4 GROUP 2 DAVEY NE
45- LOCATION OF SITE
47- DAVEY MASTER PLAN
49-52- MASTER PLAN ANALYSIS
53-54- ETHAN GRIGER
55-56- STEVEN SEVERSON
57-58- ANNA O’NEILL
59-60- MEGAN JANOUSEK

5 GROUP 3 SPRAUGE NE
61- LOCATION OF SITE
63- SPRAUGE MASTER PLAN
65-68- MATER PLAN ANALYSIS
69-70- JULIE REYNOLDS
71-72- DAYNA BARTELS
73-74- ALEX MOORE

6 STUDIO OUTCOME
77- STUDENT INTERVIEWS
1 INTRODUCTION
STUDIO GRAPHIC

MATTER OF ECOLOGY

MATTER OF SURVIVAL

SUSTAINABLE URBANISM

MATTER OF HERITAGE

HUMAN SYSTEMS
NATURAL SYSTEMS

ENERGY

WASTE

WATER

SHELTER

FOOD

ECONOMY

IMPROVEMENT

OCCUPATION

IDENTITY

TRADITION

PRESERVATION
The planet is a finite resource inhabited by a dwindling collection of flora and fauna. The rise of homo sapiens has skewed the ecology of this environment in ways that threaten not only the existence of other living things, but of the human race itself. Blinded by the potential of technology and their own sense of entitlement, humankind has developed a dysfunctional relationship between human settlement and the natural world. To find a healthy balance on the planet between all of its inhabitants, one that has the resilience to sustain a dynamic balance, requires the reorientation of planning and design trajectories from their exploitive and self-centered approaches. The framework this studio operates on is an interactive construct between the areas of survival, purpose, ecology and heritage. Survival, to reconnect settlement to water, food and shelter as the foundations of settlement. Purpose, to connect human industry and innovation to the needs of settlement while being mindful of their impacts. Ecology, to integrate systems of urbanism and the systems of the environment in ways that operate through renewable energy and eliminate waste. Heritage, to critically consider the role the past has in defining the present and the future definition of place. This diverse construct serves as the platform from which this studio explores various trajectories in pursuit of a ‘sustainable urbanism’.

The Sustainable Urbanism Studio focuses on exploring alternative strategies that seek to evolve the nature of the city from its unsustainable present towards a sustainable future. The rapid urbanization of the planet has made this a pressing reality for the professions concerned with human settlement and the environment. The Studio pursues this goal through grounded speculation in the present, seeking balanced, inclusive solutions as opposed to singular, biased polemics. Density is embraced, but not at the expense of privacy. Basic needs are understood as something that must be addressed within development not somewhere else. Growth is a reality pursued strategically where integration and diversity are important as opposed to segregation and singularity. Human industry, as manifest in economics, improvement and occupation, provides the means for civilization and the environment to adapt to the dynamic conditions of our world. Sustainability is not just green. It comes in all colors, requiring a holistic approach where ecological balance is valued over human arrogance. The breadth of sustainability is not its weakness. It is its strength. Humanity’s weakness is its failure to embrace this reality. The Studio embraces the challenge of pursuing balance over polemics, inclusion over exclusion, integration over segregation and the fact that human settlement is a part of the environment not apart from the environment.
STRATEGIC GROWTH

Sustainability and Growth
The current course of human settlement has seen a migration towards cities, making growth a big challenge facing the design community. The notion of ‘sustainability’ as the maintenance of the status quo is an unfortunate (mis)reading of the Brundtland Commission’s call for ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’. Its problem lies in the lack of leadership it provides in the present, when current actions are governed by an unknowable future. The long-term growth trajectory of cities since the dawn of the Industrial Revolution is a well-documented fact. This trajectory has continued in developed countries, but the postindustrial and environmental circumstances of the present call for different strategies to address growth. The high carbon footprint of segregated, car-centric growth has been proven to be a contributor to global warming and declining public health. It is clear that these strategies are failing to meet the needs of the present. Acknowledging and learning from this present is the starting point for the exploration of new approaches.

Context
The specter of urban sprawl is a universal problem in American cities. This high carbon form of development started with the flight from the Industrial Revolution city, facilitated by increased access to the personal vehicle, formed by segregated land use planning and fueled by the quest to fulfill the promise of the ‘American Dream’ in the post World War II era, is the dominant residential development pattern in the United States. This low-density growth pattern has consumed large tracks of land, contributed to environmental pollution, and challenges city’s ability to maintain its infrastructure. Further, with its low densities, mass transit becomes problematic and its car centric approach, discourages walkability, contributing to public health problems. In the face of these negative outcomes, cities must start to explore other more sustainable paths to growth. Examining the 2030 Comprehensive Plan for the City of Lincoln, the greatest share of future growth has a target of three units per acre. With eight units per acre, generally understood as the threshold for supporting mass transit, the growth formula proposed in this plan can only be understood as a car centric formula for sprawl.
Design Research

Sustainable settlement must accommodate the needs of survival, purpose, ecology and heritage. Survival requires the provision of food, water and shelter. Purpose requires the opportunity to improve oneself, earn a living and contribute to making the world a better place. Ecology requires solutions that create integrated and mutually beneficial environmental systems including carbon free energy and the elimination of waste. Heritage requires one to respect tradition, frame identity and nurture the preservation of place. This basic framework is designed to project a diverse and integrated approach, involving many contributory needs and influences. The studio seeks, through design research, to translate these aspects of a sustainable form of urbanism into tangible solutions.

Sustainable Program Charge

Fundamental to sustainable urbanism is the creation of a balanced natural and human ecosystem. This goal requires the integration of different uses with each other and interlocking systems, often creating more complex and often messy design responses. It also creates situations where everything needs to do more than one thing. Streets have mixed circulation requirements, public space shifts in their use patterns, buildings serve mixed populations, storm water conduits double as infrastructure and recreation spaces. This need to ‘do more with what you have’ is another fundamental tenant when programing a sustainable urban environment.

As a collective activity, teams will develop a framework/program for the sites chosen within the overall alternative growth plan. This framework/program, to be sustainable, should think in terms of activities that need to be accommodated and basic questions that will need to be answered. In terms of activities, having places to live (housing and hotels), places to work (commercial and industrial) and places to grow (educational, cultural, social and recreational) is a minimum requirement. Overlapping these requirements are questions of survival (food water, shelter), purpose (economy, occupation, innovation), ecology (energy, waste, systems integration) and heritage (tradition, preservation, identity). This more comprehensive framework will grow and evolve as synergies and other opportunities emerge during the design process. Natural ecologies evolve and adapt to present conditions and it is expected the program for the Eco Villages will do the same.
The scenario for this design research study proposed future growth for the City of Lincoln be accommodated by the dense expansion of incorporated villages surrounding the City in Lancaster County rather than continuing the three units per acre sprawl proposed in the comprehensive plan. These new ‘eco villages’ would be connected by transit to Lincoln and would have to be self-sufficient. To achieve this goal, it was necessary that there be a plausible transit corridor connection to the city and easy connection to the natural water systems of the County.
Located north of Lincoln, Davey was originally founded as a railroad workers community founded primarily by Irish immigrants. While the rail line that once gave the town its reason for being is gone, the town lingers on with traces of its Irish past present in the large Catholic Church still standing in the town. The town is located in a well head protection basin, defined by natural drainage corridors on the east and west that converge on each other north of the site.

Founded in 1865 by Hamilton Queen and Ellis Shane. It served as a cattle shipping location and got its name after stock raiser DM Denton. During the Depression, the Town included a WPA camp for agriculture assistance workers. A natural drainage way flows south and east of the town with an active rail line sliding between the creek and the town. The Town, located southwest of Lincoln, has its own community infrastructure with park space, a community center, water tower and waste water system lagoon. Currently Denton is an expanding residential location for Lincoln commuters wanting to live in the country.

Founded in 1887 by a homesteader named Sprague, the Town was incorporated in 1913. Sprague, its early days was primarily populated by workers on the Missouri Pacific Railway giving it a tough town reputation. Located adjacent to a creek, the existing town is a peninsula of high ground reaching out into the flood plain. This edge condition places it adjacent to both agriculture and the natural flood plain landscape defined by the creek. A rail line, now abandoned, bends around southern and eastern edge, between the town and the natural drainage way. Water, supplied through Rural Water District #1, comes from the wellhead protection zone primarily east of the site. Wastewater is address with a lagoon system located east of the town.
2 RESEARCH
GARDEN CITIES - Canberra

LOCATION
Australia

POPULATION
356,585 (2011)

AREA
814.2 sq km (314.4 sq mi)

DENSITY
428.6/sq km (1,110/sq mi)

PLANNERS
Walter and Marion Griffin

PROJECT DATE
Planned in 1912

CITY TYPE
Urban

GARDEN CITY CHARACTERISTICS
- Use of rounded street intersections
- Extensive tree planting and generous provisions for parks and playgrounds
- Strong local jobs offered within the city
- Distinct separation of the residential, industrial and civic areas

Walter and Marion Griffin master plan
GARDEN CITIES - Letchworth

CONCEPT
“Town and Country must be married, and out of this union...will spring a new civilization.”

Country - Open fields and space to breath but isolated from other people.

Town - Economic and social opportunities abound but more dense and tighter spaces.

Town-Country - Intended to capture the best of both worlds. Idealized theory Howard used to drive is design forward.

PLAN
The entire garden city is about 3/4 mile radius containing six wide radial boulevards with six wards. In the center is a large public green space with six public programs wrapping around it. These include Town Hall, Museum, Library, etc. These programs over look a 150 acre park that is used for sports and other large scaled public events.

Zoomed in section of concept
Community space

Park space

Master plan
ECO VILLAGES - Earthsong Eco Village

LOCATION
457 Swanson Rd, Ranui, Auckland 0612, New Zealand

PROGRAM
32 housing units

DEMOGRAPHICS
68 Residence
46 Female
22 Male

SITE SIZE
3.2 acres
139,250 sq feet

SITE SUSTAINABILITY
Earthsong uses a variety of sustainable methods. They have marsh gardens along with water channels to collect rain water. Community composting stations. Earthsong utilizes large permaculture atmosphere.

BUILDING SUSTAINABILITY
The housing units are made of locally sourced materials and recycled materials. Zero net energy buildings from water collection and solar heating. Co-housing for reduced energy.
Architectural Design Strategies

- Mix of Housing Types and Size
- Porches at Entries
- Private Outdoor Spaces
- Periphery Parking
- North South Spine
- Twenty Foot Spacing
- Attached Housing
- Solar Oriented Houses
- Build on the Terrace
- Expandable Houses

Pedestrian paths inside
Solar Paneling
Expandable housing
ECO VILLAGES - ReGen Village

REGEN

LOCATION
Almere, The Netherlands

ARCHITECT
EFFEKT Architects

SITE
100 Housing Units Organized in “Clusters” the residential units run around the perimeter with community and production activities located at the core of the clusters.

HOUSING
A variety of housing typologies provide diversity within each community. All housing units are integrated with greenhouse space to be capable of producing plants throughout the year.
GREEN SPACE

FOOD PRODUCTION

SOCIAL SPACE

TOTAL AREA:
15450 M²
COMPANY TOWN - Googleplex

LOCATION
1600 Amphitheater Pkwy, Mountain View, CA 94043

SITE SIZE
26 acres (42 more in development)

GROSS BUILDING AREA
3,100,000 SF

MASTER PLAN
Clive Wilkinson Architects, DEGW, and William McDonough

PROJECT COMPLETION
2005

ARCHITECTS
Clive Wilkinson

ENERGY USAGE/ RESOURCE USAGE
Purchase from Northern California wind producer, solar panels on campus buildings (100% Renewable Energy)
Main Campus Programs

Barber Shops

Sleeping Pods

Laundry Stations
COMPANY TOWN - The Woodlands

LOCATION
Montgomery County, Texas

SITE SIZE
43.9 square miles

POPULATION
109,679 people

DENSITY
2,500 people/square mile

PROJECT COMPLETION
1974-present

JOBS PROVIDED
65,000
Water and Green Belts within site
LANCASTER COUNTY SOILS
The soils that are in Lancaster County are Wymore-Pawnee-Burchard, Sharpsburg, Sharpsburg-Pawness-Steinauer, and Kennebec-Nodaway-Zook (lowlands). Sharpsburg is an open habitat soil for wildlife. It is good for dry land crops but poor for septic systems. The soils in the northern part are saline and can hold more water. 31% of the non developed soils are classified as Prime Farmland.

GREEN PRINT CHALLENGE
The Green Print Challenge was taken on by Lincoln, Lancaster County and Parks and Rec. The challenge has a full plan and is featured on the comprehensive plan. The focus of the challenge is to protect and preserve the ecological systems in Lancaster county. This plan should be used as a base guide to the planning strategies in the future for urban and rural development.
Saltine Wetlands in Lancaster County are federally regulated by the Clean Water Act. They are homes to the unique salty soils, plants and animals. There are only 1,400 acres of saltine wetlands remaining nationwide.

Wetlands are misunderstood to be continuously wet which is not the case. The soils are able to hold a great deal of water. The wetlands in this region are major habitats and must be protected.

Saltine Wetlands

Saltine Wetlands in Lancaster County are federally regulated by the Clean Water Act. They are homes to the unique salty soils, plants and animals. There are only 1,400 acres of saltine wetlands remaining nationwide.
ENERGY SYSTEMS

CLEAN ENERGY
There are many ways to produce clean energy. These include Solar Paneling or Photo Voltaics. There are a number of Wind Turbines available. Geo Thermal allows the constant inter temperature of the soil to make heat or cool down. Solar heating for inside spaces or heating of water.

DAYLIGHT HOURS IN LINCOLN
This is the breakdown for the amount of daylight available in Nebraska. It gives both daylight hours and sunlight hours.

ENERGY USES IN NEBRASKA
The total amount of energy used in Nebraska is shown below. Transportation is the main use of energy in Nebraska while residential is the lowest form of energy used. There is a further breakdown of the energy used in the Nebraska with pie charts.
WASTE/FOOD SYSTEMS

COMPOST
The ability to compose a lot of waste is beneficial to the community. Composting reduces waste, water and energy usage among people. There are indoor and outdoor ways of composting.

INDOOR COMPOST can be done without attracting pests or producing smells if done properly. After a two to five week time period your compost will be ready.

OUTDOOR COMPOST can be done in a dry and shady spot. Mix in brown and green leaves and moisten with water often. Cover the pile with a tarp and add 10in of greens on top. The process might take up to two years depending up the amount of compost needed.

COMPOSTING TOILETS
Composting toilets can be used to turn human waste into rich plant fertilizer. This can be used in gardens to help produce food. There are two main types of composting toilets. The single composting toilet for an individual. The compost is produced right in the toilet itself. There is a larger composting toilet that collectively produces compost consisting of 4-6 individuals.
**TRADITIONAL FARMING**
For Vegetables 160 people are fed per acre
For Fruits 87.5 people are fed per acre

**GREENHOUSE FARMING**
For Vegetables 3200 people are fed per acre
For Fruits 1750 people are fed per acre

**GREENHOUSE PRODUCTS**
The most common types of greenhouse crops produced are LEAFY GREENS, MICRO GREENS, SPINACH, CUCUMBER, TOMATOES, PEPPERS, HERBS, SQUASH, CITRUS FRUITS, GRAPES, STRAWBERRIES, PEACHES, CORIANDER, CHILLIES, RASPBERRIES,
3 PROJECTS

DENTON NEBRASKA
DENTON NEBRASKA
MISSION STATEMENT

A community in which all age groups can enjoy the benefits of sustainable design through collaboration of program.

DESIGN GOALS

1 - Design to Net Zero Energy, Water
2 - Produce all vegetables on Site
3 - Remove all waste from site
4 - Design all buildings to meet the Well Standard design goals.
TOTAL WATER USED
279,444,000 gal/year

RAIN WATER CAPTURED
The rain water will be captured in the retention ponds that are located throughout the site. The retention ponds will then provide the water needed for the buildings to use treated grey water.
Total amount 186,290,436 gal/year

GRAY WATER
257,830,476 gal/year

BLACK WATER PRODUCED
A living machine will treat our black water and will provide fertilizer for community gardens along with the composting toilets. 6,167,040 gal/year

WELL WATER NEED
21,613,524 gal/year.
ENERGY SYSTEM

ROOF PV POTENTIAL
61,055,604 kWh/yr

SOUTH FACADE AND SOLAR TREES
650,621 kWh/yr

WIND ENERGY
14,892,000 kWh/yr

TOTAL ENERGY
76,598,225 kWh/yr

TOTAL ENERGY NEEDED
75,758,791 kWh/yr
FOOD/ WASTE SYSTEM

TRASH WASTE
The trash collection area is on the Northeast part of the site to avoid the smell with the cross winds. There are main collection routes that follow the loop road and go to the industrial areas.

RECYCLING
Assuming that most of the waste that is produced on site can be recycled, a large recycling center is needed to accommodate. This center is located on the far west end of the site along Denton Road.

PRODUCTION/COMPOST WASTE
One person using a composting toilet will produce 80 lbs of compost. It will also save 6,600 gallons of water a year The compost can be sold for profit or used in the community gardens on the site.

GARDEN AREA
30,310 sq ft = 0.70 acres
12,000 lbs of vegetables/year per acre
12,000 lbs/acre X 0.70 acres
= 8,400 lbs of vegetables per year
PROJECTS

DAVEY NEBRASKA
MISSION STATEMENT

A community working to benefit from the promotion of education and sustainable living.

DESIGN GOALS

1 - Treat all water on site
2 - Design to Net Zero (water, energy, waste)
3 - Use sustainable building methods
4 - Increase recycling within the development
5 - Optimize fresh food production
CIRCULATION SYSTEM
RAIN WATER CAPTURED
Captured rainwater will flow into collection systems that consist of gardens and swells. The water will then be transferred to the utilities and living machine. The water will be filtered into potable or grey water. The potable and grey water will transfer to two separate water towers to be used throughout the programs.

BLACK AND GREY WATER
Black water and grey water will flow down to the retention ponds located on the northern part of the site. The black water is transferred to one of the ponds by pipe line.
ENERGY SYSTEM

ROOF PV POTENTIAL
Roof area equals 1,471,450 sqft with 110,303 solar panels. This many panels will produce 41,253,545 KWh/year.

WIND ENERGY
One wind turbine produces 2,628,000 KWh/year based on a 25% capacity factor.
5 turbines equals 13,140,000 KWh/year

TOTAL ENERGY
54,393,545 kWh/yr
SOLID WASTE
The solid waste will be picked up from the dedicated collection areas of the site. The waste is to be picked up along the circulation loop the loops around the site.

SOLID HUMAN WASTE
The use of composting toilet allows there to bee a sustainable recycling method with in the town. The waste will be picked up at six different centrally located areas.

COMPOSTING
Two large composting zones will be located at the southern end of the site. This will be open for public use and is also located in close proximity to the community growing beds located in the multifamily residential units.
SOUTHWEST BLDG. LEVEL 1
1/16" = 1'-0"

SOUTHEAST BLDG. TYP.
OFFICE LEVELS 2-4
1/16" = 1'-0"

SOUTHWEST BLDG. TYP.
PARKING/ OFFICE
1/16" = 1'-0"

SOUTHEAST AND SOUTHWEST BLDG. LEVEL 5
1/16" = 1'-0"

SOUTHEAST BLDG. SECTION B
1/16" = 1'-0"

SOUTHWEST BLDG. SECTION A
1/16" = 1'-0"

SOUTHEAST AND SOUTHWEST BLDG. LEVEL 6
1/16" = 1'-0"

SOUTHEAST AND SOUTHWEST BLDG. LEVEL 7
1/16" = 1'-0"

NORTHWEST BLDG. TYP. FLOOR PLAN
1/16" = 1'-0"

SOUTHEAST AND SOUTHWEST BLDG. LEVEL 8
1/16" = 1'-0"

NORTHWEST BLDG. SECTION C
1/16" = 1'-0"

SOUTHEAST AND SOUTHWEST BLDG. LEVEL 9
1/16" = 1'-0"
5 PROJECTS
SPRAGUE NEBRASKA
SPRAGUE NEBRASKA
MISSION STATEMENT
A community to allow growth of agriculture to provide food and jobs for people.

DESIGN GOALS
1 - Treat all water on site
2 - Design to Net Zero (water, energy, waste)
3 - Use sustainable building methods
4 - Increase agriculture
5 - Optimize fresh food production for village population
6 - Combine to grow all food for Lincoln
7 - Incorporate Bus Rapid Transit
CIRCULATION SYSTEM
DRAINAGE
Site drainage and layout allows for water to be funneled and filtered into grey water ponds at the low land. This creates recreational areas with in the site. The topography allows the water to flow in a cycle and then discharge water from the cycle into the Salt Creek. The town is not in the flood plain but the vertical farms are.

WATER CYCLE
Almost 94% of the water system is recycled and reused.

WELLS
Wells will need to provide 1,825,000 gallons of water a year.

GREY WATER PONDS
The ponds are able to hold 1 months of water supply for the town at 14,166,127 gallons.

WATER TOWERS
Two water towers on the site. grey water tower to gravity flow into the city is 465,736 gallons. A potable water tower 15,000 gallons for drinking water.

LIVING MACHINE
A 7,200 sf Living Machine will take the 96,000 gallons of black water per day. 65% of that turns to sludge and used for fertilizer. 35% purified for grey water with 20% lost.
ENERGY SYSTEM

ROOF PV POTENTIAL
Produces 30 KW/h/year/sq ft
1,643,190 sq ft of panels = 49,295,700 KWh/year.

WASTE COGENERATION
Produces 1500 KW/h/ ton.
3.75 tons/day
2,053,125 KWh/year

WIND ENERGY
A 1.5 MW turbine at a 35% capacity factor can produce
4,500,000 KWh/year. With 8 on the site at the highest point
that makes 5,956,800 KWh/year.

TOTAL ENERGY NEEDED
55,816,445 KWh/year

POSITIVE NET ENERGY
1,489,180 KWh/year
TRASH WASTE
The waste from the site will go into a cogeneration system that is located in the South Eastern part of the site.

ENERGY
Produces 1500 KW/h/ ton.
3.75 tons/day
2,053,125 KWh/year

VERTICAL GARDENS
3,400,000 square feet
50,000 square feet of green house
This provides 800 jobs for people
JULIE REYNOLDS
6 STUDIO CULTURE
What was the main take away from the Sustainable Design Studio you feel can be applied to your future career?
“I think the main takeaways from this studio are not only how to go about sustainable design, but how to apply it now in the world we live in and move towards the future. It was very helpful to take an existing town as it is, and apply all different kinds of methods of sustainable design. It was very interesting to see how much the town needed to grow and how much space these different methods took. It gave us a realistic view of what the world needs to change and what it will look like if we went down this path completely. For example, our project was focused on agriculture and growing enough of food for our town to survive. Our indoor farming buildings took up an insane amount of space to be able to produce enough food. I think I can apply this to my future career by using the sustainable methods we studied and used in our projects such as the different water systems, trying to go net zero energy, and even using different fixtures such as composting toilets. I am excited to use this new information and help transform the world to be like our eco-villages we designed.

“I’ve never had the opportunity to design at a scale this studio provided with such depth taken into account of the sustainable aspect of design. This studio provided great opportunity to design at a large master plan scale while having to prove the sustainability of the design for the whole and individual buildings.”
“The studio provided an opportunity to learn about different aspects of sustainability and what is necessary to create a sustainable community, while working through design/sustainability issues as a group and individually at the same time.”