

COVID-19

# Is Project Héroe the Audacious Solution Needed to Stem Future Outbreaks?

The in-depth concept outlines the design and logistics for a rapidly deployable, city-scaled emergency medical complex with the goal of containing the next global virus threat wherever in the world it hits—and potentially staving off another global pandemic.

By [WANDA LAU](#)

The COVID-19 pandemic has brought immense pain to the world with no definitive end in sight. With more than [735,000 deaths and 20 million known cases](#) worldwide to date, COVID-19 has upended families in [more than 200 countries](#). The virus has also curtailed global economic growth by one-third from 9% to 6% in 2020, affecting the livelihoods of billions more.

On a bright note, the world saw individuals and businesses across sectors step in to volunteer their services and adapt their skills to staunch the outbreak. The architecture community was certainly no exception, helping to [convert](#) convention centers, field houses, parks, and parking lots to pop-up intensive care units and isolation rooms, and [pivoting fabrication labs overnight](#) into manufacturing lines for personal protective equipment. In the U.S., Congress has already approved [approximately \\$3 trillion](#) in relief measures to cushion the economic blow for Americans.



HLW and the Project Héroe team Aerial view, Project Héroe deployed

As [HLW](#) senior partner David Swartz, FAIA, watched the devastation unfold, he felt increasingly troubled. He [openly wondered](#) why society was stuck in a defensive stance to the coronavirus and if the building industry could lead a proactive, multidisciplinary solution that would stem future pandemics at their source. Using his connections at the University of Southern California, where he sits on the alumni association's board of governors, Swartz began meeting with leaders at the [USC Keck School of Medicine](#) and [School of Architecture](#) in the mid-spring. He reached out to industry connections and clients to mobilize a coalition of medical, construction, engineering, and supply chain experts, and raised approximately \$55,000, including \$10,000 of his own, to hire six architecture graduates to work on the proposal and design. Collaborators, including his own firm, donated hundreds of thousands of dollars in employee labor.

After seven weeks—during which Swartz says he did nothing but work on this project and sleep—the team had a detailed study for Project Héroe, a massive, city-scale endeavor to stop future outbreaks at ground zero. From warehousing logistics and code compliance, the 121-page report dives deep into what a multifaceted, modular, and mobile response to future outbreaks could look like.

At the project's center is a rapidly deployable, high-tech emergency medical center capable of spanning block-long stretches of city streets. But the study also dives into the challenging logistics: How can such a large-scale system reach a ground zero anywhere in the world within the shortest time frame possible? How can highly programmed space be erected and operational within a week? How can it attract leading health care experts, virologists, and epidemiologists from around the world to work *and* live there until the outbreak is contained?

To understand how the Project Héroe study came together, ARCHITECT interviewed Swartz about his vision.





HLW and the Project Héroe teamThe hospital components were streamlined to fit exam rooms, operating rooms, and radiology imaging laboratories within a four-lane street. Patient room modules spin off the central hub.

### **What is Project Héroe's objective?**

*Swartz:* We felt we could mitigate our current issues and even solve them. Our cities and our existence are just not based on social distancing. That's where Project Héroe came from. This interdisciplinary study asks the fundamental question: "Is there a built solution that can be implemented to stem a future outbreak of a similar virus?"

Many people have asked, "How is this different than the [Javits \[Center's conversion into a hospital in New York\]](#)? How is this different from what [was done in Central Park](#)?" Project Héroe is almost the opposite of the Javits Center because it is preplanned. Being preplanned, it's ready. It's probably a multibillion-dollar project. Is it worth our peace of mind? Is it worth the fact that we can feel safe? We think so. And that is what Project Héroe is.

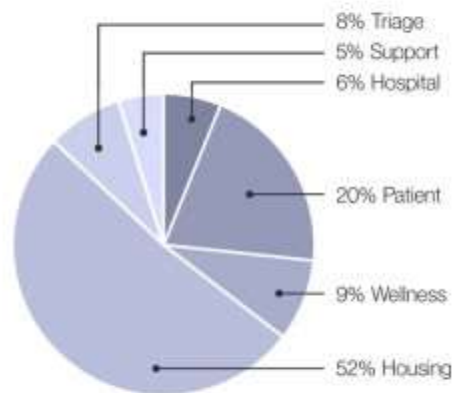
# 1,000-Patient Capacity = 13,348 Modules (8' w x 20' l x 9'-6" h)

## Program = 6 Building Types

1 module = 1 (8'W x 20'L x 9'-6"H) container

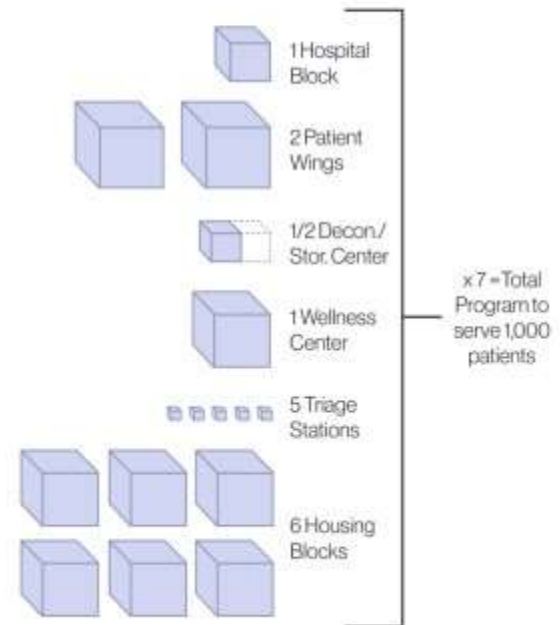
- 1 **7 Hospital Blocks**  
826 modules
- 2 **35 Triage Stations\***  
1,085 modules
- 3 **14 Patient Wings**  
2,732 modules
- 4 **7 Wellness Centers**  
1,169 modules
- 5 **42 Housing Blocks\*\***  
6,888 modules
- 6 **4 Decontamination / Storage Centers**  
648 modules

## % Breakdown of Total Shipping Containers:



## # of Building Types Required for every 1 Hospital Block:

(Block size is scaled proportionally to the amount of total program)



\* Triage Stations are highly dependent on the size and nature of the city. A baseline of 5 Triage Stations per Hospital Block is used for this exercise.

\*\*A ratio of 6:1 staff-to-patient is assumed, so that each Hospital Block requires 6 Staff Housing Blocks.

HLW and the Project Héroe team Preliminary program to accommodate 1,000 patients in 13,348 modules, totaling 2.1 million gross square feet





HLW and the Project Héroe team The variety of building types enables numerous configurations to meet the need and demand for services (see previous image for key of building types).

**What building typologies does it feature?**

Our project uses modules, but it's not [the typical] shipping containers. It's a brand new module that's fully wired, integrated, furnished, and automated. Even the pipes can connect automatically. It's plug-and-play. It's using a module so it can be shipped or transported by train or truck and lifted into place during construction.

We have six building types: the hospital unit itself; patient rooms; staff housing; an amenity, such as a cafeteria, fitness area, contact tracing offices, conferencing center, or outdoor garden; a small triage building that can be [placed at various points] throughout the entire host city; and a storage center that could house security, IT infrastructure, and decontamination. These building types make up this entire facility, a small city in itself.

Once each unit is built, it's self-sufficient. Each room has its own MEP and fire protection system, while each building has its own emergency generator, water tank, and blackwater tank. That's why we're housing everybody; we wouldn't even take janitorial staff from the city with a pandemic. We're looking at a 1,000-patient hospital that would need 6,000 staff members. We're proposing about 2.1 million square feet initially.

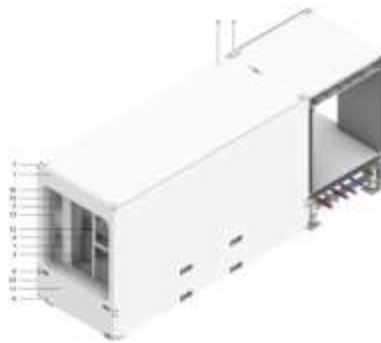




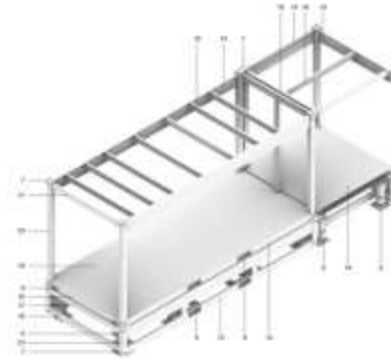
HLW and the Project Héroe team Satellite intake and triage buildings will be located throughout the host city to ensure mass testing and contact tracing can be conducted to contain the outbreak.



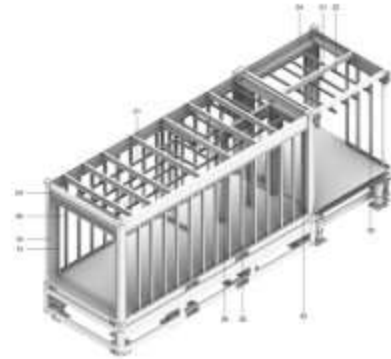
HLW and the Project Héroe teamThe support buildings house a variety of functions, such as a decontamination area on the first floor, IT and server hub on the second floor, and a security center on the third.



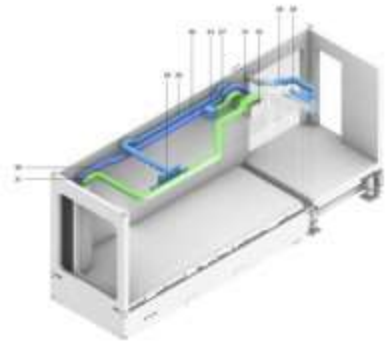
Full Module



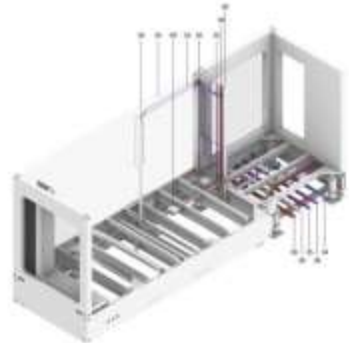
Structural Steel Frame



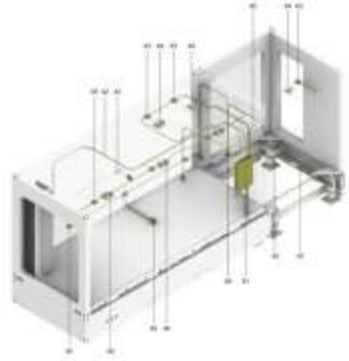
Metal Stud Framing with Rough Openings



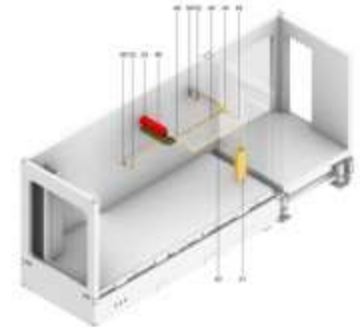
Mechanical



Plumbing & Roof Drain



Electrical



Dry Suppression System



Overlay of All

- 1 6" THICK TONGUE AND GROOVE INSULATED PAINTED METAL PANELS WITH HEAVY GAGE EXTERIOR SHELL
- 2 ALUMINUM COVERED PAINTED PLATE PANEL
- 3 1 1/8" THICK INSULATED AND LAMINATED GLASS UNITS
- 4 OPERABLE WINDOW
- 5 PLATE METAL WITH TRAFFIC TOPPING
- 6 AUTOMATED JACKING AND LEVELING ASSEMBLY
- 7 CORNER LIFT FITTING PAINTED
- 8 VERTICAL PIPE PENETRATION
- 9 FORK LIFT POCKET AND STRAP PAINTED (UNGED OPENING)
- 10 METAL TRIM PANEL SURROUND

- 11 PAINTED PLATE STEEL
- 12 PAINTED ALUMINUM WINDOW FRAMES
- 13 COILING SHUTTER SIDE JAMB
- 14 STEEL TOP SIDE RAIL
- 15 STEEL BOTTOM SIDE RAILS
- 16 STEEL TOP END RAIL
- 17 STEEL CHANNEL CROSS MEMBER FLOORING
- 18 PLATE METAL
- 19 HEAVY GAGE METAL FRAMING
- 20 LIGHT GAGE METAL FRAMING
- 21 BENT L METAL TO STEEL CHANNEL

- 22 PAINTED STEEL CORNER POST
- 23 COILING FIRE RATED SHUTTER HOUSING
- 24 STEEL DOOR FRAME
- 25 POCKET DOOR ASSEMBLY
- 26 RETURN DUCT
- 27 SUPPLY DUCT
- 28 LINEAR SLOT DIFFUSER
- 29 FRESH AIR INTAKE DUCT
- 30 FRESH AIR OUTLET DUCT
- 31 AIR EXCHANGE AIR TREATMENT UNIT (HEATING COOLING AND DEHUMIDIFICATION HEPA FILTER 15 FILTRATION)

- 32 RETURN AIR DIFFUSER
- 33 COLD WATER SUPPLY
- 34 HOT WATER SUPPLY
- 35 GRAY WATER WASTE LINE (SHOWER AND SINK)
- 36 GRAY WATER SUPPLY LINE-TOILET
- 37 TOILET SANITARY VACUUM SYSTEM
- 38 ROOF DRAIN LINE
- 39 ACCUMULATOR
- 40 PANEL BOX
- 41 CONDUIT (TYPICAL)
- 42 J-BOX
- 43 DOWNLIGHTS

- 44 OUTLETS
- 45 SWITCH (TYPICAL)
- 46 MAIN ELECTRICAL FEED
- 47 AGENT STORAGE CYLINDER
- 48 SUPPLY FRAMES
- 49 NOZZLES
- 50 FIRST SUPPRESSION CONTROL PANEL WITH EMERGENCY RELEASE
- 51 SMOKE DETECTORS
- 52 FLUSH ACCESS PANEL
- 53 EMBOSSED SHUTTER DOOR

HLW and the Project Héroe team Technical connections and details

**Project Héroe is premised on reaching ground zero at nearly the onset of an outbreak. That assumes we can trace the origin of the pathogen with the speed and accuracy to contain everything in time.**

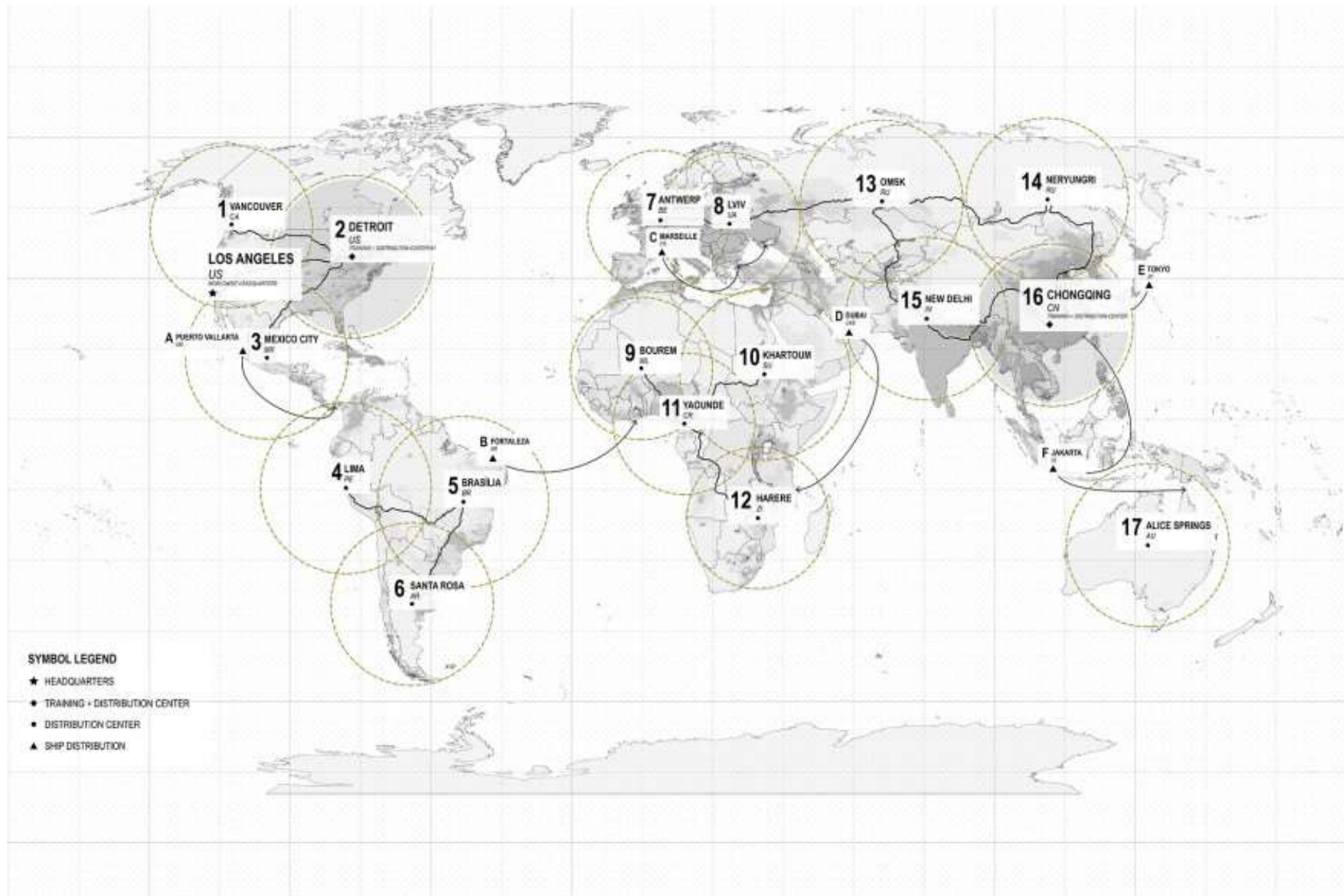
With artificial intelligence, [researchers] are getting their arms around where the next ground zero might be. We also think a tremendous amount of progress is being made in contact tracing.

### **How fast can Project Héroe be transported to the identified site?**

We would have a worldwide warehouse and distribution network. The distribution centers would offer a two- or at the most three-day driving distance to a ground zero nearly anywhere in the world. When [the modules come] out of a distribution center, they're being logically loaded so that a small portion of the hospital can be up and running right away. If 2.1 million square feet is not large enough, we would have [additional modules] that are farther out and even stored in container ships that could come into port to build this thing up larger, taking over city streets, if necessary. Who needs city streets in a pandemic?

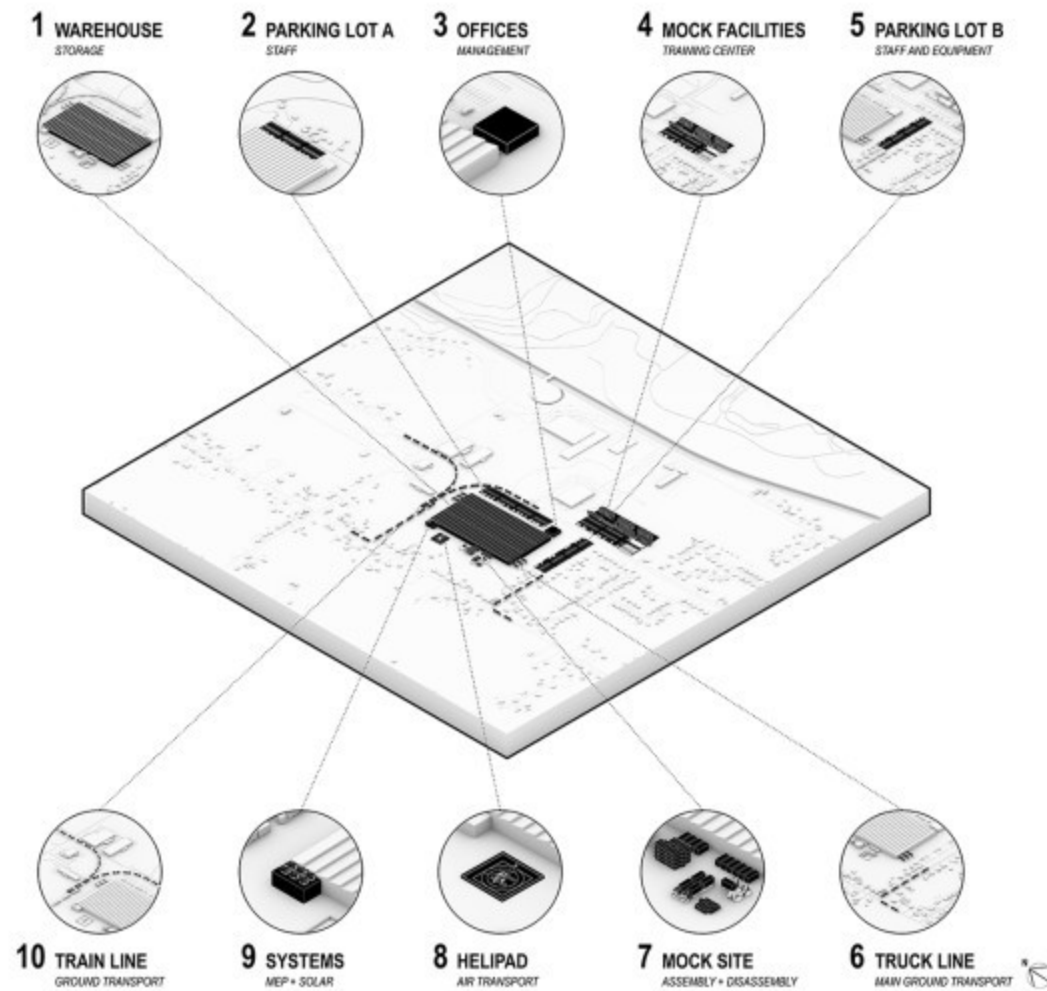
For example, if something happened in Los Angeles, Detroit would have a series of trucks or trains that could deliver the modules. If [the resulting center was] not large enough, [modules from] Vancouver could come in and then be supplemented by Mexico City. [At some point,] we are talking about 6,000 or 7,000 patient rooms and bringing in 35,000 to 45,000 people.





HLW and the Project Héroe teamThe Project Heroe team identified 17 cities to locate distribution and/or training centers as well as seven port cities to ensure the modules could reach nearly any ground zero site within two to three days.

## TRAINING AND DISTRIBUTION CENTER *DETROIT, MICHIGAN*



HLW and the Project Héroe team Sample training and distribution center

**Would each distribution center house a complete set of modules, or a set of specific modules types?**

There's multiple sets. We envision several container ships fully loaded throughout the world.

**What considerations did your non-architecture team members suggest?**

We had doctors who gave their input on the programming, contractors looking at constructability and how they would set up [assembly] teams. We had transportation logistics look at whether we could actually get this from the warehouse on-site. I was responsible for bringing information from the structural, MEP, laundry, kitchen, elevator, solar, and engineers together. An interior designer from HLW also looked at what we were designing on the outside and brought that inside.

**With the residential component, how long would you expect staff members to stay there?**

When [the number of cases per day] gets down close to zero, the [assembly] could get smaller as the outbreak gets smaller. Then it could be just the smallest portion, which is the hospital and the patient wing.

**The level of detail you have in a project of this scale is incredible.**

On this project, if I didn't solve the technical problems, how can I sell it? There are still things that aren't fully resolved, but I have an answer for our whole approach. Having 40 consultants certainly offered a lot of viewpoints that I had to ferret through. At the end, the designers said they were glad I was a technical czar on this project because it needed someone to make sure the story stayed intact. I held fast to the scale of this project. When we fight a war, we bring in 100,000 soldiers and they have to have food, medicine, and certain types of gear. It's a similar kind of thing.



HLW and the Project Héroe team Operating room module





HLW and the Project Héroe team The patient buildings can house up to 70 patients each, using a repeated floor plan and simple wayfinding. Three modules form two patient rooms and individual restrooms, with a miniature nursing station. Virtual visitation devices enable patient communication with family members.

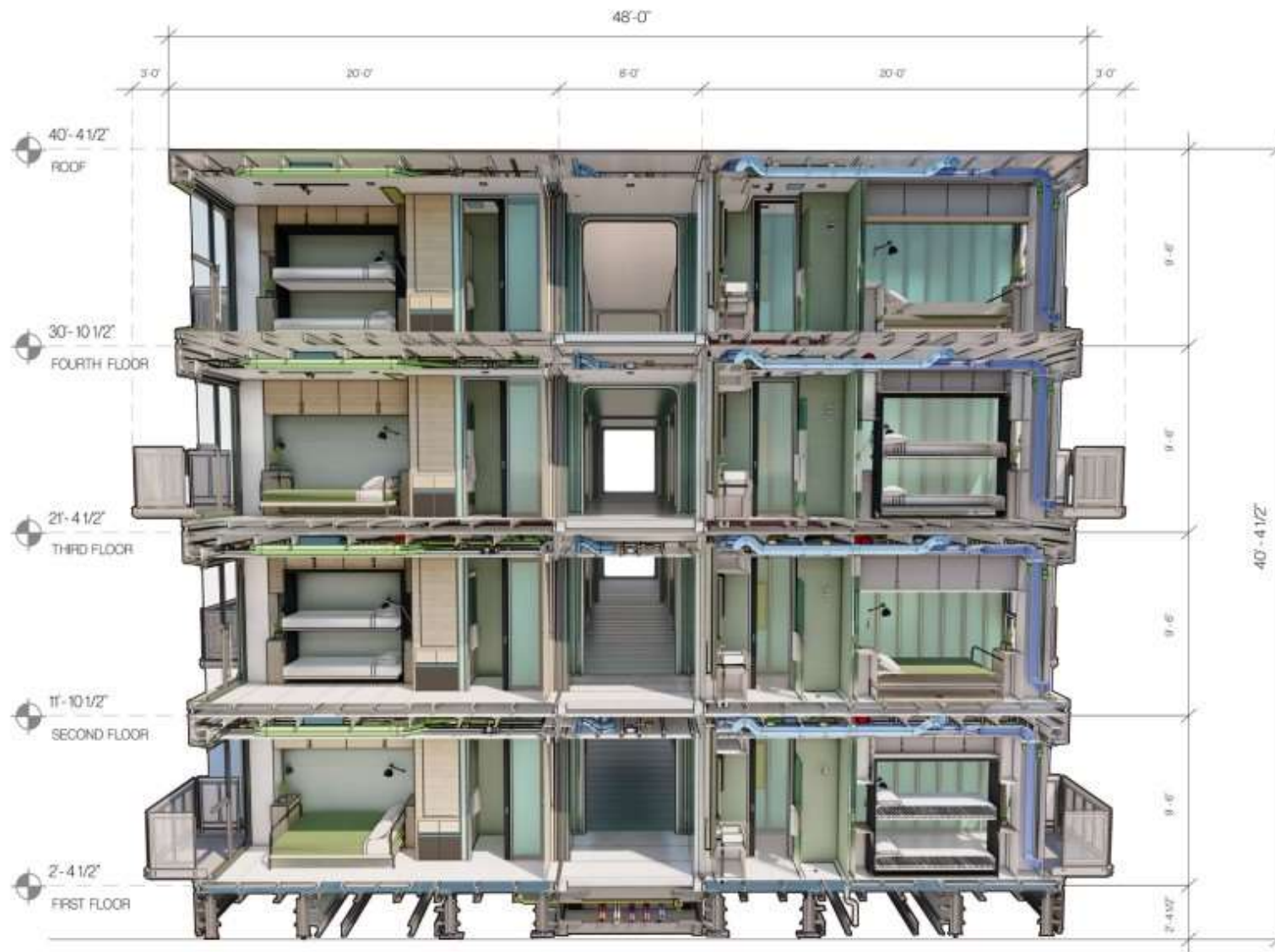


HLW and the Project Héroe team The staff housing block features single- and double-occupant rooms complete with their own bathroom, a fold-out balcony, and fold-up bed.



HLW and the Project Héroe team The wellness building offers amenities for staff members, including recreational areas, cooking, and dining.





HLW and the Project Héroe team Cross section through staff housing. The Project Héroe modular system was designed to form a small, autonomous city, using existing infrastructure or operating self-sufficiently.



**Do you have a cost estimate?**

No, I have no idea. [Likely in the billions for the modules themselves.] Then we have to train construction and assembly crews and everyone else. You have to keep the modules in storage, hooked up to diagnostics so that they're not just laying dead. They have to be smart units that plug in like a car.

**Who would be the client?**

We're looking at a couple things. I want to start out in the private industry to get some initial funding. We're trying to stay out of politics. We had a few mainland Chinese students involved in the project as well. We're trying to make it as international as we can (but we did base who we accepted on our student team solely on portfolio).

**What does phase two of Project Héroe comprise?**

Our goal is to develop financial partners and investors to move the project forward in development. We're looking to have the project recognized in the public realm. We're also creating a website devoted to this project. In the next three months, I would like to see this thing get some serious legs. We have to have a business plan and a rough estimate of costs because if somebody says, "I'm giving you a half a million dollars. What are you doing with it?" I have to have an answer.

**For the skeptics among us, the Project Héroe study assumes many idealized conditions and capabilities. For example, it assumes someone would be willing to invest not only in the project delivery, but also in staff training, equipment monitoring, and storage and maintenance on a speculative basis, not knowing if or how often Project Héroe will be deployed.**

Right now, we are seriously talking with a group in Detroit that can build a mock-up of a few units as a prototype to show "proof of concept," focusing on key functionality. This first phase [would require an]

approximately \$1 million investment, which we [believe] is achievable based on interest. The Project Héroe concept is an idealized version of the best-case scenario of a worldwide program. Our hope is to get the mock-up built as quickly as possible to show that it can work, and that we then look at investment and government interest.

**This project assumes construction crews will be continually at the ready, but people change jobs and fields, forget their training, or relocate.**

There will be many construction crews to assemble these with additional staff in excess of what is needed to offset these issues. [Any major contractor] could train two groups of 50 employees, whereas 30 are needed [to construct] each building.

**The study also assumes countries will allow teams to cross international borders easily, that roads and rail tracks everywhere will be cleared for module transport, and that airlines will prioritize seating for those rushing to the scene.**

Yes, this has to be worked out in advance and countries have to be prepared to receive the components. Language differences between countries can be addressed in a similar way that airlines communicate; translators may be needed.

**It comes down to one fundamental question:  
What value do we place of saving lives and  
safeguarding our future from other pandemics?**

**In short, Project Héroe assumes a very organized, collaborative, and functional world.**

Everything would need to be worked out in advance. Each country would know from where the modules are being delivered and, once the project was implemented, would need to be organized and rational. It comes down to one fundamental question: What value do we place on saving lives and safeguarding our future from other pandemics? Considering the \$2 trillion spent on the U.S. CARES Act alone, the cost estimate for this program is a very small percentage of that.

Lastly, the program's technology and outcome can be used for other functions, including pop-up clinics, temporary housing for refugees and the homeless, or in the aftermath of flood and earthquake [events].

We recently spoke with a government representative who said this program could be a game changer in how we house, feed, and deploy troops, as well as how they set up [military] bases in a crisis too. Many people see this program going and developing into different uses.

**What is the biggest challenge moving forward?**

Getting Project Héroe implemented. People are asking about its validity. And I do have very good answers so that has helped, and I have done my homework. There's a lot of pressure. Someone told me that with this project "the worst case scenario is that you'll have a lecture, maybe a few publications. In the best case scenario, someone wins the Nobel Peace Prize." And I said, "Yeah, if this project was just built and implemented and actually worked, I would be happy."

That's what I'm looking for. We're not looking to get enriched—we're looking to do good. It would be wonderful to one day say, "It was the architecture and building industry that came forward to really make a difference in the world."

*The Project Héroe team includes, from HLW: David Louis Swartz, FAIA, Rik Ekstrom, Peter Bacevice, Lorene Ford, AIA, Jade Li, Marcelo Franganillo, AIA, Melissa Horvat, Ellen Park, Jianxin Li, Victor Zhang, and Wei Fang "Fiona"; USC School of Architecture students and recent graduates Andrew Blumm, Keith Nathan Vincent Tiu, Timlok Li, Yuqi Tian, Sixue He, and Mitchell Foo; and USC Keck School of Medicine participants Henry Wu, Vedang Uttarwar, Terrance Peng, Nina Balac, Jonathan Alaniz. Kylie McManus wrote and managed the project content. Content contributors and advisers include Syska Henessey Group, AlfaTech, Matt Construction, EYP Mission Critical Facilities, Vantage Technology Consulting Group, Ricca Design Studios, Risha Engineering, PlanNet Consulting, W-Trans, Newson Brown Acoustics, GVK Elevator Consulting Services, Herman Miller, Intermountain Electric, Swinerton Builders, Insight Structural Engineers, Henderson Engineers, GCX Interiors, Structural Focus, PeopleSpace, and Haworth.*

*This interview has been edited and condensed for clarity. This article has been updated since first publication.*

#### **ABOUT THE AUTHOR**



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Wanda Lau, LEED AP, is editor of tech, practice, and op-eds for [ARCHITECT](#) and [ARCHITECTURAL LIGHTING](#). Along with 10 years of AEC experience, she holds a B.S. in civil engineering from Michigan State University, an S.M. in building technology from MIT, and an M.A. in journalism from Syracuse University's Newhouse School. Her work has appeared in *Men's Health*, *ASID Icon*, and *University Business*.