Architecture?

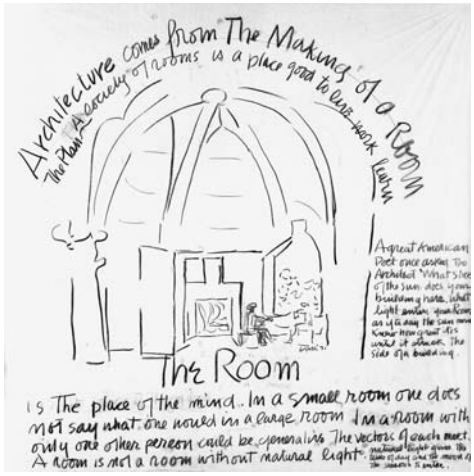

IMAGE THREE: Louis I. Kahn. American, born Estonia. 1901–1974. *Drawings for City/2 Exhibition: Architecture Comes from the Making of a Room.* 1971. Charcoal, 34 x 34" (86.4 x 86.4 cm). Philadelphia Museum of Art. Gift of Louis Kahn

IMAGE FOUR: Louis I. Kahn. American, born Estonia. 1901–1974. *Drawings for City/2 Exhibition: The Street is a Room.* 1971. Charcoal, 34 x 34" (86.4 x 86.4 cm). Philadelphia Museum of Art. Gift of Louis Kahn

IMAGE FIVE: Louis I. Kahn. American, born Estonia. 1901–1974. *Drawings for City/2 Exhibition: The City From a Simple Settlement.* 1971. Charcoal, 34 x 34" (86.4 x 86.4 cm). Philadelphia Museum of Art. Gift of Louis Kahn

INTRODUCTION

During a lecture at Princeton University in 1967, Kahn said, "If I were not an architect, I would be a writer."[4] This lesson explores how Kahn used writing and sketches as tools for articulating his thoughts about architecture and its place in the world.

LESSON OBJECTIVES

- **Students will be introduced to Kahn's architectural philosophy through writing and drawing.**
- **Students will examine primary source imagery composed of text and drawing.**
- **Students will discuss their interpretations of architecture and the built environment.**
- **Students will observe and record buildings in their neighborhood.**

INTRODUCTORY DISCUSSION

Experts on Kahn's work often describe the architect's connection to written language: "Words, for Louis I. Kahn, projected the same powerful imagery as his sketches, drawings, and the work itself"[5]; "He toiled over the making of words with the same indefatigable energy that he devoted to architecture, crossing out and rubbing out and remaking a phrase or a plan."[6] In many cases, Kahn combined text and drawing to clarify his ideas and to elaborate on them. His words often read like poems, reflective of an inner journey. Ask your students to consider in what situation or environment they encounter words and images used together to communicate ideas. In these instances, do the images and words communicate similar ideas? Ask them to consider when images would be a better format than words. When is it more effective to have words?

IMAGE-BASED DISCUSSION

- **Print Kahn's three *Drawings for City/2 Exhibition* (Images Three, Four, and Five) from the CD-ROM or download them from the Web site. If possible, copy the drawings for each student, cropping out the text. Break your class into pairs and distribute the copies. Ask your students to brainstorm a list of adjectives that describe the drawings, and, in addition, have them write down three questions they have about the works. Have one pair present their findings to another pair. Next, moderate a class discussion based on everyone's experiences. Make a list on chart paper or on the board of all your students' descriptive words. Next, ask your students what questions they have, and try to answer them based on the descriptive words generated in the brainstorm. Make a list of any new questions that arise as a result of this discussion.**

Inform your students that these three drawings were made by the architect Louis I. Kahn. With these drawings, Kahn was attempting to illustrate his architectural philosophy.

- **Pass out copies of the same three drawings, this time with the text included. Next, read aloud the excerpts transcribed below from each of the drawings. Work with your students as a group to understand what Kahn might have been trying to say about architecture.**

  Architecture comes from the making of a room
  The room is the place of the mind

4. Louis I. Kahn, "The Institutions of Man" (lecture, Princeton University, Princeton, N.J.: March 13, 1967). The Museum of Modern Art Archives
5. Alessandra Latour, ed., *Louis I. Kahn: Writings, Lectures, Interviews* (New York: Rizzoli, 1991), 8.
6. David D. Brownlee and David G. De Long, *Louis I. Kahn: In the Realm of Architecture* (New York: Rizzoli, 1991), 129.

- **Ask your students to make lists of the different kinds of rooms they are familiar with. Have them include descriptive words that convey a sense of the activities that take place in those spaces. Are any of the spaces they mentioned places where they use their minds? Have them cite specific examples.**

  In a small room one does not say what one would in a large room
  A room is not a room without natural light

- **Ask your students to consider the important elements of a room. What does a room need to be functional? What role does natural light play in the experience of a place?**

  The street is a room by agreement
  A community room the walls of which belong to the donors
  The ceiling is the sky

- **How is a street like a room? Have your students make lists of words that describe the design elements and activities that exist on a street in their neighborhood. Have them compare their descriptive lists about the street to those about the room. Are there any similarities?**

- **Ask your students to consider who the "donors" are in a community.**

  The city from a simple settlement became the place of assembled institutions
  The measure of the greatness of a place to live must come from the character of its institutions sanctioned through how sensitive they are to renewed desire for new agreement

- **Ask your students to consider the different elements that make up a city. What are the different activities that take place in a city?**

Inform your students that, for Kahn, the room was the basic building block of architecture. For him, a building was composed of organized groups of rooms that share a common purpose. Institutions were the places and spaces where civic life takes place. These places–sites of inspiration and wonder–could be a church, a museum, or a school. In his view, cities were made up of different kinds of institutions, including places for shopping, learning, worship, and play, among others. The donors are the people who inhabit these places and spaces in a community.

- **Ask your students to work in partners and discuss the texts as they relate to the imagery. Do these images and words tell us about Kahn's approach to architecture? If so, what do they tell us? Do these statements answer any of their questions about the work? Bring your students back together as a group to share their experiences, revisiting earlier questions.**

ACTIVITY

Ask your students to choose a neighborhood "institution" that they are very familiar with. Have your students make a list of the activities that take place in that space. Then, have your students make a list of words that describe the mood or feeling of that place. Is it bright and loud or dark and quiet? Based on these descriptions, have your students make a sketch of this place.

IMAGE SIX: Louis I. Kahn. American, born Estonia. 1901–1974. *Towers, San Gimignano.* 1928. Watercolor and red pencil on paper, 12 ⅛ x 9 ¼" (30.8 x 23.5 cm). Collection, Williams College Museum of Art. Museum purchase with funds provided by an anonymous donor and with the J. W. Field Fund, John B. Turner '24 Memorial Fund, Joseph O. Eaton Fund, Karl E. Weston Memorial Fund, Bentley W. Warren Fund

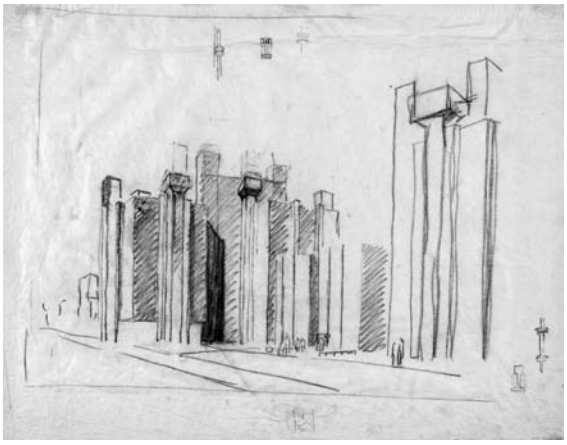

IMAGE SEVEN: Louis I. Kahn. American, born Estonia. 1901–1974. Alfred Newton Richards Medical Research Building and Biology Building, University of Pennsylvania, Philadelphia, Pennsylvania. Preliminary version: perspective. 1957. Charcoal on tracing paper, 23 ⅞ x 31" (60.6 x 78.7 cm). The Museum of Modern Art, New York. Gift of the architect

IMAGE EIGHT: Louis I. Kahn, c. 1971. The Architectural Archives, University of Pennsylvania, Philadelphia. Photograph: Martin Rich

INTRODUCTION

Kahn learned to paint and draw at a very young age. As a child, he enrolled in after-school art classes, which he continued until he graduated from high school. In architecture school he learned how to create different types of architectural **renderings**. When he graduated from college in 1924, it was these skills that earned him his first job in an architecture firm — as a **draftsman**. In 1928, he decided to spend a year in Europe to experience great architecture of the past. He began his journey in England, then traveled across northern Europe and on to Italy and France. While he was in Europe, Kahn made many drawings that were much more painterly than the precise renderings he had created in architecture school and at the Philadelphia architecture firm. Using watercolor and pencil in new ways, he employed his new style throughout a body of work that illustrated structures that interested him for their compositional elements.

Even as Kahn's career as an architect escalated, he never abandoned painting and drawing, and he continued to create and exhibit artwork throughout his life. He also continued to travel throughout the world, creating drawings of the structures that inspired him. This lesson explores the different techniques of drawing Kahn used to articulate his ideas.

LESSON OBJECTIVES

- **Students will compare and contrast works of art in different mediums.**
- **Students will become familiar with the different ways architects express their ideas visually.**
- **Students will be exposed to different styles of rendering.**

INTRODUCTORY DISCUSSION

- **Lead a discussion with your students about the role of drawing in their lives. Ask your students what kinds of subject matter they choose to draw and how they decide to represent their subjects. Ask them to make a list of the different kinds of tools they use to draw. Do they use these tools the same way every time? Inform your students about Kahn's background as an artist and how he used different techniques of rendering throughout his life.**

IMAGE-BASED DISCUSSION

- **Give your students a few minutes to look at *Towers, San Gimignano* (Image Six). Ask them to describe what they see. Ask them how they would describe it to someone who has never seen it. Have them make a list of five to ten adjectives that describe this work.**

Inform your students that this is a watercolor sketch of San Gimignano, a small town in the Tuscan region of Italy. Kahn made this sketch while he was traveling in Europe in 1928.

- **Ask your students to consider what materials these structures could be made of. Is there any visual evidence that answers these questions?**

Kahn's travel sketches were not rendered in perfect perspective. He was interested in capturing the essence of the place he was drawing, which had to do more with the feeling of the environment and less with documenting exact architectural details.

- **Ask your students if they feel this drawing expresses a certain kind of mood or tone.**

- **Read the following quotation from Kahn out loud:**

  No object is entirely apart from its surroundings and therefore cannot be represented convincingly as a thing in itself; also the presence of our own individuality causes it to appear differently than it would to others. . . . There is no value in trying to imitate exactly. Photographs will serve you best of all, if that is your aim. We should not imitate when our intention is to create—to improvise. . . . I try in all my sketching not to be entirely subservient to my subject, but I have respect for it, and regard it as something tangible—alive—from which to extract my feelings. I have learned to regard it as no physical impossibility to move mountains and trees, or change cupolas and towers to suit my taste.[7]

- **Ask your students to discuss this quotation as it relates to the image. What can we interpret about this sketch of San Gimignano based on reading this quotation? Conduct an Internet search for photographs of San Gimignano. Does Kahn's representation depict the town exactly?**

- **Show your students Kahn's perspective sketch for the Alfred Newton Richards Medical Research Building and Biology Building (Image Seven).**

In 1957, Kahn was commissioned by the University of Pennsylvania to design a new research laboratory for the medical school. Until this time, Kahn had not built a high-rise structure. For the Richards Building he designed three laboratory towers surrounded by four monumentally scaled air-intake stacks. This was an early sketch he made to document his overall idea. He went on to create many more drawings, rendered in greater detail.

- **Ask your students to look at this sketch and *Towers, San Gimignano* and observe any similarities or differences in subject, style, and technique. Ask your students if they see any relationship between the two works.**

Architects create perspective sketches as a nonprecise way of articulating a main idea—much in the same way Kahn's drawing of San Gimignano gives us a sense of the mood of the place without precise, photorealistic details. The main idea in this perspective sketch is the relationship of the overall size, shape, and **scale** of the structures. Kahn began the design process with sketches like this to illustrate his broad **concept** rather than specific details.

- **Show your students Image Eight. This is a picture of Kahn drawing a flower within a circle, using both hands simultaneously. Kahn learned this drawing technique in his childhood art classes in Philadelphia. To render using this technique, the drawer needs to balance his or her body movements with the sensation of the chalk against the board.**

- **Have your students model this exercise in your classroom. Have them draw a circle on the board or on paper tacked up on the wall, then draw a flower (a basic outline of the leaves and petals) inside the circle with both hands simultaneously. Lead a discussion with your students about this process. Did they find it difficult? Why or why not? Ask your students if they can see a benefit to practicing a technique of drawing like this one.**

ACTIVITY

Have your students visit a place in their community and spend some time observing what is there. Have them consider what mood or feeling the design of the place conveys. Encourage them to position themselves in different places in order to gain multiple perspectives. Have your students choose one perspective to render through the drawing techniques of their choice. Exhibit your students' work around the classroom and lead a discussion in which students talk about their processes.

7. Louis I. Kahn, "The Value and Aim In Sketching," in Latour, *Louis I. Kahn,* 11.

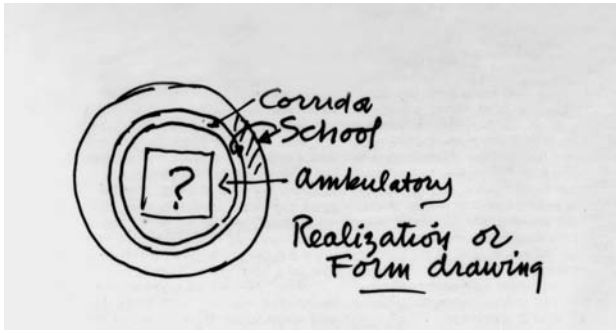

IMAGE NINE: Louis I. Kahn. American, born Estonia. 1901–1974. First Unitarian Church, Rochester, New York. Plan. 1961

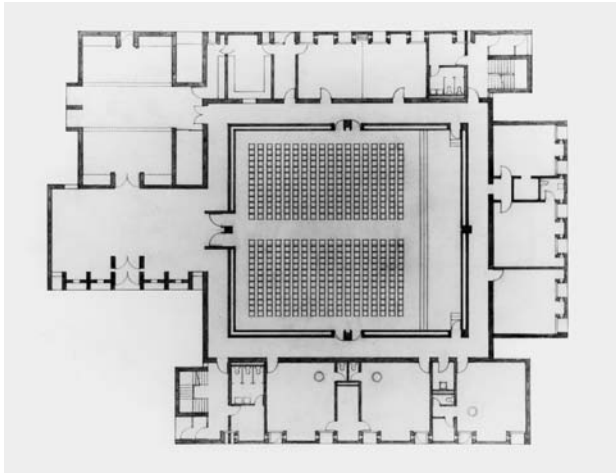

IMAGE TEN: Louis I. Kahn. American, born Estonia. 1901–1974. First Unitarian Church, Rochester, New York. Floor plan. 1961. The Architectural Archives, University of Pennsylvania, by the gift of the First Unitarian Church, Rochester

IMAGE ELEVEN: First Unitarian Church, Rochester, New York. Louis I. Kahn Collection, University of Pennsylvania Historical and Museum Commission

INTRODUCTION

In 1959, Kahn was commissioned to design a new building for the First Unitarian Church of Rochester, New York. The original church building, designed by well-known nineteenth-century architect Richard Upjohn (whose other projects include Trinity Church in Lower Manhattan), was demolished as part of a redevelopment plan for downtown Rochester. This lesson examines Kahn's design process from the initial **concept** through to the final plan.

Note: Additional information about the First Unitarian Church of Rochester building and about Unitarian philosophy is available on the First Unitarian Church of Rochester's Web site, at www.rochesterunitarian.org.

LESSON OBJECTIVES

- **Students will learn how an architect conceptualizes and plans a building design.**
- **Students will compare conceptual representations, drawings, and photographs.**
- **Students will learn the following vocabulary words: plan, ambulatory, concept.**

INTRODUCTORY DISCUSSION

In the late 1950s, a committee was formed in Rochester to search for an architect to redesign the First Unitarian Church to equal the architectural integrity of Upjohn's original building. A number of well-known architects were interviewed, but the committee was drawn to Kahn for his sense of spirituality and mysticism, which closely echoed the ideals of the Unitarian faith. Committee members were also impressed with Kahn's innovative approach to building and his style of expressing "only what matters."[8] Kahn was selected, and shortly afterward he began the process of envisioning a space that would function as a sanctuary (a space of congregation) and a school of religious instruction for children, from infants to teenagers. Have your students work in pairs to discuss what a space like this might look like if they were to design it. Have them take turns pretending to be client and architect, one determining the activities for the space and the other creating sketches of possible design solutions for those needs.

IMAGE-BASED DISCUSSION

- **Give your students a few minutes to look at Kahn's concept sketch for the First Unitarian Church (Image Nine). While your students are looking at the work, read the following quotation from Kahn out loud:**

  Form precedes Design. Form is "what." Design is "how." . . . Design gives the elements their shape, taking them from their existence in the mind to their tangible presence. . . . In architecture, it characterizes a harmony of spaces good for a certain activity.[9]

Tell your students that Kahn called this type of sketch a "form drawing." While in an early design meeting with members of the First Unitarian Church congregation, he drew this to express his ideas. Kahn often used this kind of drawing as a tool for visualizing and explaining his thoughts about a project. It also helped him explain his ideas to others. In this sketch, Kahn began his exploration of a design concept.

8. Louis I. Kahn, quoted in Jean France's untitled essay in the architecture brochure distributed to visitors at First Unitarian Church of Rochester, in Rochester, New York, 2006.
9. Louis I. Kahn, quoted in Lobell, *Between Silence and Light*, 28.

- **Ask your students to work in pairs to consider Kahn's ideas, basing their discussions on this sketch and on the information they have learned. Why would he begin the process with a question mark? Could the lines and shapes have a specific meaning?**

Inform your students that Kahn chose a question mark to represent the sanctuary, which he believed should be the central part of the space. He surrounded the sanctuary with an **ambulatory**, or aisle, which is represented by the two circles surrounding the question mark. The aisle would be structural as well as functional, serving as the walls of the sanctuary. The outer ring, in which Kahn drew diagonal hatch marks, represents the school, surrounding the sanctuary.

This sketch, or form drawing, is not a literal representation of what the building will look like or a final architectural plan. It serves as the visual expression of Kahn's design concept for the space. Share the following quotation from Kahn, in which he explains the early process of developing this project and discusses his sketch:

> [This] idea was my first reaction to what may be a direction in the building of a Unitarian Church. Having heard the minister give a sense of the Unitarian aspirations, it occurred to me that the sanctuary is merely the center of questions and that the school was that which raised the question . . . and I felt that that which raised the question—[and] the spirit of the question—were inseparable. So I drew the ambulatory to respect the fact that what is being said or what is felt in a sanctuary was not necessarily something you have to participate in. And so you could walk away from what is being said. And then I placed a corridor next to it—around it—which served the school which was really the walls of the entire area.[10]

- **Have your students go back into their pairs to reexamine the drawing with this new information in mind. Ask them if this information has changed their interpretation of the sketch. Can they get a sense of Kahn's intention based on this drawing?**

Once Kahn had decided on the form of a project, he continued to make rough sketches to test its validity, then moved on to the first designs of the way the spaces would be built. These sketches brought him further toward finalizing a plan that he could then render in detail.

- **Show your students the final plan for the First Unitarian Church (Image Ten). This plan consists of the sanctuary and school (on the right side) and a central corridor that connects them to an additional space, which would serve as a meetinghouse (left of the sanctuary).**

- **Have your students compare this final plan to the photograph of the finished building (Image Eleven) and with Kahn's form drawing. What elements has Kahn retained? What has changed?**

ACTIVITIES

1. Kahn's form drawing is a kind of diagram, or visual representation of an idea. Ask your students if they have ever made use of a diagram to solve a problem.

2. Have your students work in teams to create a basic plan of your classroom or school as it exists. Then, ask them to brainstorm things that they feel could be improved upon or changed. Once they have identified a problem, ask them to diagram a possible solution. Their diagrams could include shapes, lines, text, or even pictorial representations collaged together. Have each group plan a presentation to the rest of the class to illustrate its concept.

10. Louis I. Kahn, quoted in Heinz Ronner, Sharad Jhaveri, and Alessandro Vasella, eds., *Louis I. Kahn: Complete Works, 1935–74* (Colorado: Westview Press, 1977), 169.

IMAGE TWELVE: Louis I. Kahn. American, born Estonia. 1901–1974. Alfred Newton Richards Medical Research Building, University of Pennsylvania, Philadelphia, Pennsylvania. Overall building complex (final version). 1957–65. Model: basswood, 13 ½ x 22 ¾ x 14 ¾" (34.3 x 57.8 x 37.5 cm). The Museum of Modern Art, New York. Gift of the architect

IMAGE THIRTEEN: Louis I. Kahn. American, born Estonia. 1901–1974. Alfred Newton Richards Medical Research Building, University of Pennsylvania, Philadelphia, Pennsylvania. Structure of typical laboratory tower (final version). 1957–65. Model: wood, 28 ½ x 23 15⁄16 x 23 15⁄16" (72.4 x 60.8 x 60.8 cm). The Museum of Modern Art, New York. Gift of the architect

IMAGE FOURTEEN: Alfred Newton Richards Medical Research Laboratories, University of Pennsylvania, Philadelphia, Pennsylvania. Louis I. Kahn Collection, University of Pennsylvania, and the Pennsylvania Historical and Museum Commission. Photograph: Malcolm Smith

IMAGE FIFTEEN: Pre-cast beam during transport, Alfred Newton Richards Medical Research Laboratories, University of Pennsylvania, Philadelphia, Pennsylvania. The Louis I. Kahn Collection, University of Pennsylvania, and the Pennsylvania Historical and Museum Commission. Photograph: Ronald C. Binks

IMAGE SIXTEEN: Construction photo, Alfred Newton Richards Medical Research Laboratories, University of Pennsylvania, Philadelphia, Pennsylvania. The Architectural Archives, University of Pennsylvania. Photograph: Marshall D. Meyers

IMAGE SEVENTEEN: Construction photo, Alfred Newton Richards Medical Research Laboratories, University of Pennsylvania, Philadelphia, Pennsylvania. The Architectural Archives, University of Pennsylvania. Photograph: Marshall D. Meyers

IMAGE EIGHTEEN: Construction photo, Alfred Newton Richards Medical Research Laboratories, University of Pennsylvania, Philadelphia, Pennsylvania. The Architectural Archives, University of Pennsylvania. Photograph: Marshall D. Meyers

IMAGE NINETEEN: Louis I. Kahn. American, born Estonia. 1901–1974. Salk Institute for Biological Studies, La Jolla, California. c. 1962. Model. Louis I. Kahn Collection, University of Pennsylvania, and the Pennsylvania Historical and Museum Commission. Photograph: George Pohl

IMAGE TWENTY: Detail of laboratory tower wall, Salk Institute for Biological Studies, La Jolla, California, 2006. Photograph: Lisa Mazzola

IMAGE TWENTY-ONE: Detail of porch off library, Salk Institute for Biological Studies, La Jolla, California, 2006. Photograph: Lisa Mazzola

IMAGE TWENTY-TWO: Detail of laboratory, Salk Institute for Biological Studies, La Jolla, California, 2006. Photograph: Lisa Mazzola

IMAGE TWENTY-THREE: Detail of courtyard, Salk Institute for Biological Studies, La Jolla, California, 2006. Photograph: Lisa Mazzola

IMAGE TWENTY-FOUR: Detail of light wells, Salk Institute for Biological Studies, La Jolla, California, 2006. Photograph: Lisa Mazzola

IMAGE TWENTY-FIVE: Courtyard, Salk Institute for Biological Studies, La Jolla, California, 2006. Photograph: Lisa Mazzola

IMAGE TWENTY-SIX: View of study towers, looking west, Salk Institute for Biological Studies, La Jolla, California, 2006. Photograph: Lisa Mazzola

IMAGE TWENTY-SEVEN: View of study towers, looking east, Salk Institute for Biological Studies, La Jolla, California, 2006. Photograph: Lisa Mazzola

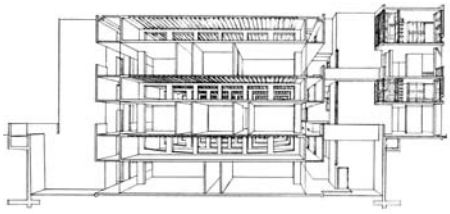

IMAGE TWENTY-EIGHT: Louis I. Kahn. American, born Estonia. 1901–1974. Salk Institute for Biological Studies, La Jolla, California. Section-perspective of laboratory. The Architectural Archives, University of Pennsylvania, August Komendant Collection

INTRODUCTION

In 1957, Kahn was commissioned to design a new laboratory and research facility for the University of Pennsylvania. Due to a rise in student enrollment at the university's medical school, more space was needed for teaching and research. The new building, which was completed in 1960, was named the Alfred Newton Richards Medical Research Building.

In 1955, scientist Jonas Salk was successful in trials for a new vaccine against the virus that caused polio. By 1956, polio had been almost completely eradicated. Salk's vaccine saved thousands of lives and turned the scientist into a celebrity. Fueled by his scientific achievements, he began planning a research facility dedicated to the search for medical advances. In 1959, Salk met with Kahn after touring the Richards Building. He decided that Kahn would be the architect with whom he would collaborate on his new research facility, which eventually became the Salk Institute for Biological Studies.

These buildings were crucial to the development of Kahn's work, as they allowed him to try out new techniques and new ideas in two different projects. Kahn brought what he learned from the Richards Building to the larger scope of the Salk Institute. Previous experience, coupled with a fruitful collaboration with Salk, allowed Kahn to create a highly successful building in form and function.

LESSON OBJECTIVES

- **Students will explore the process of building construction through photographic documentation and architectural plans and elevations.**
- **Students will use primary source documentation to explore the history of a building.**
- **Students will learn the following vocabulary words: design brief, model, plan, rendering, concept, and structural engineer.**
- **Students will learn about different kinds of building structures and construction techniques.**

INTRODUCTORY DISCUSSION

When Kahn was commissioned to design the Richards Building, a committee from the university gave him a design brief, or program. This brief specified that the building must include seventy-five thousand square feet of floor space and separate facilities to house research animals. Kahn's design also included two additional biology towers, which were built after the main structure. There were many rounds of revisions as a result of conflicts between Kahn and the university over space allotments and budget. Kahn created multiple sketches, renderings, and models of his many design iterations. On May 19, 1958, Kahn and his colleagues met to approve a final architectural plan.

- **Split the class into two groups: one will represent an architecture firm and one will represent a client. Have the client group designate a design program for your classroom that addresses a need or a problem. This could be larger desks, more shelving, or larger storage spaces. Have the client group also include a budget for the project they have outlined. Have the architecture group make a series of recommendations for ways to address the problem, including sketches of possible ideas and an estimated budget. Ask your students to describe the process of working in groups to address a variety of needs. Did they find it difficult? Why or why not?**

IMAGE-BASED DISCUSSION

- **Give your students a few minutes to look at the models and photograph of the Richards Building (Images Twelve, Thirteen, and Fourteen). Have your students describe the design of the building.**

- **Ask your students what they can infer about the function of this building based on how it looks.**

Inform your students that Kahn's final design for the site incorporated concrete laboratory towers and brick tower shafts to house all of the mechanical facilities. Kahn felt strongly that "the air we breathe and the air we throw away must be in different channels."[11] The concrete laboratory spaces were designed for scientists to conduct research in, and the gasses or by-products of experiments would be expelled from the building through the brick towers. Kahn called the laboratories the "served" spaces and the towers the "servant" spaces, and kept the two separate in his design. This was a new concept for the modern building of the time.

- **Ask your students to look at the images again. Ask them to locate the served and servant spaces. Ask your students to explore the idea of a hierarchy of spaces in their school. What is a function of a classroom, versus a hallway or a stairwell? How do the hallways and stairwells serve the classrooms? How are these spaces organized? Are there any similarities between these spaces and spaces outside your school?**

- **Next, show your students the Richards Building construction photos (Images Fifteen, Sixteen, Seventeen, and Eighteen).**

Kahn formed a team of people to collaborate on the construction of the Richards Building, including August Komendant, a structural engineer. Also a native of Estonia, Komendant was educated in Germany. After World War II, he worked in Germany on the reconstruction of bridges that had been destroyed during the Allied bombing. Due to the shortage of steel at that time, Komendant was forced to innovate new ways of building. He eventually developed a system of building with prestressed concrete structures that were prefabricated off-site and assembled onsite. He introduced this method of building to Kahn, and Kahn used it for the Richards Building.

- **While your students are looking at the construction photographs, read the following statement by Kahn out loud:**

A building is like a human, an architect has the opportunity of creating life. The way the knuckles and joints come together make each hand interesting and beautiful. In a building these details should not be put in a mitten and hidden. Space is architectural when the evidence of how it is made is seen and comprehended.[12]

- **Ask your students to consider how a building is like a human body. What structures in buildings and bodies have a common design or purpose?**

Eventually, the building skeleton was covered with a protective skin of brick, concrete, and glass.

- **Ask your students to look at the construction photos and the images of the models again to see if they can see the seams or joints where building parts join together.**

11. Louis I. Kahn, "The Institutions of Man."
12. Louis I. Kahn, quoted in Ronner, Jhaveri, and Vasella, *Louis I. Kahn,* 116.

With the Richards Building, Kahn was trying out a new process of building, using prefabricated pieces that were assembled at the building site. Cranes were used to put each piece in the right place, and workers secured the pieces to each other, ensuring the safety and stability of the building. Share the following quotation by Kahn with your students:

> One day I visited the site during the erection of the prefabricated frame of the building. The crane's 200-foot boom picked up 25-ton members and swung them into place like matchsticks moved by the hand. I resented the garishly painted crane, this monster which humiliated my building to be out of scale. I watched the crane go through its many movements calculating how many more days this "thing" was to dominate the site and building before a flattering photograph of the building could be made. Now I am glad of this experience because it made me aware of the meaning of the crane in design, for it is merely the extension of the arm like a hammer.[13]

- **Ask your students to consider this idea. How is a crane like an extension of the arm? What do they have in common? What is different about the way they are structured and used? Encourage your students to consider how they look in order to understand how they are used.**

In 1961, the Richards Building was the subject of an exhibition at The Museum of Modern Art. The show's curator, Wilder Green, described it as "probably the single most consequential building constructed in the United States since the war."[14] Kahn's design clearly demonstrated innovative structural concepts and new principles for the organization of space, and it created a lively dialogue with the older, more traditional architecture of the university campus.

In 1959, Jonas Salk met with Kahn and toured the Richards Building. The two discovered that they shared a common ancestry. Like Kahn, Salk was born to Russian-Jewish immigrant parents and had attended city public schools. An immediate bond was formed; Kahn would forever refer to Salk as his greatest client. In 1960, the two first went to visit the project site that the city of San Diego and the University of California were offering for Salk's research center, on top of a large mesa overlooking the Pacific Ocean to the west and La Jolla to the south. With this commission, Kahn was at last given the chance to establish the entire nature of a space, planning all of its elements alongside Salk. Kahn had a new opportunity to explore his ideas of served and servant spaces, working again with Komendant, who was a partner in the design program, along with Salk.

- **Ask your students if they have had the experience of testing out an idea or technique in different situations. This could include a new sports maneuver or a challenging dance move. Ask them if this idea or experience is the same each time they attempt it. Does the experience change the more times they try something?**

Salk told Kahn that he wanted a place he could invite Picasso to.[15] With this in mind, Kahn immediately saw the need for a design program that would serve the technical and the human needs of the scientists who would use the space.

- **Ask your students to make a list of what they think constitute technical needs and humanistic needs for a space for scientific research. Can they see any similarities to the needs fulfilled in their place of research, their school? Ask your students to consider what Salk meant about inviting Picasso to the research center.**

- **Show your students the presentation model of the Salk Institute (Image Nineteen).**

13. Louis I. Kahn, quoted in Thomas Leslie, *Louis I. Kahn: Building Art, Building Science,* (New York: Braziller, 2005), 92.
14. Green, "Louis I. Kahn, Architect," 3.
15. Peter Reed paraphrases Salk in "Louis I. Kahn," in *Envisioning Architecture: Drawings from The Museum of Modern Art,* ed. Matilda McQuaid (New York: The Museum of Modern Art, 2002), 126.

Kahn and Salk developed a three-part design consisting of laboratories, a meetinghouse, and dormitories for visiting faculty. The laboratories were at the center of the design, and the meetinghouse and the dormitory sat on either side, to the north (left) and south (right) in the presentation model. The laboratories were realized, but the meetinghouse and dormitory have yet to be built.

- **Ask your students to locate all three structures in the presentation model, then ask them how these structures (laboratories, meetinghouse, and dormitories) address humanistic and technical needs. Can this question be answered by looking at this model?**

- **Next, show your students photographs of the built complex (Images Twenty to Twenty-seven).**

Each of the two laboratory structures is six stories tall, comprising three laboratory floors and three mechanical floors that house the utilities that the building needs to function. The selection of building materials was an integral part of the design process. Each material was carefully chosen for specific reasons, with respect to the aesthetic and functional needs of the building. For the laboratory structures, Kahn decided to use poured concrete, travertine marble, wood, steel, brick, and water. Kahn and Komendant designed wooden forms to serve as molds for the building, and concrete was then poured into the formwork. Once the concrete was cured, or hardened, the formwork was removed and the building was revealed. Kahn called concrete "liquid stone." This process of construction was not entirely uncommon at that time, but what was uncommon was Kahn's technique of leaving the exposed concrete free from any kind of added ornamentation. The pattern, seams, and joints of the formwork were left visible. In addition, Kahn also left visible the metal form ties (rods) that were used to hold the formwork in place. You can see part of an oval rod in Image Twenty.

- **Have your students look at the detail photographs of the Salk Institute (Images Twenty to Twenty-four). Ask them if they can identify the different building materials. Ask them to consider the nature of these materials and relate that to the function of the space.**

- **Have your students look at Image Twenty. Ask them describe the pattern they see.**

Another integral part of Kahn's design was the incorporation of natural light. He believed that natural light was a basic human need that should be considered in the design of buildings.

- **In what ways has Kahn incorporated natural light into the building design? Are all of the ways the same? Different? Do the building materials or the environment allow him to do this? Is it a combination of the two? Ask your students to refer to the images to support their ideas.**

In his original design, Kahn included a garden space between the two main laboratories. The space, as built, can be seen in Images Twenty-three, Twenty-five, and Twenty-six.

- **Have your students compare the photograph of the presentation model to the photographs of the space as it exists today. How did the original concept change, as evidenced by these photographs?**

Kahn wanted to include a garden to add to the natural elements of light, water, and trees and to further address the human needs of those who would inhabit the space. "I separated the studies from the laboratory and placed them over gardens," he said. "The garden became outdoor spaces where one can talk. Now one need not spend all the time in laboratories."[16]

16. Louis I. Kahn, quoted in Ronner, Jhaveri, and Vasella, *Complete Works,* 158.

As the design evolved, Kahn called in Mexican architect Luis Barragán to assist with the design of the courtyard garden. Kahn had been exposed to Barragán's work in an exhibition at The Museum of Modern Art. He recalled the first time Barragán saw the space:

> He turned to us and said, "I would not put a single tree in this area. I would make a plaza. . . . If you make a plaza, you will have another facade to the sky." I was so jealous of this idea that I could not help adding to it by saying "then we would get all those blue mosaics for nothing," pointing to the Pacific Ocean.[17]

There were concerns that a plaza made entirely of stone would appear harsh, so the architects created a central channel filled with water, which emptied into a fountain located in a lower courtyard, where staff could gather. This can be seen in Images Twenty-three and Twenty-five.

- **Have your students look at the images of the plaza. Have them compare the plaza to the garden concept in the model. How did the mood or tone of this place change when the trees were removed and a plaza was created?**

- **Next, show your students the cross-section view of one of the Salk Institute laboratory buildings (Image Twenty-eight). Ask your students to describe what they see. What do they think this drawing might represent?**

These rendering details show us a view of the side of the building as if one of its walls has been cut away. To the right are studies and stairway structures. To the left are three laboratory floors with mechanical structures above each one. The series of six rectangular shapes represent the trussing.

- **Print out and enlarge a copy of the image so that your class can work together to locate and identify the laboratory floors, mechanical areas, stairway structures, and studies. Have your students label the drawing like a map. Use the photographs included in this lesson as a guide for this exploration.**

In the design of the Salk Institute, Kahn and Komendant incorporated a type of support called a Vierendeel **truss** (named after the Belgian engineer Arthur Vierendeel, who developed the design in 1896). Kahn first used this style of trussing in the design for the Richards Building. The Vierendeel truss features rigid upper and lower beams connected by vertical beams. Previous to this innovation, diagonal beams connected the upper and lower beams in trusses; you can see this in many railroad bridges. This new style of truss could support the floor above and give lift to the ceiling below without any additional support system. This was the perfect solution for the Salk Institute, where laboratory spaces had to be flexible enough to be customized for the needs of incoming scientists. The laboratories could be designed as wide-open horizontal spaces, with their mechanical facilities stored above in the trussing, leaving more room in the laboratories themselves for people and equipment. Also, this allowed the space to include two separate channels, one for incoming clean air and one for outgoing gases expelled from experiments.

ACTIVITIES

1. Have your students conduct research to investigate other modern building styles. Information about modern structures can be found on MoMA's teacher Web site at www.moma.org/modernteachers. Search the site for the term *architecture* to find images and lessons. Have your students work in groups to create a presentation comparing the Richards Building to other buildings of its time.

17. Louis I. Kahn, quoted in Leslie, *Louis I. Kahn,* 165–66.

2. Have your students compare the Salk Institute and the Richards Building. These buildings were created to serve similar functions. How are they the same? How are they different? How does the environment in which they were built play a part in their designs?

3. Have your students explore structures further through the online curriculum of the Salvadori Center, at www.salvadori.org. On this site, you can order books and download lesson plans covering a range of architectural topics, including trussing, which will guide you in working with your students through a hands-on exploration of structures.

LESSON FIVE: The Spirituality of Matter

IMAGE TWENTY-NINE: National Assembly Building (center), Sher-e-Bangla Nagar, Dhaka, Bangladesh, c.1972. Louis I. Kahn Collection, University of Pennsylvania, and the Pennsylvania Historical and Museum Commission

IMAGE THIRTY: Interior Prayer Hall, Sher-e-Bangla Nagar, Dhaka, Bangladesh. National Assembly Building, 2002. Photograph: Raymond Meier

IMAGE THIRTY-ONE: Exterior Prayer Hall, Sher-e-Bangla Nagar, Dhaka, Bangladesh. National Assembly Building, 2002. Photograph: Raymond Meier

IMAGE THIRTY-TWO: Kahn and assistants with model of the Assembly complex, spring 1964. Louis I. Kahn Collection, University of Pennsylvania, and the Pennsylvania Historical and Museum Commission. Photograph: George Pohl

IMAGE THIRTY-THREE: Construction photo, National Assembly Building, Sher-e-Bangla Nagar, Dhaka, Bangladesh, c. 1970. Louis I. Kahn Collection, University of Pennsylvania, and the Pennsylvania Historical and Museum Commission

INTRODUCTION

In August 1963, Kahn received a telegram from the Pakistani department of public works asking him if he was interested in a commission to build the new National Assembly building in Dhaka, East Pakistan. Kahn accepted the commission, and in January 1963 he flew to Dhaka for the first of many visits. He was given a tour of the thousand-acre site of open farmland and was also given the design program from the Pakistani government. The project was designed in two phases. The first phase included the National Assembly Building, a prayer hall, and dormitories. With the expectation that eight hundred more acres would be acquired, the complete master plan included courtrooms, a hospital, a museum, schools, and low- and high-income residential areas. This lesson examines Kahn's process of designing a ceremonial building that was to serve as a political and spiritual symbol for a community.

LESSON OBJECTIVES

- **Students will learn about creating an architectural structure in another country and environment.**
- **Students will consider the design of structures that are meant to fit within an overall master plan for a site.**
- **Students will compare different types of construction techniques.**

INTRODUCTORY DISCUSSION

Organize your students into pairs. Assign one student to be the "drawer" and the other to be the "describer." Give pencils and paper to the drawers and give the describers copies of the photograph of the National Assembly Building (Image Twenty-nine). Then, ask the describers to explain what they see. The drawers should draw what they hear being described, without ever seeing the image, and the describers should limit their comments to descriptions of the image—they must not comment on the drawing that is being created. Various additional rules can be applied to this exercise. For instance, the drawer may not be allowed to ask the describer any questions, or the describer may not be allowed to see what the drawer is drawing. Decide which rules you want to apply, or take turns trying them all out. The activity works best when the drawers and describers switch roles. After ten minutes of describing and drawing, discuss the process with your students. What was the most challenging part of the exercise? Talk to your students about the ways individual perception and language play into this exercise. Inform your students that this photograph shows the National Assembly Building in Bangladesh (formerly East Pakistan)(center), designed by Kahn, and that it serves as the political seat of Bangladesh.

IMAGE-BASED DISCUSSION

- **Give your students a few minutes to look at the photograph of the National Assembly Building complex (Image Twenty-nine). Have your students note the different geometric forms they see.**

With this project, Kahn first focused on the National Assembly Building itself, which was to include a two-hundred-seat chamber for the legislature to convene in, a prayer hall, a dining hall, and numerous offices. He started his design process with rough sketches of a large square structure (or diamond-shaped, depending how it is viewed) with four corner towers. Then he went on to make rough sketches of the entire site, including secondary structures, such as dormitories and hostels, to the east and west of the National Assembly Building.

- **Have your students look closely at the photograph, taking note of the way Kahn incorporated geometry in his design.**

- **Next, show your students the photographs of the Prayer Hall (Images Thirty and Thirty-one).**

After he finalized his **concept** for the National Assembly Building, Kahn reconsidered the Prayer Hall. Originally, this space was not to be significant in size or **scale**. But the more Kahn thought about the nature of the space (designated for prayer and reflection), the more strongly he felt that it should be a significant part of the design. Kahn decided that the Prayer Hall should serve as the main entrance for the National Assembly Building. (Although, officially, this space was called the Prayer Hall, Kahn often referred to it as a mosque.) Kahn described his new design:

> The first design submitted . . . showed a Mosque as a separate building adjoining the Assembly Building. In this new second scheme, the Prayer Hall of the program is made a part of the spaces of the Assembly block and woven into the architecture as one. In this way, its meaning is equally emphatic as a mosque and gives equal spiritual significance without inviting controversy.[18]

- **Have your students compare the interior and exterior views of the Prayer Hall (Images Thirty and Thirty-one). How are they similar? How are they different? Ask your students if they have ever experienced a building whose interior and exterior seemed very different.**

18. Louis I. Kahn, quoted in Brownlee and De Long, *Louis I. Kahn*, 376.

- **Ask your students to consider what the experience of approaching, entering, and being inside the Prayer Hall would be like.**

- **Ask your students to consider what Kahn may have meant when he talked about weaving the Prayer Hall into the Assembly Building as one architectural form, giving it more "spiritual significance."**

- **Next, show your students the photograph of Kahn and his assistants in his studio (Image Thirty-two).**

For months, Kahn continued to refine his ideas and make additional **scale models** of the structures included in the master plan. In this photograph you can see Kahn and his assistants maneuvering the various models, trying out different configurations.

Kahn and his team also considered the placement of the structures within the cardinal (directional) points. Eventually they decided to shift the Prayer Hall east, to face toward Mecca, a city in Saudi Arabia considered to be the spiritual center of Islam because it is the birthplace of the prophet Mohammed.

- **Ask your students how this choice connects to Kahn's idea that this space should have "spiritual significance."**

Kahn felt strongly that the structures he designed for this site should not just stand for the political nature of the National Assembly's activities but also for their spiritual nature. Ask your students if they feel that Kahn succeeded in this.

- **Next, show your students the construction photograph of the site (Image Thirty-three).**

Once the design was complete, Kahn and his team began to plan the construction phase of the project. Kahn worked with his long-time colleague August Komendant, a **structural engineer**. This project presented engineering issues unlike any they had dealt with before.

- **Ask your students to compare these construction photos to the images of the Alfred Newton Richards Medical Research Building under construction from previous lessons (Images Fifteen to Eighteen). Have them describe the differences they see. What do these photos reveal about the construction process? Ask your students to consider how environment and culture might affect this process.**

The issues surrounding the construction of this project included the climate of the region and construction techniques in Asia. The structures were built by hand, with workers carrying concrete on their heads up and down bamboo scaffolding, and they were not completed for twenty-three years. Construction was held up in 1971 by war, as East Pakistan (Bangladesh) sought independence from West Pakistan. Many feared that the site would be bombed during the conflict, but enemy pilots bypassed the site, thinking it was an ancient ruin. Eventually, the conflict was resolved and the site was renamed Sher-e-Bangla Nagar (the city of the Bengal tiger). By 1983, most of the work was complete. Kahn, who died in 1974, was posthumously presented the Aga Khan Award for Architecture for the Sher-e-Bangla Nagar National Assembly Building.

ACTIVITY

Have your students research the history and culture of Dhaka, the capital of Bangladesh. Have them consider the area, its climate, food, music, population, and architecture. Working in groups, students should select areas of individual research, then combine their work into a group presentation. Compare the process of designing the National Assembly complex with the process of designing the First Unitarian Church of Rochester, discussed in Lesson Three. Have your students consider the cultural and environmental factors of each project.

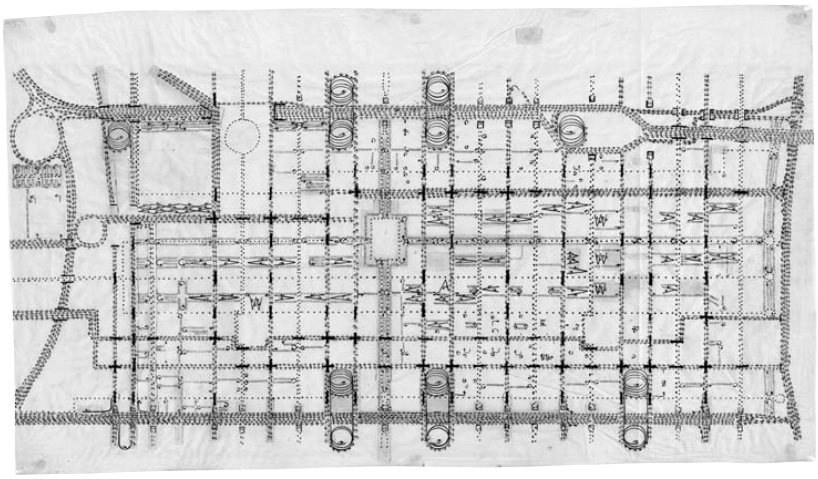

IMAGE THIRTY-FOUR: Louis I. Kahn. American, born Estonia. 1901–1974. Traffic Study, project, Philadelphia, Pennsylvania. Plan of proposed traffic-movement pattern. 1952. Ink, graphite, and cut-and-pasted papers on paper, 24 ½ x 42 ¾" (62.2 x 108.6 cm). The Museum of Modern Art, New York. Gift of the architect

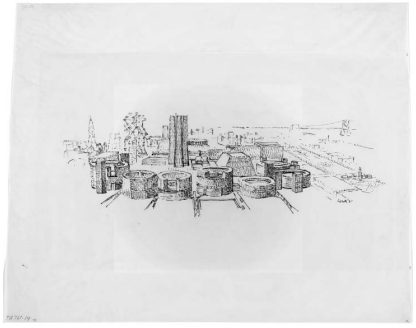

IMAGE THIRTY-FIVE: Louis I. Kahn. American, born Estonia. 1901–1974. Civic Center, project, Philadelphia, Pennsylvania. Aerial perspective. 1957. Ink on tracing paper, 11 x 14" (27.9 x 35.6 cm). The Museum of Modern Art, New York

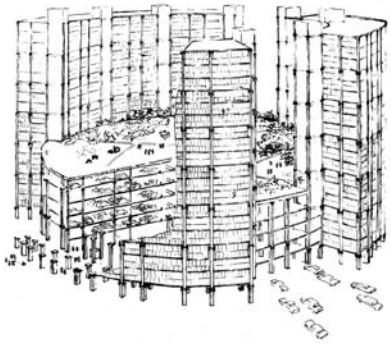

IMAGE THIRTY-SIX: Louis I. Kahn. American, born Estonia. 1901–1974. Civic Center, project, Philadelphia, Pennsylvania. Cut-away perspective of parking tower. c. 1957. The Architectural Archives, University of Pennsylvania, by the gift of Richard Saul Wurman

INTRODUCTION

"What spaces, what activities, what buildings formed the creative center of human communication?"[19] This is the question Kahn was asking in the 1950s. He felt that in order to preserve the quality of life in urban environments, people, buildings, and services should be brought to the city center and cars and roadways should be placed on the periphery, or outer edges. This would, he theorized, allow people to walk safely and easily from place to place within a city. This lesson explores Kahn's conceptual plans for the redevelopment of Philadelphia in the 1950s.

19. Louis I. Kahn, quoted in Reed, "Louis I. Kahn," 112.

LESSON OBJECTIVES

- **Students will learn that in addition to buildings, architects are involved with the design of cities and systems of flow for pedestrians and vehicular traffic.**

- **Students will be introduced to the discipline of urban planning and will consider how it relates to other architectural processes or concepts.**

- **Students will compare and contrast conceptual drawings and plans.**

INTRODUCTORY DISCUSSION

In the 1950s, Philadelphia was undergoing a period of redevelopment, and Kahn, a long-time Philadelphia resident, was very interested in the idea of improving modern urban life. Based on his principle of "served" and "servant" spaces, Kahn created conceptual plans for the Center City district of Philadelphia that included traffic-flow redesign and structures that were sensitive to the issues of an ever-growing urban center. Have your students brainstorm a list of possible improvements to the design of their neighborhood. Have them consider what might have to occur in order to have these ideas come to fruition.

IMAGE-BASED DISCUSSION

- **Show your students the plan drawing of Kahn's proposed traffic-movement pattern for Philadelphia (Image Thirty-four). Ask your students to describe what they see in this drawing.**

Inform them that this is a plan of the Center City region of Philadelphia. In this drawing, Kahn started his exploration of the modern city with a look at how traffic flows, specifically addressing what he saw as a need to reorganize streets to alleviate congestion. He created a system of symbols to represent the different types of traffic flow. The dotted line represents stop-and-go movement of trucks and buses. Arrows represent fast-moving traffic, and the spirals represent cars in parking lots. In his plan, Kahn said, he intended "to redefine the use of streets and separate one type of movement from another so that cars, buses, trolleys, trucks, and pedestrians will move and stop more freely, and not get in each other's way. . . . This system of movement is not designed for speed but for order and convenience. The present mixture of staccato, through, stop and go makes all the streets equally ineffectual."[20]

- **Have your students look at the drawing again, using the notation system as a guide for reading it. What conclusions can they draw based on the notations? Draw their attention to the bands of arrows running around the periphery of the drawing. Ask your students what kind of roadway this might represent.**

In Kahn's drawing, the bands of arrows around the periphery of Philadelphia's downtown area are expressways. The circular arrows represent parking towers, while in the center are smaller streets. He likened this plan to the walled cities of ancient times, specifically Carcassonne, a walled town in southern France. Just as Carcassonne had to defend itself against its enemies, Kahn felt the modern city must defend itself against the automobile, which he saw as a threat to human interaction. Kahn himself did not own a car. He never learned to drive, and he felt that cars should be kept to the periphery of the city, which would allow the downtown to be reserved for pedestrians.

- **Next, show your students the panoramic aerial (bird's-eye) view of Kahn's proposed city structures (Image Thirty-five). With this drawing, Kahn was further developing his idea for a city surrounded by cylindrical parking towers. Have your students look at the panorama**

20. Louis I. Kahn, "Toward a Plan for Midtown Philadelphia," in Latour, *Louis I. Kahn,* 29.

view to locate the cylindrical structures. Ask your students what other forms they see in the foreground, middle ground, and background. Ask them if these structures recall other structures they are familiar with.

A panorama is a form of pictorial representation that allows for a wide, unobstructed view. The cylindrical structures in the foreground are parking towers that would sit on the periphery of the city, leaving the downtown open for institutions.

- **Next, show your students the detail cut-away view of the parking tower (Image Thirty-six).**

- **Ask your students to compare this detail to the panorama view. Ask them to describe how it is different. What information can they see here that is not available to them in the panorama view? Ask your students to debate the merits of this design for Philadelphia. Ask them to express their feelings about the validity of this design concept and whether or not it would better the lives of the people who live there.**

Ultimately, Kahn's plans were not considered as part of the redevelopment of Philadelphia due to conflicting opinions within the city planning administration. Although they were not realized, architects and scholars continue to research and reference Kahn's ideas about the modern city.

ACTIVITIES

1. Have your students take part in a study of their environment based on some of the concepts included in Kahn's design for Philadelphia. Have your students include movement studies that reflect the pattern of traffic on streets and sidewalks. Consult with your local library to obtain maps of your city or town to use as the basis for the projects. Once your students have gathered their data, have them work in teams to analyze their findings and make recommendations for ways to improve their community. Have the teams create two- and three-dimensional presentations of all phases, from research to design. Set up your classroom as a gallery space, and invite members of the school and the local community to see the completed work.

2. Kahn's conceptual drawings for Philadelphia's Center City were inspired in part by eighteenth-century views of Rome. Have your students search online for images of Rome. They can go to the Metropolitan Museum of Art's Web site (www.metmuseum.org) to use the museum's Timeline of Art History feature. Have your students compare the images of Rome to Kahn's designs.

FOR FURTHER CONSIDERATION

The excerpt below is taken from Kahn's writing about his architectural philosophy. Have your students analyze this text and discuss its meaning.

> A great building, in my opinion, must begin with the unmeasurable, go through measurable means when it is being designed, and in the end must be unmeasurable. The design, the making of things, is a measurable act. At that point, you are like physical nature itself, because in physical nature everything is measurable—even that which is as yet unmeasured. . . . But what is unmeasurable is the psychic spirit. The psyche is expressed by feeling and also thought and I believe will always be unmeasurable. I sense that the psychic existence-will calls on nature to make it what it wants to be. I think a rose wants to be a rose. Existence-will, man, becomes existence, through nature's laws and evolution. The results are always less than the spirit of existence.
>
> In the same way, a building has to start in the unmeasurable aura and go through the measurable to be accomplished. It is the only way you can build. The only way you can get it into being is through the measurable. You must follow the laws, but in the end, when the building becomes part of the living, it evokes unmeasurable qualities. The design involving quantities of brick, method of construction, engineering is ended and the spirit of its existence takes over.[21]

Have your students revisit previous examples of Kahn's philosophy outlined in his words. Ask your students to consider whether their perspectives or opinions about the built environment have changed based on what they have learned.

CONCLUDING QUESTIONS

Put the images of Kahn's finished buildings featured in this guide side by side and ask your students to compare them.

- **Ask students what kinds of similarities and differences they notice. Have them use visual evidence to back up their assertions.**
- **Ask them which designs they like best. Discuss why.**
- **Ask your students to make a list of any remaining questions they have about the buildings featured in this guide or about architecture in general. Have them take turns writing questions on the board, and then organize the questions into categories, which may include: historical events during Kahn's lifetime, and how these factors may have played a role in his career; building materials and technologies; history of a building's community; economic factors, such as the cost of materials, construction, or land; and climate or natural environment.**

21. Louis I. Kahn, quoted in Green, "Louis I. Kahn, Architect," 3.

RESEARCH PROJECTS

Unbuilt Masterworks

Kahn remains an important figure in the history of American architecture. Have your students conduct research projects about his built and unbuilt masterworks. His projects include libraries, art museums, schools, memorials, parks, places of worship, and residential buildings in the United States and abroad. Consult the bibliography section of this guide for a list of research resources. In addition to Kahn's works, detailed texts of his lectures and writings are available for consideration and reference.

Art Museums

As well as the buildings included in this guide, Kahn designed and built several art museums in the United States. These include the Kimbell Art Museum in Fort Worth, Texas, and the Yale Center for British Art and the Yale University Art Gallery, both in New Haven, Connecticut. These buildings have been recognized in the architectural community for the excellence of their designs. Have your students research these sites for in-class discussion.

Adopt an Architect

Contact your local chapter of the American Institute of Architects or a historic preservation group in your area, such as the National Trust for Historic Preservation. Ask if they can arrange for a local architect to visit your school and partner on a participatory design project with your students.

Walk around the Block

Conduct a walking tour of the neighborhood around your school. Have your students find examples of buildings that incorporate some of the styles or features that they have learned about in this guide. Have them document their findings.

GLOSSARY

Ambulatory: A covered place for walking, as in a cloister.

Column: A decorative pillar, most often composed of stone and typically having a cylindrical or polygonal shaft with a capital and usually a base.

Concept: A scheme; a plan. An idea.

Cupola: A light structure on a dome or roof, serving as a belfry, lantern, or belvedere.

Design brief: A written record describing the elements and scope of a design project**.**

Dome: A vault with a circular plan that is usually in the form of a portion of a sphere and that is constructed to exert an equal thrust in all directions.

Draftsman: A person who draws plans or designs, often of structures to be built.

École des Beaux-Arts: Literally, school of fine art. Refers to one of several art schools in France that advanced a classical approach to design**.**

Model: In architecture, a three-dimensional representation of a concept and/or a design for a building.

Pediment: In classical architecture, a low gable, typically triangular with a horizontal cornice and raking cornices, surmounting a colonnade, an end wall, or a major division of a facade.

Plan: A scale drawing or diagram showing the structure of an object or arrangement of objects.

Rendering: A drawing in perspective of a proposed structure.

Scale: The relationship between the sizes of two objects.

Structural engineer: A person who inspects, analyzes, designs, plans, and researches structural components and structural systems.

Truss: A static structure used in architecture and structural engineering usually consisting of straight slender members interconnected at joints into triangular units.

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ONLINE RESOURCES

American Institute of Architects
www.aia.org

The Center for Understanding the Built Environment (CUBE)
www.cubekc.org

Cooper-Hewitt, National Design Museum
www.ndm.si.edu

First Unitarian Church
www.rochesterunitarian.org

Great Buildings
www.greatbuildings.com

Grove Dictionary of Art Online (requires subscription)
www.groveart.com

Learning by Design, A Program of the New York Foundation for Architecture,
The Center for Architecture
www.nyfarchitecture.org

The Louis I. Kahn Collection,
The Architectural Archives of the University of Pennsylvania
www.design.upenn.edu/archives/majorcollections/kahn.html

Modern Teachers
www.moma.org/modernteachers

The Museum of Modern Art, New York
www.moma.org

National Architectural Trust
www.natarchtrust.org

National Building Museum
www.nbm.org

PBS Building Big
www.pbs.org/wgbh/buildingbig/wonder/structure/home_insurance.html

Salvadori Center: Education and the Built Environment
www.salvadori.org

FILM

My Architect. 2003. Written and directed by Nathaniel Kahn

ABOUT MOMA LIBRARY

The Museum of Modern Art Library is a comprehensive noncirculating collection devoted to modern and contemporary art. It documents painting, sculpture, drawings, prints, photography, architecture, design, performance, video, film, and emerging art forms from 1880 to the present. Staff are available to help locate relevant collections and materials or to direct your question to the appropriate department.

The Library's holdings include approximately 300,000 books and exhibition catalogues, 300 periodical subscriptions, and over 40,000 vertical files of announcements and ephemera about individual artists. Collection highlights include works on Dada and Surrealism, The Museum of Modern Art/Franklin Furnace Artist Book Collection, and the Political Art Documentation and Distribution (PAD/D) Archive. The Library is open by appointment only.

For more information please visit www.moma.org/research/library.

ABOUT MOMA ARCHIVES

The Museum Archives were established in 1989 to collect, organize, preserve, and make accessible documentation concerning the Museum's art historical and cultural role in the twentieth century and, now, the twenty-first. They are also an internationally recognized center of research for primary source material concerning many aspects of modern and contemporary art. The Archives are open by appointment only.

For more information please visit www.moma.org/research/archives.

MOMA SCHOOL PROGRAMS

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For more information about Teacher Resources, please call (212) 708-9882 or e-mail teacherprograms@moma.org.

PLANNING A MUSEUM VISIT

To schedule a guided discussion with a Museum Educator at MoMA or in your classroom, please contact Group Services at (212) 708-9685 or email groupservices@moma.org.

For more information about School Programs, please call (212) 333-1112 or e-mail schoolprograms@moma.org.

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