BOOK C
How to manage a contractor-built construction project

In a contractor-built construction project, CRS/NGO engages a building contractor to carry out all construction works. The contractor is responsible for managing the day-to-day on-site construction activities, material sourcing and site supervision.

CRS engineers/architects will need to undertake the following activities:

1. Produce the technical documents required by the contractor to build what is needed.
2. Maintain a managerial and monitoring role to supervise the contractor's activity.
3. Maintain a good working relationship between the contractor and the program participants/affected communities and ensure protocols are respected (e.g., any agreement to hire local labor or use local materials).

C.1 STAFF COMPOSITION

These activities require adequate qualified staff with different skill sets:

- **Engineers/architects:** Producing the technical information, managing construction contracts and monitoring the contractor's activity.
- **Social staff:** Community mobilizers explain the program, resolve disputes and keep close communication between communities and contractor.
- **Support team:** This is often the most overlooked team, but these team members (logistics, procurement, finance) are critical players to the success of the team.

These are often two distinct skill sets comprised of different staff but these teams must work together to communicate challenges and identify solutions to both technical and social issues. A successful construction (shelter) program will successfully marry technical and social issues.

Refer to chapter C.15 for identifying appropriate staff and organizational structure

Book C cover photo: CRS built 45 shop houses in Panggong, National Road, Meulaboh, NAD, Indonesia. two-storey row building, ground floor will serve as store/shops, other use it as canteen/eatery and the second floor is a 2 bedrooms residential area. The total floor area is 96 m2 (48m2 per floor). Photo Credit: Ariel Sadural for CRS

Example 1: Permanent housing project in Aceh, Indonesia, in the village of Cot Seumerang in Meulaboh, 2006

After the tsunami in 2004, CRS developed a standard 45m2 permanent house for Aceh, Indonesia. In total CRS constructed nearly 5,000 of these permanent shelters. The design was slightly adapted depending on the specific location. In some instances, the design was elevated with stairs and handrail to be more flood resilient.

In the village of Cot Seumerang in Meulaboh, CRS provided 98 of these permanent houses on 120m2 lots. The house design included two bedrooms, a living room, dining room, one toilet and bathroom, and a kitchen.

The house structure is a concrete frame construction with concrete foundation, columns and roof beam. The external walls are made of masonry block wall with steel bars, and the internal partitions are made of light gauge steel (LGS) vertical and horizontal studs with cement board over. The roof is an LGS truss structure with roof sheeting. Internal ceilings are gypsum board on LGS steel support.

The land for the permanent housing project was donated by the Government of Indonesia (GOI). CRS undertook the design for the housing and for civil works, such as roads/drainage and community Infrastructure (Mushola, community hall). Once the construction was completed to 95%, the GOI started the construction of service connections such as electrical post, etc. The GOI was responsible for connecting the power line and issuing individual land title certificate to each CRS program participant/house owner.

Completed permanent houses in the village of Cot Seumerang in Meulaboh at hand over
Photo Credit: Ariel Sadural for CRS

The construction project was procured through a contractor-built route. The design and planning was done by CRS internal engineering staff, as was the quality control. A CRS internal quality control technical team was responsible to oversee the contractor's activities. One full-time field engineer and one site foreman were employed for this project. They were supervised directly by the project engineer (PE), and the PE reported directly to the construction manager.

Quality control procedures were put in place with specific inspection forms for each construction stage. The site foremen and field engineer conducted the daily on-site quality control. In addition, an independent quality assurance engineer was making site visits to monitor compliance with the design and material specification. He also provided a final "punch list" – a list of defective items that needed repair before the house was handed over from the contractor to the new owner.

As part of the quality control procedure and contractual obligations of the contractors, a one-year defects liability period was included in the construction contract. Within this defects liability period, CRS community liaison officers were in direct contact with the community to report any defects or repairs that were needed on the new houses. After one year, the contractor and the QA engineers visited the site to determine any defective works. The contractor was obligated to repair all defects before CRS concluded the contractor's responsibilities.

The quality control procedures put into place were successful and there have been no defect issues with the CRS projects in Aceh. A newly constructed three-story hospital building that was struck by a 7 magnitude earthquake after completion withstood the earthquake without structural defects. The permanent houses are in good condition after the one-year inspection, and individual house owners have started to make personal improvements.

Permanent housing after one year of hand-over
Photo Credit: Ariel Sadural for CRS

Example 2: Permanent housing project in the mountain village of Nias, Aceh, Indonesia

As part of the re-construction efforts after the tsunami in 2004, the CRS standard 45 sqm houses were also constructed in the mountain village of Nias to support the local partner, Caritas Sibolga. During a period of one year and four months, 103 permanent houses were built by a single, reliable contractor. Within all the construction projects in Aceh, this was the most challenging, due to its inaccessibility. The main challenge was to manually deliver all construction materials by foot to the mountain village located at 640 m altitude, along 2-km-long foot track.

The construction materials were re-packed into 20kgs-40kgs packages for the workers to carry and deliver to the mountain village from the warehouse at the bottom of the mountain. The materials included cement, LGS, plywood, metal roof sheet, cement board, metal wall siding, paints, plumbing pipes and accessories, gutter and tuff tank water storage for rain water catchment. Gravel and sand was supplied by each house owner (program participant). Many of the workers were CRS program participants and were paid per kg of material that they carried and delivered to each individual area.

To facilitate this delivery process, a warehouse controller was stationed at the bottom warehouse and another material controller was stationed at the construction site. A detailed material list was issued, and once the worker arrived at the final destination, the material controller checked and signed the delivery list acknowledging receipt of the materials. On the following day, the worker brought down the signed shipping list and to the finance staff at the warehouse to claim payment. Upon receipt of payment, the worker again collected materials and delivered them to the top of the mountains. This process continued until delivery all the materials for one house was completed.

To facilitate the successful completion of this challenging work, 11 CRS staff were assigned to the project, including project engineer, field engineer, quality control engineer, material controller, finance staff and community liason officers. Training of all staff was conducted prior to the start of the project, and quarterly inspections were carried out by a CRS construction manager.

To train the contractor, CRS built one prototype at the contractor's compound using the contractor's workers. This prototype served to determine the actual materials needed, train workers and show to our partners (Caritas Sibolga) and program participants the actual material components of the proposed permanent housing.

Construction in progress of 45sqm permanent housing in mountain village of Nias
Photo Credit: Ariel Sadural for CRS

45sqm permanent housing in mountain village of Nias
Photo Credit: Ariel Sadural for CRS

DIAGRAM 3: CONTRACTOR-BUILT WORK STAGE DIAGRAM

Book A

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

Book C

CONTRACTOR-BUILT

SUMMARY OF TASKS

C.3 TECHNICAL DESIGN DEVELOPMENT

Task 1: Community-led site planning and selection

Task 2: Initial community mobilization – Conduct focus group discussions

Task 3: Develop technical drawings and material specification

Task 4: Obtain permission to build

Task 5: Develop cost estimate

C.4 PRODUCTION INFORMATION, DETAILS AND BOQ

Task 1: Produce final set of technical design drawings and specifications

Task 2: Produce Bill of Quantities (BoQ)/Unit Cost Analysis (UCA)

Task 3: Review technical design – Local building codes

Task 4: Develop monitoring plan

C.6 TENDER SELECTION

Task 1: Compile a tender package

Task 2: Conduct a "pre-qualification process"

Task 3: Conduct a tendering selection process

C.7 CONTRACT AWARD

Task 1: Prepare the construction contract

Task 2: Award contract to selected contractor

C.9 CONSTRUCTION SUPERVISION

Task 1: Arrange "kick off" meeting with contractor

Task 2: Define site supervision procedure

Task 3: Establish site safety and security measures

C.10 PROJECT CONTROLS – TIME, COST AND QUALITY

Task 1: Set up a project schedule (progress tracking)

Task 2: Set up cost control (budget tracking)

Task 3: Set up quality control (assures construction quality)

Task 4: Set up document control (records management)

C.11 PAYMENT PROCEDURES

Task 1: Verify progress/ making progress payments

C.12 CHANGE MANAGEMENT

Task 1: Set up change management processes

C.13 PRACTICAL COMPLETION AND HAND OVER

Task 1: List outstanding defects/work – "punch list"

Task 2: Issue practical completion certificate

Task 3: Manage warranty period

Task 4: Hand over to end-users

Task 5: Issue final completion certificate

C.14 AFTER COMPLETION

Task 1: Introduce maintenance activities

Task 2: Introduce disaster risk reduction procedures

Task 3: Evaluation and program participant satisfaction

SUMMARY OF OUTPUTS

C.3 TECHNICAL DESIGN DEVELOPMENT

Outcome 1: Propose design solutions specific to post-disaster context

Outcome 2: Site layout and design agreed upon with stakeholder community

Outcome 3: (Written) permission/agreement obtained to construct project by local government

Outcome 4: Cost estimate and technical design/specification developed

C. 4 PRODUCTION INFORMATION, DETAILS AND BOQ

Outcome 1: Completed engineering package for tender action

C.6 TENDER SELECTION

Outcome 1: Tender package completed

Outcome 2: Short-list of potential contractor drawn up

Outcome 3: Tender selection process completed

C.7 CONTRACT AWARD

Outcome 1: Construction contract agreed upon, awarded and signed by all parties

Outcome 2: Contactor is in a position to start site preparation work

C.9 CONSTRUCTION SUPERVISION

Outcome 1: Site supervision procedures set up

Outcome 2: Good communication and feedback mechanism set up

Outcome 3: Site safety measures implemented and monitored

C.10 PROJECT CONTROLS – TIME, COST AND QUALITY

Outcome 1: Project schedule set up and included in contract agreements

Outcome 2: Progress/cost reporting/ tracking procedures set up and agreed upon

Outcome 3: Construction quality procedure set up and agreed upon with contractor

Outcome 4: Filing system set up

C.11 PAYMENT PROCEDURES

Outcome 1: Payment procedure set up

C.12 CHANGE MANAGEMENT

Outcome 1: Change procedures are clearly defined in contract and agreed upon

C.13 PRACTICAL COMPLETION AND HAND OVER

Outcome 1: Defects/outstanding work list set up

Outcome 2: Practical completion certificate issued

Outcome 3: Warranty period completed

Outcome 4: Ownership certificate handed over

Outcome 5: Final completion certificate issued

C.14 AFTER COMPLETION

Outcome 1: Maintenance procedures agreed upon and established

Outcome 2: Disaster risk reduction training set up

Outcome 3: Evaluation conducted

C.2 WORK STAGE: FRONT END ENGINEERING & DESIGN (FEED)

The **Front End Engineering & Design (FEED) work stage** cannot begin until 1) the scope, size and goals of the construction project have been clearly defined with the inputs from the feasibility study/assessments (refer to book A.3 for assessments), and 2) an agreement or Memorandum of Understanding (MOU) has been made among the stakeholders about the objectives and scope of the construction project.

Note: By this stage, an MOU should have been signed between involved stakeholders (program participants, affected communities, local government) to clearly define their roles and responsibilities. Also at this stage, a project team is set up including technical, social and support staff.

"Who to target" program participant selection criteria: As explained in the introduction, this document does not include program participant selection processes/criteria. However, clear, participatory and transparent program participant selection is absolutely essential and should have been conducted during the feasibility stage or even prior to that. Past experiences have shown that absence of a clear program participant selection process can lead to serious conflicts between program participants and communities. This process should be as participatory as possible. PRA tools like social mapping could be used to see that vulnerable HHs are given priority.

Refer to Introduction

Front End Engineering & Design (FEED) is an iterative process intended to generate comprehensive engineering documentation that defines the technical requirements to build the buildings/shelters, etc.

The main output from the **FEED** process is the **"engineering package"** (refer to C.4 for detail) which provides clear and concise information about the entirety of the construction work.

It is important to ensure adequately qualified engineers/architects and support staff are employed to accomplish the technical design work according to the complexity of the project scope of work.

It is possible to outsource the work required for the FEED to a consulting architects/engineering firm. However, outsourcing still requires technically skilled staff and project management within CRS to supervise the consultant.

Includes:

Sub-stage: Technical design development refer to C.3

Sub-stage: Production information, details and BoQ refer to C.4

C.3 TECHNICAL DESIGN DEVELOPMENT

The technical design process requires several cycles of development before an appropriate, context-specific solution can be established.

The understanding and knowledge gained from the feasibility stage (refer to book A.3) needs to be developed into technical information. The aim is to design **simple, safe and achievable structures.**

Also refer to Book A.4 – Quality, quantity, cost and timescale

SUMMARY OF TASKS

Task 1: Community-led site planning and selection

Task 2: Initial community mobilization – Conduct focus group discussions

Task 3: Develop technical drawings and material specification

Task 4: Obtain permission to build

Task 5: Develop cost estimate

TASK 1: COMMUNITY-LED SITE PLANNING AND SELECTION

Planning of the exact location of the structures on the site is very important. Where possible, the program participants should lead this process with support from CRS/partner technical and social staff. In many cases, the local authorities need to be consulted on site planning/selection issues. Key items to keep in mind when selecting a shelter location are:

- Geo-hazard vulnerability (Is this new site prone to land-slides, flooding, etc.?)
- Does the new site have proper drainage (storm runoff, grey water, flooding).
- Site leveling or clearance of debris required (destroyed structures) .
- WASH considerations: Were WASH facilities destroyed/damaged during the disaster? If yes, to what extent can we rebuild or integrate our shelter program around these WASH services?
- Existing vegetation, prevailing wind directions and sun path.
- Current use of site by the community.
- Accessibility (roads, path, electricity, water, etc).
- Is the site near conflict or high risk borders?
- Will occupying the site create tension with the host community?

It is essential to develop the site layout, plot sizes other considerations mentioned in close partnership with the program participants and surrounding communities to use their local knowledge, get program participants' buy-in and mitigate future grievances and disagreements.

Example: Conflict between the host community and the program participants, due to possible difference in housing standards.

Example: Orissa and West Bengal, India, 2008

CRS was in discussion with the local government from the beginning of the project. Approval was sought from the authorities for site selection, planning and the design. In some cases, a model shelter was constructed in front of the government offices to encourage local government support and buy-in. As a result of strategically involving the government, the more vulnerable households were included into the government housing scheme.

In other cases, the local government gave financial (part contributions) support or land was identification for permanent shelter construction.

Plinth of flood-resistant shelter is being reinforced with chicken wire and concrete
Photo Credit: Kirtimayi Mishra for CRS

TASK 2: INITIAL COMMUNITY MOBILIZATION – CONDUCT FOCUS GROUP DISCUSSIONS

Engaging with the community and the program participants from the beginning is essential. Initial community mobilization should introduce the project to the community, collect feedback, and discuss and agree upon roles and responsibilities.

Template of household agreement in Appendix 1

Template of household agreement, decline of participation in Appendix 2

Conducting focus group discussions with affected community members is a useful tool to gain important information on: what their previous structures looked like, material used to build them, and their cultural preferences. Find out priorities in how they live. Understand aspects such as women/men, different generations sleeping in different areas, household size and family structures, WASH facilities indoor or outdoor, cooking methods, climatic conditions, religious requirements, etc.

- Identify and talk to households that have not rebuilt temporary houses and find out why.
- Identify and talk to household who have rebuilt and find out how they started and why.
- Identify availability of skilled/unskilled labor (market survey should establish labor availability).
- Identify community organizations/NGOs familiar with the area and communities.
- Identify whether there is confidence in the local construction practices after a disaster. Are there changes required to make the new construction more hazard resistant? How can it be improved?

TASK 3: DEVELOP TECHNICAL DRAWINGS AND MATERIAL SPECIFICATION

The design development of the structures requires input and buy-in from the program participants who are going to inhabit the structures. **Engineers/architects must not design the structures in isolation, but with the specific post-disaster context in mind.** Technical drawings and specification need to be developed with consideration to other sectors, such as WASH, protection and livelihoods.

The shelter standards of host communities and before the disaster are important considerations, as well as contractor capacity, timeframe and material availability and cost.

What are technical design documents?

Design parameters

- List of design parameters (size, structural loading and resistance), list of drawings and assumptions

Site plans and infrastructure plans

- Civil drawings (roads, drainage, bridges, WASH, etc.)
- Site plan (showing site boundaries, location of structure on the site in plan, access, north direction, any water/drainage/electrical supplies, topographical information, vegetation, neighboring structures, etc.)

Architectural and structural package

- Architectural/structural drawings (plans, elevations, sections)
- Electrical, mechanical drawings (lighting circuits, ducting, ventilation)
- Material specification /equipment schedules
- Detail drawings (showing important junctions, i.e., foundations, wall/roof junction)
- Design Bill of Quantities (BoQ)
- Structural calculations

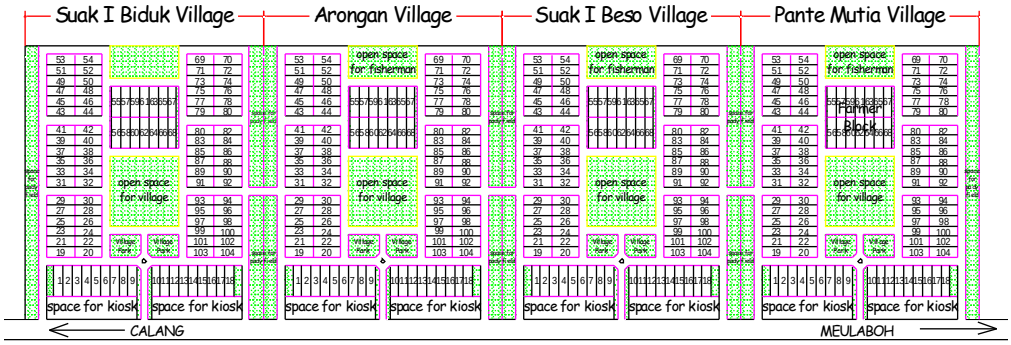
What is part of the specifications?

Specifications describe the **minimal** construction requirement to be achieved and describe the approved design in words and construction sequence. It must reflect the **design quality, material quality/characteristics** (i.e., concrete mixing strength, alignments tolerances) and the construction methodology (i.e., prefabrication versus on-site construction).

For example contact CRS Shelter advisor

Example 4

Housing Type 45m²

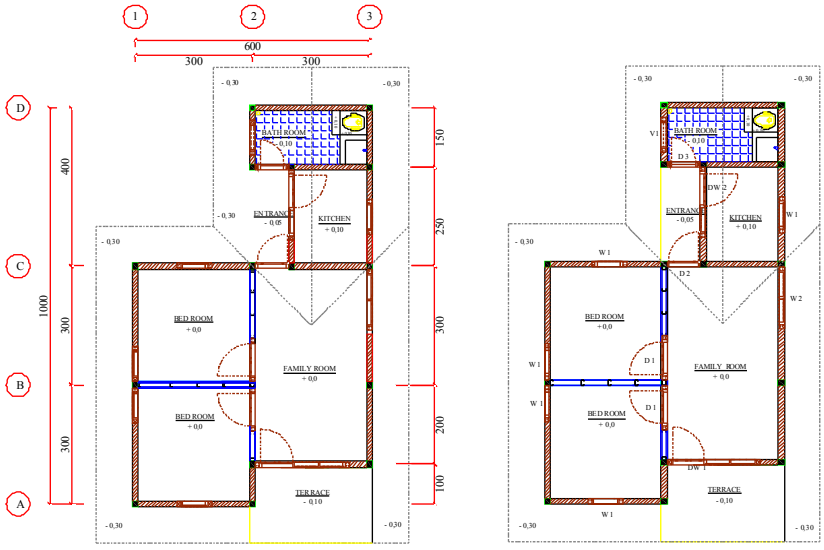


SEUNEUBOK TENGOH RELOCATION AREA
(392 HOUSEHOLDS)

MASTER PLAN

Technical drawing of site layout for Seuneubok Tengoh relocation area, Aceh, 2004
Photo Credit: CRS

Housing Type 45m²



FLOOR PLAN

Technical drawing of ground plan for 45 sqm permanent house, Aceh, 2004
Photo Credit: CRS

TASK 4: OBTAIN PERMISSION TO BUILD

To the extent possible (especially for permanent construction), written permission should be obtained from government, local authorities and communities (program participants/host communities) to build on the proposed site to the scope intended. In some cases, this formal process is not always possible, because:

- Not all local contexts have formalized building permission procedures and timeframes.
- In many cases, after a disaster the local administration is understaffed or government systems collapse are not functioning, etc.

Therefore it is important that CRS assists program participants with needed documentations of the project for submission according to the local laws. This could include: Site plans/survey plans with property boundaries/plot numbers and technical drawings of the construction (plans/sections/technical specification).

T-shelter construction: In the case of transitional shelters/buildings, permission may take more informal format as official processes are too lengthy and/or connected to formal landownership. In the past, this has been a strategic reason why CRS to opted for T-shelter construction. Furthermore, it is important to consider in the design the possibility to demount and rebuild the structures while leaving the building structurally safe.

Land use agreement for transitional settlement

Seek written agreement from the land owners in the form of a signed Memorandum of Understanding. However, 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.

Important clauses to be included in agreements:

Project Documents. The land of the Land Owner shall be used exclusively for the purpose of building transitional shelters; inclusive of toilets, bathing cubicles, hand washing stations, clothes washing area, and cooking area; and according to the goal and objectives as set forth in the attached project design.

Period of Agreement. The project shall be implemented by CRS and the Church on behalf of the Archdiocese of Cagayan de Oro. The Land will be used for a period of six months, renewable in six month increments.

Safety. It is the responsibility of the Church to comply with all applicable laws, ordinances, rules, regulations and orders of any public authority having jurisdiction over the safety of persons or property or to protect them from damage, injury or loss.

Injury or Damage. It is understood that the personnel/workmen hired, engaged or contracted in connection with this project including employees of CRS or its donors shall not hold the Land Owner responsible for personal injury or damage caused or sustained by said personnel/ workmen.

Sale, Transfer and Mortgage. The Land Owner agrees that the subject Land shall not be sold, transferred or mortgaged to parties outside of this agreement until such time as permanent housing is available for program participants residing in transitional shelters built on the Land.

Site Preparation. All site preparation, including construction of access road and necessary culverts and brush clearing shall be the responsibility of CRS. Large trees will not be removed from the land during site preparation.

Utility Connection. Provision of metered water and electrical connection will be the sole responsibility of CRS.

Drainage and WASH Facilities. Proper drainage and WASH facilities are the sole responsibility of CRS. Drainage will be designed and tested before construction to ensure suitable run-off of water. All latrines constructed will have properly sealed septic tanks.

Also refer to land ownership issues task 2 under point A.3

Land use agreement template (digital copy) available on share point

TASK 5: DEVELOP COST ESTIMATE

The initial budget (refer to A.4) needs to be developed and updated to reflect scale, design, material selection and specification (unit prices and quantities/Bill of Quantities [BoQ]) and should be calculated with contingencies between 5-15% to account for operating uncertainties. In general, the contingency should increase with increased uncertainty.

Refer to B.6 for BoQ example

What is a Bill of Quantities (BoQ)?

The final BoQ is based on the final approved design drawings and specifications. The BoQ lists out all the materials and quantities required to build the structure as drawn on the technical drawings. It determines unit costs. The BoQ is needed to calculate total project costs and monitor the budget.

What is a Unit Cost Analysis (UCA)?

UCA is part of the BoQ. It itemizes material cost, labor cost and equipment cost

These estimated costs can be derived in several ways:

1. Use of a standard construction cost index (i.e., R.S Means Construction Cost Index, etc.) generally provides a lower accuracy estimate and is not always available.
2. Unit costs based on an up-to-date actual local area market price survey are more accurate, but will require more time and staff resources.

The total estimated construction cost = quantities x unit costs (materials, labor and equipment). In addition to the construction cost, make allowance for staffing and overheads.

SUMMARY OF OUTCOMES

Outcome 1: Propose design solutions specific to post-disaster context

Outcome 2: Site layout and design agreed upon with stakeholder community

Outcome 3: (Written) permission/agreement obtained to construct project by local government

Outcome 4: Cost estimate and technical design/ specification developed

C.4 PRODUCTION INFORMATION, DETAILS AND BOQ

SUMMARY OF TASKS

Task 1: Produce final set of technical design drawings and specifications

Task 2: Produce Bill of Quantities (BoQ)/Unit Cost Analysis (UCA)

Task 3: Review technical design – Local building codes

Task 4: Develop monitoring plan

TASK 1: PRODUCE FINAL SET OF TECHNICAL DESIGN DRAWINGS AND SPECIFICATIONS

Defines what is going to be *built*. Produce the final set of technical drawings, structural requirements and material specifications (define the material quality). This set of technical drawings and the BoQ/UCA constitutes the **engineering package** that is required for selecting a contractor.

What is part of the engineering package?

It collates all information relevant to the project and is the core documentation for overall construction project management and budget and timeframe control. The engineering package is essential to proceed to the next work stages. It includes:

- Technical assessment, field investigations, site planning and requirements
- Scopes of work, technical design drawings, material specifications, BoQ
- Construction modality – owner-driven or contractor-built or a combination of the two
- Monitoring plan

Note: The construction project manager/ engineering team should verify the accuracy and completeness of the engineering package, as its accuracy and completeness contribute to their ability to manage the construction works effectively.

TASK 2: PRODUCE BILL OF QUANTITIES (BOQ)[8]/UNIT COST ANALYSIS (UCA)

BoQ: Develop a list of all materials, material quantities, equipment and labor required to build the structure.

UCA: Determine the unit cost for construction materials, equipment and labor.

Refer to B.6 for BoQ example

TASK 3: REVIEW TECHNICAL DESIGN – LOCAL BUILDING CODES

Technical designs and specifications should be reviewed for compliance with local building codes and regulations or accepted international codes where local codes and regulations are not available or are below acceptable standards. This can include a combination of in-country local and international professional engineers, a wider review via email/internet utilizing the CRS network of construction professionals/shelter advisor, and/or a professional design review conducted by an architect and engineering consultant firm.

Transitional structures: "Build Back Better" principles must be emphasized. Structures must be designed so that if they do fail in a future disaster, they do not cause injury to the people. Evacuation procedures should be known and practised.

This is particularly important in earthquake, high wind or flooding zones, where special construction techniques and detailing are essential to build safe and hazard-resistant structures.

Reference: Uniform Building Code (UBC), www.iccsafe.org

Reference: hazard resistant construction: "Battling the storm", "Learning how to live with floods", http://www.sheltercentre.org/library/search/hazard%20resistant%20construction?filters=type:resource

Contact shelter advisor for review of technical drawings/specification

8 This UCA should be done by the CRS Procurement Officer with technical support from the engineers in order to ensure separation of duties. Once the UCA is determined, it should be kept confidential to reduce the risk of collusion in the procurement and/or contracting phases.

TASK 4: DEVELOP MONITORING PLAN

This is a **tool** that defines the procedures to be used to monitor the quality of the construction works and their **progress.** Ideally divided into the different construction stages (typically foundations, walls, roof, finishes and completion). It is developed on the basis of the technical design, material specifications and sets out the key inspection stages.

A monitoring plan is a communication tool to use with the local community/program participants/skilled laborers to agree on the inspection procedures, assist them in achieving accountability and raise awareness for safe construction. An induction meeting with the community should explain the process carefully.

SUMMARY OF OUTCOMES

Outcome 1: Completed engineering package for tender action

What is part of a monitoring plan?

It sets the basic requirements and defines inspection standards of the construction works by the engineering team/program participants and community. It is a very important tool to monitor the quality of the construction.

- **States the responsible individual** for each of the inspection activities.
- **Includes verifying documents** for each inspection activity consisting of inspection forms/construction checklist(i.e., Daily Inspection reports that monitor day-to-day activities).
- **Includes breakdown of overall construction process** into different phases such as completion of ground works (drainage/sewers), foundations/plinth, wall structure, (RCC columns/timer, etc.), roof structure (safe connection to wall structure) and finishes (internal/external).
- **Includes construction "Dos and Don'ts" poster** with pictures posted at the construction site to inform/ educate the construction workforce on good and bad practices witnessed during construction. Past experience has proven that pictures help to communicate safe construction practices.

The monitoring plan defines:

- **"Hold points"**– critical stages of the construction work where construction is stopped until inspection and quality certification is provided from the engineering team and program participants. The hold points clearly describe what requires inspection. They are particularly important where on-going construction would otherwise conceal completed works (i.e., reinforcement and pouring of foundations, columns and support beams, installation of electrical, septic tanks, etc.).
- **"Monitor"** – random checks, by direct or indirect inspection, to verify conformance with specification and quality control.

Permanent construction:

- Owner-driven permanent construction should include a "defect liability period" of 6 months with a retention withheld (5%) to repair any minor issues that arise during this period.

C.5 WORK STAGE: TENDER

In general, it is the task of the tender process to establish the most suitable contractor (best price/quality/time offer) for the construction. Consequently, a comprehensive engineering package is essential to gain a clear understanding and definition of what is being tendered to allow the bidding contractors to give realistic prices.

The tender work stages include necessary steps to:

- **Select the appropriate contractor(s)** with the necessary capacity and reliability (management, financial and construction skill) through a fair and transparent bidding process.
- **Award the contract** to the selected contractor(s) to construct the structure(s) within agreed timeframe, budget and specified quality.

CRS note:

Please refer to agency CRS procurement policy and procedures and EFOM and Baltimore Purchasing Manuals.

Includes:

Sub-stage: Tender selection refer to C.6

Sub-stage: Contract award refer to C.7

C.6 TENDER SELECTION

SUMMARY OF TASKS

Task 1: Compile a tender package

Task 2: Conduct a "pre-qualification process"

Task 3: Conduct a tendering selection process

TASK 1: COMPILE A TENDER PACKAGE

A tender package includes all relevant information and project documentation that will allow the bidders to make informed decisions on construction costs, labor requirements and work plans.

It should include and be consistently applied to all potential bidders:

- **Tender condition/procedure and schedule:** Outlining the specific conditions/procedures to follow for bid submission, submission dates and selection date
- **Engineering Package:** Technical drawings, specifications, Bill of Quantities/Unit Cost Analysis without the prices to provide a common format for contractors to submit their price quotes (developed during the FEED process). Refer to C.4 for detail
- **Project scope:** Number and location of construction sites, site preparation requirements, environmental impact requirements, access restrictions, specific donor requirements
- Any performance bond or bank guarantee (if required)

"The success of the project is ultimately linked to the contractor capacity and reliability in regards to their construction skill, financial and managerial capacity to build to a consistent and agreed quality within the timeframe and cost."

TASK 2: CONDUCT A "PRE-QUALIFICATION PROCESS"

This review provides insight into the availability and experience of local contractors. It draws up a short-list of suitable contractors that have the capacity to participate in a formal tendering process. It is a continuation of the market surveys conducted during the feasibility stage and aims to safeguard against unrealistic tender returns, as well as assist in mitigating problems during later stages in the project by filtering out contractors that are not suitable or reliable.

The pre-qualification assessment process should include the following steps:

A. Tender announcement:
It is a good practice to use local media resources (e.g., radio, TV, newspapers) to notify local contractors of the planned construction work and where/when to participate in the tendering, or if feasible, to conduct an open information meeting for potential contractors to promote openness and transparency

B. Pre-qualification checklist:
Interested contractors are required to submit the pre-qualification checklist to be invited to the formal tender process.

Pre- qualification checklist in Appendix 12

C. Review submission and draw up short-list:
The submissions are reviewed in regards to completeness, capacity, experience and reliability of the interested contractors. A short-list is drawn up, and selected contractors are invited to participate in the formal tender process.

TASK 3: CONDUCT A TENDERING SELECTION PROCESS

There are two tender process options:

1. Open tender process – one in which any company can bid.
2. Invitational/closed tender process – one in which only certain companies are invited to bid.

In either of these cases, CRS might choose to have a public bid opening in which those who bid are invited to attend a meeting at which the bids will be opened and recorded.

The process includes the following steps:

A. The short-listed contractors are provided with the complete tender package (Task 1). This is best done in an **information meeting** with the technical staff to clarify questions.

The contractors need to be made aware of the tendering schedule and submission requirements (the completed tender package), including clarification period, submission date, evaluation period and tender announcement date to promote openness and emphasize that fair competition will be guaranteed between bidders.

B. Recommended tendering schedule:
The timeframe must be clear to all contractors:

- 7 days to bidders to answer tender package.
- 7 days to procurement/engineering staff to evaluate received bids and obtain required clarifications.
- 7 days for final contract negotiation with the selected contractor.
- 7 days to finalize contract and all necessary reviews and authorization.

C. Tender evaluation/selection:
It is advisable to form a Bid Selection Committee including technical and procurement staff.

The **submitted tender returns** need to be analyzed and tabled **(comparison worksheet)** in regard to:

- **Technical evaluation will appraise:** The commitment to safety and quality, the contract schedule proposed by the company, the resources (equipment and labor), the proposed management organization
- **Contractual and legal evaluation will appraise:** Contractor registration, validity of bonds, track record, financial capacity
- **Financial evaluation:** Unit costs for each line item from the Bill of Quantities to be entered into the bid comparison worksheet
- Only complete tender returns should be considered.

Note: Experience shows that calculation mistakes are common even in automated Excel spreadsheet. Reconfirming calculations is important.

In general, the contractor offering the best price/quality /reliability ratio should be selection. It is important to keep the comparison worksheet on file for reasons of transparency and fair process.

CRS internal note:

Tender selection process must comply with CRS Purchasing Policy.

SUMMARY OF OUTCOMES

Outcome 1: Tender package completed

Outcome 2: Short-list of potential contractors drawn up

Outcome 3: Tender selection process completed

C.7 CONTRACT AWARD

It is recommended to use an approved construction contract template to draw up the **construction contract.** This construction contract is the official agreement between CRS and the contractor. All details concerning the project must be contained within the document. Any disputes will be referred to this document in the first instance. It is imperative that a construction contract is signed as it has clauses specific to complexities associated to the construction industry. The contract must be completed and signed between both parties. The contract documents must be completed with the contractor's returned tender information and other negotiated term. Once a contract is signed, the contractor is obligated to initiate the construction activities within the contract-mandated period of time. During construction start-up, the contractor mobilizes resources by securing the site and bringing labor, materials and equipment to the designated worksite. The contractor must make the construction site safe (fenced off, supervised). It is at this point that the working relationship with the contractor begins.

SUMMARY OF TASKS

Task 1: Prepare the construction contract

Task 2: Award contract to selected contractor

TASK 1: PREPARE THE CONSTRUCTION CONTRACT

It is advisable to use standard CRS construction contract templates in bi-lingual format. The contract templates should be reviewed by local legal counsel within the host country to assess the cultural and legal appropriateness and adapted as needed.

For contract templates/requirements and advice contact shelter advisor

Note: A common error during contract preparation is a failure to update information in the contract template gained during the tender negotiations.

TASK 2: AWARD CONTRACT TO SELECTED CONTRACTOR

Contract documents include the:

- Engineering package – design, specifications, BoQ and monitoring plan
- **Payment schedule –** outlining when progress payments will be made against verified work completion
- **Contractors prices** as submitted in the Unit Cost Analysis format
- **Approved project schedule** and any negotiated terms (i.e., performance bonds)
- **Change procedures,** refer to C.12

Locked tender submission box in CRS office, Nairobi, Kenya
Photo Credit: Annika Grafweg for CRS

Contracts should be clear regarding the terms and conditions for payment. In general, **contract payment schedules** should:

- **Clearly define the responsibilities and procedures** of payments. Progress payments are made after invoices have been submitted **based on progress completed.** This is monitored through signed progress spreadsheets indicating the used materials in the BoQ and co-signed by the project manager.
- **Avoid the use of pre-payments –** It is advisable to avoid advance payments to contractors. If necessary for small contractors, payment should only cover site mobilization.
- **Include details on payment retentions –** Retention is money retained for tax requirements and to a cover warranty period after

In post-disaster situations, ensure that the contractor is realistic in their time planning and has considered labor shortages or delays in the delivery of materials and equipment to site.

SUMMARY OF OUTCOMES

Outcome 1: Construction contract agreed upon, awarded and signed by all parties

Outcome 2: Contactor is in a position to start site preparation work

C.8 WORK STAGE: CONSTRUCTION CONTRACT MANAGEMENT

This stage includes all phases of the construction project from signature of construction contract with the contractor until hand-over of the completed building.

Includes:

Sub-stage: Construction supervision — refer to C.9

Sub-stage: Project controls: time/cost and quality — refer to C.10

Sub-stage: Payment procedures — refer to C.11

Sub-stage: Change management — refer to C.12

Sub-stage: Practical completion and hand-over — refer to C.13

Sub-stage: After completion — refer to C.14

C.9 CONSTRUCTION SUPERVISION

The primary activity of this work stage is to assure safety and quality of construction by monitoring the contractor's construction performance and contract management. The contractor is accountable for the day-to-day management of the on-site construction activities under the construction contract.

SUMMARY OF TASKS

Task 1: Arrange "kick off" meeting with contractor

Task 2: Define site supervision procedure

Task 3: Establish site safety and security measures

TASK 1: ARRANGE "KICK OFF" MEETING WITH CONTRACTOR

To establish a good working relationship with the contractor, an initial "kick-off" meeting should be held including the community and any other stakeholders (i.e., local government officials). It is advisable to have the construction project manager chair the meeting. The following points should be considered:

- Introductions of all stakeholders
- Roles and responsibilities including communication protocols
- The construction supervision procedures
- Site safety and security
- Review of key contract documents, including the construction design and specifications
- Format of subsequent weekly meetings

As part of the kick-off period, training and induction in the project controls procedures, weekly meetings, inspection reports and minute keeping, etc., may be required. Even though the best-qualified contractor should have been selected, it should not be assumed that all contractor staff is professional or have the management capacity to meet contract obligations.

TASK 2: DEFINE SITE SUPERVISION PROCEDURE

The tools and protocols for effective site inspection (cost, time and quality) are detailed under C.10 –Project controls.

In addition:

- **Weekly site meetings** should address any concerns from the community, construction progress updates and quality or performance issues. It is important to maintain good communications between the contractor's management team, the CRS engineering team and the community/program participants. Minutes should be recorded by the contract manager or community liaison officer.
- It is good practice to set up a **feedback mechanism** to ensure that the appropriate people are targeted; grievances or concerns can be address in a timely fashion, in form of hotline, notice board, etc. Refer to B.8
- **A resource and equipment schedule** must be provided by the contractor to the engineering/ project management team and needs to be approved before construction begins.
- **Construction materials' quality** (sourced by the contractor) need to be checked and approved by construction manager prior to any purchases.
- **Any items designed by the contractor,** such as railings or drainage culverts, must first be approved by the engineers before manufactured and installed to be structurally safe.

It is important to review materials considered by contractors to ensure that restricted materials (i.e., restricted wood, asbestos, etc.) are not used.

Mon Ikuen, Banda Aceh, Indonesia

Shortly after a contractor was awarded a contract for construction of over 100 houses in Mon Ikuen Village, the villagers blocked the contractor from starting activities. Villagers felt that the contractor should purchase materials (i.e., sand, gravel, rocks and rebar) directly from them rather than sourcing these items at a better price outside the community. The contractor was under no contractual obligation to do so. A lengthy and time consuming dispute with the villagers ultimately was resolved by using some materials from the community while still allowing the contractor to source the best prices elsewhere.

Reflections:
Weekly meetings with communities are essential to ensuring expectations are being discussed.

TASK 3: ESTABLISH SITE SAFETY AND SECURITY MEASURES

It is essential that safety measures protect the workforce and surrounding communities from harm during construction. Construction works are inherently dangerous activities. Contractor must follow proper safety procedures and protocols under their contract. If not adequately monitored and managed, safety issues can contribute negatively to quality, schedule and cost. It may also lead to injury or loss of life.

Safety measures include:

- Develop site safety training and awareness campaigns for workforce and communities
- Provide barriers to enclose the construction site, create safe access to site (i.e., from roads, etc.)
- Consider climate and weather conditions or specific hazards related to the post-disaster situation (i.e., further landslides, aftershocks, etc.)
- Protection from falling, using barriers when excavating or working at higher levels
- Protective clothing for workforce: Shoes, helmets, vests, harness

Withhold payment to contractor in cased of non-compliance to safety measures. A very complex project may require a site safety coordinator to monitor and report on site safety.

Construction materials are unsafely scattered over construction site
Photo Credit: CRS

Site safety hazard
Photo Credit: CRS

Safety is a matter of communication and is closely related to the country's culture. Finding the most appropriate communication method to explain the importance of on-site safety is an essential part of site supervision.

CRS internal note:

Catholic Relief Services are fulfilling their legal and moral obligation to maximize awareness of safety in the workplace and to minimize the potential for accidents on their projects.

SUMMARY OF OUTCOMES

Outcome 1: Site supervision procedures set up

Outcome 2: Good communication and feedback mechanism set up

Outcome 3: Site safety measures implemented and monitored

C.10 PROJECT CONTROLS – TIME, COST AND QUALITY

Project controls encompass the **monitoring and evaluation (M&E) processes** (i.e., procedures, tools and protocols) that are essential to achieve safety and quality of construction. Project controls facilitate the construction team to **track project performance** in respect to **quality, cost** (expenditures, payments to contractor) and **progress,** as well as the projects' compliance with donor requirements, agreements with local governments, communities and/or institutions associated with the construction activity.

The below listed **tools and procedures** have been developed to:

A. Constantly track **construction progress** and cost expenditures against project schedule and budgets.

B. Monitor **material inventories and costs** (coordination with procurement officer).

C. Pro-actively **identify problems** and make decisions regarding changes in project completion dates design and budget expenditures.

D. Constantly monitor the **safety and quality** of construction.

These documents and schedules should be set up to be project specific using the information in the engineering package as base information, refer to C.4

- Technical assessment, field investigations, site planning and requirements
- Scopes of work, technical design drawings, material specifications, BoQ
- Monitoring plan

In general, there are four main tasks to assist **effective construction management:**

SUMMARY OF TASKS

Task 1: Set up a project schedule (progress tracking)

Task 2: Set up cost control (budget tracking)

Task 3: Set up quality control (assures construction quality)

Task 4: Set up document control (records management)

TASK 1: SET UP A PROJECT SCHEDULE – A TIMELINE

It lists the work activities and enables project managers to monitor construction progress against time. The monitoring plan is particularly important to the **project schedule** as it sets out the most important phases of construction and key inspection points.

Regular reporting from the site inspection teams is used to update the schedule. The project schedule is a working document. It is best updated on **a weekly base** with actual field measurements and observations of the construction works completed. This procedure is important to allow the project managers to foresee problems and be in a position to take action, in most cases in regard to delays, cost increases and quality issues.

Note: It is important that the project managers take the time to review the project schedules before the start of construction to ensure they respond to the post-disaster situations, such as actual performance capabilities of the contractor, craftsmen, site conditions and climate, access, security situation and program participants' needs.

Project tracking and reporting

Weekly site inspections are recorded on the project schedule; cost is normally reported monthly by showing the current (Job to Date) cost of completed work and a current estimate of final cost at project completion (Estimate at Complete). A tracking curve diagram can be used to graphically represent the status of the project's actual progress/expenditure against planned progress/expenditure.

Example: Orissa in India, 2008

As experiences during the low-cost flood-resistant shelter project in rural villages in Orissa have shown, in a case where construction works are stopped (due to various reasons), the workers tend to leave to outside places in search of work. The non-availability of workforce and high drop-out rate could become a challenge and cause delays in the progress of construction.

Reflection:

In absence of any formal binding or contract, these trained workers leave the construction site for personal or other reasons, affecting the project progress. Further, the project loses trained/skilled workers and must invest time and resources to train another group, which also hinders progress.

It is advisable to agree on a fixed-term contract/ formal contract from the beginning between partner/CRS and the workforce.

Project schedule/project tracking templates: Templates can be developed using scheduling software such as MS Project, Primavera or MS Excel that organize information in a Gantt chart format.

Digital project schedule templates available on share point

TASK 2: SET UP PROJECT COST CONTROL

Track the progress of the project by keeping an updated weekly project cost. Add a tracking line into the Bill of Quantities as materials are used. Use regular weekly reporting from the site inspection teams to assure the BOQ remains up-to-date.

The **Bill of Quantities (BOQ)/Unit Cost Analysis (UCA)** developed in the FEED stage (refer to C.2) are the documents needed to track budget expenditures over the life of the whole project.

Unit Price Analysis

Project title: **Date:**

title of construction activity

No	Description	Unit	qty	Unit Price	TOTAL			
					MATERIALS	LABOR	EQPT.	TOTALS
A	**Material**							
B	**Labour**							
	Skilled labour	day						
	Helper	day						
C	**Equipment**							
	Misc. Tools	lot						
	Sub -Total							
	Profit & OH 15 %							
	TOTALS							

Unit cost analysis example template itemizes materials, labor and equipment requirements

Tip: Dividing the cost of completed work to date by the overall contract cost is an accurate and industry standard method of tracking and reporting overall project progress. Trends in actual cost expenditure versus planned expenditure can be analyzed to estimate budget over/under expenditures.

BOQ/UCA template in Appendix 4

CRS internal note:

Budget requests to allocate funds for the purchase of materials or to finance construction through contracts or agreements should comply with the standard CRS purchasing policy and procedures as well as any specific donor requirements. The construction project manager should track budget expenditures in close collaboration with the CRS country program finance department.

TASK 3: SET UP QUALITY CONTROL PROCEDURES

To assure construction quality to safe and specified standards, it is essential to set up a procedure to verify and check the quality of the construction works as part of construction supervision. This needs to be done on a regular basis to avoid dangerous construction practices being covered or hidden as the construction progresses.

A **monitoring plan** should be developed with the contractor and sets out:

- **Inspection reports:** daily, weekly inspection schedule of construction progress and quality
  - **Day-to-day inspection** by contractor on daily inspection report (include sphotographs with date)

Daily site report in Appendix 14

  - **Weekly inspection** by engineer/architect, construction manager on weekly inspection report (includes photographs with date)

Weekly site report contact shelter advisor (only digital)

- **Staffing required:** adequate technical staff required to monitor and inspect effectively
  - Staff should have at least contractor foreman, contractor engineer, field engineer/architect, construction manager and project manager
- Establish **"hold points"/key inspection points:** Which elements/construction work require inspection at which times (i.e., foundations, connection foundation to main structure, connection roof structure to wall/ columns, etc.)?
- **Posters of safe construction methods:** with pictures and illustration to be posted on construction site.

Note: Outsourcing project supervision to partners or management companies should not be substituted for in-house supervision staff.

Example: West Sumatra, 2009

Safe construction poster from west Sumatra earthquake, Indonesia
Photo Credit: CRS

TASK 4: SET UP DOCUMENT RECORDING PROCEDURE

This includes recording matrix and filing system. All documents relevant to the project should be recorded to reduce risk and confusion, especially in multiple sites and various revisions. This facilitates the retrieval and consolidation of information from regular progress reports for reporting to project management and donors.

Documents that should be included:

- Design plans and specifications
- Site inspections, surveys, soil and water testing results
- Land titles or other land ownership/ occupancy rights documents
- Building permits and certifications, other government approvals
- MOUs/agreements and contracts, including contract variations or amendments
- Progress report, quality control inspection reports
- Budget expenditure/liquidation tracking documents, progress billing/payments to contractors, invoices
- Relevant incoming and outgoing correspondence

Filing system includes:

- Labeling and indexing
- Filing by date of hardcopies

SUMMARY OF OUTCOMES

Outcome 1: Project schedule set up and included in contract agreements

Outcome 2: Progress/cost reporting/tracking procedures set up and agreed upon

Outcome 3: Construction quality procedure set up and agreed upon with contractor

Outcome 4: Filing system set up

Example 10, Lan Lumpu, Banda Aceh, Indonesia, 2005

Lan Lumpu is one of several villages devastated by the Indian Ocean Tsunami in 2004. CRS made a commitment to villagers to rebuild over 240 houses. A consultant was commissioned by CRS to develop a design and specification for a 45 m2 house. Once completed, CRS presented the design and specification to contractors as part of a bid solicitation process. Two contractors were selected to carry-out the construction work, roughly dividing the number of houses between them. A management consulting firm was contracted at the same time to monitor the construction quality and contractor performance. The CRS engineering team, led by one international engineer supervising a team of five national field engineers, monitored the consulting firm through regular on-site inspections. Several months into the construction, it was discovered that contractors were not being adequately supervised by the consulting firm and poor quality construction was detected in over 200 houses under construction. It was later determined that neither CRS engineers nor the management consultant were providing adequate oversight of the project and collusion was suspected. The contractors were asked to make the needed improvements but refused to do so. The ensuing dispute between CRS and the contractors lasted more than a year. During this time, CRS engaged another construction firm to make the needed improvements. Access to the site was temporarily impeded by the original contractor, and the performance of the second contractor was poor. The community became increasingly angry with CRS for creating delays in the construction on structural issues that were not immediately apparent to them. A third contractor was engaged to complete the work, which was finally achieved almost 7 months behind schedule at a cost almost double to the original estimates. In addition, a final settlement was reached with two contractors costing CRS an additional $250,000.

Reflections:

Extensive research should be conducted to assess contractor and consultant financial and management competency as part of a pre-qualification process.

Adequate oversight should be provided by qualified CRS staff to monitor consultants and contractors.

Contracts need to be clear and hold contractors and CRS staff accountable to a well-defined inspection process that is counter-checked and documented on a regular basis.

C.11 PAYMENT PROCEDURES

Payment procedures are defined in the contract payment schedules as part of the contract document.

Refer to C.7 for details

SUMMARY OF TASKS

Task 1: Verify progress/making progress payments

TASK 1: VERIFY PROGRESS/MAKING PROGRESS PAYMENTS

Payments can only proceed after receiving invoices from the contractor in an agreed format and verifying it against progress. Signed and approved progress reports become the primary supporting documents for progress payments to the contractor. The contracts manager should work closely with the finance manager to track payments to contractors.

In post-disaster situations, access to site may make it difficult to verify progress and authorize subsequent payments to the contractor. Delaying payment often results in delays in completing the project or works being stopped. Using dated site photographs and training community members in assisting with monitoring can help CRS staff remotely monitor quality and progress.

Contact shelter advisor for standard invoice format and payment tracking data sheet

Contact shelter advisor for digital payment tracking data sheet

SUMMARY OF OUTCOMES

Outcome 1: Payment procedure set up

C.12 CHANGE MANAGEMENT

In post-disaster situations, it is almost inevitable that during construction, changes to the design, material or construction processes will be required, and consequently to the contract documents.

This could be due to:

- Social, political or economic changes – social unrest, security issues, market prices, labor disputes, land ownership
- Environmental conditions – including unforeseen soil conditions, contamination, landmines, unusual weather patterns
- Structural design changes – where original designs need to be changed to satisfy unforeseen conditions
- Changes in material specifications and quantities – resulting from design changes or availability of materials
- Changes in material prices – a function of local markets, access, transportation costs, inflation, etc.

SUMMARY OF TASKS

Task 1: Set up change management processes

TASK 1: SET UP CHANGE MANAGEMENT PROCESSES

It is important to anticipate and to include change procedures – change orders – within the construction contract. Generally, variations fall into several categories:

- Changes in design scope
- Quantity variations
- Time variations
- Changes in material specification
- Changes in unit price

Change orders can either be requested by the contractor or by the project team. In all cases, the changes must be priced and must indicate the time delay they may cause. The change can only be implemented after it is approved in writing by the construction management team. To mitigate future disputes in regards to time delay and cost overrun, it is important that all related correspondence be clearly documented and filed.

Change order template in Appendix 11, for digital version contact shelter advisor

Note: In addition, changes should be assumed in the project cost estimates and budget (i.e., within the BoQ), **normally in the form of a 10% contingency.**

A common source of claims originates from ambiguity in contract documents, especially if working under changeable market condition and within a limited timeframe to conduct assessments. To the extent possible, it is good practice to anticipate changes by thinking through possible scenarios.

SUMMARY OF OUTCOMES

Outcome 1: Change procedures are clearly defined in contract and agreed upon

C.13 PRACTICAL COMPLETION AND HAND OVER

As the contractor progresses toward completion of the construction, several steps should be taken to ensure the construction works are completed to the quality intended and no substandard construction is accepted and paid for, which could cause problems in the future use of the structure. This stage completes the contractual relationship with the contractor.

SUMMARY OF TASKS

Task 1: List outstanding defects/work – "punch list"

Task 2: Issue practical completion certificate

Task 3: Manage warranty period

Task 4: Hand over to end-users

Task 5: Issue final completion certificate

TASK 1: LIST OUTSTANDING DEFECTS/ WORK – "PUNCH LIST"

It is good practice to list outstanding defects in the construction when the contractor has completed about 90% of the work. This list, called a "punch list", enumerates any outstanding work and substandard work that requires fixing before the contractor leaves the construction site. Quite often, contractors may not focus on small detail work until larger work is completed. The intention of this list is to focus both the field engineers and contractor engineering team on completing outstanding work concurrently with other work to avoid any delays in the issuance of the practical completion certificate and any final payments that may be due.

The "punch list" should:

- List all defects and outstanding work by date, how to remedy, with pictures.
- Be updated weekly.
- Be attached to the practical completion certificate to document work completion.

"Punch list" – defects/outstanding works template in Appendix 13

TASK 2: ISSUE PRACTICAL COMPLETION CERTIFICATE

Field engineers, site inspectors and the construction project manager must ensure that the contractor has **completed all outstanding work and remedied all defects** listed **before issuing a practical completion certificate,** which states that the contractor has met the established contract obligations.

The contracts manager should review any amendments, past payments and any outstanding warranty retention to determine the final balance due to the contractor. A final payment should only be made after verification with the CRS finance manager. Retention of usually 5% of the contract value is retained.

Practical completion templates in Appendix 15

TASK 3: MANAGE WARRANTY PERIOD

The practical completion certificate establishes the beginning of the warranty period. The contractor is obliged to make good any defects that arise during this (usually) 6 month period. The 5% retention is held back to give an incentive for the contractor to make good any defects or, in the case that he refuses, the money is used for another contractor to do the needed repair work. To manage this transition period effectively, it is important to retain the engineers/architect until the structure has been handed over, and maintenance and DRR procedures established.

TASK 4: HAND OVER TO END-USERS

In general, the structure(s) may be handed over to the program participants once practical completion has been given and the program participants have accepted the quality of the construction. This document requires the signature of the program participants, local authority or community leaders and CRS.

Attention and advocacy should be given to shared ownership between husband and wife and sole female ownership.

TASK 5: ISSUE FINAL COMPLETION CERTIFICATE

The last contractual step is to issue a final completion certificate when all detected defects have been repaired. This releases the retention to the contractor and documents the final settlement between CRS and the contractor.

All contract documentation, final inspections and defects list should be filed and kept for the duration of the defects liability period (usually 10 years). This documentation could be important in determining liability for any construction defects or catastrophic failures after construction is completed and turned over to the user.

Refer to example 1 front of Book C

SUMMARY OF OUTCOMES

Outcome 1: Defects/outstanding work list set up

Outcome 2: Practical completion certificate issued

Outcome 3: Warranty period completed

Outcome 4: Ownership certificate handed over

Outcome 5: Final completion certificate issued

C.14 AFTER COMPLETION

The time after completion is often overlooked in a construction project, as the actual construction activities have been completed and the end-users are occupying the structure. Especially in areas that are prone to reoccurring hazard events, such as flooding, earthquake, fire, high winds, etc., it is important that the inhabitants know how to take care of their structure to remain safe.

SUMMARY OF TASKS

Task 1: Introduce maintenance activities

Task 2: Introduce disaster risk reduction procedures

Task 3: Evaluation and program participant satisfaction

TASK 1: INTRODUCE MAINTENANCE ACTIVITIES

Different construction materials require different ways to maintain them in a good condition. These should be explained to the end-user through meetings, maintenance leaflets, etc. Good maintenance has a significant impact on the safety and longevity of a structure. Maintenance procedures could include:

- Seasonal maintenance before rainy seasons, typhoon seasons, etc., such as checking for roof leaks, that drainage channels are not blocked, roof trusses are secured, roof sheeting has no missing nails, etc.
- General maintenance such as checking for termite infestation, root, corrosion

TASK 2: INTRODUCE DISASTER RISK REDUCTION PROCEDURES

Simultaneously with maintenance procedure, disaster risk reduction (DRR) must be addressed. This could include:

- Fire safety, especially for highly flammable materials such as bamboo, wood, etc.
- Evacuation meeting points, routes and procedures agreed upon
- Community-based risk mapping
- Setting up community evacuation drills

Refer to C.4 Technical design

Refer to hazard resistant construction, PASSA (Participatory Approach for Safe Shelter Awareness), www.sheltercentre.org/library

TASK 3: EVALUATION AND PROGRAM PARTICIPANT SATISFACTION

To be in a position to learn from past experiences and challenges, an evaluation is an important part of the overall project. In areas with extreme weather conditions, a midterm evaluation is good practice. An essential part of the evaluation is to include the program participants in the process through interviews, questionnaires or other feedback systems to evaluate the performance of the construction project.

SUMMARY OF OUTCOMES

Outcome 1: Maintenance procedures agreed upon and established

Outcome 2: Disaster risk reduction training set up

O**utcome 3:** Evaluation conducted

C.15 IDENTIFY APPROPRIATE STAFF

An important lesson-learned from CRS construction activities is that project success depends on the qualifications, skills and experience of the technical and management resources engaged to manage the project. Careful but expeditious vetting of potential candidates is critical in creating highly performing teams.

Within the engineering and construction industry, a four/six year engineering degree normally represents the foundation on which individuals will build different levels of experience and skills[9], especially in post-disaster situations. Beyond that, the years of experience and breadth of exposure to different construction designs of varying complexity develops the needed qualifications to manage different types of construction projects.

Senior staff will be required to have a balance of the technical skills and social skills to lead a program, as well as a sound knowledge of contract administration and the ability to think creatively about resolving conflict and technical issues without losing sight of the overall project goals: rebuilding livelihoods and reducing vulnerability.

C.15.1 ORGANIZATIONAL STRUCTURE FOR CONTRACTOR-BUILT PROJECT

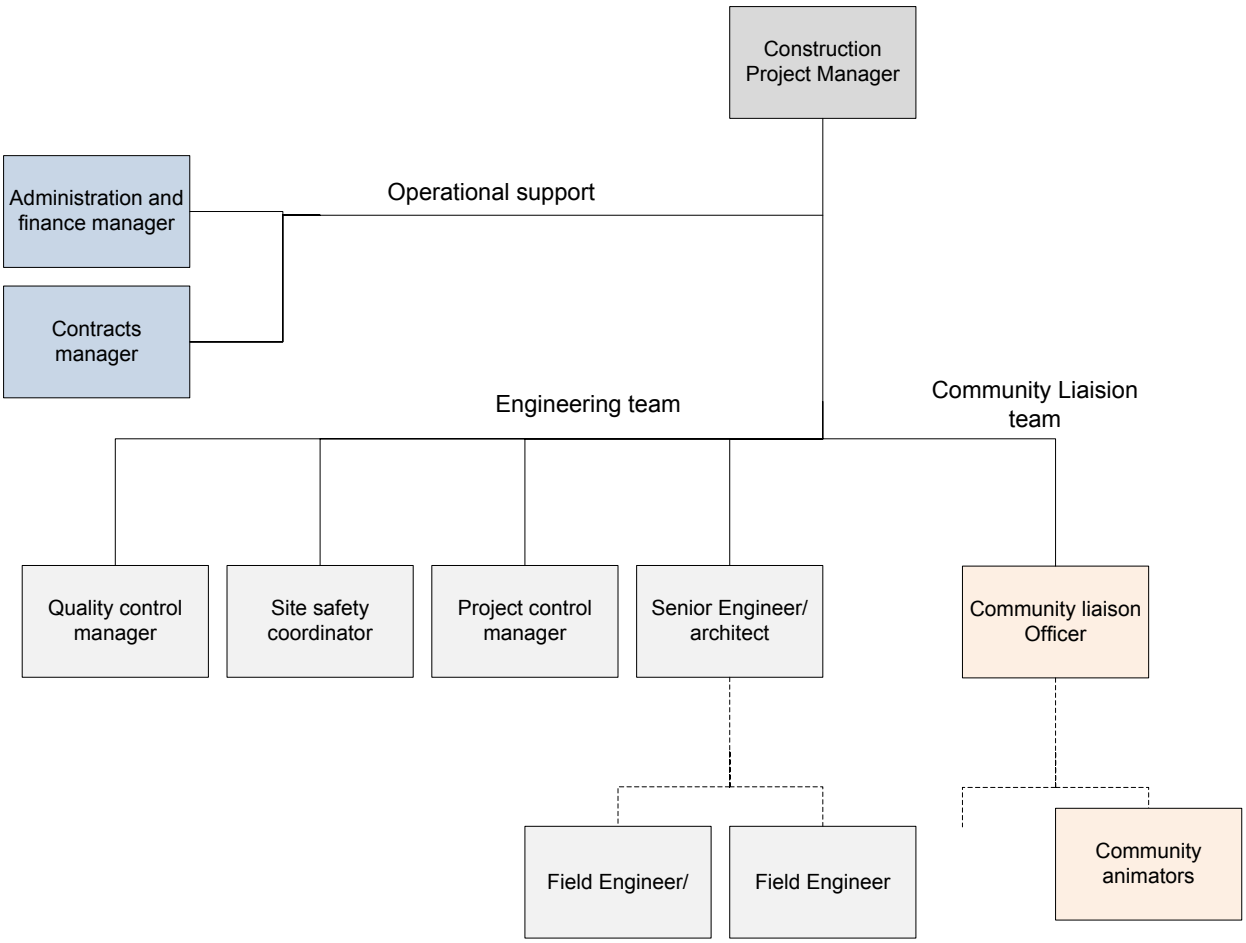
Staff recruitment should follow Country Program protocols; however, there are a number of internal and external risks that CRS teams should consider when staffing up a construction program. Staffing plans and management structure should seek to mitigate these risks

The structure below offers an example for contractor-built projects where the contractors are responsible for carrying out the project to the correct standard and managing the day-to-day construction activities. CRS is responsible for managing the contract (monitoring the contractor's quality/progress), payments and establishing good community relationships through the CRS community liaison officer.

For sample job descriptions refer to digital versions available on share point.

9 Engineers and architects generally specialize in design, construction management or contract management. Engineers often focus on one or more disciplines such as structural engineering, water and wastewater, geotechnical engineering, architectural design, among others.

DIAGRAM OF ORGANIZATIONAL STRUCTURE FOR CONTRACTOR BUILT PROJECT



Responsibilities
All positions may not be needed, depending on the amount and complexity of the engineering/ design work required for the project.

Construction project manager
The project manager is responsible for the overall effective implementation of the construction project. This includes: budget control and program control (cost and time), overall quality control (site audits), change control (changes to the design/ agreements while constructing), effective staff communications (technical, community mobilization and support staff), health and safety issues and document control.

Engineering team

Quality control manager
Independently monitors construction quality audits as a second tier review over field-based engineers and site inspectors; ensures implementation of the monitoring plan by the contractor. The quality control manager is responsible for the site quality audit, corrective actions and follow-up as well as the quality assurance audit.

Project control manager
Closely monitors construction progress against project schedule and tracks and projects costs against the project budget; also can assist with materials and equipment checks. The project control manager is responsible for budget maintenance, purchase request, master schedule, project tracking and reporting.

Site safety coordinator (large projects)
Is responsible for safety training, inspection and reporting.

Senior engineer/contracts manager
Is responsible for supervising the field engineers and provides the design, specifications and Bill of Quantities.(There are options for contracting to an external consultant to produce design documents.) Manages the contracting process including contractor selection, development of contracting strategies, development of contract templates and tender packages, and support of procurement staff in the tender process. Conducts bid analysis; monitors contract compliance. Contracts manager is responsible for preparing contract templates, contractor survey, preparation, tracking, variation management and payment requests.

Field engineer (very large projects)
Is responsible for site instruction, progress monitoring, quality monitoring, safety training inspections and reporting, and variation management.

Administration and finance manager
Is responsible for preparing contracts, bid selections, contract and payment tracking.

Community liaison staff

Community liaison officer
The community liaison officer is responsible for managing relations with recipient communities, ensuring accurate and timely information sharing, and ensuring community expectations are aligned with project objectives. This position oversees complaints and feedback processes, helps resolve conflict with the communities and works closely with the technical team.

Community animators
Community animators are responsible for maintaining communications with the community and ensuring information is channeled to the correct place. They are important contact points for feedback from the program participants and ensure that people are targeted with the appropriate intervention. These staff can assist identifying vulnerable pockets of the community and help tailor specific aspects of the program for those with special needs (elderly, disabled, women, single headed HHs, PLWHA, etc.).