

# Ball State University: Committed to Masonry Design Education and R & D That is Informed by Socially Responsible Goals

Tony Costello, FAIA / Irving Distinguished Professor Emeritus of Architecture  
Department of Architecture / College of Architecture & Planning / Ball State University  
Principal, C+ A Costello + Associates, Muncie, Indiana

**INTRODUCTION:** I am honored to write this article in response to the invitation from Clare Ramminger, Director of Programs and Member Services, National Concrete Masonry Association. She requested that I share both the process and product of the elective course I taught at Ball State University during the spring 2018 semester. The course was funded by a grant from the National Concrete Masonry Association (NCMA) through its foundation along with a smaller grant from the Midwest Masonry Council.



**NCMA STUDENT DESIGN COMPETITION GRANT REQUIREMENTS:** Her request came after she read the *Final Report* that I submitted which is a requirement of the NCMA foundation grant that funds their STUDENT DESIGN COMPETITION PROGRAM for architecture students. The process begins with the faculty member submitting a *Course Proposal* that must provide the specifics of the course according to the *Submission Guidelines*. The school's prior involvements with student competitions, the instructor's credentials and the specifics of the design project the students will undertake are included and evaluated for funding.

**NCMA FINANCIAL SUPPORT:** The *Course Proposal* also must include a *Budget* that provides funds for: instructor's salary (\$3,000; student award prize money (\$2,750); course advertisement (I need to recruit a minimum of 12 students is meet the *Guidelines'* requirements) and other institutional overhead costs (computer time / graphic production) incurred. [See page 4 / Lower right for advertisement placed throughout college].

**NCMA UNIT DESIGN COMPETITION:** An additional \$500 was available to me for the course for the second student design competition sponsored by the NCMA, that of the UNIT DESIGN COMPETITION. However, the faculty member must find a local masonry association to provide the funds which provide \$500 in student award money. I am very fortunate to have the full support of the Midwest Masonry Council and its Executive Director Terri Truitt. The total budget for my course was \$ 6,700.00. A final accounting must be provided as part of the *Final Report* to the NCMA by the faculty member at the conclusion of the course.

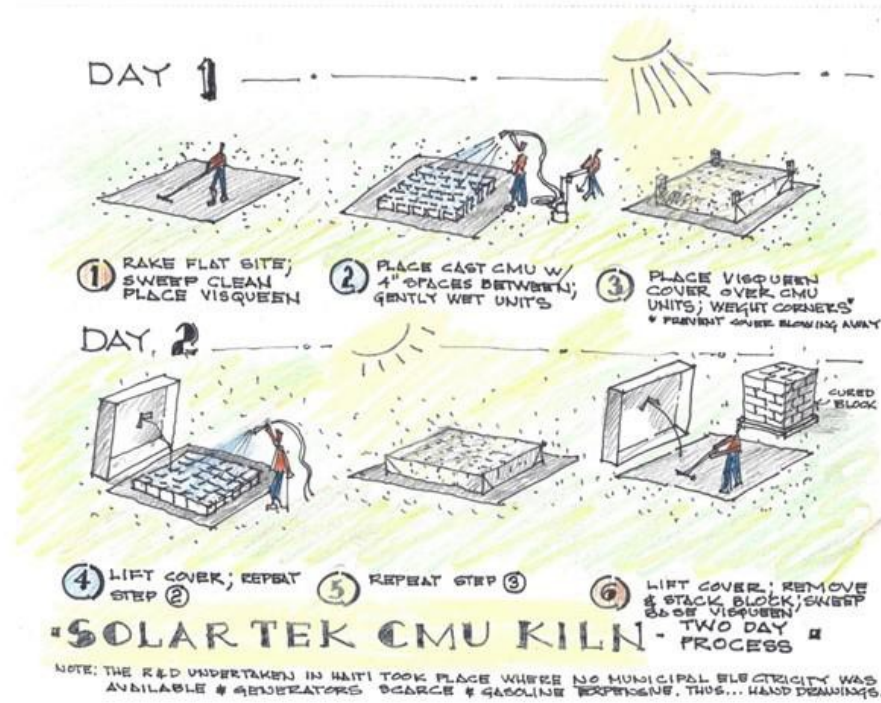
**MY UNIQUE SITUATION:** In my case ... that of being an adjunct faculty member since 2005 when I retired from full-time teaching after 38 years on the faculty of Ball State's Department of Architecture ... this course would not be offered to our student if it wasn't for the grant support of the NCMA and its foundation as I promised I would not teach part time after retiring if I did not make my own salary. Thus, I am very thankful for this program and only hope I have contributed to the education of my students (below), the NCMA and its foundation and the Midwest Masonry Council as much as I receive from continuing to teach in "semi-retirement."



**STUDENTS SHARE IN FIRM'S AWARD-WINNING R & D Work IN CMU CONSTRUCTION IN HAITI:** Teaching this course has greatly informs my desire to continue to practice as an architect through my limited-practice firm, **C+A** Costello + Associates, founded in 1976. Since 2010, the year of the disastrous 7.2 earthquake that struck Port-au-Prince, Haiti, my practice has focused on providing pro-bono services to the Our Lady of Perpetual Help Orphanage Complex, located in Plaine de Nord, Haiti. To date, one building on the campus is totally completed and used, two have completed the first phase of construction and are in use, and two are in construction. Two additional buildings are in the design phase. All use a reinforce concrete frame with CMU infill, the latter manufactured to be much stronger through the use of the SOL Tek kiln to cure them.

I am very proud that the combined work of my students in past NCMA Foundation-funded classes (formally recognized as “Associates”) have won an *Honorable Mention Award* in the prestigious 2017 ARCHITECT Magazine R & D Awards Program and *Honor Award* in the 2016 AIAIN Design Awards Program for Strengthening Concrete Masonry Construction in Haiti [Below] as well as an *Honor Award* and *Citation Award* for the SOL Tek Kiln in the 2017 AIA Indiana and AIA Indianapolis Design Award Program, respectively.

## R & D in Improving the Strength of Concrete Masonry Construction in Haiti & Other Developing Countries



**Inter[BLOCK] Design Goals**

- 1 **Ease and Simplicity of Assembly**  
Ability to be used with or without Mortar
- 2 **Integration and Stability of Blocks**  
Ability of CMU blocks to be stacked with interlocking parts to provide structural support in horizontal and vertical directions
- 3 **Efficiency of Manufacturing**  
Economic efficiency of modified process allows for blocks to be manufactured from a time which reduces waste
- 4 **Multiplicity of Orientations and Fittings**  
Each face has interlocking parts which allows for versatility in layout and multiple connecting faces
- 5 **Performance of Aesthetic Qualities**  
Multiple faces create rhythm in the elevation of the design

**Inter[BLOCK]**



**Inter[BLOCK]**, a highly structural masonry block that uses both horizontal and vertical reinforcing components, is an incredibly useful building material that can be successfully used in applications with or without the use of mortar to keep the blocks together.

With the ability to be manufactured with minimal waste while incorporating interlocking components, this block is an economically efficient alternative to the traditional CMU block. With the ease and versatility of this thoroughly thought out design, this concrete masonry unit has the ability to change the way architecture is thought about in hurricane impacted areas.

A masonry block that can be used either dry stack or with wet mortar is truly revolutionary. The concept of this design was based on the functionality and constructability of this block specifically being used in third world countries such as Haiti. For use in third world countries, this design could improve safety from natural disasters and improve the quality and aesthetics of construction.

Billions of people are affected by natural disasters each year with millions of those people living in third world areas where damage to buildings could be prevented with the use of correct structural materials. Haiti, for instance is a country that does not properly use mortar.

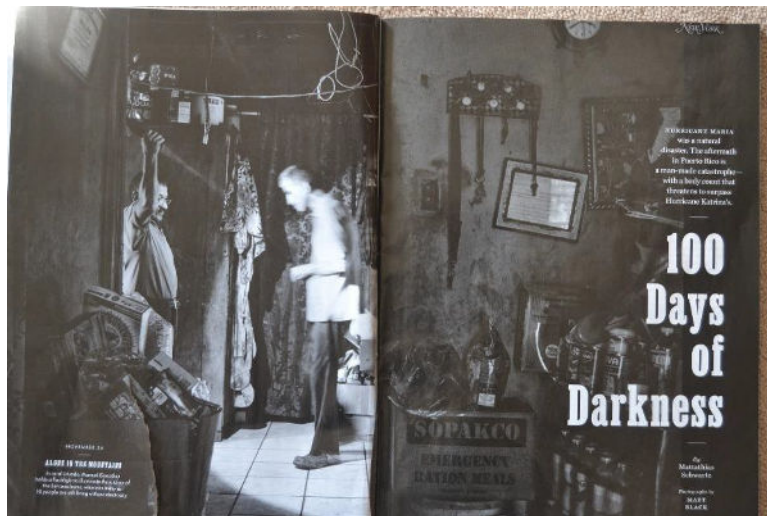
In many applications, mortar is slapped on top of the block instead of between the blocks, creating a gateway for a crumbled wall during a hurricane. The interlocking parts of this block allow for stability of the application even when mortar is not correctly applied.



**PRIOR SUCCESS WITH THE UNIT DESIGN COMPETITION:** In addition, to these awards, student teams from Ball State have been selected as one of three (3) “finalists” in the national judging of the UNIT DESIGN COMPETITION. The 2016 and 2017 teams were awarded **SECOND PRIZE** and the team from the spring 2018 class won **THIRD PRIZE** after the team presented their project at the 2018 NCMA Mid-Year Meeting in Chicago on 01 August.

**SPECIFICS OF THE COURSE:** At Ball State, this course is a three (3) credit, elective course traditionally open to architecture and landscape architecture students. With the Department of Construction Management moving to our College of Architecture & Planning in 2017, I hope to get permission from the NCMA to have them sign up for the course as both competitions can gain from their involvement. It meets one evening / 16-week semester for 3 hours and uses a four (4) student team format.

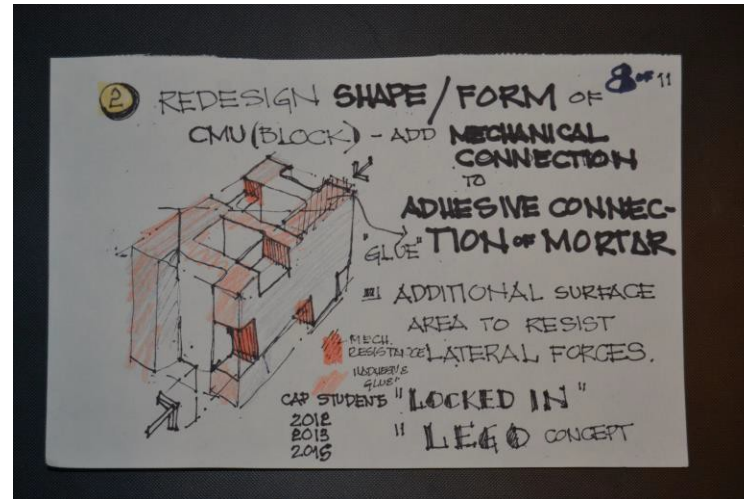
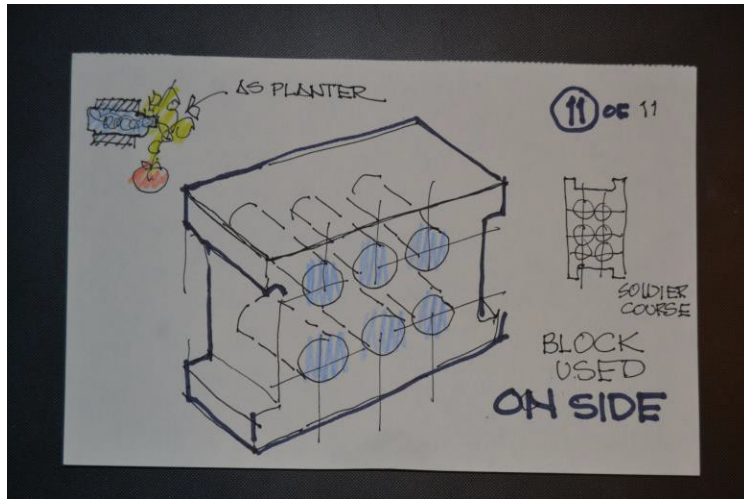
This year’s course differed from prior courses in that both projects were unique. The project for the STUDENT DESIGN COMPETITION was a project for Puerto Rico instead of Haiti. Entitled, *A Prototype Medical Clinic for Rural Puerto Employing the “Clinic in a Can” System to Also Serve as a Pre & Post Disaster Assistance Center*, it was chosen by me in the wake of the (continuing to this day!) impact on all human services on the island, especially in the rural areas. [Below / left].



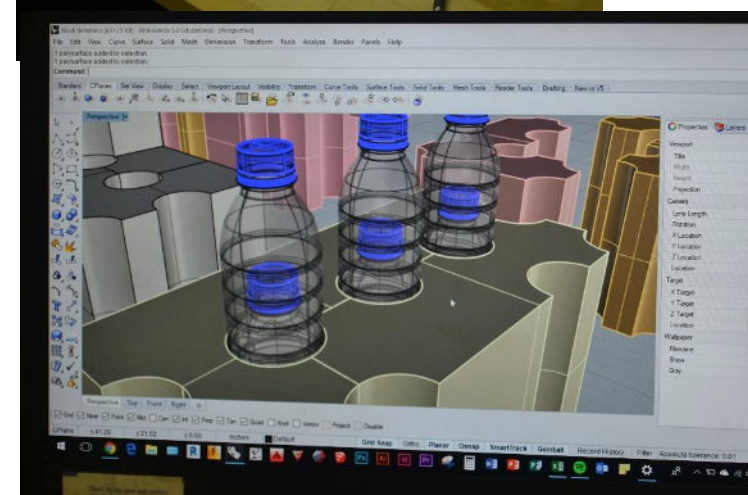
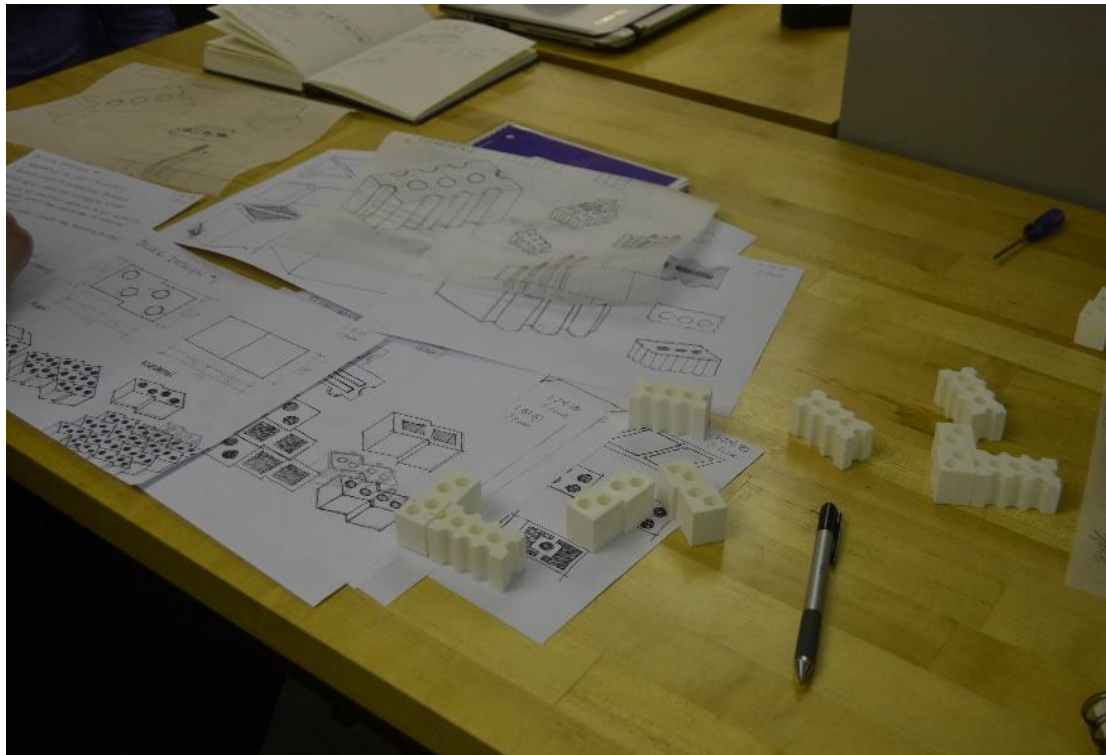
**COURSE TITLE:** Socially-responsible Planning and Design in the Developing World  
**SPECIFIC TITLE THIS OFFERING:** ASSISTING PUERTO RICAN RECOVERY: Design of a Prototype Medical Clinic Using the “Clinic in a Can” Prefabricated System  
**OPEN TO STUDENTS IN:** Architecture; Landscape Architecture; Nursing; and Const. Manag'mt  
**CRN NUMBERS:** ARCH 498.7 undergrads CRN# 35571  
 ARCH 598.7 graduates CRN# 35574  
**CREDITS:** Three (3) undergraduate or graduate  
**MEETS:** One night per week (Wednesday) / 6:30 – 9:10pm for first five weeks; subsequent weeks, team meets with Costello by appointment, although Wednesday night is preferred.  
**LOCATION:** AB 310 and/or students’ design studio  
**FUNDING:** The is course financially underwritten by the National Concrete Masonry Association Foundation and Midwest Masonry Council  
**FORMAT:** Three-person, interdisciplinary design teams will undertake both the 2018 NCMA Foundation Student Design Competition and Unit Design Competition.  
**TOTAL PRIZE MONEY:** \$ 3,250 of which ALL students will receive some prize money in both.  
**COURSE DESCRIPTION:** This design competition-formatted course will challenge interdisciplinary student teams in two competitions. 1. *A Prototype Medical Clinic for Puerto Rico & the U.S. Virgin Islands using Clinic in a Can / Midmark Industries technology (www.clinicinacan.org/our-story)* a world-leader in pre-fabricated, containerized medical unit systems. 2. Continuation of research and development (R & D) of new concrete block units specific to improving CMU construction in the Third World with emphasis on integrating the use of recycled, plastic water bottles.  
**INSTRUCTOR:** Tony Costello, FAIA. Irving Distinguished Professor Emeritus of Architecture & Principal, Costello + Associates. Has made 25 trips to Haiti as a practitioner / educator since 2001 and is the architect for five projects located there. His national award-winning teaching and practice focus almost exclusively on *pro bono* projects in Haiti since 2010. The focus of this course was changed recently due to the devastation brought to the entire island occupied by Puerto Rico. He has also traveled extensively to other Caribbean Island and these combined experiences will be applied to teaching this course. [costello44@sbcglobal.net](mailto:costello44@sbcglobal.net)

The project for the UNIT DESIGN COMPETITION included the challenge to incorporate disposed, plastic water bottles in their design as a component of sustainable design, an emphasis placed in all architecture courses at Ball State. These bottles are ubiquitous in Haiti and also in all post, natural disaster situations ... domestic and Third World ... in which the provision of potable water becomes a prime concern.

Tony supplied the images [Below / left & center] to his students as well as providing bottles brought back from his last trip to Haiti [Below / right] in introducing this unique aspect of the UNIT DESIGN COMPETITION.



**THE PROCESS OF DESIGN INVESTIGATION AND RESEARCH & DEVELOPMENT:** As the instructor of this course, the most exciting part for me is to see the student teams engaged simultaneously in both the planning and design investigations of the medical clinic and the research and development required to come up with the final design for the CMU that incorporates disposed water bottles as an integral component of design based on recycling and sustainable practices. Below are some images of preliminary 2D and 3D design investigations [ Team B / Left and Team A / right, top & bottom].



**The project for the UNIT DESIGN COMPETITION included the challenge to incorporate disposed, plastic water bottles in their design as a component of sustainable design, an emphasis placed in all architecture courses at Ball State.**

**Each phase of the course is structured to allow students to undertake both projects simultaneously. It included: developing a knowledge base aided by: presentations by visiting medical facilities architects Don Able, AIA, and Gary Vance, FAIA FACHA [Below / left]; a presentation by Lee Ann Mengelt, Director of Disaster Response for NE Indiana Red Cross (Below/center); and, a tour of the L. Thorn CMU plant, Shelbyville, IN, by Dave Wheeler [Below / right] to programming: conceptual design investigations reviewed weekly w/ the instructor: design development reviewed weekly w/ the instructor; and the production and presentation of their final graphic boards and models for presentation to the external jury. Don, Gary and Dave all served on the external jury [See page].**



## THE STUDENT TEAMS:

The students self-selected their teammates to establish their “STUDIO TEAM” that would: take advantage of the strengths (management / conceptual design / design detailing / production of computer-graphics) of each student. Tony also required they establish their own schedule.

**“Working in a team for the semester was great because each person was able to bring their personal skillset and ideas to the table. This helped us to create a very comprehensive design solution that I don’t think we would have been able to do as successfully individually.”** *Chase Woosley, Member of Team A*



### TEAM A:

Anna Goodman UG AR Nick Hennessey UG AR  
Jordan Jones UG AR Chase Woosley UG AR



### TEAM B:

Brian Bracht GR AR Jen Pease GR AR  
Stephanie Vance UG



### TEAM C:

Victoria Bell UG AR Ashley Caceres UG AR  
Jessica Franke UG AR Sabrina Streicher UG NU

KEY: UG Undergraduate / GS Graduate student / AR Architecture / NU Nursing



**THE JURY:** The instructor is responsible for assembling a jury that is comprised of representatives from the various sectors of the masonry industry as well as the design professions. Page 8 contains photos of the three teams presenting their clinic projects, the STUDENT DESIGN COMPETITION PROJECT, to the jury. The UNIT DESIGN PROJECT was juried without being presented in order to replicate the national jury process.



**Anthony J. "Tony" Costello, FAIA**

Irving Distinguished Professor Emeritus of Architecture, Ball State University and

Principal **C+A** COSTELLO + ASSOCIATES / Architects & Urban Designers

2701 W. Petty Road, Muncie, IN 47304

T. (765) 289-5971 / Cell. 215-4880 / F. 285-1765 E-Mail: [costelloaj44@sbcglobal.net](mailto:costelloaj44@sbcglobal.net)

The members of the external jury for my current, spring semester elective class that is doing both the 2018 NCMA Foundation Student Design Competition and 2018 Unit Design Competition, funded by the Midwest Masonry Council, is confirmed as follows:

**Don Able, AIA ACHA, LEED BD+C**, Architect and project manager w/ archDESIGN, Indianapolis, IN. Multiple decades of planning, design and project management in medical facilities. Spoke to class on February 21<sup>st</sup>. Ball State alumnus.

**Malcolm Cairns, FASLA**. Professor of Landscape Architecture at Ball State. Has served on several past NCMAF juries at Ball State and his design studio in the fall 2017 semester undertook a housing project for Puerto Rico.

**Eston Hathaway**, President, Indianapolis Mason Contractors Association. Multiple decades of experience in the masonry industry. Eston has also served on a number of previous juries. Serves on the Advisory Board for the CAP/ Construction Management Program.

**Terri Truitt**, Executive Director of the Midwest Masonry Council (MMC), Indianapolis, IN. Vast experience in the masonry industry and its educational program. She coordinates the MMC sponsorship of the Unit Design Competition with Tony and is the primary person to coordinate/manage the annual masonry program w/ CAP on the Ball State campus for ARCH, LA and CM students. Lastly, serves on the Advisory Board for the CAP/ Construction Management Program.

**Dave Wheeler**. Thirty plus years of managing CMU production at Wheeler Block (now L. Thorn Company) Shelbyville, IN. Toured this year's class on a tour of his plan in March.

**Gary Vance**, FAIA, FACHA, LEED AP, President of Vance Consulting, LLC. Nationally recognized architect in medical and health care facilities. Spoke to class on February 21<sup>st</sup>. Ball State alumnus.

cc: Jason Thompson, NCMA

# THE CO-FIRST PRIZE ARCHITECTURE & LANDSCAPE ARCHITECTURE PROJECTS / STUDENT DESIGN COMPETITION [Team A , Left / Team C, Right]

## Prototype Medical Care Clinic

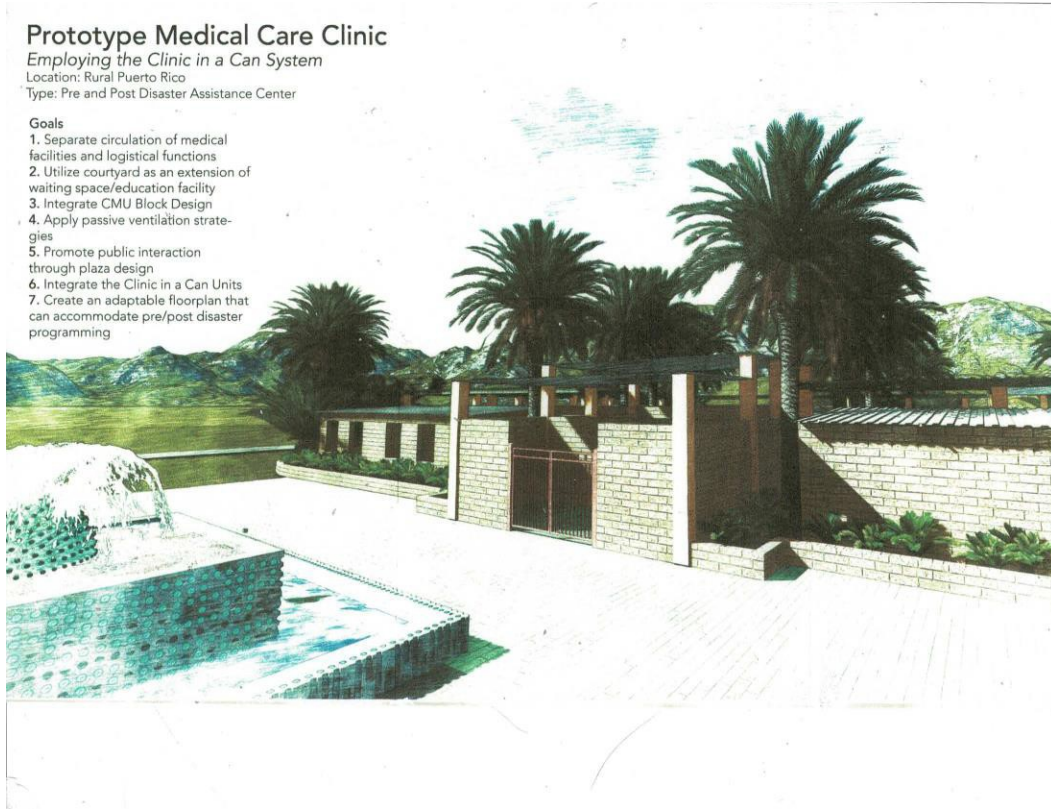
*Employing the Clinic in a Can System*

Location: Rural Puerto Rico

Type: Pre and Post Disaster Assistance Center

### Goals

1. Separate circulation of medical facilities and logistical functions
2. Utilize courtyard as an extension of waiting space/education facility
3. Integrate CMU Block Design
4. Apply passive ventilation strategies
5. Promote public interaction through plaza design
6. Integrate the Clinic in a Can Units
7. Create an adaptable floorplan that can accommodate pre/post disaster programming



### PURPOSE

Puerto Rico has been severely affected by Hurricane Maria that hit in September of 2017. This hurricane only worsened the health care crisis and places to go after disaster hit was hard to come. Our solution to this was designing the Clinica de Refugia or Refuge Clinic to be used for daily health treatment but also prepared for disasters. When one approaches, Clinic in a Can provides assistance by supplying extra disaster response units which holds a medical clinic in a retrofitted storage container.

### GOALS:

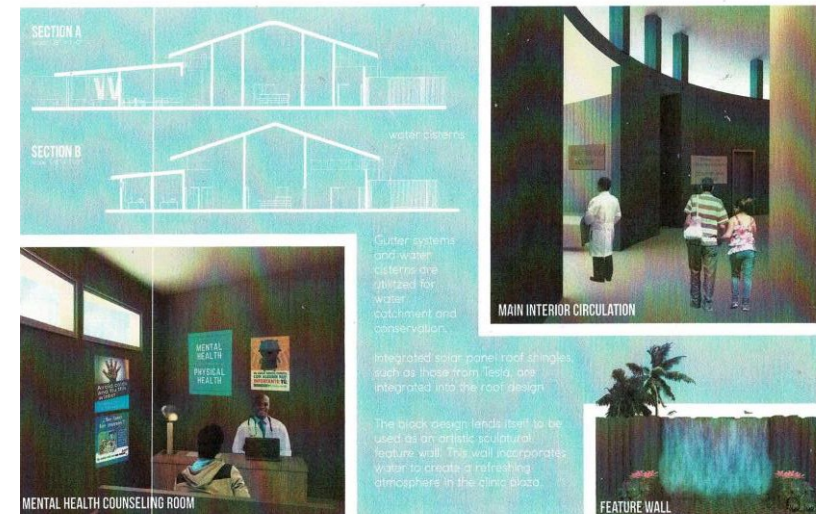
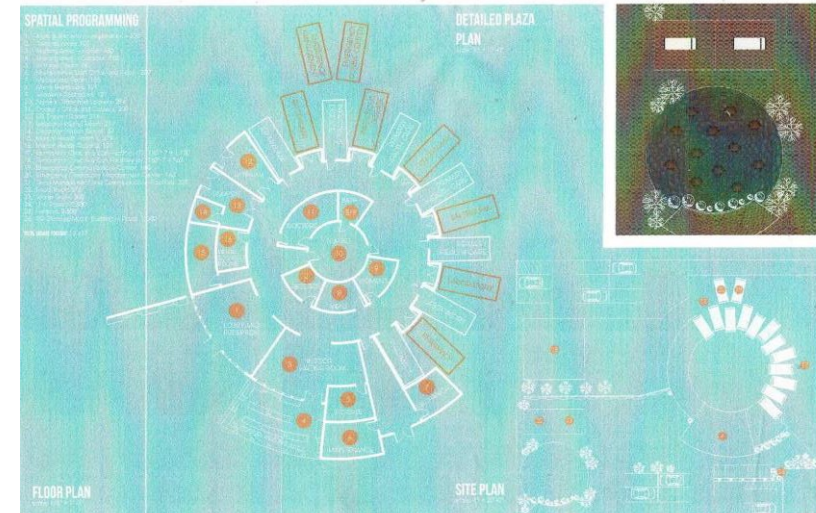
- Generate a medical clinic that facilitates easy accessibility and care for all patients.
- Integrate our concrete masonry unit in both the architecture of the building and the landscape architecture.
- Develop a clinic that incorporates smart environmental systems such as water conservation and catchment system, ventilation, roof and tesla solar panels.
- Create a public plaza that citizens can use as a gathering space and waiting area on clinic days.
- Create a flexible floor plan where the clinic can easily transition from an every day clinic to pre and post disaster clinic.

**CLINICA DE REFUGIA**

medical clinic | puerto rico | pre/post disaster care

## THE CO-FIRST PRIZE ARCHITECTURE & LANDSCAPE ARCHITECTURE PROJECTS / STUDENT DESIGN COMPETITION – Team C

- **JURY COMMENTS:**
- This project impressed the jury for its ability to take a very difficult concept ... that of a circular plan ... and develop it into a very innovative, yet functional solution.
- The relatively small dimension of the standard CMU allows for the large circumference curved walls to be accomplished without the use of a special unit.
- The jury was most impressed that the conversion of the facility from regular operation to disaster assistance mode is accomplished without having to shut down the operation of the facility.
- The jury also noted the importance that the circulation around the core remains exactly the same in either mode which allows for patients to have the exact same circulation pattern in both modes and aids to reduce confusion and apprehension. Interior perspectives are very effective in conveying this and quality of other spaces.
- The site plan and landscape development ... especially the use of CMU's to create the very attractive wall incorporating a water feature that orients patients to the entry ... were lauded by the jury.
- Section development needs work to bring up to level of plan development and use of white on both does not read well graphically.
- Certainly worthy of **FIRST PRIZE AWARD**



# THE CO-FIRST PRIZE ARCHITECTURE & LANDSCAPE ARCHITECTURE PROJECTS / STUDENT DESIGN COMPETITION [Team A]

## JURY COMMENTS:

This is a project that is very strong in all aspects of design ... from site plan to building concept and design development to the quality of the final drawings.

Site Plan is very well considered in response to requirements of heli-pad and fountain using water bottles is exceptional in its contribution.

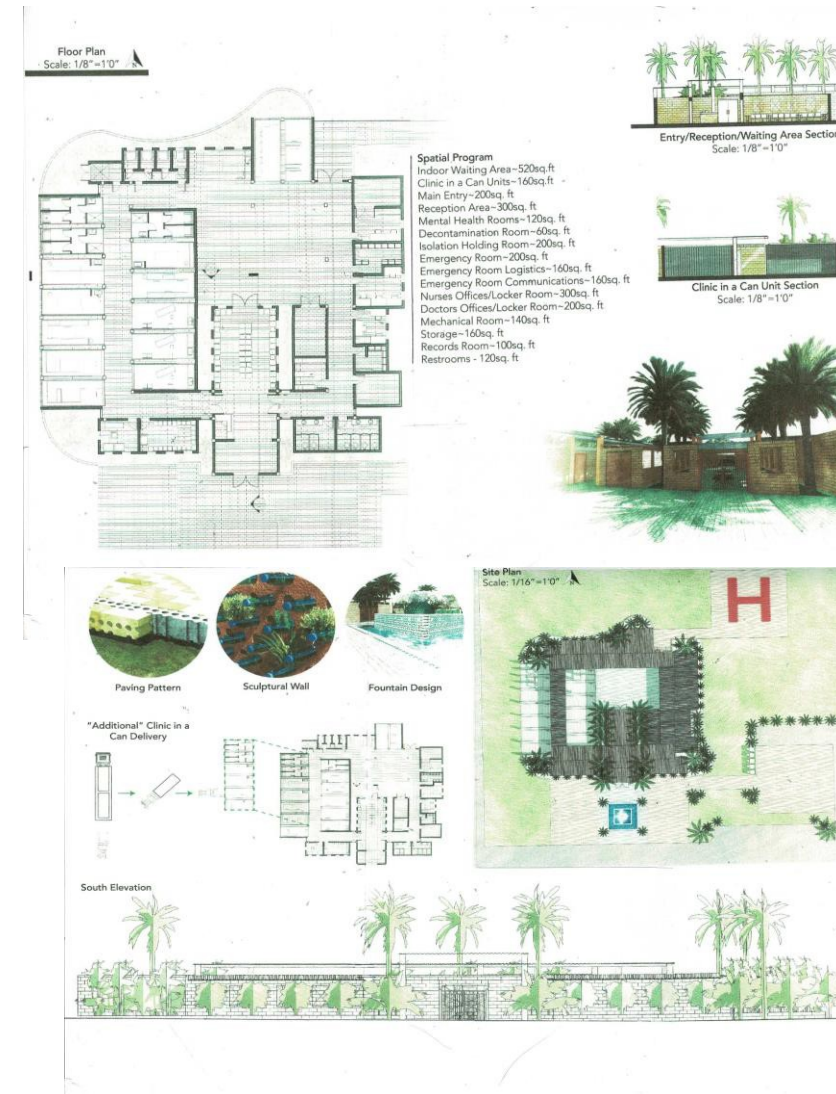
The courtyard plan is well-developed with a clear circulation pattern that continues from entry sequence through post-care exit.

Plan actually works better in disaster mode when medical care rooms are off corridor and not facing out/away from courtyard.

CMU enclosure of *Clinic in a Can* units results in a very strong solution to creating a familiar esthetic of Caribbean architecture... both on the interior and exterior through use of CMU as major material for wall walls that are also structural.

Conversion to disaster assistance might disrupt operation of facility.

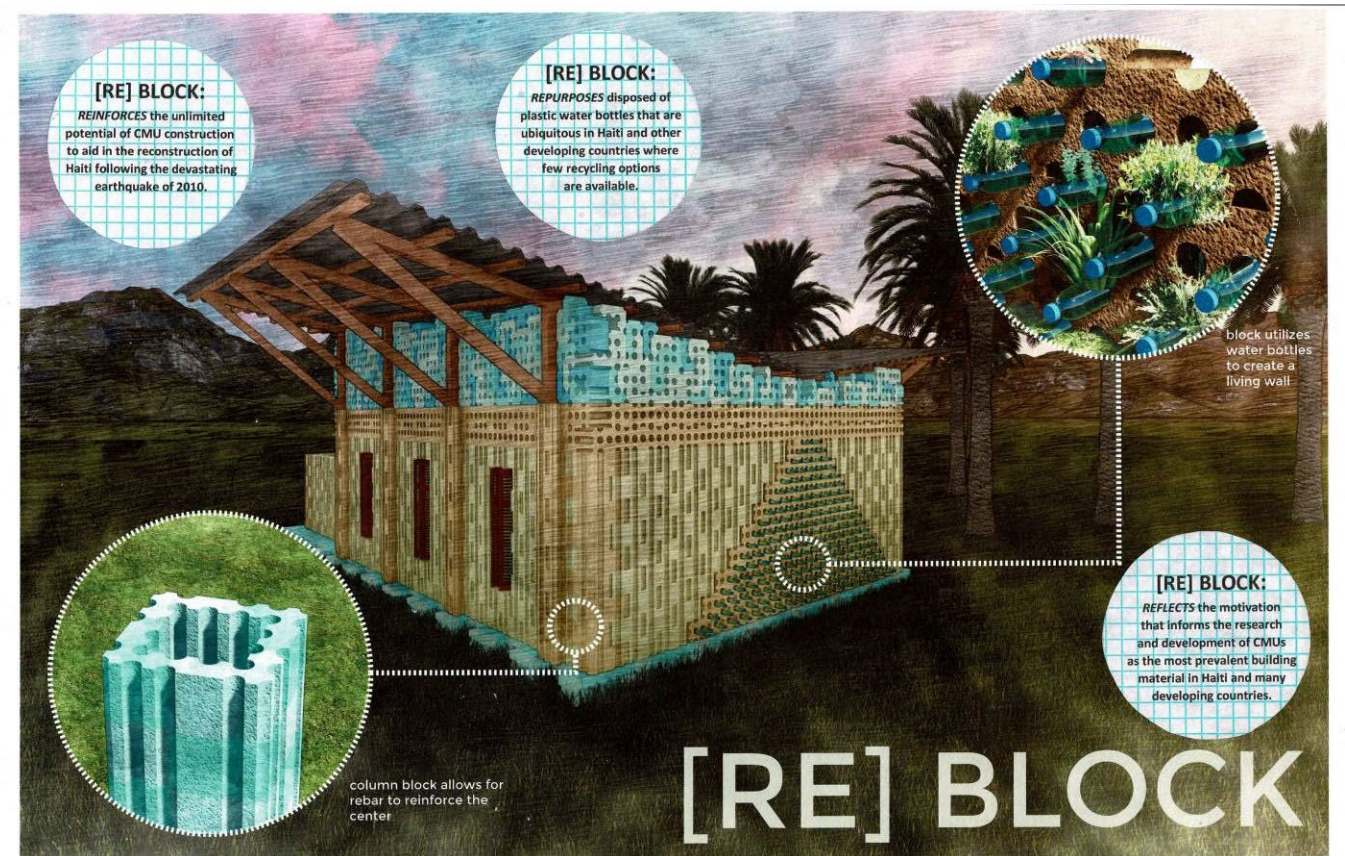
Certainly worthy of FIRST PRIZE AWARD



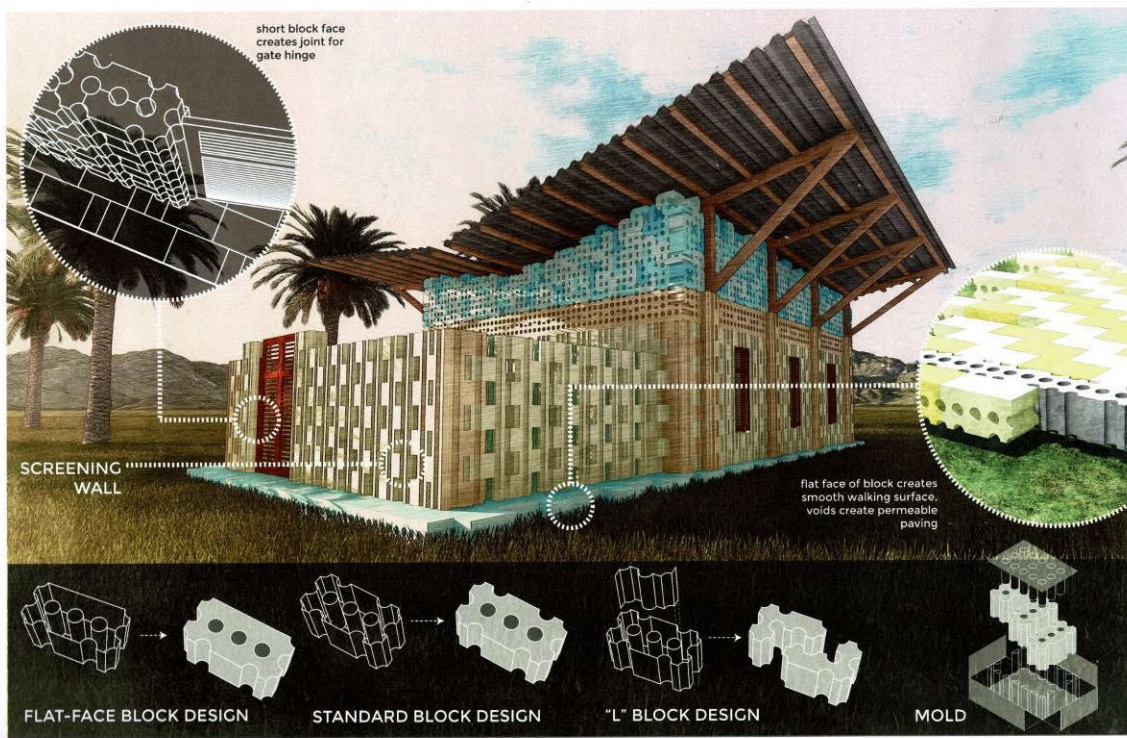
## THE FIRST PRIZE SCHOOL PROJECT / UNIT DESIGN COMPETITION & THIRD PRIZE NATIONAL AWARD WINNER [ Team A ]

“Working in a team situation was quite valuable, as both designs are far richer due to the input of all team members than it ever would have been if the project had been done individually. All four of us have different skills, experiences, and backgrounds that allowed us to come up collectively with a strong design for both project. It was really discussions on the pros and cons of the individual designs that continuously pushed the evolution of our group’s designs.”

Anna Goodman, Member of TEAM A



# THE FIRST PRIZE SCHOOL PROJECT / UNIT DESIGN COMPETITION & THIRD PRIZE NATIONAL AWARD WINNER [ Team A ]



## ACKNOWLEDGEMENTS :

**It is only fitting that I end this article by acknowledging the people who have played a big part in making this course both possible and successful. Without them this course would not have been offered to the students at Ball State University's College of Architecture & Planning.**

- **FUNDING: National Concrete Masonry Association and its Foundation**
- **Jason Thompson, VP Engineering**
- **Miranda Knipple, Industry Events and Executive Affairs Coordinator**
- **THIS ARTICLE: National Concrete Masonry Association and its Foundation**
- **Clare Ramminger, Director of Programs & member Services**
- **FUNDING: Midwest Masonry Council**
- **Terri Truitt, Executive Director**

**ACADEMIC SUPPORT: Ball State University,  
Department of Architecture**

**Andrea Swartz, AIA, Department Chair**

**Tammy McCord, Administrator Coordinator**

- **Special thanks to all the students who have taken this class since 2010. It has been their collective efforts that has inspire me every year to continue to teach and learn from them.**