2010

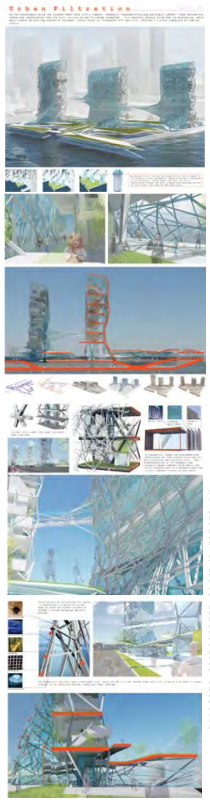
2010_NCARB Prize Design Collaboratory

Thomas Fowler, IV
Kevin Dong
Prof James Doerfler, *California Polytechnic State University, San Luis Obispo*
Mark Cabrinha, *California Polytechnic State University - San Luis Obispo*

Student Project #1 (Selected) — Urban Filtration - Seattle, Washington's Coleman Ferry Dock Housing + Retail

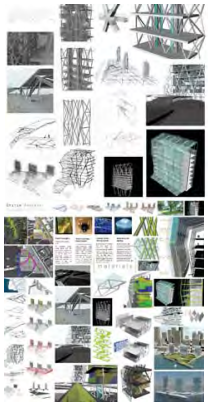
Architecture Concept:

Seattle's weather forecast frequently includes rain, and the Coleman Ferry Dock's location at a low point in the city's topography means the site receives run-off from the entire downtown area and surrounding parts of the city. Waterwalks traces the path of human circulation through the site, from the ferry terminal to the waterfront. Rainwater is channeled through gutters and collection cisterns and filtered through the screens of each residential tower to provide clean water to the residents. The playful articulation of the ground plane provides retail spaces and protected access to the ferry terminals as well as a park-like setting for residents and visitors alike. This multiuse project aims to create a sense of community through a balance of housing, greenery, and retail space while speaking of Seattle's intimate connection between people and water.



Structure/Skin Concept:

As organically inspired three-dimensional steel truss system lifts the ground plane in close to nature a network of retail leading to the three residential towers and ferry terminal. The playful landscape of articulated green roofs serves to provide protection from the rain, light to the lower parking level, and a wonderful park as a new community social space. Using the varying planes of the roof and realistic beam spans, a system of triangulation was developed to determine the truss form. This system appears organic because of the constantly changing variables of span and roof location but is in fact rationally derived. A similar system, though scaled down, is used in the residential screens. The screen structure is designed not only to support the glass and ceramic filtering system, but also some of the lateral forces experienced by the towers. A steel mega structure in a canted diamond pattern spans four floors and establishes points that were used to determine the locations of the residential towers. Rainwater is channeled through gutter based stability and elevators access to the modules. Peeling up and out from the ground is a water filtration screen that cleans storm and stormwater flowing into the site and delivers fresh water to the apartments contained in the residential towers. The runoff is first screened of debris and collected at the base of the tower or where it is stored in large, exposed tanks before being pumped up through the elevator core to the top of the towers. As the dirty water runs through the ceramic panels that are cast to mimic the steel screen structure that supports it, mic roscopic particles are filtered out by the ceramic's pores and by the time the water reaches the first floor of the towers it is clean. Here the water flows through a break in the screen to trickle down as a water wall into a collection area at the base of the residential towers.



Selected Reflective Comments From Architecture and Architectural (Structural) Engineering Interdisciplinary Team:

Collaboration:
I felt that as a team, my group came up with a much richer design, strengthened by the ARCE team's input to create something new and innovative in my school career: a group project that has transformed my own thinking and helped me to continue to develop my design skills and critical thinking. Group interdisciplinary project involvement is a skill that is important to learn for the architecture field while still in school.

Design Process:
The initial design charrette was a huge leap for our team, and the success of the first charrette propelled our team forward into developing sketches of our screen filtration ideas, organic structural system, research in developing a materials system for the screens and the set up of the vertical suburbia. In winter quarter, Rachel and I worked very closely, dividing the work between us, and meeting every few days to update the combined digital file, go over ideas, and updating each other on new design developments.

I worked a lot in my sketchbook drawing ideas for the design, and then on to my colleagues and I had discussed them, we would implement it digitally. Initially we had the work divided up between the towers and the retail; I worked in Rhino drawing up the landscape, parking level, and retail structure (which was extensively revised over time) while my colleagues worked on the structure for the residential towers and the screens. Later on, I also became involved in digitally drawing the screens, creating details, developing the patterns, and applying it to the master model. I also worked extensively on the modular apartments, coming up with floor plans, modelling them in Rhino, and modifying them as necessary. As far as digital modelling, my colleague focused primarily on modifying the mega structure for the towers, placing the completed apartment modules, and modifying the final screens that did have to create a more three dimensional structure.

Learning:
I was interested in this studio particularly because of the interdisciplinary aspect, but also because I had yet to enter a competition and wanted the experience before fifth years since it would enable me to sharpen my presentation skills. 1) I feel I have made huge strides in my communication and presentation skills; 2) I have also reinforced both design theory and developed a sense of structural understanding that is an undeniable benefit to my projects and thus make them stronger; 3) I have learned that miscommunication is possible despite valiant efforts to prevent it.

Lectures / Workshops (Selected)

Student Project # 2 (Selected) — Performance Driven - Phoenix, Arizona's Deck Park High School for the Performing Arts

Architecture Concept:

The site is Deck Park, just north of downtown Phoenix, Arizona and next to the Phoenix Central Library located in the art district of the city. The site is situated above Freeway 10 and can be seen when driving on the freeway. Considering that Phoenix has extreme climatic conditions, it is preferable that the building would be passively cooled and heated to reduce the use of mechanical systems and thus, reduce the impact on the environment. The site is currently not in much use. With the introduction of a High School for the Performing Arts on this site, we will bring a sense of community back to the city. By developing this area that otherwise would be neglected, we can avoid the development of green lands and help preserve the natural environment.

Performance can be a presentation of an artistic work to an audience or the effective sense in which something functions, operates, or behaves. Why can't it be both? This High School for the Performing Arts is not only meant for performances, but also a performance in of itself. The building is meant to house the transition of performing students that attend the school to learn, rehearse, and ultimately perform. This idea became the basis for the programmatic organization of the school. The transition the students go through is a hub because the circulation path on the site that flows from private to public as the students learn, rehearse, and perform for the community.

Structure/Skin Concept:

The primary structure, although at first glance, appears as a chaotic web of steel members, consists of a series of standardized panels of steel tubes. Each panel is made up of a hidden cross member and infill elements that are added for additional support as well as complexity. The structure's redundancy allows the members to be smaller and it helps minimize the need for lateral support. The structural panels inform the skin and the skin's perforations are based on the structural members and the desire for natural sunlight. The skin itself consists of a series of louvers, or fins, that are oriented either vertically or horizontally depending on the solar orientation. The skin is attached to the primary structure through a series of smaller members that are placed across the primary structure. The building's south and north walls tilt down towards the south at 15 degrees in order to prevent direct summer and solstice sunlight from the south and to maximize the amount of indirect north light that comes into the classrooms and lab spaces.

Selected Reflective Comments From Architecture, Architectural (Structural) Engineering and Construction Management Interdisciplinary Team:

The top three things that I learned in this studio experience include working efficiently with a group, the application of structural concepts in the design process, and the benefits of using (advanced digital) technology for the development and presentation of a project. Some of the things that contributed to this learning experience include the involvement of professors, the field trips to the site and related projects and the involvement of professionals in our design process.

By working in this interdisciplinary group I feel that we all greatly learned from each other. We were able to put aside our differences and work together as a team to achieve our project goals. Working with the Architectural Engineers and the Construction Management Student helped us develop our structures and understanding of constructability issues so that we all were content with the project outcomes. I think this experience is unique here at this institution and I feel other majors should also collaborate with different disciplines. This is something that will benefit us in the future when we get into the workforce and have to work with many different fields of study.

Participating Professionals
The participation of the different range of professionals greatly assisted our group to further develop our project. In person reviews with Practitioners were probably the best due to the ease of communication of our concepts and ideas. Through their critiques and suggestions we were able to make changes and take into consideration issues that we would of never have thought of. I feel that the web was beneficial. . .Web Conferencing is a great tool. . .Visiting the actual firm was probably one of the best experiences that I enjoyed about this class.

2010 NCARB Prize Winner:
California Polytechnic State University, San Luis Obispo
College of Architecture and Environmental Design
"Design Collaboratory (DC)"

Jury comments: "Students were provided the opportunity to fully engage in a studio design project that was enhanced by the support and collaboration of leading architect practitioners. Students from all disciplines participated in the building design to learn the fundamental principals of negotiation and building systems integration. Practitioners interacted with students during lectures, design critiques, and technology training. The jury noted that the project recognized that integration of architecture education and practice leads to more informed and better outcomes and showed ways architects lead teams of professionals to common goals."

Introduction

FOUR faculty, THREE iterations, TWO departments, and ONE objective: Design Collaboratory.

To emphasize the quality of the work presented in this collection seems self-evident for two reasons. First, because the work partakes in today's iconography of an architectural production that remains suggestive of urban places –a utopia of superstructures that has become reality in many of our contemporary metropolises. Second, even at a glance the reader will discover projects whose content is about more than rudimentary concepts. The resulting work demands careful consideration to understand what lies beyond and beneath the extraordinary imagery. In the projects there is a comprehensiveness, an exhibition of process, a clarity of intent, and a legitimacy of ideas that is sufficient to convince us that these projects convey something fundamentally different.

The true road map to understanding the projects lies in the students' reflective essays. These essays are a testimony to the rich potential of a collaborative approach to design issues and offer insight into the students' certitudes. They are also a testimony to the experience of collaboration and the hope that this is the beginning of a long journey in which teamwork is the antidote to the solitary artisan. I hope that you will reflect on the works they have presented, for the projects, and the entire experience of the collaborative efforts.

The students and faculty have my sincere gratitude for the richness of the experience they have shared with us. My thanks also go to Kenneth Rodrigues, principal of Kenneth Rodrigues & Partners, Inc, for naming the first interdisciplinary studio at his alma mater. We are indebted to him as he paved the way for sustained collaborative excellence.

Henri T. de Hahn
Department Head, Architecture

Design Collaboratory

Since the 2007/2008 academic year, this interdisciplinary design studio called the Design Collaboratory has been co-taught by four faculty members building upon the successful 46-year multi-disciplinary experience of this academic institution cultivating innovative models of practice through an integrated architecture and architectural engineering design studio. This team of professors, with over 40 years of collective cross disciplinary collaborative experience, and students from Architecture and Architectural Engineering Departments participate in a 20-week design studio.

The Design Collaboratory provides for an intensive two-quarter course sequence designed to familiarize undergraduate students with practiced based knowledge and application for how interdisciplinary teams can work together to design buildings. All discipline students have a seat at the building design table and therefore students learn the fundamental principles for negotiation and building systems integration. Students are provided a unique opportunity, not provided anywhere else in the curriculum, where they are all fully engaged in the studio design project that is enhanced by the support and collaboration with leading practitioners in the field.

This interdisciplinary team approach to building design has all disciplines involved from the inception of the building design project. Innovative uses of steel, integration of structure and design, and energy efficient cladding systems, are emphasized in this comprehensive design studio. The DC's collaborative practitioner partners are internationally recognized architecture and engineering firms, and the educational division of a major software company. Interdisciplinary student teams address complex structural/cladding systems, environmental issues, and use advanced digital technology tools, while simulating innovative collaborative practice strategies based on workflows demonstrated by leading design and engineering firms.

This Collaboratory model expands the role of the practitioner in the academic design studio by having leading firms sponsor workshops, lectures and critiques across the disciplines to reformulate the methodology for integrating a practitioner's workflow strategies into a studio project.

The five major Collaboratory activities are:
1. Practitioner Lectures/Workshops
2. Practitioner Reviews and Discussions in a Selected Practitioner's Office
3. Advanced Technology Training By Software Company and Practitioners
4. Digital and Physical Prototyping of Project Cladding System

Design Collaboratory Project Goals —

- To challenge or transform the preconceptions about the boundaries between academia and practice;
- For firms to strengthen students' preparedness for practice;
- To provide opportunities for practitioners to teach, mentor and recruit;
- For students to learn from and in a practice environment.

Design Collaboratory Learning Objectives —

- That students recognize that innovative structural and cladding systems, environmental issues and building siting and building constructability knowledge is not distinct from design knowledge;
- That students develop a "rules of thumb" working knowledge of core building design topics such as structural and cladding systems design, building siting and constructability, and LEED issues can be synthesized into their design studio project;
- That students learn to conceptualize buildings not as discrete objects that ONLY RELATE to their particular discipline, but rather as an assemblage of systems and elements that are connected to and interact with the larger world;
- That students are able to understand building design from the perspective of other disciplines involved for inFORMing and inspiring the development of building project;
- That students' learn to develop leadership and partnering skills over the course of the studio that will be used as future professionals.

Professor Jim Doerfler, AIA
Associate Professor Kevin Dong, SE, CE
Assistant Professor Mark Cabrinha, PhD, RA
Professor Thomas Fowler IV, AIA, NCARB

Thanks to Ken Rodriguez, of Kenneth Rodrigues & Partners, Inc., for supporting the development of this interdisciplinary design studio publication. The following companies have also supported the Design Collaboratory through involvement in student reviews, providing seminars/workshops (in person and via Webinars) in how they approach design projects in practice along with providing examples of the fi rm's workfl ow strategies for integrating technology into the development of the project. Autodesk has provided training and support for REVIT building information modeling (BIM) and Ecotect environmental analysis software.

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ARUP
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Bruce Danziger, Associate Principle and Aime Nulman, Associate

Thomas Fowler IV, AIA, NCARB
Professor – Architecture

Thomas Fowler, IV received his Masters of Architecture in Theory and Design from Cornell University in 1995 and his Bachelor of Architecture from New York Institute of Technology/ Old Westbury in 1984. Thomas has over 15 years of practice experience working for architectural firms in New York City and Washington DC and over 20 years of teaching experience.

Thomas' teaching responsibilities include third and fourth year design and building technology courses, working with a range of four and fifth year independent study students and directing his award winning digital media facility founded in 1997, called the Collaborative Integrative-Interdisciplinary Digital-Design Studio (CIDS). Over 1,500 students (700 from architecture, plus 800 from other disciplines) have participated in over 80 interdisciplinary projects since the founding of CIDS in 1997. These collaborations have involved over 11 disciplines on campus, and have brought together a range of industry professionals and clients. Thomas has published widely his work with students in the studio. Thomas has also served as paper referee for numerous conferences, journals, and has published a range of papers on his design studio teaching methods and interdisciplinary project activities. He has published an essay on teaching titled, "A Teacher's View", in Becoming an Architect, Lee Waldrep editor, Wiley 2006 (second edition with updated essay released for 2009).

During his career Thomas has received numerous awards in recognition of his teaching, research activities, and his student's design studio work. A selected sampling of these awards includes: ACSA's 2010 Creative Achievement Award, the 2009 American Institute of Architects (AIA) Education Honor Awards for the Integrated Project Studio (IPG) taught in collaboration with full time Lecturer Barry Williams, the 2008 AIA Education Award for CIDS, the College of Architecture and Environmental Design 2007 Wesley Award for Teaching Excellence, Architecture Department's 2005 Faculty Teaching Award, the 1997 Young Faculty Teaching Award from the ACSA/AIAS, and was selected for the 1994 Young Architects Competition, Progressive Architecture.

Kevin Dong, SE, CE
Associate Professor - Architectural Engineer

Kevin Dong has a Masters of Engineering in Civil Engineering, University of California, Berkeley in 1988, a Masters of Science in Civil Engineering, University of California, Berkeley in 1987, and a Bachelor of Science in Architectural Engineering, California Polytechnic State University in 1986. He is licensed as a Civil Engineer and Structural Engineer in the State of California. Prior to beginning his teaching career at Cal Poly, Kevin practiced holistic design with Ove Arup & Partners (ARUP) for 13 years, starting as an Arup Fellow in London and then moving to the San Francisco office. During his tenure with ARUP he worked on numerous projects nationally and internationally that required collaboration and integration of all disciplines from design inception through construction and occupancy.

Kevin's teaching responsibilities range from 2nd year technology classes through graduate structural systems and seismic engineering courses. Additionally, he has been teaching a collaborative design studio for the past five years. In a movement to help non-engineering majors better understand the link between structure, design, and construction; he helped reconfigure the technology sequence for architecture and construction management majors. Kevin is also responsible for integrating Building Information Modeling (BIM) into the architectural engineering core curriculum. His latest curricular achievements include leading the development of a new graduate degree program in Architectural Engineering, re-instituting the departmental advisory council, and establishing internships for continuing graduate students. He is currently the department assistant head and graduate program coordinator/director.

During his tenure at Cal Poly he has received teaching awards and grants for his collaborative work with Cal Poly and Iowa State University faculty. The list of honors include the 2009 College of Architecture and Environmental Design Wesley Award for Teaching Excellence, 2008 ASEE Best Presentation Award for "Connecting Architecture and Structures", ARUP Foundation Grant for the "Collaborative Design Studio" with Professors Cabrinha, Doerfler, and Fowler, the BIM Experience Award from Autodesk, in collaboration with James Doerfler, for work in creating interdisciplinary classes, and Instructionally Related Activity funding for the Collaborative Design Studio: ACSA/AISC Steel Competition

James Doerfler, AIA
Professor – Architecture

James Doerfler received a bachelor of the arts degree in art history from the University of Hartford and a master of architecture degree from Syracuse University. Prior to joining the faculty at Cal Poly James taught at the University of Technology, Sydney from 1998 to 2005. While at UTS, James was course director of the bachelor of the arts in architecture degree.

James' teaching responsibilities include third and fourth year design and building technology courses, as well as a number of electives exploring issues of prefabrication and digital production. At both Cal Poly and UTS, James revised the building technology core classes to reflect current international practice. He is currently developing interdisciplinary classes and studios for architecture, architectural engineering and construction management students. His work and research focuses on connecting conceptual design to digital fabrication methods using digital tools to supplement the design process. James has lectured in the United States and Australia on the topics of museums, prefabrication, digital culture and media, and sustainability.
James has had over twenty years of international practice experience. He has worked with Raphael Vinoly, Richard Gluckman and Fox & Fowle in New York City and PTW in Sydney, and his own practice in New York and Sydney. His projects have included work in the United States, China, Spain, Switzerland and Australia. James is a registered architect in New York and New South Wales, Australia. He has participated in a number of interdisciplinary and artist collaborations with diverse projects including the design of the Perth City Foreshore with artist Dennis Ashbaugh and "Agrippa: Book of the Dead" with author William Gibson and Dennis Ashbaugh.

Mark Cabrinha, PhD, RA
Assistant Professor - Architecture

Mark Cabrinha received his PhD in Architecture and Informatics from Rensselaer Polytechnic Institute in 2010, his Master's of Architecture from the University of Illinois at Chicago in 2001, and his Bachelor of Architecture from California Polytechnic State University, San Luis Obispo in 1995 with a minor in philosophy. He is a registered architect in the state of Illinois practicing in Chicago for over seven years as a project designer and project architect for OWP/P Architects. His professional experience focused on educational environments such as the award winning A.E. Stevenson High School in which he was project architect. He began teaching full-time at Cal Poly, SLO in 2002 teaching across all year levels with focus on design, practice, and digital media and fabrication. Over the last six years, Mark's research has focused on the impact of technology on design culture through the lens of digital fabrication through his teaching at Cal Poly, RPI, the University of Oregon, and at Ball State through the Institute for Digital Fabrication. His dissertation, (In)Forming: the affordances of digital fabrication in architectural education, focuses on the image of practice projected from within design education through a disciplinary cultural shift in the form of architectural practice afforded through digital fabrication. For this dissertation he was awarded the Architectural Research Centers Consortium (ARCC) King Medal for Excellence in Architectural and Environmental Design Research.

"This experience gave me the opportunity to explore fields and programs that I would not normally be exposed to. Through interactions with architects and engineers, I had a glimpse of issues and solutions that a real consultant (and contractor) would face." *-Construction Management Student*

"Working with architects forced me out of my comfort zone. They pushed me into the realm of a nontraditional structural steel design and the project only benefited. This collaborative class is one of the best educational experiences I have had while in school." *- Engineering Student*

"Working with multiple disciplines for this design project was a great experience. It allowed multiple perspectives in the design as well as some compromises that had to be made as a group. It was a great team environment that gave us a realistic approach to a steel design project. Having to do the presentation at a firm with different professionals makes you realize the importance of the project." *-Architecture Student*