BOOK A
Things to consider when (re)-constructing in post-disaster situations

A.1 WHAT IS SPECIFIC ABOUT (RE)-CONSTRUCTING IN POST-DISASTER SITUATIONS?

Working in post-disaster situations on behalf of CRS or other non-profit organizations brings with it a specific position and outlook compared with operating within the commercial/private sector construction industry.

Specific positions non-profit organizations take are:

- No commercial interest.
- The clients are the affected populations and host communities.
- Accountable to the affected population and host community.
- Aims to deliver appropriate quality construction without creating inequity within an existing social structure or community.
- The participation of the affected community is an essential component of any (re)-construction project. The degree of participation can vary widely depending on the type of disaster and the post-disaster specific situation.
- Capacity building and livelihoods regeneration is an integral part of the project.
- Aims to support the most vulnerable population (program participant selection criteria and targeting are not included in this document).
- Final product is often donated to program participant or community, be it a shelter or health facility.

After a disaster, national and local government administration, with their staff and physical infrastructures, often become overstretched or are lost. Becoming aware of key issues contributes to the effectiveness of the project. Every disaster will bring specific challenges and each will have to be addressed on a case-by-case basis.

The following is a checklist of some of challenges to look out for:

Post-disaster specific challenges:

1. **Political environment** is unstable, lack of adequate capacity to respond to disaster.
2. **Security issues, political unrest and frequent changes of protocols** may lead to low productivity and high cost, limits access to sites (material delivery, labor, assessments).
3. **Authorities' ability to operate** may have been affected; ministries (public works, housing infrastructure, urban planning departments) may not be able to offer clear guidance and leadership.
4. **Transportation channels** can be blocked, damaged or destroyed (ports, roads).
5. **Material and labor market** prices inflate due to restricted access, destruction of infrastructure, shortage of supply, etc.
6. Demand for local construction materials exceeds the availability of **sustainable** local materials.
7. **Lack of qualified technical staff/skilled manpower/professional expertise.**
8. Some countries **lack building regulations/codes or resources** to enforce them, including land contamination regulations and procedures and debris clearance mechanisms such as landmines/ unexploded ordinance (UXO).
9. **Land ownership:** Demarcation of land boundaries erased by disaster (floods, tsunami); property documents have been lost/destroyed due to disaster, creating challenges in property land restitution.
10. **Lack of security of tenure** for displaced populations. Forced relocation decisions can be made due to political reasons after disaster without the consent of the population.
11. **Emergency proposal writing process** at times dictates us to commit to projects before conducting technical assessment.
12. Deliver appropriate quality construction without creating **inequity between program participants and host communities.**
13. Different protocols and management structures in refugee/IDP (internal displaced people) Camps.
14. Influx of companies/contractors with technologies/ready solutions on housing **undermining local markets/small contractors.**
15. **Risk of exploitation** of local labor/local skills by contractors after emergency.

Book A cover photo: Port au Prince after 2010 earthquake, Photo by Benjamin Depp

CRS partner Divine Ministries employees load a truck with sections of a transitional shelter at pre-fabrication yard in Batimal, Haiti, 2010, Photo Credit: Benjamin Depp for CRS

A.1.1.1 THE SPHERE PROJECT – HUMANITARIAN CHARTER AND MINIMUM STANDARDS IN HUMANITARIAN RESPONSE

The Sphere Handbook is designed for use during humanitarian response to meet the urgent survival needs of disaster-affected populations. The Sphere is based on two core beliefs:

1. That those affected by disaster or conflict have a right to life with dignity and, therefore, a right to assistance.
2. That all possible steps should be taken to alleviate human suffering arising out of disaster or conflict.

For construction-based projects, the Water Supply, Sanitation and Hygiene Promotion chapter and the Shelter, Settlement and Non-Food Item chapter offer minimum standards, key actions, key indicators and guidance notes.

Refer to www.sphereproject.org/handbook

A.1.1.2 IASC CLUSTER APPROACH

The Cluster Approach aims to strengthen overall response capacity as well as the effectiveness of the response. The system has been developed since the beginning of the Interagency Standing Committee (IASC) Humanitarian Reform process in 2004 to ensure partnerships between UN agencies, the International Red Cross and Red Crescent Movement, international organizations and Non-Government Organizations (NGOs) all work together towards common humanitarian objectives. The approach aims to improve strategic field-level coordination and prioritization in specific sectors of response by placing responsibility for leadership and coordination of these issues with the competent operational agency. Depending on the needs of a specific crisis, a combination of the following cluster maybe activated in country: Agriculture, Camp Coordination and Camp Management, Early Recovery, Education, Shelter, Emergency Telecommunications, Health, Logistics, Nutrition, Protection and Water Sanitation and Hygiene.

Refer to http://oneresponse.info and www.sheltercluster.org

A.1.1.3 CROSS-SECTOR ACTIVITY

Construction is a cross-sector activity; most activities needs a physical space to carry out the tasks, and in post-disaster contexts, some or much of the physical infrastructure may have been lost. Thus this document can be used across sectors for the construction component of the project. Below are listed some of the common construction activities within each sector.

Sector	Construction Activities
Shelter	Emergency, Transitional and Permanent Shelters, Evacuation Centers
Water, Sanitation and Hygiene	Emergency, Transitional and Permanent water facilities and excreta disposal systems
Camp Coordination and Camp Management	Fencing, site levelling, site drainage
Early Recovery	Debris removal and drainage canal
Agriculture	Silo, grain stores, warehousing
Health and Nutrition	Health centers, hospitals
Education	Emergency, Transitional and Permanent schools
Logistics	Warehousing
Protection	Safe houses

Construction is a resource-intensive activity in terms of human capital and finance. Connecting the need for resources for the construction project with the need for livelihoods and employment of an affected community can be doubly rewarding. As can be seen in the above table, many (re)-construction activities may be required in a post-disaster situation. It is essential that an integrated and coordinated approach is planned from the outset for a successful outcome. For example, a house without water supply is not livable; a school without a latrine will jeopardize the health of children.

Meeting with CRS field staff - wash and protection- planning for refugee influx at the Niger-Mali border,2012, Photo Credit: Seki Hirano for CRS

A.1.2. ORGANIZATIONAL RISKS

In general, construction work carries inherent risks due to the large sums of money involved relative to the local economies; there is a risk of collusion, theft and threat of bodily injury. These risks vary widely depending on the socio-economic conditions, such as national building codes and standards, and the monitoring capacity and level of professional experience of contractors/local building industry.

Roles and responsibilities – The organizational structure of a construction team should provide clarity as to roles and responsibilities and lines of authority, and provide adequate management oversight in order to manage the project with efficiencies.

Collusion – CRS/NGO construction staff may be approached and compensated by contractors to falsify inspection, progress or quality control reporting. Having adequate supervision and a system of counter-checks, including unannounced quality control visits from senior managers, helps to mitigate this potential risk.

Theft – CRS/NGO is more at risk of theft where large quantities of materials and equipment are to be purchased and warehoused to supply owner-driven construction projects. It is essential to set up a clear warehouse management/control system with full-time, dedicated warehouse management staff to mitigate potential risk of theft.

Refer to task 5, construction supervision work stages, B.10/C.9

Threat – Local CRS/NGO construction staff are at greater risk to being threatened by contractors or others to falsify reporting as they are usually members of the community. Staff may be under incredible pressure from contractors to falsify records and facilitate the theft of CRS assets, especially when there is limited support from their supervisors. Providing adequate supervision and reporting procedures to senior management alongside good communications between staff members helps protect field staff from potentially threatening situations.

Site safety – CRS/NGO managers need to ensure that field teams have the proper skills and knowledge to supervise onsite construction and mitigate any potential risk of injury to laborers or program participants during construction projects. This is addressed by recruiting and retaining qualified staff that understand both the social and technical aspects of the program, and ensuring that construction teams have the appropriate tools and equipment to complete the task in a safe manner.

Refer to task 3, B.10/C.9 construction supervision work stages

A.1.3 WHAT TYPE OF CONSTRUCTION

CRS's involvement in post-disaster (re) construction activities range from emergency shelter, such as distribution of emergency shelter kits (i.e., tarpaulin sheets, etc.), and transitional shelter construction programs/ projects (i.e., timber structure with CI sheet wall covering) to permanent housing and complex infrastructure projects (i.e., housing, hospitals, schools, community centers, roads, water and sanitation projects, etc.).

A.1.3.1 EMERGENCY SHELTER

UNHCR tents in refugee camp in Niger, 2012
Photo Credit: Seki Hirano for CRS

Tarpaulin-covered simple wooden structure in Niger, 2012
Photo Credit: Seki Hirano for CRS

Emergency shelters are intended as first-response structures that provide life-saving protection from the elements ensuring safety, health and privacy. It has a life span of 1-6 months and conforms to Sphere[1] standards. These structures are often tents, simple pole structures (timber, bamboo, steel) with tarpaulin covering, rope and pegs.

A.1.3.2 TRANSITIONAL SHELTER

Transitional shelter in Philippines, Sendong Typhoon, 2012
Photo Credit: Andrew Schaefer for CRS

Transitional shelter in urban area of Port-au-Prince, 2011
Photo Credit: Benjamin Depp for CRS

Transitional shelters are *"rapid, post-disaster household shelters made from materials that can be upgraded or re-used in more permanent structures, or that can be relocated from temporary sites to permanent locations. Transitional shelters can support disaster affected people between the emergency and the time*

1 Sphere Handbook – Humanitarian Charter and Minimum Standards in Humanitarian Response; 2011 Edition, The Sphere Project, http://www.sphereproject.org/

when they are able to rebuild longer term housing. If well designed, the structure or materials from the transitional shelters should be re-used for permanent housing. Transitional shelters respond to the fact that post-disaster shelter is often undertaken by the affected population themselves, and that this resourcefulness and self-management should be supported."[2]

Transitional shelters:

- Are intended as more robust structures compared to emergency shelters.
- Conform to Sphere standards (particularly for shelter/water supply, sanitation and hygiene).
- Remain intact and inhabitable for approximately 6-24 months.
- Are constructed with structural and/or sheathing materials which are re-useable.
- Are either upgradeable to become permanent structures or can be disassembled for transport and re-use for program participants' permanent housing.
- Integrate construction techniques that improve resistance to natural hazards (i.e. more durable wooden structures, steel frame structures).

A.1.3.3 PERMANENT HOUSING

Permanent housing is a durable solution that provides long-term shelter. For construction of permanent housing, the security of land tenure is important, as the structures will tend not to be easily re-locatable and village or urban planning becomes essential. Many permanent housing projects have used concrete frame with brick or block infill. However, this is not necessarily the only solution. Successful housing design is specific to the climate, culturally appropriate and responds to the natural hazards of the area.

Permanent housing:

- Conforms to national housing standards and building codes.
- Remains intact and inhabitable for a minimum of 10 years.
- Is constructed with durable materials and construction techniques.
- Integrates construction techniques that are resistant to known natural hazards.

Permanent housing project in Sri Lanka, post-tsunami, 2006
Photo Credit: CRS

Permanent housing construction in progress in Sierra Leone, 2004
Photo Credit: CRS

2 Transitional shelter- eight designs, IFRC, 2011

A.1.3.4 COMMUNITY INFRASTRUCTURES

Permanent school building in Sierra Leone, 2004
Photo Credit: CRS

Community infrastructures such as roads, sewers, hospitals and schools can either be transitional or permanent. Construction management processes are similar to others with varying degrees of complexities. Specific design standards exist for each type of building.

Refer to Sphere, www.sphereproject.org handbook

Refer to UNICEF, Compendium of transitional learning spaces, www.unicef.org/education/index_56204.html

A.1.4 HOW TO IMPLEMENT CONSTRUCTION PROJECTS – CONSTRUCTION MODALITIES

Within this document, there is a focus on the two main construction modalities: owner driven and contractor built. The two approaches are explained separately in detail in:

Book B: **Owner-driven construction**

Book C: **Contractor-built**

Both approaches have been used by CRS in the past and are commonly implemented throughout the sector. It is important to understand that these two main construction approaches are not exclusive of each other and, in many cases, combinations have been designed to respond most effectively to the specific post-disaster situation.

A.1.4.1 BOOK B: OWNER-DRIVEN CONSTRUCTION

Local laborers built temporary shelter at Batimat factory, Haiti, 2010, Photo Credit: Benjamin Depp for CRS

In general, CRS has more frequently implemented owner-driven construction programs in post-disaster situations. This approach has proven to be effective in responding to post-disaster situations, especially in emergency and transitional shelter responses, where, for example, shelter kits or simple design solutions were implemented.

In general, there is a CRS policy focus on this approach, as it is aligned with the overall CRS Mission and Program Quality Standards. Key aspects, such as participation of the affected community and "value added" activities, as well as promoting ownership, are often more effectively achieved though employing skilled and unskilled labor from the affected communities with the construction works directly supervised by CRS program staff/ engineers and partners.

In an **owner-driven construction project,** the program participants are at the center of the construction activities. The program participants are engaged in all stages of the construction project, from site selection and quality/progress monitoring to final inspection of the completed structure. In many cases, program participants give their unskilled labor as contributions.

Several variations of owner-driven construction are listed below. These are not exclusive of each other. In many (re)-construction projects combinations have been designed to suit the particular post-disaster context. Several examples of past construction projects are given in the beginning of Book B to illustrate particular variations.

- **Self-built construction,** where the program participants undertake the construction works themselves with technical assistance/construction training/supervision by CRS/NGO. The construction materials are either sourced /distributed by CRS/NGO or, in a voucher/ cash, approach the program participants are sourcing the construction materials themselves on the local market. The program participants and/or CRS take on material delivery and material quality control responsibilities.
- The program participants may opt to **employ skilled laborers and craftsmen** instead of undertaking the construction work themselves. In this case, the program participants take a managerial and monitoring role. The construction materials are either distributed by CRS/ NGO or, in a voucher/cash approach, the program participants are sourcing the construction materials themselves on the local market. CRS/NGO provides technical assistance/supervision to monitor quality, progress and compliance with the intended scope of the project.
- CRS/NGO may **directly implement** the construction works by employing craftsmen and skilled/unskilled laborers from the affected communities. In this case, CRS/NGO is responsible for sourcing the construction materials, supervising the labor force and monitoring quality and progress. The affected communities are engaged in site selection, design solutions and monitoring, but not all program participants may be involved in the construction activities.

A.1.4.2 BOOK C: CONTRACTOR-BUILT PROJECTS

Permanent housing after one year of occupation in Cot Seumerang in Meulaboh, Indonesia, Photo Credit: Ariel Sadural for CRS

In a contractor-built projects, CRS/NGO engages a building contractor to carry out all building works. The contractor is responsible for managing the day-to-day, on-site construction activities, material sourcing, material quality control, site supervision and quality construction within a contract-specified program. The CRS engineer's role is to produce the technical design and specification, to oversee the contractor's construction performance (quality/time/within budget) and compliance with the contract (technical drawings/specifications), and to liaise with communities and government authorities.

A.2 WORK STAGES OF CONSTRUCTION PROJECTS

Every construction project is split into a sequence of work stages to simplify the management of the overall project and to structure the large variety of activities.

The individual work stages vary in scope and importance according to scale and type of (re)-construction project and the post-disaster specific conditions. Not every (re)-construction project requires activities from all work stages or is able to conduct all the listed activities due to the specific post-disaster situation. **An experienced construction professional is required to lead the process.**

Diagram 1 illustrates the overall structure of the guide.

Book A includes technical assessments, initial design, costing and selecting a construction modality.

Book B (left side of the diagram) focuses on owner-driven construction work stages.

Book C (right side of the diagram) focuses on contractor-built construction work stages.

DIAGRAM 1: OVERALL WORK STAGE DIAGRAM FOR OWNER-DRIVEN AND CONTRACTOR-BUILT APPROACH

Book A

THINGS TO CONSIDER WHEN (RE)-CONSTRUCTING IN POST DISASTER SITUATIONS

Book B

OWNER-DRIVEN CONSTRUCTION

Book C

CONTRACTOR-BUILT

Book A and B outline owner-driven construction approach, whereas Book A and C describe contractor-built route

A.3 TECHNICAL ASSESSMENTS

Common to development and humanitarian relief activities, construction projects should be started with a study into the factors that determining the projects feasibility. This needs to be undertaken by experienced and qualified staff to execute high-quality assessments that facilitate informed decisions.

This chapter focuses on construction-specific assessments – technical assessments. Overall programmatic decisions (who, where, what) are not included in this document. Refer to introduction chapter for more explanation.

The **feasibility stage** is essential to be able to make informed decisions regarding budget, timeframe, scope, quality, staffing, construction material, construction modality/approach and managing the construction process.

Several factors determine the project design and most appropriate construction approach: The scale, type and complexity of the proposed project; the availability of labor, materials and other external factors specific to the post-disaster situation, such as security, accessibility, available infrastructure (i.e., roads, communications, water, electricity, etc.); and funding.

The following assessments are part of the feasibility and need considerations. The depth to which technical assessments are carried out depends on the specific post-disaster situation. Not all projects need all the below tasks to be carried out.

Construction is a site-specific activity; thus, one must visit each site, as conditions at each site will be different.

SUMMARY OF TASKS

Task 1: Market survey – Capacity/availability of local construction labor/materials/support services

Task 2: Land ownership and property disputes

Task 3: Local knowledge and construction practices

Task 4: Local building codes and laws

Task 5: Technical assessments

TASK 1: MARKET SURVEY – CAPACITY AND AVAILABILITY OF LOCAL CONSTRUCTION PROFESSIONALS, LABOR, MATERIALS AND SUPPORT SERVICES

Assess local contractors, labor and suppliers according to their availability, experience and good quality performance as well as financial/material assets and management capacity. In addition, a market survey of construction materials and their availability in quantities, quality, supply times and transport is important to design within the project budget, timeframe and specific post-disaster context.

This assessment is important as labor markets, material availability and financial capacity can be severely disrupted, partially or even completely destroyed by the effects of the disaster. Consider long lead times for importing materials and the high cost of transportation.

Material and labor market prices inflate due to restricted access, destruction of infrastructure, shortage of supply, etc. Demand for local construction materials may exceed the availability of sustainable local materials

Contact the emergency livelihoods advisor for market assessment questionnaire templates

Refer to emergency market mapping analysis (EMMA)3, www.emma-toolkit.org

3 EMMA focuses on single elements (i.e., cement); contact emergency livelihoods advisor for advice

Example: Cagayan de Oro, Philippines, 2011:

The coconut trees for the structural frame for the transitional shelter were sourced from local suppliers. From the outset, farmers were hesitant to cut down mature coconut trees (more than 60 years old) because the global price of coconuts was very high. There was no shortage of trees, but farmers felt that they could earn more income from selling the coconuts rather than cutting down the trees and selling the timber. Normally, older mature coconut trees are cut to be sold for construction, as they do not grow as many coconuts anymore and are replaced by younger more productive trees.

Coconut timber delivery to construction site
Photo Credit: Chin Lovi for CRS

TASK 2: LAND OWNERSHIP AND PROPERTY DISPUTES

It is essential to assess the up-to-date land ownership situation of the prospective sites by contacting the local authorities and surrounding communities. For permanent construction projects, a clear land ownership arrangement is essential before any construction starts to avoid future property disputes.

Transitional shelter (T-shelter) projects do not necessarily need formal land ownership. In some circumstances, this would be even harmful to the informal land-use arrangements that are in existence (or were in existence before the disaster). An agreement of the right to temporary occupation of land may be more suitable. This allows the T-shelter projects to avoid lengthy land-ownership disputes or negotiations.

In some instances, verbal statements can be the most one can anticipate. If this is the case, be sure to record such verbal agreements in the form of meeting minutes.

Contact shelter advisor for land use agreement template (digital format)

Refer to B.4 for details

Land-ownership disputes or boundary disputes are not uncommon in post-disaster situations, especially if no clear land registration structure existed prior to the disaster, or if demarcations have been erased or property documents have been lost, creating challenges in property land restitution. Land disputes can be very lengthy and expensive. It is important to have legal advice on land-ownership issues.

Lack of security of tenure for displaced populations: Forced relocation decisions can be made due to political reasons after disaster without the consent of the population.

Example: Port-au-Prince, Haiti, 2010

The T-shelter program did not have to wait until land titles were obtained. CRS accepted one of several documents as a proof of the program participant's right to occupy land on which to erect a T-shelter, including:

- Land title
- Land tax payment receipt
- Land rental agreement
- Proof of renting the house on the land before the disaster – even if now destroyed
- A document signed by the community leader and two witnesses that stated that the family had been occupying the plot pre-disaster.

Legal land titles exist within established formal neighborhoods in Haiti. Even in informal neighborhoods, some legal land title documentation exits. However, for some affected populations, legal land title documents were lost in the rubble of the earthquake.

Also, because government departments that kept land documents on file were destroyed in the earthquake, it was difficult to obtain proof papers. Thus, in order to be best able to help affected families, CRS T-shelters were designed to be easily re-locatable. This had the benefit of shifting emphasis from land ownership to rights for temporary land occupation.

Supporting the affected population to return to their plots of origin reduced the need to resolve land tenure challenges with concerned government entities. In Haiti, there were large unoccupied pieces of land, but land tenure was impossible to establish, and the Government of Haiti did not support it. The vast majority of T-shelters were built in neighborhoods, with relatively few built in temporary resettlement sites (camps), such as Terrain Toto.

Transitional shelters were built on the same land after rubble was cleared, Port-au-Prince, Haiti, 2010
Photo Credit: Benjamin Depp for CRS

TASK 3: LOCAL KNOWLEDGE AND CONSTRUCTION PRACTICES

Local culture and traditional/vernacular building practices should be assessed, as it is preferable to work with culturally accepted and practiced construction techniques. This will influence the architectural/engineering design, the appropriate construction techniques and the most suitable construction modality within this cultural context. In addition, it often influences the range of available materials, skilled labor and their knowledge/experience in construction. There is often a very strong link between design, local practices and relevant local labor skills.

In some cases, specific construction techniques may be mandated or restricted by local government[4].

Where local materials and labor skills do not meet the required design needs, training must be considered as part of introduced unfamiliar construction techniques/designs. The challenges may be quality, supervision and training time.

4 Local government restrictions of certain constructions materials should be determined (i.e., use of local timber may be restricted as part of a local forest protection program).

TASK 4: LOCAL BUILDING CODES AND LAWS

Where local building codes and construction laws exist, it is important to assess the necessary permits and approvals, and the anticipated time this could take, as this impacts the overall project timeframe.

In some cases, local building codes may dictate a level of design complexity that precludes an owner driven construction modality or mandate specific post-construction liability requirements. In addition, donor requirements (if any) may or may not be aligned with local government requirements (i.e., local labor laws, materials selection and structural design).

T-shelter projects: In many cases, T-shelter projects are not required to comply with local building codes and laws. It is important to confirm this with local authorities. T-shelters must be constructed to be structurally safe and improve resilience to natural hazards.

Where more than one code or regulation exists, it is important to determine which is the governing code and clearly identify the local agency with approval authority and jurisdiction. Never assume that external building codes would automatically govern.

In the absence of appropriate local building codes, building standards should be determined in close collaboration with local government authorities, international best practices, the shelter cluster and CRS' disaster risk reduction policies. This process should be supported by engineering and construction professionals and local and/or HQ-based legal counsel.

Example: Post-disaster (re)-construction often takes place in earthquake, flood, landslide or hurricane/typhoon areas, meaning humanitarian organizations need special engineering advice to "build back safer".

TASK 5: TECHNICAL ASSESSMENTS

It is important to undertake all necessary field investigation and site survey work to establish the technical (engineering) parameters that will be the basis of the detailed technical design. The following technical assessments should be considered:

A. Number and proximity of construction sites

B. Site topographic surveys

C. Soil type test (soil type has impact on required foundation design and cost)

D. Water table/source tests (i.e., flood water level will have impact on the plinth design to be promoted)

E. Transportation: Can sites be easily accessed for material/equipment supply/labor?

F. Environmental impact assessment, sustainable building materials

G. Land contamination, landmines, hazardous waste, large amount of debris, etc.

H. Hazard mapping (assessment of potential disaster risks, such as flooding or earthquake zones)

I. "No build zones" created after a flooding/tsunami/landslide

J. Climate conditions (i.e., when best to construct, need for insulation, ventilation, flood protection)

Field assessments are important, as existing field information, surveys and site data may not be accurate after a disaster. The sites may have experienced landslides, erosion, flooding or large amount of debris.

SUMMARY OF OUTCOMES

Outcome 1: Understanding of available construction materials/labor/construction companies

Outcome 2: Understanding of site ownership situation and approach to be taken

Outcome 3: Understanding of local construction practices and design

Outcome 4: Understanding if local building codes exist and how they apply

Outcome 5: Understanding of the existing site conditions (soil, climate, natural hazards, etc.)

A.4 QUALITY, QUANTITY, COST AND TIMESCALE

The understanding gained from the assessments, technical and socio-economic should define the initial design quality, quantity, cost and timescale. These aspects are closely interrelated and common to all construction projects. It is essential to prioritize in line with the overall project goals and consider the effects and relationship to other sector projects. This prioritization process informs, to a great extent, the most suitable design and construction modality that will be most effective in the specific post-disaster context.

The spider diagram below illustrates the relationship between cost, quality, quantity and time. It is a useful tool to illustrate their effects on each other and assists in establishing a project-specific balåance.

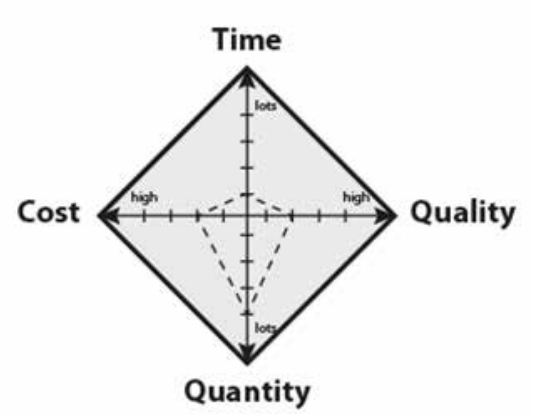

Fig. 1: Relationship diagram – cost, time, quality, quantity

SUMMARY OF TASKS

Task 1: Establish project budget

Task 2: Establish project timeframe

Task 3: Develop initial design

Task 4: Identify risks and liability

TASK 1: ESTABLISH PROJECT BUDGET

A clear understanding of the available budget and funding is crucial and should be undertaken in the feasibility stage. Assessing the available funds in relation to the (re)-construction needs is essential; it is largely instrumental in determining the scale of the construction activities, the materials and especially the construction approach, such as owner-driven or contractor-built construction. The initial budget develops into the Bills of Quantity in a later work stage.

In large responses where needs exceed the resources available, considering questions of equity is important. If a few high-quality houses are built for a limited number of families, what does the rest of the affected receive? If low-quality structures are spread across large number of families, how long with these structure last? Do they conform to humanitarian standards?

TASK 2: ESTABLISH PROJECT TIMEFRAME

The timeframe is specific to the post-disaster context and determined by many interrelated factors, such as overall need for (re)-construction, security situation, political stability, donor requirements, availability of funds, local government capacity and political will, and availability of materials and skilled/unskilled labor.

The emergency shelter timeframe is often with range of 0 – 6 months; transitional shelter, 3 months – 2 years; permanent (re)-construction, 6 months and up. Construction projects associated with longer term development programs may be more flexible on completion times.

TASK 3: DEVELOP INITIAL DESIGN

Initial technical drawings and material selection should be developed reflecting budget and timeframe decisions. This stage includes site layout drawings. These activities need to be undertaken by both technical and program staff.

This stage should include field investigation and site visits to the proposed construction sites(s) by engineers/architects to verify design assumptions.

Initial design decisions should consider:

- Use of locally appropriate construction techniques and materials that will ensure protection from the various weather conditions and withstand natural hazards events (plinth, walls, roof and pillars remain intact).
- Sphere recommended standards
- Shelter cluster (if active) recommendations and decisions
- Coordination with other sector activities, especially WASH

Refer to sphere, www.sphereproject.org/handbook

Refer also to point B.3 concept design, owner-driven construction

Refer also to point C.3 technical design development – contractor-built construction

TASK 4: IDENTIFY RISKS AND LIABILITY

Identifying and mitigating risk to CRS, partners and stakeholders is best done during the feasibility stage. It is important to assess short- and long-term liability to CRS, partners and program participants in the early planning phase, especially when health and safety implications are associated with the project scope of work[5].

SUMMARY OF OUTCOMES

Outcome 1: Outline project budget established and agreed upon

Outcome 2: Outline project timeframe established and agreed upon

Outcome 3: Initial designs sketched out and agreed upon

Outcome 4: Understanding of potential risks to the project and CRS

Human Resources

- Depending on the project scope, it may be necessary to contract local professionals and construction support services (i.e., soil testing, surveying, design engineers and management consulting companies).
- Consider the following when hiring staff: Expertise and experience in professional technical knowledge, field experience in managing construction activities within the development context and understanding of participatory construction work with program participants.

5 Construction of a large community water supply system could be in complete alignment with overall program development goals, but a design incorporating a water treatment system with many mechanical systems and chemical processes could cause serious community health problems if not operated properly. Similarly, a small footbridge designed to carry motorcycle traffic might be within the limits of liability for CRS, but a larger bridge design to handle car traffic could be potentially misused by heavily laden trucks to the point of structural damage, creating an unacceptable future risk to CRS.

A.5 HOW TO CHOOSE BETWEEN OWNER-DRIVEN OR CONTRACTOR-BUILT APPROACHES

Selecting the method for *how* the structures should be built is a key decision, as it has significant impact on the overall construction process. Each post-disaster (re)-construction project requires a context-specific arrangement for how to build most effectively and suitably.

The decision on the **most suitable construction modality** needs to be made in close consultation with CRS construction staff, CRS management, social team and program participants. Program participants' buy-in is a key aspect that requires time, access and appropriate ways to communicate technical issues.

SUMMARY OF TASKS

Task 1: Selecting an appropriate construction modality

TASK 1: SELECTING AN APPROPRIATE CONSTRUCTION MODALITY

The list below covers important considerations that can assist in selecting the most suitable construction approach. To make an informed decision on the construction modality, these issues should be assessed and prioritized in line with the overall project objectives.

However, the advice and skill of a professional engineer/architect with post-disaster experience is essential to tailor a construction approach suitable for the specific post-disaster situation. As stated previously (point 1.3) owner-driven or contractor-built construction approaches are not exclusive of each other and, in many cases, the most effective response has been a combination of the two.

- What are the project objectives? Do they include income generating activities for the affected communities?
- What structures are required? Which construction types: Emergency shelter, T-shelter, permanent housing or community infrastructures?
- What is the targeted timeframe (0 – 6months, 3 months – 2 years, +3 – 25 years)?
- Scale of the project: How many structures are required?
- Project budget (cheaper to use owner-driven approach, but more monitoring intensive)
- Socio-economic conditions – Community level of acceptance of project
- Accessibility of the (re)-construction sites (transportation)
- Security situation and political stability
- Availability of local construction capacity – Contractor/skilled labor/craftsmen capacity (i.e., management, financial and material assets, design-relevant experience, etc.)
- Availability of construction material on the local market, cost/proximity to site (market survey)
- Introducing new construction techniques or materials that may be unfamiliar to the local community and craftsmen
- Complexity of the project in regards to sophisticated or uncommon construction techniques
- In-house capacity (to train, monitor and manage owner-driven construction), specifically the program support functions (i.e., Administration, Finance, Procurement, Logistics and Warehousing) and ability to meet project support needs in the short term.

Aspects to consider for owner-driven construction projects:

- This approach may require a greater CRS/NGO management investment (i.e., in terms of staffing and systems management) to supervise the labor workforce; procure the materials and equipment; reach agreements with vendors; assess quality of material; manage transport, logistics and warehousing; provide training to program participants and builders; and oversee day-to-day on-site construction activities.
- Essential for owner-driven construction is a close working relationship between the construction team (engineers/architects, technician) who will produce the necessary technical information, and the social mobilizing team (community officer, etc.) to create strong working relationships with owners and community.
- In this approach, community is placed at the center and the choice of design, material, etc., depend heavily on the local context and practices. This approach tries to integrate local technical knowledge with improved practices. Communities are at ease as not many alien materials/techniques are used.
- This approach brings in higher community participation and a greater sense of ownership. The community can monitor the quality of construction on their own. They can repair their houses if damaged in future disasters.
- This approach has the scope to modify designs/material choices depending on program participant needs.
- Past experiences have shown that this approach tends to be more cost effective in the long term and can be a tool to minimize large-scale corruption and exploitation specifically in countries where this is a key challenge. The chances to collude with every program participant are much smaller than with a single contactor.

Aspects to consider for contractor-built construction projects:

- This approach requires CRS/NGO engineers/ architects skilled in construction contract management.
- In general, the construction cost is higher for contractor-built projects, due to the added contractors' profit margin.
- Very complex buildings, such as hospitals, etc., may need the technical expertise of an experienced contractor.

Note: The internal management configuration will differ between contractor-built and owner-driven/community-built construction projects.

Refer to B.15 and C.15

SUMMARY OF OUTCOMES

Outcome 1: Project-specific construction approach is established and agreed upon

Outcome 2: Project team in place, including technical/social and operational support staff