



## PROJECT SCOPE

- Design a sustainable and cost-efficient Affordable Housing Complex for 100 families in the Central Texas Region
- Access the Sustainability of the proposed design utilizing the Leadership in Energy and Environment Design (LEED) Rating System
- Develop a Construction, Material, and anticipated Life-Cycle Cost Analysis to determine a final Net Present Value in current dollars.

## BACKGROUND

- Currently, Texas only has 29 affordable homes for every 100 Low-Income Renters (1).
- An affordable home is defined as a rented/leased residence that does not require a cost burned higher than 30% of a renter's income.
- This presents a major problem as with the consistently rising population. Rent increases and housing shortages could occur if this issue is neglected. These outcomes would heavily impact the Central Texas Region as the median income is almost \$10,000 less than the national median as shown in the Table 1 (3).

**Table 1 – Median National and Central Texas incomes.**

Median income for Central Texas	\$50,242
National Median Income	\$67,521

## DESIGN CONSIDERATIONS

- Sustainability
- Renter Satisfaction
- Environmental Impact
- Community Impact
- Land Usage
- Cost (Construction and Lifetime)
- Constructability

## DESIGN ALTERNATIVES

- Initially, three different design alternatives were assessed based on the design considerations proposed.
- These alternative options include:
  1. Apartment Style, Multi-Building Complex
  2. Duplex and Triplex Style Cottages
  3. Prefabricated Micro Homes
- Ultimately, the team opted to utilize an apartment style structure based on the model's satisfaction of the proposed design criterion.

## SITE SELECTION

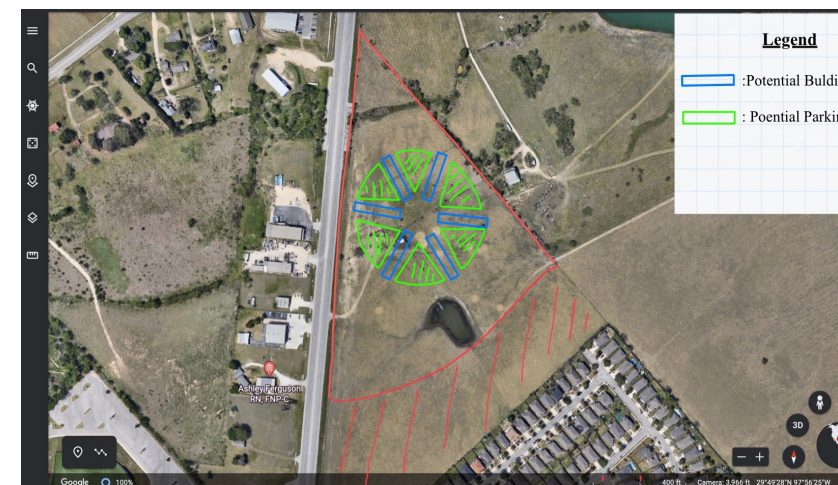


Figure – Schematic 1



Figure – Schematic 2

- Located on State Highway 123 North of the Rattler Stadium in San Marcos, TX. It's a location that provides easy access to a main highway.
- The land chosen is 21 acres in a Character District 4 zone, which is applicable for multifamily households. In addition, the land is located outside the flood zone.
- Schematic 1 and 2 are two possible layouts that are considered for the design phases.
- Land features include light vegetation with a relatively flat surface.

## SUSTAINABILITY EVALUATION

- As stated, the team utilized the LEED rating system to determine the sustainability of the apartment complex alternative.
- The LEED score was assessed before and after Cost evaluation and material selection in order to obtain a realistic expectation of scoring.

**Table 2- LEED Rating Results**

LEED Assessment	Score	Rating
1	47	Certified
2	52	Silver

## CAPITAL AND LIFE CYCLE COSTS

<b>MOBILIZATION</b>	\$1,896,347.46
<b>CONTINGENCY (30%)</b>	\$5,689,042.37
<b>FINAL EST COST</b>	\$26,548,864.41

**Table 3 - Capital and Construction Costs of Infrastructure**

<b>INFLATION ADJUSTMENT</b>	\$79,232,280.00
<b>CONTINGENCY (20%)</b>	\$15,846,456.00
<b>FINAL EST LIFE CYCLE COST</b>	\$95,078,736.00

**Table 4 - Life-Cycle Costs of Maintenance and Rehabilitation of Infrastructure**

<b>Construction Costs</b>	\$26,548,864.41
<b>Life Cycle Costs</b>	\$95,078,736.00
<b>NPV</b>	\$38,119,506.88
<b>NPV (Adjusted)</b>	\$45,743,408.26

**Table 5 - Total Costs and Net Present Value of Affordable Housing Apartments**

- Capital costs from building material and construction labor were adjusted with logistical contingency rates to provide a more accurate number (5).
- Life-Cycle costs include lawn care, preventative maintenance, parking lot rehabilitation, foundation repairs, etc.
- When adjusted to generate a net present value (NPV), the totals costs appear to be just over \$45.7 million. The construction costs of an average 100-unit apartment complex is around \$37 million (1).

## TEAM PHOTO



Team Members from left to right:  
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## SECOND SEMESTER PLAN

- Conduct a site visit to capture images of the site selected
- Begin designing the initial floorplan of the housing complex
- Determine the exact capital and life cycle costs based off the initial design
- Produce a 3-D model of the floorplan using the Ingram Makerspace
- Conduct a final sustainable evaluation for determining the LEED Certification achieved
- Compile a final presentation with a final floorplan design and present at the Senior Design Day in the spring semester

## REFERENCES

- 1) <https://www.levelset.com/blog/cost-to-build-an-apartment-complex/#:~:text=Across%20the%20nation%2C%20the%20average,around%20%2437%20million%20to%20construct.>
- 2) <https://www.rent.com/research/average-rent-price-report/>
- 3) <https://comptroller.texas.gov/economy/economic-data/regions/2020/central.php>
- 4) <https://www.census.gov/library/publications/2021/demo/p60-273.html>
- 5) RSMMeans <https://www.rsmeansonline.com/>