



# ARCHITECTURE DESIGN THEORY

## PART 5: CIRCULATION

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# ARCHITECTURE DESIGN THEORY



## LECTURE SERIES

- ❑ PART 1 PRIMARY ELEMENTS
- ❑ PART 2 FORM
- ❑ PART 3 FORM & SPACE
- ❑ PART 4 ORGANIZATION
- ❑ **PART 5 CIRCULATION** *(This Lecture)*
- ❑ PART 6 PROPORTION & SCALE
- ❑ PART 7 PRINCIPLES

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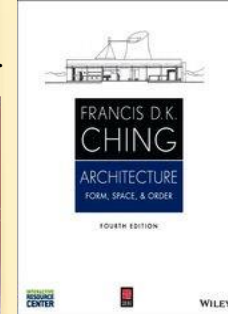
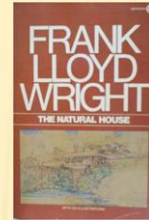
# SOURCES

\* Personal Architecture projects, frequent international travel, BS Architectural Engineering (U.Texas 84), plus 1-1/2 years of Urban Design (UCSD 1986-87)

## COURSE TEXTBOOKS

[1] Ching, Francis D.K. *Architecture: Form, Space, and Order*. 4 ed., Wiley, 2014.

[2] Wright, Frank Lloyd. *The Natural House*. Bramhall House; 1954.



## OTHER SOURCES

[3] Storrer, William A. *The Architecture of Frank Lloyd Wright, Complete Catalog*. 4<sup>TH</sup> ed. U. of Chicago Press, 2017.

[4] Bacon, Edmond. *Design of Cities*. Thames & Hudson Ltd, 1978.

[5] Lynch, Kevin. *The Image of The City*. MIT Press, 1960.

[6] Wright, Frank Lloyd. *Testament*. New York, Bramhall House, 1957.

[7] Froebel; *Brief History of the Kindergarten*. Froebel Gifts, 2013.

<http://www.froebelgifts.com/history.htm>

[8] *PENN Rare Book and Manuscript: Frank Lloyd Wright's Paternal Family*. Penn Library. University of Pennsylvania, Feb. 20, 2014.

<http://www.library.upenn.edu/rbm/featured/mscoll822.html>

[9] Huxtable, Ada Louise. *Frank Lloyd Wright*. New York Times, Oct. 31, 2004.

<https://www.nytimes.com/2004/10/31/books/chapters/frank-lloyd-wright.html>

[10] Burns, Ken, and Novick, Lynn. *Frank Lloyd Wright: A Film by Ken Burns and Lynn Novick DVD*. PBS Home Video, August 28, 2001.

[11] Wright, Frank Lloyd. *The Art and Craft of the Machine*, Vol. 8, No. 2 pp. 77-81, 83-85, 87-90, May, 1901.

<https://www.jstor.org/stable/pdf/25505640.pdf>

[12] Wright, Frank Lloyd. *In the Cause of Architecture*. Architectural Record, vol. XXIII, March 1908.

[13] Wright, Frank Lloyd. *In the Cause of Architecture; Second Paper*. Architectural Record, May 1914.



our bodies and our movement are in constant dialogue with  
our buildings.

Charles Moore and Robert Yudell  
*Body, Memory, and Architecture*  
1977

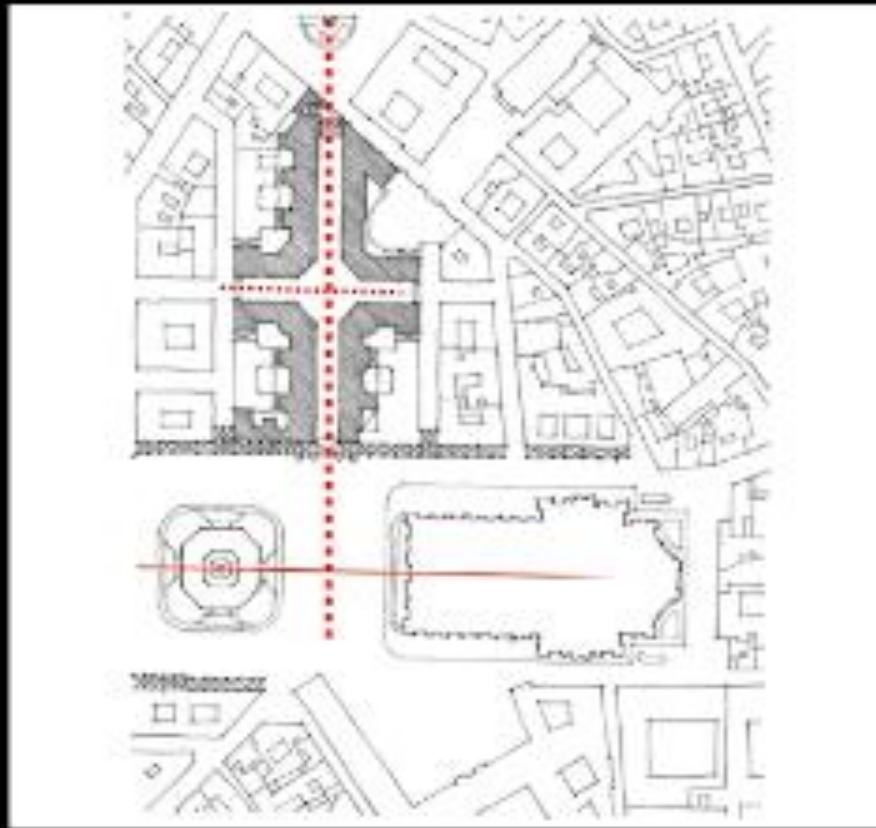


*“The path of our movement is thread that links a series of interior or exterior spaces.” [1]*

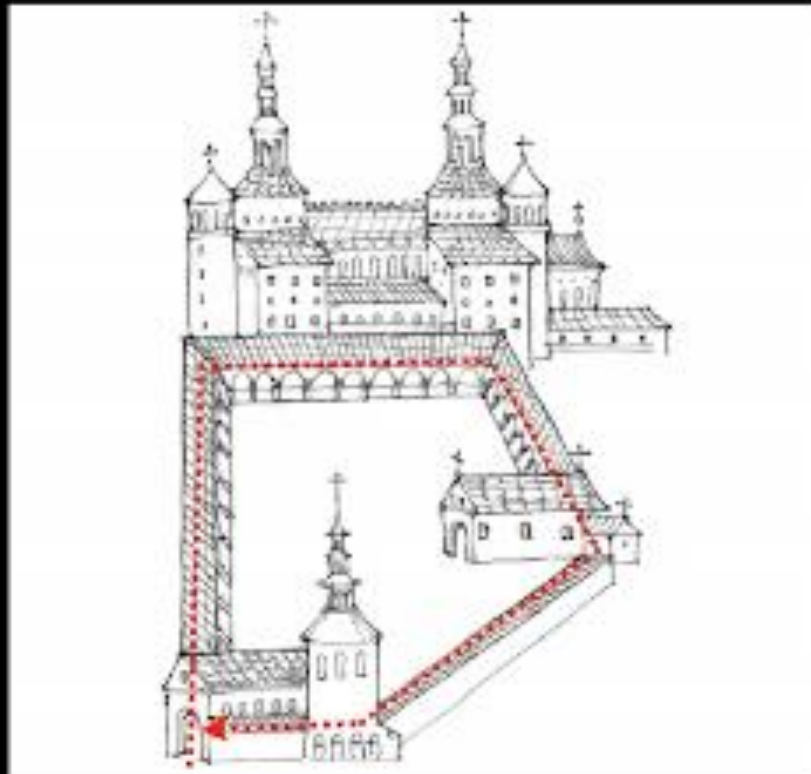


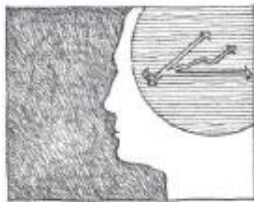
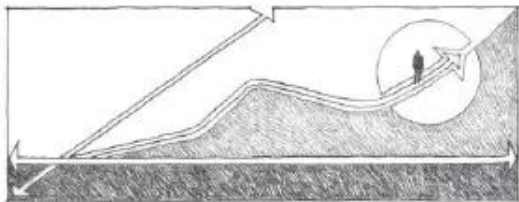


*“thread that links EXTERIOR spaces.” [1]*

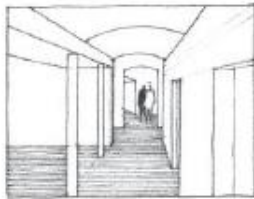
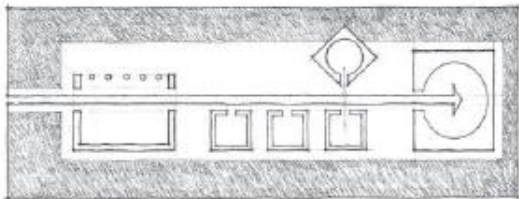


*“thread that links INTERIOR spaces.” [1]*

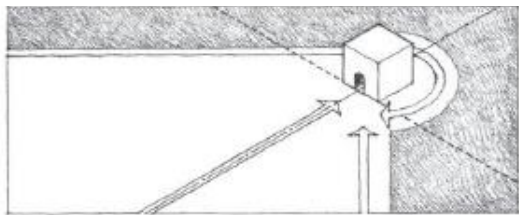




PATH configuration  
- Sequence of Spaces

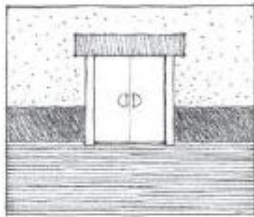
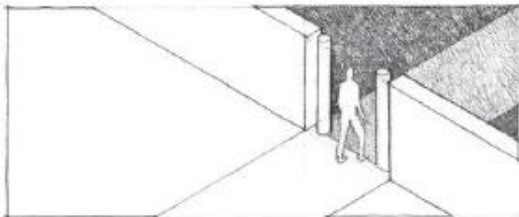


PATH-SPACE relationship  
- EDGES and NODES

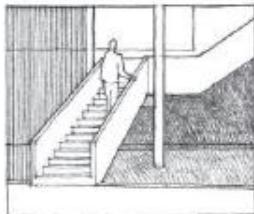
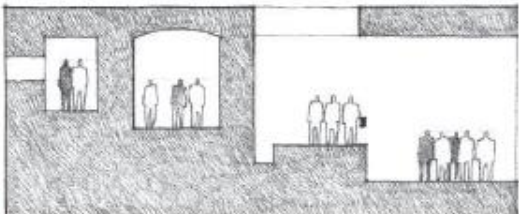


APPROACH  
-The Distant View

URBAN DESIGN  
ARCHITECTURE



ENTRANCE

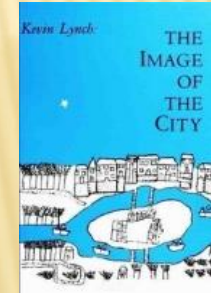
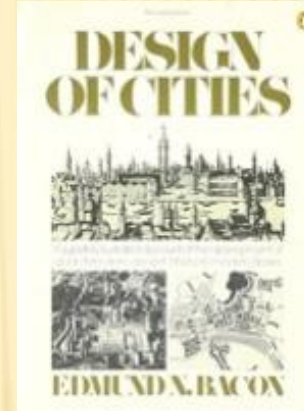


FORM of CIRCULATION space  
- Corridors, Halls, Stairs, Rooms





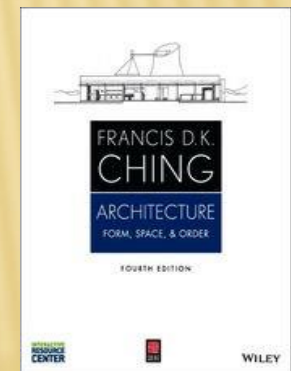
In **URBAN DESIGN**, we identify and design **Paths, Edges, Nodes, and Axis** [4,5]



## URBAN DESIGN ARCHITECTURE

In **ARCHITECTURE**, we design

- Promenades – typically along a waterfront
- Concourses – like in airports
- Hallways – connecting path within building
- Corridors – hallway with doors to rooms



# CIRCULATION

- A) *in Urban Design*
- B) *in Architecture*



# CIRCULATION

## A) *in Urban Design*





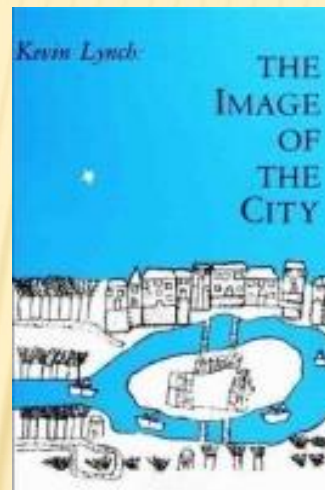
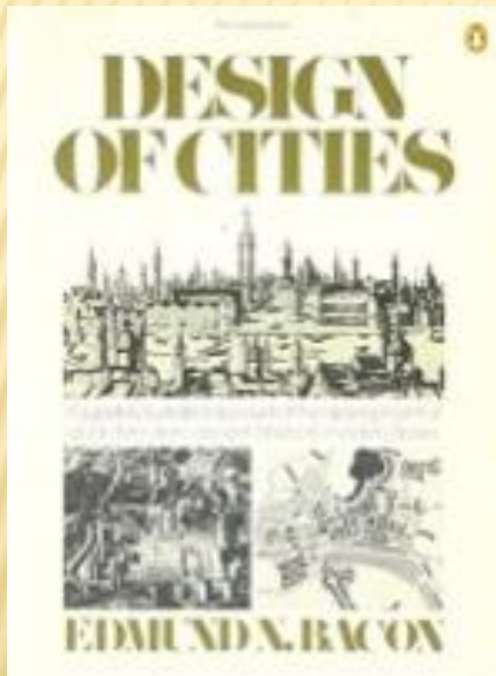
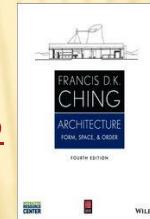
# CIRCULATION in URBAN DESIGN

a Line can create a **PATH** [5]

a Line can create an **EDGE** [5]

a Line can create an **AXIS** [4] ... more in PART 7 PRINCIPLES

**NODES** can be created along a PATH, EDGE, or AXIS [5]



[4] Bacon, Edmond. *Design of Cities*. Thames & Hudson Ltd, 1978.

[5] Lynch, Kevin. *The Image of The City*. MIT Press, 1960.



# LINE → PATH

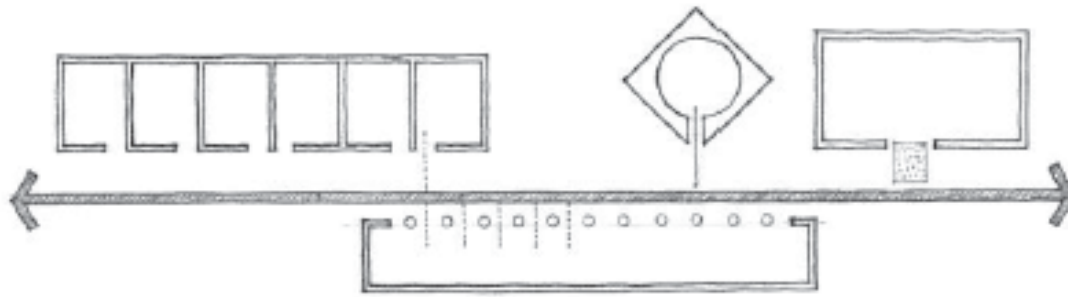
*“The **CHARACTER** of a line, whether taut or limp, bold or tentative, graceful or ragged, is determined by our perception of its **length-to-width ratio**, its **contour**, and its **degree of continuity**” [1]*



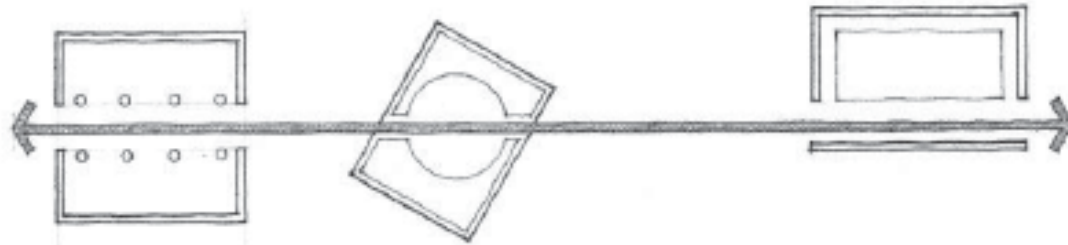
*“Since we move in time, through a sequence of spaces, we experience a space in relation to where we’ve been and where we anticipate going.” [1]*







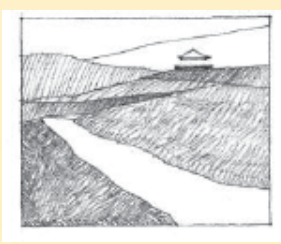
Pass by Spaces



Pass through Spaces

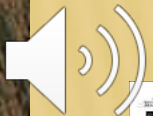


Terminate in a Space



## APPROACH -The Distant View

Wunderlich Pennsylvania Design/Build, 2000's





# Rail LINES in Europe



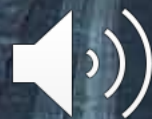




















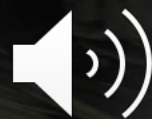


























## PARIS (ONE OF THE OLD STATIONS)







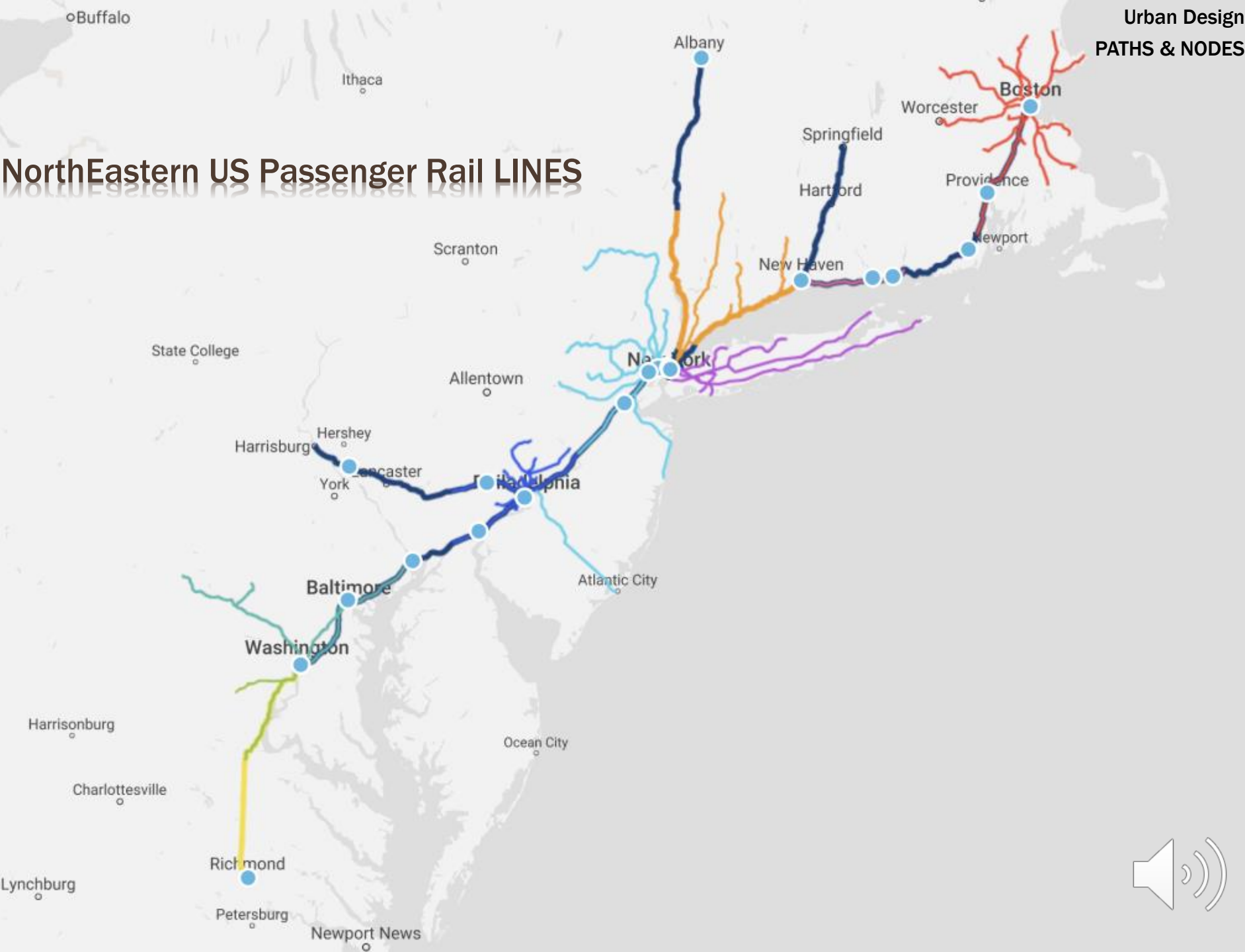
TOTALLY







# North Eastern US Passenger Rail LINES





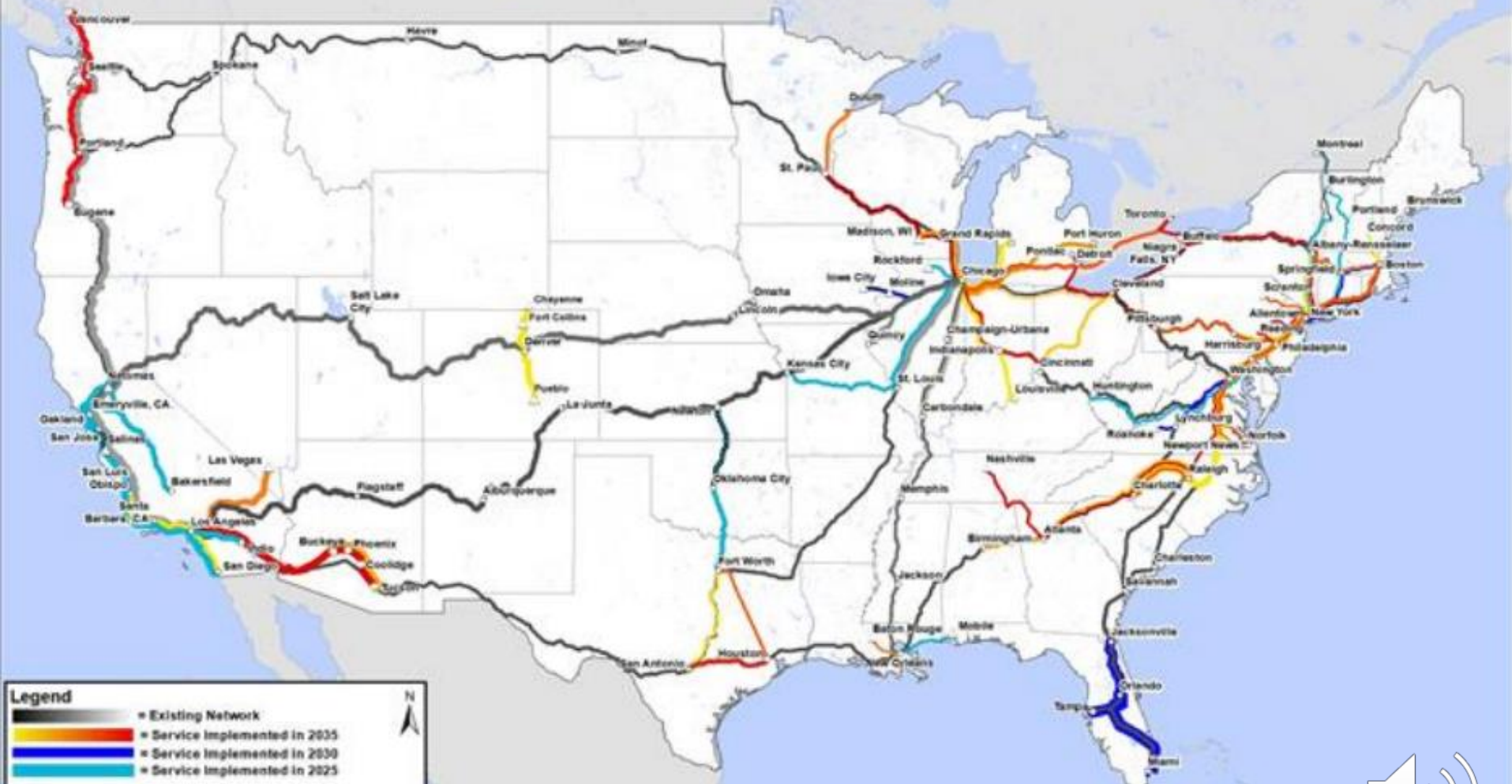
## NorthEastern US Passenger Rail LINES (2022 Proposed)



New service is highlighted in light blue, enhanced service in yellow and existing service in dark blue (Image credit: Amtrak)



# *The Amtrak System 2035*





## GRAND CENTRAL STATION (NEW YORK)





# GRAND CENTRAL STATION (NEW YORK)





# GRAND CENTRAL STATION (NEW YORK)





# GRAND CENTRAL STATION (NEW YORK)



GRAND CENTRAL STATION

NEW YORK CITY, 1934





# UNION STATION, WASHINGTON DC





# UNION STATION, WASHINGTON DC





# READING STATION (PHILADELPHIA)

Urban Design  
NODE





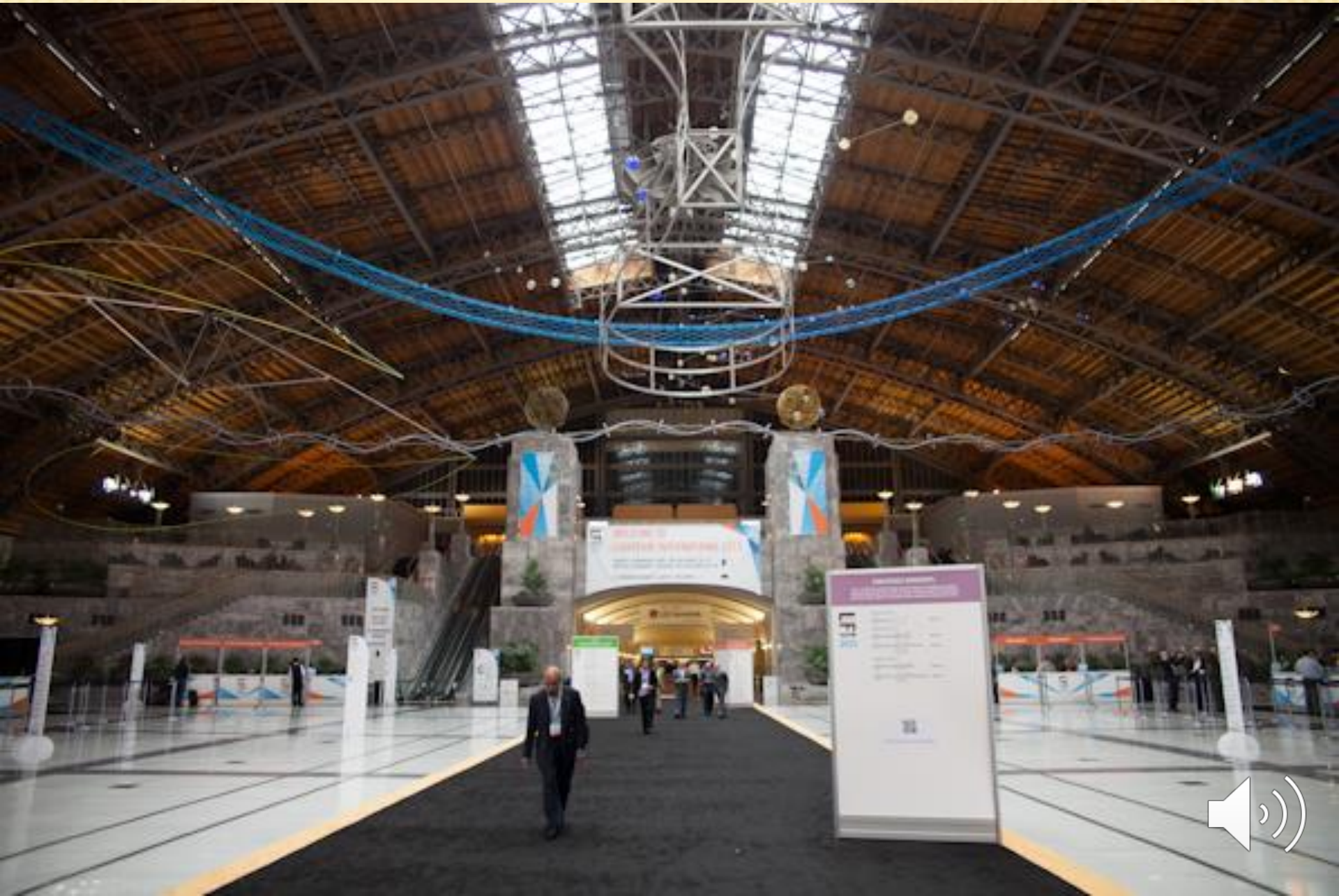


READING TERMINAL (PHILADELPHIA)



# READING TERMINAL (PHILADELPHIA)

– REPURPOSED AS AN EXHIBITION SPACE

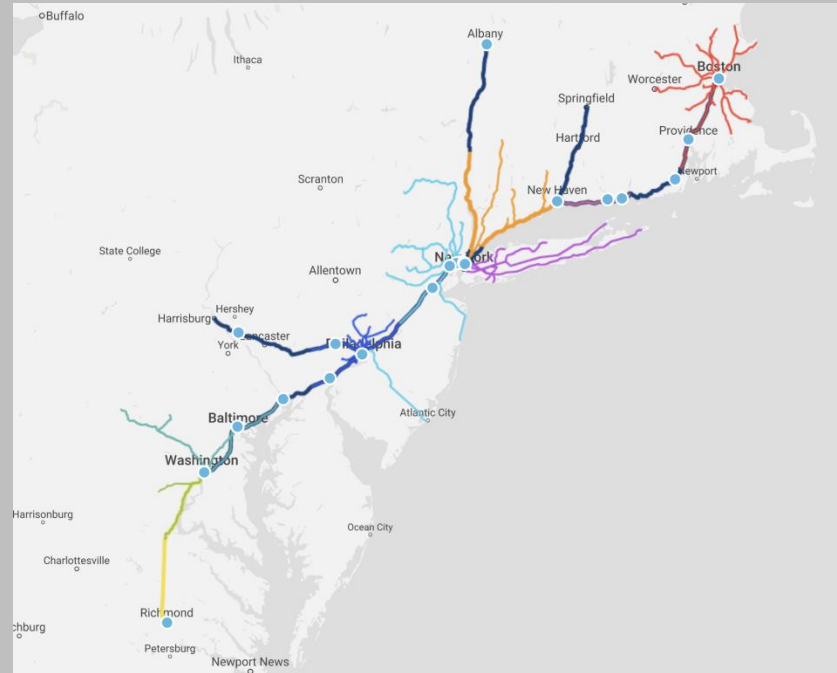


# Philadelphia Regional Rail LINES



# Amtrak Northeast Corridor Rail LINES

Urban Design  
PATHS & NODES



Strafford Station  
*J Wunderlich III Hometown*



Elizabethtown Station





## 30<sup>TH</sup> STREET STATION (PHILADELPHIA)





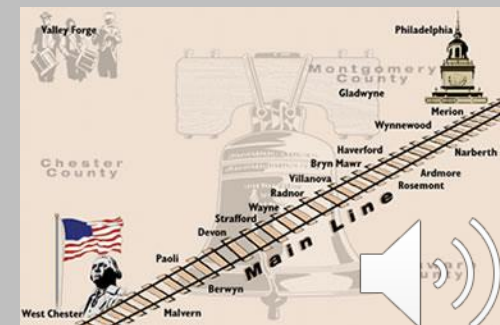
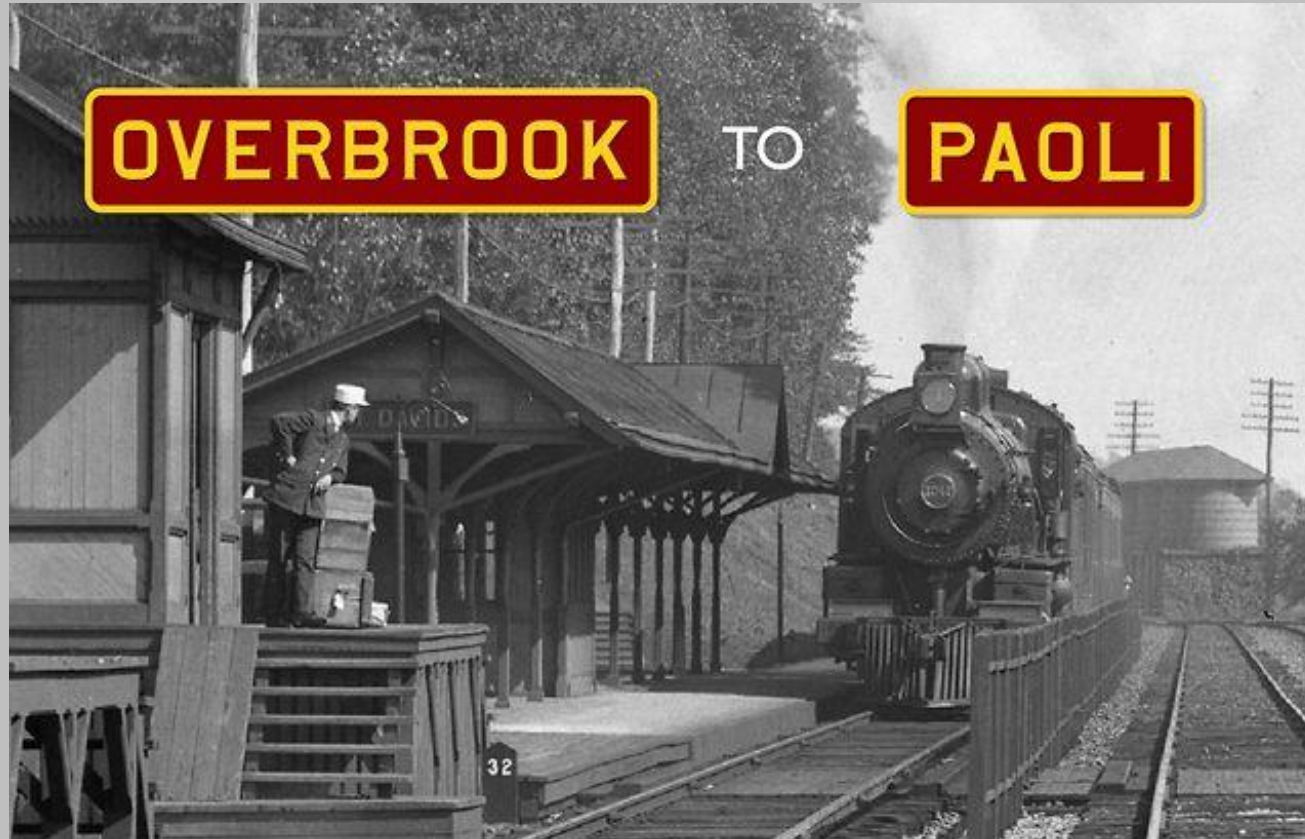
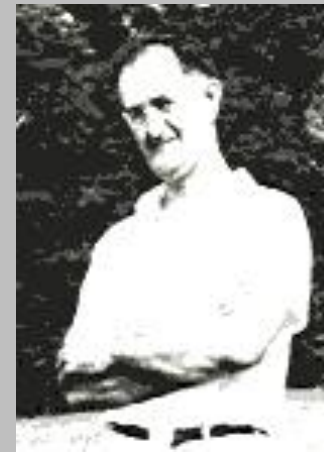
# 30<sup>TH</sup> STREET STATION (PHILADELPHIA)

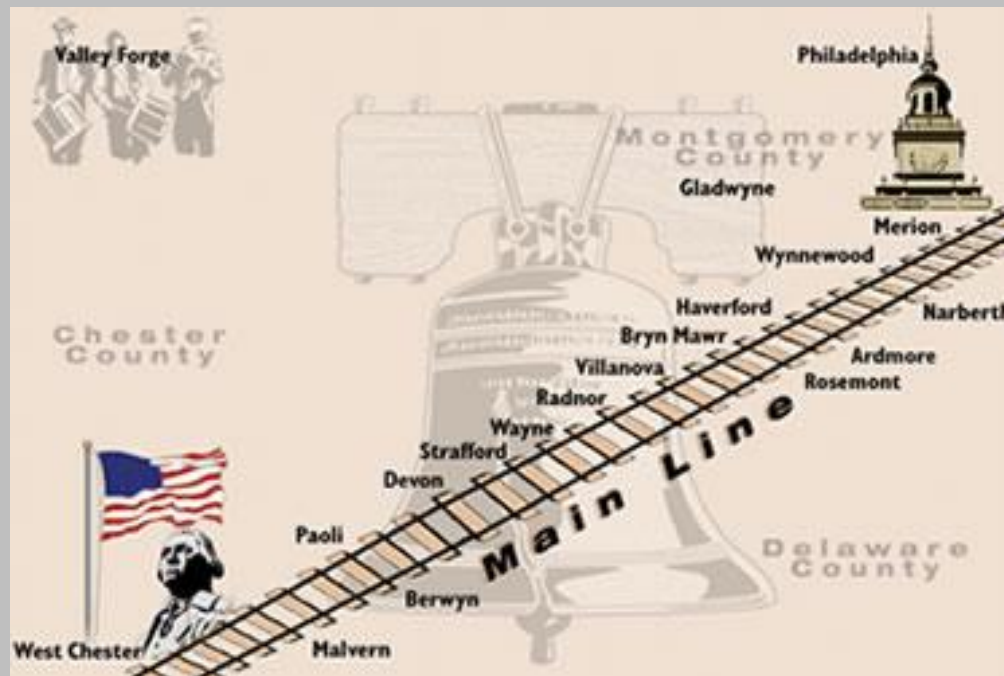




## Joseph Henry Wunderlich I 1890 to 1968

50 Years Designing Locomotives  
(Baldwin Locomotives in Philadelphia)





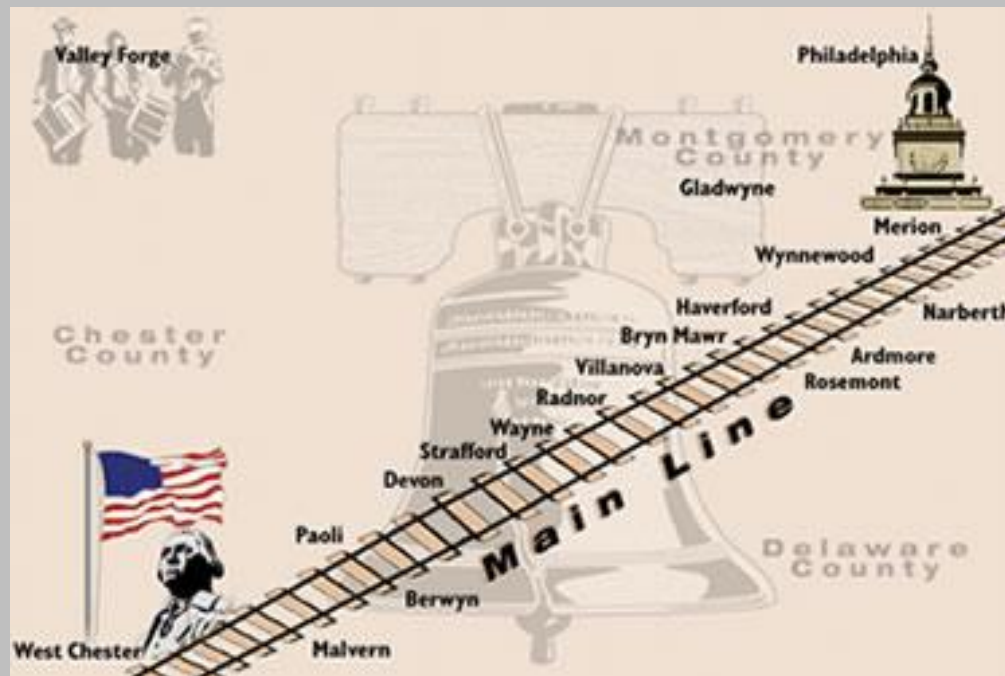
Overbrook



Merion



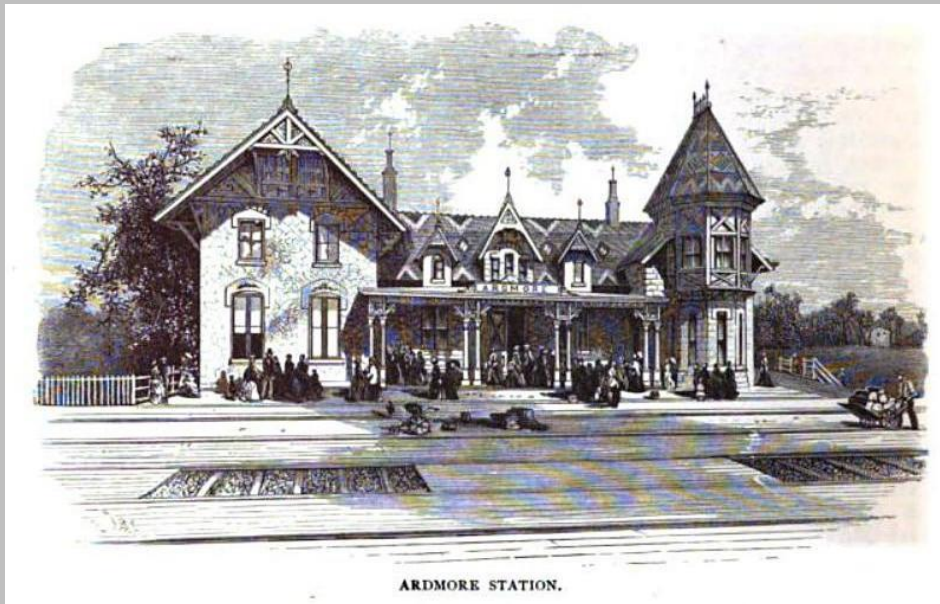
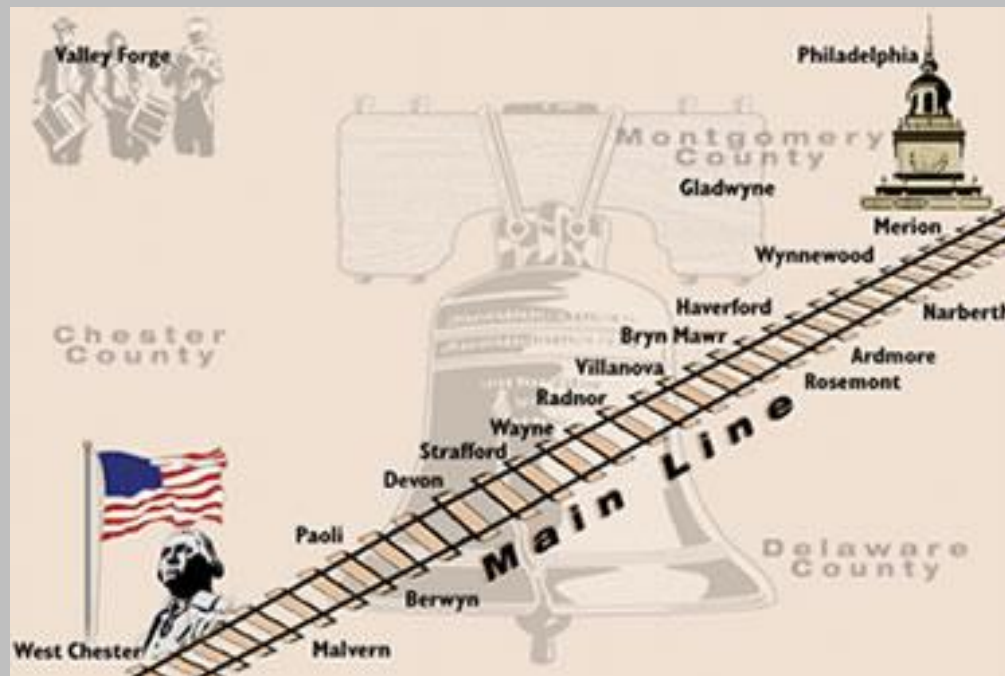




Narberth



Wynnewood



ARDMORE STATION.

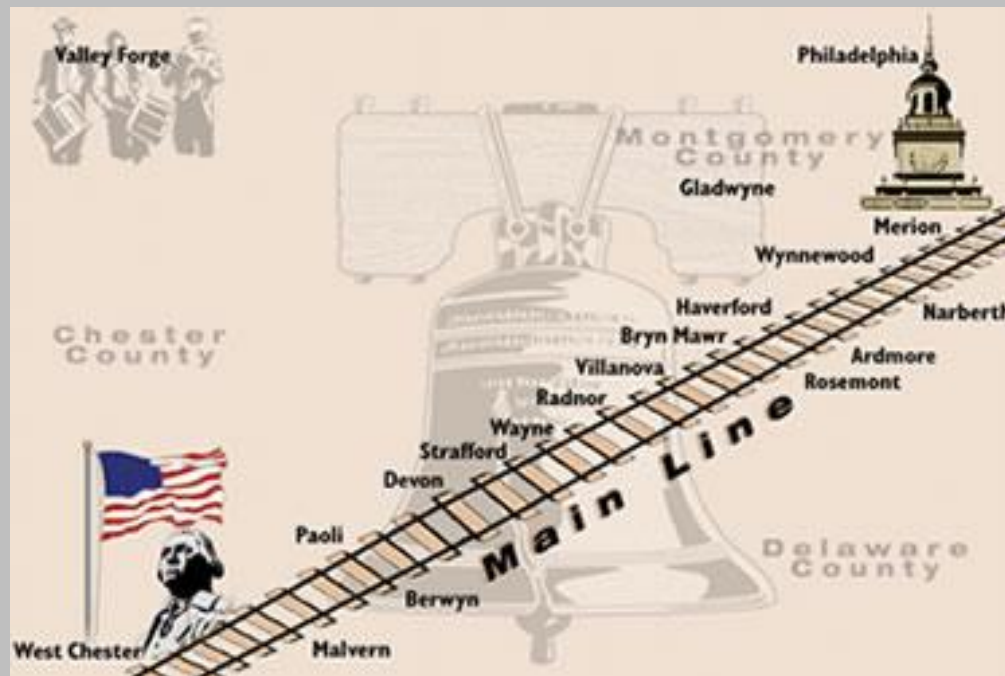
Ardmore



Haverford







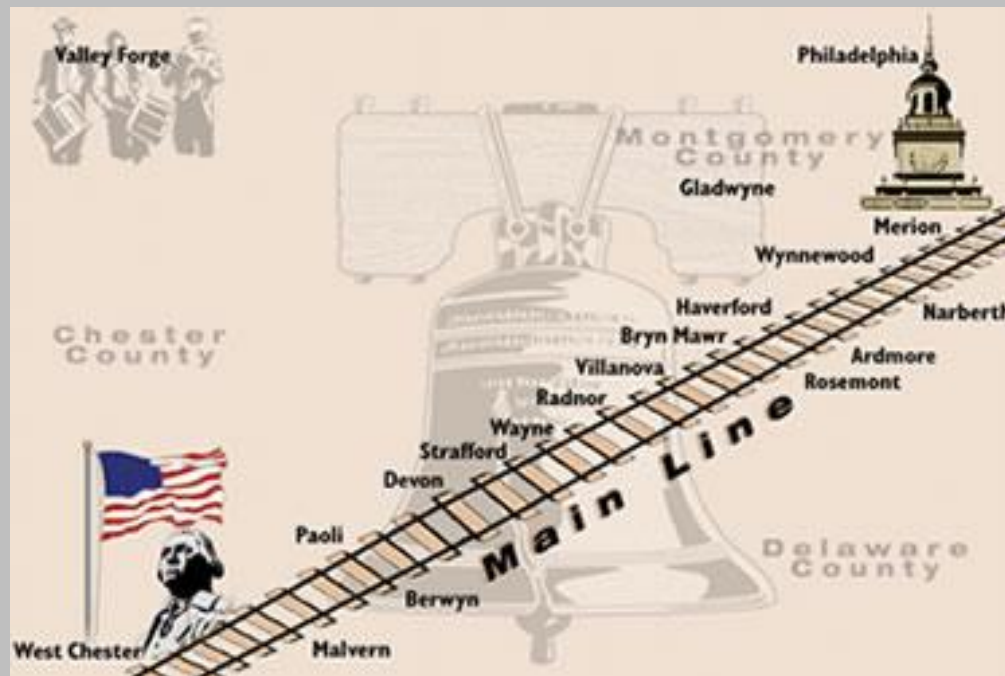
Bryn Mawr



Rosemont







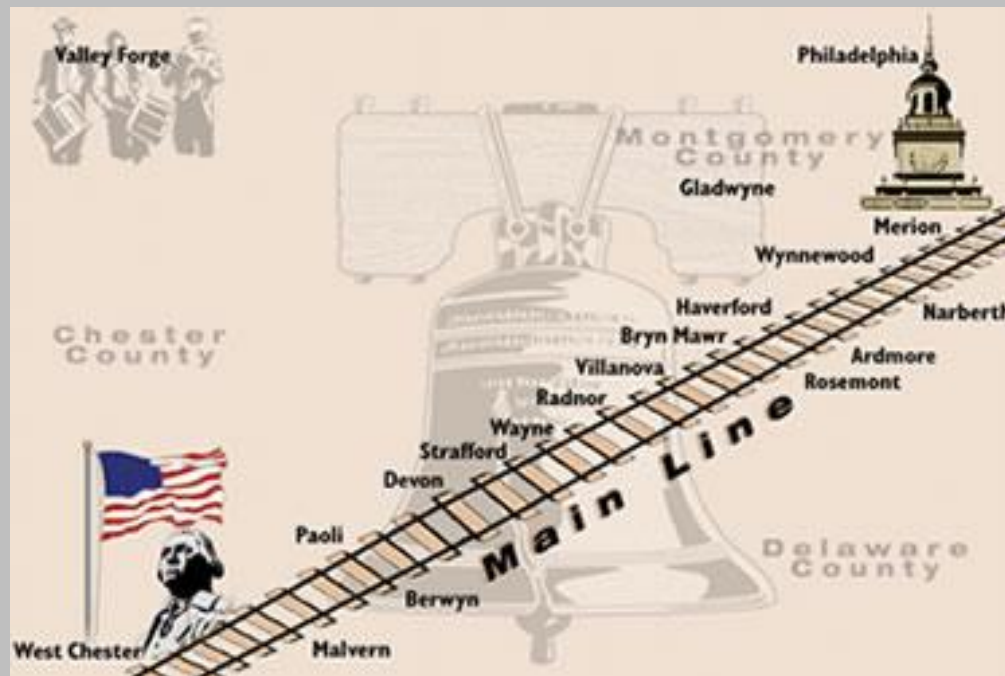
Villanova



Radnor



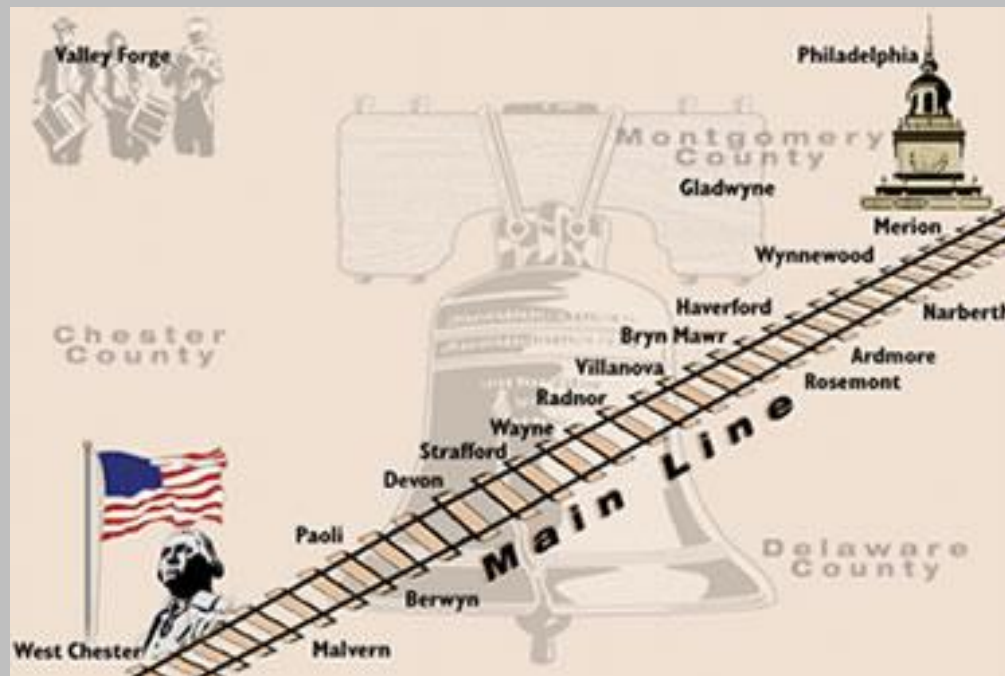




Saint Davids



Wayne



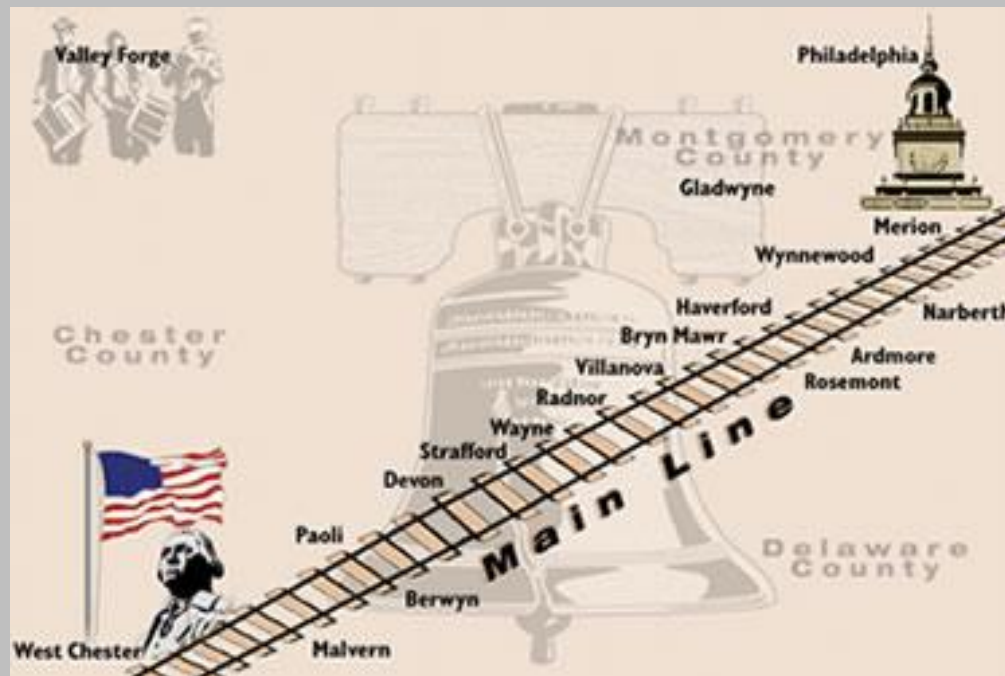
Strafford



Devon





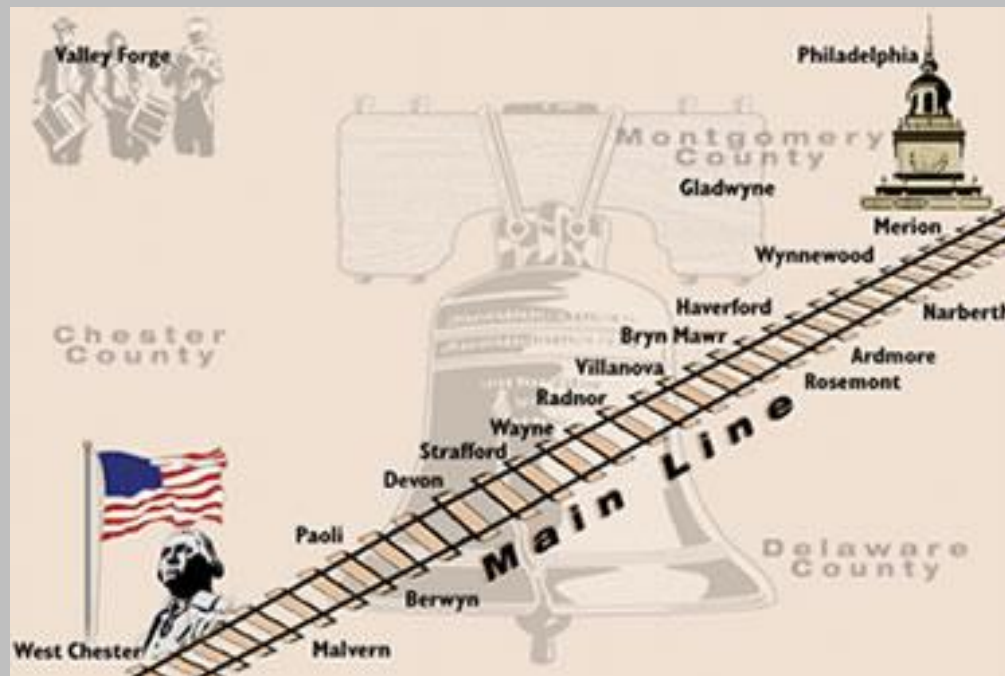


Berwyn



Daylesford





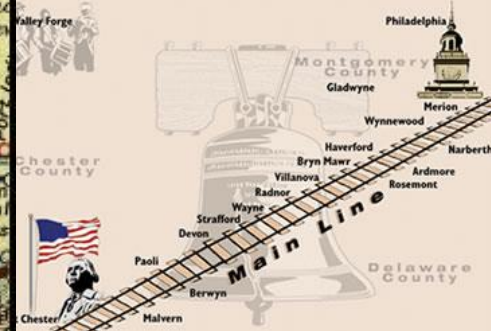
Paoli



Malvern







1895 Map

MORE HERE:

<https://www.west2k.com/pastations/chester.shtml>





# Philadelphia Main Line Rails now Continue To Elizabethtown

Urban Design  
NODE





# Japanese Urban Design

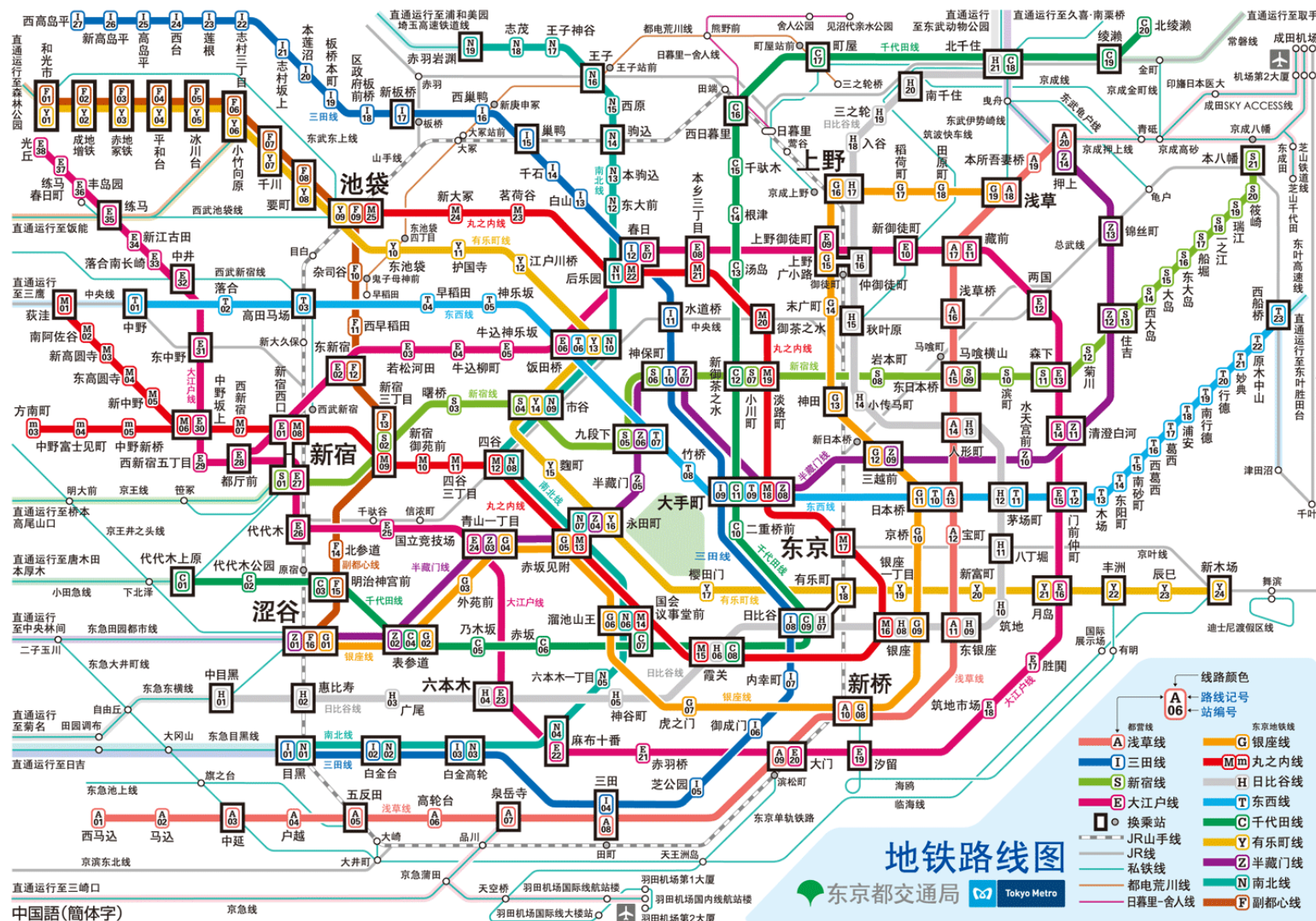
## PATHS

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(of rails)



# Rail LINES - Tokyo Subway











Japan 2013







[Bullet Train Video](#)  
[Bullet Train Video](#)

Japan 2013









Japan 2013

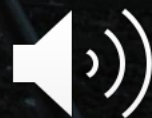
Urban Design  
PATH



Japan 2013



















Japan 2013





# Japanese Urban Design

## PATHS

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(of water)





VIDEO:  
River Ride along railroad in Kyoto









# Monkey Mountain at end of River Ride in Kyoto

Urban Design  
PATH



























Japan 2013

VIDEO

<https://www.youtube.com/watch?v=VbCOI3IEUgk>





VIDEO

[https://www.youtube.com/  
watch?v=iEsZVHjv3u0](https://www.youtube.com/watch?v=iEsZVHjv3u0)

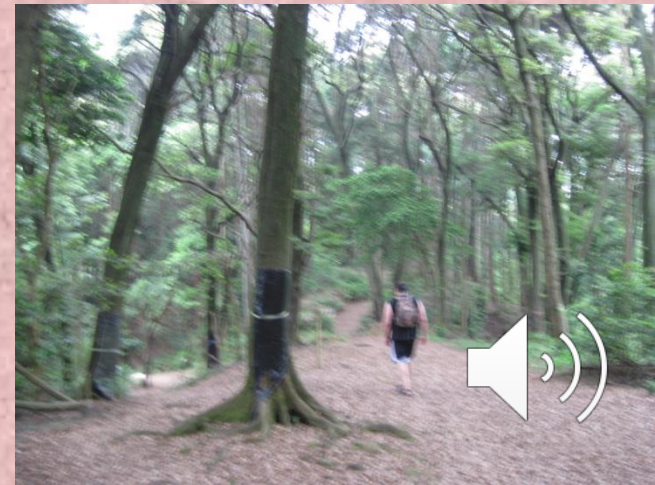




# Japanese Urban Design

## PATHS

(by Foot)



































みんなの町  
フンの町  
買い主の買





























*“A stairway can be an organizing element and weave together a series of spaces at different levels of a building or outdoor space.”[1]*

















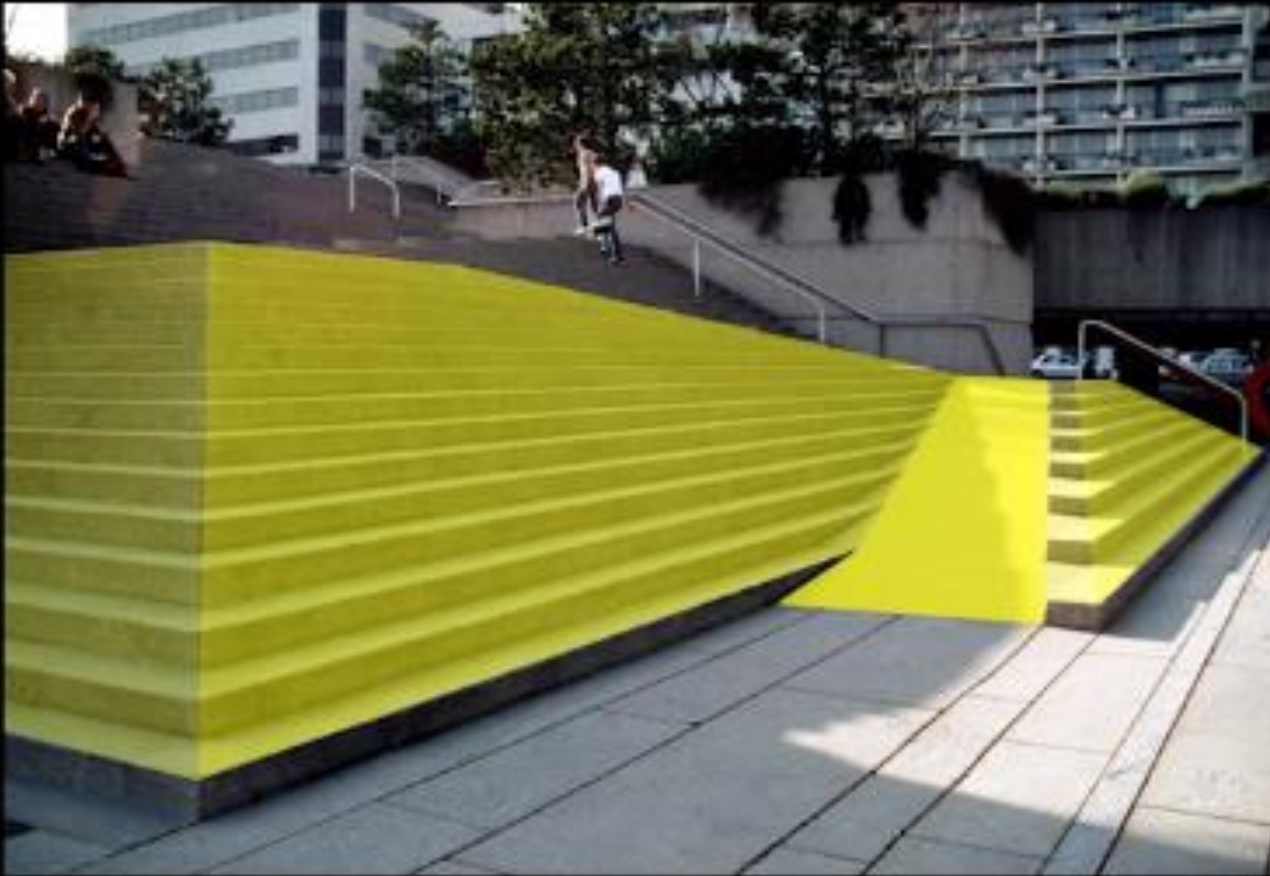








*“Stairs can be woven into the boundaries of a space or be extended into a series of platforms for seating or terraces for activity.” [1]*









# BRIDGES

movement  
across space

## BRIDGES

As you watch this video about bridges in Japan:  
YouTube: "[Japanology Plus – Bridges](https://www.youtube.com/watch?v=4V04-S-IPJg)"

Urban Design

PATH

<https://www.youtube.com/watch?v=4V04-S-IPJg>

Take notes about each bridge; you may note technical aspects including structural methods and materials as well as required levels of craftsmanship; and/or recognize notable aspects of space and form including circulation such as the relative intensity of waterway and man-made flows as well as where pathways lead to and from; and possibly note aesthetic qualities of scale and form as they relate to the natural surroundings. Make sketches as time permits, but don't worry about the quality of your drawing on this part of your assignment.

1. **Gyoja-bashi Bridge** in Kyoto
2. Initial high-arch pedestrian bridges found at shrines and temples
3. **Kozuya-bashi Bridge** that temporarily floats during floods
4. The submersible bridge
5. **Ishi Shrine** in Mie Prefecture and the **Uji-bashi Bridge** that it leads onto
6. **Kintaikyo Bridge** in Yamaguchi Prefecture
7. **Togetsukyo Bridge** ("Bridge to the Moon")
8. **Seto Ohashi Bridge**
9. **Akashi Kaikyo Ohashi Bridge**
10. **Nihon-Bashi Bridge**

As homework, pick a place on earth with a waterway that you believe could be bridged for whatever reason -- pedestrian, automobile, mass transit, aqueduct, or whatever, and propose a new bridge of your own making. Create at least one decent quality drawing that communicates your concept. Perspective drawing is not required, but certainly do so if you feel comfortable with this technique. Or perhaps create a technical type drawing if you feel so inclined. Also write a paragraph describing your proposed bridge and whatever aspects of it you believe most noteworthy; whether they be technical or artistic is not important, rather just emphasize what you believe is unique about your design. Next week display your drawing onto the screen at the front of the class and very briefly tell your story about how you conceived of your bridge idea. You can do this homework on the back of this paper, or staple it as an attachment as additional page(s).



*“Linear members that possess material strength can **express** movement across space” [1]*

























# Japanese Urban Design

## EDGES

















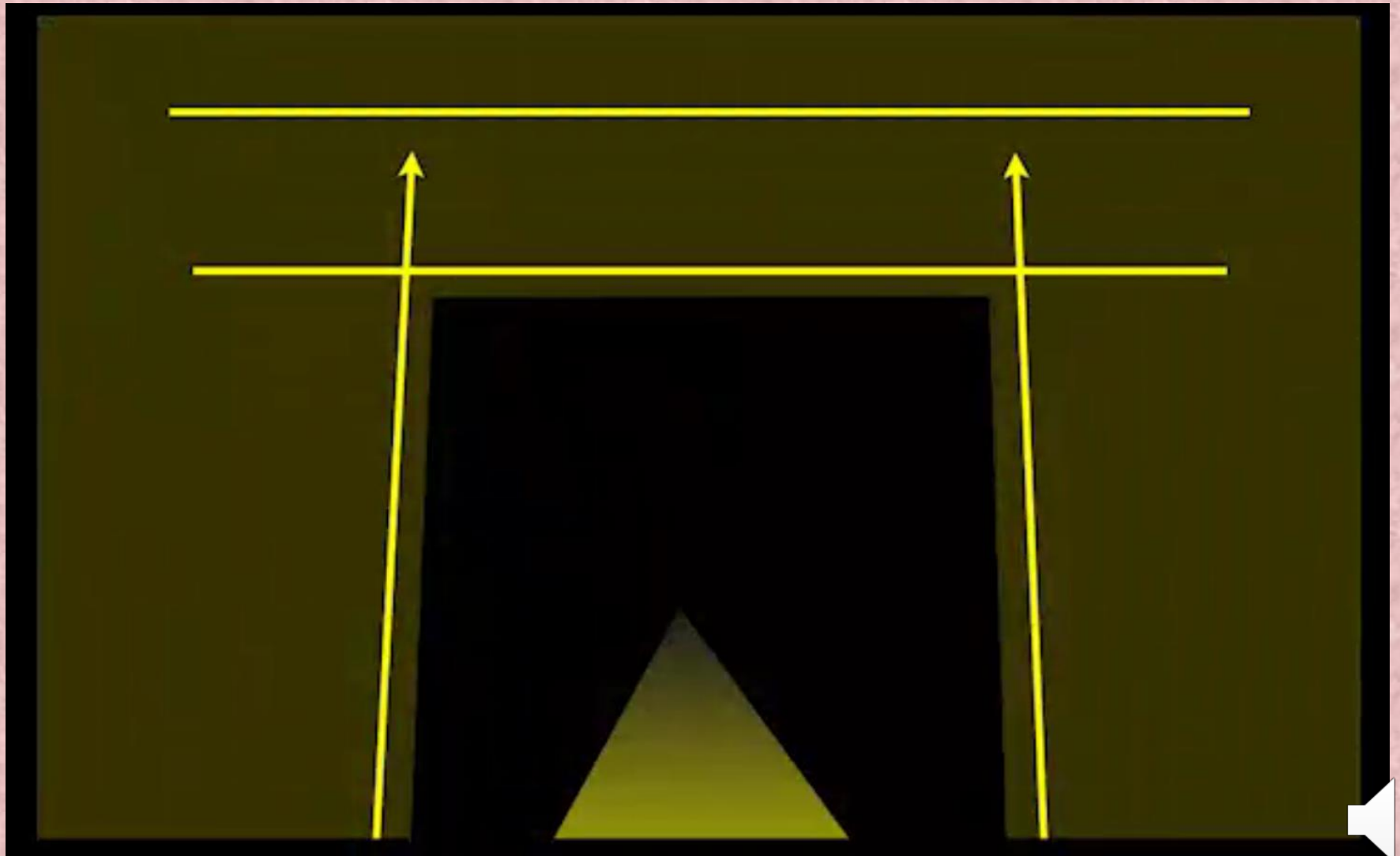








*“a **PLANE** of **ENTRY**, and an approach perpendicular to a gateway, signifying **PASSAGE** from one place to another” [1]*







*“a PLANE of ENTRY  
signifying PASSAGE” [1]*





## Semester paper on Design Theory:

*"The Evolution of City Boundaries in Western Civilization"*

## UCSD USP173 Urban Design History

where.<sup>13</sup> The underlying inferences of Bacon's analogy could suggest that an introverted but stable person is "closed-minded" and that a city which is self-sufficient but non-responsive is doomed to deteriorate. Are extroversion and expansion necessarily redeeming qualities? A vernacular architect would probably say so, that the limited size, constant human scale, and close community relations of medieval cities would easily justify the organic, self-contained form and that medieval cities seem well-planned even though there was no planning.

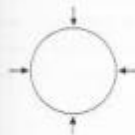


Figure 1



<sup>13</sup>Ibid., p. 36.

6

human concept of "self." This picture represents the outgoing man, whom he describes as ebullient, involved, and courageous.<sup>17</sup>

Figure 2

Figure 3

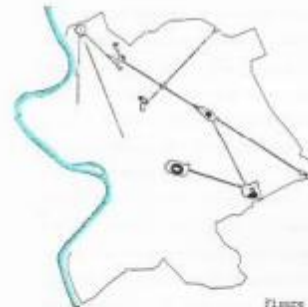
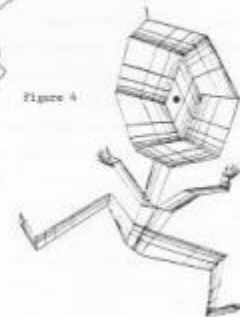


Figure 4



<sup>17</sup>Bacon, p. 37.

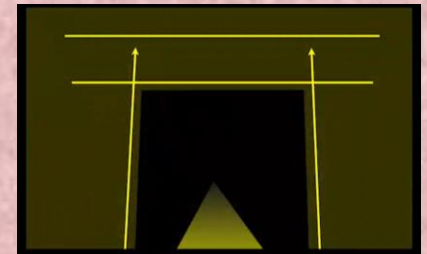
9

READ: <http://users.etaown.edu/w/wunderjt/Urban%20Design%20City%20Boundaries%20Wunderlich%201987.pdf>





**“PLANE of ENTRY”** and an **Axis** is created



an **Axis** is created





# AXIS









# ONE POINT PERSPECTIVE (to Horizon)

- Lines into distance converge at a **VANISHING POINT** ("F" in the image below) on the **HORIZON LINE**
  - Moving this point from side to side along the horizon line changes the viewer's lateral position within the drawing
- Horizontal and Vertical lines are parallel to the edges of the paper
  - **FORESHORTENING** means things closer to you seem bigger, so sequences of horizontal or vertical lines get further apart as they get closer
    - Use **diagonal lines** to help you with the spacing

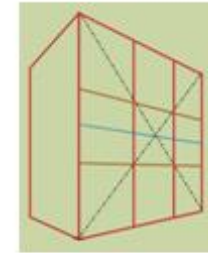
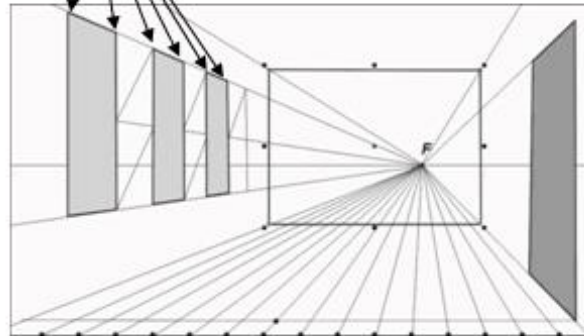


Image from:  
<http://kaplanpicturemaker.com/perspective/architecture>

## **HORIZON LINE**

This line will be higher in the drawing if the viewer's eyes are high above the ground



Image from:  
<http://www.drawinghowtodraw.com/drawing-lessons/Perspective-Drawing/1-One-Point-Perspective.html>

<http://users.etown.edu/w/wunderjt/Architecture%20Lectures/Perspective%20Drawing%201.1.pdf>





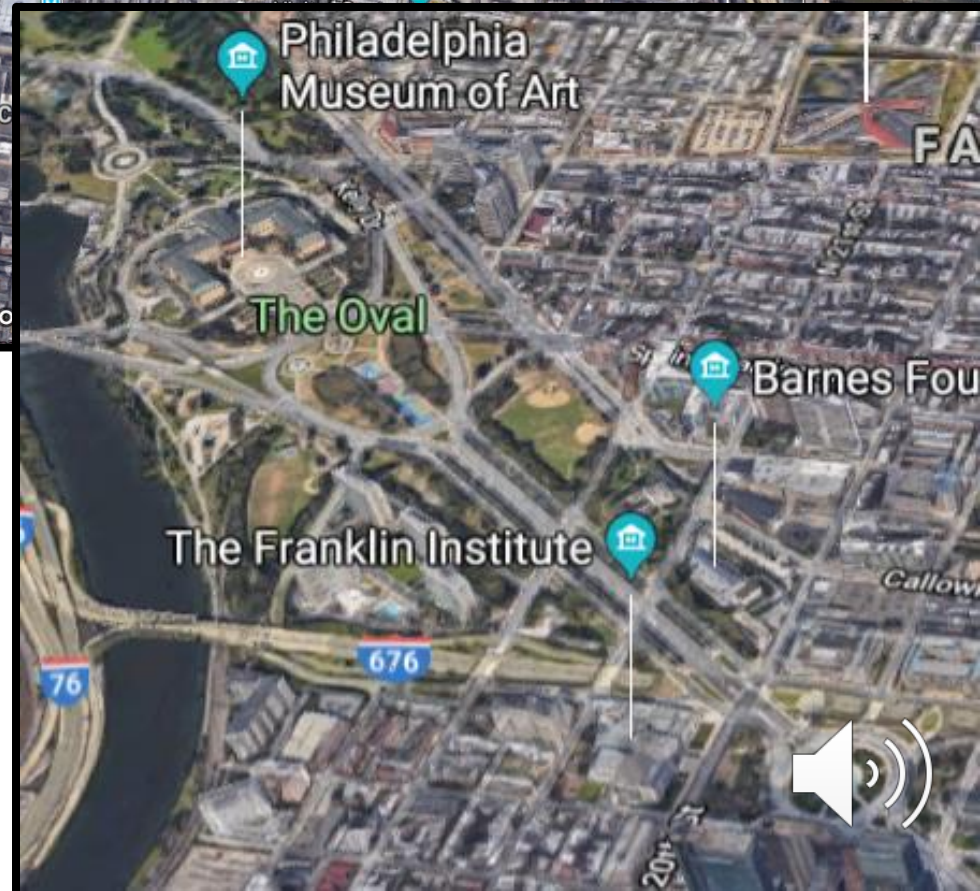
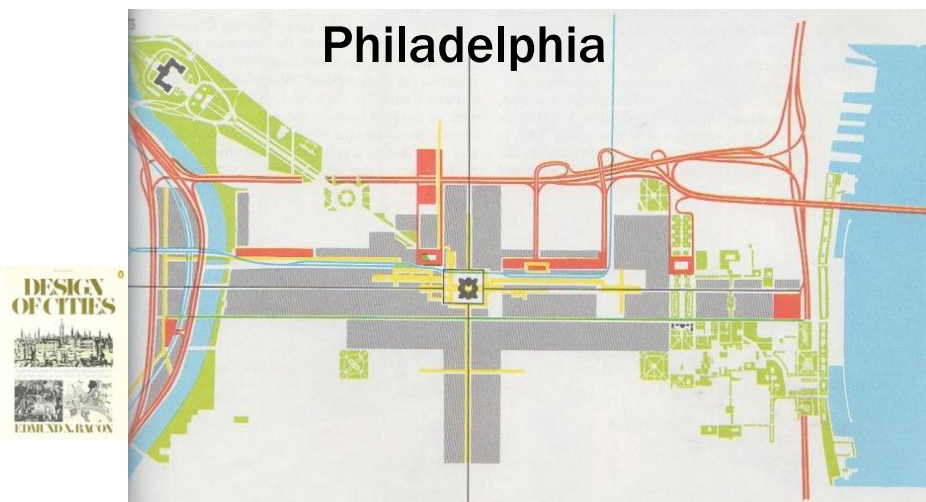
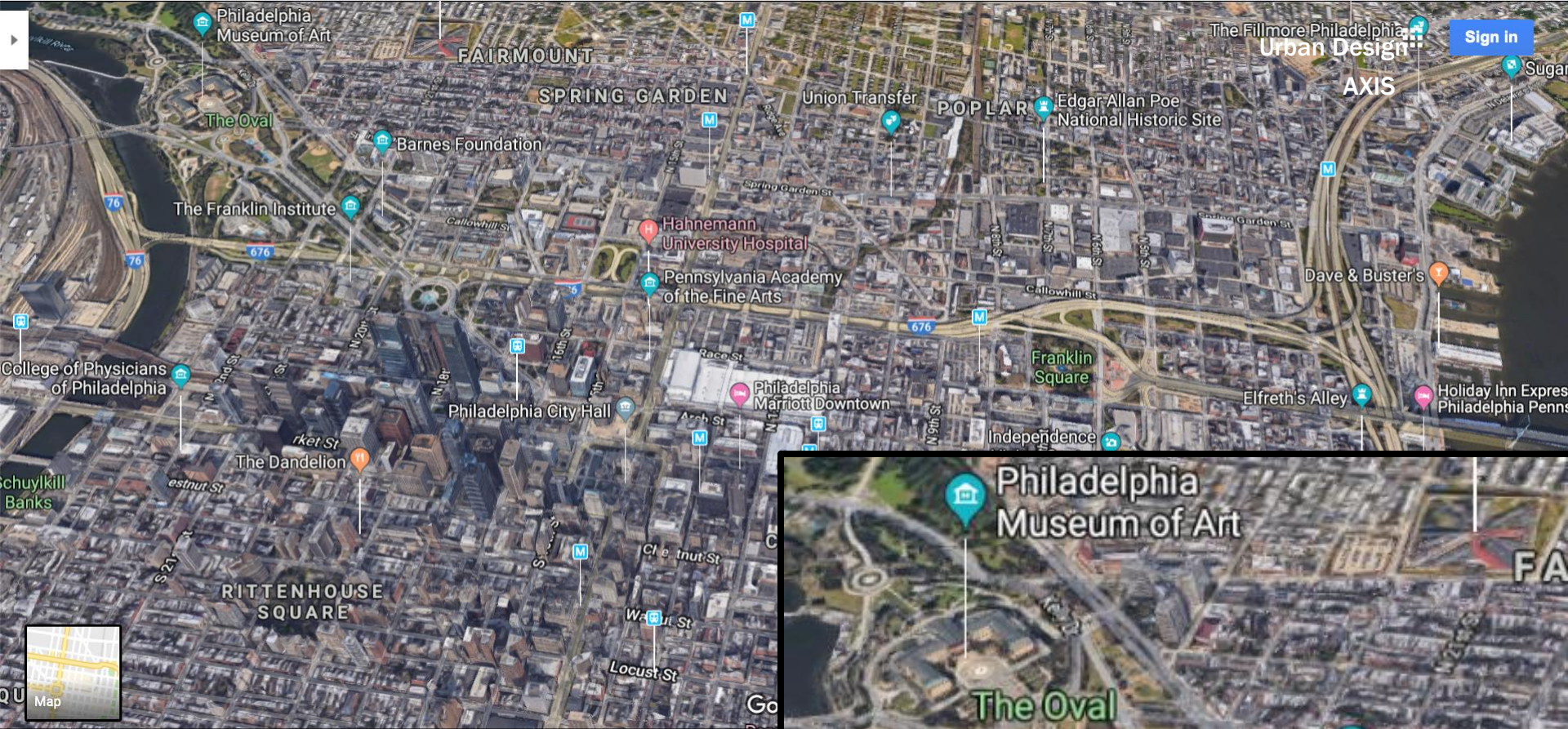


Acropolis 9x11"

**ONE-POINT EXTERIOR PERSPECTIVE**  
by JJ Wunderlich IV  
[2019 Portfolio](#)

[http://users.etown.edu/w/wunderjt/Architecture%20Lectures/Joseph\\_Wunderlich\\_2019\\_Portfolio.pdf](http://users.etown.edu/w/wunderjt/Architecture%20Lectures/Joseph_Wunderlich_2019_Portfolio.pdf)















## Rome – The Vatican







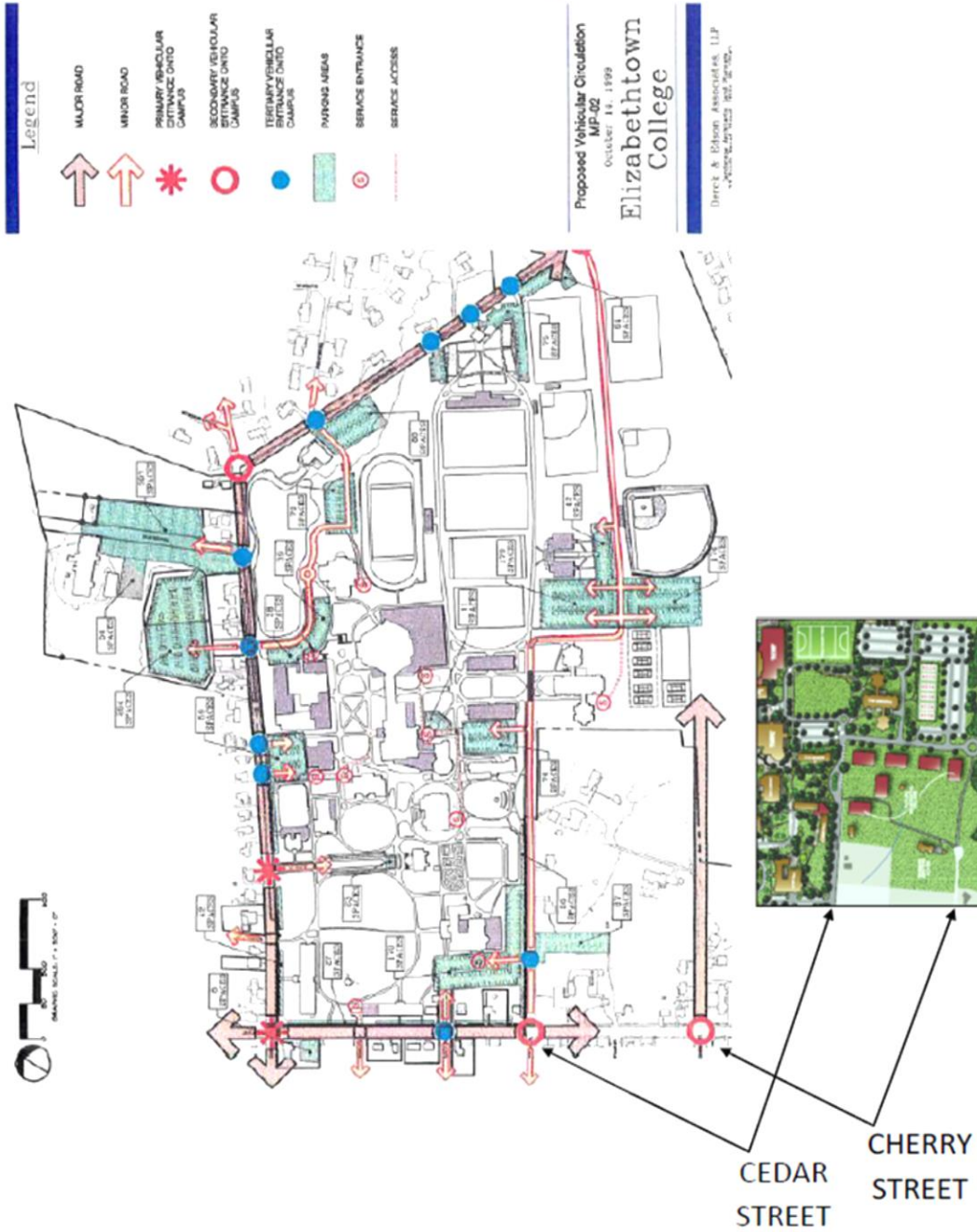
Italian Plaza 9x11"

**ONE-POINT EXTERIOR PERSPECTIVE**  
by JJ Wunderlich IV  
[2019 Portfolio](http://users.etown.edu/~w/wunderjt/Architecture%20Lectures/Joseph_Wunderlich_2019_Portfolio.pdf)

[http://users.etown.edu/~w/wunderjt/Architecture%20Lectures/Joseph\\_Wunderlich\\_2019\\_Portfolio.pdf](http://users.etown.edu/~w/wunderjt/Architecture%20Lectures/Joseph_Wunderlich_2019_Portfolio.pdf)

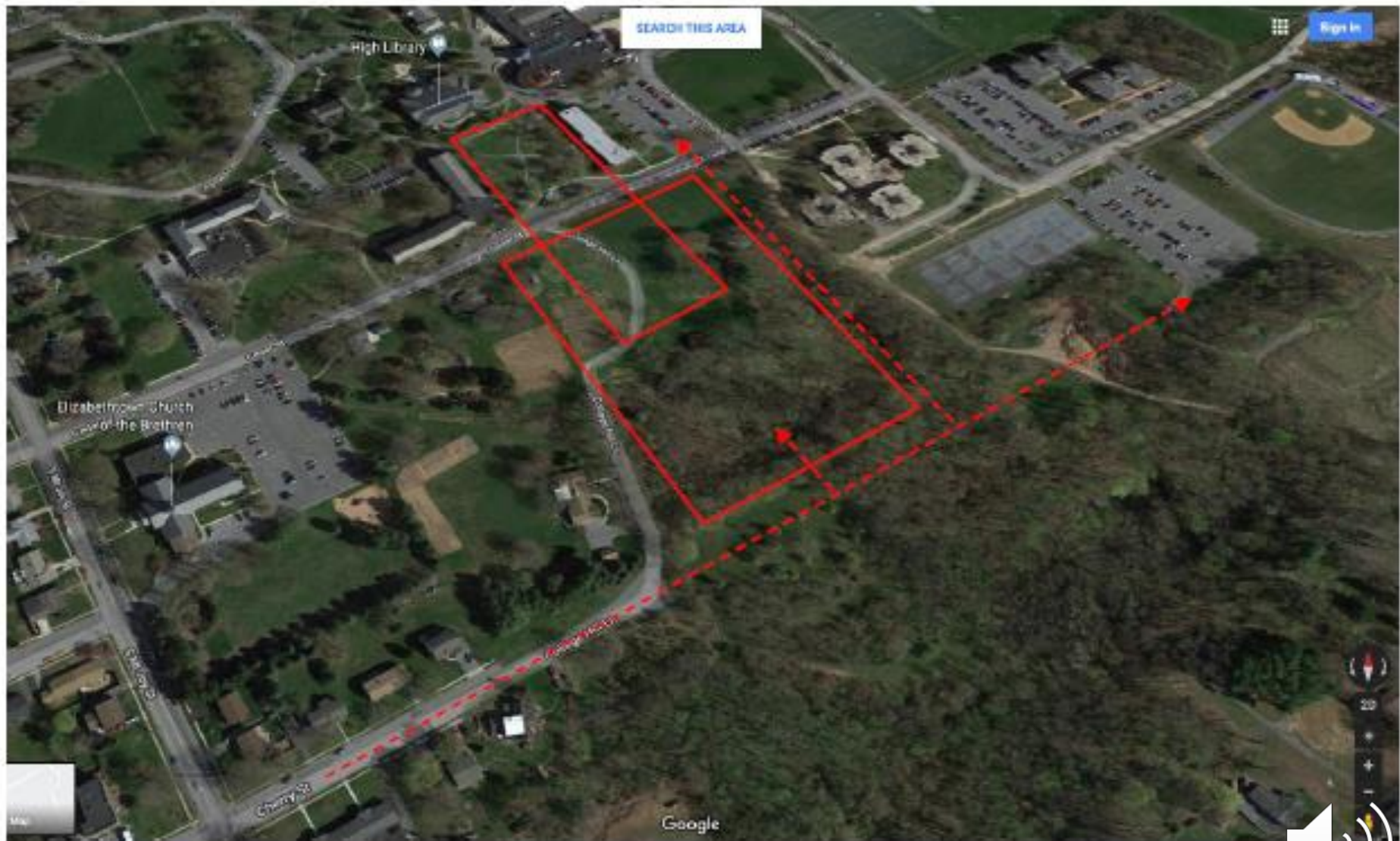


# PROPOSED MOVING OF MAIN ENTRY on CEDAR STREET to CHERRY STREET 1999 Elizabethtown College Master Plan





# 2019 and 2022 Semester Project **CEDAR HILL HOUSING**













J T Wunderlich 1986 ,87  
UCSD Campus Design Changes  
USP174 Urban Design Project

Urban Design *student*



- PATHS
- EDGES
- DISTRICTS
- NODES
- LANDMARKS





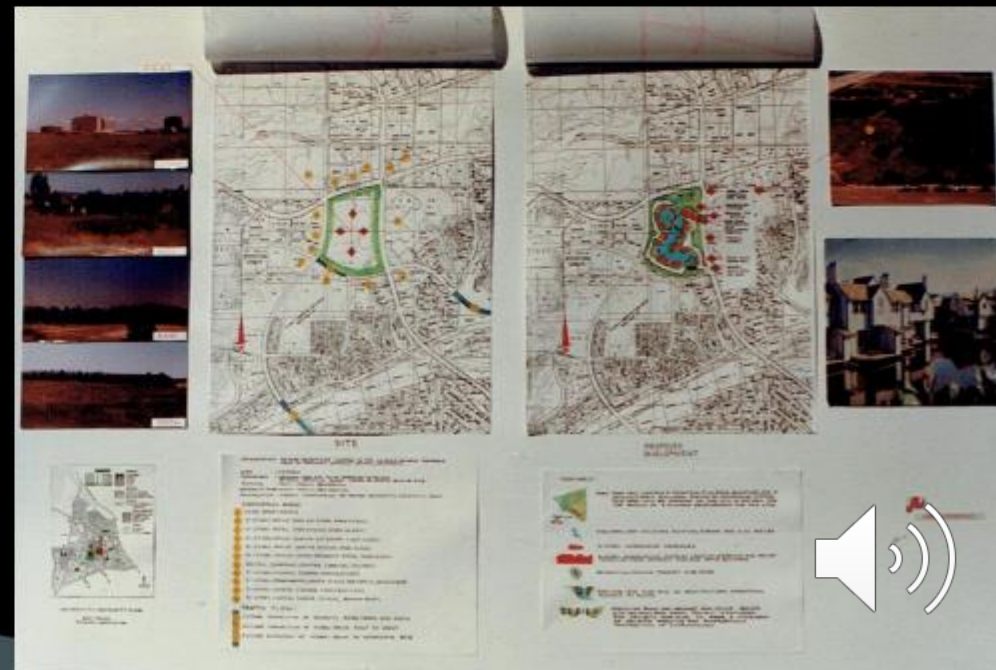
# J T Wunderlich 1986 87

## Proposed La Jolla, California Development

### UCSD USP174 Urban Design Project

Urban Design *student*

- PATHS
- EDGES
- DISTRICTS
- NODES
- LANDMARKS





# CIRCULATION

*B) in Architecture*





# APPROACH & ENTRANCE

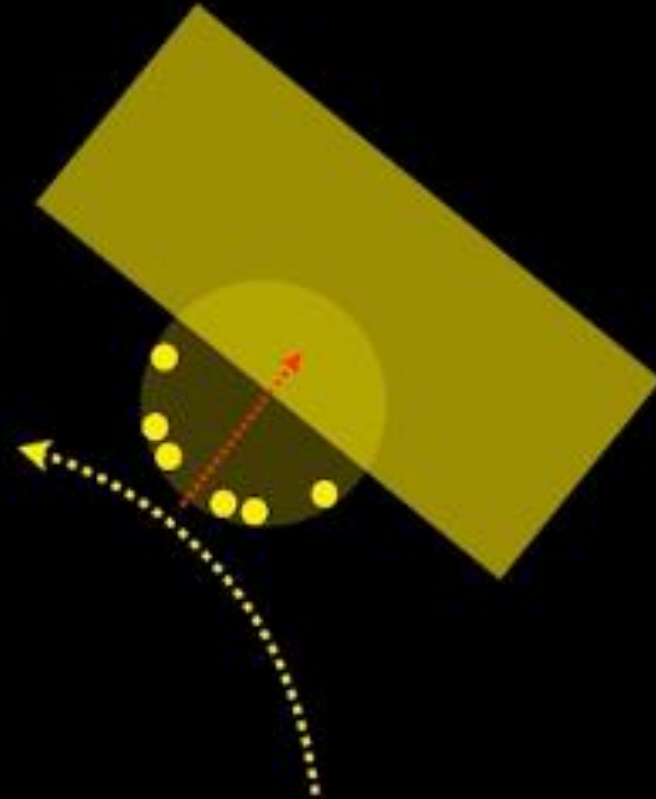
*“ approach along a path may be perpendicular to the facade” [1]*



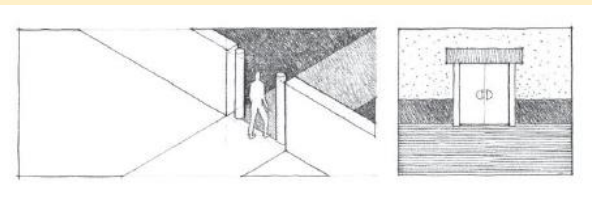


# APPROACH & ENTRANCE

*“An indirect or oblique approach enhances perspective. The path can be redirected to delay and prolong the approach” [1]*







## ENTRANCE

## ARCHITECTURE

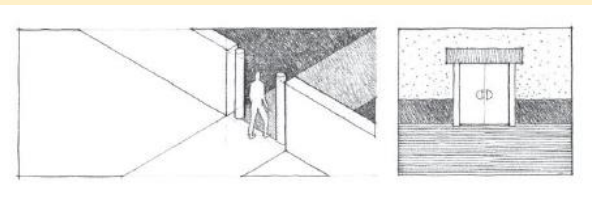
**JT Wunderlich 1987**  
1000sf Calivita Remodel  
San Diego, CA



*Design/Builder*

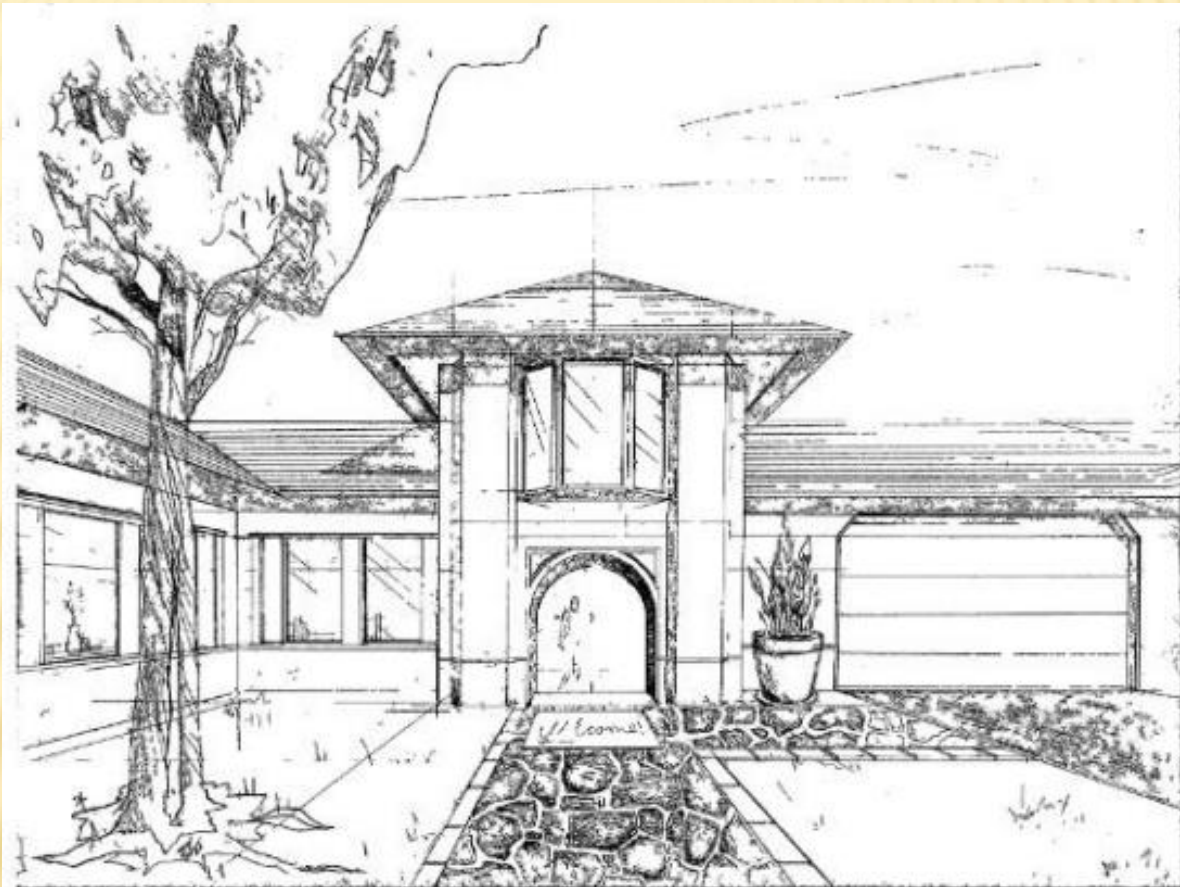






## ENTRANCE

## ARCHITECTURE



Midwestern Villa 9x11"

**ONE-POINT EXTERIOR PERSPECTIVES**  
by JJ Wunderlich IV  
[2019 Portfolio](#)





# APPROACH & ENTRANCE

URBAN DESIGN &  
ARCHITECTURE

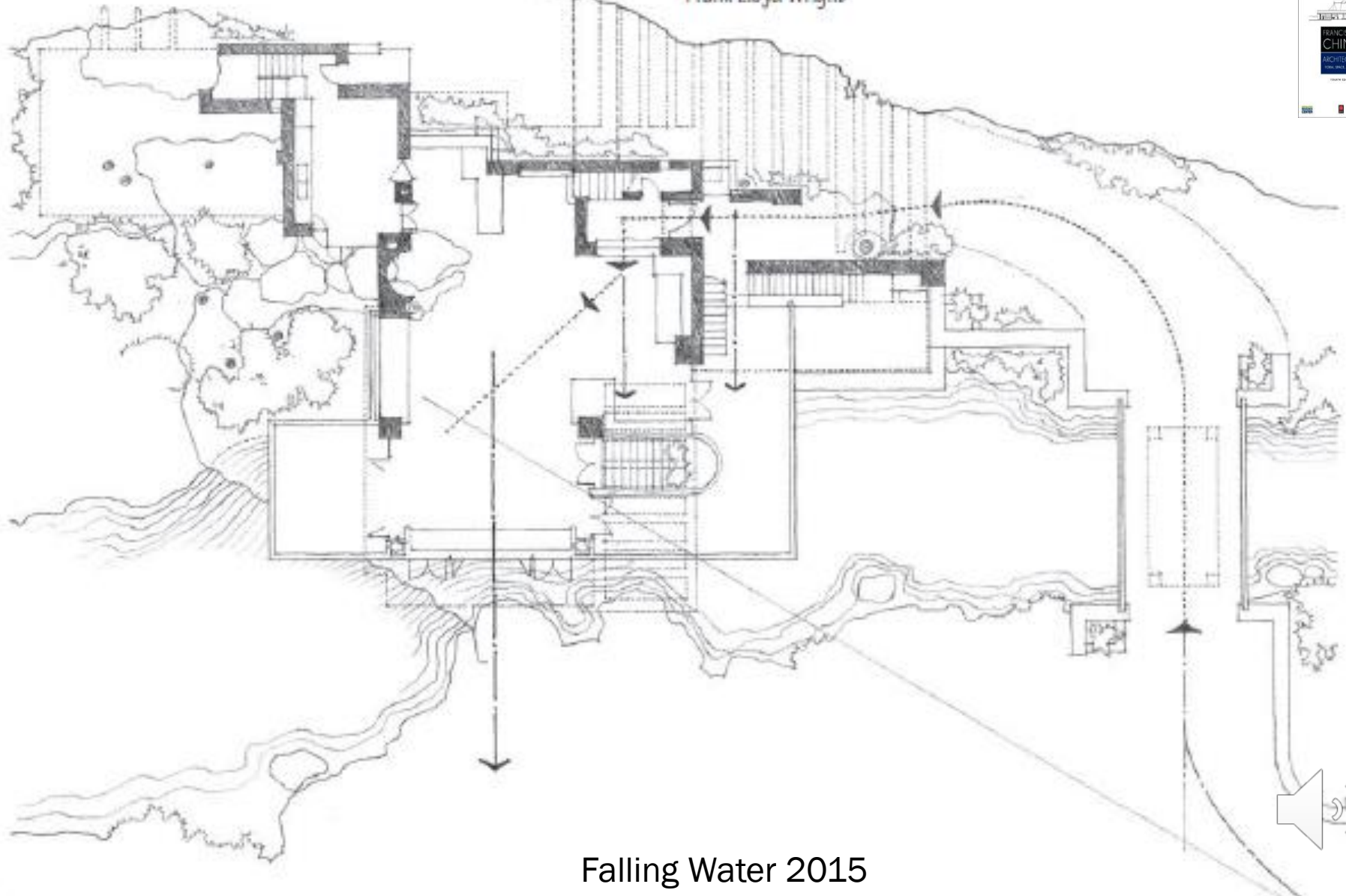


Kyoto 2013



# APPROACH & ENTRANCE

Fallingwater (Kaufmann House), near Ohiopyle, Pennsylvania, 1936–1937,  
Frank Lloyd Wright



Falling Water 2015






# APPROACH & ENTRANCE (INTENTIONALLY HIDDEN)

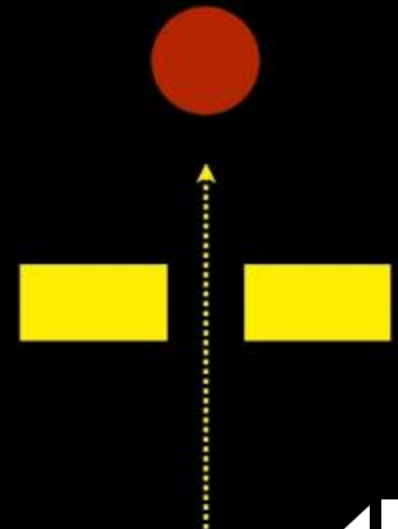
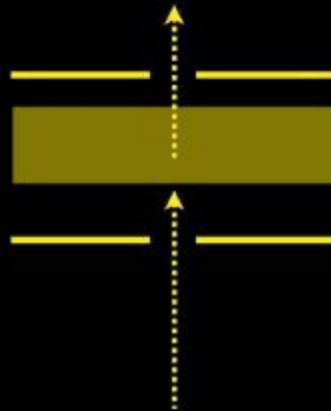
URBAN DESIGN &  
ARCHITECTURE



Falling Water 2015 

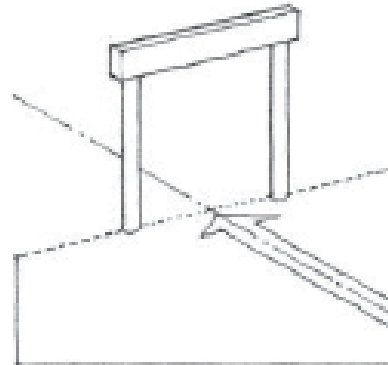
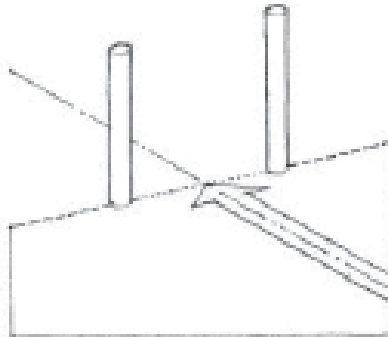
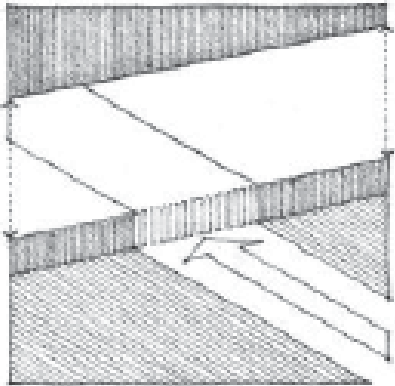


*“Portals and gateways orient us to the path beyond, and welcome or guard against our entry” [1]*



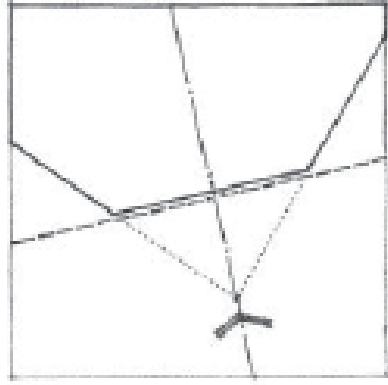
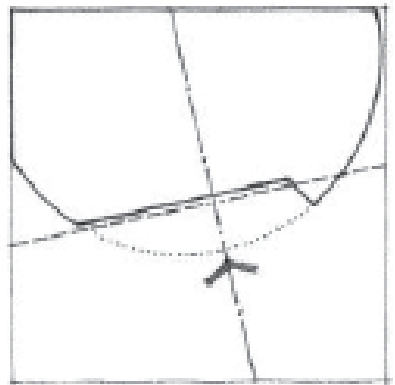


# APPROACH & ENTRANCE



The act of entering can be signified in more subtle ways than punching a hole in a wall. It may be a passage through an implied plane established by two pillars or an overhead beam.

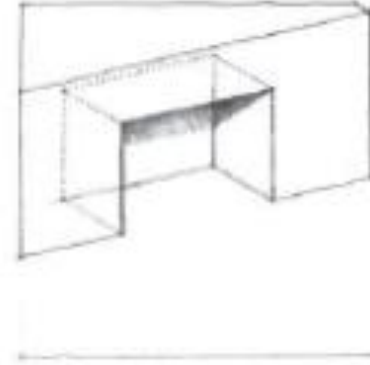
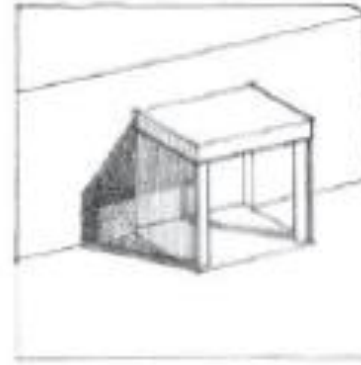
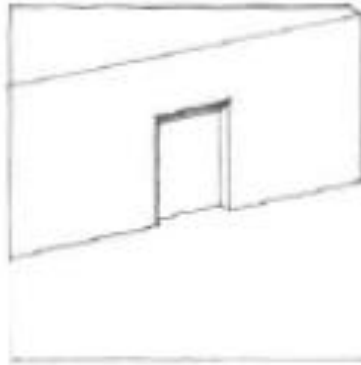
a threshold and mark the passage from one place to another.



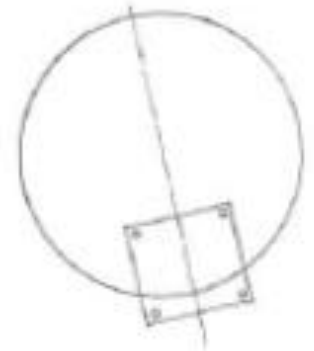
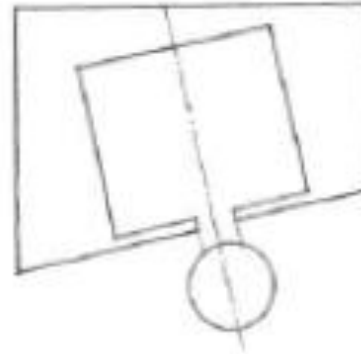
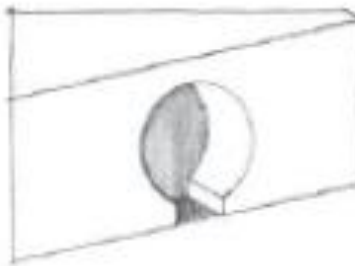
entrance into the space is best signified by establishing a real or implied plane perpendicular to the path of the approach.



flush, projected, and recessed.



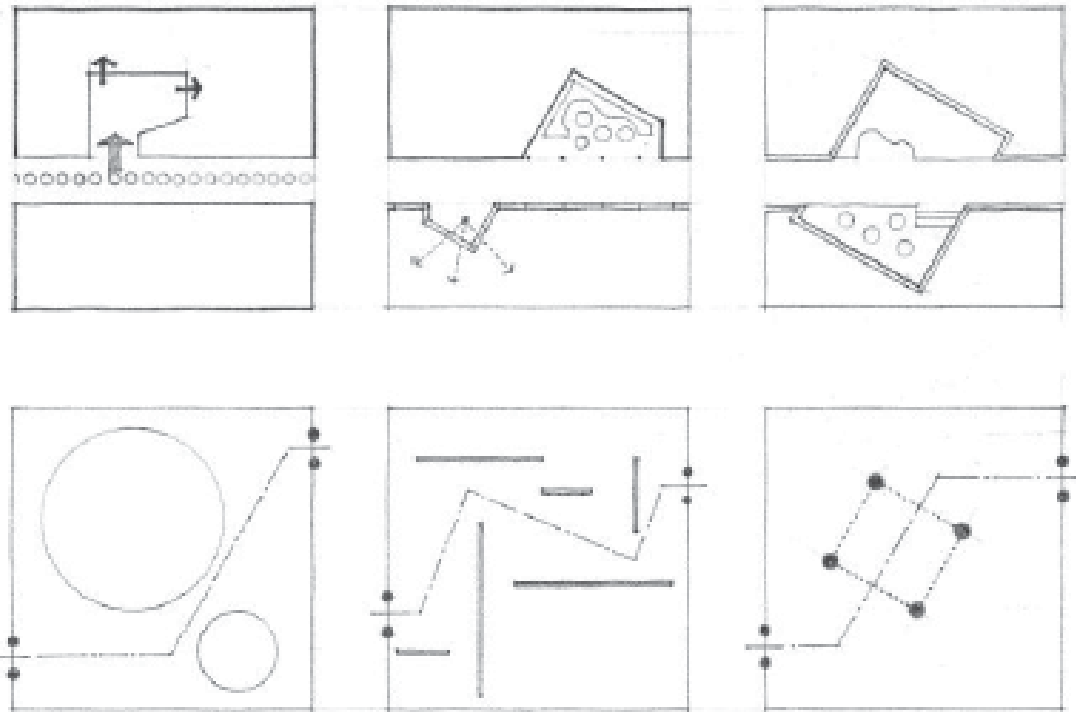
entrance can be similar to, and serve as a preview of, the form of the space being entered. Or it can contrast with the form of the space to reinforce its boundaries and emphasize its character as a place.





A narrow, enclosed path naturally encourages forward motion. To accommodate more traffic as well as to create spaces for pausing, resting, or viewing, sections of a path can be widened. The path can also be enlarged by merging with the spaces it passes through.

Within a large space, a path can be random, without form or definition, and be determined by the activities and arrangement of furnishings within the space.





ENTRANCE

ARCHITECTURE



Windsor England 2014





*“ can be visually reinforced by:*

- Being taller, lower, wider, or narrower*
- Being deep*
- Articulating it with ornamentation” [1]*





ENTRANCE

ARCHITECTURE



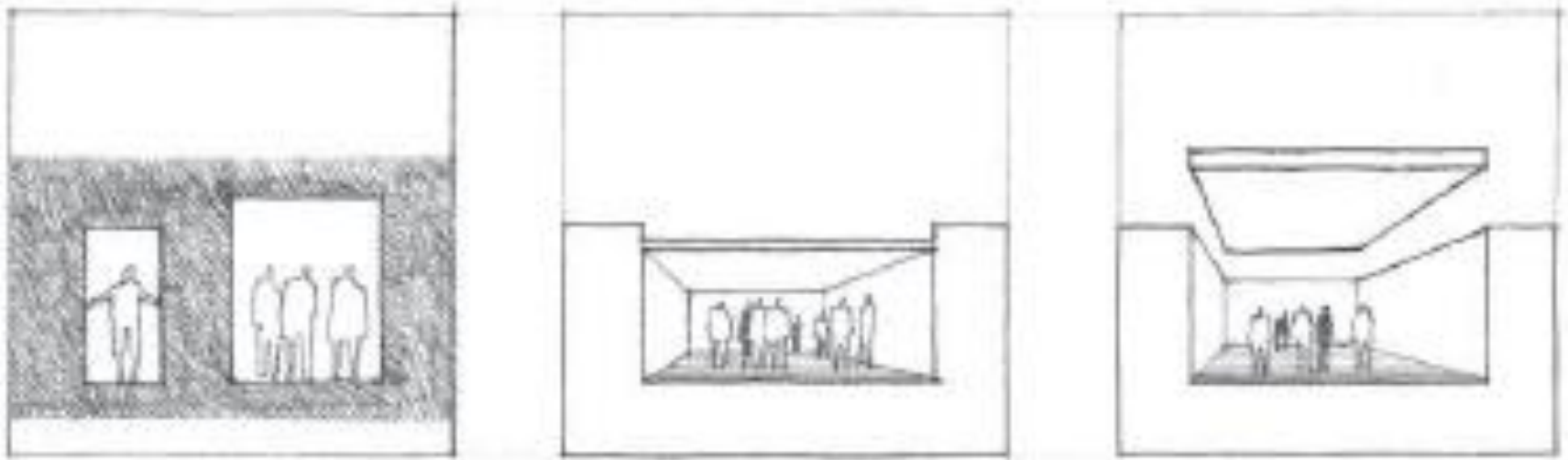
Kyoto 2013



*“can operate at building scale and at human scale” [1]*





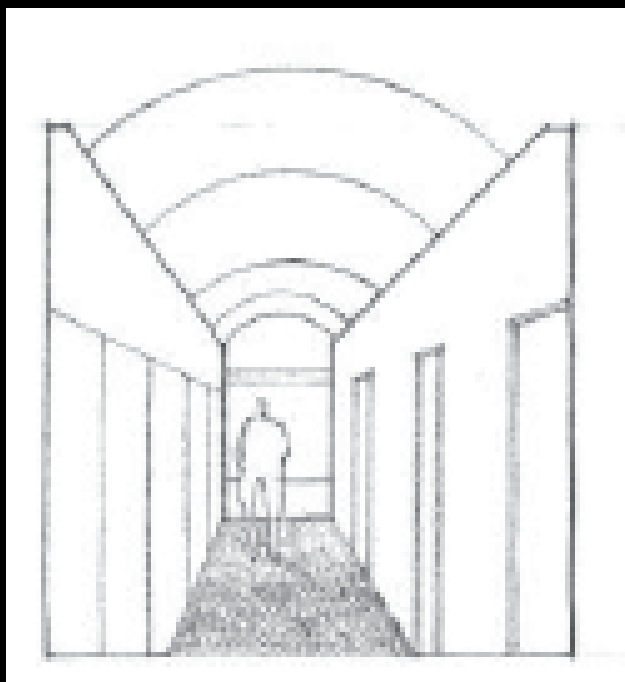


The width and height of a circulation space should be proportionate with the type and amount of movement it must handle. A distinction in scale should be established between a public promenade, a more private hall, and a service corridor.



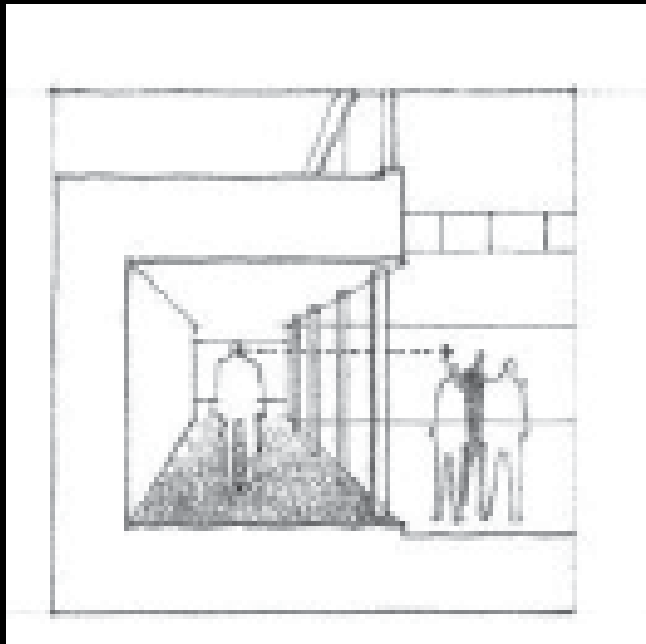
## CORRIDOR

*“relates to spaces it links though doors [1]”*



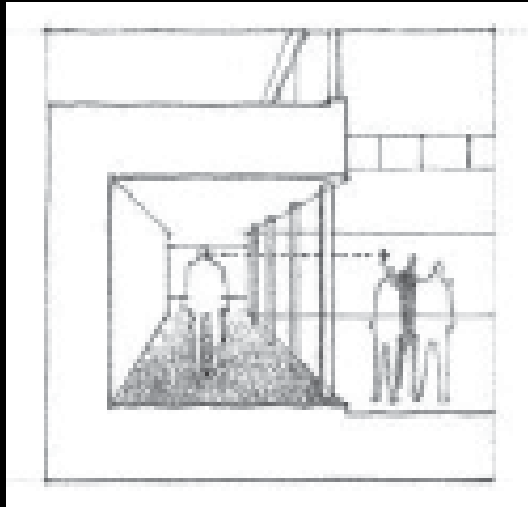


*“Form and scale should accommodate movement of people as they promenade, pause, rest, or take in a view along a path” [1]*

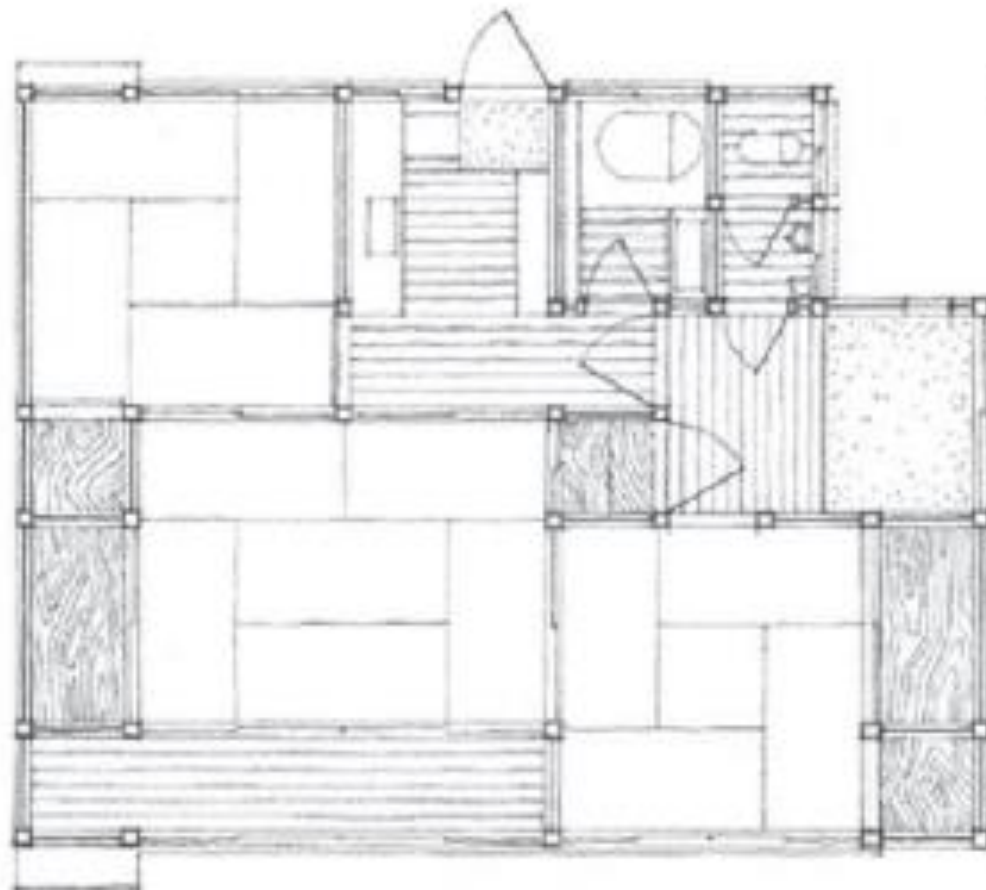




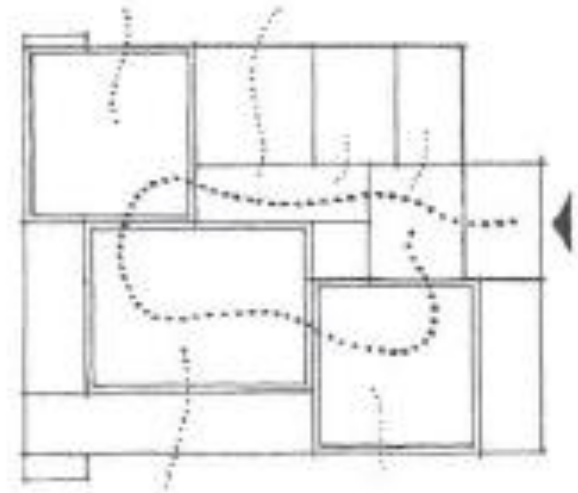
*“may be open on one or both sides, forming a balcony or gallery that provides visual and spatial continuity with the spaces it links” [1]*



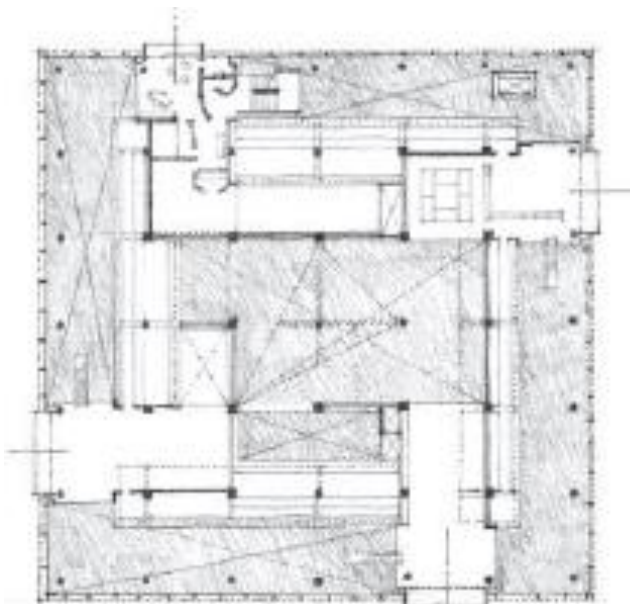




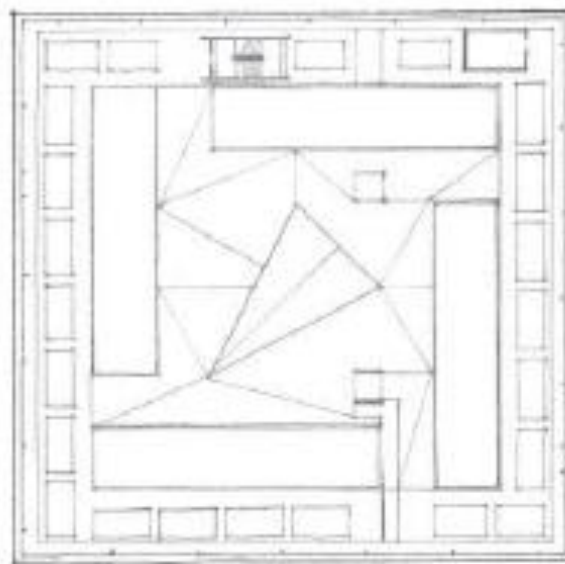
Traditional Japanese House





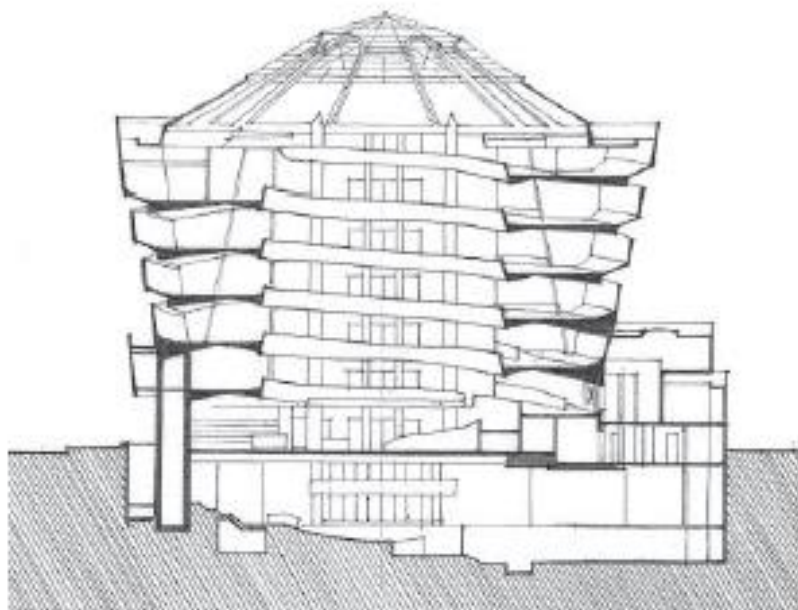


Mezzanine Plan



Roof Plan

**Museum of Western Art, Tokyo,**  
1957–1959, Le Corbusier



**Guggenheim Museum, New York City, 1943–1959,**  
Frank Lloyd Wright





*“traversing up may convey privacy, aloofness, or detachment,  
going down may convey moving toward secure, protected, or stable ground.” [1]*





*“The slope should be proportioned to fit movement and capability.*

*If steep, a stair can make ascent physically tiring , and psychologically forbidding, and make descent precarious”[1]*





“A narrow, steep stair can lead to private places, while wide, shallow steps serve an invitation”[1]





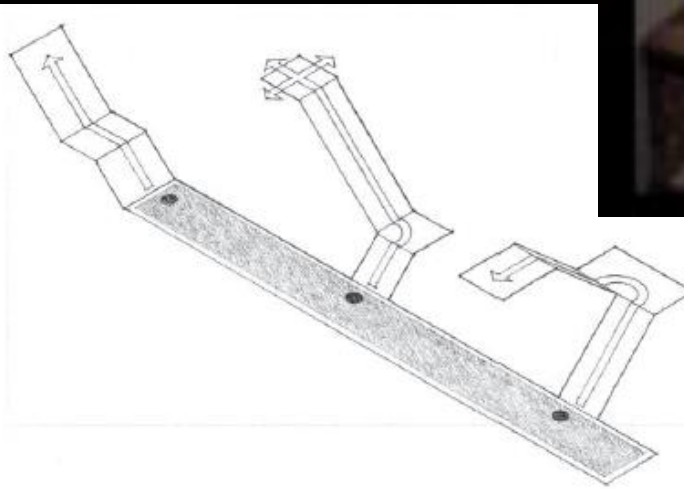
Rome 2011  
Vatican Museum





*“Stairs reinforce the path, interrupt it, accommodate a change in course, or terminate it prior to entering a major space.*

*... space carved out for movement as well as rest.” [1]*



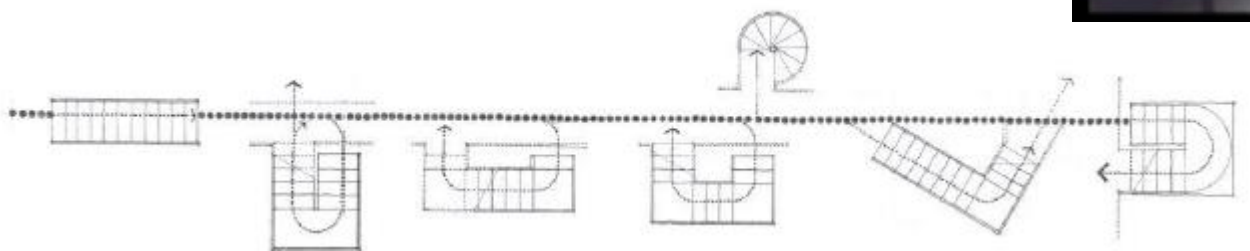


Venice



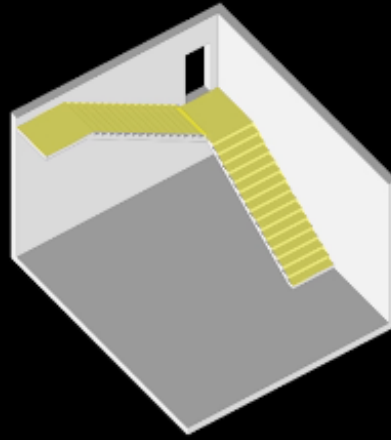


*“ locations of landings determine rhythm and choreography of movement as we ascend or descend .” [1]*

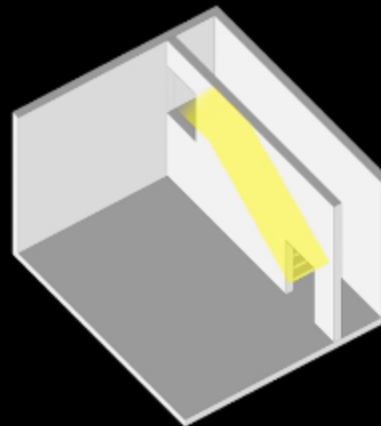




*Stairs can run along one of the edges, or wrap around*



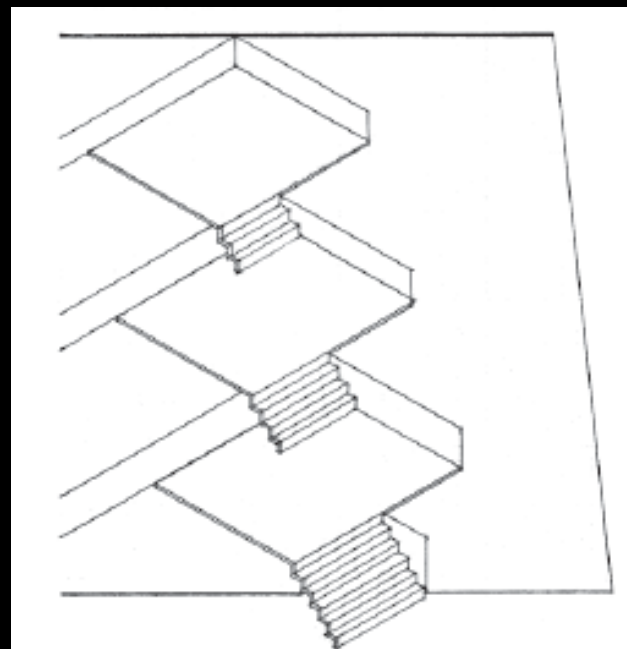
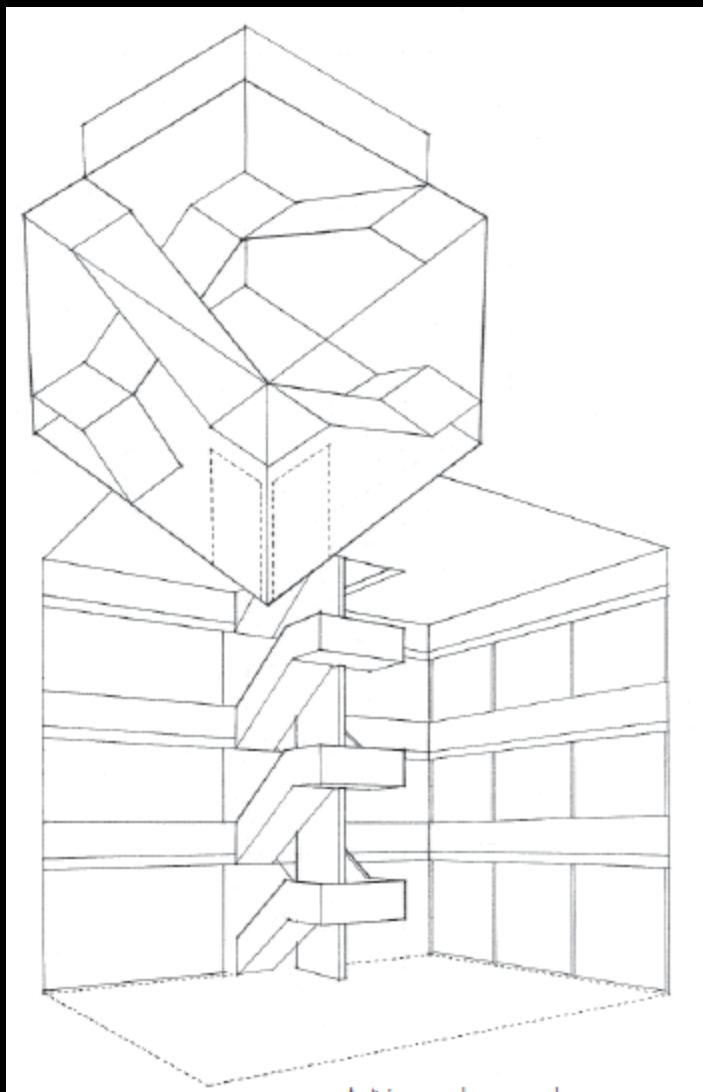
... rise between walls through a narrow shaft to access a private place, or signify unapproachability” [1]





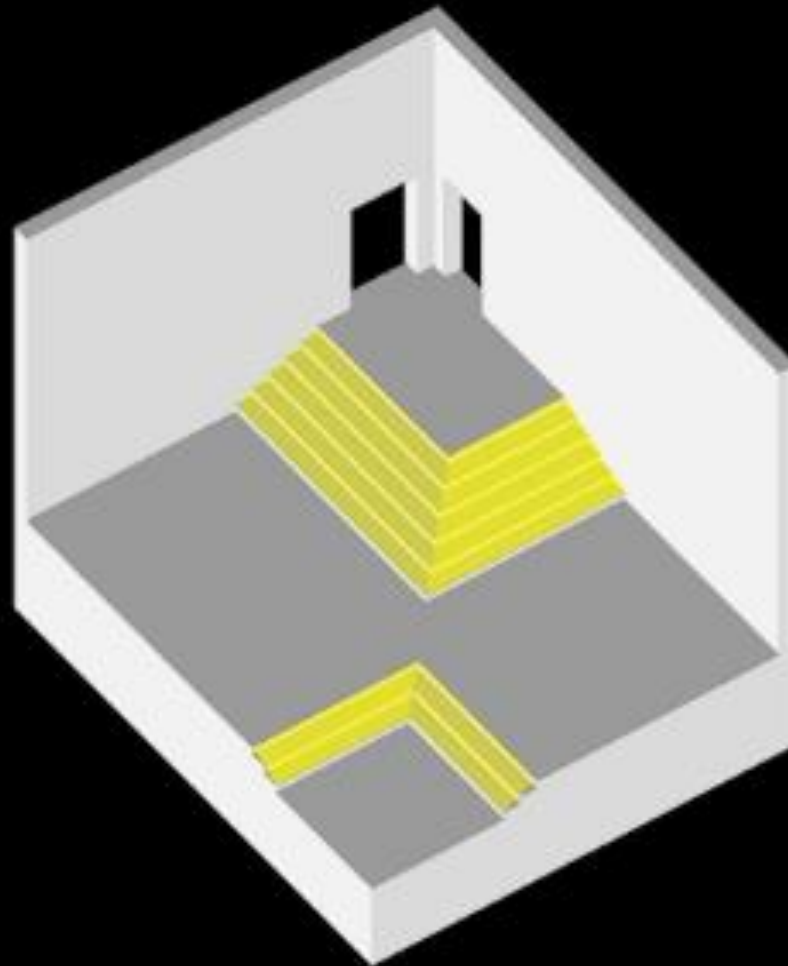
*“Stairs are 3D forms just as moving up or down a stairway is a 3D experience.”*

*Treat as sculpture freestanding or attached to a wall plan” [1]*





*“Space itself can become an oversized, elaborated stairway” [1]*



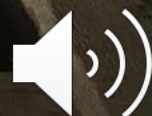




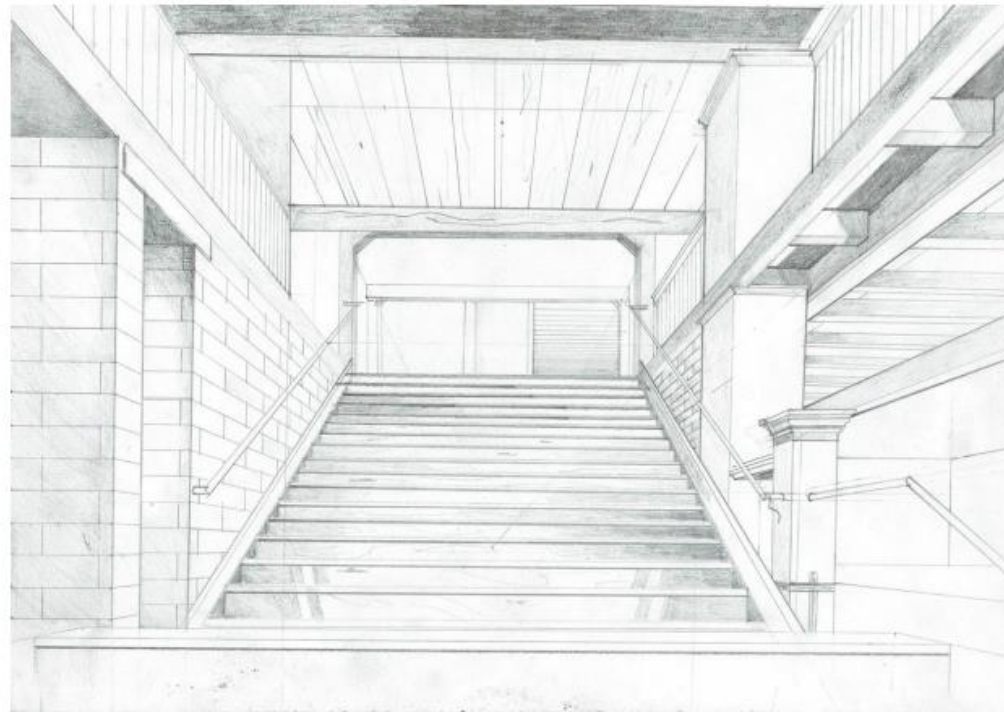
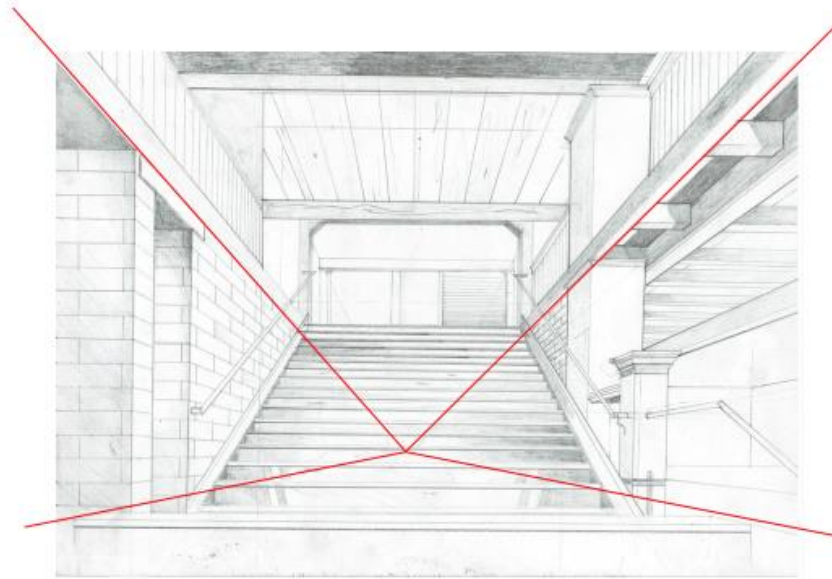
Wunderlich Pennsylvania  
Farm Design/Build 2000's











## ONE-POINT INTERIOR PERSPECTIVE

by JJ Wunderlich IV (2020)

Tutoring 20 Freshman [EYS100 Conceptual Architecture](#) students





# ORGANIC ARCHITECTURE DESIGN PRINCIPLES

CONFORM TO SITE, sun, topography, environment

PINWHEELED PLANES -- CRUCIFORM

- PRAIRIE-SCHOOL, BROAD CENTRAL CHIMNEY, LONG CANTILEVERS (overhangs & balconies)

FOLDED PLANE like origami ...continuity...walls, ceilings, and floors become one

SIMPLE GEOMETRIES

HUMAN SCALE

OPEN FLOOR PLAN

✕ DESTROY BOX, no Victorian box-type rooms, – FLOW between rooms, and inside/outside

✕ Walls become screens, BANDS of WINDOWS, FRAME VIEWS – like ENGAWA

✕ Use MATERIALS IN NATURAL STATE -- same on exterior and interior

FORM and FUNCTION are one! Harmony, *not one following other, secondarily*

A UNIFIED WHOLE - inside and out - ORCHESTRATE SUN

BRING NATURE OUT OF MATERIALS, but Innovate (Textile Blocks, Modular "Ken" Design, etc.)

STRUCTURAL ART like in Nature (e.g., the veins in Leaves) - Interior space made exterior as architecture

SOFT WARM OPTIMISTIC COLOR TONES of earth, and autumn leaves

ASSIMILATE FIXTURES into structure, BUILT-IN FURNITURE ..... many plants & planters

ARCHITECTURE = MUSIC

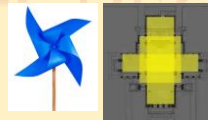
Arts & Crafts, Italy, JAPAN



MUSICIAN  
Preacher  
FATHER



ARCHITECT  
MENTOR Louis  
Sullivan



FROEBEL  
BLOCKS



UNITARIAN  
MOTHER  
Teacher



JT Wunderlich PhD

Frank  
Lloyd  
Wright

Japanese Buddhism & Shintoism,  
with some roots in Chinese Philosophy

NOTE: COMPRESSION & RELEASE is not Organic Design, but commonly used by FLW to cramp/hide entries so as to magnify destination Architecture



See more on **ORGANIC ARCHITECTURE DESIGN PRINCIPLES:**

Wunderlich Lecture Series on *“The Life and Work of Frank Lloyd Wright”* ©



Frank Lloyd Wright

1867-1958



# ARCHITECTURE DESIGN THEORY



## LECTURE SERIES

- ❑ PART 1 PRIMARY ELEMENTS
- ❑ PART 2 FORM
- ❑ PART 3 FORM & SPACE
- ❑ PART 4 ORGANIZATION
- ❑ **PART 5 CIRCULATION** *(This Lecture)*
- ❑ PART 6 PROPORTION & SCALE
- ❑ PART 7 PRINCIPLES

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