

C2.03 - Affordable Housing Alternatives

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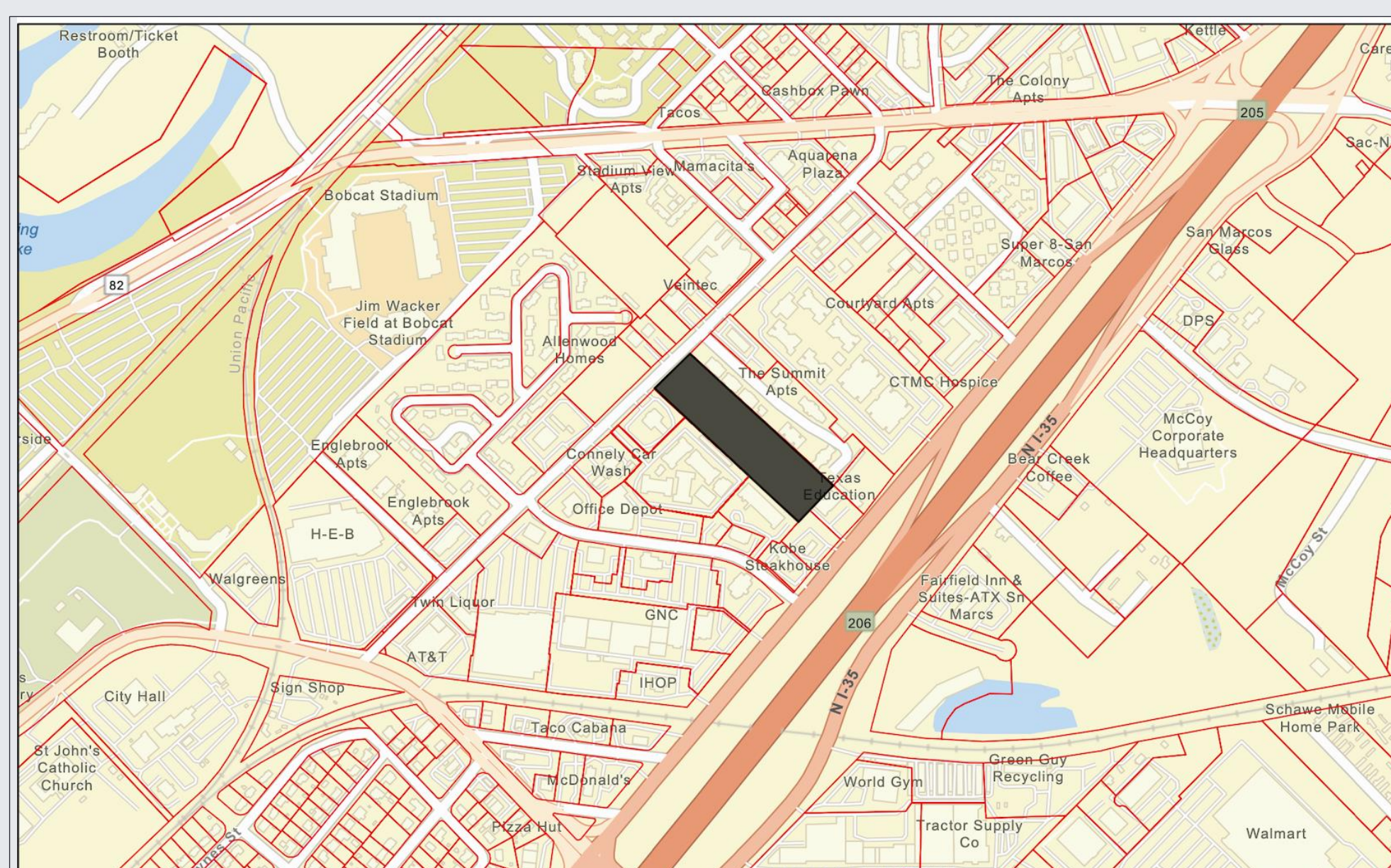
Special Thanks: Scott A. Rouse, Gordon Bohmfalk, Mr. Shaun Condor, Dr. Stacey Kulesza, Dr. Niyi Arowojulu



Purpose

Design an affordable housing complex capable of housing at least 100 families of 4. This project will be located in San Marcos, Texas.

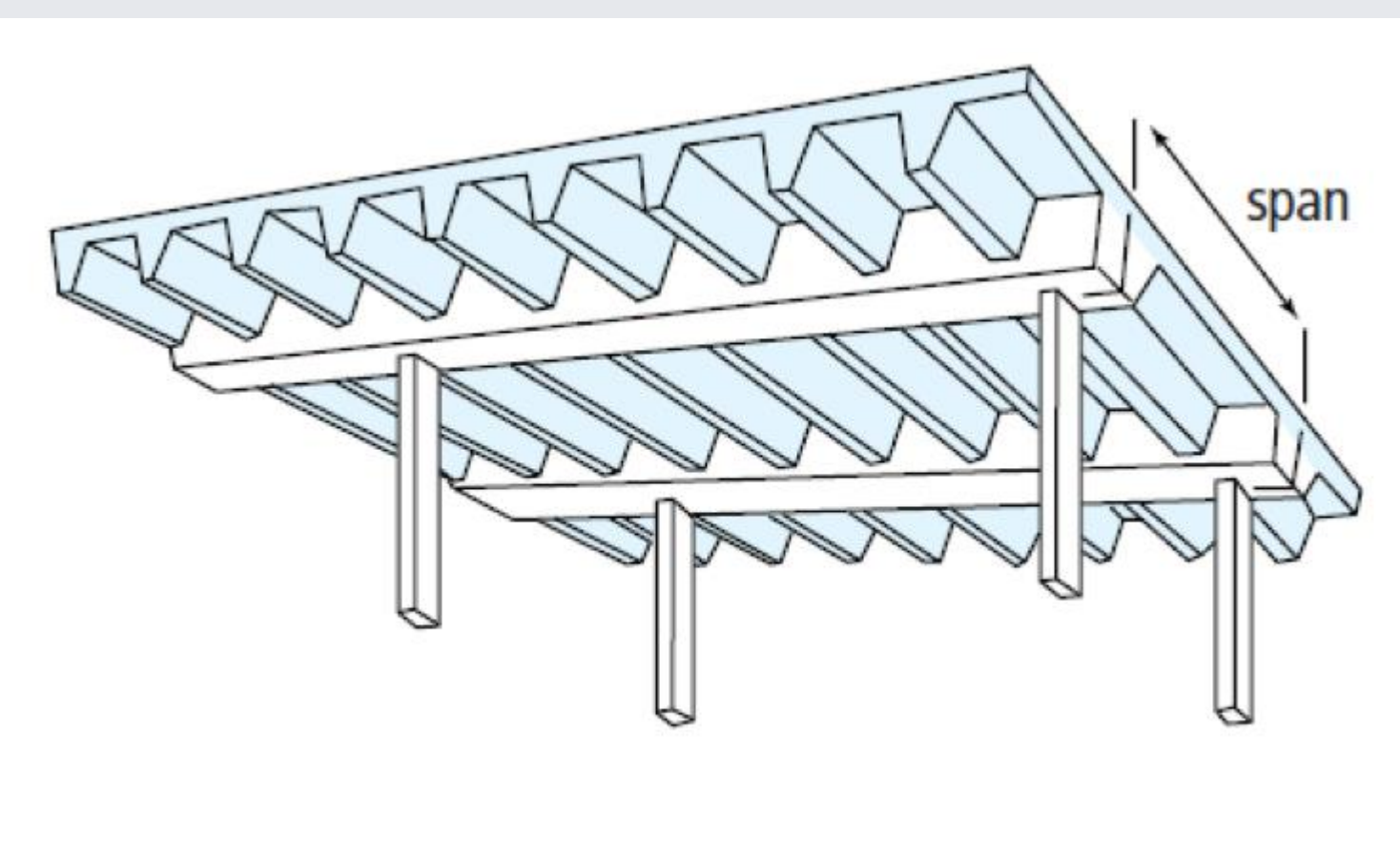
Site Location



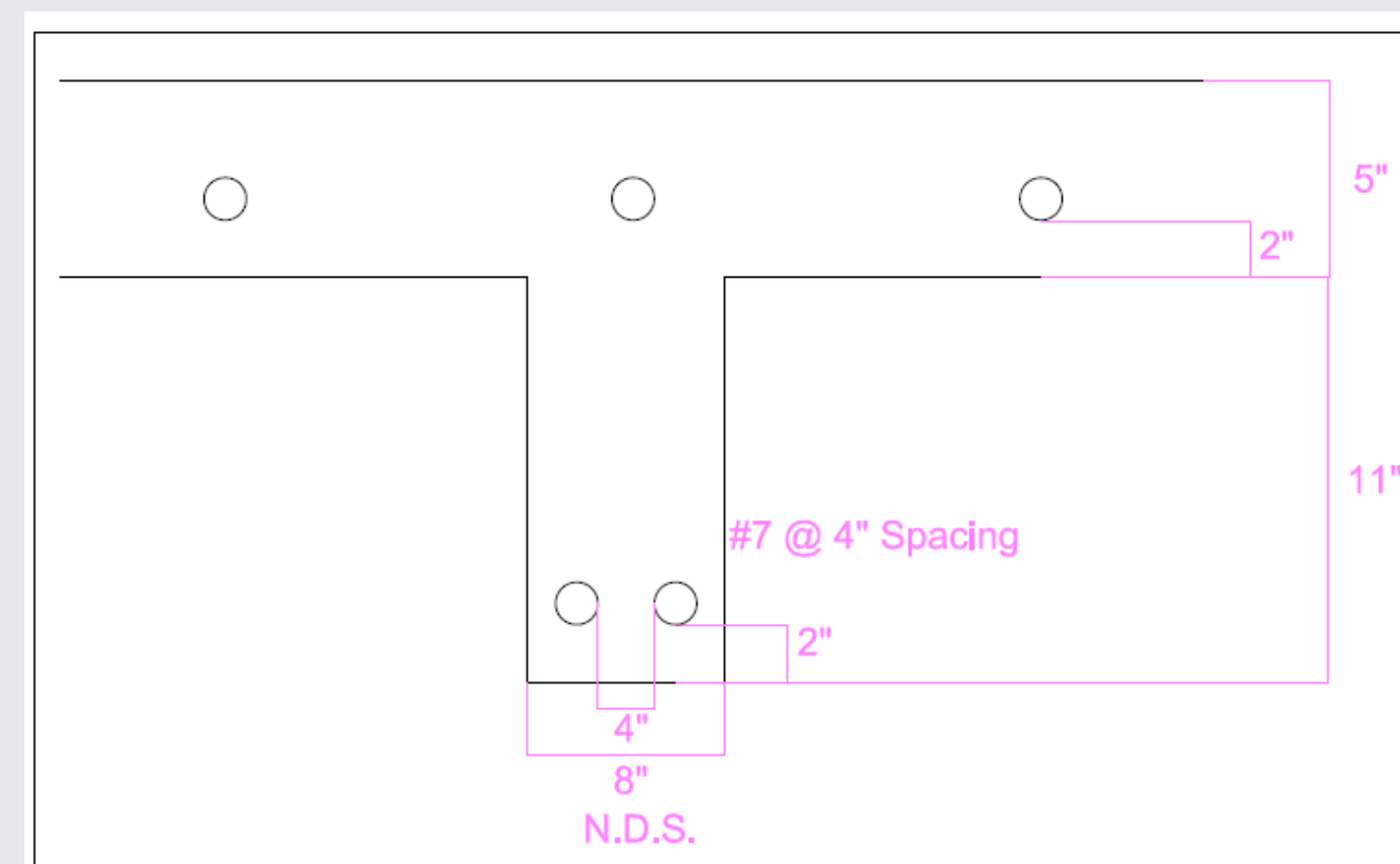
1330 Thorpe Ln., San Marcos TX, 78666

Structural Design

Calculations were completed for one unit and applied throughout the rest of the building

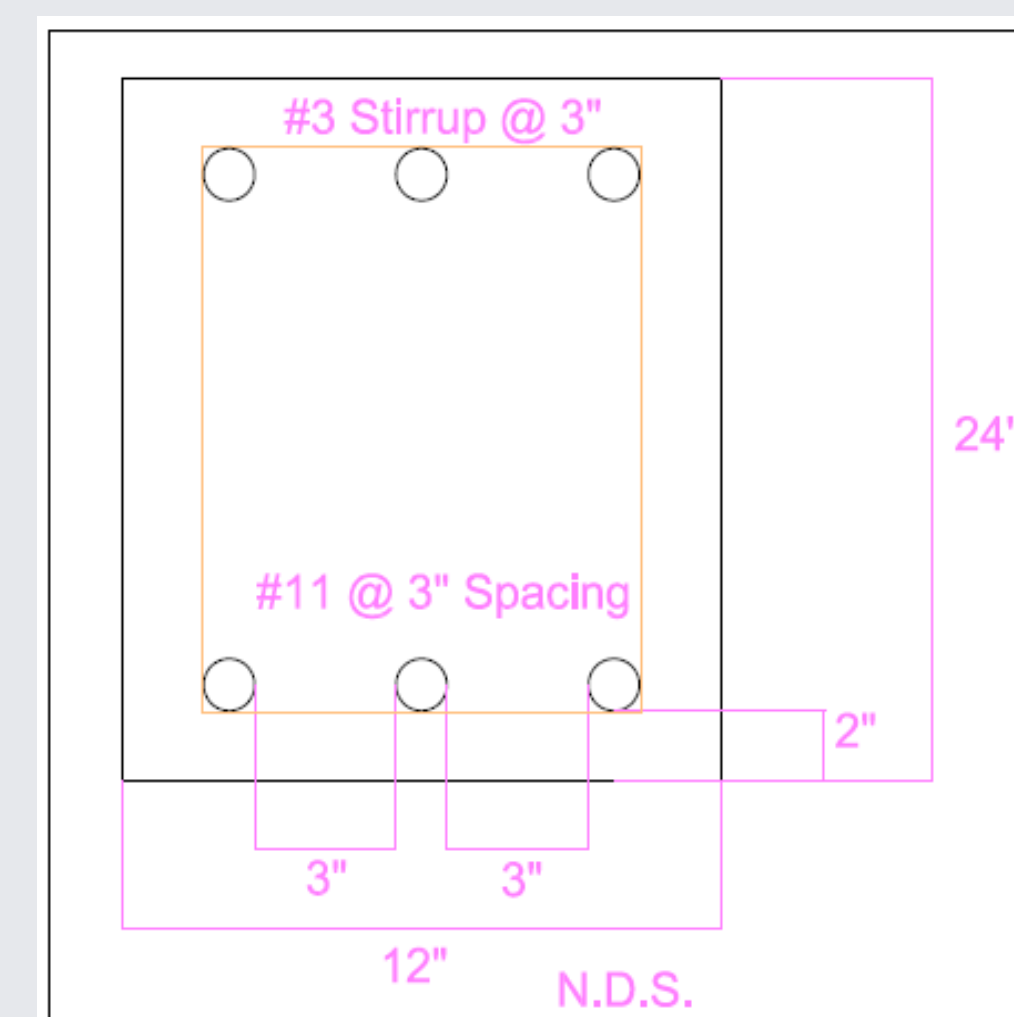


One-Way Joist System Design

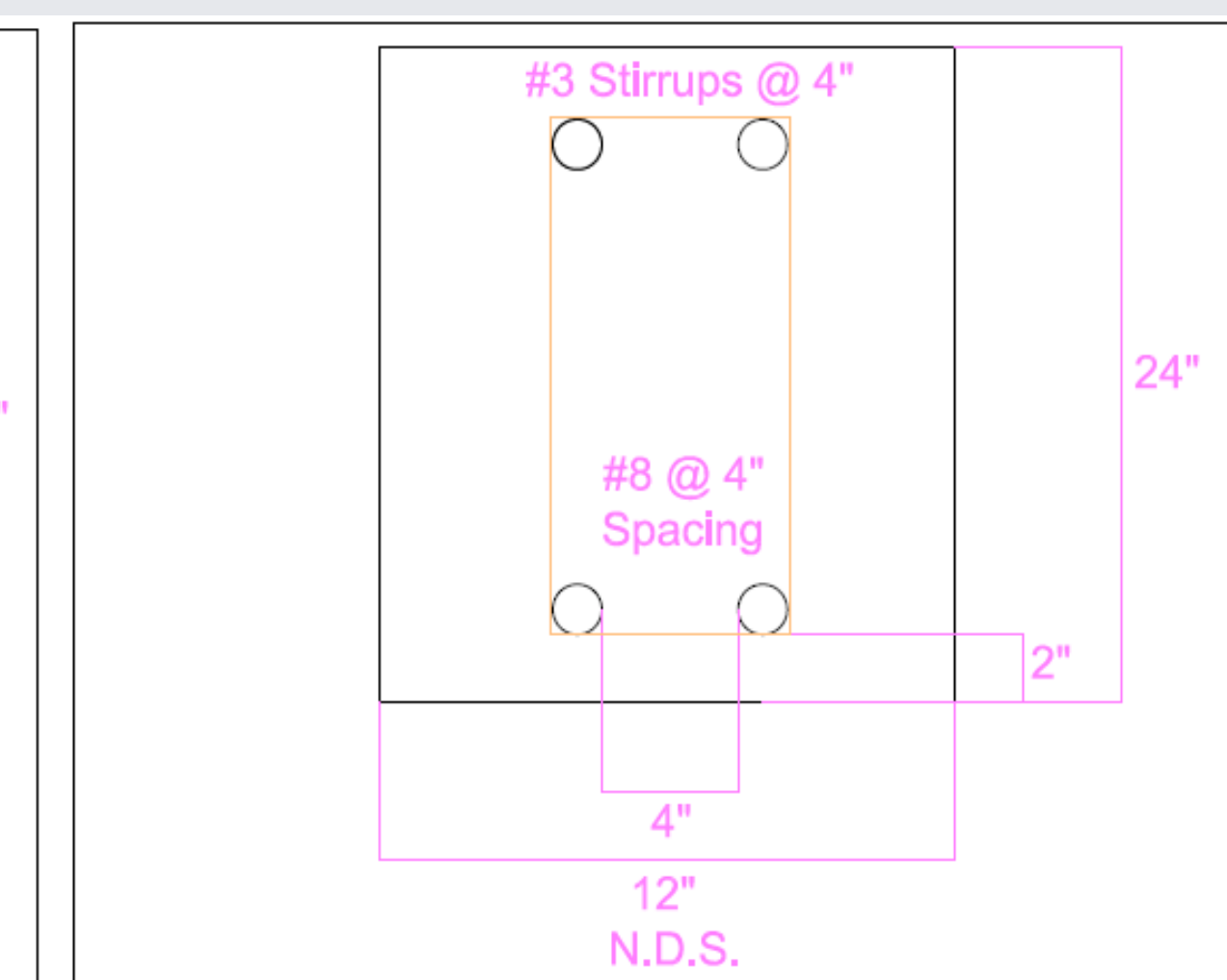


Slab & Joist

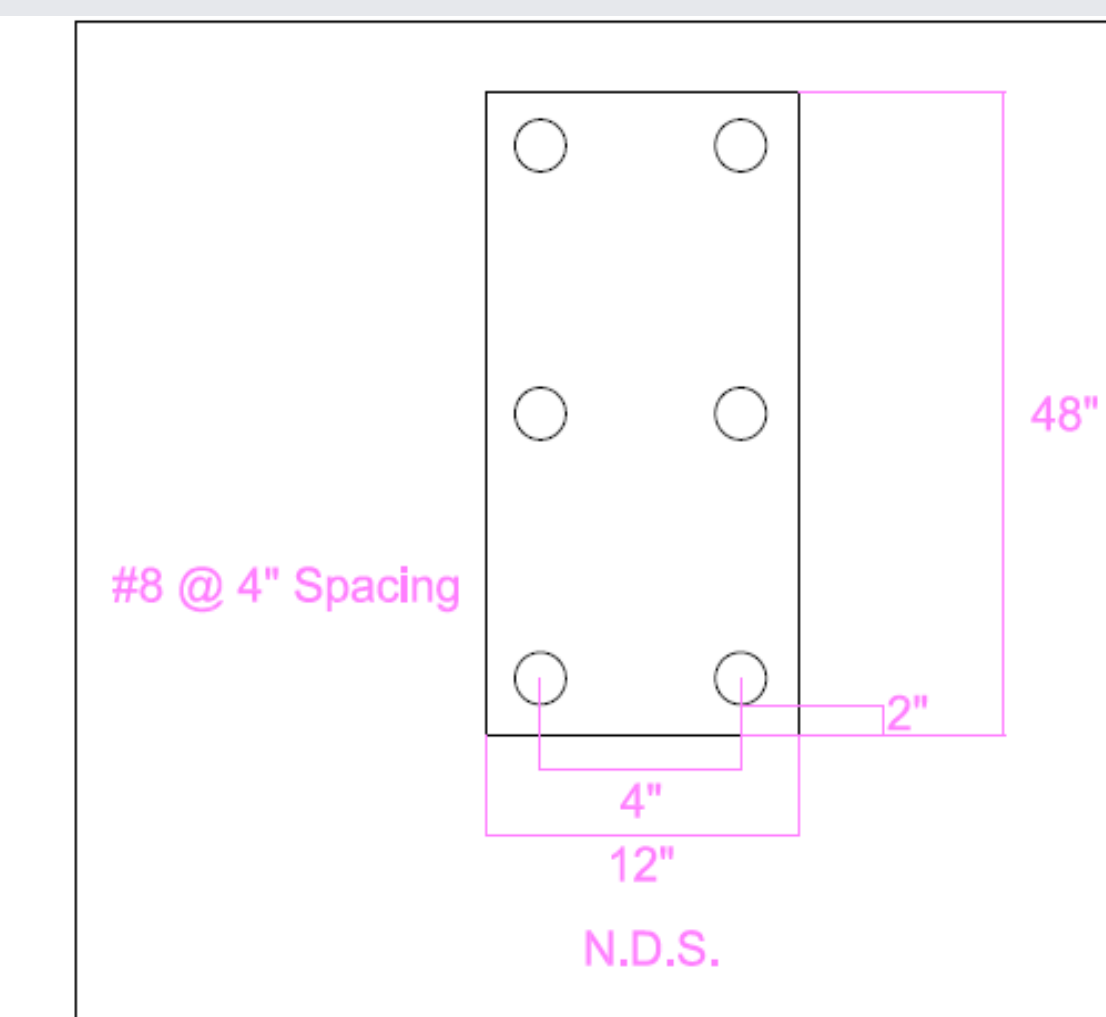
Component	Dimension	Reinforcement
Slab	5" thick	#3 steel @ 12" spacing
Joist	4 joists @ 3.5' spacing	#7 steel @ 4" spacing
Beam (35')	2' X 1'	#8 steel @ 4" spacing with #3 stirrups @ 4" spacing
Beam (40')	2' X 1'	#11 steel @ 3" spacing with #3 stirrups @ 3" spacing
Column	4' X 1'	#8 steel @ 4" spacing



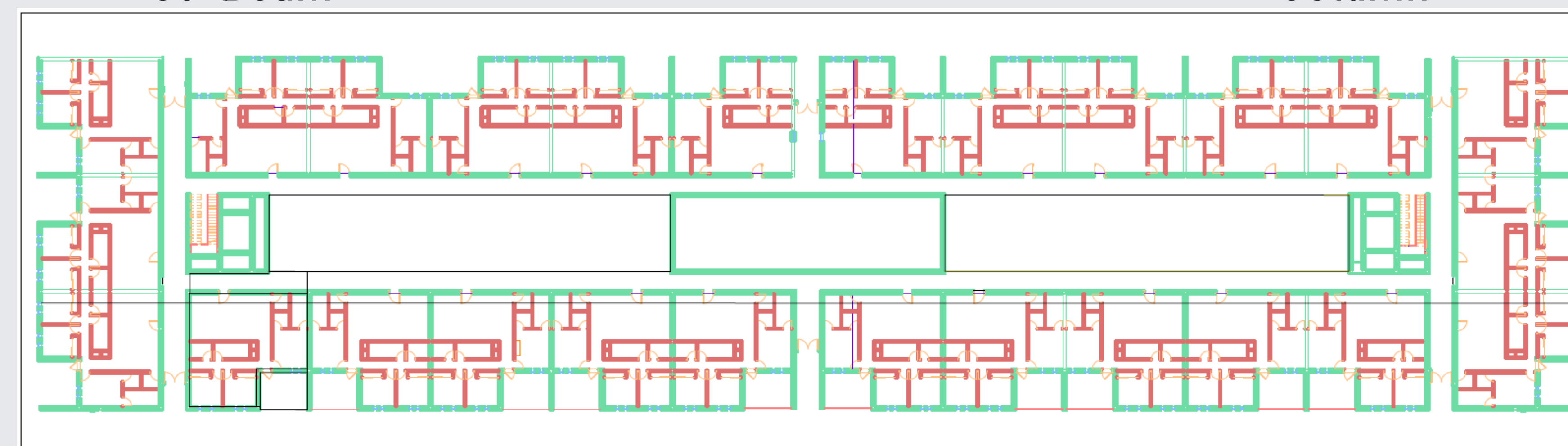
35' Beam



40' Beam



Column



Building Layout

Geotechnical Design

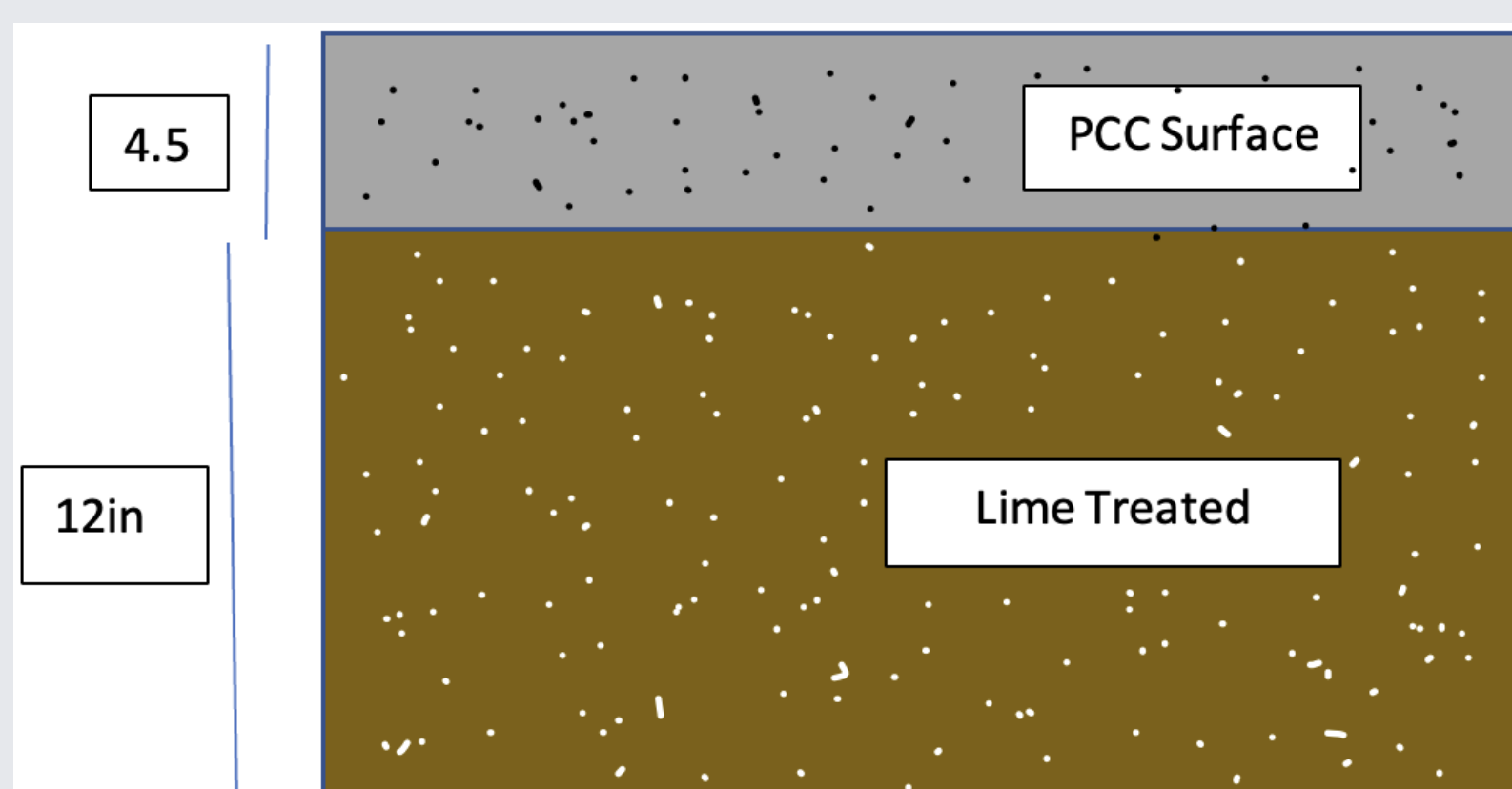
This region of Central Texas is home to **expansive soils** which can cause excessive swelling when the soil encounters water, as well as shrinkage when it undergoes drying especially during the hot summer months. Challenges for the site include producing innovative and sustainable designs for the site to withstand these invisible forces.

Based on the geotechnical data for the site, our team provided foundation and pavement recommendations, for the building.

Based on the number of columns the building has, and the respective column loads, our team produced three alternatives for the foundations of the building.

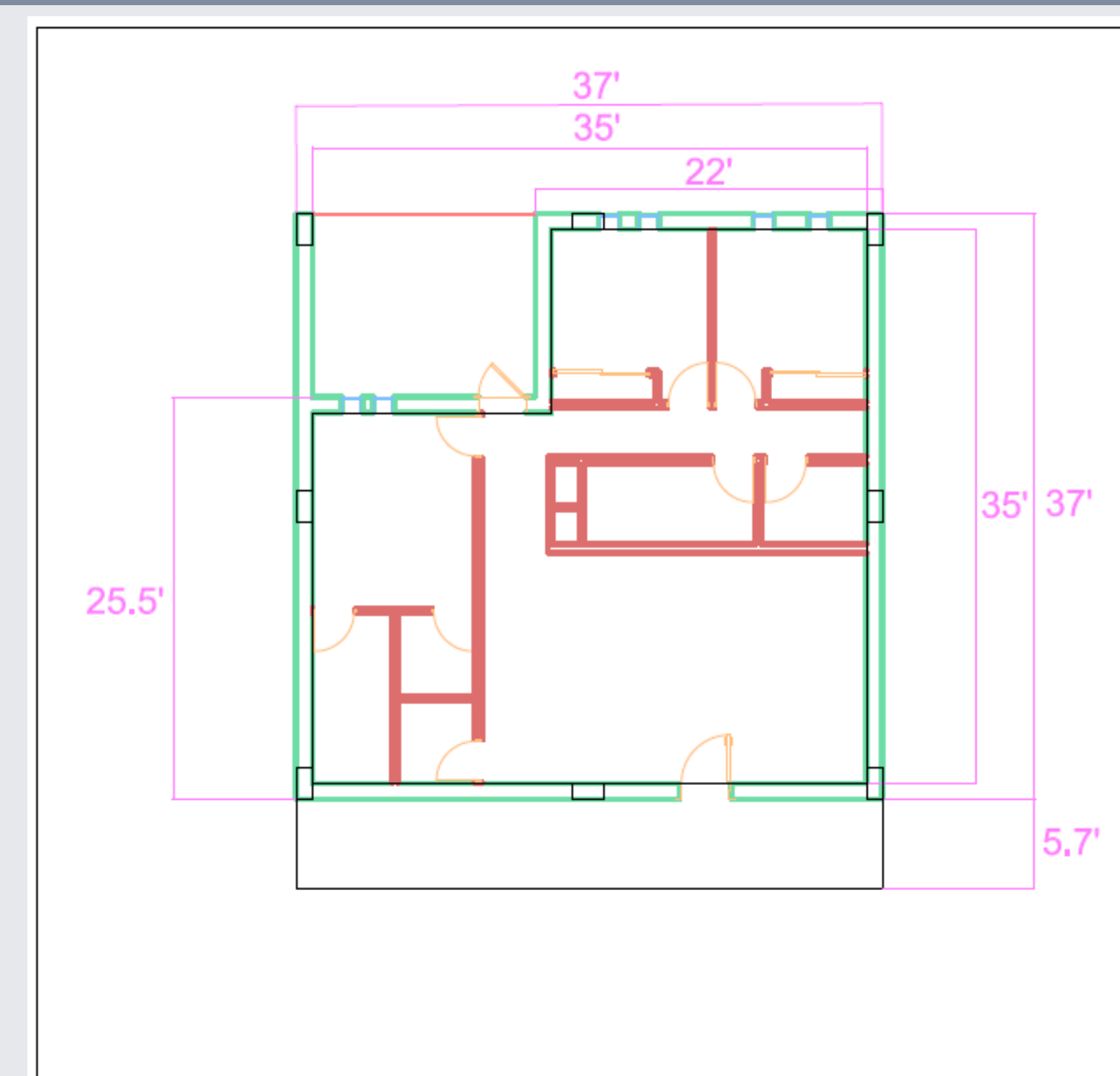
Square Spread Footings - Yielded a high # of foundations, produced 3" max settlement. Cheaper option. Passed Bearing Capacity.

Pavement Design - based on ESAL factor of 6831. Assumption of one (1) garbage truck per week. Most sustainable design was to create a permeable PCC Surface that would allow for the recharge of water into the Edwards Aquifer.



Footing Name	Dimension			Depth of Embedment (ft)	Max Settlement (in)	Passes Bearing?	# of Footings
	Width (ft)	Length (ft)	Thickness (ft)				
A	7.25	7.25	2	6	3.18	Yes	154

Unit



Schedule

Task Name	Duration	Month																															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Affordable Housing Alternative	905 days	[Gantt bar]																															
Permitting	15 mo	[Gantt bar]																															
Affordable House Grant	6 mo	[Gantt bar]																															
Design	6 mo	[Gantt bar]																															
Construction	12 mo	[Gantt bar]																															
Inspection (LEED)	1 mo	[Gantt bar]																															

Sustainability



Leadership in Energy and Environmental Design:
Silver Certified

Costs

Item	Cost (Mil.)
Initial Cost	\$25
Maintenance Cost	\$18
Replacement Cost	\$48
Salvage Cost	\$20
Net-Present Value (NPV)	\$71

Site Layout

