

**Department of Engineering Services
TAT and SOP**

**TAT
Engineering Service Division**

1. Compliance Checking of Building Designs:

Process Name	Concerned Agency	Time Frame for Service Delivery
Application for approval for building construction	Dzongkhag Administration	
Scrutiny of Architectural Drawings	Architectural Section, ESD, DES, MoWHS	7 days (3 officers)
Scrutiny of Structural Drawings.	Structural Section, ESD, DES, MoWHS	5 days
Scrutiny of Electrical Drawings	Electrical Section, ESD, DES, MoWHS	5 days

2. Designing, Estimating and Procurement of Works:

Process Name	Concerned Agency	Time Frame for Service Delivery
Preparation of Conceptual designs, understanding clientele requirements etc.	Architectural Section, ESD, DES, MoWHS	45 days
Designing/drafting details of plans, elevation, sections, etc.	Architectural Section, ESD, DES, MoWHS	30 days
Drafting details of doors, windows, rabseys, water and sanitation system, etc.	Architectural Section, ESD, DES, MoWHS	60 days
Preparation of detail structural design and drafting	Structural Section, ESD, DES, MoWHS	35 - 45 days
Preparation of detail electrical design, estimation and drafting	Electrical Section, ESD, DES, MoWHS	30 - 35 days
Preparation of detail estimate for civil infrastructure	Estimate Section, ESD, DES, MoWHS	20 - 30 days
Preparation of bidding documents, technical sanction, invitation of bids, bid evaluation and work award	Estimate Section, ESD, DES, MoWHS	40 - 55 days

3. Review of Designs and Estimates prepared by consultants:

Process Name	Concerned Agency	Remarks
Scrutiny of Architectural Designs	Architectural Section, ESD, DES, MoWHS	Core Competence required is same as designing, estimating and procurement of works.
Scrutiny of Structural designs	Structural Section, ESD, DES, MoWHS	
Scrutiny of Electrical designs and review of estimates for electrical works	Electrical Section, ESD, DES, MoWHS	
Review of estimates for civil infrastructure works	Estimate Section, ESD, DES, MoWHS	

4. Publication of BSR:

Process Name	Concerned Agency	Time Frame for Service Delivery
Preparation of material inventory based on BSB approved list	BSR Section, ESD, DES, MoWHS	20 days
Rate collection of Material, Labour, Machinery from the four base towns.	BSR Section, ESD, DES, MoWHS	20 days/base towns
Compilation, Rate analysis using LMC	BSR Section, ESD, DES, MoWHS	20 days
Formatting, proof reading, printing	BSR Section, ESD, DES, MoWHS	20 days

5. Development of Labour, Material, Equipment Coefficient and Specifications.

Process Name	Concerned Agency	Time Frame for Service Delivery
Inventorying construction activities (Nationwide)	BSR Section, ESD, DES, MoWHS	20 days
Data Collection (Note: depends upon number of samples to be collected)	BSR Section, ESD, DES, MoWHS	5 days/item of work
Data Sampling & Analysis (Note: depends upon number of samples to be collected)	BSR Section, ESD, DES, MoWHS	2-3 days/item of work

6. Development of Guidelines/Manual.

Process Name	Concerned Agency	Time Frame for Service Delivery
Desk-study on existing practices, legislation, rules and regulations.	ESD	20 - 90 days
Gathering related materials, making illustration, etc.	ESD	15 - 30 days
Drafting, brainstorming, etc.	ESD	20 days
Finalization, publication, etc.	ESD	15 - 30 days

Standard Operating Process

Water and Sanitation Division, Dept of Engineering Services

S.No	Activity	Unit	Working Days required in worst scenario	Working Days required in best scenario
1	Design of Water Supply system			
	1.1 Site visit to study the feasibility (excluding travel days)	Days/ assign	7	7
	1.2 Survey of the water source, pipeline		21	21
	1.3 Design of water supply systems (manual designing)		45	2
	1.4 Technical Drawing		15	9 (with training, as of now not even a basic Auto CAD training given)

	1.5 Estimating of the water supply systems(manually)		15	8 (using estimating software. Eg construction manager)
	1.6 Technical support during implementation (excluding travel days)		7	7
	Total		110	54
2	Sanitation			
	2.1 Sewerage systems			
	2.1.1 Surveying of the area to be sewerred		10	10
	2.1.3 Design of sewer network(Manual designing)		25	2
	2.1.4 Drawing of sewer components	Days/ assign	14	9 (with training, as of now not even a basic Auto CAD training given)
	2.1.5 Estimating for sewer components		14	8 (using estimating software. Eg construction manager)
	2.1.6 Technical support during implementation (Excluding travel days)		9	9
	Total		72	38
	2.2 Solid Waste			
	2.2.1 Design of landfill			
	2.2.1.1 Topo survey of the proposed area including site selection		7	7
	2.2.1.2 Design of landfill (manual designing)		20	6 (if explored for software for cut and fill)
	2.2.1.3 Drawing of the landfill	Days/ assign	14	6 (with training, as of now not even a basic Auto CAD training given)
	2.2.1.4 Estimatingof the landfill and components		10	4 (using estimating software. Eg construction manager)
	2.2.1.5 Designing and estimation of landfill approach road		14	6(software for road designing. Eg MX road)
	Total		65	29
3	Sustainable Sanitation and Hygiene for All (SSH4A) under Small Towns Programme in collaboration with Netherlands Development Organization(SNV), Bhutan	Days/year	180	
4	Construction of urban water supply infrastructure (GoINu 492 Mn approved for 11 FYP) for Paro, Tserang, Phuntsholing and Monggar towns	11 FYP	11 FYP	
5	Water Safety Plan (WSP) Implementation to all Dzongkhags	days /year	140	
6	Zero Waste Project for Mongartown(till 2016) (excluding travel days)	days /year	60	
7	Preparation of ToR, tender documents including evaluation for water and sanitation works	Days/assign	132	14 (If it can be done by procurement section)
8	Water and sanitation monitoring visits to Dzongkhag municipalities and Thromdes	Days /year	100	

SOP for FEMD

Standard operating procedure for carrying out flood protection works

The roles and responsibilities of specific agencies that have to follow for carrying out the flood management works:

Sl.No	Activities	Description	Responsible Agency(ies)	TaT (Days)	Remarks
1	Budget securing	The agency should process, obtain and plan budgeting for implementing the Flood related works.	Dzongkhag/T hromde		Budget for particular works should be earmarked.
2	Initial site identification	The concerned agency should identify critical sites with flooding risk and propose for technical support by using standard format.	Dzongkhag/T hromde		Use ANNEX I form.
3	Forwarding the request for technical support in flood works.	The concerned Organization/Institutions should request the DES, MoWHS for technical support related to flood assessment studies and management works.	Dzongkhag/T hromde/Institution/NGO		Standard format should be attached
4	Preparation to visit the site	Desk study for specific area (past flooding events, meteorological and hydrological assessment).	FEMD	10 working days	After receipt of the request letter
5	Joint site investigation	Joint site visits, field survey and field assessment will be carried out.	Dzongkhag/T hromde and FEMD	Duration will depend upon the site conditions	During the site visit, the logistics should be arranged by concerned Agency.
6	Decision on the type of measures required	Whether to propose for long term or short-term measure	FEMD/DES	5 working days	The decision will be made by FEMD
7	Response to the Agency	Reporting back to the Agency about the findings of the site visits.	FEMD	5 working days	After joining office from the site visits and field assessment.
A		Short-term measure			
i	Design of the measures	Design, Drawing and Estimation of the measure.	FEMD	21 working days	After submitting the findings by FEMD, concerned agency should request for the design of the proposed structures
ii	Technical sanction of the design	Forward the complete set of design documents to the concerned agency.	FEMD	3 working days	
B		Long term measure for prioritized areas			
i	Field assessment	Detailed field assessment using assessment forms.	FEMD	15 working days	Depands on size of project area

ii	Cross section Survey	Carry out detail field survey of the proposed area for long term measures.	FEMD	21 working days	Depands on size of project area
iii	Hydrological assessment	Hydrological assessment and analysis (Statistical /modeling) using compiled data.	FEMD	60 working days	Minimum man days
iv	Modelling	Hydrodynamic modeling by using flood modeling software (Arc-GIS, HEC-RAS etc.)	FEMD	45 working days	Minimum man days
v	Analysis of results and scenario	Propose appropriate structural measures based on model results.	FEMD	5 working days	Minimum man days
vi	Flood Management Plan	Draft the sustainable flood management plan accordingly to the outcomes of the detailed study.	FEMD	60 working days	Minimum man days
vii	Drawing and Estimation	Drawing of the flood protection structures and prepare estimates (BoQ) and technical specifications as per the design.	FEMD	30 working days	Minimum man days
viii	Set of complete technical documents	Forward the complete set of flood management plan and design structure documents to the concerned agency.	FEMD	5 working days	
ix	Monitoring	To make site visits for monitoring of the works in order to ensure quality and compliance of design.	FEMD		As and when required
8	Obtain public and environmental clearances	The concerned agency should process and obtain public and environmental clearances.	Dzongkhag/T hromde		
9	Procurement of works	The tendering, evaluation and awarding of work should be carried out	Dzongkhag/T hromde		Specifications and designs should be included properly.
10	Implementation and site supervision	Implementation of flood management structures should be carried out as per design and specifications.	Dzongkhag/T hromde		Inform FEMD in case of any design/site related issues.
11	Monitoring and work progress	FEMD shall carry out monitoring of the work if deemed necessary or upon request from the concerned Agency.	Dzongkhag/T hromde		However, if the budget is with FEMD, the division will plan stage wise monitoring programme
12	Sharing of flood related informations/documents	Any organization in need of flood related documents (flood hazard maps, flood risk maps and flood assessment reports etc) should request in writing to the DES.	Dzongkhag/T hromde/Institution/NGO		The written request should be made to the Director,DES

ANNEX I FORM
Planned and Budgeted Flood Protection Works in the Proposed FYP

Sl. No.	Details of the flood protection measure proposed.	Response from requesting agency.	
1	Name of Dzongkhag/Thromdey		
2	Name of River or stream along which the flood protection works is planned.		
3	Name of Village and Gewog in which the work will be implemented.	Village:	Gewog:
4	Are the Design, Drawing and Estimate of the flood protection work completed?	Yes	No
5	If Yes for Sl. No. 4, What is type and the length of the flood protection work planned?	Type:	Length:
6	If No for Sl. No. 4, does the Dzongkhag/Thromdey Administration require technical assistance for Design, Drawing and Estimate from FEMD, DES, MoWHS?	Yes	No
7	If Yes for Sl. No. 6, mention the month and year the Administration would expect the detailed Design, Drawing and Estimate from FEMD, DES, MoWHS?	Month:	Year:
8	What is the budget earmarked for the planned flood protection work?	Amount in Ngultrum:	
9	When is the tentative month and year for implementation of the work?	Month:	Fiscal Year:

SOP for EARRD:

1. Engineering Adaptation and Risk Reduction Division, Quality Assurance Section.

1.1 PLAN: 2014-015

Outputs	Output indicator	Activities	Sub-activities	UNIT	Duration required (working Days)	Existing Staff strength	Remarks
To provide sustainable and quality infrastructures through adoption of approved standards	1. Systematic compliance of relevant standards and guidelines. 2. Establishment of procedures to check conformity 3. Strengthen EARRD & Dzongkhag Engineers capacity. 4. Raise Awareness. 5. System to ensure quality in the field. 6. Set up laboratory for related/scientific studies. 7. Institutionalize information and knowledge bank for sharing and reference on quality assurance plans and quality construction.	Review and improve guidelines, manual, Related policies and Evaluation.	Planning for quality and safety improvement.	Days	20	Two Engineers	Quality and safety are directly proportional to Budget & Time hence all developing partners to plan accordingly.
			Inform short fall procurement manual and bidding document {Review on SBD}	Days	35		Review on SBD, E-tools and corresponding roles and responsibilities of the engineers developed and presented to Division.
			Quality assurance plan at design stage.	Days	15		Study on Check list for QA at Design stage in progress
			Quality assurance plan for building construction.	Days	40		Study for QA plan in progress
			Inspection checklist for supervision in the field	Days	40		Developing checklist in progress with items of work involved in the construction.

		Establish monitoring mechanism to check Quality Assurance methods in built in the field	Study on top down and bottom up approach on the effect on quality. (Total Quality Management).	Days	40		1. Study on merits and demerits on Design, drawings and technical support provided from the HQs and implemented by the LG. 2. Study on planning, Design and implementation at the grassroots level on quality management.
			Evaluate quality assurance plan and quality management implementation at field.	Days	20		To be evaluated actual field of construction.
			Develop Reports, Feedback and recommendations.	Days	14		Collection of feedback recycles inform of questionnaires developed.
		Capacity building at Dzongkhag level	Training on quality assurance and Quality management programme and enables them to perform actively	Days	40		Two days per Dzongkhag
			Familiarize dzongkhag engineers with ISO 9000 quality management essentials.	Days	20		One day each per Dzongkhag
			Create awareness and importance on the handing taking notes between the client and the contractors.	Days	20		Explanation/Awareness on quality checklist and handing taking notes
		Sectoral coordination and trainings	Coordinating training for engineers of various agencies on quality assurance.	Days	10		Arrange technical training on quality management in the Technical Training Institutes within the country.
		Educate and raise awareness on quality assurance and its benefits.	Awareness workshop and seminar on quality assurance of materials, equipments and construction.	Days	40		Proposed a day visit to every Dzongkhag to propagate the details of basic testing tools and equipment, quality management and roles and responsibilities of the site engineer in the construction.

1.2 Plan 2015-2016

Outputs	Output indicator	Activities	Sub-activities	Unit	Duration required (working Days)	Existing Staff strength	Remarks
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To provide sustainable and quality infrastructures through adaptation of approved standards	1. Systematic compliance of relevant standards and guidelines. 2. Establishment of procedures to check conformity 3. Strengthen EARRD & Dzongkhag Engineers capacity. 4. Raise Awareness. 5. System to ensure quality in the field. 6. Set up laboratory for related/scientific studies. 7. Institutionalize information and knowledge bank for sharing and reference on quality assurance plan and quality construction.	Develop quality control Guidelines and Quality management systems.	Material quality conformity at source.	Days	60	Two Engineers	Develop/research on the physical and chemical properties checklist
			Plant and equipment.	Days	45		Develop/research on the requirement of plants and equipment based on technology applied.
			Quality at Planning, Surveying and Design stage.	Days	20		Strengthen quality management system at Department, Dzongkhags, Gewogs & construction levels.
			Quality assurance plan for building construction.	Days	40		
			Quality on Building and Awarding Document.	Days	20		
			Quality on implementation.	Days	40		
		Implementation Monitoring Mechanism	Collect Feedbacks /Complains from the field.	Days	15		Develop monitoring and rewarding mechanism
			Constraint on quality plans.	Days	30		
		Set up laboratory and manpower	To conform quality of construction materials	Days	30		Develop mandatory test requirements for all construction materials and quality checklist on products.
			To conform the quality on the product of the Materials	Days	40		
		Monitoring and Evaluation Mechanism	Coordinating training for engineers of various agencies on quality assurance.	Days	15		Arrange technical training on quality management in the Technical Training Institutes within the country.
			Awareness workshop and seminar on quality assurance of materials, equipment and construction	Days	40		

1.3 Plan 2016-2017

Outputs	Output indicator	Activities	Sub-activities	Unit	Duration required (working Days)	Existing Staff strength	Remarks
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To provide sustainable and quality infrastructures through adaptation of approved standards	1. Systematic compliance of relevant standards and guidelines. 2. Establishment of procedures to check conformity 3. Strengthen EARRD & Dzongkhag Engineers capacity. 4. Raise Awareness. 5. System to ensure quality in the field. 6. Set up laboratory for related/scientific studies. 7. Institutionalize information and knowledge bank for sharing and reference on quality assurance plan and quality construction.	Monitoring and Evaluation Mechanism	Collect feedback/complains from the field.	Days	414	Two Engineers	Visit all climatic regions to collect feedbacks and study on the complains. If necessary consultant may be deployed for technical accuracy.
			Constraint on quality plans	Days			
			Evaluate	Days	60		Evaluate on the improvement infrastructure built.
			Report	Days	30		
			Incorporate necessary changes/amendments in guidelines, manual, policies after feedbacks through evaluations.	Days	50		Involve all sects of expertise in the engineering field to comprehend and incorporate at the appropriate areas.

1.4 Plan 2017-2018

Outputs	Output indicator	Activities	Sub-activities	UNIT	Duration required (working Days)	Existing Staff strength	Remarks
To provide sustainable and quality infrastructures through adoption of approved standards	1. Systematic compliance of relevant standards and guidelines. 2. Establishment of procedures to check conformity 3. Strengthen EARRD & Dzongkhag Engineers capacity. 4. Raise Awareness. 5. System to ensure quality in the field. 6. Set up laboratory for related/scientific studies. 7. Institutionalize information and knowledge bank for sharing and reference on quality	Assurance Monitoring	Collect feedbacks/issues from field/Dzongkhags	Days	100	Two Engineers	Visit all climatic regions to collect feedbacks and be involved where core technical specifications necessary.
			Gaps in quality plans as part of contract documents and specifications	Days	60		
			Evaluate quality assurance plan and quality management process & implementation in field	Days	60		Evaluate on the improvement in quality assurance of the infrastructure built.
			Report and recommendations	Days	20		

assurance plan and quality construction.	Dessimation & and Capacity Building	Research best practices in construction industry, adopt and update in the domestic industry, dessiminate and train engineers on the new recommendations	Days	25		Target both govt and private engineers in new and effective quality assurance mechanisms for adoption and practice. Also, support in establishment of basic quality management facilities In the field.
		Plan & develop quality assurance facilites in all district engineering offices	Days	25		
	Laborator y and manpower managem ent	Validate Quality conformation of construction materials	Days	60		Collaboration with local construction materials supplier and product manufacturer. Also close collaboration with exiting private testing facilites to ensure better qualitiy assurance in the construction industry.
		Assist Quality conformation on product of the materials (Precast products). Such as Concrete, RCC, Doors, Windows etc...	Days	80		
		Assist private testing facility services in providing efficient and responsible quality services and growth in the field	Days	20		
	Networkin g and interacting with institute and technical college and institutes on quality constructi on	Quality Assurance	Days	15		Networking and interacting with institute and technical college and institutes on quality construction to adopt quality construction for ensuring resilient infrastructures. This ensures keeping abreast with regional and international level practices and know hows besides opportunites for joint collaborations.
		Total Quality management	Days	15		
		Internation Standards & Practices(ISO 2000 etc)	Days	40		
		Engineering college and Vocational Institutes for introducing syllabus on quality	Days	30		

2. RISK REDCUCTION SECTION,ENGINEERING ADAPTATION & RISK REDUCTION, DES,MoWHS

Sl. No.	Activity	Sub-activities	Unit	Duration Required (working days)	Existing staff strength	Remarks
1	Data and Inventory Establishment	a. Define building structure types across Bhutan.	working days	-	3	Already defined
		b. Data collection format & actual field data collection.		60 (total 120)		The number of days only reflects the number of days a team of two will take for the representative survey of one Dzongkhag. The detailed survey will be carried out by the Dzongkhag Engineering Sector.
		c. Data compilation and periodic updating.		30		For initial compiling only after receiving data from the Dzongkhags
		d. Develop structural parameters (desktop study, software modelling/simulation as well as field and experimental/laboratory research).		100		The number of days reflected is for one typology.
2	Vulnerability Assesment	a. Study and research on regional and global vulnerability assessment practices.	working days	20	3	
		b. Develop a quick and basic tool for Vulnerability Assesment for dominant building typologies.		40		
		c. Capacity building of engineers on vulnerability assessment.		54		3 days training in 6 centers over three years
		d. Field assessment (EARRD & Dzongkha Engineering Sector).		36		2 days field assessment in 6 centers over three years. This will build capacity of the Dzongkhag engineers to carry out the comprehensive assessment of their respective Dzongkhags
		e. Vulnerability database.		20		Initial compiling
3	Post-earthquake safety assessment	a. Capacity building of engineers of post-earthquake safety assessment of structures.	working days	54	3	3 days training in 6 centers over three years
		b. Build a strong reserve of trained and capable engineers for response in times of earthquake disasters.		-		This needs to be a continuous process
4	Retrofitting	a. Research on doable retrofitting techniques for Bhutan.	working days	20	3	
		b. Procurement/tendering/evaluation		40		
		c. Pilot retrofitting of buildings (4 numbers)	working days	120		Periodic supervision of the retrofitting at site
		d. Retrofitting documentation of the pilot buildings which will also serve as a guideline.				
		e. Capacity building of engineers on retrofitting.	working days	20		5 day training at the four sites
		f. Capacity building of masons on retrofitting through hands on training.		20		5 day training at the four sites
5	Stone masonry construction	a. Revision of stone masonry guidelines.	working days	10	3	

	guidelines	b. Capacity building of engineers on earthquake resilient stone masonry construction.		36		4 day training in 9 dzongkhags
		c. Capacity building of masons and local leaders on earthquake resilient stone masonry construction.	working days	36		4 day training in 9 dzongkhags
		a. Study and research on good timber construction practices in Bhutan and elsewhere.		20		
		b. Develop guideline for timber construction.	working days	30		
		c. Capacity building of engineers on timber construction.		60		3 days training in the 20 Dzongkhags
		d. Capacity building of masons, carpenters and local leaders on timber construction.	working days	60		3 days training in the 20 Dzongkhags
		a. Study and research on fire safety codes.		20		
		b. Develop and introduce fire codes for vernacular as well as reinforced concrete homes.	working days	30		
		c. Capacity building/raising awareness of engineers on fire safety.		60		3 days training in the 20 Dzongkhags
		d. Capacity building/raising awareness of engineers/masons/homeowners on fire safety.	working days	60		3 days training in the 20 Dzongkhags
		a. Study of traditional roof system and their strength and vulnerabilities.		20		
		b. Develop and introduce windstorm resistant roofing system.	working days	30		
		c. Capacity building of engineers on windstorm resistant roofing system.		60		3 days training in the 20 Dzongkhags
		d. Capacity building of masons and carpenters on windstorm resistant roofing system.	working days	60		3 days training in the 20 Dzongkhags
		a. Study and research on confined masonry practices.		30		
		b. Develop guideline for confined masonry construction.	working days	30		
		c. Capacity building of engineers on confined masonry construction.		60		3 days training in the 20 Dzongkhags
		d. Capacity building of masons, carpenters and local leaders on confined masonry construction.	working days	60		3 days training in the 20 Dzongkhags
		a. Study on existing IS Codes.		30		
		b. Approval and compliance system.	working days	10		
		a. Frame Policy and Legal requirements for engorcement of Codes and Guidelines.		60		
		b. Frame appropriate strategies for raising awareness, implementation and enforcement.	working days	30		
		a. Study on non-destructive and destructive testing methodology.		15		
		b. Procurement of tools/tendering/evaluation	working days	15		

		c. Develop/adopt procedures and methodology, criteria and testing grades appropriate to Bhutan.		15		
		d. Develop manual.	working days	15		Ex-country/in-country trainings
		a. Advanced technical training on various aspects of earthquake and structural safety		10		
		b. Fire safety code	working days	10		Ex-country/in-country trainings
		c. Windstorm protection		10		Ex-country/in-country trainings
14	Course guides and content for Stone Masonry	a. Prepare course guide and content for introduction in the college, polytechnique and vocational level courses in the country.	working days	30	3	
		a. Prepare course guide and content for introduction in the college, polytechnique and vocational level courses in the country.		30		
16	Networking	a. International.	working days	20	3	
		b. Regional.		15		
		c. National	working days	10		
		Planning, Development, Monitoring, evaluation and periodic reporting of World Bank and UNDP projects		60		

2.2

Sl.No.	Activity (for 4 years of 11FYP)			Unit	Duration Required (Working Days)	Existing Staff Strength	Remarks (for 4 years)	
1	Initiation of Pilot Project (Implementation of the identified viable technology)	Execution of CSEB	Pilot Project Component	Draft and signing of MoU with the Dzongkhag Administration/Institution head.	10 days /dzongkhag	30	2	Drafting of MoU in consultation at Division, Departmental level and with the Dzongkhag
				In-house capacity building/familiarization	5 days per new project case	15	above mentioned 2	
				Familiarization and capacity building of dzongkhag engineers, local leaders, masons and community	10 days per dzongkhag	30	above mentioned 2	Duration required calculated in all activities are effective duration.
				Follow up i.e., monitoring and evaluation of CSEB Pilot projects.	5 days /dzongkhag	15	above mentioned 2	

		Promotion and Implementation of CLC technology	Procurement of softwares/tools/equipments/publication		21 days per procurement	42	above mentioned 2	for average 2 procurements	
			In-house capacity building		10 days per new case study	10	above mentioned 2		
			Pilot Project Component	Draft and signing of MoU with the Dzongkhag Administration/Institution head.		10 days /dzongkhag	30	above mentioned 2	for 3 districts
				Familiarization and capacity building of dzongkhag engineers, local leaders, masons and community		10 days per dzongkhag	30	above mentioned 2	
				Follow up i.e., monitoring and evaluation projects implemented			15	above mentioned 2	3 districts
			Portable Electric earth rammer s	Procurement of softwares/tools/equipments/publication			60	above mentioned 2	
				In-house capacity building			5	above mentioned 2	
				Development of guide/manual			120	above mentioned 2	includes study and design of earth technology
				Pilot Project Component	Draft and signing of MoU with the Dzongkhag Administration/Institution head.		10 days /dzongkhag	50	above mentioned 2
Familiarization and capacity building of dzongkhag engineers, local leaders, masons and community		12days /dzongkhag			70	above mentioned 2			
Follow up i.e., monitoring and evaluation of CSEB Pilot projects.		7 days /dzongkhag			35	above mentioned 2			

2	Technology Study & reviews	Embodied energy study for local building materials	Procurement of software and related publication for research study	days	60	above mentioned 2	Identification of relevant resources, source of resources and procurement of relevant resources
			Training on embodied energy computation	6 months minimum for database, software, training	180	above mentioned 2	Identification of training centre, software, database, tailoring of training (if need be) and actual training participation
			Study of local building materials in terms of embodied energy	6 months per material case study	150	above mentioned 2	Study of building materials in Bhutanese context i.e., source of material, raw material, transportation, manufacturing process, etc for the embodied energy computation
		Energy simulation of building typologies	Procurement of consultant	days	60	above mentioned 2	Drafting of ToR and procurement of consultant
			Development of guidelines/manual	days	180	above mentioned 2	6 months or more depending on the procurement of softwares/tools/publication necessary
			Research on building typology on energy simulation	days	250	above mentioned 2	Field assessment and research studies and documentations
			Procurement of softwares/tools/equipments/publication	days	21	above mentioned 2	
			In-house capacity building	days	30	above mentioned 2	
		Termite Ventilation	Procurement of consultant	days	60	above mentioned 2	Study and literature review for drafting ToR, actual drafting of ToR and procurement of consultant

		Development of guidelines/manual/report	months	20 months	above mentioned 2	minimum 20 months for pilot study and documentation	
		Procurement of softwares/tools/equipments/publication	days	90	above mentioned 2		
		In-house capacity building	days	45	above mentioned 2		
		Pilot Project Component	Pilot project if a feasible project is available	months	18	above mentioned 2	1.5 year minimum depending on the size of the project
			Follow up i.e., monitoring and evaluation of CSEB Pilot projects.	30 days / dzongkhag	30	above mentioned 2	
		Energy Efficient Door Window system	Research on door/window system	months	6	above mentioned 2	
			Development of guidelines/manual	days	180	above mentioned 2	
			Procurement of softwares/tools/equipments/publication	days	60	above mentioned 2	
			In-house capacity building	days	21	above mentioned 2	
		Equipments / plants/tools/Softwares	Study of the construction equipments / plants [CLC, rainwater harvesting, termite ventilation, hume pipes, double-glazed window(timber) and other viable plants]	days	90	above mentioned 2	
			Study of the construction softwares.	days	60	above mentioned 2	
3	Green Construction policy	Recruit consultant for development of green construction policy.	days	30	above mentioned 2	Identification of relevant resources, source of resources and procurement of relevant resources	
		Development of draft green construction policy (Consultant)	months	6	above mentioned 2		
4	Networking	Participate in workshops, seminars, conferences relevant to the above mentioned works	days	45	above mentioned 2	Duration depends on the organizing party The Division needs to keep abreast of all the relevant technology and technique for which participation at technical seminars, conferences, workshops and similar platform is highly	
		Procurement and familiarization of guidelines, codebooks, and other books Register for membership such as green council and so on & Subscribe to international and national newsletters and journals.	days	60	above mentioned 2		

						recommended
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