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ENGINEERING SERVICES FOR RURAL ROADS REHABILITATION CONTRACT NO: EDH-I-00-08-00023

CONSOLIDATED REPORT:

ROAD PRIORITIZATION PROCESS AND OUTPUTS

September 2014

The views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the US Government.

ENGINEERING SERVICES FOR RURAL ROAD REHABILITATION (ES3R)

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CONSOLIDATED REPORT: ROAD PRIORITIZATION PROCESS & OUTPUTS

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Acronyms

A & E	Architect and Engineer
BOQ	Bills of Quantity
COP	Chief of Party
COR	Contracting Officer Representative
EMMP	Environmental Mitigation and Monitoring Plan
ES	Environmental Specialist
ESMMP	Environmental & Social Mitigation & Monitoring Plan
ES3R	Engineering Services for Rural Roads Rehabilitation
ETL	Engineering Team Leader
FED	Food and Enterprise Development
FTF	Feed the Future
FTL	Field Team Leader
F2M	Farm to Market
F2MRR	Farm to Market Road Rehabilitation
GIS	Geographic Information System
GOL	Government of Liberia
LESSP	Liberia Energy Sector Support Project
LMWP	Liberia Municipal Water Project
MOF	Ministry of Finance
MPEA	Ministry of Planning and Economic Affairs
MPW	Ministry of Public Works
OCA	Organizational Capacity Assessment
PIRS	Performance Indicator Results Sheet
RE	Resident Engineer
SI	Site Inspector
USAID	United States Agency for International Development

ENGINEERING SERVICES FOR RURAL ROADS REHABILITATION (ES3R)

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1. BACKGROUND

A principle task for ES3R is the detailed design of some 450 km of rural road within the Counties of Lofa, Nimba, Bong and Grand Bassa.

The construction of these roads is largely in support of USAID's Food and Enterprise Development Program (FED). The FED program is active in these Counties.

The roads to be targeted are defined as 'farm to market roads'. This permits any road section from any of the three classifications[1] distinguished by MPW as comprising its core rural road network to be included in the selection when that road section constrains the flow of agrarian outputs from grower to buyer.

FED program is composed of geographically clustered projects with each project focused on 1 of 4 value chains:

- Upland/lowland rice
- Cassava
- Goats
- Vegetables

The FED projects are intended to promote food security and a grower surplus which can then be converted into cash through the medium of the local markets.

Whether producer/buyer transactions are undertaken at farmstead, homestead, village, roadside or market sites, unimpeded all-weather

[1] MPW's road classification is composed of three classes, Primary, Secondary and Feeder Roads i.e. roads are classified according to their function. Currently all three classes are under the management of MPW's central office, Monrovia.

vehicular transit of agrarian goods and services along the existing road network[2] promotes grower/buyer exchange.

The premise is that improved vehicular access to markets strengthens realization of the FED program objectives.

The FED Project Sites[3] are sited alongside the County road networks. The Project sites are grouped into 'clusters'. The rural road networks lying within or in the vicinity to the FED project clusters are the target networks for ES3R.

Figure 1. FED project sites in Lofa County

[2] Existing network in this sense refers to all roads/tracks along which 4 wheel vehicles can or, in the recent past could, navigate. Much of the tertiary network is made up of un-engineered vehicle tracks rather than engineered roads.

[3] The FED project sites appear to be sited as much by prevailing access conditions as project suitability.

Liberia's rural road network is extensive. The primary network in the FED supported Counties is by and large is trafficable all year. However significant proportions of the secondary network do not possess all weather access. The tertiary network, so called Feeder Roads, is dilapidated and largely un-engineered[4]. Few of the feeder roads possess all weather access. Some are impassable to vehicles throughout the year.

The USAID roads program, 'Farm to Market Roads Rehabilitation' includes 84km of road that is currently under contract for improvement and a further 450km scheduled for improvement between 2015-18.

This total, 534km, is to be divided evenly between the ES3R project counties i.e. 134 km per county. The length of road networks in the FED clusters significantly exceeds this length.

There is therefore a need for prioritization that identifies road links in order of importance the sum total length of which is in the order of 133.5km per county. Table 1 summarizes the theoretical distribution of road lengths per county and provides an indicative commencement time for construction.

[4] Access along much of the Tertiary network is maintained by community driven initiatives and reactive (and mostly temporary/emergency) repairs by GOL and Development agencies.

Table 1. Distribution of Road Lengths Scheduled for Improvement by County

	Construction commenced 2014 (km)	Scheduled for commencement 2015 (km)	Scheduled for commencement 2016/7 (km)	Total (km)
Bong	49	15	69.5	133.5
Nimba	21	35	77.5	133.5
Lofa	14	40	79.5	133.5
Grand Bassa	0	60	73.5	133.5
total	**84 km**	**150 km**	**300 km**	**534 km**

The road links eligible for inclusion in the selection process should possess one or more of the following characteristics**:**

- Support the FED program by reducing the effort of transport between FED supported farmer's farmstead and 'strong' markets. This is the primary characteristic.
- Provide access to sister USAID projects within or in the vicinity of the road network supporting FED project clusters
- Inclusion in the County Development Agendas where these links lie within or in the vicinity of the FED cluster road network.

Characteristic #1 is included within the ES3R scope of works. Characteristics #2 & #3 were added following discussions with high level stakeholders.

2. SELECTION OF A TOOL TO "GUIDE AND INFORM" ROAD PROJECT IDENTIFICATION

In the Project Inception Report, December 2013, ES3R proposed the use of a selection tool based on a multi criteria analysis. The rationale is explained below.

2.1 Inherited Parameters

Many of the principle parameters and constraints usually encountered in a prioritization process have been pre-determined i.e.

- Length of road to be improved is predefined at 450km
- Four project area Counties are allocated four equal lengths of road improvement projects
- No budget restraint has been placed on the construction cost of the selected 450km.
- Road improvements projects are to be selected from within, or in the vicinity of, the road network supporting the FED's project clusters.

2.2 Required Characteristics of the Prioritization Tool

The Project context and the Liberian setting required the following key features:

- Rapid: the Project time frame does not permit a detailed assessment
- Inclusive: Stakeholders at all four administrative levels, National, County, District and Community need to be consulted.
- Active Participation: As far as possible the tool needs to include the active engagement of each administrative level. For this reason County level workshops held at the County Administration and attended by County and District officials.
- Accountable and Transparent: All data used for the calculation of a prioritization index needs to be official and/or verifiable. As far as possible decisions are based a quantitative assessment or are arrived at by consensus.
- Comprehensible to a Layperson: For the tool to be universally accepted and its outputs endorsed its components need to comprehensively understood at each stakeholder level.

The tool suggested in the Inception Report fits all these characteristics.

3. THE TOOL EXPLAINED

Various tools have been developed to assist and support road project selection[5]. The tool considered most suited to the Liberian setting, the Project context and consistent with the characteristics listed above is a simplified version of Integrated Rural Access Planning[6]. This uses a combination of benefit/cost (defined hereinafter as 'cost effectiveness') and multi criteria analysis. The population served is a proxy for benefits and required road improvements as the cost.

A multi-criteria analysis is used to assess and quantify the impact of existing socio economic infrastructure and the project prime objective of serving FED projects.

$$Ranking\ index\ of\ road\ link = \frac{\text{Population served by the road link x Benefit factor of the link}}{\text{cost of road link improvements}}$$

Where:

- *Ranking index* is the relative level of importance of the road link.
- *Population* served is the number of people lying within a defined corridor either side of the road link.
- *Cost of road improvements* is the estimated cost of upgrading the road link to a prescribed level of service.
- *Benefit Factor* is the sum total of relevant and influential socio economic characteristics along each road link. Each characteristic is weighted to reflect its perceived relevance. It is calculated using multiple criteria analysis. The criteria are composed of 4 distinct categories – Agriculture and Market Access, Health and Education, Transport characteristics and other Development Projects.

[5] A Review of Road Project Prioritization, Fourarce-Dyson, TRL, 2006.
[6] Overseas Road Note 20, Management of Rural Road Networks, TRL, 2003.

Each road link is accessed individually, it's ranking index computed and compared to other competing links. The higher the ranking index the higher the importance of the road link.

The three variables, population, estimated improvement costs and Benefit factor and their respective weightings, are discussed below.

3.1 Formulation and Criteria of Rankings

Criteria: This is a physical characteristic that exists along the road link or within the zone of influence of the road link that adds value to the road's importance e.g. a clinic adds value to a road's purpose since residents need access to the clinic and the clinic needs access to the wider road network when medical cases require referral to a higher level service. Therefore a clinic is a criterion. Also, farmers need access to large markets if they want to sell any surplus crops they produce. They also need to transport fertilizers and soil conditioners from the market to their farmsteads. Therefore farmers are criteria.

Weighting: This is the relative importance of the criteria. For example, a project that focuses on health improvements may be given a higher rating to clinics than farmers. Similarly, if a project focusses on agriculture then farmers may be given a higher weighting than clinics.

The selected criteria are illustrated in annex 1. Their respective weightings were the outputs of a series of discussions with the Project's COR, and senior FED officers. The criteria and its weightings were validated by Senior Stakeholders at a presentation of the tool at the US Embassy on 26 May 2014.

The selected criteria are divided into of 4 distinct categories:

- Agriculture and Market Access: allocated a contribution of 35% of total
- Health and Education: allocated 20%

- Transport network characteristics: allocated 35%
- Other Development Projects: allocated 10%

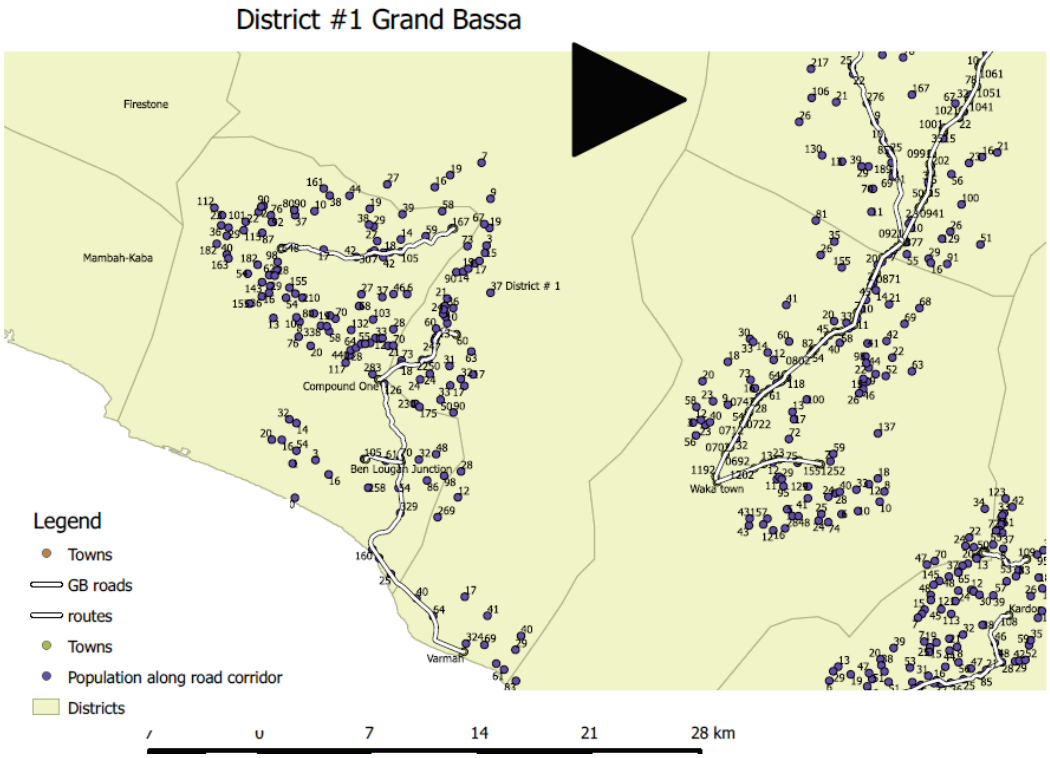
This matrix illustrated in annex 1 was used as the basis for all four county prioritization workshops.

3.2 Population

Every road link provides a service for communities lying alongside or close to the road corridor. The width of the population band served by the road link varies according to the road network density. The population band width selected was 3km either side of the road. In Lofa this was reduced to 2km due to Lofa's higher road density.

The population data was taken from official data taken from the nationwide Population and Housing census 2008. LISGIS provided this data. An example of road corridor populations is illustrated in Fig. 2.

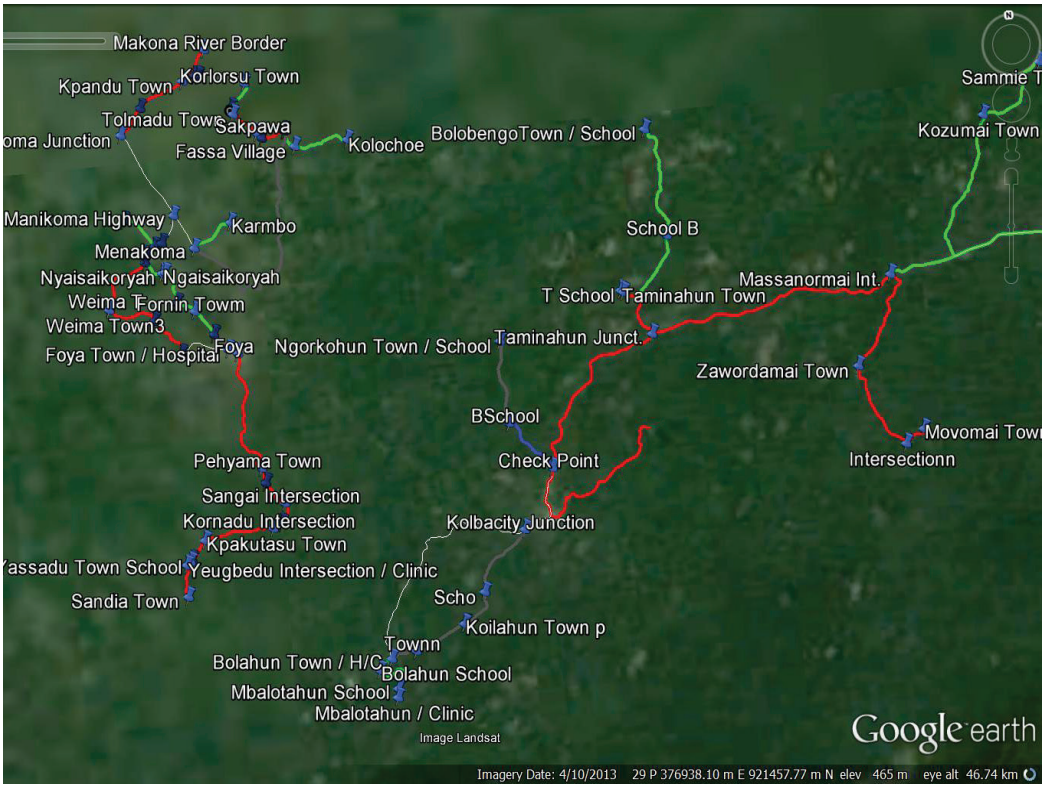
Figure 2. Road Corridor population distribution, Grand Bassa, District #1



Each team was equipped with a GPS, in order to track and record road alignments, and GIS software in order to plot the road link and compute population lying along its alignment within the 2-3km band width. Figure 2 illustrates population bands and figure 3 illustrates mapping of the tracked roads.

In Bong County, population figures were compiled using a combination of census data and house counts. Where it was clear that census data was no longer relevant (possibly due to population immigration and emigration) house counts were undertaken and population computed using average household statistics for Bong.

Figure 3. Mapping of surveyed roads, Lofa County



3.3 Estimated Cost of Road Improvements

Estimated road improvement costs were computed by the field teams on the basis of improving existing service levels of the road links to a standard of 'basic access'[7]. This service level is permitted by the Feeder Roads Design Manual.

Unit rates for a variety of road interventions were taken from unit costs used on an ongoing USAID funded contract in Bong County

4. IMPLEMENTATION OF ROAD LINK PRIORITIZATION

The tool was presented to high level stakeholders at a presentation and discussion session at the USG Embassy on 26th May 2014. The tool and its components: composition of the criteria and their weightings, use of cost effectiveness and the characteristics described above are judged to have been validated.

The tool was then rolled out for implementation to each of the four Counties.

5. PROCESS

The process is split into four major activities performed in the following sequence:

[7] Basic access is defined as 'The least cost intervention for providing reliable all season access for the prevailing means of transport' - World Bank Technical Paper 496. Lebo & Schelling.

5.1 Engagement of Stakeholders

In support of inclusion, active participation, accountability and transparency the field teams undertook:

- Introduction and explanation of the tool to the high level County Authorities
- Engagement of key County and District level stakeholders into the data gathering activities
- Mapping of the FED project sites with FED field officers.
- Definition of the road network in the vicinity of the FED project sites in conjunction with FED officers and MPW Resident Engineers.
- Gathering key road links identified by County Development agenda

5.2 Data Collection

This component of the process lends itself very readily to GIS techniques[8].

- Rapid assessment of each identified road link's existing condition
- Detailed inventory of socio-economic features along road link (schools, clinics, road junctions etc. It activity was informed by criteria list.

5.3 Data Processing

- Computation of population within selected corridor width.
- Computation of estimated cost of improvements consistent with 'Basic Access'
- Population of MCA matrix using outputs from inventory and rapid assessment survey.

[8] The Field Teams used GPS to gather data and Basemap, Google-earth and ArcGIS to process the data. This is consistent with the LISGIS GIS management system.

5.4 Workshops

Workshops were arranged at each County Administrative headquarters and delivered to County and District stakeholders on the following dates:

- Gbarnga, Bong 4th June 2014
- Voinjama, Lofa 9th June
- Sannequelle, Nimba 11th June
- Buchanan, Grand Bassa 25th June 2014

Detailed reports were prepared for each County Workshop. These reports are available from USAID's Contracting Officer's Representative[9].

6. OUTPUTS

Table 2 summaries road lengths covered by ES3R in a chronological order by County.

Table 2. Summary of road lengths covered by ES3R against County

County	Roads Under contract	Rapid assessment survey	Prioritization outputs	Detailed Design of prioritized road links	
	Jan '14 - Dec '15	April – May '14	June '14	July - Sept '14	Oct '14 -Sept '15
Bong	49	261.6	88.3	31.6	56.7
Nimba	21	302	117.4	28.2	89.2
Lofa	14	199.2	120.7	15.4	105.3
Grand Bassa	0	239.4	136.7	0	136.7
	84 km	1002.2 km	463.1 km	75.2 km	387.9 km

The outputs of the workshops are summarized in annexes 2 (Bong), 3 (Nimba), 4 (Lofa), & 5 (Grand Bassa). The County Workshop Reports contain a more detailed account of the data collected and data processed.

[9] dwounuah@usaid.gov

County:				
Si No.	Criteria	MAX %age Weight	weighting range	MAX SCORE
Transportation and connectivity (35%)				
1	Number of Intersections along Road Section	10	<3	0
			>3 to <5	5
			>5	10
2	No. of Villages/Community Centers being connected by the road section	10	Nil	0
			<5	5
			>5	10
3	Origination point of the route	10	Primary network	10
			Secondary network	5
			Another feeder road/dead end	2
4	Route provides direct access to protected area, (Eg. Protected forest or environmentally sensitive site.	5	If yes	0
			If no	5
AGRICULTURE & Market Access(35%)				
5	Number of FED supported crop aggregation sites, processing and storage facilities located along the route	5	NIL	0
			between 1 and 2	3
			3 or more	5
6	Number of FED supported farmers along route	10	NIL to 15	0
			15 to 75	5
			76 and above	10
7	Number of FED supported field demostration sites	10	nil	0
			<2	5
			>3	10
8	No of markets being connected by the route	10	Nil	0
			<2	6
			>2	10
Education, Health and Other development projects(30%)				
9	No. of Health Centres/Dispensaries along road section	10	Nil	0
			1 to 2	6
			>2	10
10	No of Educational institutions being connected by the route	10	Nil	0
			<3	7
			>3	10
11	Any other ongoing development projects along the route	10	Nil	0
			<2	6
			>2	10
Economic Benefit Factor (EBF)		100%	Max 100 Points	
Road Length (Km)				
Population				
Estimated Total Investment Cost (Dollars)				
Cost Effectiveness [CE] - (Popn per 1000 Dollars)				
Ranking Index = EBF X CE				
Rank				

ANNEX 1: MULTI CRITERIA MATRIX

District	Road Name	Length Km	Estimated Cost	Population served	cost effectiveness	Economic Benefit factor	Ranking index	Ranking	Aug - Sept	Oct '14 - Sept '15	Large drainage structures	Intervention Required
Panta	Foequelleh - Morgan	1.9	48,063	2491	52	49	2,540	1		1.9		Rehabilitation
	Garmu - Desa	4.3	52,840	2,388	45	54	2,440	2				Maintenance +Spot Imp
Fauma	Bong mine - Yeamah	16.7	249,758	10,292	41	59	2,431	3				Maintenance + Drain improv.
	Bong mine - Yarbayah	23.3	466,889	10,679	23	86	1,967	4				Maintenance + Drain improv.
Suakoko	Suakoko - Yaindewoun town	19	342,207	8,379	24	78	1,910	5				Periodic Maint + Drain Impr
Salala	Salala - Sonyea Road	9.8	287,843	5,178	18	49	881	6				Rehabilitation
Yellequelleh	Gbatala - Taylor town - Fenetolee	21	482,597	4,134	9	76	651	7				Maintenance + Drain improv.
Zota	Foequelleh - Menequah-Yowee	13.2	510998	3392	7	56	372	8		13.2	1	Rehabilitation
Fauma	Handi - Mawah	6.6	243057	1555	6	44	281	9				Maintenance + Drain improv.
Salala	Felela - Jarwuta	8.6	486612	2277	5	54	253	10		8.6	1	Rehabilitation
Yellequelleh	Yaindewoun - Nyan - Maroon ta Junction	6.1	252637	1132	4	50	224	11	6.1			Rehabilitation
Suakoko	Gbondoi - Gbarnla	17.5	522274	1610	3	69	213	12	17.5			Rehabilitation
Jorquelleh	Weinsue - Kpai	8.7	248001	815	3	64	210	13		8.7		Rehabilitation
Suakoko	Sinyea - Kayata	13.4	472096	1429	3	54	163	14		13.4		Rehabilitation
Jorquelleh	Amos (Jimmy) town - Kpaiya	12.4	475630	963	2	69	141	15				Rehabilitation
Panta	Tobacco - Gbaota	3.1	129727	456	4	38	134	16				Rehabilitation
Salala	Bassa town - Veleyan - Molonakpaiga	10.9	283205	746	3	50	132	17		10.9		Rehabilitation
Suakoko	Suakoko (Geayea)- Gamue	9.4	296476	733	2	48	119	18				Rehabilitation
Yellequelleh	Taylor ta - Gaeyaerd - Belefanai	8	579243	1324	2	37	85	19				Rehabilitation
	Marroon Ta Jn ton Taylor Town	8							8			Rehabilitation
Jorquelleh	Janyea - Darwata	10.4	491654	788	2	40	64	20				Rehabilitation
Jorquelleh	Samay - Baryata	14.1	487910	472	1	59	57	21				Rehabilitation
Fauma	Popota - Dombli	4.8	279598	433	2	40	62	22				Rehabilitation
Jorquelleh	Janyea - Goleemue	9.9	557773	502	1	51	46	23				Rehabilitation
Fauma	Lepolu Junction - Lepolu ta	3.3	120202	101	1	27	23	24				Rehabilitation
	Total	**261.6**						TOTALS	31.6	56.7		

ANNEX 2: WORKSHOP OUTPUT, BONG COUNTY

District	Road Name	Length Km	Estimated Cost	Population served	cost effectiveness	Economic Benefit factor	ranking index	Ranking	Aug - Sept '14	Oct '14 - Sept '15	Large Drainage Structures	comments
Zoe-geh & Gbehlay-Geh	Bahn - Karnplay	42.9	1,583,425	18283	12	93	1,074	1				Primary road MPW to Rehabilitate using County Equipment
Zoe-geh	Bahn - Gbarplay	4.9	199,975	2,342	12	48	562	2		4.9		
Zoe-Geh	Baylehglay - Siaplay	5.6	241,100	1,797	7	57	425	3				Road link remote from others
Zoe-geh	Payee - Gbanwin	3.6	279,595	2,214	8	51	404	4		3.6	1	
Buu-Yao	Wea Beadatua - Bahn	15	856,550	5,167	6	62	374	5		15	2	
Yarmein	Gbaleyee Junction - Kinnon	14.2	686,031	5,666	8	42	347	6				Primary road MPW to Rehabilitate using County Equipment
Zoe-geh & Saclepea mah	Barn - Saclepea	14.5	570,525	1,573	3	83	229	7				Primary road MPW to Rehabilitate using County Equipment
Zoe-geh	Kpaglay - Nyenpa	2.5	132375	566	4	45	192	8		2.5		
Gbehlay-geh	Geanplay - Souplay	5.1	327555.9196	1067	3	55	179	9				
Saclepea Mahn & Meinpea mahn	Saclepea - Tengbin	12.8	423650	1724	4	44	179	10				No FED farmers on link
Yarmein	Yekepa - Bolewee	26	1616850.777	4131	3	66	169	11				Primary road MPW to Rehabilitate using County Equipment
Meinpea-mahn	CNC Jctn (Tunukpuyee) - Y Intersection	8.5	507655.9196	2340	5	36	166	12				Primary road MPW to Rehabilitate using County Equipment
Tappita & Saclepea Mahn	Dounpa - Zuaplay - Gogein	22.2	1581800.812	3502	2	71	157	13	22.2		6	
Yarweih Mehnssonoh	Fleedin - Nyonkiayee	15.1	1025577.283	2443	2	51	121	14		15.1	1	
Buu-Yao	Baylehglay - Rlekorlay	8.4	703561.8064	1453	2	54	112	15		8.4	2	
Meinpea-mahn	Kpain - CNC Junction (Zao)	10.1	747907.5604	1094	1	59	86	16		10.1	2	
Yarwein Mehnsonnoh	Boyee Junction - Goekorpa	23.8	1368702.25	1567	1	51	58	17		23.8	3	
Zoe-geh	Zontuo - Sangarplay	16.5	1062597.451	1425	1	42	56	18				
Saclepea Mahn	Gaopah - Garwompa	5.6	497655.9196	581	1	42	49	19	5.6			
Saclepea Mahn	Garwonpa - Fleedin	6.1	497655.9196	581	1	42	49	19		6.1		
Tappita & Gbee & Dorlu	Tappita - Unification Town	20.2	1,016,740	50	1	42	38	20				
Tappita	Gbonvarglay - Gbarplay	19.2	1077030.887	57	0	32	2	21				
	Total length of road surveyed	**302**						**TOTALS**	**27.8**	**89.5**		

District	Road Name	Length Km	Estimated Cost	Population served	cost effectiveness	EBF	ranking index	Ranking	Aug - Sept	Oct '14 - Sept '15	Large Drainage Structures
Voinjama	Zenalomai-Boiboimai	5.1	45245	809	18	44	787	19			
	Massanormai-Zawordamai- Movolomai	10	68090	1,600	23	52	1,222	18			
Zorzor	Zorzor-Yeala Border	6.9	33159	6,759	204	65	13,249	5		6.9	
	Passama	5.5	25422	1,386	55	37	2,017	11			
	Zelemai-Woima	22.2	27449	2,418	88	61	5,373	8		22.2	
	Konia - Ziggida	11.8	54049	3,867	72	50	3,577	9		11.8	
Salayea	Yarpuah Town	2.8	41354	1,624	39	49	1,924	12			
	Zorzor-Kpaiyea-Gbarnway	14.3	30066	8,664	288	58	16,714	2		14.3	
Quardu Bondi	Jarmulor-Kenela-Korlelah	7.6	41192	1,577	38	57	2,182	10			
	Wankerdu	2.3	46644	85	2	35	64	25			
	John's Town-Bulor	25	32349	5,064	157	58	9,079	6	15.4		
	Bulor - Tusu									9.6	
	Sansanor - Moibadu	3.7	49374	533	11	39	421	23			
	Kanela - Safudou	3.2	39851	433	11	44	478	22			
Kolahun	mahun Junct. - Tanimahun Town - Bolobe	11.5	41429	818	20	39	770	20			
	Koiba city - Koilahun - Bolahun	9.7	41648	9,591	230	58	13,357	4		9.7	1
	Bolahun-Mbalotahun	2.6	40966	1,277	31	48	1,497	16			
	Checkpoint - Bassamolahun - Ngorkohun	7.2	39671	5,607	141	61	8,621	7		7.2	
Foya	Foya-Sangia - Kelima Pombor	8.2	31472	7,056	224	69	15,470	3		8.2	
	Menekorma Highway - Kpandu - Koimei	4.6	58821	1,444	25	52	1,277	17			
	Menekorma Highway - Karmbo	2.1	45780	753	16	42	691	21			
	Leo Genbu - Weima - Kporndodu	8.3	33931	1,630	48	36	1,729	15			
	Sengai - Menekorma Highway	1.4	201161	490	2	42	102	24			
	Foya Town - Sandia	15.2	29509	10,779	365	54	19,725	1		15.2	
	Korlorsu Road	4.7	46558	2,278	49	38	1,859	13			
	Kolochoe Road	3.3	52259	2,295	44	40	1,757	14			
	Length of road surveyed	**199.2**						**TOTALS**	**15.4**	**105.1**	

District	Road Name	Length Km	Estimated Cost	Population served	cost effectiveness	EBF	ranking index	Ranking	Aug - Sept '14	Oct '14 - Sept '15	Large Drainage Structures	comments
District 1	Compound 1 - Little Bassa - Varmah	21.4	715,941	4476	6.25	81	506.4	6		21.4		
	Ben Luogan Town - Kor's Town Road	2.4	126,784	4659	36.75	25	918.69	3		2.4		
	Compound 1 - Doezohn Road	6.8	189,977	3256	17.14	55	942.64	2		0.9		
	Bokay Town - Moores Town Road	12	534,495	5365	10.04	64	642.4	4				logging road
District 2	Waka Town - Compound #2 Road	20.6	#######	4406	3.60	82	295.53	13		20.6	4	
	Compound #2 - Zarn Town Road	18.6	800,560	4961	6.20	57	353.22	9		18.6	5	
	Compound #2 - Karngbo Town Road	23.7	#######	4220	3.59	76	272.85	15				
District 3	James Henry Town - Kardor Town Road	11.9	475,201	4182	8.80	40	352.02	10		11.9		
	Rally(Yarmah Town - St John River Road)	12	758,366	4949	6.53	41	267.56	16				
	Siahn - Waiker Town Road	3.2	156,175	2062	13.20	47	620.55	5		3.2		
	FDA Junction - Keyah	29.6	#######	3684	1.86	51	94.94	19				
	Blewein - Doewhein - Sarwain Town	9.7	393,392	67305	171.09	42	7,185.73	1		9.7		
	Garpu Town - Behn Town	6.4	265,225	2459	9.27	37	343.04	11		6.4		
District 4	Gio Town - Little Kola Road	12.6	460,422	1733	3.76	64	240.89	18				
	Timbo Town (Gbagee) - Yeahbee Town	4.8	212,856	1607	7.55	33	249.14	17				
	Waka Town - Johnny Tutu Town Road	7.1	340,011	1973	5.80	48	278.53	14		7.1		
	Karsuah - Newcess Beach Road	8.5	319,191	3650	11.44	27	308.75	12		8.5		potentially a logging road
	Yonbehn Town - Grand Kola	23.9	710,753	4821	6.78	59	400.19	8		23.9		
	Keyan - Karjuah Town Road	2.1	156,068	300	1.92	20	38.44	20				
	Tain Town - Frank town (2.1km)	2.1	98,265	1263	12.85	37	475.56	7		2.1		
	length of road surveyed	**239.4**							**total**	**136.7**		

ANNEX 5. WORKSHOP OUTPUT, GRAND BASSA