Name of Institution: North Carolina State University Name of Academic Unit: School of Architecture

Interim Progress Report

Bachelor of Architecture Master of Architecture [prerequisite + total number of credits]

Please provide contact information for the following individuals:

Program Administrator: Robin Fran Abrams

Chief administrator for the academic unit in which the program is located (e.g., dean or department chair): Marvin Malecha

Provost: Warwick A. Arden

President of the Institution: W. Randolph Woodson

Individual submitting the Interim Program Report:

Name of individual to whom questions should be directed:

Year of the Previous Visit: [e.g., 2011]

Current Term of Accreditation: [quote in full from decision letter]

Submitted to: The National Architectural Accrediting Board

Date: November 24 2014

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1. Plans for/Progress in Addressing Conditions Not Met from the 2012 Visiting Team Report a. Conditions I.1-I.5 or II.2-II. N/A

b. Conditions II.1 (Student Performance Criteria)

B.7 Financial Considerations

This concern is now addressed in ARC 561, Practice of Architecture. It is presented in a three hour participatory session led by project manager from a construction company and a senior partner in an architecture firm. The first hour of the session is a lecture, performed in this case by a principal in a construction firm and a principal in an architecture. ARC 561 is a required course for the B.Arch and the M.Arch accredited degrees. The Google shared file containing our attachments includes the powerpoint from the lecture on Financial Considerations and three Excell Life Cycle work files that were used in the class to demonstrate long-term cost differences.

The following are links supplied to the for further research:

Life Cycle Resources:

WBDG Life Cycle Cost EstimatingNC State State Construction OfficeUS Dept. of EnergyGSA Life Cycle GuideDept of Energy Guide to Life Cycle Costing for Sustainable BuildingsLife Cycle Analysis of the built environment

Cradle to Grave Resources

The Cradle to Cradle Products Innovation Institute McDonough Braungart Design Chemistry (MBDC) William McDonough TED Talk EPEA Principles and Implementation

2. Plans for/Progress in Addressing Causes of Concern from the Most Recent Visiting Team Report

Transfer Credit Procedures

When a student wishes to transfer courses into the Bachelor of Environmental Design Program, the Head of the School is assigned as their advisor. She carefully goes over the courses, including syllabi if available, and transcript, examines their portfolio if studio credit is requested, and determines what can be applied to the BED curriculum. A university form, entitled Course Substitution Form, is filled out and presented to the Assistant Dean for Student Services, who double checks it, makes a copy for the student's file, and sends it to the University Records and Registration Office to update the student's degree audit.

When a student from another university's accredited pre-professional program applies to our one-year B.Arch program, their transcript is analyzed by the B.Arch program coordinator, they present a portfolio, and they are required to take any prerequisite courses not adequately covered by their previous degree. This is recorded and placed in their student file.

The same procedure is used for students entering the M.Arch Track 1, which is for students with an accredited pre-professional degree (unless from a foreign institution). We have

students from foreign universities also entering into this track. The student's portfolio is carefully examined and their transcripts and if requested, course materials. Any courses deemed to be missing from their preparatory degree are added to their course load for the M.Arch. This is recored on a form, and placed in the student's file. Occasionally, a student may have actually taken a course, but the Director of Graduate Programs determines that they should repeat the course. An example is a foreign student who may have taken construction in their original degree, but needs a course in American structural systems.

It is unusual for a student to have courses transferred into the M.Arch Track 3, for students without a pre-professional degree, but on occasion, we may have a student who has completed graduate work in an allied field, such as landscape architecture, interior architecture or civil engineering (construction). In this case, they may be given credit for previous work, but it would only be used as a substitute for elective courses.

A copy of the form used to assess students' prior background is provided in the shared Google file.

Financial uncertainties

We have continued to have budget cuts every year since our accreditation, and another is predicted for next year. However, through entrepreneurial efforts, we have been able to raise funds to make up for our losses. We have taken advantage of incentives provided by NC State to develop distance-learning classes. Four of our required classes, ARC 211 Natural Systems; ARC 241 Introduction to World Architecture; and ARC 331 Structures I and ARC 332 Structures II have been "flipped" – lectures are available to students online, and they come to class for discussions and to work on projects in teams. Additionally we have developed two elective courses: ARC 140 Experiencing Architecture is a course for non-majors, is offered to the university at large and satisfies a general education requirement; ARC 590 Experiencing Cities, is offered to the university at large and to architecture students, and satisfies a requirement for the Graduate Certificate in City Design. We are paid per enrolled distance-learning student and also given funding for teaching assistants for these courses. We have managed to increase our operating budget by a factor of five through this source.

We have increased the frequency of funded studios, where research is performed for a client. For example, we have a studio this semester sponsored by a private developer, who has funded the cost of the adjunct instructor and the teaching assistant, plus travel for the students to New York City. We have another studio with a visiting faculty member from Columbia University, with a development agency that is paying half of the cost of the instructor. The intent of both of these studios is to come up with a range of ideas prior to the client contracting with a professional design team. We we are currently planning for our Summer 2015 design/build studio to be funded by the College of Veterinary Medicine, for whom we will build a red wolf teaching facility.

Additionally, the amount of funded research of our faculty has increased dramatically. These funds cover the cost of faculty travel, research assistants, teaching assistants, etc., for those faculty performing the research. The overhead return to the school is minimal, but it has succeeded in buffering the research faculty from the severest impacts of the budget cuts, and enables them to carry on with their work.

Diversity

In Fall 2014, we were provided with funding from the Provost's office and from the Dean of the College of Design to hire Marshall Purnell as a Professor of the Practice in the School of Architecture. Mr. Purnell was president of the AIA and of NOMA. He is teaching design studio and Professional Practice. A key task for Marshall will be mentoring the diversity students. This is a significant step forward in diversifying our faculty and providing a role model for our students from different cultural backgrounds.

Our undergraduate and graduate student bodies are diversifying through a natural process, reflecting national trends. We are beginning to see undergraduate international students, who present a different sort of challenge. We have had significant growth in the number of international graduate students as well, primarily from China and Iran.

We are participating with all departments in the College of Design to develop a recruiting plan for graduate students.

Since our accreditation visit, a new initiative has been developed in the College of Design: The Design Lab for K-12 Education. There were many reasons for this initiative, not the least of which was to nurture talent in the Triangle area, including diversity students. The staff in K-12 Education hold regular workshops, host an open studio for high school students, train school teachers and run the summer design camp. Scholarships are provided for students needing assistance.

The website for this venture is: <u>http://design.ncsu.edu/academics/design-lab-k-12-education</u>.

3. Changes or Planned Changes in the Program

There have been no substantive changes to our program.

As a design school in a STEM Research I university, we find that our professional full-time faculty are being pulled away from the practice of architecture and pushed towards funded research. This represents a challenge when it comes to teaching sound building and comprehensive studios, as they the full time faculty are increasingly less engaged in the design of substantial buildings. We therefore must rely upon adjunct professors of practice to teach these key studios that satisfy so many of the Student Performance Criteria. The adjuncts we have are experienced teachers and several are FAIA. We have a process for approving adjuncts that includes scrutiny of their portfolios and cv's, and determining whether they should be lecturers (non-licensed, a few years out of school, allowed to assist in studios with full time faculty); Assistant Professors of Practice (in process of taking ARC, with professional M.Arch, with several years experience in practice); Associate Professors of Practice (licensed, several years of practice and teaching); or Professors of Practice (in practice for 20+ years, licensed, principals of firms). We are seeking ways to nurture the adjunct faculty to a greater extent, and provide them with greater security in their teaching positions. Because of the budget situation, we've been limited to providing contracts of no longer than nine months. It is our hope that this will ease and we will be able to create longer-term contracts. We have applied for a NCARB grant to explore ways to further develop the adjunct teaching faculty.

Our distance-learning courses have proven to be quite successful and to have brought unexpected benefits. We spend substantial time with students in the required core courses, even though the lectures are available online. As our international student numbers increase, we find the recorded lectures to be of great assistance to students for whom English is a second language. Our Structures professor was hospitalized last year, but his teaching assistants were able to carry on with the course, since all of the lectures were pre-recorded. The professor was able to carry on meeting with students through virtual office hours on Skype once he returned home.

4. Identity & Self Assessment

a. History Mission

I.1.1 History and Mission

History of the Institution

With nearly 34,000 students and 7,300 faculty and staff, North Carolina State University (NC State) is a leading land-grant university, known locally and globally for its leadership in research, discovery and technology. NC State is North Carolina's largest comprehensive university. Founded in 1887 as a land-grant institution under the Morrill Act of 1862, NC State has a three-part mission: instruction, research, and extension. NC State is a member institution of the seventeen-campus University of North Carolina System, which is directed by a board of governors and the university president. A board of trustees and a chancellor (as administrative and executive head) govern NC State University. The provost, subject to approval of the chancellor, makes decisions affecting academic affairs and allocation of resources at NC State. The chief administrative officer of each college is an academic dean. The colleges of the university are: Agriculture and Life Sciences, Design, Education, Engineering, Natural Resources, Humanities and Social Sciences, Science, Management, Textiles, Veterinary Medicine, and the Graduate School.

NC State opened in 1889 as the North Carolina College of Agriculture and Mechanic Arts. The college offered courses in agriculture, horticulture, pure and agricultural chemistry, English, bookkeeping, history, mathematics, physics, practical mechanics, and military science. In 1917 the institution's name was changed to North Carolina State College of Agriculture and Engineering. By the 1950s two new schools had been established: the School of Design and the School of Forestry. The faculty and student population more than doubled during the post–World War II period, and in 1965 the name of the institution itself was changed to North Carolina State University, signifying its new role as a comprehensive university.

By the late 1970s NC State was recognized as one of two major research universities within the renowned University of North Carolina system. During the 1980s the university added a 1,000-acre research campus. In recent years, the university has focused on building the campus community, promoting partnerships, implementing a progressive business model, and supporting the growth of the Centennial Campus. On January 8, 2010, Dr. Randy Woodson became NC State's fourteenth chancellor. His aim for the university is "locally responsive, globally engaged." Since its founding, NC State has become a nationally recognized leader in science and technology with historic strengths in agriculture, textiles, design and engineering. NC State has evolved into a comprehensive community of scholars that also has outstanding degree programs in the humanities and social sciences, education, life sciences, management, natural resources, physical and mathematical sciences, textiles and veterinary medicine. The research park, Centennial Campus, was named the top research campus in the nation in 2007 and hosts more than 130 companies and agencies and creates an advanced technology community where university, industry, and overnment partners produce scientific and technical innovations. NC State serves all North Carolina communities through statewide research, extension and engagement activities.

NC State offers bachelor's degrees in 110 fields of study, master's degrees in 110 fields, and doctoral degrees in 61 fields, plus a Doctor of Veterinary Medicine. The university hosts sixty-eight research centers, institutes, and laboratories, and NC State discoveries have resulted in more than 660 patents and over 70 companies that employ more than 13,000 people. The nationally ranked library system offers a wealth of research resources for faculty and students, and, through the Triangle Research Libraries Network, also provides access to resources housed at Duke University, the University of North Carolina at Chapel Hill, and North Carolina Central University. The James Hunt Library, designed by Snowhetta and currently under construction, will serve as the academic and cultural center of Centennial Campus.

NC State has an annual budget of approximately \$1.2 billion, and an endowment valued at more than \$503 million (2010). According to the 2010 National Science Foundation rankings, NC State is 3rd in

Industry Research Funding and 9th in Total Research Expenditures among universities without medical schools, and 25th in Graduate Students in science and engineering fields among doctorate-granting institutions.

Currently, NC State faculty include nine members of the National Academy of Sciences, ten members of the National Academy of Engineering, and numerous fellows in a large number of professional associations. Over 70% of the faculty are engaged in funded research.

NC State students come from all 50 states and 110 countries. The average incoming freshman scores 1193 on the SAT and has a grade point average of 4.24. Located in Raleigh, North Carolina's capital city, NC State anchors one corner of the Research Triangle Park, which houses more than 140 organizations dedicated to innovative research and development. Duke University in Durham and the University of North Carolina at Chapel Hill mark the other two points of the triangle.

North Carolina State University Mission Statement

As a research-extensive land-grant university, North Carolina State University is dedicated to excellent teaching, the creation and application of knowledge, and engagement with public and private partners. By uniting our strength in science and technology with a commitment to excellence in a comprehensive range of disciplines, NC State promotes an integrated approach to problem solving that transforms lives and provides leadership for social, economic, and technological development across North Carolina and around the world.

Approved by: NC State University Board of Trustees, 4/22/11; UNC Board of Governors, 6/10 /11

History of the College of Design

The North Carolina State University School of Design was established in 1948 with two original academic components: the Department of Architecture and the Department of Landscape Architecture. In the late 1950s the school added a third degree-granting unit, the Department of Product Design. In its early years, under the leadership of founding Dean Henry L. Kamphoefner, the School of Design experienced a remarkable period of creative and intellectual development.

Designers and theorists such as Buckminster Fuller, Matthew Nowicki, Lewis Mumford, and Eduardo Catalano joined the faculty and helped build a reputation for innovation and experimentation. Frank Lloyd Wright, Mies van der Rohe, Walter Gropius, Louis I. Kahn, Pier Luigi Nervi, Charles Eames, Marcel Breuer, and numerous other internationally prominent figures came to lecture, to conduct design experiments, and to inspire a new generation of designers. The legacy of imagination, diversity, and excellence set by this first generation has continued throughout the school's history.

During the School of Design's early history its students won numerous national recognitions, including the Prix de Rome, Fulbright scholarships, and five Paris Prizes. They initiated an outstanding student publication reflecting the school's experimental posture. Many went on to the nation's leading graduate schools and assumed important positions in architectural practice and education. Recent graduates continue this illustrious tradition, readily gaining admission to prestigious graduate programs and entering positions of leadership in the profession.

On the retirement of founding Dean Kamphoefner in 1973, the administrative leadership of the School of Design passed on to Dean Claude E. McKinney. During McKinney's fourteen-year tenure as dean, the school's curricula were substantially reshaped and increased attention was given to cross disciplinary connections and public-service programs. Graduate programs in architecture and the related disciplines expanded and reached maturity.

In 1987 Deborah Dalton, associate professor of landscape architecture, was appointed interim dean, a position she filled until 1990, when she was succeeded by J. Thomas Regan, who had previously served as dean at the University of Miami. In 1994 Marvin J. Malecha, FAIA, was appointed as Dean Reagan's successor. During Dean Malecha's tenure the School of Design has experienced a remarkable period of

expanding academic programs, service, and research initiatives, and the school's ties to the university community, its alumni, and professional constituencies have been greatly strengthened. Technical and academic resources have expanded. Media laboratories, workshops, design library, and other support facilities are among the best in the nation. Notable accomplishments have included the creation of the Prague Institute, the Raleigh Downtown Design Studio, The First Year Experience, and significant graduate program growth in the areas of animation, fashion design, and graphic design.

In 2000 the School of Design evolved into the College of Design. The College of Design hosts a highly regarded Ph.D. in Design program. Full details of this degree can be found on this website: http://www.ncsu.edu/www/ncsu/design/sod5/phd/.

In 2008, a new interdisciplinary program was introduced for all freshmen in the college, called the First Year Experience. This program replaced the freshman year of each separate curriculum, providing opportunity to develop an interdisciplinary approach to design education. Each semester, students take a four-hour design studio taught by faculty and graduate teaching assistants from every department, a two-hour seminar on Design Thinking taught by Dean Malecha, that examines the fundamental concepts and language of design thinking especially those processes, methods, philosophies, theories and special topics, such as making choices in a consensus driven organization or in a collaborative venture; and a three-hour seminar on Context and Culture, an interdisciplinary survey that analyzes the impact of culture on the ideas, style and expressions of art and design. A secondary intent of the FYE is that students will form bonds across disciplinary boundaries that will stay alive throughout their years as undergraduates. Currently under development is a fourth year interdisciplinary design studio that will allow students from all departments to once again come together in the context of a trans-disciplinary studio for creative production in emerging areas of design practice, often found in the boundaries between traditional disciplinary practices.

CHANGE: The First Year Experience design studio is now only one semester; students in architecture have their first architecture studio in spring of their freshman year.

College of Design Mission Statement

The College of Design integrates practical, ethical, and aesthetic thought and action to enhance the meaning and quality of life through the creation of knowledge informing the critical study of artifacts and places.

From the 2007-2010 College of Design Compact Plan:

The College of Design is committed to a culture of collaboration. Societal imperatives challenging the relevancy of design define the expectations to:

- Respond to a society that is becoming extraordinarily complex
- Expand access to the College for a diverse student population
- Internationalize the student experience
- Expand life-long education
- Establish a collaborative culture of scholarship and engagement
- Utilize new instructional technologies and techniques
- Seek partnerships across the campus

A transforming student body requires new approaches. Students today:

Are digitally literate

- Demand more service from faculty and staff
- Have fiercely competed educationally from an early age
- Address pressures that undermine an innate love of learning
- Range from wealthy to financially disadvantaged and may themselves be parents

An agile posture is required to:

- Connect with rapidly transforming industries and professional offices in private and public settings
- Prepare students for success and excellence within a rapidly transforming culture
- Accept accountability for educational outcomes that include interdisciplinary approaches
- Understand the implications of increasing parental scrutiny and expectations
- Respond to the requirements of federal research institutions and accrediting agencies.

The College of Design Compact Plan can be found on this webpage: <u>http://design.ncsu.edu/publications</u>

CHANGE: There is a new Strategic Plan for the College of Design, which was completed in 2014. This plan has not been published yet, but will be available at the time of our next accreditation. Its primary focus is the organizing of research affinity groups focused on solving grand challenges in the 21st century.

History of the School of Architecture

Since its founding in 1948, the NC State's School of Architecture has earned a national reputation for the depth and breadth of its programs. The School of Architecture, from its inception, has been a force for globally informed innovation in design. According to Robert Burns, FAIA, and former department head, "At the core of the school in these early years was an uncompromising belief that comprehensive design would produce a healthy environment, an improved society, and a better way of life for all. Experimental in nature, the school was open to new ideas and challenges. It identified with the progressive aspirations of the New South, but its perspective was global. Unlike many of its peer institutions emerging from traditional academic positions, the school's zeal for the new was balanced by an uncommon concern for the broad development of the individual student who was expected to assume a formative role as a creative leader and committed citizen."

Founded in part on Bauhaus educational principles, the school emphasized the interrelationship of the design disciplines, materials and craft, and social responsibility. In its early years the Department of Architecture offered a single degree: the five-year Bachelor of Architecture. In the late 1960s, a "4+2" professional Master of Architecture curriculum was added. This new structure was seen as a way to address newly emerging professional and academic issues and provide broader opportunities for students to pursue alternative as well as traditional career paths. The 4+2 curriculum encouraged diversity and increased student choice in shaping their future roles in architecture. The Bachelor of Architecture degree was phased out in 1972, but was reactivated a decade later.

Since the 1980s the Department of Architecture has offered three degrees: the four-year, preprofessional Bachelor of Environmental Design in Architecture (BEDA), the professional Bachelor of Architecture (B.Arch), and the Master of Architecture (M.Arch). The latter two degree programs are accredited by the National Architectural Accrediting Board and, as such, satisfy the educational requirements for architectural licensure in North Carolina and throughout the nation.

Students in the BEDA program not only complete the curriculum of the School of Architecture's preprofessional program, they must also complete the General Education Program of NC State. The mission of GEP is to provide students the opportunity to experience diverse and integrative disciplinary perspectives. General education enhances students' intellectual engagement in their majors, prepares them for the changing demands of professional careers, equips them for a lifetime of learning, and lays the foundation for involvement in their communities as responsible citizens and leaders.

In the last twenty years, the School of Architecture has been guided by a succession of department heads and directors, including Robert Burns, FAIA, from 1983 to 1991; Dr. Paul Tesar from 1991 to 1992; Christos Saccopoulos, AIA, from 1992 to 1997; Dr. Fatih A. Rifki from 1997 to 2001; Robert Burns, FAIA, from 2001 to 2002; Thomas Barrie, AIA, from 2002 to 2007. Dr. Paul Tesar served again as Head in 2007-2008. Robin Abrams, Ph.D., AIA, ASLA, was appointed head of the school in 2008.

A new generation of architecture faculty and students has furthered the tradition of innovation and commitment to excellence established in the college's formative period. The three allied departments of Landscape Architecture, Graphic Design & Industrial Design, and Art & Design offer architecture students opportunities for lateral enrichment. A variety of foreign study programs are available in many parts of the world.

In 2000, when the School of Design was renamed the College of Design, the Department of Architecture was renamed the School of Architecture in anticipation of expanding its degree and program opportunities.

Two forces have particularly shaped the school over the past half-decade. The first is NC State's accelerated mission to be a national leader in funded research and invention. This has significantly impacted the School of Architecture, which is currently undergoing a shift from a majority of practitioner-professors to one of research-oriented professors. In the past two years, we have gained two new positions through the Provost's office that are half-research, half-teaching positions, intended to increase departmental engagement in funded research.

The second force is the nation's unpredictable economic climate. We have not escaped the challenges of budget cuts experienced by schools of architecture on a worldwide scale. We have striven to turn these challenges into opportunities to strengthen the nature of our programs. We have streamlined our curricula, and eliminated repetition and overlap in course offerings, and explored interdisciplinary opportunities where feasible. Through a series of faculty workshops and from input by students and our Advisory Board, it was determined that our strength and potential lay in three areas: Energy & Technology, City Design, and Housing & Community. As a consequence, we are developing graduate certificates and post professional masters degrees in each. These areas of research and teaching reflect a broadened vision of the practice of architecture, which is emerging out of necessity from the suppressed economy. The concentrations provide opportunity to collaborate with students and faculty in other departments, colleges, and universities, as well as practitioners seeking post-professional education, and students in the PH.D. in Design program. As well, they help define the unique qualities of our school.

CHANGE: We gained approval for two graduate certificates, City Design and Energy & Technology in Architecture. Since the certificates were adopted, we are averaging 4 to 5 graduate students earning each certificate per graduation cohort. A few students have managed to earn both. The purpose of the certificates is to certify that the student has particular advanced training in one of the areas of specialization.

Mission of the School of Architecture

• To educate students for the profession of architecture;

- To promote growth, change, and improvement in the profession and academic discipline of architecture through creative work, scholarship, research and service;
- To increase public awareness of the nature of architecture and its essential contribution to life and society.

Today, we live in a world of profound challenges, pushing the practice of architecture towards fundamental change. Our intent in the School is to lead the search for new ways an architectural education can be a strong, positive force in the creation of healthy and sustainable buildings and communities. Our intent is to develop the knowledge and skills to address complex contemporary issues regarding:

- The design of sustainable buildings reflecting knowledge at the leading edge of the 21st century
- Stewardship of scarce resources
- Promotion of livability in cities
- Mitigation of the impacts of poverty through provision of humane housing
- Research and development of ecologically- responsive building materials and integrated building systems
- Understanding history as a means of creating a better future

Architecture's Benefits to the Institution

The School of Architecture brings benefit to NC State in the following ways:

- Conducting leading-edge research in the areas of energy optimization, construction, housing and city design;
- Establishing strong relationships with communities and non-profit groups in throughout the state through extension and pro-bono consultation;
- Bringing renown through winning faculty and student entries in regional, national and international design competitions;
- Developing student leaders in undergraduate and graduate research;
- Creating the first Study Abroad programs on campus resulting in the Prague Institute, now used by colleges across campus;
- Participating in the First Year Experience, a model being cited across campus for interdisciplinary undergraduate education;
- Bringing recognition through publications of theoretical and academic books (Wayne Place, Pat Rand, Roger Clark and Tom Barrie);
- Design of a multitude of award-winning structures, on and off campus, by full-time faculty, adjunct faculty, and alumni;
- Leadership in national organizations, in particular President of the American Institute of Architects and President of the American Collegiate Schools of Architecture (Dean Malecha).

CHANGE: Creation of two graduate certificates.

Benefits Derived from the Institution

The School of Architecture gains benefit from NC State in the following ways:

- Opportunity to collaborate on funded research with colleagues in a broad range of disciplines, including but not limited to the Colleges of Engineering, Textiles, Business, and theHumanities;
- Provision of an established network of resources in support of research;
- Pre-eminence in the Research-Triangle region, taking advantage of established academic ties with UNC Chapel Hill and Duke University;
- Ability to attract top-quality faculty and students based on the university's reputation;

b. Responses to the Five Perspectives

One: Architectural Education and the Academic Community

The School of Architecture is part of a unique college of design within a university that specializes in sciences and engineering. At the most elementary level, we offer a course to the entire university entitled "Experiencing Architecture". This is a course for non-majors that introduces them to the profession of architecture, concepts of sustainable design, architectural history and theory, and city design. This course is taught through distance learning as well as face-to-face. The summer 2011 distance learning section had students in Iraq, Vietnam, on a working fishing boat at sea, as well as across the United States and the NC State campus. Dean Malecha's courses ARC 100/101 Design Thinking I & II have become a required course in academic units across campus, and now have over 250 students enrolled each semester. Other courses open to the university include History of World Architecture and Introduction to Western Architecture.

CHANGE: We now offer a second, more advanced distance-learning course, ARC 492/590 Experiencing Cities, which is open to students from across the University. Our graduate certificates are also available to students outside the School of Architecture.

Our faculty are actively engaged in collaborative research and product invention, particularly in the area of Energy & Technology, with faculty in the College of Textiles, the College of Engineering, and the College of Agriculture. David Hill is collaborating with a professor in the Humanities to construct a digital model of the original St. Paul's Cathedral, that is acoustically accurate, so that recordings of John Dunne's poetry can be recorded in situ. He is also collaborating with faculty in Textiles in developing building skin prototypes. Wayne Place and Jianxin Hu work closely with faculty in engineering on developing more effective ways to measure the potential daylighting through real-life simulation rather than computer modeling.

Georgia Bizios and Tom Barrie are leaders in the university in community engagement and extension, working with communities and local governments throughout the state, and have been recognized as such. They regularly engage students in their work across North Carolina. Recent projects have included development of affordable housing prototypes for three North Carolina counties; design of elderly housing for an Indian trip; revitalization strategy for a low-income neighborhood in East Raleigh; and prototypes for adapting historic structures in downtown Rocky Mount, NC. Additionally, our students actively pursue outreach opportunities, including assisting a small rural community in the Dominican Republic with a community asset inventory (2 student, summer 2011, sponsored by a university undergrad research grant); building bus benches for the Triangle Transit Authority; establishing a university chapter of the USGBC.

Our summer design/build studio taught by Professor of Practice Randy Lanou designs and builds structures for the public good. Summer 2010, students under his instruction constructed three huts for workers at the county recycling site. The structures were built from recycled and donated materials.

Students in the summer 2011 studio have constructed a striking shade structure and performance stage for Central Park in Downtown Durham. Students in our 2011 Asheville design/build studio have constructed a similar structure in downtown Asheville, in conjunction with students from Appalachian State University.

CHANGE: In summer 2012, students constructed a scenic overlook in the Sculpture Park of the North Carolina Museum of Art. In 2013, they constructed floating classroom for the Durham School District's Urban Farm. In the summer of 2014, they constructed a barn for Benevolence Farm, a rehabilitation initiative for former women prisoners.

Commitment to Holistic, Practical and Liberal Arts-Based Education

Prior to entering the B.Arch degree program, students must have completed the equivalent of our Bachelor of Environmental Design in Architecture degree. Students in this program, and undergraduate programs across the university must complete the General Education Program (GEP). The mission of general education is to provide students the opportunity to experience diverse and integrative disciplinary perspectives. General education enhances students' intellectual engagement in their majors, prepares them for the changing demands of professional careers, equips them for a lifetime of learning, and lays the foundation for involvement in their communities as responsible citizens and leaders.

General Education at NC State provides the opportunity for a broad and informed understanding of the world, offering students the foundation for rich and productive lives. General education is valuable because logical and creative thinking are fundamental to improving the human condition; because a respect for the value of diversity and an understanding of human history and cultures are essential to true citizenship; because the development of global knowledge has become increasingly important in response to international interdependence; because knowledge of science and the ability to apply scientific reasoning provide the basis for an appreciation of the workings of the universe and the richness, variety, and ecological interconnectedness of the world around us; because well-considered moral, philosophical, aesthetic, and intellectual convictions are necessary for contributing to human thought and achievement; because effective communication is central to productive engagement in academic, professional, and civic communities; because an ability to understand and evaluate the interaction among science, technology, and society is important in a world that is changing through technological innovation and scientific discovery; and because the development of attitudes and skills for a healthy life is essential to social, mental, and physical wellbeing.

Students entering the B.Arch. or the M.Arch from other undergraduate programs are expected to have similar academic backgrounds. In many cases we find the M.Arch students have an even greater interdisciplinary background, as several have completed masters degrees in other programs before pursuing architectural studies. In recent years, students have come into our M.Arch Track 3 program with advanced degrees and/or professional experience in journalism, biology, sculpture, urban planning, interior design, filmmaking, and construction.

The doctoral program within our college brings great benefit to our accredited programs. Several PHD students are licensed architects, who participate in the School in a variety of ways, ranging from assistant teaching to adjunct teaching. Often the focus of doctoral studies is design education, and the research is disseminated through lectures and oral defenses of the work. A dissertation presentation in August 2011 was concerned with "Building a Theory of Relationships Among Academic Culture, Professional Identity & the Teaching Environment," seeking to answer the question, "How do graduate design programs express their approach to anticipating, defining and meeting the demands of preparing students for change in professional and social conditions of practice through the design of the teaching environment?"

The interdisciplinary nature of the College of Design also contributes a great deal to the holistic educational environment. The Assistant Dean for Research sponsors a research colloquium, where faculty from each department present their work to the entire college, including students. This event

brings into focus not just the diverse nature of research taking place among faculty and graduate students, but reveals the common threads as well.

Two: Architectural Education and Students

An invaluable asset in this regard is our Dean, Marvin Malecha, who served as President-Elect and President of the AIA in 2008 and 2009, as well as President of the American Collegiate Schools of Architecture. During his tenure as president, Dean Malecha traveled throughout the world meeting with architectural practitioners and educators, and gained a unique perspective on architectural education and the profession, which he has shared with our students and faculty. The primary message was the need to broaden the definition of what architecture is and what architects do.

This consideration was brought into our faculty deliberations as we discussed during 2009-10 ways that we could refine our curricula, both in light of this understanding and in light of anticipated budget cuts. Direct impacts included a decision to widen the range of electives open to students in the B.ARCH and M.ARCH programs, as a means of broadening their skill bases, but also to encourage collaboration with allied professions, and to share teaching resources. A second impact was the initiation of graduate certificates and post professional programs, which are explained further in this document.

In Spring 2010, Dean Malecha formed a Leaders' Council (Supplemental Information IV.7), comprised of internationally recognized alumni from each of the departments in the college, with the primary purpose of bringing them together on a regular basis to discuss future directions for all of the professions taught within the college. In the most recent meetings, it particularly emerged that architectural practitioners need to develop a wider range of skills and marketable services to stay afloat. We are working now to determine the impacts this will have on our curricula.

A major topic of discussion in our faculty meetings is the most effective way to teach current and future students, who clearly learn in different ways. We question if we are teaching too much, particularly in studio, given the additional requirements placed on full-time faculty in a Tier 1 research institution (i.e., producing funding proposals, etc.). The outcome from this was a decision to allow faculty the option to reduce the number of hours they spend teaching and critiquing in the advanced studios (ARC 301, ARC 401, ARC 402, and ARC 503), allowing students more time to advance their work.

We are also exploring more effective ways to teach lecture courses and seminars. Faculty are provided multiple opportunities to attend workshops on digital currency, and to integrate technology into their teaching, including development of distance/face-to-face hybrid courses and coursecontent websites. We are building a catalogue of online course material and course delivery, so that students can access course content, previously delivered through weekly lectures, when they need it via a school of architecture intranet site. The technology faculty (ARC 211, 251, 232, 331, 332, 414, 432) met regularly over the past year to discuss more effective ways to tie their course content to studios, as a means to increase learning. We are seeking better ways to tie material in these courses to real-life design problems, so that students will see how to apply the skills they learn about in lectures.

CHANGE: A result of our seeking better ways to teach the core content is the creation of distancelearning courses in ARC 241 History of Architecture, ARC 331 and 332 Structures 1 & 2, and ARC 211 Natural Systems. Students have access to the lectures and resource materials (readings, videos and linkages of significant online data) 24 hours a day. Class time is devoted to working on team-based problem solving.

One example of how we are implementing this is tight coordination between ARC 211 Natural Systems and ARC 450 Architectural Drawing, and the ARC 201/ARC 403 design studios, which are co-requisites. Now, the assignments and projects in Natural Systems and Drawing are directly related to the projects students are grappling with in studio. For example, rather than assigning a random site to make a site model of, students make the model of their studio site. Another example is assigning Soolyeon Cho, a new faculty member who is a building scientist specializing in energy optimization, to act as a consultant to students in the Comprehensive studio. When we found that our adjunct faculty were struggling to teach studio three days a week given the intense demands of their shrunken offices, it

seemed an ideal opportunity to bring Professor Cho into the studio to discuss energy issues relating directly to students' studio projects (rather than wait till an end of semester review).

Three: Architectural Education and the Regulatory Environment

CHANGE: Professor of Practice Marshall Purnell, FAIA, is the current IDP Coordinator. He has replaced Burak Erdim, who attended the annual IDP workshop and working closely with IDP students in the school. We hosted the AIAS regional forum in spring 2013, and the regional NCARB conference in spring 2014. All licensed faculty members have transferred their licenses to North Carolina.

Members of the North Carolina Board of Architecture sit on our Advisory Board and otherwise maintain a relationship with the school, including hosting studios when they travel to project sites around the state, and funding scholarships through their firms.

IDP is a central element of ARC 561 The Practice of Architecture, which all students in the accredited programs are required to take.

Four: Architectural Education and the Profession

In 2010 we received a grant from NCARB to explore a more effective means of teaching about the practice of architecture. We had multiple concerns that led to the grant application. Firstly we were concerned that the lack of internships meant our students were not spending time inside architecture practices. Secondly, we questioned the efficacy of teaching about professional practice in a lecture setting. Thirdly, we were concerned that our adjunct professional faculty were disengaged from significant research taking place in the school, and felt they should benefit from exposure to research faculty as much as research faculty benefit from working with practitioners.

In 2014, in a graduate architecture studio setting taught by Professor Bizios, students worked inteams in five local practices two afternoons a week for five weeks. Principals in each office contributed to the design process, providing critiques and input on the development of affordable housing prototypes. This studio will be repeated in summer 2015.

ARC 561 Practice of Architecture each semester undertakes detailed case studies of architectural practices around a central theme, i.e., new buildings on the Duke University Campus. This semester-long exercise gives students an opportunity to engage with a firm and become familiar with the design and construction process through detailed recounting of the processes. Students must undertake repeated interviews with the multitude of professionals involved in getting the buildings designed and constructed.

A central theme of ARC 211 Natural Systems is a focus on the ethical responsibility of architects to be stewards of the environment. Over the course of the semester, this significant topic is discussed in a theoretical manner as bioregionalism, in a practical manner through learning concepts tied to Design with Nature, and finally in a reality-based manner through discussions about sustainable community development and infrastructure design. These lessons are reinforced through further coursework as students move through the rest of the technological courses, in particular ARC 414Environmental Systems.

We work hard in the School to maintain a close relationship with local practices, and we are lucky to have practices that are devoted to the school. *CHANGE:* Marshall Purnell, FAIA, serves on the Board of Directors of the Triangle AIA. Several adjunct faculty are active in the Triangle Young Architects Forum and sponsor frequent events in the school, including an active mentoring program; Dean Malecha and Robin Abrams are on the Board of the North Carolina Chapter of the AIA. A "State of the School" report is given at each of the monthly AIA NC Board meetings. We participate actively in all state conferences, and also those of the South Atlantic Region of the AIA, where there is always a showcase of student work from the region's schools.

Our development staff work hard at every state, regional and national meeting to connect with our alumni. We have an alumni reception at each of these events, we maintain a booth in the exhibition hall. In turn,

our alumni support us in many, many ways. First and foremost, they contribute excellent teaching in our design studios and in some cases core courses (e.g. ARC 414 Environmental Systems). Their firms provide the foundation of our scholarship and fellowship funds. They participate in planning workshops and retreats and volunteer for our advisory board. They employ our students as interns, they mentor them, they provide critiques in our reviews, and they give tours of new buildings and construction sites. Simply stated, we would not be what we are without them.

At the same time, we have an obligation to work with our region's practices to keep them current and assist with their continuing education. Our jointly sponsored (NC State/AIA Triangle) lecture series provides multiple opportunities for practitioners to gain continuing education credits. Our faculty travel to practices to make presentations on technical issues, such as digital communication. We participate in the local AIA Theory Forum on a regular basis. We participate on design award juries whenever possible.

Five: Architectural Education and the Public Good

Design in the public interest is a central focus and strength of our school. Each semester, there is at least one ongoing project engaging students in hands-on public work. Two research efforts have lengthy histories of involving students in community work: Professor Bizios's Home Environments Design Initiative, and Professor Barrie's Affordable Housing and Sustainable Communities Outreach. **CHANGE:** Brian Bell, Principal of DesignCorps, teaches an advanced, elective spring studio, entitled Public Interest Design. Students in each of the accredited programs in the school have multiple opportunities to participate in such projects through either studio or seminars, or final projects. The mission of these programs is to provide educational resources for local governments, non-profit organizations and community groups to create innovative solutions to the housing and urban challenges facing North Carolina.

There is a well-documented need to tackle issues of affordable housing and sustainability in North Carolina. The state's population growth has resulted in significant deficits in safe, durable and affordable housing, and prompted unsustainable sprawl. Workforce and migrant worker housing, place-based economic development, and the creation of affordable and sustainable communities, can all be effectively addressed by a land-grant university such as NC State, which has a unique research, service and educational mission. The school's outreach focuses on strategies, models and best practices of affordable housing and the creation of economically, socially, and environmentally sustainable communities. Faculty and students engage in research, community based demonstration and service-learning projects, and provide documentation and outcomes to the public.

The programs work collaboratively with:

- Non-profit housing and community development organizations.
- Municipalities and communities across the state.
- A broad range of academic units in the College of Design and University.
- Funded research and service-learning projects result in tangible results and applicable solutions for our community partners, including:
- Affordable housing models and prototypes.
- Handbooks of design solutions and best practices.
- Community educational symposia, workshops and presentations.

In a seminar setting, a group of College of Design students organized, designed, and built a storage shed for a nonprofit organization that helps people with emergency needs in eastern North Carolina. Sander's Service Center is operated by Lillie Sanders of Magnolia, N.C.. Students designed the master plan for her nonprofit in an affordable housing class taught by Georgia Bizios. Students began fundraising in May, 2010. They designed the shed in June, found donated and recycled materials in July, and built the shed over two weekends in July, 2010. In a studio setting, students met with officials from three communities in Wake County, studied the communities intensively, and then designed multi-family affordable prototypes specifically tailored to those communities. Students gain leadership skills and communication skills through this work, in addition to seeing new ways to apply their skills. Multiple examples of student work in the public interest will be on display in the Visiting Team Exhibition.

Students in the College of Design, largely involving architecture students have established an organization called New Sense Studios. The mission of New Sense Studios is to engage, support and inspire area youth through artistic expression. The program engages students from across the university, but it is led by students from the College of Design and Caldwell Fellows Program. The mission of New Sense Studios is to engage, support and inspire area youth through artistic expression. We believe in art as an outlet for young people to communicate their ideas and passions. They seek to instill a sense of pride and ownership in youth through public display of works in the community. Students from the College work closely with students at Haven House, a resource for troubled youth, leading them through a variety of design challenges. More information on this program can be found here: http://newsensestudios.org/.

A group of architecture students and others from the College of Design were leaders in the establishment of a NC STATE chapter of the US Green Building Council. This is a campus-wideinterdisciplinary interested in environmentally sustainable building. Our students created a wasteawareness project in Spring 2011 promoting more responsible use of studio materials. The intent is to encourage use of collected waste to start a Scrap Exchange for the campus.

A video of this effort can be found here: <u>http://www.youtube.com/watch?v=jSGsUchpUNs</u>.

c. Long Range Planning

Planning Process

The current budgetary climate all public institutions are facing makes it difficult to plan effectively long term. To illustrate this point, *CHANGE:* the 2014-15 budget was determined by the North Carolina state legislature *after the school year had begun*. In this situation, we have found the most effective means of planning is to set objectives and priorities for the on a year-by-year basis. As a foundation to this, the School of Architecture and the College of Design have Compact Plans (*and a new Strategic Plan*) that evolved through lengthyconsensus-based processes with multiple opportunities for participation among administrators, faculty, staff and students. These are explained below under Long Range Planning.

Our current planning process begins with a two-day administrative retreat prior to the start of the semester, run by the Dean of the College of Design and attended by Associate Deans, Assistant Deans, Department Heads and student representatives. This meeting is run by the Dean, and establishes College concerns, priorities and initiatives for the year. It is a democratic, open process with all attendees invited to join the discussion.

This retreat is followed by a one day School of Architecture retreat. This is attended by full-time faculty. Outcomes from the Administrative Retreat are presented to the faculty and discussed. Then priorities are established through discussion that will become the focus of bi-weekly faculty meetings through the semester. Student leaders from AIAS and AGSA attend these meetings during the academic year. The Head of the School meets biweekly with the leadership of AIAS and AGSA to discuss these priorities and seek student input, and also to discuss their particular concerns. A final retreat is held at the end of the fall semester at both the College Administrative Council level and in the School of Architecture to examine progress towards initiatives and reset them for the spring. If possible, an Advisory Board meeting is also held during or at the end of the fall semester to discuss initiatives, directions, and priorities and seek feedback from representatives of the profession. Faculty meetings continue through the spring semester, where there may be need to reset priorities again. There is a final retreat at the end of the academic year to examine progress, discuss remaining issues and begin to set an agenda for the coming year.

We have found this fluid process to be critical to our mission to remain a strong program in the face of budget cuts and lost of all of our staff. We are a small faculty, we have a strong sense of respect for each other, and are usually able to come to decisions quickly and effectively.

As an example, in 2009-2010, a key priority was to reexamine the curricula of all programs to find inefficiencies and other places where cuts could be absorbed without affecting the quality of the classroom experience – a strategic planning initiative under the chancellor's leadership and followed throughout the university. We lost all of our staff in that year as well. **CHANGE:** We now have a full time departmental assistant whom we share with the Department of Landscape Architecture. We set objectives for growing our income to introduce some measure of independence from state funding sources. Multiple initiatives came out of this: 1) to raise our graduate program enrollment in ways that would not overtax studio resources through development of post professional programs and graduate certificates; 2) to double the supplemental tuition; 3) to examine ways faculty could devote more time to seeking funded research; and 4) to maximize use of educational technology (i.e. development of distance learning courses that could create an income stream and liberate faculty time).

Planning Information Resources

Data to inform our planning processes and setting of priorities needs to be current. For the mostpart, it comes from the following sources:

Chronicle of Higher Education ACSA Journal Journal of Architectural Education AIA Architect AIA Newsletters Communications from NCARB, NAAB, and IDP Mainstream media, such as New York Times Education Supplement Attendance at regional and national meetings of ACSA, AIA Constant interface with regional practitioners through local and state AIA meetings Communication with our faculty-of-the-practice (adjuncts) Office of University Planning & Analysis Communication with colleagues at other universities Faculty participation on University and College committees

Long-Range Planning

Existing long-range planning documents serve as mainsails. They set a tone for discussions, they provide a framework for decision-making, but by their very nature they must be flexible and allow for day-to-day operations to respond to the issues of the day. We are finding that the context of decision-making is changing rapidly – so rapidly that it doesn't really make sense at this time to invest in a long-range planning exercise. The academic arena in which we operate requires a more fluid, responsive method for making decisions. Still, the master plans provide some measure of guidance and a reminder of institutional priorities – or what those priorities were three or five years ago.

NC State developed a Compact Plan in July 2010, which was superseded by the University's Strategic Plan in 2011, with the inauguration of the new Chancellor. In Summer 2010, Chancellor Randy Woodson launched a strategic planning initiative to produce a vision and action plan that will guide NC State for the next five to 10 years. Provost Warwick Arden and Chair of the Faculty Margery Overton led the process that began in July, when a steering committee was formed, a planning retreat was held for members of the University Council and nine task forces were established to address key issues. Dean Malecha was a member of the Core Strategic Planning Committee for the University – the only dean on

the committee. During the fall 2010 (September through November), the task forces met with the campus community to prepare their recommendations.

After reviewing reports from the task forces, the strategic planning committee prepared a draft plan for review by the campus community in March 2011. The revised plan was reviewed by the chancellor and then presented to the Board of Trustees for approval at their April 2011 meeting, where it was unanimously endorsed. The NC State Strategic Plan can be found here: http://info.ncsu.edu/strategic-planning/pathway-to-the-future/.

Key initiatives from this plan are:

- To enhance the success of students through educational innovation;
- To enhance the scholarship and research by investing in faculty and infrastructure;
- To enhance interdisciplinary scholarship to address the grand challenges of society;
- To enhance organizational excellence by creating a culture of constant improvement;
- To enhance local and global engagement through focused strategic partnerships.

The College of Design developed a Compact Plan in 2007 as required by the previous Chancellor, which remains the key guide for decision-making. The process for development was organization of task forces, which provided recommendations to the College Administrative Council, who ultimately developed the plan with oversight by Dean Malecha. The College Compact Plan can be found on this webpage: http://design.ncsu.edu/publications. Key initiatives from this plan are:

- Fostering an administrative service culture;
- Embracing inclusion;
- Secure environmental well being;
- Build a community of inquiry.

The School of Architecture followed the college in creating its own Compact Plan through deliberations involving faculty, staff and students. This document will be provided to Visiting Team Members ahead of the visit. Key action items from this plan are:

• *Enhancement of place and operating resources*: to enhance the School of Architecture's ability to address new instructional programs, improved opportunities for faculty development and a growing demand for service to the State of North Carolina;

• *Design for inclusion*: to redefine and expand the role of the School of Architecture in research, extension and engagement programs;

• Design for sustainability: to establish a practicum/research framework specifically rooted in questions about the long-term wise use of ecological, economic and social resources;

• Design for integrated technology/design for humanistic technology: to critically engage and reflect on the multifaceted use of technology throughout the design process, including new media and related technologies as a core area of faculty scholarship;

• *Design for inquiry*: to define areas within the school for shared teaching and course opportunities, and to develop courses for non-majors and programs for K-12 students and teachers.

Additionally, the school aims to share in mandated reductions in budget while preserving accreditation of its professional programs and its leadership role among peer institutions in teaching, scholarship and engagement activities. Initiatives in this regard include:

- Seeking commonalities among course offerings within the College of Design;
- Improvement of deployment of faculty resources;

• Improvement of deployment of staff resources.

CHANGE: The College of Design has a new Strategic Plan. It is included in the shared Google file.

d. Program Self Assessment

In 2003 the School of Architecture adopted an Assessment Plan for engaging in regular selfassessment of undergraduate programs. This was part of a university requirement for continuous assessment including annual reports by the Director to the Provost. Currently, this specific reporting process is no longer required by the Provost.

In recent years, the urgency of evaluating the curriculum in light of budget cuts and turnover of faculty have directed self-assessment, and additional external assessment has been added. We are a small school, and it is quite possible to monitor and discuss what is going on in the courses and seminars. The Head of the School reviews student enrollment every semester, observing how students vote "with their feet", i.e., are they avoiding a particular course or section? The Head reviews each faculty member's student evaluations in each course. She also attempts to walk through every review, particularly at the end of the semester, as do most of the faculty. The faculty participate regularly on design reviews in other sections and studios. All faculty are invited to review M.Arch final projects. This keeps a constant dialogue going keeping us in a state of continuous refinement. While the Five Perspectives are in the forefront of consideration, the questions we ask are:

• Is our teaching keeping ahead of the forefront of best practice, both in terms of the teaching of architecture and in the practice of architecture?

• Are our students graduating with the skills they need to move into practice, now and six years from now when the freshmen will enter practice?

- How is practice changing and how will that affect our teaching?
- Are we making use of the best teaching technology and content delivery available?

Self-Assessment for Studios: Examples of work from every studio is mounted in an exhibition at the end of the fall semester. This exhibit is viewed and discussed by the faculty, by the Board of Directors of Triangle AIA, and by the Advisory Board members, for comment, discussion and criticism.

Self-Assessment for Lecture and Seminar Courses: Since the previous accreditation visit, this has largely focused on coordination of the technology sequence, with a committee comprised of the faculty teaching the courses examining the courses in an attempt to better coordinate course content with each other and with studios.

CHANGE: The university has stepped up its assessment requirements significantly, reflecting a national trend. We now formally submit assessment plans and results to the Office of Educational Assessment for the BEDA, the M.Arch, and the Graduate Certificates. These require a three-year assessment rotation for pre-determined elements of each curriculum, and evidence of student outcomes. At the time of our next team visit, we will be able to share our assessment plans and outcomes. The assessment plans are largely based on the SPC's from NAAB, and assessment takes place primarily at final design reviews, where jurors will be asked to assess student work on the basis of the stated objectives. Additionally, Assistant Professor Sara Queen has just been appointed a fellow to the university's Quality Enhancement Plan committee.

Supplemental Material

The following items are provided in the shared Google file:

- 1 A file entitled "Life Cycle Cost Estimating", that includes the syllabus from ARC 561 Practice of Architecture, showing the lecture addressing Life Cycle Cost Estimating; lecture notes from that session, further references and some examples of spreadsheets used to illustrate life cycle cost estimating from the State of North Carolina Construction Office.
- 2 Transcript Evluation Form
- 3 College of Design 2014 Strategic Plan