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An introduction to urban design at the undergraduate level

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Abstract

This paper presents an undergraduate approach to introducing urban design within an architecture curriculum, responding to the National Architecture Accrediting Board (NAAB) requirement that all accredited programs incorporate foundational urban design knowledge. At Kent State University's College of Architecture & Environment Design, the third-year spring design studio was designated as the primary vehicle for meeting this requirement, with the author coordinating the semester based on his expertise in urban design. Drawing on the pedagogical principles of Colin Rowe, the studio framework integrates five core components: (1) analysis and diagramming, (2) collage and precedents, (3) urban and architectural typologies and morphologies, (4) the design of exterior urban space, and (5) structured readings. The paper outlines the exercises developed to operationalize these principles, each supported by lectures introducing key concepts and methods. Examples of student work accompany the exercises to demonstrate how these foundations collectively shape students' understanding of urban design at the undergraduate level.

Keywords: accreditation, architecture, Colin Rowe, curricula, education, pedagogies, studio, teaching, undergraduate, urban design

1. Introduction

In the education of an architect, the NAAB (the National Architecture Accrediting Board) requires that all architectural students be introduced to *urban design* at the undergraduate level, which is a part of the accreditation prerequisite. While the specifics of how this introduction is achieved can vary between curricula, NAAB accreditation mandates that architecture programs incorporate a range of design knowledge that includes urban design principles. This ensures that graduates are prepared to consider the broader context of their work and how it interacts with the built environment at a larger scale and requires architectural programs to introduce students to Urban Design as part of the accreditation requirement.

To accomplish this pre-requisite, the College of Architecture & Environment Design at Kent State University decided to use the spring semester 3rd year design studio as the UD platform, and since my Master of Architecture degree was in Urban Design, I was asked to coordinate the semester, which I first taught in the spring of 2009 until I retired in the spring of 2018.

My pedagogy for Urban Design is based on that of Colin Rowe, whom I studied with at Cornell University, and where I received my Master of Architecture degree in Urban Design in 1979. These teaching ideas were founded on a few basic principles or foundations.

1) Analysis & Diagramming
2) Collage & Precedents
3) Urban and Architectural Typologies & Morphologies
4) Designing Exterior Urban Space
5) Readings

At Cornell, Colin Rowe used some of the following methodologies for analysis and design.

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- **Figure-Ground Drawings:** Rowe popularized this analytical technique at Cornell to help students understand the urban fabric, or the pattern of solids (buildings) and voids (open spaces).
    - **Historical influence:** Rowe drew inspiration from Giambattista Nolli's 1748 map of Rome, which accurately rendered public spaces as voids in a solid built mass.
    - **Pedagogical impact:** By creating these black-and-white plans, Rowe forced students to recognize the importance of streets, squares, and other open spaces as positive, designed elements rather than just leftover areas between buildings.
- **Opposing Values and Dialectics:** Rowe's use of dialectics, often seen in his solid/void analysis, was a fundamental part of his theoretical work.
    - **Influence from his past:** Rowe's time at the Warburg Institute in London, studying Renaissance history under art historian Rudolf Wittkower, exposed him to traditions of formal analysis that valued historical precedent and abstract ideas.
    - **Modern vs. Traditional:** His application of opposing values often framed the debate between the Modernist vision of buildings as isolated objects in space versus the traditional city's continuous, street-based urban fabric.
- **Application of Analytical Cubism:** His comparison of Cubism to architectural theory is most explicitly detailed in the essay "*Transparency: Literal and Phenomenal*," which he co-authored with Robert Slutzky (Row & Slutzky, 1963).
    - **Cubist principles in architecture:** Rowe used concepts like the simultaneity of different views and the compression of deep space into shallow, layered compositions to analyze modern architecture, including works by Le Corbusier.
- **Privileging the Plan:** Rowe emphasized the plan as the most important element of an architectural idea, using it to analyze both individual buildings and entire cities.
    - **Analyzing historical typologies:** He taught students to analyze historical precedents through their plans, understanding the development and evolution of building types over time.
    - **The "Collage City" concept:** This approach directly fed into his *Collage City* concept, which proposed that a city should be a collection of urban "fragments" of different styles and eras, all organized through a larger formal structure that can be discerned through the plan(Row & Koetter, 1979).

Beyond the core analytical methods, Rowe's teaching at Cornell also emphasized:

- **Contextualism:** The idea that new buildings should respond to and fit within their existing historical and physical context, a philosophy that contrasted sharply with many Modernist principles.
- **History and design:** His curriculum stressed that architectural history should be taught as a crucial discipline in conjunction with design, providing a foundation of ideas for students.

2. The Exercises

The following are the studio exercises issued to accomplish the UD requirement. Each exercise is issued with a lecture on the process and pertinent subject matter.

The exercises are as follows,

- Analysis
    - 1a The regional scale
    - 1b The city scale
    - 1c The site scale

1d Precedent city

- Collage: 2D
  - 2a Collage City
- Collage: Into 3D
  - 3a Collage City into 3D
  - 3b Collage City into a 3D Site
  - 3c Analysis of Individual Designs
- Typology
  - 4a A Small Public Theater
  - 4b Row Housing
- Bay Design
  - 5a Facade Design – Process
  - 5b Insertion Into Main Square
- Final Product
  - 6 Final Presentation

What follows is a description of each exercise and examples of student work accompanying each exercise.

ANALYSIS

Exercise #1a

The Regional Scale

The students meet at the given site and begin to perform a walking survey. They then begin a self-guided tour of the city where the site is located. Once all the data is gathered the students then perform an analysis of the city in relation to the region, an analysis of the city to the surrounding context, and an analysis of the given site to the city. The images shown here represent the city of Shaker Heights in relation to Cleveland and its surrounding context.

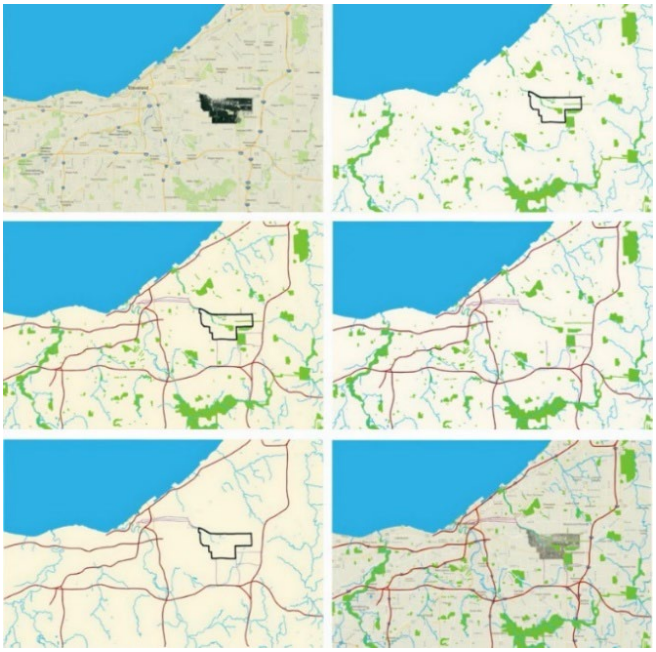

Figure 1 Analysis at the regional scale showing the city of Shaker Heights, OH in black (J. Penvose, Sp2015)

ANALYSIS

Exercise #1b

The City Scale

At the city scale investigation focuses on the fabric of building masses, street patterns, green space, water, and merchant centers as examples. The site is shown in the second and third diagram as a blue rectangle. Students also have access to GIS mapping of the region and the city of Shaker Heights online.

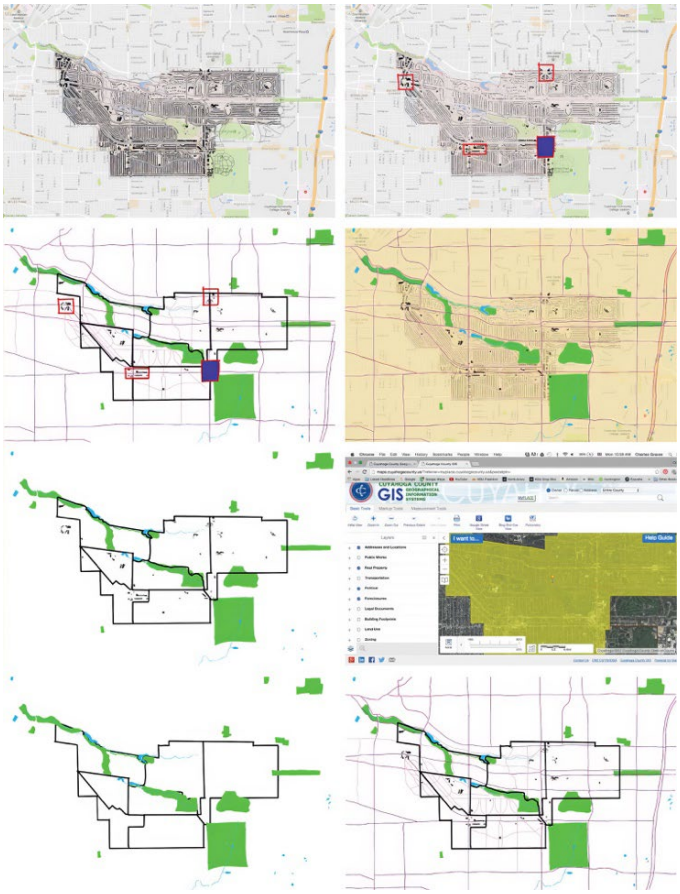

Figure 2a Analysis at the city scale (J. Penvose, Sp2015)

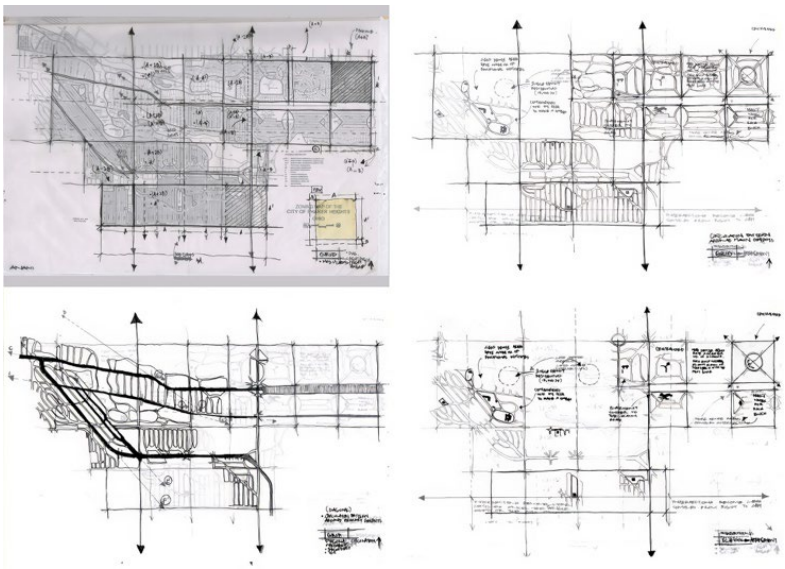

Figure 2b Analysis at the city scale (T. Anam, Sp2015)

ANALYSIS

Exercise #1c

The Site Scale

At the scale of the site, the students begin to investigate various existing programs, green space, buildable site, and road redirection.

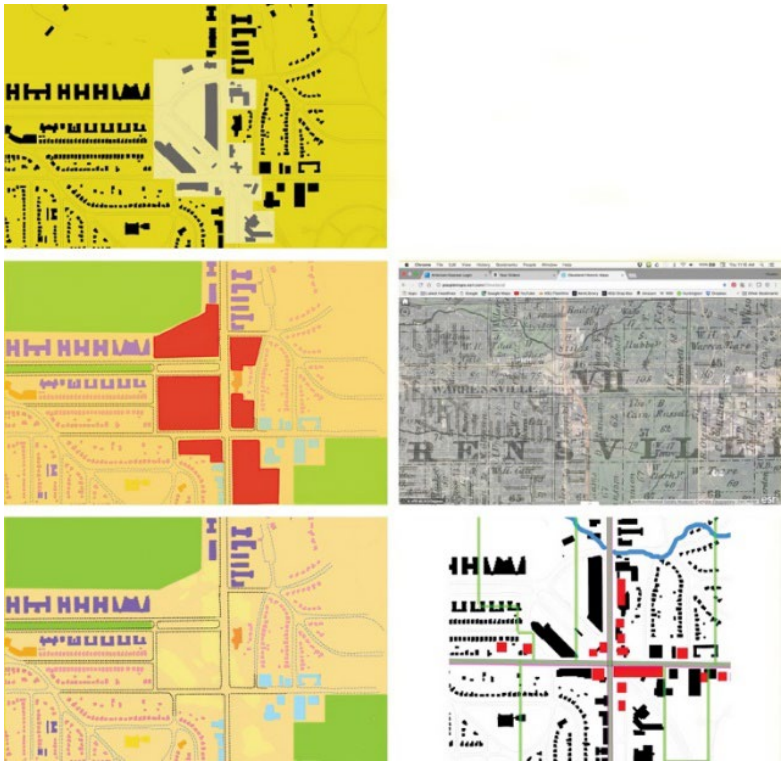

Figure 3 Analysis of the site (N. Yanxiong, Sp2015)

ANALYSIS

Exercise #1d

Precedent City

In this exercise, the students are given an existing city plan in figure-ground format. They then must translate the 2D image into 3D. The students begin by researching the site of the existing city and studying the massing in the surrounding context. Since the majority of the plans given to them are only conceptual, the area that was not built must be interpreted into 3D.

The example shown is a conceptual project designed by Steven Holl for the Parco Vittorio Formentano / Milano Porta Vittoria area. Using the given figure/ground drawing, the students are asked to analyze the plan by means of hand drawings on trace paper. Added to the 3D representation shown on the far right are the main roads as massing shown in brown.

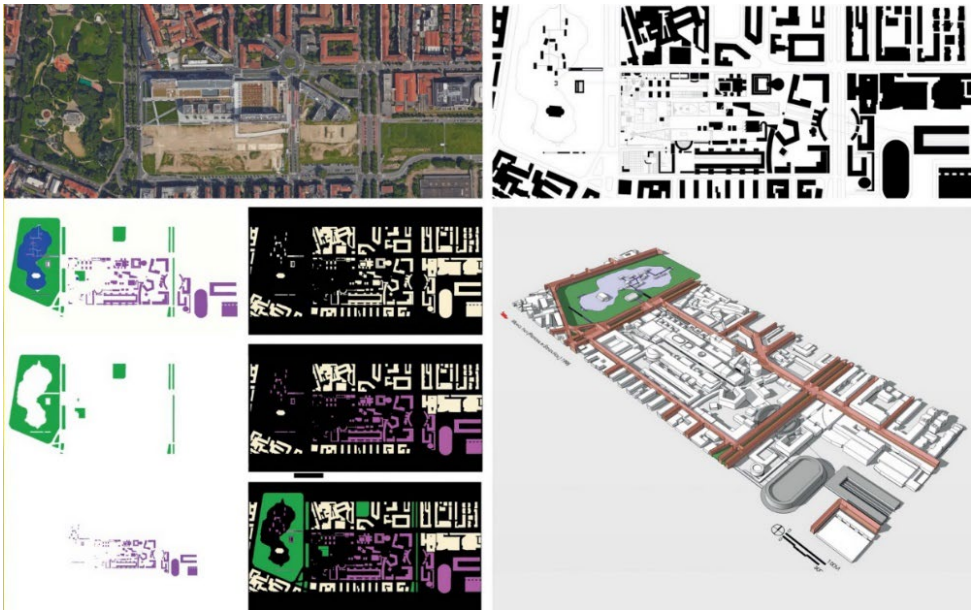

Figure 4 Student's 3D interpretation of a conceptual project originally designed by Steven Holl (C. Scaglione, Sp2013)

COLLAGE: 2D

Exercise #2a

Collage City

For this exercise the students are shown several cities drawn in figure/ground format. These city plans are taken from the text, The Genealogy of Cities (Graves 2009). It is then explained that using the existing plans the student must create a fictitious city made up from as many pieces they choose to use from the cities shown.

Figure 5 Figure-ground plans issued from "The Genealogy of Cities"[1]

[1] Ibid
Illustrations from left to right, top to bottom –
1) Almere NL (Rem Koolhaas) 1994
2) Berlin (Potsdam) DE (by Augusto Romanano Burelli) 1991
3) Frankfurt (Osthafen) DE_(David Chipperfield) 1994
4) London GB (Steven Fong) 1979
5) Milan IT (Steven Holl) 1995
6) Vienna AT (Ringstrasse) 1914

The fabric chosen does not have to be on the same scale, but once the collage is complete, a scale must be created for each solution. They are also able to add any figure-ground fabric themselves.

When presented...

1) The plan must look seamless. Meaning all the pieces should be woven together.
2) The pieces of existing fabric chosen should be shown on a separate page.
3) The areas where they added their own fabric should be shown in a separate drawing.

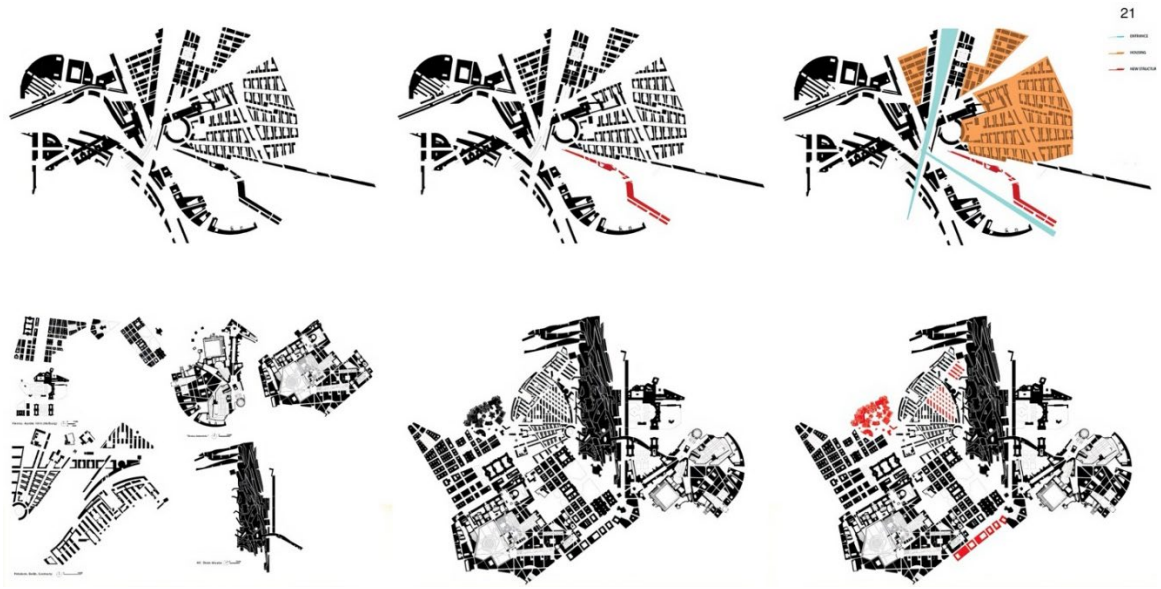

Figure 6 Two collages created from issued figure-grounds. The pieces chosen to create the collages are shown at the lower left. The areas drawn in color are pieces added by the student. (Z. Ye, Sp2014)

COLLAGE: Into 3D

Exercise #3a

Collage City into 3D

Using the collage exercise they just completed, the students are asked to begin to develop the plan into a 3D design. The plans are typically imported into a 3D computer program, scaled, and then extruded into massed buildings. The students are told they can use any 3D CAD program they choose, but that they will eventually be required to access some urban fabric through the CAD program SketchUp. It's also at this point that a list of possible urban programs is introduced. The students are required to denote where these programs might exist in their final 3D rendition. Typically, the original plan from exercise #2 are constantly revised from its original design. This may occur when the width of streets is scaled, or when some building mass is too small for any given program.

7) Roma Interrota (Colin Rowe) 1979
8) Luxembourg LU (Leon Krier) 1978
9) New York US (Thom Mayne) 1999

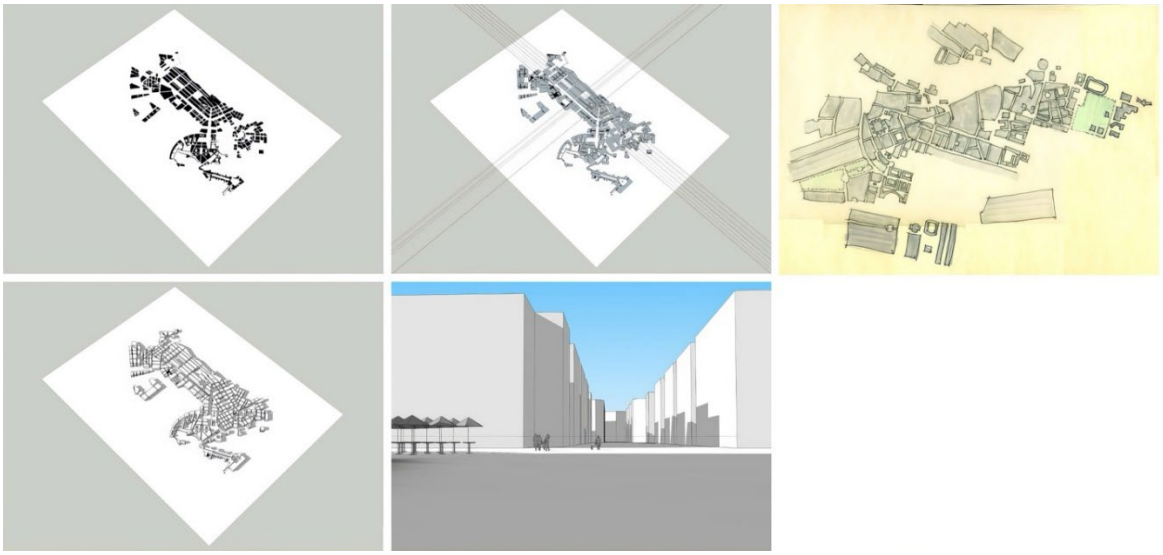

Figure 7 Fictional cities created by collaging are then developed into 3D schemes (Y. Zhang, Sp2018)

COLLAGE: Into 3D

Exercise #3b

Collage City into the 3D Site

Each student is presented with a 3D CAD file that has the existing site and the surrounding context, built in a SketchUp file. Using information and

schemes developed from the three previous exercises that students are asked to begin to develop a design. They are told to include the following.

1. Note the lanes of the existing roads. These must remain in some form in the final design.
2. There is an existing light rail system that terminates at your site. Provided a covered commuter station at the terminus.
3. A massing must be defined as the location for a small theater. This theater will show small productions, be used as a lecture hall, & show film. Since the theater will be showing staged productions, a Fly/Stage House, must be included in the massing.
4. A public square, or piazza. This space will have a hard surface and be defined primarily by building mass.
5. Mixed-use program. This could include shops, offices, housing, etc.
6. Areas that are defined as Row Housing.
7. To eliminate large parking lots, the students are told to locate parking structures.
8. All areas must be accessible to emergency vehicles. This exercise includes a lecture on Urban Typology. Once the designs are developed in 3D CAD, the students are required to build a small physical sketch model.

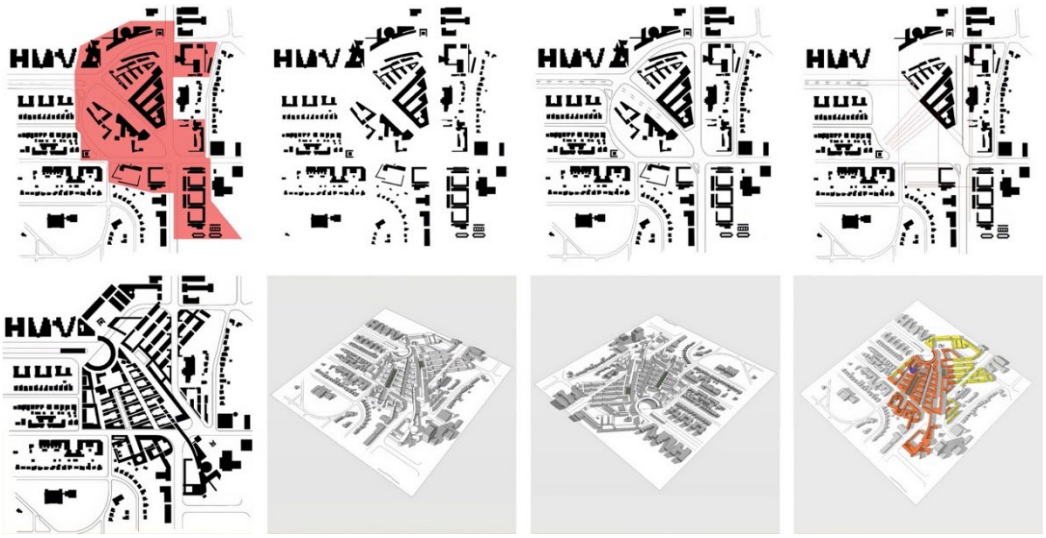

Figure 8 Using the two previous collage exercises, the students are then asked to collage and develop a 3D project into the given site, shown in red (A. Alahmadi, Sp2017)

COLLAGE: Into 3D

Exercise #3c

Analysis of Individual Designs

This exercise asks the student to investigate through analysis their own design process. At this point they must step back from the use of CAAD software and return to drawing by hand and building physically sketch models.

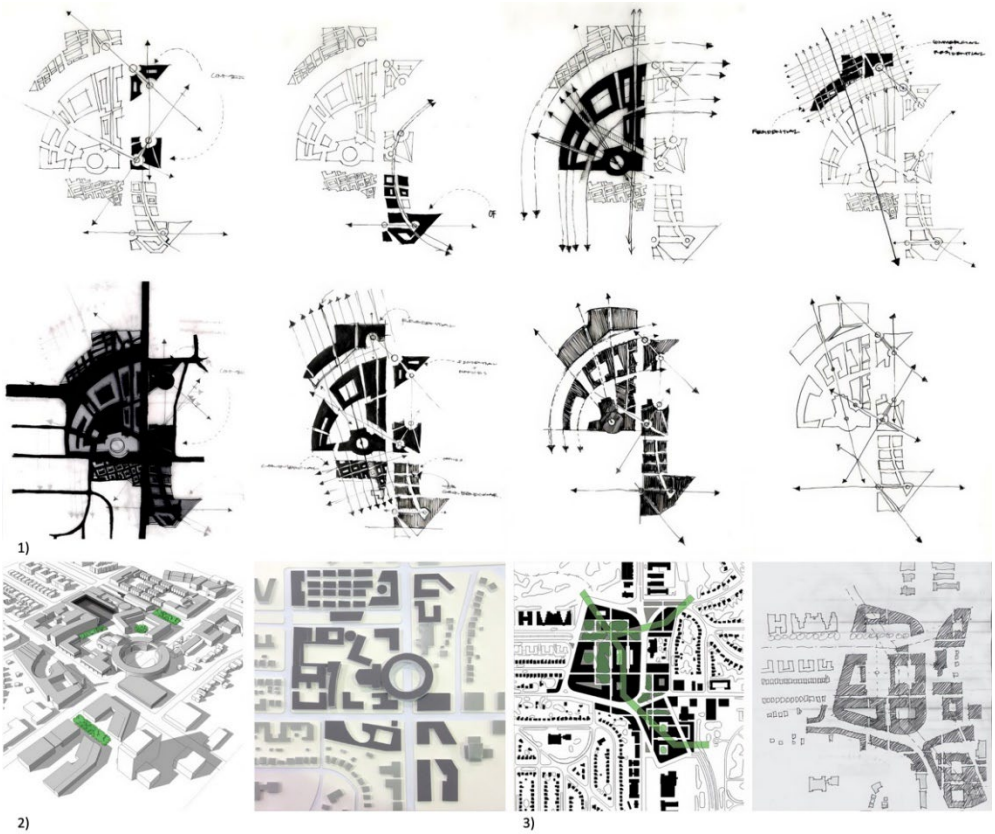

Figure 9 Once a project has been developed for the given site the students begin the analysis process, looking at circulation, how their projects relate to the surrounding context, and where various programs might be located (1- T. Anam, Sp2015) (2- C. Scaglione, Sp2013) (3- J. Gantz, Sp2009)

TYPOLOGY

Exercise #4a

A Small Public Theater

The exercise is presented with a lecture on the history of theaters and their typical siting. The exercise is not focused primarily on the theater program, but on the theater as a mass, and the various ways it may be designed into different urban contexts. Using SketchUp's 3D Warehouse and Google Earth, the students begin to locate existing theaters. They then begin to download these 3D drawn theaters into files for comparison. Since the exercise does not focus on materiality, all theaters are converted into a white format. The students then begin to import these chosen theaters into their own designs. Importing the chosen theaters into their previously designed schemes, the pupil begins testing the theaters in various locations for accessibility and connecting public spaces.

The example shown is *Teatro das Figuras* in Portugal. The *teatro* is designed by the architect Gonçalo Byrne, is a small civic theater seating only 762. Once the file is downloaded, they are then asked to simplify the project, deleting any extra site conditions or massing not needed.

Once this is completed, the model is further simplified by turning it white to match the other new context. The images illustrate how a theater appears in section, showing the 'fly/stage house.'

These images illustrate the sequence of downloading an existing theater, converting it to simplify, matching the existing context, and placing it into the new design.

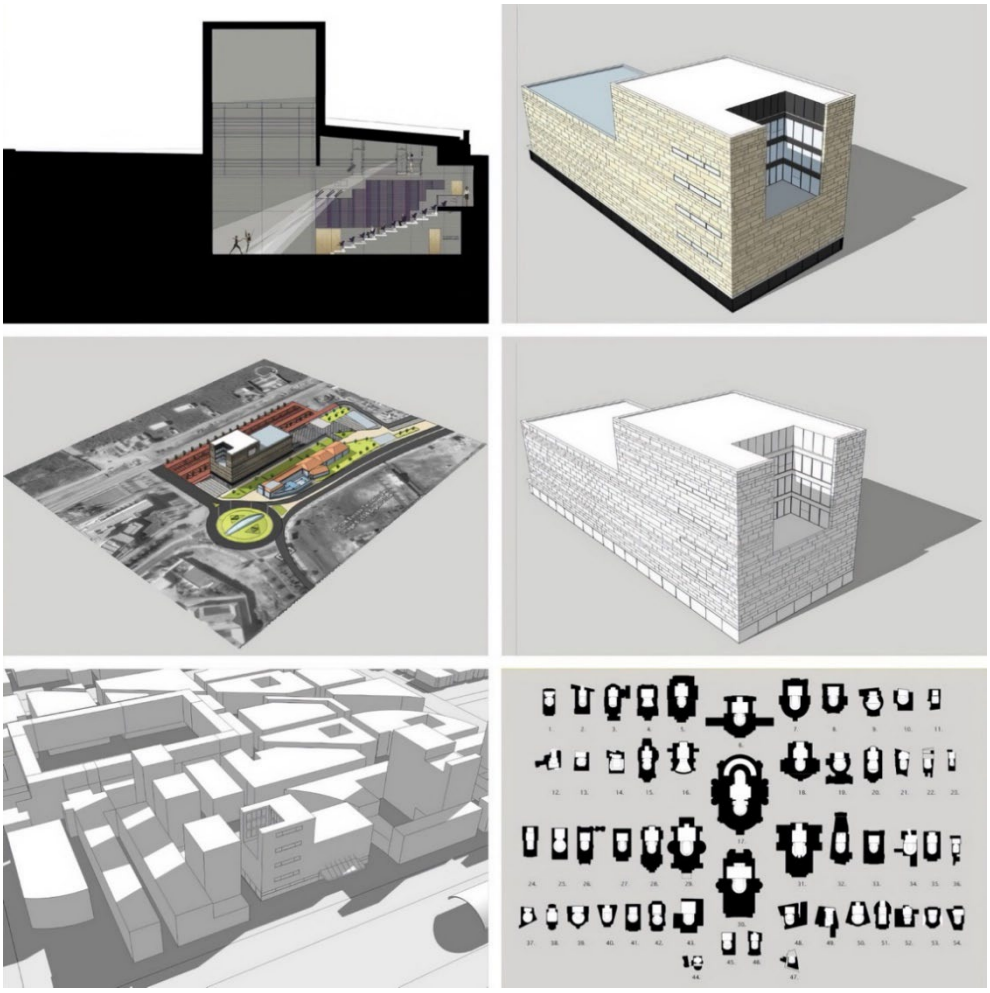

Figure 10 *Teatro das Figuras,* Faro, Portugal, was studied and compared to other existing theaters (Shown lower right) the theater is then scaled and placed near the public space (D. Fox, Sp2013)

TYPOLOGY

Exercise #4b

Row Housing

Like the previous problem, the exercise is presented with a lecture on row housing. Again, using SketchUp's 3D Warehouse, & Google Earth, the students begin to locate either existing row housing, or use an existing designed single unit that can be easily converted into town housing. Once the unit is chosen the students begin to study various ways the row housing can be arranged. This is done as a separate file, and includes various means of access, trees, and location of possible cars. Once they determine how they can possibly arrange the housing the students begin to import the housing mass into their existing designs, substituting the new massing into areas they previously determined row housing could be located. Each exercise requires the student to reinvestigate their overall designs and allows them to redevelop any area to make it work as a whole.

The top two illustrations are from the row house typology lecture. The first image depicts a typical Georgian six level unit found in London. The second image illustrates various configurations found worldwide.

The next three images depict a unit downloaded from 3D Warehouse, converted and simplified. At the next stage the students begin to investigate various types of combinations the units can be arranged, and their first attempts are made to insert the units into their master plans. At the final stage of the row house exercise the students become aware of the level of detail the units should have when displaying them at either a closeup view or zoomed out to view the complete master plan.

Below is an example of a students' row housing investigated and then inserted into their master plan. The final requirement is to illustrate the units at eye level.

Figure 11 Row house unites investigated as possible groupings and then inserted into their projects (A. Alahmadi, Sp2017)

BAY DESIGN

Exercise #5a

Facade Design-Process

In the initial stages of this exercise students begin to study other facades, and possible repetitive elements for potential bay elements.

To test the single bay the student is required to create a series of repetitive units that are connected. Forming two walls arranged 90° to each other allows for atypical investigation.

The student is also asked to design a portion of hard surface ground area, which allows the viewer to be visually grounded.

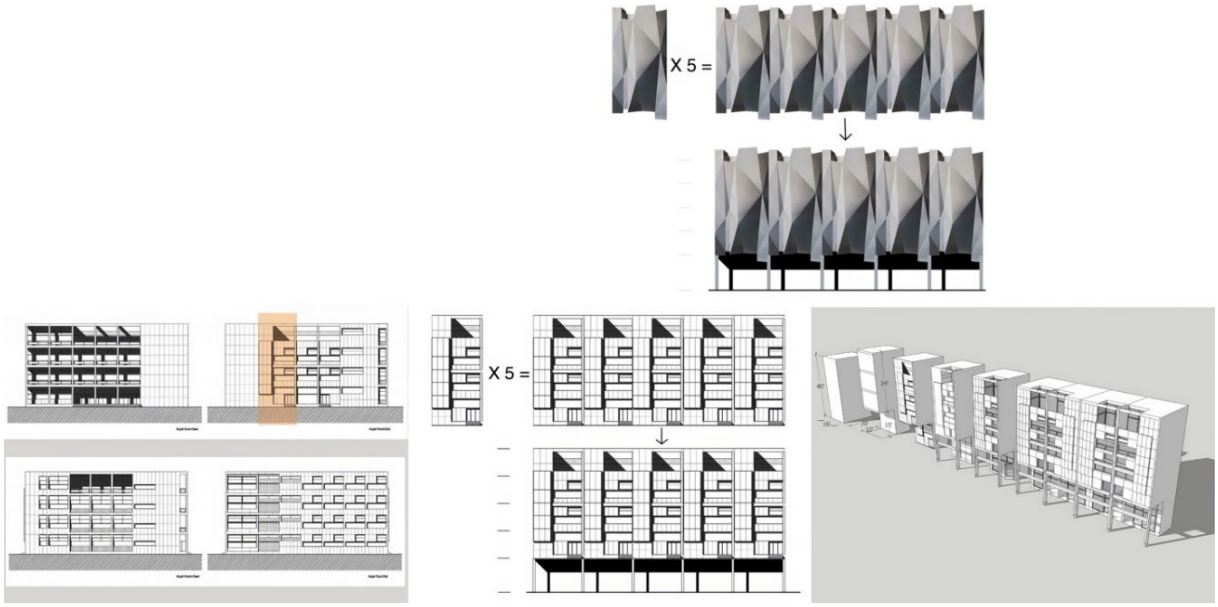

Figure 12a In the top image the student photographed a folded construct and then repeated the image. In the lower images a section of Casa del Fascio by Giuseppe Terragni is isolated and repeated, and the further developed in 3D. (S. Giuliano, Sp2017)

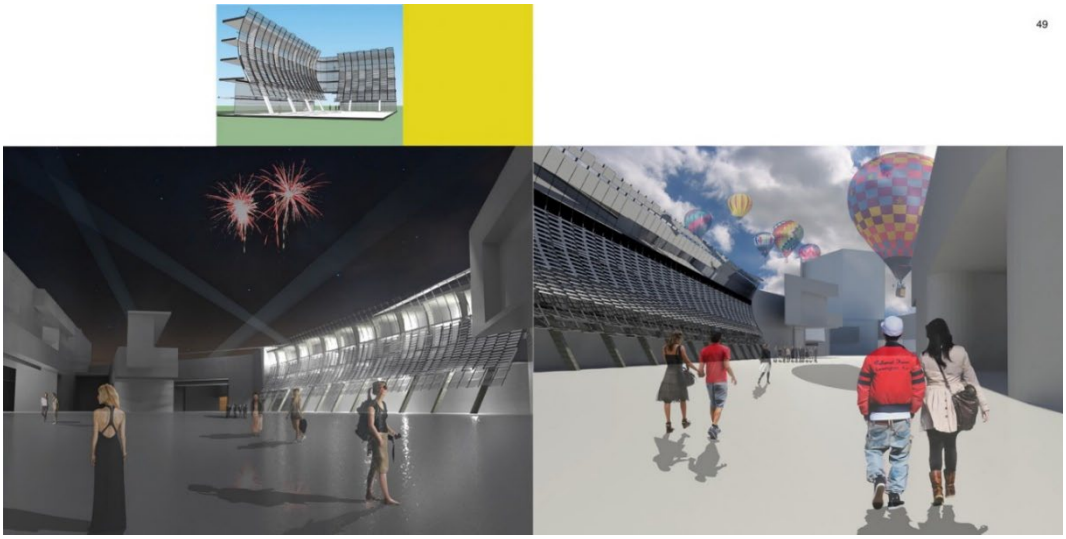

Figure 12b The bays investigated at a corner condition (Z. Ye, Sp2014)

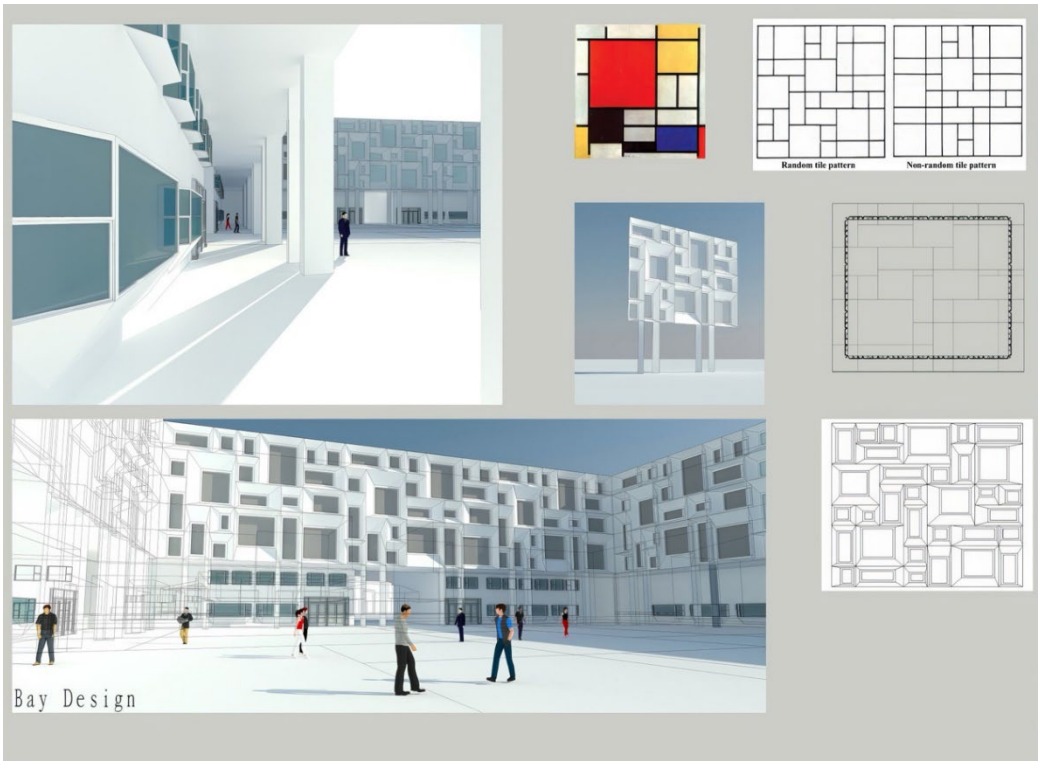

Figure 12c The student used Piet Mondrian's Composition with Red, Yellow, Blue, and Black (1921) as a base for their design (L. Ruoya, Sp2015)

BAY DESIGN

Exercise #5b

Insertion Into Main Square

The previously designed bay is now inserted into the student's main public space. Substituting their previous blank facades with the newly designed bay. These will have to be re-formed to work with their existing previous designs. Their spaces are tested to determine the proper height they should be for the proper enclosure and viewing. The bays are also corrected for the proper spacing and various entry points. All public spaces must also be designed with a covered loggia.

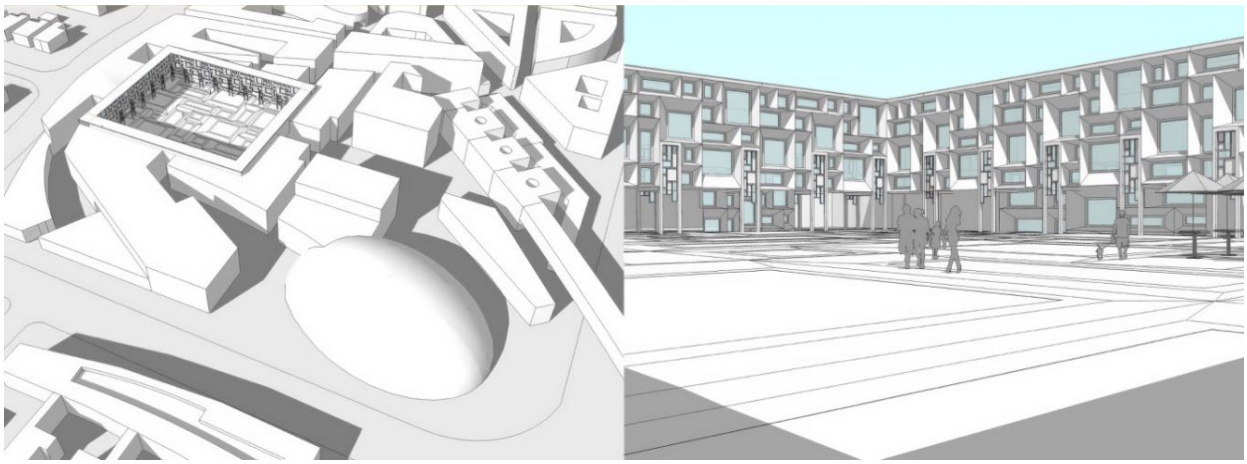

Figure 13 The public area with required loggia and designed surface (L. Ruoya, Sp2015)

FINAL PRODUCT

Exercise #6

Final Presentation

The final exercise allows the students to determine the proper design needed for their final presentations.

At this point, the pupil can go back and add any information or drawing they feel they might be missing. Process drawings and models must be included in the final presentations. This exercise also incorporates pinned mockups of their images placed into a determined-sized format and accompanied by text. Once the designs and standard formats for the class are decided, all the previous work is arranged using layout software such as InDesign. Final presentations must be written, practiced, and timed.

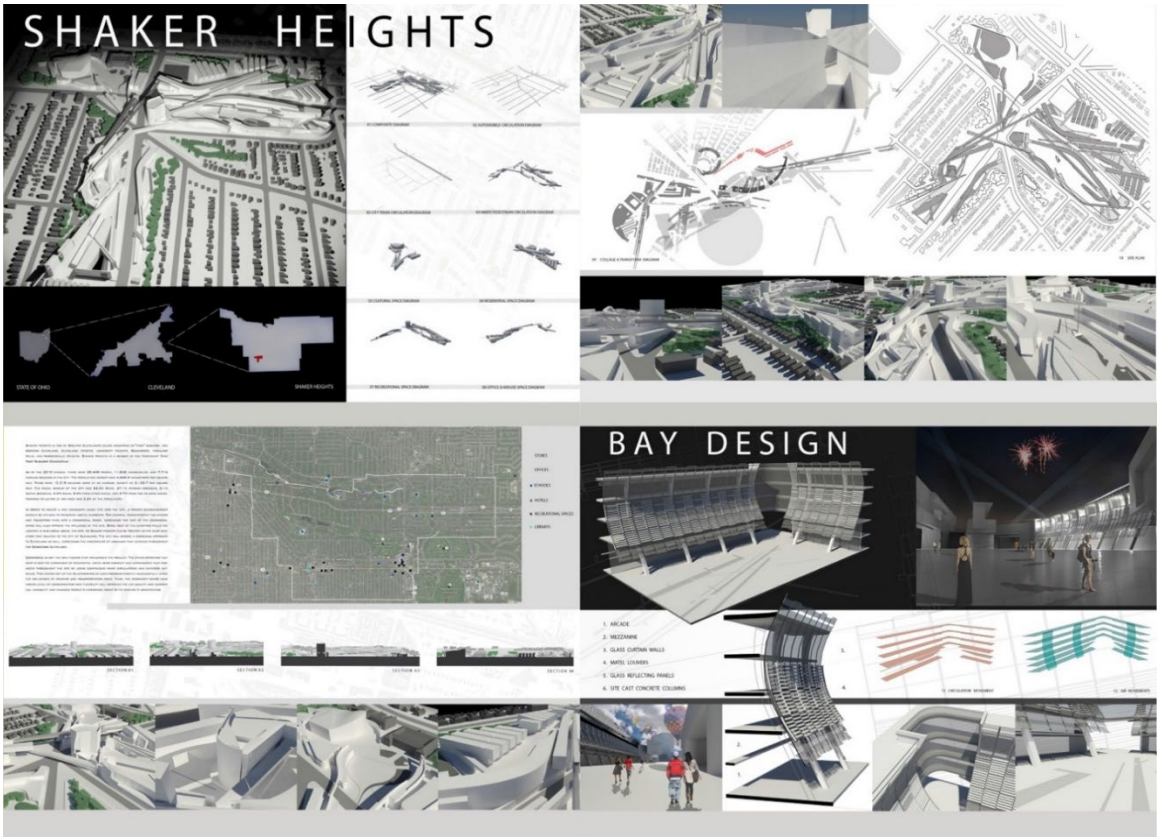

Figure 14 Final presentation (Z. Ye, Sp2014)

READING LIST

The readings were simplified over time and are issued throughout the semester as part of the individual exercises.

Journal Articles:

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3. Concluding Remarks

I will finalize this article by clarifying how this introduction to urban design changed over time. The initial program was very extensive, and during my very first implementation of the course, I quickly realized I had written the program for an audience of graduate students. It became apparent that the exercises needed to be shortened and ultimately greatly simplified. To achieve this, instead of issuing an exercise for a 2- or 3-week duration, I broke down the steps to be achieved from one studio period to the next. I also structured the exercises, so the student was constantly forced to always redesign the overall site as they added detail. Presently, the program still exists within Kent State's architecture college, but understandably has changed based on the pedagogy of who is presently teaching and coordinating.

I was recently asked if I felt Colin Rowe's theories were still pertinent in today's field of urban design. I believe so, but they don't stand alone as a single design process. Our world is ever-changing, and the process of urban design changes with it. The use of the computer for urban design started in the 1970s with Bill Hillier and his creation of *Space Syntax* and has been further developed with the introduction of *Parametric Urbanism*, which was formalized as a theory-driven movement in the early 2000s, with the term itself coined around 2008. Other examples are the use of Geographic Information Systems (GIS) and Visualization and Virtual Reality (VR).

Today, some form of AI is a common tool found in just about every piece of CAD software used by both students and professional architects, and with the introduction of AI, the process of urban design will be changing almost daily. It will be interesting to study the results of these newer methods of design combined with the theories of Colin Rowe. I look forward to viewing the solutions.

References

Rowe, C., & Slutzky, R., (1963*) Transparency: literal and phenomenal*, Perspecta
Rowe, C. & Koetter, F., (1979) *Collage City*, The MIT Press
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CRediT Authorship Contribution Statement

Charles P. Graves: Conceptualization, Resources, Writing, Visualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

Data will be made available on request.

Ethics Committee Approval

Ethics committee permission is not required.

Resume

Graduated from the University of Kentucky with a Bachelor's in Architecture in 1975, and received a Master of Architecture with a focus in Urban Design from Cornell University in 1979. He then practiced architecture in New York City until 1985. In 1985, he began his teaching career in the architecture department at the Eidgenössische Technische Hochschule (ETH) in Zürich. In 1987, he became a faculty member in the College of Architecture & Environmental Design at Kent State University. During his tenure at Kent State, he served as the program director of KSU Italian from 1996-2012, and as the coordinator of the 3rd-year design studios from 2009-2018. In 2018, Graves retired from teaching at Kent State University and is presently Professor Emeritus. His publications include The Genealogy of Cities (2009), The Urban Design Legacy of Colin Rowe, Chapter titled Colin Rowe and the Legacy of the Figure Ground, (2025), L'Enfant's Plan for Washington D.C., & a Precedent: The Plan of Versailles, CLOG: National Mall (2012). He reviewed The Evolution of Urban Form: Typology for Planners and Architects, The Journal of Urban Morphology (2013). Graves has been the recipient of the Graham Foundation twice. Presently, during his retirement, Graves continues to write, travel and lecture.