Romberg Tiburon Center (RTC) Water Tank Alteration Proposals 2017

Thomas Fowler, IV
Thomas Fowler
Kevin Dong

2016 – 2017 Design Collaboratory
College of Architecture and Environmental Design
Cal Poly, San Luis Obispo, CA
The team that worked on San Francisco State University's Romberg Tiburon Center (RTC) for Environmental Studies was composed of a talented group of undergraduate, graduate and visiting international students. We thank the RTC and John Kern for providing the opportunity to research and design this re purposed steel water tank. This project is repurposed as a conference center with cafe, caretaker space, observation deck and small exhibition area.

The Design Collaboratory is an award winning (NCARB Prize, Auto Desk Grant and national student design competition recognition), multi-disciplinary group of undergraduate and graduate students, and faculty (from architecture and architectural engineering, joined occasionally by planning, construction management and civil engineering), that work directly with industry partners in developing building design projects. Professors Dong and Fowler have collaborated on these types of projects, which use interdisciplinary student groups, for more than 10 years. They bring more than 30 years of professional experience which provides avenues for insightful research and innovative design proposals, and leverage approximately 40 years of teaching experience to mentor and enable students to create holistic design solutions.

We have enjoyed seeing how much students learn in their interactions with one another, with the RTC, and with us. They have grown as designers, problem solvers, and innovators by solving “real world” building design challenges since they worked directly with the building users, John Kern and Kathy Boyer.

Sincerely,

Professor Kevin Dong
Professor Thomas Fowler
Professor Thomas Fowler, DPACSA, NCARB, AIA

The Director of the Graduate Program of Architecture and a Professor of Architecture. 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 has been co-teaching as part of the Collaboratory Building Design Studio since 2007.

Prior to beginning his teaching career at Cal Poly, Thomas worked with a range of architecture firms in New York City and Washington, DC for over a 13 year period. His work was highly collaborative with a range of disciplines on small to large scaled building types.

Professor Kevin Dong, PhD, SE

The Associate Dean of Administration of the College of Architecture and Environmental Design and Professor of Architectural Engineering.

Kevin’s teaching responsibilities range from 2nd year technology classes through graduate structural systems and seismic engineering courses, and has been co-teaching the Collaboratory Building Design Studio since 2007.

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.
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project research | site analysis

Sliced

Pierced by the Sun

Tank In-Tension
The teams visited the site at Tiburon in order to explore the context of the existing water tank.

Attractive views over the bay (left, bottom) were found to be a significant feature of the elevated site.

The materiality of the tank (right) was thoroughly documented, to inform the technical aspect of the rehabilitation.

The surroundings (below) were measured in order to provide accurate spatial context, considering the tank’s proximity to existing buildings.
The Romberg Tiburon Center is located in the South-eastern region of Marin County on the Tiburon peninsula. This sunny and quaint area of town is accessible by one road past the San Francisco Bay bridge, about 20 minutes drive from San Francisco State University. The site is located next to an east facing slope, adjacent to the wharf that was used during World War II and connects to San Francisco.

The unique aspects of this site include the water depth in the bay and connection to the Sacramento River. The RTC is located at the deepest part of the bay along the peninsula. This was an advantage when the site was used as a boating dock for the Navy in the early 1900’s. The Sacramento River flows from the north end of the site, through the site, then into the San Francisco Bay. The fresh water flow allows the RTC to have a constant salt water source for marine research.
FORM FINDING

Precedent Studies

PROPOSED MATERIALS
While this project is unique in many ways, one of the most obvious is its original cylindrical shape. While all of us are extremely comfortable with rectilinear forms, the RTC water tank reuse project proved to push the boundaries of our ability to literally “think outside the box”. It was clear from the start that we would need some inspiration.

In order to develop and progress with our designs, a solid concept was required. This is where the idea of form finding takes root. While form finding can be defined in a number of ways, there were five primary paths each team had the opportunity to take: tension (inversion), weaving & layering, compression, topology of modules and packing & tiling.

With the RTC being next to the San Francisco Bay, the selected materials can withstand salt water exposure. Proposed materials include primarily steel, glass, and minimal concrete.
## Client Requirements

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<th>Program</th>
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<td>Atrium</td>
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<td>Multi-Purpose</td>
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<td>Observation</td>
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<td>Exhibition</td>
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<td>Micro-Living Unit</td>
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<td>Snack &amp; Dining</td>
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<td>Micro Food Prep</td>
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<td>Utility Closet</td>
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<td><strong>Total SF:</strong></td>
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The RTC has been around since the late 1800’s and it was originally used as a cod fish facility, where fish were dried and sold at the local markets.

Coal was used as fuel in the early 1900’s, and the site was used as a feuling station for the navy ships.

During WWII, The navy continued to use the area as a coaling station and for manufacturing large metal torpedo nets that were used under the Golden Gate Bridge.

The site was sold to SFSU for $1.00 and it is now being used for biology and marine research.
Key Concepts

Efficient & Flexible Integration of Programs
- Multi-Story Mixed Purpose Spaces
- Full Height Atrium Space
- Private Micro-living quarters for Caretaker
- Public Spaces for Exhibitions and Gathering
- Student Spaces for Eating & Gathering

Reuse & Rehabilitation of Historic Structure
- Reuse of Existing Tank Material
- Integration with Site Circulation
- Clearly Expressed Structural Rehabilitation

Sliced

Jon McCall
Isaac Cameron
Jennifer Briggs
Sridhevi Vaidyanathan
Fabio Rainold
As an architecture graduate student at Cal Poly, it has been a wonderful experience working in a collaborative design studio. This whole design process gave us opportunities to explore, analyze, understand and resolve the various design challenges associated with interdisciplinary work.

Sridhevi Vaidyanathan
Bangalore, India

As a graduate student you often fall into the trap of thinking you know more than you do. This project, the collaboration and the people have helped to remind me that there is a lot to learn. In this process, I have gained valuable knowledge about designing that I can apply to many other facets of life.

Jennifer Briggs
Placentia, CA

I was happy to get the chance to immerse myself in a collaborative culture like this studio. This project has opened my eyes to the possibilities in the existing structures around me.

Jon McCall
Modesto, CA

I am very happy that as a graduate student in Architecture from Switzerland I had the opportunity to study for one quarter at Cal Poly. It was a nice experience to work on this unique project in a collaborative setting. It gave me a chance to improve my own skills and bring the project to another level.

Fabio Rainoldi
Switzerland

As an Architectural Engineering student, this studio was a valuable experience in working with a truly integrated interdisciplinary team.

Working with international architecture students provided valuable insight into how other countries and cultures approach design.

Isaac Cameron
Loleta, CA
Precedents

Brasschaat Water Tower
Jaegersborg Water Tower
12 East Street
Initial Sketches
Form Finding
Structural Analysis

Structural Framing lay out

Analysis model (taken from RISA 3D)

Axial forces due to lateral loading

Deflection due to lateral load
View toward the bay
Pierced by the Sun
I am an ARCE grad student in my fifth year at Cal Poly. I am interested in collaborative design as an opportunity to explore structural expression in architecture, and to gain some experience with an integrated design studio process. This studio has been an excellent setting for developing and practicing these skills.

Patrick Brutzman
Monterey, CA

I am a graduate student from Cal Poly, San Luis Obispo. Working in a collaborative group of ARCH and ARCE students has been a great blend of creativity and practicality. It has been great being in a studio class again and being able to work to bring our knowledge of structures and architectural design together.

Karen Freda
Morgan Hill, CA

I am an ARCE graduate student from Cal Poly, Lucerne, Switzerland. My exchange term here at Cal Poly was an amazing experience for me. To do a project like this in a collaboration with ARCE students was interesting and instructional. Working in a team is the most important thing in our field of work. It is sometimes stressful, but the results show that this collaboration is a useful or even a necessary thing.

Nick Gasparini
Redwood City, CA

I am a graduate student in Architecture from Lucerne, Switzerland. My exchange term here at Cal Poly was an amazing experience for me. To do a project like this in a collaboration with ARCE students was interesting and instructional. Working in a team is the most important thing in our field of work. It is sometimes stressful, but the results show that this collaboration is a useful or even a necessary thing.

Sonja Senn
Lucerne, Switzerland

I'm a Graduate Student of architecture from Germany. As an International Student I really enjoyed this interdisciplinary project. It was a great experience to work together with students from different fields, because this gave me the opportunity to gain a lot of knowledge about structural design.

Daniela Wagner
Nuremburg, Germany
Pierced by the Sun
Concept - Weaving & Layering
Sun Considerations

10 AM
22° ESE
40° SE
60° SSE

12 PM
28° S
53° S
70° S

5 PM
0° SW
15° W
37° WSW
Lighting Study
As a graduate student in Architectural Engineering at Cal Poly, we are fortunate to have these types of experiences with other disciplines. I truly believe that these types of collaborative environments are what set us apart from other universities. It has been beneficial in a number of ways to coordinate with the Architecture students from the beginning of the project. It was refreshing to get an input during the design phase.

Mika Marsh
San Diego, CA

As a graduate student in Architecture from Switzerland, it was an interesting experience coming to Cal Poly and working with students from other countries with different backgrounds. While collaborating with engineers was challenging at times, working in a group can take a design project further in its development. Furthermore, we can learn from each other in many different ways.

Nadine Bussinger
Nüttigen, Switzerland

As a graduate student in Architecture at Cal Poly, San Luis Obispo, I have my bachelors in art from University of California, Santa Cruz. I have a passion for where art and architecture meet, with form, function and meaning. This collaborative studio has been interesting and dynamic learning experience I will continue to carry with me in my professional career.

Justine Neves
Santa Cruz, CA

As an Architectural Engineering graduate student, I am passionate about all things structure and architecture.

With this experience, I look forward to continuously working in a collaborative environment among design professionals.

Elvis Hernandez
Guatemala
Tank In-Tension
Precedent Studies
From early explorations of form finding, we knew that if we were to use a building skin as the primary expression of tension, we needed to have a dynamic floor system to define the form. Understanding that the shape of each floor was directly related to the building form, we tried many iterations throughout the design process. These iterations looked at the number of protrusions or points on each floor plate as well as their relative orientations and elevations. We quickly realized that with limited available space surrounding the existing water tank, we would not be able to significantly extend beyond the tank walls.

Another challenging aspect of this project was determining what material the building skin is actually made of. Fabric? Tension Cables? What were its density characteristics? Enclosed? Open? There were so many factors to consider for one piece of the overall project. Initially, we had started experimenting with different types of fabrics; however, we realized that by wrapping the tank entirely in fabric, any historical recognition became lost and the project suddenly became visually massive within the site. This was when we ultimately decided to create a “netting” of our own using tension cables in order to control density and configuration.
Through experimentation with the opening in the tank, we moved from a conservative triangular shape to a full-height angled opening. These evolved openings are oriented primarily South for maximum natural light, yet our balconies extend out to allow shading in the summer months.
Pipe Connection

Tension Cables

Diagrid to Floor


