THESANDBOXBLOG

Co-Build Kathmandu: An NYC engineer assesses homes, builds friendships

April Greene — September 26, 2015

"As a kid, I was always fascinated with bridges and buildings," said Justin Den Herder, a senior engineer at Silman. "I'd come into the city from New Jersey with my dad to go to Yankee games, and we'd drive over the George Washington Bridge. I'd look out at the skyline in amazement, and as we drove under the Brown & Guenther Bridge Apartments, I'd be dumbfounded that we could drive beneath such tall buildings perched on top of bridges."

"At the time, I didn't know what structural engineering was," he said. "I just had this burning curiosity. Now, here I am. I've been at Silman for eight years, and it's great. We have wonderfully diverse projects. I have the privilege of working with some of the best architects in the world on jobs of all types: new construction, renovation, preservation. I especially enjoy existing building work. There's something special about uncovering old construction techniques and repurposing a structure, perhaps for an entirely new use. It's a practical form of preservation: the history of the city is not demolished, it simply morphs with time. I love being part of that process. For me, it's the perfect fusion of art and science."

Justin heard about Pilot Projects' Co-Build Kathmandu initiative through a coworker.

"I had wanted to go to Nepal for a long time, and thought my knowledge of structural engineering—especially with regard to existing buildings—could be helpful, so I responded to the call for volunteers," he said. "And within a few weeks, I was there."

More of Justin's photos:

Patan, Nepal's third-largest city

Justin spent the first three weeks of July in Nepal; the Gorkha earthquake had struck on April 25.

"In many ways, I didn't know what to expect, which was exciting," he said. "I'd spoken to Scott [Francisco, founder and director of Pilot Projects] about his overall intentions for the project, and he'd put me in touch with people there who I could work with and who could guide me. But we couldn't make very many plans. In some respects, I was doing recon work to establish a framework for others to follow after me. It was the kind of thing where I just had to go and see what was happening, meet people and ask around, go where I needed to be."

Co-Build's partners in Nepal—Pete Rausch, an American expat, and Bikash Singh, a Newar and Kathmandu native, whom Scott met when in Nepal in April—picked Justin up from Tribhuvan airport and took him to a rooftop cafe in Patan, Nepal's third-largest city. The three talked about their course of action over breakfast.

"I was really taken with Patan; I thought it was much more beautiful than Kathmandu," Justin said. "There's tons of wood latticework and metalwork; some of the best craftsmen in the world came from there. But sadly, most of the buildings were in really bad shape. Facades weren't properly tied back to floor structures; wood and bamboo braces were jutting out into streets; many buildings that hadn't collapsed were just leaning up against each other. I'd estimate that 75 percent of the city needs to be rebuilt. It's such a shame because it's so beautiful."

"My hotel was right across the street from Patan's Durbar Square, and unfortunately several ancient temples there—we're talking thousands of years old—had completely collapsed," Justin said.

But all was not lost; Justin could see hope for other buildings.

"The ones that remained were propped up with temporary wood bracing," he explained. "Years ago, Bob Silman [founder of Silman] had designed a seismic retrofitting strategy for some of the temples which were part of the UNESCO World Heritage Program. These structures fared better during the earthquake as a result. Hopefully, funds can be allocated to implement a similar strategy for the damaged temples that remain. It's vital to the Nepalese that these temples be rebuilt because, not only are they historically and culturally significant, but they're still actively used today."

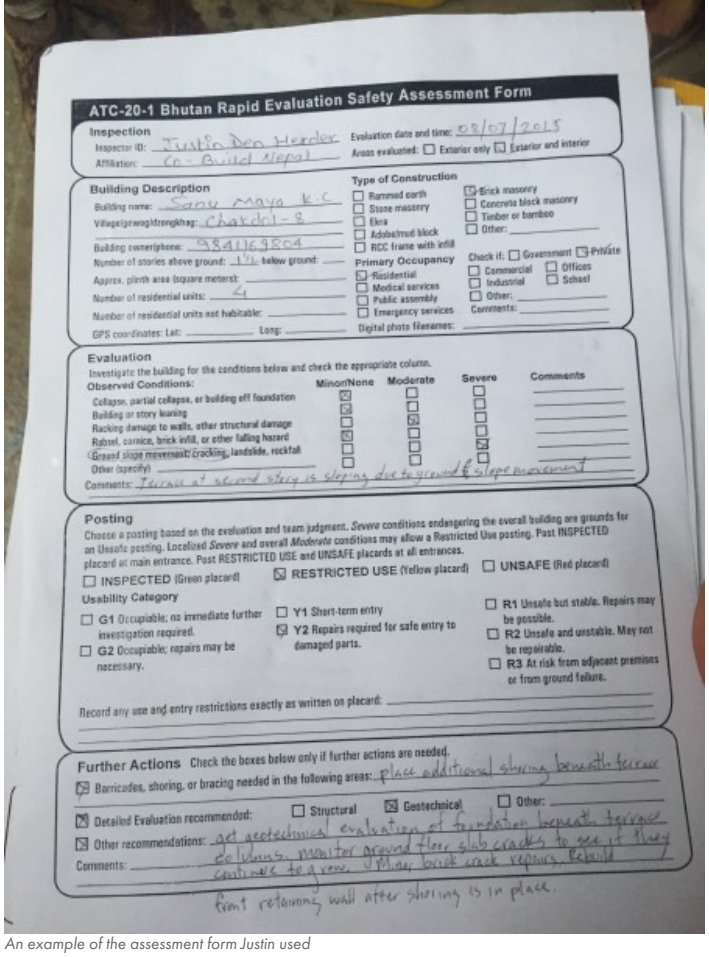
Patan's Durbar Square. "I'd estimate that 75 percent of the city needs to be rebuilt," said Justin. "It's such a shame because it's so beautiful.

Every morning, to the sounds of prayer from those very temples, Pete, Bikash, and Justin would share breakfast at the same rooftop cafe and develop a plan of action for the day. On adjacent rooftops, young Nepalese men would smoke cigarettes beneath black plastic water tanks, propping their elbows on parapets with dislodged bricks. The crooked form of Krishna crowned a stone temple. Rising from the street was the endless honking of scooters and tuk-tuks; green mountains lined the perimeter of the valley; behind a layer of cloud—and above the clouds—sat the snow-capped summits of the Himalayas. Perhaps surprisingly, it turned out that Patan would be the least of their worries.

"Because some of the larger organizations had assessed and inspected many of the buildings within the city already," Justin said, "we determined that the most useful approach would be to head out into the villages surrounding the valley and do some structural assessments there. Pete and Bikash had friends in one particular village, Ichangu, which is about 40 minutes outside of Patan. We decided that would be the first area we would target."

"I had some good engineering know-how," Justin said, "but my relief work was limited to volunteering after Hurricane Sandy in New York, when I learned a little about FEMA and ATC. So before going to Nepal—and also on the plane, actually!—I read the ATC-20: Procedures for Postearthquake Safety Evaluation of Buildings, and their 20-1, which focuses specifically on the 2009 Bhutan earthquake. I was hopeful that I'd see some of the same building and construction types in Nepal as were illustrated there. And it did turn out to be quite valuable, in terms of knowing what was safe and unsafe and familiarizing myself with the conditions I could expect to encounter."

"Much of post-disaster assessment is engineering judgment, though, to be frank," he said. "There's an assessment form that ATC has developed, and I found that very helpful, too. But a lot of it does come down to just personal experience and judgment. Each village, each house was a unique situation. Factors such as the location of the house, the location of the village, access to construction materials and tools, and who the inhabitants of the house were played a role in determining whether or not a building could be salvaged."



ATC-20-1 Bhutan Rapid Evaluation Safety Assessment Form

Inspection
Inspector ID: Justin Dea Herder
Affiliation: Co-Built Nepal
Evaluation date and time: 05/07/2015
Areas evaluated: ☐ Exterior only ☒ Exterior and interior

Building Description
Building name: Sonu Maya K.C
Village/area/district/country: Chakchi-8
Building owner/phone: 9841169504
Number of stories above ground: 1½ below ground:
Approx. plinth area (square meters):
Number of residential units: 4
Number of residential units not habitable:
GPS coordinates: Lat: Long:

Type of Construction
☐ Rammed earth ☒ Brick masonry
☐ Stone masonry ☐ Concrete block masonry
☐ Ekra ☐ Timber or bamboo
☐ Adobe/mud block ☐ Other:
☐ RCC frame with infill
Check if: ☐ Government ☒ Private

Primary Occupancy
☒ Residential ☐ Commercial ☐ Offices
☐ Medical services ☐ Industrial ☐ School
☐ Public assembly ☐ Other:
☐ Emergency services Comments:
Digital photo filenames:

Evaluation
Investigate the building for the conditions below and check the appropriate column.

Observed Conditions:	Minor/None	Moderate	Severe	Comments
Collapse, partial collapse, or building off foundation	☒	☐	☐	
Building or story leaning	☒	☐	☐	
Racking damage to walls, other structural damage	☐	☒	☐	
Rafter, cornice, brick infill, or other falling hazard	☒	☐	☐	
Ground slope movement: cracking, landslide, rockfall	☐	☐	☒	
Other (specify)	☐	☐	☐	

Comments: Terrace at second story is sloping due to ground & slope movement

Posting
Choose a posting based on the evaluation and team judgment. *Severe* conditions endangering the overall building are grounds for an Unsafe posting. Localized *Severe* and overall *Moderate* conditions may allow a Restricted Use posting. Post INSPECTED placard at main entrance. Post RESTRICTED USE and UNSAFE placards at all entrances.

☐ INSPECTED (Green placard) ☒ RESTRICTED USE (Yellow placard) ☐ UNSAFE (Red placard)

Usability Category
☐ G1 Occupiable; no immediate further investigation required.
☐ G2 Occupiable; repairs may be necessary.
☐ Y1 Short-term entry
☒ Y2 Repairs required for safe entry to damaged parts.
☐ R1 Unsafe but stable. Repairs may be possible.
☐ R2 Unsafe and unstable. May not be repairable.
☐ R3 At risk from adjacent premises or from ground failure.

Record any use and entry restrictions exactly as written on placard:

Further Actions Check the boxes below only if further actions are needed.
☒ Barricades, shoring, or bracing needed in the following areas: place additional shoring beneath terrace
☒ Detailed Evaluation recommended: ☐ Structural ☒ Geotechnical ☐ Other:
☒ Other recommendations: get geotechnical evaluation of foundation beneath terrace
Comments: columns, monitor ground floor slab cracks to see if they continue to grow. If they, brick crack, replace, Rebuild front retaining wall after shoring is in place.

An example of the assessment form Justin used

In Ichangu, Pete and Justin found some houses perched on the steep terrain near the edges of town. There, they met Aditya Kunwar.

“Aditya was the most amazing person I met in Nepal,” Justin said. “He was orphaned as a toddler, but was later taken in by a wealthy family with British ties who had some connection to the construction industry. So he spoke fluent English, and he knew something about building construction! It was incredibly fortuitous to meet him, especially on day one. He became a great partner for us.”

Aditya’s house had been decimated by the earthquake.

“He was at home when it happened,” Justin said. “He held his two-year-old to daughter to his chest as the house fell down around them. By some miracle nothing hit them—nothing from this two-story house made of stones and mortar. He got out from under the rubble and then pulled five or six of his neighbors out of their homes. That shows you what kind of guy he is.”

So, it was no surprise that, upon hearing what Pete and Justin were doing, Aditya “dropped everything to come with us,” Justin said. “He had his own house to fix, but he wanted to help. Starting that day, he took us around to home after home in his area. And once we found one person who needed an assessment, the neighbors would catch wind, and we’d wind up assessing the whole block!”

A damaged home

The houses Justin inspected ranged from simple one-room huts to four-story concrete constructs with brick wall in-fills; many were handmade by laymen. The time he spent assessing varied depending on the house's size, who lived there, and the inhabitants' capacity to make repairs.

"For example, if we went to a home that was occupied by two elderly women with no one to help them," Justin explained, "we wouldn't spend a lot of time talking about the repairs they'd want to make. In cases like that, we would just communicate whether we deemed the house safe for habitation or not. But if there were others nearby, neighbors or relatives with some construction experience, and the capacity to rebuild was possible, we'd talk through our recommendations and develop repair details and procedures with them."

"Aditya would translate for us," Justin said, "and his presence added credibility to my recommendations. People definitely wondered, 'Who's this guy from the other side of the world, walking around and telling me whether or not my home is safe to live in?' Aditya could explain."

The extent of the damage varied: sometimes unreinforced exterior bearing walls would be cracked all the way through, or wood floor joists pocketed into walls would pull away, leaving a gap between the edge of the joist and the wall unbraced. Then there were geological concerns, like houses built on steep hillsides where the ground shifted during the earthquake and a retaining wall failed. In this scenario, a house might be two feet away from sliding down the mountain—which could also trigger a landslide and pose a threat to surrounding houses.

A damaged home

"Also, I should add that this was monsoon season!" Justin said. "For several hours each day there was a crazy downpour, a cloudburst; whole towns would become muddy rivers. It was really bad timing for doing construction—and for all the people who had to live in tents."

“But despite their hardships and my being a stranger, every family—really and truly, every person I encountered—was so nice, so kind to us,” Justin said. “I probably drank enough tea there to fill Boston Harbor. They would always give us tea or offer us a snack, even though they had nothing. Tea or Nepali moonshine! That’s potent stuff. I had to watch my intake.”

Justin assessed an average of 15 homes a day, for around 30 minutes apiece, as well as the occasional temple, monastery, or other structure. Sometimes his work turned from assessing to offering manual labor on the spot. “One day, I helped demolish somebody’s house with my bare hands because they didn’t have any tools,” he said. “I just tried to do whatever I could.”

“It was a lot of work,” he said. “but I had plenty of fun, too. We’d work until sundown, then head back to the city and go out to eat and see some live music, or sit in the living room of one of Pete and Bikash’s friends and have passionate conversations on just about any topic. Pete is 50 and short, with flowing, ‘surfer-dude’ white hair. Bikash is 33, and always wears a fedora—even while playing soccer. So I think the three of us stood out a bit, but over the three weeks we became good friends. We had a great time together.”

Pete, Justin, and Bikash

Justin’s trip ended on an especially memorable note. He had originally planned to spend his last few days relaxing at Pokhara, a popular lakeside town, but, “after weeks of seeing the devastation, meeting the kind-hearted Nepalese, and understanding how much help they still needed, that just didn’t feel right,” he said. So he contacted a small group of European volunteers he’d met earlier to see if he could help them distribute money or goods during his last days in the country.

“We wound up purchasing and donating 75, 70-pound bags of rice to people in a small village in Nagarkot,” he said. “One of the most impressive illustrations of Nepalese resiliency I saw during my trip—among many—was the image of old women coming to claim their bag of rice. I’d ask who was there to carry it home for them, and they’d just smile, take the bag from me, throw it over their shoulders, and walk straight up the mountain! I can’t imagine my grandmother doing that. I was struggling trying to lift these bags myself.”

“While I found that Nepalese people don’t show their emotions outwardly very much,” Justin said, “they’re very eager to show their warmth and loyalty. They’ll always tell you how much they love you—even after just a few minutes! People started calling me ‘brother’ shortly after we met. They never want to say goodbye; they just sort of fade into the next room, or tell you to make sure you eat something! I know there are a lot of social problems there, too—gender discrimination and conflicts between people of different regions—but that was almost hard for me to believe, as they’re so cordial and family-oriented.”

A Nepalese woman

Justin is still in touch with several friends he made in Nepal, and knows from them that there's still a great need for help.

"The government has been slow to issue aid money," he said. "It's a relatively new government, and the population of the Kathmandu Valley has been exploding in recent years. New construction—especially quality construction that's seismically resistant—just can't keep up. Let alone financial restrictions, there isn't the know-how nor the type of regulatory agency to provide proper oversight of construction processes."

Justin said that's where he can see the next batch of Co-Build Kathmandu volunteers really shining.

"I think at this stage, the critical need for assessments is past, and it would be better to focus our attention on improving future construction techniques and increasing awareness of the importance of building seismically-resistant buildings, especially while the country is still in the immediate wake of this disaster," he said. "Now is the time to convince the government that better standards need to be put into practice permanently. As it stands, there are too many ways and temptations to cut corners: watering down concrete mixes, lack of proper rebar detailing... There are no enforcement bodies there like there are here, and, currently, no good incentives to institute them."

The next wave of Co-Build volunteers is planning to depart for Nepal in mid-November—and there's still time to join them.

"They need so much help, in every capacity," Justin said. "I was so thankful and glad to be able to go to Nepal. I'd never done anything like this before in my life. I was able to experience a very beautiful, thoughtful, and compassionate culture in a most profound way, and at a time when the people were so vulnerable but yet so strong. It was an inspirational, unforgettable trip, and I want to do more work like it."

"If you're the kind of person who likes life-changing things," Justin counseled, "do it!"

Justin with Nepalese kids

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If you're a structural engineer or architect, or have related professional experience, and are interested in joining the Co-Build Kathmandu initiative, please email info@pilot-projects.org with "Co-Build Kathmandu" in the subject.

Justin will be speaking on the topic "Wood in Engineering: Historic Building on the East River" at the 2015 Wood at Work conference, October 30 at the Bronx Zoo. Online registration will be open until the day of the event.

Justin is also open to giving presentations to other groups, whether or not they're design professionals. If you're interested, contact him at denherder@silman.com.

Tags: nyc, sustainability, participatory design, nepal

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