

# CAROLINA NORTH

*The* UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL



Sustainable Design and Infrastructure Workshop  
November 6-8, 2006



STONEBRIDGE

# Infrastructure Workshops

## *Sustainable Design & Infrastructure Workshops*

### DISCOVERY PHASE

- November 6-8: Exploring Possibilities for Carolina North, Part 1
- November 27-29: Exploring Possibilities for Carolina North, Part 2
- December 12-14: Development of Parameters
- January 8-10: Presentation of Draft Results/ Begin Technical Studies
- February: Technical Studies
- March: Technical Studies





# Landscape, Natural Habitat, Water Quality



CAROLINA NORTH

*The* UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL

# LANDSCAPE, NATURAL HABITAT, AND WATER QUALITY

- Integrate research and education into the landscape, habitat, and water quality features (e.g., visible stormwater BMPs, ecosystem restoration, planning and monitoring of biodiversity)
- Maintaining/enhancing community and ecosystem connectivity (for example through protection of Bolin Creek corridor and also through preserving forest connectivity)

# LANDSCAPE, NATURAL HABITAT, AND WATER QUALITY

- Build on brownfields first with eye towards conserving greenfield areas. This is an important opportunity to restore existing impacted landscapes, habitat, and water quality
- Allow natural drainage to form stormwater management strategy. Emphasize capture-reuse-recycle approaches. Use natural areas to receive excess flows as sheet flow to filter and infiltrate.

# LANDSCAPE, NATURAL HABITAT, AND WATER QUALITY

- Preserve viewscales and integrate ecological function throughout the built environment and create a natural and functional transition to the non-built environment.
- Identify existing site features that we want to celebrate and design for better access to experience their value.

# LANDSCAPE, NATURAL HABITAT, AND WATER QUALITY

- Create a space with more biodiversity than it has today. Understand and educate people that CN will look and feel different from the Main Campus.
- Allow natural site features influence building siting and utility location.

# LANDSCAPE, NATURAL HABITAT, AND WATER QUALITY

## Possible Barriers

- Liability with respect to brownfields
- Need for balance between factors such as building height, need for density, and impervious cover footprint and how these intersect with view corridors and community “feel”



# Stormwater, Water & Sewer Systems



CAROLINA NORTH

*The* UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL

# Water, Wastewater, Stormwater

- Integrate research and planning
- Flexibility, adaptability in the master plan
- Potable versus non-potable versus fire supply
- OWASA Master Plan accounts for Carolina North at 1.6 MGD
- Funding opportunities for innovative systems
- Utility corridor/tunnel; needs to be integrated with master plan
- Innovative technologies must integrate design, operations and maintenance
- Zone treatment options – one size does not fit all
- Education of users

# Water, Wastewater, Stormwater

- Evaluate the need for redundancy and back-up systems
- Grab the free stuff: rain harvesting and up-stream capture
- Use reclaimed water: OWASA versus on-site?
- Stormwater treatment: How far do we go? Off-site treatment?
- Land planning for all treatment systems: Wetlands wastewater treatment?
- No waste leaves the site?
- Management of water budget: collection and reuse of water
- Standardization of decentralized systems.

# Internal Transportation, Parking & Roads



CAROLINA NORTH

*The* UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL

# Background

- Site is about 2 miles end-to-end
- Site is about 1 mile from main campus
- Closest major road intersection is I-40 and Martin Luther King
- Railroad provides opportunities

# Types of Transportation Needs

- People
  - Workers
  - Residents
  - Visitors
- Operations
- Construction



# General Considerations

- Think of transportation modes as carbon based and non-carbon based, emphasize non-carbon based
- Consider where people are coming from and going to
  - Has mode implications
  - Has site access implications
- Integrate with the greenway systems in Chapel Hill and Carrboro

# Land Use

- Need to develop proper land use design to support transit-oriented transportation system
  - High density mixed use supports transit
- What will the street system/urban design look like?
  - Grid versus traditional pedestrian campus
  - Different in different zones (residential, institutional, commercial)

# Transit

- Design transit needs from Day #1
  - RR corridor ?
  - MLK?
- Future regional transit solutions unclear
  - MPOs are taking lead in developing vision
  - We need to look at a strategy that will integrate with a variety of potential regional outcomes
  - Leverage Carolina North plan to obtain state and federal funding
- Reserve right-of-way for transit corridors to site
- Local and regional transit penetrate site versus use shuttles for internal circulation

# Flexibility

- How does the system evolve with the different phases of development?
- Provide flexibility for future technologies and unknowns
- Undertake scenario planning to understand and compare different futures
- Think 3 dimensional
  - ? put service and other supply lines underground

# Building Typology

How Buildings Behave



CAROLINA NORTH

*The* UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL

# Possibilities to explore

---

- Building Types
- **Response to Climate**
- **Baseline Design Standards**
- **Integration of Users**
- Synergistic Building Types
- Pedagogical Opportunities
- Human Health and Productivity
- Adaptability
- **Carbon Footprint**
- **A Living Building**





# Workgroup Summary

---

- Treat buildings as species. Design as close as possible to have a positive impact, move beyond reduction strategies to restorative solutions
- Increase Human potential: provide spaces where occupants are comfortable, productive so that research breakthroughs can occur.
- A common goal we all share is to recruit and retain the best researchers, faculty and students. If we do that private sector will want to join us and bring research dollars.
- Additional benefits of high performance buildings are adaptability/flexibility, durability, maintainability, reduced emissions including carbon footprint and pedagogical opportunities
- Methodology: use free resources, design in efficiency, use best technology, then renewable systems and reuse waste.



# Workgroup Summary

---

- **Educate about the benefits of high performance design including looking at life cycle cost and net present value not just first cost. Expand the options considered based on sound science and peer collaboration**
- **Educate project managers, eventual occupants, decision makers, governing boards, legislature, state agencies, community and local government**
- **Move from suggested guidelines to requirements developed from performance based criteria.**
- **Standardize design process regardless of project manager, funding stream or eventual occupants**
- **Use knowledgeable integrated design teams**



# Workgroup Summary

---

- **Invest in intensiveness of buildings strategically so systems are not oversized**
- **Incentivize decision making and appropriate behaviors**
- **Standardize systems to limit unique maintenance requirements**



# Utility Infrastructure, Energy Generation & Consumption



CAROLINA NORTH

*The* UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL

# Energy Generation & Consumption, Utilities

- Drivers
  - Carbon Reduction – Minimize Greenhouse Gases
  - UNC / TCH CRed Pledge – 60% Per Capita Reduction by 2050
  - Alternative Non-Carbon Bases Fuel Sources
  - Carolina North to be Sustainable Campus
  - Social Responsibility
  - Maintain Best in Class Central Systems

# Energy Generation & Consumption, Utilities

- Hierarchical Approach to Energy Systems
  - Individual Building Level
  - Highly Efficient Central Plant
  - Reuse Excess Energy from Buildings through Plant



# Energy Generation & Consumption, Utilities

- District Systems
  - Take Advantage of Diversity
  - Adaptable for Future Technologies
  - Consider Standby Power as a Central Utility
  - Hot Water is a Viable as an Alternative to Steam

# Energy Generation & Consumption, Utilities

- Other Issues
  - Demand Side Management
  - Net Energy Metering per Building
  - Local Display of Building Energy and Systems Operation and Performance
  - Education of Building Occupants
  - Need to Study Distribution Methods

# Comments/Questions from Session



CAROLINA NORTH

*The* UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL

# Final Plenary Notes/Comments

- Use of natural site hydrology as a key principle for the site (based on HWCC principle); no more runoff (net) than what is now on the site
- Integrated pedestrian networks to reduce/eliminate conflicts at street level; underground?
- Any thoughts to integrating regional transportation options from north and northwest areas? Rural MPO; geocoding of UNC employees—need to reach out to this big employee growth area
- Preserve fixed guideway corridors to and through Carolina North

- Is geothermal an option for HVAC? One of the options discussed energy supply; appropriate for certain uses
- Education was a common theme in the workgroups: education of users about functions of building, site features, knowing what options are
- Next workshop will have simultaneous workgroups; longer period for each workgroup
- Potential conflict between available time and how much dialogue there can be
- More discussion of the possibilities to lead to parameters
- No outright rejection of any of the ideas/possibilities that were expressed this week

- Next workshop will emphasize goals that build on the possibilities from this workshop; ultimately would like consensus; examples from other places from broad range of experiences of UNC community, other participants, and consultants
- Provide all participants with summary of the worksessions so that everyone can be thinking ahead to next time and be prepared to hit the ground running
- Suggested combined topic areas: green infrastructure, gray infrastructure, and buildings/land use
- Can consultants try to organize the blue sky ideas/ group them/ provide examples from other places and how others have developed goals, metrics, objectives

- This session has been a lot of idealizing; for next time, think about competing issues, values, interferences—help get to realistic conversations
- More time in next work groups—drill down, explore more in more detail

- By thinking more broadly and in a more integrated way (like nature), can we start working in a different way
- Chaotic thinking: integration of chaos and order
- Continue to think about all the options, beyond the barriers
- Celebrate what's already been done and what we can do in the future
- What are we each doing about being carbon neutral? What is the commitment?
- Carbon footprint calculators on line