The University of Texas at San Antonio
College of Architecture, Construction and Planning
Fall 16 Arc 4156
MWF 1:00–4:50pm
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Office Hours: TR 10:30–11:00 am or by appointment (3.380G Monterey Building)
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LEARNING OBJECTIVES

This advanced undergraduate studio seeks to embed issues of ecological literacy into a traditional studio setting through the comprehensive integration of advanced performance metrics and design pedagogy. The two studio instructors—one with expertise in building performance and the other in architectural design—will initiate a critical feedback loop, creating dialogue between issues of analysis and design, performance and form. The studio will pursue these critical topics in parallel, with the goal of fully exploring the oft-misunderstood relationship between architectural sustainability and aesthetics.

To this end, the studio will embrace the goals and methods of the Architecture 2030 Challenge, which commits that all new buildings and major renovations will be carbon-neutral by 2030. The studio will specifically focus on suburban retrofits and infill, project types that will comprise up to 75% of urban development develop in the coming years.2

Our learning objectives are as follows:

1. Advance the design of a carbon neutral built environment, in accordance with the Architecture 2030 Challenge
2. Embed issues of ecological literacy into traditional studio setting
3. Create a critical feedback loop between issues of building performance and design
4. Embed advanced performance modeling and metrics into traditional studio setting
5. Provide students with the opportunity to enter an international design competition
6. Explore contemporary and competing theories of suburban design
7. Develop new housing typologies that correspond to the contemporary suburban condition in South Texas

1 The term “Flat” comes from author Judith De Jong, New SubUrbanisms. New York: Routledge, 2014. 3. The concept describes an American urban landscape in which “...suburbs are becoming more similar to their central cities, and cities more similar to their suburbs.”

STUDIO BRIEF

Demographic and Geographic Explosion

“The metro areas in Texas are all going to boom, we don’t need to compete for growth, it’s going to happen.”

-Mike Frisbie, director of the San Antonio’s Transportation and Capital Improvements Department

One million people will move to San Antonio in the next 25 years, a demographic influx will bring the population of the city from 1.4 million to 2.4 by 2040. It will also add 500,000 jobs and require 500,00 units of housing. All of this growth in a city that already added 430,00 people in the last ten years. Where will these people go? Where will we locate the jobs? Where will we build the housing?

If current growth trends hold, the growth is set to take place at the suburban periphery: Between the years 2000-2010 the growth rate outside of Loop 1604 registered 233%, while the growth rate inside Loop 410 stood at a modest 1%. During the same time period, growth within the Inner City limped in at -3%. These trends represent a historical pattern of concentric growth, one that began in the late nineteenth century with the advent of the electric streetcar, and continued throughout the twentieth century with the introduction the automobile, the construction of the federal interstate system, and the introduction of metropolitan ring-roads. A continuation of this pattern would double the size of San Antonio’s footprint by 2040, from 500 square miles to more than 1,000 square miles. The negative financial impact of this scenario would be severe in a city and state that already struggle to meet annual obligations towards public infrastructure. The ecological consequences--particularly as they relate to carbon emissions and water supply--would be equally damaging.

Interestingly, just as San Antonio is experiencing growth in population, another trend is underway that challenges historical patterns of expansion: San Antonio is becoming a polycentric city. Last year the City’s Planning and Community Development Department spearheaded a comprehensive effort to replace the existing master plan, which will soon be two decades old. The public process, which enjoys the support of Mayor Ivy Taylor--herself a planner by training—challenges dated concentric growth models that would privilege the historic downtown and central business district. The new planning effort forecasts that no fewer than thirteen distinct employment centers will be required to absorb the continuing economic boom. This shift is noteworthy because it recognizes the reality that the new San Antonio is a rapidly expanding, polycentric, decentralized landscape that will continue to resist geographic containment.

The confluence of these two shifts: of a demographic boom on one hand; and of a shift from a concentric to polycentric city on the other, means that San Antonio will look very different in 2040 than it does in 2015.

The Need for New Housing Typologies

“The ongoing flattening of the American metropolis is increasingly visible through the proliferation of hybrid sub/urban practices...Each of these practices not only evinces new forms from reciprocating urban and suburban influences, but also provides a key point of departure for the articulation of new ways of forming the evolving American metropolis. Thus it becomes clear that for the city, flattening through suburbanization is not the formal and spatial death sentence it might once have been, as new forms emerge that transform suburban influences in denser environments.”

Judith DeJong, New SubUrbanisms

“At the age of sixty-five or so, the great American dream of residential suburbia, which came of age with the GI Bill of the 1940s and America’s postwar economic and baby booms, seems about ready to retire.”

-Barry Bergdoll, Foreclosed: ReHousing the American Dream

As a response to San Antonio’s unprecedented population growth, and in light of historical shifts in the form of this growth, our studio will speculate about a new residential form for San Antonio—one that maintains relevance as urban centers and edges as we know them cease to exist. The studio will specifically explore the form of 500,000 units of new housing, set to be built in the next twenty-five years. The location, design, construction, and financing of these units will make an indelible impact on the physical, ecological, social, and financial landscape of the next San Antonio. What will these units look like formally? Where will they be built? At what density? What will be their relationship to existing urban fabric?

This studio begins with the assumption that as architects we currently lack the insight to answer these questions. As the city “flattens,” traditional distinctions between urban and suburban forms will continue to dissolve and lose relevance. As this occurs, traditional housing typologies will prove increasingly irrelevant. What good is a single-family ranch house when required urban densities exceed 20 units per acre? How useful is an urban tower if we don’t have a lot large enough to accommodate it? Is a row of townhouses an effective way to densify existing culs-de-sac?

Therefore, we will explore the possibilities of the “flat” city, resisting the temptation to additional greenfield sites with known residential typologies. Instead, the studio will pursue infill sites that enjoy access to existing infrastructure and fabric. Incidentally, the City of San Antonio already recognizes the need for urban infill, a fact demonstrated by their initiation of multiple programs to encourage building within existing city limits (see Inner City Reinvestment Infill Policy Map, Infill Pilot Program, Center City Implementation Plan).

Unfamiliar Typologies for Familiar Sites

Designers will explore the following new housing typologies in an attempt to introduce density and diversity into existing suburban fabric.

**Site 1: The Modular Micro-Home**
This site calls for the introduction of prototypical micro-housing units onto existing inner-ring suburban lots.

**Site 2: The Multi-Family McMansion**
This site calls for the introduction of new multi-family McMansion prototypes that take 6 units in a single-family footprint.

**Site 3: The Re-Calibrated Cul-de-Sac**
This site calls for the introduction of multi-family housing into the existing lot structure of cul-de-sac neighborhoods.

**RE-EXAMINING THE RELATIONSHIP BETWEEN FORM AND SUSTAINABILITY**

As the studio examines the retrofit of U.S. suburbs, it also aims to clarify the complex and often misunderstood relationship between architectural form and sustainability. Specifically, we will pursue the topic of sustainability as a form generator, not a technical overlay. To accomplish this goal, we will model our design process on a highly structured feedback loop that takes into account issues of design and analysis, form and performance. We will always pursue these critical topics in parallel; never in isolation. This means that initial formal impulses must answer to feedback from simulation and software.

A similar dialogue will take place between the two studio instructors, with Professor Azari advocating for performance and sustainability and Professor Caine emphasizing architectural and site issues. In the end, the instructors and issues will inform each other, while the responsibility for final design decisions will rest solely with the students. This robust dialogue will commence with initial sketches and continue until final renderings and models are complete.
Ultimately, all proposals must account for the fact that the built environment is a key contributor to a host of environmental pollutants, including the carbon emissions associated with global warming. This studio therefore requires designers to minimize the environmental impact associated with their building and site proposals. This will require each student to simultaneously attend to multiple aspects of site and building design including water use, energy use, resource consumption, occupant comfort and daylighting. At the conclusion of the semester, students must deliver a proposal that is formally dynamic, environmentally efficient, programmatically compelling and that engages users at the scale of the site and building.

**Modeling Performance**

Dr. Azari will introduce student designers to critical software packages, allowing them to leverage the latest technology to model building performance. The studio will focus on the following software packages extensively:

Climate Consultant: Developed by the University of California in Los Angeles (UCLA), Climate Consultant enables users to understand, analyze, and visualize local climatic characteristics (i.e. temperature, relative humidity, solar insolation, wind patterns, sky cover) before selecting climate-responsive design strategies.

Sefeira: This software allows users to analyze design proposals, specifically with regard to energy and daylighting performance. It also enables users identify design characteristics that optimize energy and daylighting performance.

Athena Impact Estimator: The software allows students to evaluate the impact of design and materials on the environment (i.e. global warming potential, acidification potential).

**The Architecture 2030 Challenge**

The studio will subscribe to the goals of the Architecture 2030 Challenge. The “Architecture 2030 Challenge is an initiative by Ed Mazria that calls for built environments with zero emissions by 2030. Students will use the studio’s Performance+Design pedagogical approach, the lab modules, and the extensive resources provided by the online Architecture 2030 Palette tool to design, analyze, re-design, visualize, and document the performance of the design proposals.

Buildings are the major source of global demand for energy and materials that produce by-product greenhouse gases (GHG). Slowing the growth rate of GHG emissions and then reversing it is the key to addressing climate change and keeping global average temperature below 2°C above pre-industrial levels. To accomplish this, Architecture 2030 issued The 2030 Challenge asking the global architecture and building community to adopt the following targets:

All new buildings, developments and major renovations shall be designed to meet a fossil fuel, GHG-emitting, energy consumption performance standard of 70% below the regional (or country) average/median for that building type. At a minimum, an equal amount of existing building area shall be renovated annually to meet a fossil fuel, GHG-emitting, energy consumption performance standard of 70% of the regional (or country) average/median for that building type. The fossil fuel reduction standard for all new buildings and major renovations shall be increased 80% in 2020 and 90% in 2025 and be Carbon-neutral in 2030 (using no fossil fuel GHG emitting energy to operate).”

**The 2030 Palette**

In order to advance our knowledge of sustainable strategies, this studio will also utilize the following critical online tool: http://www.2030palette.org/.

“The 2030 Palette presents sustainable planning, landscape, and building design principles and actions called Swatches. Swatches are global in scope yet local in application, providing location-specific strategies across the built environment at any latitude and in any environment: from interconnected transportation and habitat networks that span entire regions, to elegant passive design solutions to light, heat, or cool individual buildings. The 2030 Palette informs the planning and design process at the point of inspiration. By curating the best information and practices, and using powerful visuals and straightforward language, highly complex ideas are made intuitive and accessible.”

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AIA COTE Top Ten Competition for Students

Last year, the American Institute of Architects (AIA) and Association of Collegiate Schools of Architecture (ACSA) joined to implement The AIA COTE Top Ten for Students, an international design competition to honor student work that demonstrates the highest commitment to sustainable design principles. This semester the studio will dedicate itself to advancing this critical public effort.

AIA COTE TOP TEN CRITERIA:

Measure 1: Design and Innovation
Measure 2: Regional/Community Design
Measure 3: Land Use and Site Ecology
Measure 4: Bioclimatic Design
Measure 5: Light and Air
Measure 6: Water Cycle
Measure 7: Energy Flows and Energy Future
Measure 8: Materials and Construction
Measure 9: Long Life, Loose Fit
Measure 10: Collective Wisdom and Feedback Loops

RECASTING THE STUDIO AS 5 PARALLEL PERFORMANCE + DESIGN LABS

In order to facilitate a robust pedagogical dialogue between the often-separate discourses surrounding performance and design, instructors will lead 5 parallel and interactive Performance and Design Lab sequences.
5 Performance Labs

To provide students with the technical skills necessary to generate and evaluate design alternatives, Assistant Professor Azari will implement labs covering the following topics:

Lab 4. Bioclimatic Design. The studio will leverage Climate Consultant software to help students understand the macro- and micro-climate aspects of site location, orientation and building form. Students will also learn to use climatic diagrams such as psychrometric charts, annual and monthly temperature fluctuation diagrams and solar radiation diagrams to find comfortable and uncomfortable times and conditions in a specific site location. We will also identify, analyze and design passive and active systems.

Lab 7. Energy Flows and Futures. The studio will leverage Sefaira as an energy modeling tool and Energy Use Index (EUI) as a performance metric in order to evaluate design alternatives. During this lab we will examine the operational energy implications of design choices including form, geometry, systems, and envelope materials.

Lab 5. Light and Air. The studio will leverage Sefaira, Annual Sunlight Exposure and spatial Daylight Autonomy in order to consider light and heat exposure. Design teams will learn to examine the quantity and quality of daylighting while understanding the impact of design elements such as window-to-wall ratio, geometry, window location, and daylighting. The studio will utilize energy and daylighting metrics to evaluate proposed design alternatives.

Lab 6. Water Cycle. The studio will work to understand and maximize efficient water flow on the site and in the building.

Lab 8. Materials and Construction. The studio will quantify the lifecycle impacts of design alternatives using Athena Impact Estimator. This analysis will help students to consider and select materials based on environmental performance.

5 Design Labs

Assistant Professor Caine will simultaneously ask students to engage labs covering the following topics:

Lab 2. Regional and Community Design. Students will consider the relationship of their design proposal to the broader metropolitan context. This will require students to select the most relevant topics from a broad set of issues such as neighborhood morphologies, typologies, vehicular and pedestrian circulation systems, access to transit, adjacent programs, demographics, socioeconomics, zoning and local building codes.

Lab 3. Land-use and Site Ecology. Students will map an existing ecosystem such as hydrology, food, pollution, migration, air quality and waste. Once students establish the prevailing logic of the system, they will examine the impact of their design proposal on the selected system.

Lab 9. Long Life Loose Fit. Student designers will consider topics such cost, assembly and disassembly and durability of materials and systems over time.

Lab 10. Collective Wisdom and Feedback Loops. Student designers will document their decision-making process as way of evaluating the efficiency and relative success of their design process. The instructors will ask students to carefully document sketches, diagrams, models and drawings in anticipation of this exercise. The goal here is to encourage designer to invest their physical process with care throughout the semester, then curate the results as a means of evaluating the efficacy of their physical design process. This exercise will additionally provide students with the opportunity to consider the dialogue between the Performance Labs and the Design Labs.

Lab 1. Design and Innovation. Each student will select one environmental strategy and make it the subject of a highly developed design drawing. This drawing—which will anchor one of the final graphic panels—must simultaneously illustrate architectural concept, performance and user experience.

The parallel lab structure will allow students to understand and evaluate their design ideas while engaging in a continuous cycle of formal and conceptual adjustment.
**SELECTED BIBLIOGRAPHY BY TOPIC**

**Online Resources**
- Architecture 2030 and 2030 Palette: http://www.2030palette.org/
- AIA COTE Top Ten for Students: Curriculum Addendum
- AIA COTE website: aia.org/cote
- AIA COTE Top Ten for Professionals Projects: http://www.aiatopten.org/taxonomy/term/9
- Architecture 2030 and 2030 Palette: http://www.2030palette.org/
- ARCHIVE online exhibition of faculty and student projects and stories: Archive100.org
- Climate Consultant: http://www.energy-design-tools.aud.ucla.edu/climate-consultant/request-climate-consultant.php
- PVWatts Calculator: http://pvwatts.nrel.gov/

**Sustainability Resources**
- McDonough, William and Michael Braungart, Cradle to Cradle. (New York: North Point Press, 2002).

**Suburban History, Definitions, and Issues**
Sherman, Roger. LA Under the Influence: Negotiating the Complex Logic of Urban Property. (Minneapolis: University of Minnesota Press, 2010).

**Code and Landscape Design**
University of Arkansas Community Design Center, LID: Low Impact Development: A Design Manual for Urban Areas. (Fayetteville: University of Arkansas Press, 2010).

**Housing**
http://densityatlas.org/
http://www.housingprototypes.org
http://collectivehousingatlasi.wordpress.com
http://www.moma.org/interactives/exhibitions/2012/foreclosed/

**Drawings and Morphology**
Campoli, Julie and Alex MacLean, Visualizing Density. (Cambridge: Lincoln Land Institute, 2007).
LEARNING OBJECTIVES
Design teams will select one environmental strategy and make it the subject of a carefully developed design drawing. This drawing must simultaneously illustrate architectural concept, performance, and user experience.

DELIVERABLES
Choose a single design strategy that relates to one of the following issues:

- Natural daylighting
- Sun shading
- Modular or prefabricated structure and material assembly
- Natural ventilation

Please note the difference between an issue (i.e. southern sun), principle (i.e. block it), and strategy (i.e. use horizontal louvers).

**On the first sheet(s), provide a brief case-study demonstrating the issue, principle, and strategy (analyze).**

Be specific. How does it work?

Demonstrate the principle with angles, dimensions, orientation, human scale, time of year, latitude, etc.

Pay attention to the specific type of graphic representation that best illustrates this strategy.

**On the second sheet(s), explore the impact of the issue, principle, and strategy on your project (design).**

Select the most relevant drawing type, whether it’s a section, axonometric or another diagram type.

Draw digitally or by hand.

Draw to scale.

Pay attention to the specific to the issue of performance. How does it increase efficiency?

**Provide a series of 11 x 17 sheets (landscape or vertical) that contain one or a series of the following drawings:**

- Exploded axonometric
- Section perspective
- Physical model

Narrate your performance and design strategies in 150 words.
LAB 2: REGIONAL + COMMUNITY DESIGN

LEARNING OBJECTIVES
Design teams will consider the relationship of their proposal to the broader metropolitan context.

This will require each team to develop an approach towards one or several topics from a broad set of issues such as neighborhood form, housing types, vehicular and pedestrian circulation systems, access to transit, adjacent programs, demographics, socioeconomics, zoning, and local building codes.

METROPOLITAN SCALE ISSUES
How does the acceleration of suburban infill relate to larger regional growth issues?
How can the city best accommodate 1.1 million people by 2040? How would the city look under various growth scenarios?
What target density would be required in order to accommodate 1.1 million new people by 2040?
What is the existing and target density for San Antonio? What is the existing and target residential density for your site?
Where are the major existing employment centers in the city?
What is the proximity of various housing types to these employment centers?

PROJECT SCALE ISSUES
Neighborhood Analysis
• Neighborhood Area
• Neighborhood Coverage
• Zoning Classification
• Parking Requirements (per Zoning)
• Actual Parking #
• Density (population/acre)

Project Analysis
• Lot Area
• Lot Coverage
• Gross Building Area
• Floor Area Ratio
• Density (units/acre)
• Units
• Population
• # Parking

Demographic Analysis
• Housing Cost ($/sf)
• Socioeconomic Profile
• Demographic Profile

DELIVERABLES
Generate an existing and proposed density analysis of your site.
• Refer to densityatlas.org and Alex MacLean’s “Visualizing Density.”

Provide a series of 11 x 17 sheets (landscape or vertical) with additional analytical diagrams.

Narrate your performance and design strategies in 150 words.
LAB 3 : LAND USE + SITE ECOLOGY

LEARNING OBJECTIVES
Design teams will map an existing ecosystem such as hydrology, food, pollution, migration, air quality, and waste.
Once the logic of the system is established, teams will examine the impact of their design proposal on the selected system.

ISSUES
What is the impact of the architectural intervention on the existing ecological system?
What is the relationship of the part to the whole within a given system?

DELIVERABLES
On one or several 11 x 17 sheets, analyze the performance of EXISTING ecological systems on the site.
Use an annotated site section to represent selected systems. Include topography if relevant.
Focus on the relationship between the PARTS and the WHOLE.
Consider one or several of the following systems:

• Watershed: describes a land area with a shared set of streams and rivers all drain into a single larger body of water such as a river, a lake or ocean. Where does the water drain on your site? What are the architectural mechanisms that capture, distribute, store, and evacuate water?

• Flora: the plant life that occurs within a particular region, period, environment, or climate. Define each of these for your site. Which of the flora are native and which are introduced or maintained by humans? What are the specific architectural interventions that are used to maintain existing flora?

• Fauna: the animals that live within a particular area, period, or environment. Define each of these for your site. What are the specific architectural interventions that are impacting existing fauna?

On additional 11 x 17 sheets, analyze the IMPACT of your architectural proposal on the site’s ecological systems.

• What is the specific architectural intervention that you propose?
• What part of the system does the architecture impact?
• What is the larger impact of the architecture on the whole of the system?
• Utilize metrics to quantify impacts wherever possible.

On additional 11 x 17 sheets, analyze the IMPACT of your architectural proposal at the regional scale.

• What is the larger systemic issue?
• How would your architectural intervention, if multiplied at the regional scale, positively impact the system?

Narrate your performance and design strategies in 150 words.
LAB 4 : BIOCLIMATIC DESIGN

LEARNING OBJECTIVES

Design teams will leverage Climate Consultant software in order to understand the macro- and micro-climate characteristics of site location, orientation, and building form.

Design teams will learn to use climatic diagrams such as psychrometric charts, annual and monthly temperature fluctuation diagrams, and solar radiation diagrams to find comfortable and uncomfortable times and conditions in a specific site location.

Design teams will learn to identify, analyze, and design passive and active systems.

ISSUES

What is climate like in San Antonio with regard to temperature, relative humidity, incident solar radiation, prevailing wind speed and direction, etc.?

What percentage of the year is San Antonio thermally comfortable?

Based on your response to the first question, what are major climatic priorities in San Antonio?

What design strategies should be applied to address the climatic priorities above?

DELIVERABLES

Deliverable for this lab include one or several 11 x 17 sheets (landscape or vertical) which address the following topics:

- Temperature range
- Monthly temperature and radiation averages

Timetable plot for:
- Dry-bulb temperature
- Relative humidity
- Wind Speed
- Tilted Surface Radiation (i.e., the amount of solar radiation that hits a tilted surface) for vertical surfaces facing N/S/E/W
- Psychrometric Chart
- Wind Wheel

Answer the following questions

- What percentage of the year is San Antonio is comfortable outdoors?
- What percentage of the year can building occupants be comfortable indoors using passive strategies?

Narrate your performance and design strategies in 150 words.
LEARNING OBJECTIVES

Design teams will learn to utilize Sefaira, Annual Sunlight Exposure, and spatial Daylight Autonomy in order to consider light and heat exposure.

Design teams will learn to examine the quantity and quality of daylighting while understanding the impact of design elements such as window-to-wall ratio, geometry, window location, and daylighting.

The studio will utilize energy and daylighting metrics to evaluate proposed design alternatives.

ISSUES

What is the metric for daylight availability in a building? How do we know if a design offers sufficient daylighting?

• Metric: spatial Daylight Autonomy (sDA): percentage of floor area that receives sufficient daylight (i.e., at least 28 footcandle (300 lux) of daylight in 50% of daytime hours of the year)
• Revise your design to increase sDA. Some guidelines prescribe a sDA of at least 55%; that is, at least 55% of floor area must receive a daylight level of at least 28 footcandle (300 lux).

How do we know if we have a design with too much direct sunlight indoors?

• Metric: Annual Sunlight Exposure (ASE): Percentage of floor area that receives too much direct sunlight (more than 93 footcandle (1000 lux) of sunlight for more than 250 hours in a year).
• Revise the design to decrease ASE by maximizing orientation, adding proper shading, and using more efficient windows.
• Some guidelines prescribe an ASE of less than 10%; that is, only less than 10% of floor area can receive too much direct sunlight on an annual basis.

What design strategies can improve daylight availability, natural ventilation, and indoor air quality in my design?

• See 2030 Palette. www.2030palette.org Investigate the effects of the strategies on sDA and ASE.

DELIVERABLES

Deliverables for this lab include one or several 11 x 17 sheets (landscape or vertical) with the following studies:

A series of simple axonometric diagrams that demonstrate how your design evolves from original design to an alternative with high sDA and low ASE. Report: sDA and ASE.

A series of color-coded Sefaira visualizations demonstrating how your design evolves from original design to an alternative with regard to distribution of daylight in interior space.

For the final design alternative, develop Sefaira visualizations that represent

• sDA and ASE
• percentage of the year that minimum daylight level of 300 lux in the floor area is guaranteed

Develop an axonometric or sectional diagram of your design that demonstrates daylighting, shading, and ventilation strategies.

Narrate your performance strategies in 150 words, discussing your design’s daylighting and natural ventilation strategies. Report how your design evolved with regard to sDA, ASE and other metrics.
LAB 6: WATER CYCLE

LEARNING OBJECTIVES
Design teams will work to understand and maximize efficient water flow on the site and in the building.

ISSUES
How does the design address storm water and drainage?
What is the percentage of storm water that is managed onsite?
Does the design retain, treat, or reuse storm water on site?
Does the design conserve potable water?
How much can we reduce the use of potable water on site (by %) using architectural measures?
Does the design take advantage of graywater strategies?
Is it possible to reduce or eliminate the use of potable water for irrigation? How?

DELIVERABLES
Deliverables for this lab include one or several 11 x 17 sheets (landscape or vertical) that address the following questions:
How is stormwater managed onsite?
How is storm water collected, treated, or reused on site?
How is water use reduced indoors (for example, with selection of low-flow fixtures)?
How is graywater or wastewater treated on site?
Narrate your performance and design strategies in 150 words.
LAB 7: ENERGY FLOWS + ENERGY FUTURES

LEARNING OBJECTIVES
Design teams will leverage Sefaira as an energy modeling tool and Energy Use Index (EUI) as a performance metric in order to evaluate design alternatives.
Design teams will examine the operational energy implications of design choices including form, geometry, systems, and envelope materials.

ISSUES
What is the target energy use for this building type?
What is a realistic target for energy reduction?
How does the energy performance of design proposal compare to a benchmark (average U.S. household)?
What are potential strategies to lower heating, cooling, and lighting loads?
What are strategies to generate energy onsite?

Metric = Energy Use Intensity (EUI), KBtu/sf.yr. (kilo Btu of energy that is consumed per square foot of floor area in one year).

DELIVERABLES
Deliverables for this lab include one or several 11 x 17 sheets (landscape or vertical) with the following diagrams:
A series of simple axonometric diagrams demonstrating how your design evolves from original design to an alternative with low energy use. Next to each of the above diagrams, report:
• floor area
• exterior Wall area
• EUI
For the final design alternative, develop a diagram to represent the breakdown of energy use.
Also demonstrate
• percentage of energy savings in your design as compared with that of a benchmark (i.e. typical residential building in U.S.)
• breakdown of energy use in your design versus benchmark.
Develop a diagram that demonstrate which design strategies lower energy energy use and by how much (compared to a benchmark such as energy use in typical residential building in U.S.).
Develop an axonometric or sectional diagram that demonstrates the energy-related strategies in your building.
Narrate your performance and design strategies in 150 words.
LAB 8 : MATERIALS + CONSTRUCTION

LEARNING OBJECTIVES

Design teams will quantify the lifecycle impacts of design alternatives using Athena Impact Estimator.

Design teams will consider and select materials based on environmental criteria including health, durability, energy use, and environmental impacts.

Design teams will describe efforts to reduce the amount of materials used in the project, plans to reduce construction waste, and to promote recycling during occupancy.

METRICS

The metric that is used for reporting energy use is called Energy Use Intensity (EUI) that is expressed in KBtu/sf.yr. (i.e., kilo Btu of energy that is consumed per square foot of floor area in one year.)

ISSUES

Material Selection

Impact on human health

• Project cannot contain hazardous materials. For example, paints and coatings must be zero-VOC. Avoid PVC windows.

• To specify materials, look up their VOC content on manufacturer’s website.

• Living Building Challenge’s Declare program lists some materials and products without the red list content.

• See: https://living-future.org/declare-products?f[0]=field_csi_masterformat_division%3A389

Impact on heat and moisture transfer and energy performance

• Design construction details so that the total R-value of the wall/floor/roof reduces the thermal loads and energy demand of building. Report the total R-value of building assemblies in the wall section.

• For San Antonio, select window systems that have U-factor of below 0.3, Solar Heat Gain Coefficient (SHGC) of below 0.35, and reasonable Visible Transmittance. Report these values for the window system. This often translates into Low-E double-, or triple-pane windows.

• Select efficient HVAC systems that improve energy performance and indoor air quality such as radiant heating and cooling systems, heat pumps, etc.

Embodied energy and environmental impacts

• Try to use locally- or regionally-produced materials. Living Building Challenge, for instance, prescribes that at least 20% of materials construction budget must come from within about 300 miles of construction site.

• Propose the use of recycled and reused materials.

• Try to use materials with low embodied energy. For instance, wood structure has lower embodied energy compared with concrete or steel structures. If you need to use steel or aluminum products, specify high recycled content.

Durability
Waste Management Plan

Plan to eliminate waste production during construction, operation, and end of life in your project.

Any waste must return either to industrial loop or a natural nutrient loop.

Plan to collect wasted materials during construction

• If the building is on a site with existing structure, you should have a plan to reuse or recycle materials or assemblies.

• Your plan must divert all materials. For instance, you may include statements in your plan that all metals, paper and cardboard, wood, rigid foam, etc. will be diverted.

• Plan to collect consumables and durables during building operation.

• Plan for adaptable reuse and deconstruction at the end-of-life of the project

Reduction in environmental impacts

Conduct a life-cycle assessment (LCA) to communicate life-cycle environmental impacts of your design.

DELIVERABLES

Deliverables for this lab include one or several 11 x 17 sheets (landscape or vertical) which contain following information and diagrams:

A wall section of your design that demonstrates construction detail of envelope (floor, wall, windows, roof). The construction detail should be effective in limiting of heat and moisture transfer. Label materials on the wall section diagram and report name, thicknesses. Also, report the total R-value of the building assembly. For window systems, report U-factor, SHGC, and VT.

Include a diagram that compares your material selection and systems to common or previous practices.

Include the results of life-cycle assessment.

Include a short statement that describes your approach to material and system selection.
LAB 9: LONG LIFE LOOSE FIT

LEARNING OBJECTIVES
Design teams will consider the impact of residential density and housing typologies on existing and proposed demographics in targeted neighborhoods.

ISSUES
How can we define social and economic sustainability?
Can the introduction of new housing prototypes make neighborhoods more socially and economically sustainable over time?
Can introducing diversity into a system make it more sustainable?

DELIVERABLES
Use the American Fact Finder to make a demographic and socioeconomic argument for your proposed housing typology.
1. Go to advanced search/geographies and type your site address.
2. Click on census track.
3. Go to topics, click on 2014 ACS 5 year estimates.
4. Begin using data, being careful to clear results of any search terms you use.
Focus primarily on age, income, and family type.
Additional issues might include transportation times and proximity to jobs.
Create one or a series of graphics that demonstrate the relationship between housing types and sustainable communities.
LAB 10 : COLLECTIVE WISDOM + FEEDBACK LOOPS

LEARNING OBJECTIVES
Design teams will document their decision-making process as way of evaluating the successes and challenges of their process.

ISSUES
How would you characterize the dialogue between the performance labs and the design labs?
What is the preferred relationship between performance and form?
Which comes first: performance or form?
What are the critical lessons that you learned during this process?

DELIVERABLES
Archive critical sketches, diagrams, models and drawings in anticipation of this exercise.
Generate one or a series of diagrams that describe critical turning points in your design process.
Focus on the specific issues, options, decisions, criteria, and solutions that defined your design decisions.
PEOPLE WILL MOVE TO SAN ANTONIO BY 2040. WHERE WILL THEY LIVE?

San Antonio will add 1.1 million people to its population by 2040. In twenty-five years, this will result in bringing the population up to 4.4 million or 1.25 million, seeing 200,000 jobs and an additional 20,000 units of housing.

"Housing A Million" provides more affordable housing across a range of residential density, engagement, inclusion, and transport options in existing neighborhoods. The proposal utilizes micro-units, which combine a small studio apartment with a fully functional bathroom and kitchen. In the background of the project, a one-story modular housing is used to add new community spaces including green space, parking, bikeways and walkways.

The micro-unit concept is an emerging neighborhood-scale form in areas like Jersey Village, Uptown, Montrose, and Midtown. It can accommodate 10% of San Antonio’s projected population growth on about 300,000 people.

**DESIGN INNOVATION**

The building concept is driven by modular Structural Insulated Panels (SIPs), taking advantage of the material's high efficency in cost, fabrication, includes low cost, energy of assembly and potential for energy conservation.

Portakal and ready available, SIPs offer speed, relatively low cost and installation. They can be organized in a 4x4 grid, making it possible to add more housing at approximately the same cost. This provides a way to build major new developments while having the flexibility to change housing types and the ability to move in response to economic conditions.

The proposal harnesses the potential of modular construction and is a sustainable option for a larger urban area. The micro-units are designed to be self-sufficient with a green roof and solar panels. The micro-units are designed to have a high density, energy-efficient homes that are sustainable and affordable. The project will use a combination of energy-efficient technologies, including solar panels, which will contribute to reducing energy consumption and costs.

**LONG LIFE, LOOSE FIT**

The design of the micro-units is created to accommodate the needs of residents in various stages of their lives. The micro-units are designed to be adjustable, allowing residents to modify and expand their living space as their needs change.

The micro-units are designed to be sustainable and efficient, featuring energy-efficient materials and systems. The project also includes innovative design elements that make the micro-units comfortable and livable.

This innovative design approach is intended to attract a diverse range of residents and provide a range of housing options. The micro-units are designed to be both affordable and sustainable, making them a viable option for a wide range of residents in San Antonio.
02 REGIONAL & COMMUNITY

In the next ten years, 7 million people are expected to move to the San Antonio area. This will come for various job opportunities and affordable living. In order to accommodate this growth, we aim to significantly increase the metropolitan lands area by 15.44%. This involves reconfiguring density to an average of 10 people per 4,000 square feet, per year.

As the population grows, San Antonio will require new housing typologies that help prevent the annexation of rural-urban sprawl development. The addition of micro-units adds an average of 2 people to an average residential lot. The net result will be to double the population of an average residential lot without destroying the small-scale housing typologies and surrounding environmental, demographic, and educational profiles.

Existing

- 9,000 total units
- 28,000 total population
- 8,000 square feet density
- 3 people/ft² density
- 7,000 people/square mile density

Proposed

- 18,000 total units
- 56,000 total population
- 8,000 square feet density
- 7 people/ft² density
- 14,000 people/square mile density

Density: 3 people/lot

Density: 12+ people/lot

Density: 6+ people/lot

03 LAND USE & SITE ECOLOGY

The project Spearly connects the area with the new micro-units. As the percentage of native grass, native plants, and functional trees in the opening neighborhood. The project provides spaces to accommodate local wildlife, which is adapted to the environment. The layout of the site is designed to provide a productive and naturalistic landscape that will help protect against San Antonio’s harsh summer sun and frequent flooding.

- Lavender: Aromatic, Summer, and winter blossoms that can be used as a scented herb
- On-eye Daisy: An annual edible flowering plant that is attractive to different temperatures and partial shade
- Stone Crops: An annual edible flowering plant that thrives in direct sunlight, for up to 9 hours a day
- Currant: A shrub that provides edible berries
- Mahonia: An evergreen shrub that produces edible berries that provide fiber and
- ST. Augustine: An annual cutting grass used for warm and cool temperatures

Native Grass

Community Areas

Water Catchment

Permeable Pavement

Erosion
**BIOCLIMATIC DESIGN**

- High Thermal Mass Right Placed: 3%
- Sun Shading: Windows: 19%
- Prescriptive Solar Gain: High Mass: 7%
- Wind Protection of Outdoor Spaces: 5%
- Comfort: 11%
- Internal Heat Gain: 55%

**LIGHT & AIR**

- Photovoltaic Panels: 15%
- SIPS: Roof/Floor Panels: 20%
- SIPS: Wall Panels: 15%
- Cross Ventilation: 60%
- Operable Shading: 10%
- Back to Water System: 10%
- To Aquifer: 10%
- Distribute Trees: 5%
- To Steam Heat: 5%

**WATER CYCLE**

- Gray Water Collector: 10%
- Low Flow: 10%
- Filter: 10%
- Harvested Water: 5%

**ENERGY FLOWS**

- Equipment: 10%
- Heating: 10%
- Cooling: 50%
- Most Well Lit: 5%
- Well Lit 15% General Daylight Autonomy (GDA) Over 75% Annual GDA (Light): Lighting 75% Under GDA: 25%
INTRODUCTION

Adaptive Reuse and Big Box Sites

“It is a well-recognized if unwelcome fact of architectural life: architects design only a small percentage of what gets built in the United States. Still, it is astonishing that in the past quarter century a vast landscape has been produced without the kind of buildings that architects consider “architecture,” a landscape almost entirely uninformed by the critical agendas or ideas of the discipline.” - Ellen Dunham-Jones, 2005

Recent estimates suggest that a full 75% of new construction occurs at the suburban fringe, a context devoid of traditional urban morphologies, programs, and building typologies. For decades, architects have declined the opportunity to critically engage this landscape, surrendering its formulation to the bottom-line logic of suburban developers. The result, described with depressing clarity in the passage above, is a prototypical suburban landscape marked by building typologies that, in their current incarnation, remain unaffected by architectural discourse or serious design thinking.

The studio will address this perceived oversight by engaging the adaptive reuse of the most common and mundane of suburban typologies: the commercial big box. To this end, students will specifically generate a design proposal that re-imagines one of the type’s most common incarnations, the Walmart Neighborhood Market, as something completely different, in this case a branch library.

“Typologically, the big box has become the universal motherboard for suburban nonresidential colonization. In other words, a type which made its debut as a suburban warehouse, is now the dominant architectural encasing for everything from shopping, production centers, warehouses, to business centers, company headquarters, churches, hangars, etc. Furthermore, of the great multitude of older, once empty big boxes scattered across America, many have taken a new lease on life with other programs, including schools, libraries, community centers, and even residential developments. In other words, the big box is a type, which

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can exist without any programmatic justification. It simply exists, and the very need for flexibility out of which it was first born, now makes it a winner in the Darwinian struggle between architectural types. Ultimately, the independence of the big box from its programs."4 -Alexander D’Hooghe, 2009

We trust that Walmart Neighborhood Markets enjoy the capacity to accommodate such a radical conversion because typologically they exhibit four promising traits: ubiquity, obsolescence, low cost, and flexibility.

**Ubiquity**

Since the first Walmart Supercenter opened its doors in 1988, the big box typology has emerged as the primary form of commercial development in North America. A list of the ten largest retailers in the United States reveals that all are big box developers:

<table>
<thead>
<tr>
<th>Company</th>
<th>2013 Retail Sales (000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Wal-Mart</td>
<td>$334,302,000</td>
</tr>
<tr>
<td>2 Kroger</td>
<td>$93,598,000</td>
</tr>
<tr>
<td>3 Costco</td>
<td>$74,740,000</td>
</tr>
<tr>
<td>4 Target</td>
<td>$71,279,000</td>
</tr>
<tr>
<td>5 The Home Depot</td>
<td>$69,951,000</td>
</tr>
<tr>
<td>6 Walgreen</td>
<td>$68,068,000</td>
</tr>
<tr>
<td>7 CVS Caremark</td>
<td>$65,618,000</td>
</tr>
<tr>
<td>8 Lowe’s Mooresville</td>
<td>$52,210,000</td>
</tr>
<tr>
<td>9 Amazon.com</td>
<td>$43,962,000</td>
</tr>
<tr>
<td>10 SafewayPleasanton</td>
<td>$37,534,000</td>
</tr>
</tbody>
</table>

Wal-mart alone had 5,239 retail sites in the United States as of July 31, 2015.6 If Wal-mart were a country, it would have the world’s 26th largest economy, right behind Austria.7 The Wal-mart model is the ubiquitous form of retail in the United States—truly the gold standard for commercial sales in the United States. In 2010, consumers in the United States purchased more than 7% of their retail goods at a Walmart or a Sam’s Club store. In 2011, Wal-Mart Stores, Inc. boasted 10,130 locations in 27 countries and annual revenues of 400 billion dollars.8 This unprecedented economic expansion has prompted unparalleled territorial expansion, radically transforming the physical scale and character of urban fabric in the United States. Today, 60 percent of U.S. residents live within 5 miles of a Wal-Mart location; 96 percent live within 20 miles.9 In 2008, the total floor area of Wal-mart retail locations in the U.S. exceeded the size of the footprint of Manhattan.10

These startling numbers should be a revelation for architects, as they establish the undeniable relevance of the big box type as a topic for research and innovation. This is true of the prospects for both adaptive reuse and new prototypes.

**Obsolescence**

The average lifespan of a big box store in its first incarnation is five years. It’s not surprising then, that of August 18, 2015 Walmart Inc. listed 3022 buildings, lots and spaces for sale or lease in the United States. 62 of these vacancies were free-standing buildings, or structures that await adaptive reuse.11 These numbers do not include similar offerings from competing developers like Target, Kroger, Costco and Home Depot.

**Low Cost and Flexibility**

These vacant big boxes, which sit in the middle of acres of unused asphalt parking lots, present a troublesome blight to local communities. This situation is particularly unfortunate because programmatic flexibility and relative low re-sale cost makes the structures excellent candidates for adaptive reuse: the typical big box offers 40,000-160,000 square feet of enclosed space with

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5 “Top 100 Retailers Chart,” (retrieved 16 August 2015). https://nrf.com/2014/top100-table
11 “Building Disposition.” Walmart Realty. (Retrieved 15 August, 2015 from http://www.walmartrealty.com/stackings/#/Page=1&PerPage=100&SortBy=City&SortDir=Asc&West=-180&East=180&South=-73.97509406937127&North=83.99614740683253&State%5B%5D=&PropType%5B%5D=Building&ListingType%5B%5D=Sale&ListingType%5B%5D=Lease&MinInLast=&MinPrice=&MaxPrice=&MinSqft=&MaxSqft=&MinAcreage=&MaxAcreage=).
uninterrupted floor plans, standard structural grids, thirty-foot clear ceilings, plenty of parking, and an average cost of $25-50 per square foot. The ruthless efficiency of this architectural and financial pro-forma presents designers with a virtually limitless palette for architectural innovation.

Form and Sustainability
As the studio examines the retrofit of U.S. suburbs, it also aims to clarify the complex and often misunderstood relationship between architectural aesthetics and sustainability. Specifically, we will pursue the topic of sustainability as a form generator, not a technical overlay. To accomplish this goal, we will model our design process on a highly structured feedback loop that takes into account issues of design and analysis, form and performance. We will always pursue these critical topics in parallel; never in isolation. This means that initial formal impulses must answer to feedback from simulation and software.

A similar dialogue will take place between the two studio instructors, with Professor Caine emphasizing architectural and site issues and Professor Azari advocating for performance and sustainability. In the end, the instructors and issues will inform each other, while the responsibility for final design decisions will rest solely with the students. This robust dialogue will commence with initial sketches and continue until final renderings and models are complete. Ultimately, all proposals must account for the fact that the built environment is a key contributor to a host of environmental pollutants, including the carbon emissions associated with global warming. This studio therefore requires designers to minimize the environmental impact associated with their building and site proposals. This will require each student to simultaneously attend to multiple aspects of site and building design including water use, energy use, resource consumption, occupant comfort and daylighting. At the conclusion of the semester, students must deliver a proposal that is formally dynamic, environmentally efficient, programmatically compelling and that engages users at the scale of the site and building.

RE-EXAMINING THE RELATIONSHIP BETWEEN FORM AND SUSTAINABILITY
As the studio examines the retrofit of U.S. suburbs, it also aims to clarify the complex and often misunderstood relationship between architectural form and sustainability. Specifically, we will pursue the topic of sustainability as a form generator, not a technical overlay. To accomplish this goal, we will model our design process on a highly structured feedback loop that takes into account issues of design and analysis, form and performance. We will always pursue these critical topics in parallel; never in isolation. This means that initial formal impulses must answer to feedback from simulation and software.

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Modeling Performance
Dr. Azari will introduce student designers to critical software packages, allowing them to leverage the latest technology to model building performance. The studio will focus on the following software packages extensively:

Climate Consultant: Developed by the University of California in Los Angeles (UCLA), Climate Consultant enables users to understand, analyze, and visualize local climatic characteristics (i.e. temperature, relative humidity, solar insolation, wind patterns, sky cover) before selecting climate-responsive design strategies.

Seifeira: This software allows users to analyze design proposals, specifically with regard to energy and daylighting performance. It also enables users identify design characteristics that optimize energy and daylighting performance.

Athena Impact Estimator: The software allows students to evaluate the impact of design and materials on the environment (i.e. global warming potential, acidification potential).
AIA COTE Top Ten Competition for Students

Last year, the American Institute of Architects (AIA) and Association of Collegiate Schools of Architecture (ACSA) joined to implement The AIA COTE Top Ten for Students, an international “design competition to recognize student work that displays sustainable design at the highest level.” This semester we will contribute all of our design energy to this critical public effort.

AIA COTE TOP TEN CRITERIA:

Measure 1: Design and Innovation
Measure 2: Regional/Community Design
Measure 3: Land Use and Site Ecology
Measure 4: Bioclimatic Design
Measure 5: Light and Air
Measure 6: Water Cycle
Measure 7: Energy Flows and Energy Future
Measure 8: Materials and Construction
Measure 9: Long Life, Loose Fit
Measure 10: Collective Wisdom and Feedback Loops

RECASTING THE STUDIO AS 5 PARALLEL PERFORMANCE + DESIGN LABS

In order to facilitate a robust pedagogical dialogue between the often-separate discourses surrounding design and performance, instructors will lead 5 parallel and interactive Performance and Design Lab sequences.

The Performance Labs:

4 BIOCLIMATIC DESIGN
7 ENERGY FLOWS AND FUTURES
5 LIGHT AND AIR
6 WATER CYCLE
8 MATERIALS AND CONSTRUCTION

The Design Labs:

2 REGIONAL & COMMUNITY DESIGN
3 LAND USE AND SITE ECOSYSTEM
9 LONG LIFE LOOSE FIT
10 COLLECTIVE WISDOM & FEEDBACK LOOPS
1 DESIGN AND INNOVATION

PROPOSAL

IAN CAINE | RAHMAN AZARI | UNIVERSITY OF TEXAS AT SAN ANTONIO | 27
5 Performance Labs

To provide students with the technical skills necessary to generate and evaluate design alternatives, Assistant Professor Azari will implement labs covering the following topics:

Lab 4. Bioclimatic Design. The studio will leverage Climate Consultant software to help students understand the macro- and micro-climate aspects of site location, orientation and building form. Students will also learn to use climatic diagrams such as psychrometric charts, annual and monthly temperature fluctuation diagrams and solar radiation diagrams to find comfortable and uncomfortable times and conditions in a specific site location. We will also identify, analyze and design passive and active systems.

Lab 7. Energy Flows and Futures. The studio will leverage Sefaira as an energy modeling tool and Energy Use Index (EUI) as a performance metric in order to evaluate design alternatives. During this lab we will examine the operational energy implications of design choices including form, geometry, systems, and envelope materials.

Lab 5. Light and Air. The studio will leverage Sefaira, Annual Sunlight Exposure and spatial Daylight Autonomy in order to consider light and heat exposure. Design teams will learn to examine the quantity and quality of daylighting while understanding the impact of design elements such as window-to-wall ratio, geometry, window location, and daylighting. The studio will utilize energy and daylighting metrics to evaluate proposed design alternatives.

Lab 6. Water Cycle. The studio will work to understand and maximize efficient water flow on the site and in the building.

Lab 8. Materials and Construction. The studio will quantify the lifecycle impacts of design alternatives using Athena Impact Estimator. This analysis will help students to consider and select materials based on environmental performance.

5 Design Labs

Assistant Professor Caine will simultaneously ask students to engage labs covering the following topics:

Lab 2. Regional and Community Design. Students will consider the relationship of their design proposal to the broader metropolitan context. This will require students to select the most relevant topics from a broad set of issues such as neighborhood morphologies, typologies, vehicular and pedestrian circulation systems, access to transit, adjacent programs, demographics, socioeconomics, zoning and local building codes.

Lab 3. Land-use and Site Ecology. Students will map an existing ecosystem such as hydrology, food, pollution, migration, air quality and waste. Once students establish the prevailing logic of the system, they will examine the impact of their design proposal on the selected system.

Lab 9. Long Life Loose Fit. Student designers will consider topics such cost, assembly and disassembly and durability of materials and systems over time.

Lab 10. Collective Wisdom and Feedback Loops. Student designers will document their decision-making process as way of evaluating the efficiency and relative success of their design process. The instructors will ask students to carefully document sketches, diagrams, models and drawings in anticipation of this exercise. The goal here is to encourage designer to invest their physical process with care throughout the semester, then curate the results as a means of evaluating the efficacy of their physical design process. This exercise will additionally provide students with the opportunity to consider the dialogue between the Performance Labs and the Design Labs.

Lab 1. Design and Innovation. Each student will select one environmental strategy and make it the subject of a highly developed design drawing. This drawing—which will anchor one of the final graphic panels—must simultaneously illustrate architectural concept, performance and user experience.

The parallel lab structure will allow students to understand and evaluate their design ideas while engaging in a continuous cycle of formal and conceptual adjustment.

NOTE: THE LAB EXERCISES FOR COURSE 2 CORRESPOND CLOSELY TO THE LAB EXERCISES FOR COURSE 1.
BIBLIOGRAPHY

Online Resources

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AIA COTE Top Ten for Students: Curriculum Addendum

AIA COTE website: aia.org/cote

AIA COTE Top Ten for Professionals Projects: http://www.aiatopten.org/taxonomy/term/9

Architecture 2030 and 2030 Palette http://www.2030palette.org/

ARCHIVE online exhibition of faculty and student projects and stories: Archive100.org

Climate Consultant: http://www.energy-design-tools.aud.ucla.edu/climate-consultant/request-climate-consultant.php

PVWatts Calculator: http://pvwatts.nrel.gov/

Sustainability Resources


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The Big Box


Sherman, Roger. LA Under the Influence: Negotiating the Complex Logic of Urban Property. (Minneapolis : University of Minnesota Press, 2010).

Swyngedouw, Eric, “Wal-Marting the Urban: Reflections on the Post-Political and Post-Democratic City.”


**Parking**


**Code and Landscape Design**


University of Arkansas Community Design Center, LID: Low Impact Development: A Design Manual for Urban Areas. (Fayetteville: University of Arkansas Press, 2010).

**Drawings and Morphology**

Campoli, Julie and Alex MacLean, Visualizing Density. (Cambridge: Lincoln Land Institute, 2007).


M1. DESIGN / INNOVATION
GENERATIVE PROCESS

The design process was the building envelope, allowing the building's form to develop from the site. The existing envelope was not modified to allow for the building's form to develop and increase the amount of green space in the parking lot.

The building is located on the west side of the site. A ten-foot fall across the street was the building's form, and the building's structure is designed to act as a precedent for a building that could be expanded, allowing for the creation of a Neighborhood Branch Library and Park, hence the name "Transforming Knowledge.

LOCATION
Walmart Neighborhood Market
1310 S Ellison Dr
San Antonio, TX 78240

EXISTING ENVELOPE
- Core is closed.
- Perimeter lighting is undistinctive.
- Unbalanced solar gain makes perimeter zoning and control critical.
- Large core requires mechanical cooling.
- Perimeter ventilates poorly.
- No natural ventilation.

PROPOSED ENVELOPE
- Curtain walls provide natural light and ventilation to the interior as well as views to the outside.
- CO2 sensors check the indoor air quality.
- Compass solar shading for all spaces can be achieved.
- Passive heating and solar heat gain mitigation possible.
- Natural ventilation is fully accomplished.

DANIEL SUAREZ RODRIGUEZ AND ISAIAS GARCIA CORONADO | JURY SELECTION IN 2016 AIA COTE TOP TEN FOR STUDENTS
**[M3] Land Use and Site Ecology**

Introducing bioswales and rain gardens reduces runoff into the storm sewer. Plants were chosen on their ability to adapt to bioclimatic conditions, drought tolerance, and blooming patterns. Trees were chosen to reduce noise, filter runoff, and to provide shading.

**Plant Palette**

- **Spring**
  - Mexican fan palm
  - Crabapple
  - Sycamore

- **Summer**
  - Golden willow
  - Chinese elm

- **Fall**
  - Blue spruce
  - Pampas grass

- **Winter**
  - Japanese maple
  - Forsythia

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**[M4] Long Life, Loose Fit**

The plan identifies potential urban opportunities that have potential for urban expansion. These include the potential for new buildings, infrastructure, and parks.

**[M5] Regional / Community Design**

Transportation options in the area are limited. The site is at the 11th most walkable neighborhood in the city.

- **Walking path**
- **N/A bus route**
- **Bike and bus**
- **Site**
**Design and Innovation**

- **Cool Roof**: White paint added on metal roofing to maximize with reflective power and reduce peak demand.
- **Light Shelves**: Reflect light into the interior of the building, reducing the need for artificial lighting.
- **Perennial Garden**: A garden area for the visitor with seating, shade, and connection to the site and the city.
- **Photovoltaic Panels**: PV array system that covers about 50% of the roof with an optimum tilt of 20° to maximize loads.
- **Vertical Fins**: Light concrete panels to provide glazing facades; they work as a structural element that provides safety for the adjacent gardens.
- **Water Collection Tanks**: Collects rainwater that was previously treated on site.

**Children’s Courtyard**

- Enclosed outdoor zone for children; in this zone kids need to create their own connection to the playground while learning on an educational playground.

**Central Courtyard**

- Its main function is to allow the building for a common social area and bring more daylight to the interior.

**Indoor Zones**

- Areas with a flexible adaptability use and special evening access designed to be a peaceful, flexible zone with a connection to the internal space.
- The building is going to have in a cycle of 60 days.

**Cycle Analysis**

- Energy demand: 5.5%.
- Primary energy demand: 3.5%.
- Greenhouse gas emissions: 3.5%.
- Water consumption: 3.5%.

**Life Cycle Assessment**

- The following analysis system is composed to evaluate a building’s energy impact on the environment in different life stages.

**Materials and Construction**

- **Central Courtyard**: Outdoor teaching area designed to provide the connection of visitors and the natural environment of the site.
- **Enclosed Courtyard**: Outdoor teaching area designed to provide the connection of the children and the natural environment of the site.
- **Operable Windows**: Glass intended to minimize heat gain and support native plant growth.

**Materials Palette**

- **D1**: Aluminum Overhang
- **D2**: Steel Column
- **D3**: Vapor Retarder
- **D4**: Perforated Board

**Construction Details**

- **Central Courtyard**: Outdoor teaching area designed to provide the connection of visitors and the natural environment of the site.
- **Enclosed Courtyard**: Outdoor teaching area designed to provide the connection of the children and the natural environment of the site.
- **Operable Windows**: Glass intended to minimize heat gain and support native plant growth.

**Bioclimatic Design**

- **Cool Roof**: Added to support evaporative cooling.
- **Light Shelves**: Reflect light deeper to the interior of the building.
- **Perennial Garden**: Provides structural elements and connection for visitors.
- **Photovoltaic Panels**: PV array system to cover about 50% of the roof.
- **Vertical Fins**: Provide structural elements and safety for adjacent gardens.
- **Water Collection Tanks**: Collect rainwater previously treated on site.

**Diagrams**

- Diagrams illustrating the building's design, materials, and construction details.

**Sustainability**

- **Siting for the Adjacent Gardens**: Encourages the use of sustainable materials and technologies.
- **Siting for the Adjacent Gardens**: Ensures that the building is designed to be a peaceful, flexible zone with a connection to the internal space.

**Acknowledgments**

- **Elsa de Leon, B.S. Architecture Candidate**

- **Ian Caine, Rahsan Azari**

- **University of Texas at San Antonio**