CHAPTER 6

PERRP Design and Construction

Introduction

With the destruction of buildings in a disaster and the need for reconstruction also comes the need for new buildings to be designed. This chapter discusses both design and construction in general terms, and then looks at how both were handled in PERRP.

The first part of this chapter brings in the subject of engineering and architectural design. It considers how the new design can be an opportunity to not only reconstruct using earthquake-resistant design criteria but also to construct new buildings that have improved function and relevance to community needs, including integrating features that are culturally appropriate. Content here draws on scholarly sources in architecture that argue that "design needs to respond to culture" (Rapoport 2005: 126). Accordingly, this section looks at how PERRP responded to cultural factors in its new building designs, and how by getting community input, designs were enhanced and some costly mistakes were avoided. Included are some examples of other factors that can affect design in a postdisaster scenario.

The second part of this chapter is about construction generally and then specifically in PERRP. Drawing on research literature referring to construction in many countries, I provide an overview of the challenges and hurdles faced by construction policy makers, planners, and managers even without a disaster. I discuss how reconstruction is likely to be affected by the state of the construction industry before a catastrophe occurs. I also raise the most relevant issues of stakeholder consultation and describe how, in the design and construction, the end users are often completely ignored.

This section also looks at how a disaster multiplies existing challenges in construction. I describe how construction was organized and managed in PERRP: its staffing, locations, site selection, subcontracting, scheduling, quality assurance, monitoring and supervision, and overall management. I include results from a focus group discussion with some of PERRP's most experienced field engineers, comparing "textbook construction project management" with what they had experienced as common in Pakistan and other countries.

Despite all the challenges, PERRP received international recognition from the Design-Build Institute of America for design-build excellence. For 2012, the institute conferred the "honor award for educational facilities" to CDM Smith based on the "design-build of four earthquake resistant schools in Pakistan" (PERRP 2013: 21).

Part 1: PERRP Design

When developing a building design, whether for construction in normal times or in disaster reconstruction, there are innumerable factors to consider. New construction in both situations provides opportunities to improve on earlier designs by taking in an even wider swath of considerations—seismic resistance, environmental aspects, sustainability, and suitability of design for the building's purpose—while still meeting the usual parameters for budget, timeline, design codes and standards, and client and funder requirements, among other factors. The purpose of these considerations is, of course, to create buildings that are long-lasting, safe, good-looking, comfortable, popular, culturally acceptable, and able to function according to needs. After a disaster, however, there are additional challenges for design: shortages of qualified building technologists, engineers, and architects; rapid changes in building codes, or standards that are poorly communicated in the chaos; client or funder constraints; long lag times for approvals; and abnormally strong time pressures to produce designs so reconstruction can get underway.

Additional issues are also considered in the design. First is the importance of community and end user input to the design of public buildings. While this is common practice and is even mandatory in many parts of the world, in other countries including Pakistan such stakeholder consultation is either unheard of or, if required by authorities, is often ignored by the companies involved. Next is the general subject of culturally sensitive building design, and how postdisaster times may provide opportunities that did not exist or were not pursued before the disaster. Taking advantage of such opportunities requires deliberate attention to, knowledge of, and respect for a culture—all of which are often missing according to the research literature. Also considered in this chapter are ideas about culture, design, and sustainability. Included too is a look at how cultural issues arose in PERRP concerning the design of the seventy-seven large facilities to be constructed, and a discussion of how they were addressed and what difference was made by doing so.

Culturally Sensitive Design

For public buildings, cultural sensitivity to design is critical but frequently overlooked. This is so in Pakistan and elsewhere, even as studies show that buildings that are designed for a culture help to improve their usage—for instance, school enrolments increase and health facility attendance goes up. Culturally specific design requires architects to be aware that building design is not only based on supposedly neutral science but is also culturally based, as much of modern design requirements, standards, and influences come from Western culture. This requires architects to be willing to take the time to consult with those who will be building users and to know and have respect for the local culture. In some cases, even the most basic cultural awareness is missing, and being of the same nationality is no guarantee the knowledge will be present, as with one architect who argued against culturally specific design. See anecdote, page 239.

When rebuilding after a disaster, aid workers, donors, government officials, architects, and other designers are often outsiders—whether "outside" means from a city in the same country or from the other side of the world. Even if of the same nationality, a designer may be of a different class or culture from the community where the building is to be constructed. Those who do the design are often from the educated urban elite, and they might never have visited the poor rural areas where destruction has occurred. They might have little understanding of that culture, or they could very well look down on it, as expressed in the anecdote below. There may be many others who are simply not aware that a particular design imposes cultural norms and values—especially Western ones.

Additionally, in postdisaster situations, there can be time pressures like at no other time. With much more design and construction work happening than normal, the pressure is on to get designs ready and approved for construction to start. To save time, decisions can get rushed and compressed into a one-design-fits-all template. This rush may also mean that designers are unable to visit the sites to be reconstructed, and so do not consult the end users. Instead, they may stay in the design office, urgently producing designs based only on the technical data received, building codes, budget, time allowed, and previous experience—the priority being to meet the deadlines and expectations of the client or donor. Bowing to such pressures can result in mistakes and loss and buildings that do not reflect user needs or priorities. See anecdotes, pages 240–44.

As demonstrated by the official who thought villagers know nothing about design, or the architects who were sure a modern building needed no considerations for culture, there can be lack of awareness—even outright rejection—of local, and especially rural and conservative, cultural features. Instead, some designers may seek to impose their choices, influenced at least partly by their design education. See anecdote, page 240.

This is not a new subject. For over fifty years, Amos Rapoport, an architect and pioneer of the intersection of culture and architecture, has been renowned for his work on the relations between culture, design, and the built environment. Rapoport wrote, "Design needs to respond to culture. There needs to be a change from designing for one's own culture to understanding and designing for the users' cultures" (2005: 126). He has argued that architects too often design for themselves, not the end user ("Interview" 1992). Similarly, according to Memmott and Keys, what is needed is a "conceptualization of architecture that is sensitive to cross-cultural contexts and values and not overly dominated by Western concepts of what architecture is" (2015: 1). The authors further contend:

> Without a more balanced definition of architecture, architects will be vulnerable to designing in an ethnocentric manner, possibly providing a good "fit" in the architecture for their own cultural group, but inadvertently creating a bad "fit" for other cultural groups . . . Such a bad fit may result in users becoming stressed to varying degrees and/or being unable to cope with, or even un-wishing to enter the built environment with which they are presented. On the other hand, we would maintain a good "fit" between architecture and the user will result in a certain "well-being" experienced by the user and thereby contribute to a form of culturally sustainable architecture. (1)

While the above Memmot and Keys observations are general, they also apply to countries such as Pakistan where cultural oversights can cause people to be reluctant to enter or use a building out of protest or rejection of what they believe is wrong. When a school is rejected in this way it can cause a loss of face for school leaders or supporters who, among local people, might be seen as responsible for the design mistake. In a collectivist society where conformity to cultural norms is expected for all, using a building with features deemed inappropriate may bring stress and shame on the user. Fearful of being judged by others for using it, they avoid the building. Such design oversight can be a new problem or a repetition of design shortcomings from the past, such as toilets being put in the wrong places in some Nepali and Pakistani schools and visual barriers not included in some Pakistani schools. This reality already exists in many parts of Pakistan, and as evidenced by numerous studies, such design failures are part of the reason that significant numbers of children—especially girls—do not attend school.

Culture and Building Design in Pakistan

In Pakistan, attendance at school and usage of health facilities—and factors affecting attendance and usage—are common subjects of study by government and aid agencies. In schools, estimates on attendance rates and the number of out-of-school children vary widely. While there are many complex reasons for nonattendance, physical features of the building and lack of adherence to cultural preferences are at least partly responsible. Multiple studies have found what tends to be common knowledge among local inhabitants: that rural people are less likely to send their children, especially daughters, to school if the school is too far away to walk to, if the route is not safe, if the school does not provide the privacy or security of boundary walls, or if there are no toilet facilities (UNICEF 2014; World Bank 1996a; Alif Ailaan 2016). Although boundary walls, drinking water, electricity, and toilets are now considered basic essentials for enrollment in Pakistan's schools, only about 52 percent have such facilities (Alif Ailaan 2016).

From an outsider's perspective, having no toilets in schools may be unimaginable, but their presence or absence is a complex issue in itself, involving factors such as school planning and budget priorities, ideas of cleanliness, personal preferences, and the challenges to maintain them. In any case, change appears to be in the offing. In a part of the world where open defecation is still widely in practice, "studies suggest that access to useable toilets can increase school enrollment, attendance rates, and educational outcomes" (Hayat 2017: iii).

In Pakistan, schools are sometimes mixed-gender, but after puberty, students most commonly attend separate boys' and girls' schools, with teaching staff also separated by gender. Where the custom of *purdah* is in practice, there are additional design needs for modesty and privacy—especially different entry points and visual barriers using walls, window locations, or types. Lack of such privacy screening, and family and social pressure for modesty, can make it hard or even impossible for teenage girls and young women to go to school or on to higher education. Where such protection is not provided, it may be due to lack of budget, lack of awareness, rejection of or disbelief in the cultural needs, or simply a lack of care.

Culturally Sensitive Design in PERRP

One of the many roles taken on by the PERRP social team in the project's participatory process was to act as advocates for culturally appropriate building design, according to the wishes, preferences, and norms of the local people. We believed this would be best achieved through community input to design, and as result of this process there were in several cases some design modifications. The changes made not only helped shape design to fit cultural needs and values, but learning these preferences early also allowed for design changes to be made at the planning stage at no additional cost of money or time, whereas changes later would have been costly and might not have been possible. Schools built in PERRP included visual barriers such as boundary walls, window treatments, different drinking water sources, and culturally preferred placement of toilets. These were provided along with the new requirements for additional space per student and for rooms not previously common in most schools: science and computer labs, libraries, multipurpose halls, and office and staff space. Training in operation and maintenance of all these new facilities included how to maintain the toilets and, what was especially sensitive, how to use them.

In the first year of PERRP, when pressure was intense to produce designs for many new buildings at once, the subcontracted architectural firm insisted on working only from the survey and technical data they had been provided. Being located in a faraway city and under such pressure to produce designs meant they were at first reluctant to visit the building sites. However, the need for them to see the sites and speak directly with the people who would be using the buildings became all the more apparent and urgent as community input to design started, and as community-voiced design issues and requests arose. First needing to be heard were the teaching staff at schools and medical staff at health units: what were their needs and ideas for operating efficient schools or clinics? Next needing to be considered were the cultural preferences of local people, families of users, students, and patients. To avoid costly design mistakes and catch changes early, while the design was still only on paper, PERRP senior management directed the architects to start attending the community design input meetings. Their attendance had rapid benefits, as the designers then were able to make those changes that were feasible, as well as anticipate what would be needed in future designs.

In this disaster reconstruction, PERRP found several culture- and design-related issues, with a few examples shown in the following anecdotes.

End User and Community Input to Design: Process and Benefits

Rationale and Process

In normal times, schools would be designed in government offices or by a hired firm, with no local input. In PERRP, we invited communities to make input to the design of their new building early in the project, and considered this input to be a major step in the participatory process. In PERRP, we invited end users and community members to make input to the design of their new building early in the project. Teaching staff at schools and health personnel at the health facilities, committee members, and others attended design discussion sessions as an early and important step in the participation process. Their participation also raised interest and curiosity and, drawing on local knowledge, helped the project avoid culturally inappropriate design and costly mistakes and delays. With each partner community, the PERRP social team encouraged people in the communities to pay attention to the nature and quality of design and construction, as by then it was widely known that the high death rate associated with the earthquake was caused by shoddy construction.

Our review of related postquake reconstruction projects suggested that inviting such local input to the school and health facility design was probably unique among the hundreds of other schools being reconstructed at the time. But, as our work has shown, involving local people in this way avoided some of the problems foreseen through the social team's "What Could Go Wrong?" analysis, which identified main causes of delays in other school reconstructions, including disputes over culturally unacceptable actions and design features.

The design input was not a free-for-all; the community did not develop design from scratch. Realistically, the design was already dictated by many factors. Long before a preliminary design was shown to end users and community members for their input, the architects came up with draft designs using the parameters they were given: budget, timelines, sustainability, land available, donor and owner requirements, building standards, seismic requirements, and space allowances. At this point, the designs were taken to the community for review and input. Community input was only part of the design process. Design then passed through several layers of approval by USAID and ERRA, in conjunction with the national authority, the Government of Pakistan's National Engineering Services Pakistan (NESPAK).

Design input started in a short series of meetings. Local people had widely varied experience with such modern reinforced concrete building design. As this kind of formal design was new in these remote areas, to most people the technical drawings of floor and site plans were abstract, if not incomprehensible. A small number were familiar with design aspects—usually people who had returned home after having worked in construction elsewhere, especially the Gulf States. To begin basic familiarization before the visit of the architects, social team members brought their counterpart engineers together with community members to begin talking about the design and looking at the preliminary drawings printed out on large sheets of paper. This step enabled the community members to begin formulating their questions for the architects and envisioning what would be built.

In the second step, the project architects visited, walked around the site with community members and staff, then sat down with the people, reviewing the paper printouts and hearing what the people had to say. Designers asked the facility staff and people what they had liked about their old school. What did they think of the preliminary design? What should be included or avoided in the new school? In inviting such participation, some communities gave long wish lists to the architects. These wishes were accepted or rejected depending on feasibility, but such discussions also uncovered or highlighted some weaknesses or unpopular ideas in the preliminary design. Sometimes such discussion revealed that community members and architects had different priorities for use of the land, such as in the above anecdote where community members appealed to save their soccer field. In other projects and locations there were some newly reconstructed buildings that did not consider the culture at all. Through on-site discussion involving the architects, committee members, and clinic or school staff, what could have been a problem was avoided, as shown in above anecdotes.

As the third step in community input to design, and as a standard final step before construction started, the PERRP engineers, with the committee and contractor in attendance, had the design—according to the site and floor plans—marked on the bare ground with chalk powder for all to see. For the first time everyone got to see the exact planned location, actual size, placement, and orientation of the building. Sometimes this process revealed issues that no one had noticed before, again giving the designers time to make changes while the design was still on paper.

Benefits of Local Design Input

Being asked to make input had an empowering effect in the communities. This design input process gave people an unusual amount and type of information, and then encouraged them to analyze it and share their perspectives. This participation developed their sense of ownership, making people more interested in the design, which soon became a popular topic of conversation. In the process, the people built their capacity to analyze information in a new field and proactively share their point of view.

For PERRP, too, local design input had several benefits: it increased cultural appropriateness, enhanced the long-term functioning of the building, and helped avoid costly or impossible-to-correct design mistakes before construction started. Local people's input allowed for low-cost or no-cost changes to the still-on-paper preliminary designs. We never attempted to calculate how much construction time and money were saved by catching design problems early enough to change them—but those amounts, if they could be calculated, would be significant. Useful ideas, especially about visual barriers, came out of these early meetings, and PERRP began incorporating them as preferred design features in subsequent sites, instead of waiting for them to be requested. Recognizing the importance of these changes for design and construction is one thing, but they are, of course, even more valuable for people's comfort and use of the buildings in future.

Participants in the design input step varied from place to place. In some cases, the committees and school or health facility staff viewed the design plans as a small group. In other locations, committees chose to make the design input a public process, including other community members and large groups of the schools' own senior students. According to local practices of *purdah*, separate design meetings were held with men and women in some locations. Students also were asked for their design ideas in different forms. In a drawing exercise, students were asked to do two drawings, one to show what had happened to their school the day of the earthquake, the other to show what they would like in their new school. Students enthusiastically participated, submitting about four thousand drawings; one hundred fifty of them were selected for a special exhibition at the National Art Gallery in Islamabad, to commemorate the sixth anniversary of the quake.

Sustainability

At the design stage, the physical sustainability of new buildings was a major concern. The choices made at that time determined much about the building's physical future—not only how it would withstand future disasters but aspects of its daily operation and maintenance: how maintenance would be done, by whom, under what supervision, and with what skills and resources. The design determined what was needed to ensure the new building's maximum life and usefulness, as well as its affordability. In PERRP's case, there were a number of design considerations for sustainability of the new buildings. Earthquake resistance was of primary concern, following the ERRA and donor policies to "build back better." This was to not simply restore the level of development that had existed but to improve on it and reduce vulnerability in any future disasters.

Extreme weather conditions and low government budgets for operation and maintenance of these buildings were other major considerations. It was essential for the new buildings to be as easy and low cost to maintain as possible, as communities were to share responsibility for operation and maintenance with the government owners, and their budgets were minimal. Planning ahead for these realities involved several considerations:

- the building envelope and the kinds of floor materials and outer and inner wall treatments that would require the least attention and expense to maintain
- roof and drainage style, to help manage precipitation from monsoon rainwater and snow melt runoff while also preventing damage to the property
- placement of large windows to allow the maximum natural light, as electricity was scarce and expensive
- natural ventilation without electricity-dependent fans
- accessibility for those with physical disabilities

Due to the topography of the region and the subsequent variability of building sites, designs for each building were custom made individually, although PERRP buildings maintained a similar, recognizable style.

Location is another factor in sustainability. Some schools or other buildings had been destroyed in the earthquake or in earlier disasters because they were located in hazardous locations—particularly landslide- and flood-prone zones. In such cases, PERRP took measures to eliminate or reduce the risks, also acting upon local knowledge, such as that revealed when architects and local people took a walk together around the site where a destroyed BHU was to be rebuilt. See anecdote "Flash Floods," page 244.

Clearly, there is more to the sustainability of a new building than its technical features. One of the most important opportunities after a disaster is to design and construct buildings that are culturally sensitive and culturally sustainable, thereby making them more acceptable than the previous buildings to users. This requires knowledge of and respect for the culture, and willingness to design for what users consider culturally appropriate. As Skjerven writes, "the work of promoting sustainable development that explicitly concerns not only physical but also cultural matters is a relatively new occupation, thus there are many blank spots related to this endeavor on the map of knowledge and understanding" (2017: 19). PERRP tackled these challenges to construct buildings that would be both physically and culturally sustainable.

Part 2: PERRP Construction

Leading in to discussion of how PERRP's construction was organized and managed is some background on why the destruction rate was so high in the earthquake zone and how that damage was attributed to faults in earlier design and construction. Those observations are then set in the wider contexts of challenges to construction in Pakistan and other countries. This is especially important to consider, as much about any disaster reconstruction will be determined by the state of the construction industry before the catastrophe. While the research literature on the construction industry around the world finds many common issues and hurdles, one subject I found disturbingly common is failure to even mention the people who may be most affected by, and who may have the most effect on, the construction site: those living nearby who are expected to benefit from the construction. In this section, PERRP's main technical challenges are discussed, followed by details about the organization and management of the construction. This section ends with results of an engineer's focus group that compare this project's construction management with others. A detailed ethnography at the end of this chapter, "Boys' Primary and High School Glacier Way," illustrates how construction can have many unforeseen situations that require more than engineering or construction management expertise.

As stated elsewhere, almost all of PERRP's seventy-seven construction sites were completed on or ahead of schedule. Such an achievement not only benefitted the donor and the companies involved—it also helped build the capacities of local institutions and, for those who lost so much in the disaster, it meant people finally had facilities in which to study or get health services. When reviewing the range of challenges faced, PERRP's achievement is all the more remarkable.

First, Why the Destruction?

The 2005 quake killed over seventy thousand people and destroyed or damaged over half a million homes and almost all educational and health facilities. Why such devastating destruction? The most widely made observation about the cause of this destruction was the shoddy construction and unsuitable materials (Durrani et al. 2005). In Pakistan and around the world, hundreds of thousands of lives have been lost in recent decades due to poorly engineered and improperly constructed buildings in high seismic zones. What makes a building earthquake resistant? Some main features are "concrete (shear) walls, columns and beams that must have extra steel to withstand movement caused by the earthquake forces[,] and floors and roofs [that are] properly anchored to the beams and columns to reduce the probability of their collapse onto occupants" (PERRP 2011/2012:10).

In prequake Pakistan, building materials were often those available at hand—mainly stone, brick, or concrete, without the appropriate steel reinforcement needed to withstand seismic motion. One study by the Earthquake Engineering Research Institute (EERI), undertaken a month after the quake by a panel of seismic engineering experts from the USA and New Zealand, observed that "most of the buildings in the affected areas were of non-engineered reinforced masonry wall construction. Most of the structures consisted of one or two stories of unreinforced stone, solid brick or solid concrete block masonry bearing walls with reinforced floors" (EERI 2006: 7). Another study, this one by the Mid-America Earthquake (MAE) Center, came to similar conclusions: "The structural damage was expected owing to the poor quality of construction of traditional housing and modern reinforced concrete structures not designed to resist earthquake action" (Durrani et al. 2005: 6).

The MAE Center and EERI studies likewise determined that existing building codes in Pakistan were out of date and seldom enforced. The building codes referred to by these experts are those developed around the world from lessons learned from other seismic disasters. Comprehensive seismic building codes, guidelines, and standards, such as those in the 1997 Uniform Building Code (UBC) and subsequent updates, have been developed and used in many countries, including the USA, and in all the buildings constructed in PERRP.

Challenges in Construction in Pakistan and Other Countries

The fact is that Pakistan has a rich heritage of buildings that have lasted a very long time. The subcontinent, including Pakistan, is renowned for some of the world's oldest and most magnificent examples of design and construction. Pakistan has six UNESCO World Heritage sites, with eighteen other sites tentatively selected and untold others waiting. The six include the archaeological sites at Moenjodaro, dating from the 26th to 19th centuries BC; Taxila, from the 5th to 2nd centuries BC; the Buddhist monastery ruins at Takht-i-Bahi, from the 1st century BC; the Maki monuments at Thatta, Sindh province, from the 14th to 18th century; and the Lahore Fort and Shalimar Gardens from the Mughal era in the 17th century.

While such ancient structures are admired around the world, the challenges encountered when constructing them seem to be long forgotten. Not so with construction today. While construction is considered vital to development, it can also come with losses, complications, and controversies. The reputation of construction in Pakistan, even at the best of times before the earthquake, was frequently negative and assumed to be riddled with problems that all too frequently rendered construction projects stalled or even abandoned—whether the building was a mega project or one-room school.

The above realities indicate the challenges for construction even before the disaster and act as a reminder of how such realities will determine much about reconstruction. Such factors were what PERRP and other agencies involved in reconstruction were up against as each initiated and managed their own reconstruction projects.

Nowadays, there is a mushrooming literature on infrastructure construction challenges in Pakistan and around the world. Even without a disaster, comparative analyses indicate that Pakistan is not alone in facing barriers to getting safe, durable buildings completed. The problems they list could be categorized as managerial, technical, financial, policy related, procedural, and legal. The challenges listed barely hint at any social or "people" issues. A study by the Asian Institute of Technology on risk management in Pakistan's construction industry states its findings bluntly: construction there "is a high-risk business which haunts every participant in the business, the project owner, construction companies, consultants, bankers, financial institutions, vendors and suppliers, and even service providers, each has his own fears of facing risks in the conduct of business" (AIT 2010: 1). According to this study, the top ten problems as seen from the contractor's perspective are 1) delays in resolving contractual issues, 2) delayed payment on contracts, 3) political uncertainty, 4) financial failure, 5) scope of work definition, 6) war threats, 7) suppliers and subcontractors' poor performance, 8) change of work, 9) defective design and labor, and 10) equipment productivity.

Particularly revealing and relevant is a detailed series of studies by the World Bank to assess Pakistan's infrastructure implementation capacity. Based on literature reviews of construction challenges in several developing countries, a main conclusion in the World Bank series on Pakistan's construction industry is that "there is consensus on certain common issues that plague the construction industry in developing countries" (Mir, Tanvir, and Durrani 2007: 1)—implying that Pakistan is no exception. The same source adds that "the construction industry in Pakistan is well aware of the challenges it faces" (1). According to the World Bank series of studies, the problems in common include a lack of adequate education and training; a lack of government commitment; absence of long-term vision and planning for the industry; ineffective planning and budgetary procedures; fluctuations in work load; defective contract documents; corrupt contracting procedures; a lack of protection against adverse physical conditions; delays in payments to contractors; problems of bonding and insurance; absence of adequate credit; restrictions on imports; foreign exchange constraints; unfair competition from state-owned contractors and consultants and problems relating to availability of equipment and spare parts; and delays, cost overruns, and miscommunication of information (1).

A disaster of course multiplies existing challenges. A literature review (Hidayat and Egbu 2010) on the role of project management in postdisaster reconstruction drew comparisons from eleven disasters in different parts of the world, including the Mexico City earthquake (1985), the Kobe, Japan, earthquake (1995), the Turkey earthquake (1999), and the Indian Ocean tsunami (2004). Metrics included policies, funding, land ownership, construction material, contract abandonment, local capacities, political environment, and construction costs and quality. Not surprisingly, problems that were already common were intensified after the disaster, as costs escalated, supplies of materials and labor tightened, construction quality was compromised, and field staff struggled with insufficient relevant experience and training to manage such large and complex projects.

While construction problems are common knowledge in Pakistan, what is notable are the other factors that go unmentioned in these studies. In the studies consulted, nothing at all is mentioned about the social aspects or social context of reconstruction, or how these factors may play a large part in the success or failure of a project. The studies present a consistent, exclusive, top-down view, talking only about the concerns of the client, employer, contractor, engineer, or construction manager. Even the relatively exhaustive aforementioned World Bank series, in a 150-page analysis of "local stakeholders' perceptions" of the issues and hurdles in implementing large infrastructure projects in Pakistan, included as the only "key stakeholders" clients, consultants, and contractors (Gilani, Mir, and Malik 2007: viii). In none of the studies is anything at all mentioned about the local people: the stakeholders whom the project is intended to benefit, the people whose lives or property will be affected by the design and construction. There also is no mention of the key stakeholders' relations with the people. Unacknowledged in these one-sided studies is how the so-called key stakeholders' attitudes, actions, and behaviors can be the cause of many problems, resulting in threats, conflict, and court stay orders leading to a significant number of the work stoppages.

The above kinds of analysis miss the point that construction projects can be affected by sociocultural factors that appear to have little or nothing to do with construction, but which, if not acknowledged or if left unaddressed, can have serious impacts. Contractors in Pakistan and elsewhere frequently assume a stance similar to eminent domain—the government's right to take private land for public use—arriving invasion style, as if saying "we were sent here to build, so just get out of our way; you should be happy we are here." In many instances, there is little contractor acknowledgement of private property, and no thinking ahead as to the harms they can cause, including damage or destruction of private property; financial or material loss; local conflict and permanent damage to local relations;

and serious cultural offences, leading to loss of face or status or even loss of life. Without asking for permission, they may take over private land, cut trees, park their vehicles and unload their materials where they please, bring workers with them or hire people who may cause trouble or fail to pay what they owe locally, and so on. It is no surprise that adversarial relationships between community members and contractors are common.

There are a few reasons for the invisibility of local stakeholders. First, construction is inherently top-down and one of the last frontiers for more genuinely inclusive participation. Also, contractors tend to downplay or ignore the complaints of the poor and presumed-to-be-uneducated local people, whose concerns are often dismissed as mere irrational irritations that do not even rise to the level of legitimate problems.

There does, however, appear to be an incipient recognition—at least in the academic study of construction project management—that there is more to a construction site than steel and concrete. Construction management itself is, "in comparison with other areas, a relatively new field of academic inquiry," yet even within that field, the subject of culture—or "sociology of construction"—is underexplored (Harty 2008: 697). Harty suggests using sociological approaches to study construction management culture, as these approaches offer "a broad canvas of theories and approaches when we are thinking about the way people act when performing construction work" (706). Pink, Tutt, and Dainty have found that "[e]thnography is now emerging as part of the repertoire of approaches to understanding the construction industry" (2013: 1). As this latter work points out, for construction policy makers, planners, or managers, an ethnographic approach to construction means having direct contact with the end users "within the context of their daily lives (and cultures), watching what happens, listening to what is said, asking questions" (4)—in other words, using participant observer methods with the main stakeholders to develop an understanding of their needs and preferences, and then following up accordingly. Kivrak, Ross, and Arslan, too, have noticed that "[t]here is a growing interest in the studies on the culture of the construction industry, projects and the effects of culture and cultural differences on construction" (2008: 2).

As these scholars have noted, the need for awareness about sociocultural aspects of construction is being magnified by the enormous increase of construction firms working internationally in a highly competitive market. In this situation now, many sources are seeing cultural know-how as tied to the bottom line. "Understanding, respecting, accepting and managing cross-cultural differences effectively in construction projects can enhance the organization/project's effectiveness and provide competitive advantage, while ignoring or failing to manage cultural differences may lead to many problems in these projects, such as project delays and decreases in productivity" (Choi et al. 2015: 173-2). Occasionally, articles and papers on culture and construction appear in construction and engineering journals and at international conferences, such as the International Conference on Multi-National Construction Projects: Securing High Performance Through Cultural Awareness and Dispute Avoidance, which took place in Shanghai in 2008. Similarly, the subject of culture and construction was featured in the International Construction Specialty Conference of the Canadian Society for Civil Engineering in Vancouver in 2015.

The above does indicate growing awareness of the need for construction to include sociocultural programming. The challenge, however, is to avoid this being just more rhetoric. As discussed in chapter 3, there already is a large gap between theory and practice. To conceptualize, implement, and manage such work requires sociocultural experts specializing in people's participation—and for these specialists to be part of the project design from its early concept stages at senior levels, as was the case in PERRP. The most effective results will come when sociocultural experts, construction project managers, engineers, and other technicians work together.

Whether looking at postdisaster reconstruction or construction in normal times, whatever the country, questions need to be raised about these too often invisible or ignored stakeholders, especially because they—as users of the new facilities—may have the most at stake. As shown in PERRP, there are multiple benefits to bringing these stakeholders into the projects as partners. The question is, if construction problems are similar from country to country, could some of those challenges be reduced by structured community participation, such as occurred in PERRP?

PERRP's Main Technical Challenges

As described in detail in chapter 4, the scene was still quite chaotic when PERRP started about a year after the quake. Many dozens of international, national, and local agencies— NGOs, donors, the United Nations—had started their reconstruction projects months earlier but most of that construction was already in trouble, with many projects encountering a list of problems, including stalled work. Even so, the pressure was on to get construction started, get shovels in the ground, and get facilities completed so schools and health units could function again. Increasing this pressure were the technical challenges the project faced. The main challenges came from shortages of various kinds as well as the physical environment.

Shortage of Materials and High Prices

As the demand for construction materials was high, prices for these goods escalated dramatically. In this case, to save costs the project procured the materials in bulk—steel reinforcing rods, concrete, windows, doors, and tiles—and provided them to the contractors. This bulk buying helped to control costs, reduce speculative bidding, and maintain uniformity and quality of materials (PERRP 2013: 15).

Topography, Altitude, and Climate

The earthquake zone was spread out over an eighteen thousand square mile area on the southern edges of the Himalayas. The project's construction sites were in steep mountain locations, with few roads—and those that existed were narrow, sometimes single-lane dirt roads with many tight switchback corners that made it difficult for trucks and heavy equipment. In places, roads were not repaired after the quake or suffered other damage from landslides. All of the facilities built were at fairly high altitudes, an average of 5,500 ft. They ranged from schools at 7,900 ft at Naran, in the Kaghan Valley in KP, to schools and health units in Bagh, AJ&K, at 3,400 ft. Some of the sites were snowbound and inaccessible in the winter, while others were in monsoon areas in summer. Construction had to work around such weather conditions.

Shortages of Land, Water, Electricity, Reliable Construction Contractors, and Skilled Laborers

Land, of course, may be the number one need when it comes to construction. However, land issues throughout this project area—as discussed in chapter 2—were common and high risk, and these concerns were compounded by the disaster. The project's social team worked intensely with the communities to deal with land issues well before construction began, which helped prevent many of the problems suffered by other construction that made no such attempts.

The project was required to rebuild on the same amount of land already owned by the school or health facility, but given the new requirements, that land was often very small. The new building codes introduced or enforced following the earthquake required both more square footage per user and extra rooms not previously included in schools, such as laboratories, a library, and washrooms. As no additional land or new sites were possible, these codes were usually addressed by constructing a two-story building, whereas the destroyed building had been a single story. In one case, where a school was to be rebuilt in a risky location, the project workers and the community took extraordinary steps to reduce or eliminate the risk, as shown in the anecdote "Mohandri School, Mountainside Boulders." See anecdote, page 245.

Seismic construction involves mixing and pouring large amounts of concrete, which requires a high, consistent flow of water at crucial times. Electricity is also crucial at times, but in the project areas both were often scarce, even before the disaster—and the quake damaged electricity infrastructure as well. In many places, the earthquake had shifted the ground, causing some water sources to disappear, or appear in other places. The social team's work with communities helped deal with both these shortages.

How PERRP Organized and Managed Construction

At its peak, the project had 207 staff, including 93 engineers with various specializations and other technical staff to work at all the sites, 12 social team members, and 102 administration and support staff in finance, procurement, communications, logistics, security, transport, information technologies, and other areas. All but five of the positions were filled by Pakistanis. The majority of staff were located at the two field offices and on the construction sites. Senior management comprised four people: the project's manager or chief of party, who was also the chief engineer; the deputy chief of party, who was also the deputy chief engineer; the head of finance; and me, the head of the social component, also called the community liaison specialist. Our main office was in Islamabad, Pakistan's capital city, and we had two field offices: one in Mansehra city, KP province, and one in Bagh, AJ&K. Construction was carried out, monitored, and supervised from the Bagh field site.

The project's construction sites were spread out over Bagh district in AJ&K and the nearby Mansehra district of KP province, the sites being located from one hour's to five hours' drive from each of the two regional offices. The complete list of places built in PERRP is included in the appendix.

From the thousands of schools and health facilities destroyed, ERRA provided a list of 250 sites to USAID to consider reconstructing. These were then assigned to PERRP to conduct social, technical, and environmental assessments, and from the assessments, budget, time frame, and other factors, it was determined which places were most feasible for this project to build. To determine feasibility, small teams of PERRP engineers and technical surveyors conducted rapid assessments at each of the 250 sites. These rapid assessments sought to answer key questions: Was there access to roads, and if not, how far off the road was the site? Was there enough land to build on, given the building standards required? Did geotechnical tests indicate suitability? Were the needed water and electricity supplies available? What environmental impact could there be and what mitigation measures would be needed?

Using social criteria developed by the project, social mobilizers also visited each site for a quick assessment, talking with key informants such as teachers, medical staff, and others. This visit was to ascertain if there were any community factors that could negatively affect construction or the future operation of the school or health facility. As these communities were known to be heterogenous, the social mobilizer triangulated to identify local relations and conflict, if any, in the community. When conflict was found, we assessed its nature and risk level. We asked several key questions: Before the quake, how had the school or health facility actually been functioning? Were teachers and students, or health staff and potential patients, still present and needing these facilities? Would that need continue in the future? Who did the facility serve? Was the community involved in the school or health facility at all? Were there any sensitive areas, such as graves or monuments, that needed to be protected? Who owned the land where the facility was to be built, and the land adjacent to the building site? Did they have legal documentation of ownership—a mutation document, deed, or title? Was there the potential for conflict related to the land? If there was conflict, how feasible would it be for the social team to handle it in the time given?

In the first list of 250 schools—mostly one-room primary schools—many already had serious land ownership issues. When they were originally built, local people had donated the land, but the ownership was never officially transferred to the government and there were now many disputes over it. Settling such issues would take years—time that the project could not afford—so these sites were eliminated from the PERRP list and assigned by ERRA to local and international NGOs that would be present for the long term. ERRA and USAID redirected PERRP to construct only the larger facilities, mainly high schools where government had purchased the land so its ownership was settled.

Once the engineering, environmental, and social assessment questions were answered, a semifinal list was sent back to USAID, and—with ERRA's approval—the selection of sites was finalized.

Final Selection of Sites

From the original list of sites, the number was reduced to seventy-seven—sixty-one schools and sixteen health facilities. Places not chosen were rejected for a combination of reasons, such as intractable land issues, the size of the plot being incompatible with the new building standards, and the site being too far away from any roads. Only one site, a health unit, had to be eliminated due to a social conflict (see the anecdote "Who Should Attend the Meeting?"). In that case, the community was divided into two groups based on political affiliations with a long history of opposing each other on many subjects. Despite project efforts, they could not come to agreement, and the project declined to build there at all; instead, PERRP was assigned by the Department of Health to build a different health facility in another community. The seventy-seven selected PERRP sites were on government-owned land, with the mutation documents to prove it. While most of the communities where PERRP built still had land issues, those were due to a lack of agreement about exact boundary lines.

All of the sites in the final selection played significant roles in their regions. Most of the schools were high schools, where enrollment usually included children from preschool to grade ten, and higher secondary schools for students in grades eleven and twelve. While government primary schools are dotted throughout mountain villages, these higher-level schools are far less common, requiring students to walk far distances out of the mountains daily to attend high school. While schools for primary students were being built by other agencies, the multilevel high schools constructed by PERRP would give many more students from a wide area the opportunity to continue to a higher level of education. Of the total of sixty-one schools built, about half the students were girls, half boys. All of these schools were government owned and attended by children of the poorest families.

Subcontracts for Design and Construction

All the design and construction was carried out by Pakistani contractors who PERRP prequalified based on their technical and financial capabilities and their reputation for timely performance. From a pool of prequalified companies, the project selected construction contractors for each small group of two to seven buildings and awarded contracts based on competitive bidding. In total, twelve Pakistani construction firms, with a workforce of 5,800 workers, and over 250 local suppliers were contracted. In most cases, the construction contractors brought their own construction crews from other parts of Pakistan, as they were the skilled laborers needed, and skilled labor was scarce in the project area. Some unskilled laborers were hired locally. To design the buildings, four domestic architectural and engineering design firms were contracted.

Scheduling

Time was treated strictly. As a whole project, PERRP itself had strict beginning and ending dates by which all the work was to be completed. This required emphasizing to the contractors that they had to carry out all their work in a tightly controlled amount of time. If they got behind schedule, they were required to submit a "time-recovery schedule," a plan for making up for the lost time.

Each contract stipulated a specific maximum number of days by which all work had to be carried out for each building. The number of days was earlier estimated by PERRP design engineers according to size of the building, complexity, and other factors. For example, the 19,083-square-foot Government Girls' High School Chatter #2 was contracted to be completed in a maximum of 453 days—a goal that was achieved several weeks ahead of time. The largest in the project was the 84,031-square-foot Government Boys' Higher Secondary School Mansehra #1, which was built in 558 days. From the day USAID issued their formal notice to proceed with construction to the day the building was declared "substantially completed," each contractor's time was strictly counted. In each case, a plan was made that divided the total construction job into many stages, with dates agreed for completing each stage. At each site, the committees were also informed of the number of days the contractor was given to complete the construction, making that number of days common knowledge in the community. A countdown of days was started, adding to the committee's incentive to help prevent any interruptions. All the work was then monitored and supervised by the site and resident engineers for quality assurance. Time was also saved by having the community well prepared for the arrival of the construction contractor. As described in chapter 4, a main part of the community's responsibility was to help keep construction on schedule by preventing community-related problems, by making a formal agreement with the contractor, and by assisting whenever possible. Once the project got up and running, the average time for preparations—from first visit, to design and tendering, to the arrival of the construction contractor—was about five months. The period for construction then was on average eighteen months.

For the construction contractor, there were strong incentives to complete the contract as early as possible. As mentioned later in this chapter, contracts were awarded on a firm-fixed-price basis, meaning that the amount of money they would be paid was firmly fixed and agreed at the beginning in the contracting stage and would not be increased. To the contractor, this was the main incentive: the sooner completed, the lower the costs, and the greater the profit.

Monitoring, Quality Control, Quality Assurance, and Supervision

A common observation about construction in Pakistan and other countries is that it too often lacks supervision and quality control. However, PERRP's construction had four layers of management and monitoring to keep things on track. Full-time at each construction site was a site engineer to supervise the contractor to ensure they were building in compliance with the design provided to them, using the agreed materials, following safety regulations, and working within the agreed amount of time. At least weekly, the resident engineer visited to see the work of the site engineer, assess progress, and assist and guide as needed. At the higher level, a field-based overall construction manager monitored the sites and engineers and reported to the project's chief of party and deputy chief of party, who oversaw issues, compliance, and the progress of all of the sites.

With daily supervision on-site by site engineers and frequent visits by their superiors, weekly progress was quantified and reported. If the agreed progress had been made, the contractor continued on to the next stage. If the agreed progress had not been made, a time recovery plan was made and agreed upon. On a daily basis at each construction site, a social mobilizer and the site engineer worked closely together as counterparts—the engineer to deal with the contractor, the social mobilizer to work with the committee. Together, they were the frontline workers to keep things going. Such coordination was a key to successfully running construction in so many tough locations almost simultaneously.

During the early years of the project, the local contractors were sometimes found to lack the level of technical and managerial expertise needed, so they were mentored and trained by PERRP engineers on the building codes, scheduling, cost control, quality, health and safety, and contracting mechanisms. Project engineers themselves also upgraded their skills through both on-the-job training and online education from the implementing agency's subsidiary training organization, CDM Smith University online.

Corruption Prevention

Corruption in construction is a worldwide problem, and even in disaster reconstruction it is a reality requiring close scrutiny and control by donor and implementing agencies. Corruption is another complex subject and can happen in different forms, such as demands for cash, goods, services or favors, or illicit and often unsafe cost-cutting measures. In PERRP's construction management, this factor required multilevel involvement and stringent quality control procedures combining cost control and corruption prevention.

The project established for work on the ground a thorough selection process to vet potential contractors for their reputation for quality work, reliability, and being well-financed. Thorough costing was conducted ahead of time to know if contractor's bids and later claimed expenditures were legitimate. Bidders then were chosen based on realistic costs presented, not always on lowest bid terms (which tends to invite increased "costs" later). Contracts were detailed, specific, regularly scrutinized, and enforced to prevent loopholes and "extras," and each contract came with a firm fixed price or budget with no increases allowed. Each contractor was issued detailed scopes of work and procedures for change orders, which also helped prevent unauthorized work and payments.

In disaster reconstruction there can be additional possibilities for corruption when there is an extraordinarily high demand for and shortage of materials, and thus prices are far higher than normal. In such cases, to cut costs contractors may substitute cheaper, low-quality products and then try to cover them up by bribing inspectors, but when such costs did increase dramatically following the Pakistan quake, PERRP thwarted the problem by supplying the project's contractors with the main materials: cement and reinforcing steel.

Whereas delays in payments to contractors are a common problem, regular approvals and payments by USAID to CDM Smith allowed for the contractors to be paid regularly, keeping the needed cash flow. PERRP also kept close contact with high-ranking government officials to seek help in case of attempts at kickbacks. One situation where this did occur was when a lower-level official refused to acknowledge the government of Pakistan–approved import tax exemption for construction materials—a refusal that frequently signals a bribe demand. Reporting this to the higher officials resolved the issue with no illicit or illegal action in under twenty-four hours.

The key to corruption prevention was probably the selection, vetting, compensation, training, and monitoring of project staff. Recruiting qualified staff, with a pay scale that did not let staff fall prey to temptation, was essential. Also important was mandatory anticorruption training, with warnings of termination and potential criminal investigation if illicit activity was found. As described later in this chapter, unusually heavy monitoring was a deterrent. Besides daily, full-time monitoring on-site and from the regional office, weekly visits were made from the project head office.

Involved in the monitoring were engineering supervisors, social mobilizers, and committees. As part of the community participation, committees were asked to watch at construction sites and report any instances where they thought contractors were using substandard materials, resulting in a few such reports, which were checked and resolved. In the end, not a single issue of corruption was reported or detected.

Operation and Maintenance (O&M)

In PERRP, the committees agreed to share with the government the ongoing responsibility for the operation and maintenance of the new buildings.

This work was a completely new undertaking for such communities, because there was an expectation among the people that the government—which owns the buildings—would be responsible for looking after them.

To do their share, the social team had the committees draw up plans for what, when, and how maintenance needed to be done, as well as who would do the work and who would monitor it. The work was divided among cleaning staff (present in only a small minority of the schools), teachers, and students, with duties and a schedule posted for all to see. The committee visited regularly to see if the plan was being followed and to take action as needed. From the level of middle school upward, students, teachers, and any other staff were trained in "urgent operations," such as using a fire extinguisher, shutting off a water pump, or flipping a switch in the circuit breaker box. Nothing like this had been expected of the schools before, but most did it while the PERRP project was underway. Construction projects are often required to provide training or produce a detailed O&M manual for buildings, but the manuals are infamous for being dust collectors. Even though PERRP also produced the manuals, it encouraged teachers to post their own simple instructions and schedule where students could see it and check it off as duties were completed. Such hands-on experience raised some awareness of the need to keep up with O&M duties.

While the committees did an admirable job while PERRP was present, once PERRP was completed, the level of O&M dropped significantly in many cases, along with the committees ceasing to function as they had throughout the project. Government budgets and practices still allowed for only the minimum of O&M support, and people reverted to treating it as a government responsibility. However, general cleanliness was maintained at the female-led girls' schools by teachers and students themselves.

Reconstruction Site in Community Landscape

Most of the places built were in remote, rural areas throughout the mountains. Each construction site had high visibility in these quiet rural areas, and as such, it was the center of attention. Almost every day, visitors came from the community or other villages to watch the construction from a distance outside the marked safety boundary. Frequently, the site engineer, who was the project's full-time supervisor at the site, chatted with visiting committee members, groups of neighbors, elders, students, and families with out-of-town guests. From discussion about the earthquake features in the buildings under construction, a new seismic vocabulary of "shear walls," "columns," and "beams" was worked into the local languages.

Comparative Analysis of Construction Management

In the Public View

There may be a range of indicators of the quality of overall construction management, but in PERRP, the strongest evidence may have been the visible, concrete results seen daily by the public. Over the few years following the earthquake, reconstruction was to occur across the eighteen thousand square mile area of the destruction, at several thousand sites. In many places, these sites were visible along roads or in towns, making it easy to watch and compare construction progress—or lack of it—while traveling by. In this project's communities, construction status and comparisons were a daily topic of conversation among local people, PERRP engineers, social team members, and local officials. These ongoing observations were usually about PERRP construction as compared to the other construction happening nearby. Community people, often proud of their own involvement to help make it happen, frequently pointed out that the PERRP construction was continuing more consistently, without starts and stops, and was being completed more quickly than work in the other projects. In casual conversations and in meetings, local people talked about other nearby construction and recounted or speculated on the conflict over it, the court cases, the disappeared contractor, the funding problems, the reasons for it being slow or stopped, or other details.

As these local people were from the communities that had formed committees to work with PERRP, they often expressed pride in their roles in the project. The trouble experienced in other places was not happening in PERRP communities, partly because they had organized and were participating as partners with PERRP.

Engineers' Focus Group Analysis

As PERRP was ending, several internal assessment workshops were held. One such session was held especially for social team members, most of whom had little or no previous experience with construction, to ask project engineers about the construction management they had seen going on successfully in the previous six years. While the social team had introduced several innovations—the Committee-Contractor Agreements, the communication protocol with its grievance procedures, and so on—they wanted to understand from the engineers what construction was usually like in other projects and what these engineers did to keep PERRP moving forward.

These internal assessment workshops consisted of a focus group in which the engineers were asked to do an analysis based on their work experience inside and outside of Pakistan. This focus group was composed of eleven highly experienced Pakistani construction engineers with a combined total of 241 years of work in construction projects in Pakistan and other countries in the region. They were asked the following: Was construction in PERRP managed in any special or unique ways? How did it compare with their other construction experience? How were you, in PERRP, able to bring so much construction, in such tough conditions, in on schedule? They responded that nothing they were doing was unique. As one stated, "We did not invent any of what we do; we only applied textbook construction project management." They had learned these textbook practices in their own careers, from management training at university, from other companies, or from the implementing agency, CDM Smith. The focus group gave examples of what they meant by the "textbook construction management" strategies used in this project.

Selection of Contractors

Many of the most common problems in construction projects, according to the focus group, start with an improper process for choosing contractors. When construction is for government, the departments have a pool of enlisted contractors in different financial categories, with bid documents provided only to a select few. Only handpicked contractors are shortlisted, and these contractors can manipulate the rates or terms of payment, or deliberately underbid to try to get the job, and then demand more money later. In highly charged political environments, contracts are sometimes awarded under the table and paperwork is completed later.

However, in PERRP, potential design and construction contractors were chosen using a thorough, transparent five-step process to assess and prequalify them. First, invitations for applications were issued through the national media. A PERRP project committee of engineers then conducted a desk review of the submitted documents and made a preliminary short list of firms. Verification visits were made to those companies to see their organizational setup, including their completed and ongoing projects. From the visits, a final short list was made, prequalifying those companies to bid on "task orders"—small groups of schools or health facilities to be built. Contracts for that work were awarded based on a best-value basis. The focus group of engineers pointed out that, in Pakistan and other countries, such a thorough check is not the norm.

Contracts and Scope of Work

The focus group pointed out that contractors often are not given a detailed scope of work or assignment. There are unclear contract requirements, limited contract administration, and frequent requests for additions of unforeseen work. However, in PERRP, there were detailed contracts with each contractor, followed by close contract administration. Compliance to contractual obligations was strictly monitored and enforced.

Planning

According to the focus group, construction project planning in Pakistan and elsewhere is often not systematic or clear. Plans made at the head office do not get communicated down the line, and so are not implemented. But in PERRP, there were clear and detailed plans for each place to be constructed, and each plan was shared in detail at the different levels, managed, and monitored from beginning to end. There were clear organizational charts showing the chain of command and how all positions fit, as well as clear lines of communication and detailed job descriptions.

Timing and Schedule

Focus group members opined that it is common that the approved construction schedule is not followed in detail. Among staff there is limited sharing of the schedule and little understanding of time recovery scheduling, but in PERRP each site was on a strict construction schedule, developed along with time recovery plans as needed. Progress on the schedule was assessed weekly, with plans made to make up for lost time, if any, and with penalties for noncompliance.

Quality Control, Quality Assurance, and Monitoring

Frequently, there is little or no quality control or quality assurance and often even little conception of these, according to the focus group. They reported that, while the Pakistan Engineering Council decrees that a project is to be supervised by an engineer graduate, this requirement is seldom enforced. However, in PERRP there were four levels of monitoring and supervision for quality assurance (the responsibility of the implementing agency), in addition to the quality control (the responsibility of the contractor). Focus group members also observed that, normally, there is far less supervision and monitoring than occurred in PERRP.

Health and Safety

Members of the focus group pointed out that frequently there is little awareness of occupational health and safety requirements, including for gear like hard hats and protective clothing. Serious injuries are common but often not reported; in PERRP, however, there were strict health and safety requirements at all sites, and penalties for noncompliance. Regular incentives, briefings, and training were provided. PERRP received an award from the US National Safety Council for the project's safety record.

Payments

Reflecting on their other construction experience, focus group members pointed out how cash flow to contractors—and from contractors to workers, suppliers, and others—is commonly a major problem. Backlogs of payment result in hardship for workers and work stoppages, but as focus group members pointed out, in PERRP prompt monthly payments were made to contractors.

Cost Control

The focus group pointed out that in construction in Pakistan and elsewhere, strict project costs frequently are not given or are not firmly fixed, leading to cost overruns along with projects that take more and more time. It is a common industry practice to just keep extending the deadlines for completion and increasing the budgets allowed. However, in PERRP, careful cost estimating was carried out before contracts were let, and the contracts were awarded on a firm-fixed-price basis—meaning that the budget was agreed in the contract and cost increases or overruns of any amount were not allowed. Close financial monitoring helped keep costs as planned. The only exception to this was when the cost of certain building materials, such as steel and concrete, skyrocketed due to shortages; in those instances, PERRP purchased the materials in bulk and provided them to contractors, deducting those amounts from the contract's budget.

Leadership and Communications

According to the focus group, on other construction projects there often is not clear or consistent leadership, and information is not shared, so plans are not clear. However, as one focus group member stated, "On PERRP there was strong, consistent leadership from the top, which made the project work all the way down the ranks and into the field. This was true about the community participation too. If head office had not been definite and demanding about that, we [engineers] would have had a harder time, at least at first, to accept it."

Community Participation

As the focus group pointed out, community participation as practiced in PERRP is definitely not part of "textbook construction project management," but as it helped the construction go much more smoothly than normal, "it should be textbook." None of these engineers had any previous experience with community participation—at least, not in any deliberate, structured way, like it was in PERRP. Normally in construction in Pakistan and elsewhere, there is no organized community participation and few ways are set up to prevent problems. Unlike in PERRP, there are normally no dedicated social teams to work with construction and the people, no agreements between the contractor and local people or committees (if any exist), no plans or protocols for communications or clear grievance procedures, and few attempts are made to guide construction worker behavior in communities. Focus group members opined that, of all aspects of community participation, what helped the construction management the most was the Committee-Contractor Agreements and the communication protocol with grievance procedures.

As the PERRP project was being completed soon after these windup workshops, many of the engineers expressed concern about going back to work in normal projects where there is no community participation as there was in PERRP, because it had helped construction and made their work go much smoother.

Architect—"There's Nothing about Culture in a Modern Building"

Visiting Nepal for a reconstruction conference following the 2015 earthquake there, I was introduced by a Nepali anthropologist to a small group of prominent local architects who had an established reputation for designing schools. Not so well informed on Nepali culture, I naively asked the architects what kinds of cultural considerations they had when designing schools. Much to our surprise, the main speaker of the group answered, "In a modern building, there doesn't need to be anything about culture. There's no need for cultural considerations." I listened intently while the local anthropologist and local architects went head to head. "How can you say there's nothing needed about culture in a modern building?" the anthropologist demanded. The architects seemed to not understand his concern.

Then the anthropologist, knowing where the cultural sensitivities lay, asked: "For example, in the schools you've designed, where did you place the washrooms or toilets?" The group was still somewhat dumbfounded and couldn't answer. The anthropologist listed off possibilities: Did the washrooms face inside the building with their doorways open into the hallways? Or did they face outdoors with their doors opening to the outside? Or were they put in another building outside the main building? Were male and female washrooms in sight of each other? Put on the spot like this, none of the architects could answer. Although these architects and the anthropologist were all the same nationality—Nepalis—the anthropologist explained to the architects the Nepali taboo against people of the opposite sex being seen going into or out of a washroom. Had they really designed so many schools in the past but never thought of such things? Apparently yes, and after the schools they had designed were constructed, they had not checked to see if there were any problems either.

Official—"Village People Don't Know Anything about Design"

Even in the twenty-first century—after decades of social justice movements, sensitization, and lessons supposedly learned about "helping the poor" and the benefits of bottom-up development—some educated, urban officials still look down on rural people, being unable to imagine they could offer valuable input to such things as building design.

In one Asian country, I delivered a presentation on PERRP to a high-level international-aid decision maker. He was an engineer from a country in the region, and he listened intently until I described the Pakistani communities providing input to the design of the new schools and health facilities. At this point, he stopped the presentation, indignantly stating, "But village people don't know anything about design!" It took giving him several examples of how in PERRP community input had resulted in many good ideas and helped avoid costly mistakes before he decided to stop his protest against community input to design.

Toilet Orientation

As in many other cultures, certain aspects about toilets are delicate issues in Pakistan. In one of PERRP's preliminary school designs, washrooms had accidently been planned so that the toilet commodes faced southwest, toward Mecca, a taboo for toilets in Muslim culture. This mistake—noticed by community members in a design input session—was corrected while still on paper, a no-cost solution. Had these mistakes not been caught and corrected ahead of time, chances are high that the toilets would have been locked up, never used, a source of shame and embarrassment for the committee and school.

Boundary Walls

In areas of the subcontinent and other parts of the world, solid, high boundary walls are common around residential and other spaces. In Pakistan, such walls are used in both rural and urban spaces, especially at schools, for security purposes, for protection against unwanted visitors, and, in rural areas, also for protection from wild animals and grazing livestock. The walls demarcate the site, protecting the land from encroachment and providing the visual barriers preferred in the local culture.

For one of the large girls' colleges rebuilt in PERRP, designers had simply copied a design they had developed for a similar boys' high school. They had not planned to include a boundary wall. This cookie-cutter approach would not work in this case. When designers finally visited the girls' college and got local input, they had to make some fairly major changes to the preliminary design—major, at least, in the eyes of local people. When seeing the design on paper, the girls' college School Management Committee had noticed there were no plans for a boundary wall. This being a college for young women, they asked for a boundary wall as a priority. They also requested to have the main entry relocated from the front to the side of the building and the sports ground moved from the front to behind the school, both spots being out of sight of the busy road passing in front. As this was still early in the design phase, these requests were met at no cost to the project while making the college culturally suitable—and hence more comfortable and popular to attend. The building now has the reputation of being culturally appropriate, satisfying families who wish to send their daughters there for higher education.

Unwanted Visibility

In another reconstruction project carried out by another donor and implementing agency, the school staff and community members raised several serious issues after the completion of the building, which by then were too expensive to correct. Had community members been consulted at this large girls' high school, a better, more culturally acceptable design may have been developed and at little or no extra cost.

The problem was that the new school was built on top of a mound, which meant that all sides of the two-story building were in plain view to everyone in the vicinity—in effect, putting the girls and young women on display, a cultural taboo. To provide a visual barrier would have required building a ten-foot-high boundary wall and gate, but this was considered an unreasonable expense, so it was not included.

Also, stairs to the upper floor were built on the outside of the building, further exposing the movement of the women. Had there been input from students, school staff, or the community, stairs could have been placed internally. To deal with this, the school administration covered the stairs with old banners and pieces of cloth, which gave the women some relief, but the fabrics were unsightly for the new building. Unfortunately, this school is now stuck forever with poorly thought-out design features that may be disappointing and stressful.

Glass Blocks in Windows

At a large boys' school already in an advanced stage of construction in PERRP, neighbors who had fully participated in the earlier design discussion meetings with project architects suddenly realized that the large windows of the new two-story school would overlook the private compounds of nearby houses, another cultural taboo. At the same time, although the architects were of the same nationality, they were not aware that this would be such a serious issue. An uproar ensued, and a neighbor threatened to go to court for a stay order to stop construction.

The social team intervened to try to find ways to deal with this, asking the project architects to visit and help find a solution. In a meeting on-site, some community members demanded that the whole window space, where wall-sized glass panes would be placed, instead be filled with bricks. Although this would mean almost total darkness in the classroom, the people considered the privacy invasion and potential for cultural offence as far more important to avoid. However, a solution was found by installing in the window spaces translucent glass blocks, which would block the view but still let in the light—building materials until then unknown in these areas.

With this solution, all the needs were met. The boys could not look into the neighboring family compounds, no one could see inside the classroom, the maximum light level was kept, there was no court case or stay order, and construction could proceed without any time lost.

After that incident, as a precaution and without being asked by anyone, the project as standard practice installed translucent glass blocks in window spaces at all other PERRP buildings constructed wherever windows might look into sensitive places.

Don't Waste the Land

At one of the schools, the community had valued their soccer field for decades, but the architects had other priorities. Without making a single visit to this site to be reconstructed, the architects—using only the technical survey data—decided to design the new school building to sit on the far end of the unusually large school ground leaving the old destroyed building as is, without demolition and removal. When community members were consulted about this, they protested loudly: That's wasting the land! We need our soccer field! They requested that the old building be removed and the new one built using the old footprint, as was the case with all the other schools constructed in this project. This way, the large plot of land would be saved to serve as the soccer ground and for other major community events as well. Since doing so would ensure better use of all the land, PERRP senior management directed the contracted architectural firm to follow the community input.

Respect for Graves

After discussing one school design with community representatives and implementing changes based on their input, as a final design step and standard practice project engineers visited the school site to lay out the design on location using chalk powder lines. It wasn't until community members saw the chalk lines on the ground that they realized there would be a problem with the planned location for the school's toilets. Located at one end of the new building, the toilet block's outer wall would be adjacent to the school's boundary wall, which separated the school from the graveyard. As it was considered insulting to the graves to have toilets so close, designers reconfigured the design, which was still on paper, putting toilets in another part of the building. Had this not been caught in time, it could have been a permanent problem.

"My School Is My Life"

Sometimes students were also included in the design process in order to make them feel part of this new thing happening in their community and to raise awareness about design. Some of the schools had older students study the floor plans and sit in at design meetings with the architects, so they were unusually aware of what was going to be built.

At some schools, the youngest students were also involved by being given fun drawing exercises. They were asked to draw what they thought their new school would look like and what they hoped for. As art is rarely taught here, and even the most basic materials are scarce, social mobilizers took sheets of simple computer printer paper and pencils to schools to get the kids to draw. At one location on a steep mountain slope, where the old school had collapsed but all its rubble had been removed, children continued to attend class in the open air, using the only furniture that remained—a few wooden benches. One of the seven-year-old girls took her piece of paper and pencil, and squatting on the ground using the bench as a table surface, drew her highest hope: to have another school. Penciling in Urdu, she drew a picture of a school and printed "my school is my life." Probably no one had thought of a school building as being so important to a child.

Flash Floods and Local Knowledge

A building's sustainability depends on many factors, not the least of which is its location and orientation. At one of the BHUs to be built, project surveyors had carried out all the geotechnical testing and measuring and reported it to the designers, but it was found out later that they had missed crucial information. As part of the community's design input process, community members accompanied the architects when they visited the site to discuss the preliminary design with the committee. On this walkabout, elder members pointed out the risk of flash floods in this location and informed them that, decades ago, one had destroyed the building then on the site. Although there were no longer any visible indications of flooding, the architects were able to take this local knowledge and make changes accordingly by raising the foundation and slightly reorienting the building while it was still only on paper. Without this input, the design could have added to the risks.

Honor the Committee-Contractor Agreement

A risky situation arose that needed quick resolution. In one location's Committee-Contractor Agreement, the contractor agreed with a landowner to rent his land for the storage of materials, a launching area, and a site office. The contractor was using the land for these purposes but not paying the rent. Making matters worse, the contractor refused to acknowledge the above agreement despite his having made and signed it in the presence of several community members at the time. An uproar was starting.

As per the communication protocol and the signed-in-public Committee-Contractor Agreement, the social mobilizer asked the site engineer to have the contractor attend a meeting with the committee. At the meeting, the engineer reminded the contractor that his contract with PERRP required him to pay his bills and do it on time, otherwise PERRP would deduct the amount owed to the landowner, plus penalty, from the contractor's own fee. A few days later, the contractor complied. There was no interruption of construction.

"Construction Here Is an Uphill Battle"

"The construction here at different mountainous sites is an uphill battle in its truest sense. The Government Girls' Middle School at Besuti was successfully constructed at an altitude of 6,875 ft, and the Basic Health Unit at Bani Minhasan at 6,586 ft. In such places with heavy snow, and other places that get the monsoon effect, work had to be planned around the seasons and weather. Single-lane dirt roads with many switchback corners made it hard to bring supplies and equipment. Still, the local people are amazed to see how we were able to bring workers and heavy construction material to our sites here in the mountains. In many places there were no roads, only footpaths to the school or health unit so we had to build a kind of rough track to some of the sites."

—PERRP Construction Manager

Mohandri School, Mountainside Boulders

In one case, where no other land was available, there was no choice but to build the new school in the same risky location as the school that had been destroyed, but the project and community took extraordinary steps to reduce or eliminate the risk.

Most of the destruction in the 2005 quake came from lateral movement, but other damage was caused when the quake set off landslides or rockfalls. At one project location assigned to PERRP, at Mohandri village in KP province, the quake had dislodged boulders from the nearby steep mountainside. They bounced down the steep slope, smashing through the roof into the school, killing four students and seriously injuring nine more. When no other land was available to rebuild this school in a safe place, steps were taken to remove the risks.

At first, only an extra solid wall was planned on the slope side of the school, to deflect stones should they fall again, but no one was comfortable with this choice alone. Imagine attending a new school in that location for decades to come, always fearful of more boulders rolling down—the root cause had to be addressed. Project engineers, the social team, committee members, and other local people began a rock-by-rock survey across the whole mountain slope. Aided by a teenage boy who hunted birds on the slope and who knew all its nooks and crannies, they identified all the loose rocks and boulders. At first the thought was to explode them to break them up, but that was too dangerous for the buildings and people down below. Instead, the engineers had the rocks and boulders broken into small pieces using a nonexplosive chemical, removing the threat. The new Government Boys' Primary and High School at Mohandri is now attended by more than five hundred students and their teachers, who are now free from the worry of falling boulders.

Hostel for Students from Farthest Valleys

In the mountainous areas, primary schools in villages are dotted throughout the mountains and valleys, but opportunities for continuing into higher levels of education are few and far between. Making it into PERRP's final selection of schools to reconstruct was the town of Jared's boys' higher secondary school, the only school of its kind in an enormous catchment area encompassing valleys and mountain ranges. After primary school, this was local boy's only chance for higher secondary education in a government school in their own vicinity. This school's committee made an appeal to the project to include a small hostel space in their new building, so that boys from faraway villages could attend school and have a place to stay, as needed, instead of walking back and forth the long distances every day.

Assisting the head teacher in putting together information to make their case to project management, a social team member asked about the boys who would need the hostel. "From how far away would those students come? From two mountain valleys away?" The head teacher replied, "Oh no, it's easy for those boys to get back and forth to home every day. I'm talking about the students who come from the fourth and fifth valleys away. A few of those kids come here every day already, walking up then back down or around the mountain sides, taking two to three hours every day one way. Sometimes the weather is just too bad for them to walk. If we had a hostel more of them would attend." Fortunately, the designers were able to include a hostel space. Soon after the new school building was completed the enrollment more than doubled.

Trouble over the Word "Local"

Even the most careful contractor selection and vetting process can hit snags. In this disaster reconstruction scenario, a different project advertised across Pakistan to locate qualified construction firms to rebuild schools. The advertisements in daily English newspapers specified the qualifications needed and encouraged "local contractors" to apply. Many applications were received and reviewed, a few companies were selected and contracted, and then they were sent to start work, causing an uproar at one site. There, from the same big town, was a contractor who had applied but been not accepted, since his company did not have the qualifications specified. But, as he pointed out, the company that won this contract was not "local" as the advertisement had stated. As he pointed out, the selected contractor was from another part of Pakistan, while his business was from here—local. Immediately, the man threatened court action to stop the start of construction, based on the "false advertising," and he also blamed the donor agency. This was an embarrassing situation for the project management who had placed the advertisements, as they had not foreseen how "local" is a relative thing. By "local" they had meant Pakistani, as opposed to non-Pakistani, while the nearby company interpreted "local" to mean from the same vicinity. Fortunately, influential people in the area convinced the local man to stop his actions, so that construction of the urgently needed school could get underway, and he did not follow through on his threats.

Pouring Concrete Roof, Community Members Stood By Overnight

The mood at this construction site was described by engineers as "euphoric," as the concrete roof of the Basic Health Unit was poured and completed all in one go, a sixteen-hour period. The resident engineer reported that local people came by the construction site, sitting on the ground outside the safety perimeter to watch for hours and repeatedly offering any assistance needed. They said they had never seen such modern (concrete and steel) construction before and they were especially delighted that it had gone so fast. Keeping with local custom for when the construction of a house is completed, community members brought food that night for the workers and recited prayers for the long life of the health unit, and for no rain to interrupt the concrete pouring. The main way they assisted, besides boosting the morale of the laborers and engineers, was making sure the crucial water supply needed was provided uninterrupted.

Locals Threaten to Be Given Jobs

There had been early and repeated announcements and agreement that contractors were not obliged to hire anyone local, as they usually would bring their skilled laborer crews with them. By the time the contractors arrived, this was widely understood and accepted; however, in a few instances, the agreement was ignored.

At one of the villages, a local man threatened the contractor and demanded he and his friends be hired. Instead of responding to the threat, the contractor followed the project communication protocol and its grievance procedures and reported the incident to the site engineer, who went to the social mobilizer, who then asked the committee to step in. Committee members said this threat was a power play by the local man against other locals who did get work. Since violence was threatened, an emergency meeting was called. Committee members asked the elder brothers of this man to attend, knowing they would be the most likely influence on him. At the meeting, the PERRP resident engineer reminded the elder brothers of the PERRP policy, while meeting participants confirmed this had been established as a rule from the beginning: that contractors could bring their own work crews and were not obliged to hire anybody local. The brothers went home and ordered the younger brother to stop making trouble and to find work someplace else. That was the end of the problem.

Two Contractors in a Road Dispute

Disputes and conflict among community members and contractors were expected, but less common were contractors in conflict with each other. As construction of one of the new clinics was underway by a PERRP contractor in a remote area, the dirt road that passed by was being upgraded by an unrelated contractor. Day by day, differences arose between the contractors over who had authorization to use the road. The matter came to a head one day when the PERRP contractor arrived with his heavy equipment and was hotly accused by the other contractor of damaging the newly repaired road.

As the argument between the two contractor's managers escalated—and with over a hundred laborers divided into two sides watching on—the social mobilizers followed up by phone with a contact made several months before. As part of the preparation for construction, they had met and had discussions with the main government stakeholder agencies to inform them about the project and solicit their participation and help when needed. As part of this, they had unexpectedly met with the district public works executive engineer responsible for roads while on a snowbound road a few months earlier. See anecdote "Meeting a Main Stakeholder on the Snow-Blocked Road," page 170. At that time, he had promised any help needed, and now they asked for it. As the road contractor was under the executive engineer's supervision, he directed the road contractor to allow the PERRP contractor to do whatever they needed. This intervention closed the case, and construction was not interrupted.

Ethnography: Boys' Primary and High School Glacier Way*

**Glacier Way is a pseudonym. To maintain confidentiality, the names have been changed.*

Construction or reconstruction can be affected by many seen and unforeseen situations. Here was another example of the importance of the social side of construction working in tandem with the technical side. At one PERRP site, a tragic accident occurred that could have had dire consequences for a far greater number of local people and brought construction of the new schools to a standstill.

While divisions by caste, sect, class, wealth, power, and politics are common in Pakistan and there are people and many kinds of incidents that serve to ignite the differences, the opposite can also be true. In such places, there are respected people who can bring situations back under control, who can restore calm and keep the peace. It all depends on the nature of the incident, how and when the situations are handled, and by whom.

Glacier Way is a major tourist destination in the north of the PERRP project area, a scenic mountainous area. In summer it is packed by people from the south of the country getting away from the oppressive heat. In the winter the whole population migrates out of this area to avoid being trapped in the valley by several feet of deep snow and the glacier that crosses the road in several places. The town has many hotels and other tourist services, but in the 2005 earthquake most of the facilities were damaged or destroyed, including the two government boys' schools, one primary and one secondary. ERRA had USAID assign PERRP to rebuild these schools.

As per the usual PERRP community participation process, the social team had the two schools form a committee from different interest groups in town: the hotel association, other businesses, retired people, parents, and the range of sects, castes, and political affiliations. As this construction was to happen in the center of town, in the midst of tightly packed houses, shops, hotels, and restaurants, it would take extra careful attention by all to avoid the most common construction problems. The committee was led through all the steps by the social team to prepare before construction started.

One day, tragically, as one of the contractor's trucks was returning to the construction site from dumping excavated materials and was passing through the narrow street, a small boy was hit and killed by the truck. He was the only son of one of the hotel owners.

When something like this happens in Pakistan it is not uncommon for people to take the law into their own hands and unite against the perpetrator, capturing, beating, or even killing him and destroying the vehicle and anything connected with the guilty party. In this case, however, some of the people who witnessed the accident grabbed the fleeing driver, took his truck away, and took him to the police, where the family had him charged with murder. As is the case in many parts of the country, such incidents can grow beyond the actual people involved and multiply the causes for fighting. A response was needed immediately to keep the situation under control.

Hearing this tragic news within minutes of it happening, social mobilizers in the PERRP office two hours away started contacting by cell phone the committee leaders and one of the town's most prominent members, the president of the Glacier Way Hotel Association, to organize a response in order to keep the incident from turning into a full-blown conflict between community members and the contractor and his laborers working on the construction site.

When social mobilizers arrived, the atmosphere was tense but it was not yet clear what retaliation, if any, would happen. Consulting with the hotel association president, committee members, religious leaders, and teachers (including the deceased boy's uncle, a teacher in the school under construction), they worked out a strategy for resolving the situation. Jointly it was decided a delegation should go to the family and give their condolences.

A group of forty to fifty prominent community members, project social mobilizers and engineers, and the contractor and his site engineers went to the home of the family. With the president of the hotel association acting as spokesman, he condemned the incident, expressed the sorrow of everyone, and apologized to the family for such great loss. The delegation appealed to the family to help keep the peace for the sake of continuing construction of the new school. They explained that the guilty man had been jailed and his truck had been taken but also that he was a poor man—an Afghan refugee. "If he's punished what good would that do?" reasoned the spokesman.

The *Kateeb*—a religious leader from the mosque—also appealed to the family, telling them that in Islam forgiving someone brings high rewards from Allah. As this was the holy month of Ramadan, he appealed to the family to be even more forgiving at this time. He requested that they forgive the driver as this had been an accident and not something done intentionally. He said the contractor was there for the benefit of future generations and that construction should continue. He asked them to withdraw the charges of murder.

In response, the family agreed, forgave the driver, and wrote a statement to say that they had nothing against him and that the conflict was resolved. Right away, the driver was released from jail and given back his truck. Still fearing for this life, he disappeared from town. The family refused compensation offered by the contractor.

Had this not been resolved so quickly and effectively, it could have led, like so many other cases in Pakistan, to further conflict and losses and to stalled construction that would never start again. It also could have become a much bigger incident. Since all the hotels and other local businesses have close relations with the country's top politicians, who also visit as tourists, such high-level connections could have been involved to punish the contractor. Journalists in town were already writing up the story for national news media coverage, which could have dragged in the donor and been made this into an international incident. They decided to stop for the good of the community.

Fortunately, this was another case in which, while there can be deep divisions among local people, respected people have strong abilities to keep problems from spiraling out of control.

Follow-Up

Some months after this incident, when all of the Glacier Way population had migrated out of the valley before deep snow would block all routes, the contractor won special favor in local hearts. As the last residents fled town for the winter, construction of the two new school buildings was still going full tilt—day and night—to complete as much construction as possible before they also would have to flee and close down construction for the winter. Even years later people still talked about seeing the contractor and laborers working late at night with snow swirling around in their flood lights. They said they had never seen a contractor working in such a dedicated way.