MINISTRY OF PUBLIC WORKS AND TRANSPORTATION
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION
REPUBLIC OF LEBANON

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THE PREPARATORY SURVEY FOR ROAD REHABILITATION SECTOR LOAN FOR EMPLOYMENT CREATION

FINAL REPORT

MARCH 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS GLOBAL CO., LTD.
EIGHT-JAPAN ENGINEERING CONSULTANTS INC.
NTC INTERNATIONAL CO., LTD.

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Location Map

Base 802856AI (C00059) 5-02

Basic data of the Republic of Lebanon

Ref：the U.S. Central Intelligence Agency map 2002

- Area :10,452 square kilometers (Gifu Prefecture degree)
- Population :Approximately 46.48 million (World Bank 2015)
- Capital :Beirut
- Ethnic :Arabs (95%), Armenians (4%), others (1%)
  (2016:CIA The World Fact book)
- Language :Arabic (French and English are acceptable)
- Religion :Christianity (Malonic, Greek Orthodox, Greek · Catholicism, Roman/Catholic, Armenian Orthodox),Islam (Shi'a, Sunni, Druze) 18 sects
- Major industries
  :Financial, Tourism and Food processing industries.
- Nominal GDP :US$ 478.84 billion (World Bank 2015)
- GDP per capita :US $ 8,047 (World Bank 2015)
- GDP economic growth :1.3% (World Bank 2015)
- Inflation rate :1.6% (World Bank 2015)
- Unemployment :6.4% (World Bank 2015)

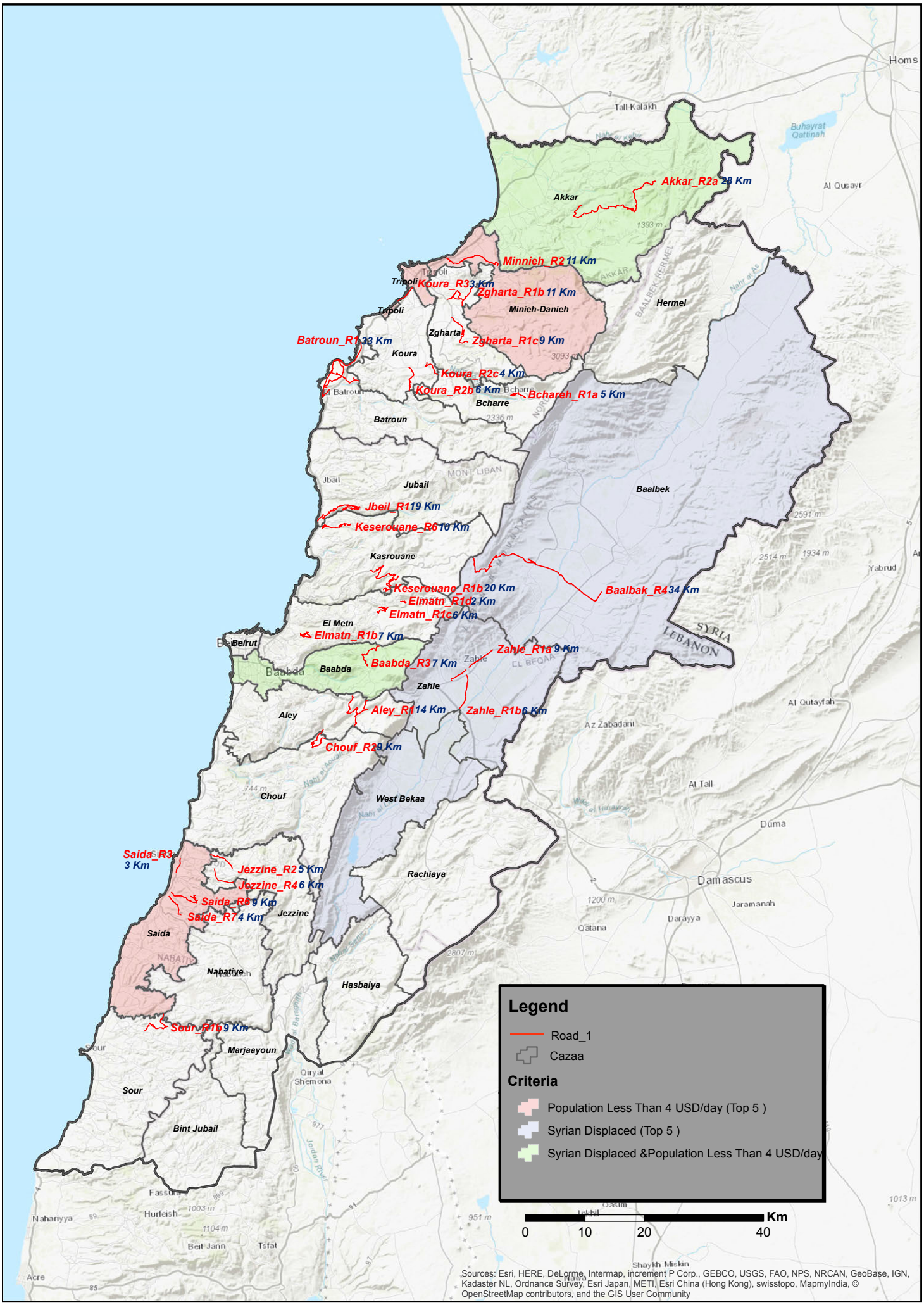
- Total trade value (Lebanese government in 2014)

(1) Export: US $ 4.55 billion
Major export items = gold, jewelry items, diamonds, scrap iron, scrap copper
Major export destinations = Saudi Arabia, United Arab Emirates, Switzerland, South Africa

(2) Imports: US $ 211.4 billion
Major imports = petroleum refined products, cars, pharmaceuticals, gold
Main importers = China, Italy, France, USA, Germany

- Currency Lebanese Pound (LBP)
- Exchange rate 1 dollar = 1,505 Lebanese · pound (January 2017)
- Japan's Aid Performance (Unit billion yen) (until the end of March 2014)
  (1) Loan financing cooperation :JPY130.22 billion
  (2) Grant Aid :JPY48.63 billion yen
  (3) Technical cooperation : JPY15.99 billion yen

Source Ministry of Foreign Affairs of Japan


Akkar_R2a 28 Km
Akkar
Minnieh_R2 11 Km
Tripoli
Koura_R3 3 Km
Zgharta_R1b 11 Km
Minieh-Danieh
Hermel
Zgharta
Batroun_R1 3 Km
Zgharta_R1c 9 Km
Koura
Koura_R2c 4 Km
Koura_R2b 6 Km
Bcharre_R1a 5 Km
Bcharre
Batroun
Jbail
Jubail
Baalbek
Jbeil_R1 19 Km
Keserouane_R6 10 Km
Kasrouane
Keserouane_R1b 20 Km
Elmatn_R1d 2 Km
Elmatn_R1c 6 Km
Baalbak_R4 34 Km
El Metn
Elmatn_R1b 7 Km
Beirut
Zahle_R1a 9 Km
Baabda_R3 7 Km
Baabda
Zahle
Aley
Aley_R1 14 Km
Zahle_R1b 6 Km
Chouf_R2 9 Km
Chouf
West Bekaa
Saida_R3 3 Km
Jezzine_R2 5 Km
Jezzine_R4 6 Km
Rachiaya
Saida_R6 9 Km
Saida_R7 4 Km
Jezzine
Saida
Nabatiye
Hasbaiya
Sour_R1b 9 Km
Marjaayoun
Sour
Bint Jubail
Legend
Road_1
Cazaa
Criteria
Population Less Than 4 USD/day (Top 5)
Syrian Displaced (Top 5)
Syrian Displaced &Population Less Than 4 USD/day
Km
0
10
20
40
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Outline of the Project

1. Country: Republic of Lebanon

2. Project Name: The Preparatory Survey for Road Rehabilitation Sector Loan For Employment Creation

3. Execution Agency:

Council for Development and Reconstruction (CDR), Ministry of Public Works and Transportation (MPWT)

4. Survey Objectives:

The Objectives of the project are

- Contribute to both the improvement of the access to public services and markets as well as the road network for local residents, which leads to the improvement of their livelihood, by rehabilitating/repairing the deteriorated or damaged roads, and for the improvement of the road surface conditions and traffic safety
- Contribute to the improvement of the livelihood of both the displaced Syrians and the vulnerable population of Lebanon by creating job opportunities for them in the Project with application of the work items that can create more employment of labor in road rehabilitation works to extract project proposals expected to require implementation in the near future

[Task]

1) Confirmation of the necessity and outline of the Project.
2) Formulation of the selection criteria (draft) for the sub-projects and selection of the sub-projects (draft) to be supported by JICA
3) Preparation of the project costs, project budget plan, project implementation schedule, and implementation methods such as procurement, construction plan and method for each sub-project (draft) to be supported by JICA.
4) Confirmation of the project implementation structure, operation & maintenance system, monitoring for environmental social consideration of each sub-project.

5. Survey Contents:

[Base Data]

Candidate sub-projects prepared by CDR Total 103 sub-projects with 1,574 km in length in 21 caza

[Step 1]

Assess all candidate sub-projects by screening with the indicator of “Necessity of Rehabilitation”

[Step 2]

Select the candidate sub-projects deteriorated more than 50% from [Step 1]

[Step 3]

Rank each candidate sub-project with the multiple criteria;

(1) Necessity of Road Rehabilitation

- Necessity of road rehabilitation investment for caza
- Importance on the road network measured by traffic volume
- Importance on the local road network measured by the access to important place(e.g. caza center)
- Road pavement damage level as the result of iRAP Pavement Damage Rating
- Road safety level in accordance to iRAP Star Rating

(2) Benefit to the Lebanese Vulnerable and the Syrian Displaced

- Existence of the work items enabling high employment creation
- Population of the vulnerable Lebanese people living near the sub-project

- Population of the displaced Syrians living near the sub-project
- Population in cazas where the sub-projects are located

[Step 4]

Check the area balance and rough cost estimate to judge the cut-off line of the sub-project list

[Step 5]

Packaging the sub-projects

[Step 6]

Preliminary design & cost estimate

[Step 7]

Final adjustment of the sub-projects for the Project

6. Conclusions and Recommendations:

(1) Conclusions

- The sub-projects for the Project were selected by multi-criteria comprising (i) Necessity of road rehabilitation: five criterion, and (ii) Benefit effects: four criterion, after screening the security level of the candidate road sections from 103 candidate road sections with 1,574km in the total length provided by CDR. As a result, 27 road sections with 289.1km in the total length located in seventeen cazas among 25 cazas excluding Beirut are selected.
- The scope of works for the sub-projects mainly concentrates to (i) pavement works: overlay or reconstruction of pavement from sub-base, (ii) drainage facility, (iii) retaining walls at both mountain and valley sides, (iv) traffic safety measures such as lane marking, warning and regulation sign boards, traffic mirrors, guard rail or wall, because the Project aims at rehabilitation and repairs of the existing road areas without improving neither horizontal and vertical alignment.
- There is little issue on both environment and social consideration for the sub-project road sections in the Project because no land acquisition and resettlement shall be identified at the preliminary design stage since the Project policy defines the road rehabilitation works are to be conducted within the present ROW. However, when the necessity of land acquisition/resettlement was identified at the detailed design stage, a resettlement action plan shall be prepared according to relevant laws and regulations on land acquisition and resettlement.
- The numbers of both the displaced Syrian and vulnerable Lebanese people, which are the target groups to be offered the employment opportunity as one of the objectives for the Project, are assumed approximately 180,000 and 49,000 people respectively based on literature review. Although the Lebanese labor regulation defines 1:1 ration between the Lebanese and the foreigners, it has been neglected because of a large occupancy by Syrian workers in the construction industry with 70-90 % in the ratio. Such regulated ratio shall be modified by MOL in reflecting the present situation in the near future. As a result of a series of interviews to the concerned international organizations, it was confirmed that the displaced Syrians who have registered as refugees with UNHCR are eligible to legally work for the Project with the acquisition of both a resident permit and work permit.
- It was confirmed that even a partial application of LBT, only to masonry work and rip-lap for a drainage facility, shall promote an effect on employment creation for the Project in consideration of no dissemination of LBT method in Lebanon so far. The LBT application in the Project is expected to increase employment opportunity at 123% compared to ones by pure EBT method, and it is estimated that the Project would provide 725,000 workers per day as the employment opportunity to both the displaced Syrian and vulnerable Lebanese people.
- No support component shall be carried out for the Project except road rehabilitation works in order to avoid duplication of support components planned in the WB portion since its content has not been elaborated at this stage, although the JICA Study Team has a concern on the insufficient capability of road maintenance activities by either MPWT or a municipality due to mainly a shortage of human resources
- It is confirmed that whereas CDR shall be an implementation agency for the Project in consideration of his past rich experience of infrastructure projects financed by foreign donors, MPWT shall have the responsibility to deal with the operation and maintenance of the road

sections rehabilitated by the Project, considering its past experience, although there has been a concern on its implementation capacity including human resources, organization structure and budget for maintenance.

(2) Recommendations

- It is necessary that an appropriate detailed design should be carried out, which is proposed to be executed by local consultants, after grasping actual damage level and area on the sub-project road sections through a careful site investigation since the preliminary design in the Study was executed by using satellite data and iRAP survey results within the limited time schedule.
- It is also recommended to execute the detailed public facility survey including electricity, telephone and water supply along the sub-project road sections in order to reflect its results to the detailed design output to be done by local consultants.
- It is recommended that the proposed work items with LBT method shall be clearly stated to be executed with the designated method in the contract conditions with the Contractor since it was confirmed its effect on employment creation in the Study. Otherwise the Contractor is likely to conduct such work items with EBT method considering the reduction of the work costs and time.
- JICA Study Team recommends to implement 27 sub-projects with eleven packages, considering its proximity, administrative jurisdiction and the capability of Lebanese contractors since the sub-projects are dispersed over the nation wide
- It is recommended to establish a PMU under Project Division of CDR prior to the Project commencement in order to be exclusively responsible for the Project because firstly, this is a co-financing project between WB and JICA and there are many stakeholders to be involved in, secondly, there as so many sub-projects to be rehabilitated over the nation
- Local consultants should be involved in both the detailed design and construction supervision activities for the sub-projects because the work items comprises ones executed in normal practice in Lebanon. However, since the Project is to be financed by JICA, it is recommended to incorporate an international consultant as Project Management Consultant to support the procurement of the Contractors, check the quality of works, advise PMU on issues occurred at site, and monitor the progress of each sub-project. Furthermore, the procurement of the Contractors should be executed through the International Competitive Bidding under the JICA guideline.
- It is necessary for CDR to timely provide the security information to both the Contractors and the Consultants working for the Project in order to enable them to provide the necessary security countermeasures in advance such as contact points in case of emergency because there has been uncertainty of the security situation in Lebanon due to the continuity of the Syrian crisis and declaration of the US to approve Jerusalem as a capital of Israel in December 2017.
- It is recommended that JICA in collaboration with ILO should advocate the concerned Lebanese authorities and promote the simplification of the work certificate application for the displaced Syrians for enhancing legal employment in the sub-projects, which has been a trial for the ILO funded projects. Furthermore, although it is necessary for the JICA portion of the Project to monitor the employment situation of both the displaced Syrian and the Lebanese vulnerable people through the project implementation period, the monitoring items should be carefully selected and adopted while referring to ones prepared by WB because of both ambiguity of interpretation of relevant laws and regulations and actual practice at the site
- The JICA Study Team recommends utilizing the resources and technical capacity of the private sector, construction companies in Lebanon, to properly maintain the road sections rehabilitated in the Project in future because the Lebanese potential implementation agencies such as MPWT and municipality have a shortage of human resources for road maintenance at present, which makes them difficult to conduct the proper maintenance work. Furthermore, in case that the support component to the road maintenance by WB is clarified and elaborated and it is judged the necessity of the further support to the road maintenance activity for sustainability of the Project, it is recommended to conduct a study application of another JICA scheme such as technical cooperation project for improvement of road maintenance capacity for the Lebanese entities.

The Preparatory Survey For Road Rehabilitation Sector Loan For Employment Creation

EXECUTIVE SUMMERY

1. INTRODUCTION

1.1 Survey Background

In the Republic of Lebanon (hereinafter referred to as "Lebanon"), the inflow of the displaced Syrians has continued since March 2011 due to the Syrian crisis, and as of the end of December 2016, the number of the refugees reached nearly 1.01 million in the territory of Lebanon. Since the Lebanese government prohibits the establishment of refugee camps for the displaced Syrians, the Lebanese communities have been accepting such displaced Syrians as the host community. The influx of the displaced from Syria, which occupies about one-sixth of the Lebanese population of 5.9 million, has been suffering exhaustion of public services and deterioration of socio-economic infrastructures and causes a heavy economic burden on the Lebanese government. This resulted in the deterioration of the GDP growth from 2.5% in 2013 to 1.3 % in 2015.

87% of the labor productive population of the displaced Syrians, which range between the ages of 15 years old to less than 65 years old, have not completed secondary education. In addition, the Labor Law and regulations of Lebanon limit the employment of foreigners to only construction, agriculture and the cleaning industry. However, since displaced Syrias can mainly get jobs in informal sectors including housekeeping works, construction, wholesale/retail, manufacturing and agriculture sectors, etc., such labor forces result in the excessive situation in the unskilled labor market. As a result, the unemployment rate for the young generation has been rising, which this is one of the factors causing a conflict between the displaced Syrians and the Lebanese host communities.

To respond to the said situation, the Lebanese government formulated “the Lebanon Crisis Response Plan” in December, 2014, and has provided humanitarian assistance to the Syrian displaced. Furthermore, the Lebanese government set up the "Support Meeting on the Syrian Crisis" (London in February 2016) in order to respond to the ever-increasing support demand due to the prolonged Syrian crisis, and the deteriorating socio-economic conditions in Lebanon. The Support Meeting newly formulated a “Five-Year Plan for Employment Creation”, which aims at investing in the infrastructure sector in order to secure economic growth not only by developing infrastructure but also creating employment opportunities for the displaced Syrians and the vulnerable population of the Lebanese host communities. As a specific action of the said Plan, the Lebanese government announced the implementation of a road rehabilitation project for the creation of employment opportunity at the First Steering Committee of the World Bank's MENA (Middle East and North Africa) Initiative Concessional Financing Facility "in July, 2016. The project comprises of the phase-1 stage to be financed by both the World Bank and JICA, which the former, with the utilization of CFF provides USD 200 million, and the latter finances USD 100 million as the “Road Rehabilitation Sector Loan for Employment Creation " to be

financed by Japan International Cooperation Agency (hereinafter "JICA") (hereinafter" the Project "), and the phase-2 stage to be financed by the European Investment Bank (hereinafter "EIB")

Under such circumstances, JICA dispatched the Preparatory Study Team to Lebanon to conduct the necessary study and data collection to formulate the Project.

1.2 Project and Survey Objectives and Outline of the Project

The outline and objectives of the Project and the Survey are as shown in Table S 1.2.1.

Table S 1.2.1 The outline and objectives of the Project

Name of Project	Project for Road Rehabilitation Sector Loan for Employment Creation
Objectives of Project	• Contribute to both the improvement of the access to public services and markets as well as the road network for local residents, which leads to the improvement of their livelihood, by rehabilitating/repairing the deteriorated or damaged roads, and for the improvement of the road surface conditions and traffic safety • Contribute to the improvement of the livelihood of both the displaced Syrians and the vulnerable population of Lebanon by creating job opportunities for them in the Project with application of the work items that can create more employment of labor in road rehabilitation works
Outlines of the Project	• The sub-projects of the multiple sections (20km in length on average per sub-project) with the approximately 500km of the total length are selected for rehabilitation from approximately 6,000 km of the road network under the jurisdiction of MPWT but excluding the international roads. • The Lebanese government requested both JICA and the WB to provide loans for the implementation of the Project and the WB has already approved a loan of US $ 200 million in February 2017. • The sub-project shall be selected based on the criteria of (1) Traffic volume and the necessity of rehabilitation, 2) Effect on employment creation mainly for displaced Syrians, (3) Security situation in the sub-project area, and 4) Area balance of the selected sub-projects • The road rehabilitation works for the sub-projects are expected to include asphalt pavement work, drainage including culvert, base course/sub-base, slope stabilization, installation of retaining walls, and frontage road etc. • The consulting services for the Project shall comprise the design review, tender document preparation and support, construction supervision oversight, strengthening of the financial management capacity of the implementation agency, evaluation / monitoring of the Project, environmental social consideration, etc.
Survey Area	All over Lebanon. However, Japan shall be excluded from the level 4 areas according to the security information by the Ministry of Foreign Affairs.
Executing Agency/ Relevant Organization	Executing Agency： Council for Development and Reconstruction (CDR) Relevant Ministry： Ministry of Public Works and Transportation (MPWT)
Objective of the Survey	• Confirmation of the necessity and outline of the Project. • Formulation of the selection criteria (draft) for the sub-projects and selection of the sub-projects (draft) to be supported by JICA • Preparation of the project costs, project budget plan, project implementation schedule, and implementation methods such as procurement, construction plan and method for each sub-project (draft) to be supported by JICA. • Confirmation of the project implementation structure, operation & maintenance system, monitoring for environmental social consideration of each sub-project.

2. GENERAL UNDERSTANING FOR THE PROJECT

2.1 World Bank Portion

2.1.1 Project Appraisal Documents by WB

According to the Project appraisal documents by WB in January 2017, the Project is to implement the rehabilitation of the total 500km of road network within five years in two phases. Whereas Phase 1 of the Project shall be conducted in the first three years with the budget of US$ 3 million, Phase 2 shall be implemented in the last two years with the remaining budget of US$ 2 million. WB has already approved a loan of US$ 2 million for Phase-1 for the three components shown in Table S 2.1.1, and the remaining USD 1 million is to be financed by other donors.

Table S 2.1.1 Project Components to be implemented by WB finance

Component	Contents of Component	Allocated budget (Mil.US$)	Remarks
1	Road rehabilitation & maintenance	185.0	
2	Improving road emergency response capacity	7.5	Purchase of road vehicles & equipment for snow removal
3	Capacity building & Implementation support	7.5	For Lebanese agency, contractor & workers
	Total	200.0	

Source: Combined Project Information Documents/Integrated Safeguards Datasheet, Roads and Employment Project, WB, Jan. 2017

Component 1: Road Rehabilitation & Maintenance, the appraisal documents stated that the sub-project road sections by the WB finance shall be selected with the criteria of i) road conditions, ii) the level of traffic, iii) balancing roads between regions and communities, iv) balancing of road sections by road class (primary, secondary, tertiary), and v) the labor creation potential and broader socio-economic impacts. In addition to the above, it stressed that the sub-project road sections are non-urban roads from all Lebanese regions, particularly in rural areas and lagging regions, and that the Project targets both the Lebanese and Syrian laborers. Regarding the civil works of the sub-projects, it is expected to include asphalt overlays, drainage works, base and subbase reconstruction, slope stabilization works, retaining works and road side improvements on the sections crossing towns such as sidewalks, and planting trees and it will be implemented with fifteen packages, ranging from US$ 5 to US$15 million each in its value. This component also envisages to be involved in the maintenance activity for the rehabilitated roads by the Project by implementing a pilot project of multi-year routine maintenance contracts with the total budget of US$ 15 million.

Component 2: Improving Road Emergency Response Capacity plans to purchase vehicles and equipment for snow removal for MPWT, including fifteen wheel loaders, ten snow blowers, five salt spreaders and ten four wheel drive vehicles, in order to secure the accessibility in lagging regions where the significant number of the Syrian displaced also stay because the existing vehicles and equipment are outdated with average age of more than twenty years. This component will also assist in revising the existing emergency procedure of MPWT.

Component 3: Capacity Building and Implementation Support aims at not only building the capacity of the Lebanese agencies in planning and management of the road sector but also for contractors and works through

the training for road construction and maintenance techniques and comprises the following five sub-components indicated in Table S 2.1.2.

Table S 2.1.2 Sub-components in Capacity Building & Implementation Support Component

Sub-Component	Name	Budget (Mil US$)	Contents
1	Road asset management	2.0	- to MPWT - Create road asset database and collect the information for the database
2	Traffic Safety planning and implementation	2.0	- to National Road Safety Council - Elaborate a national strategy and action plan for road safety and its implementation
3	Planning & Design Support	2.0	- to CDR - Prepare the planning and design for critical transport projects identified by LOG
4	Training for workers and small contractors	0.5	- to GOL and ILO or other donors - Support training for workers and small contractors for Labor Based Technique
5	Project implementation support	1.0	- to CDR - hiring necessary experts for implementation and monitoring the Project.

Source: Combined Project Information Documents/Integrated Safeguards Datasheet, Roads and Employment Project, WB, Jan. 2017

2.1.2 Observation of the Project Formulation by WB

During the first and the second site visits in Lebanon, the Study Team found the following through a series of discussion with CDR;

- The WB side fully relies on the selection of sub-project road sections to be financed by WB to CDR but has a firm intention to implement the sub-projects in all 25 cazas except Beirut of Lebanon. As of January 2018, CDR proposes 41 subproject road sections with 547.7km in total length in 25 cazas. Regarding the approval of the subproject list for the Project, CDR will submit both sub-project lists to its Board Council after obtaining the official notice of the subproject list for JICA portion from JICA.
- The WB side seems to follow the ad-hoc practice of the employment conditions of foreign labors in the Project, which has been widely tolerated in the construction sector, in terms of the necessity of work permit requested by Lebanese laws and the labor ration between the Lebanese and the foreigners designated in the ministry decision in 2017.
- There has been no detailed discussion on the intensive application of the LBT in the Project between WB and ILO so far and LBT in the road works has not spread in Lebanon because ILO has just started its activity in Lebanon from 2017. Furthermore, WB and ILO think that EBT shall be mainly utilized in the Project.

2.2 European Investment Bank Portion

2.2.1 Present Status

According to the latest information from CDR, the negotiation between CDR and the European Investment Bank (EIB) for Phase-II of the Project is scheduled in January or February in 2018.

3. SELECTION OF SUB PROJECT

3.1 Sub-project Selection Policy, Method and Procedure

3.1.1 Selection Policy, Method, Procedures and Criteria to be Applied

The Project focuses on the rehabilitation of mainly rural roads with the application of the work items that can create more employment for laborers, but not rehabilitation of high standard roads including bridges and tunnels requiring high technology and the quality standard in order to promote employment of both the vulnerable Lebanese and displaced Syrians.

A list of the sub-project roads for the Project shall be formulated with its priority from the candidate sub-project list prepared by CDR by comprehensively assessing the candidates with the application of the following criteria agreed between JICA and CDR, (i) Security level, (ii) Necessity of road rehabilitation, and (iii) Benefits to both Lebanese and Syrian people. The sub-project road list formulated above shall be finalized by picking the sub-projects from the top up to one until the accumulated road rehabilitation costs for sub-projects reaches approximately USD 107 million. After that, the final list shall be checked from the viewpoint of the area balance and if necessary, the sub-project list shall be adjusted on the basis of discussion with CDR.

(1) Security Level

- The sub-projects to be funded by JICA are not located in the areas of Lebanon which are classified at level 4, which indicates "Evacuate and Avoid all Travels" by the Ministry of Foreign Affairs in Japan.

(2) Necessity of Road Rehabilitation

- Importance on the road network measured by traffic volume
- Importance on the local road network measured by the access to important place(e.g. caza center)
- Road pavement damage level as the result of iRAP Pavement Damage Rating
- Road safety level in accordance to iRAP Star Rating

(3) Benefits to Lebanese and the displaced Syrians

- Existence of the work items enabling high employment creation
- Population of the vulnerable Lebanese people living near the sub-project and the population of displaced Syrians displaced living near the sub-project
- Population in the cazas where the sub-projects are located

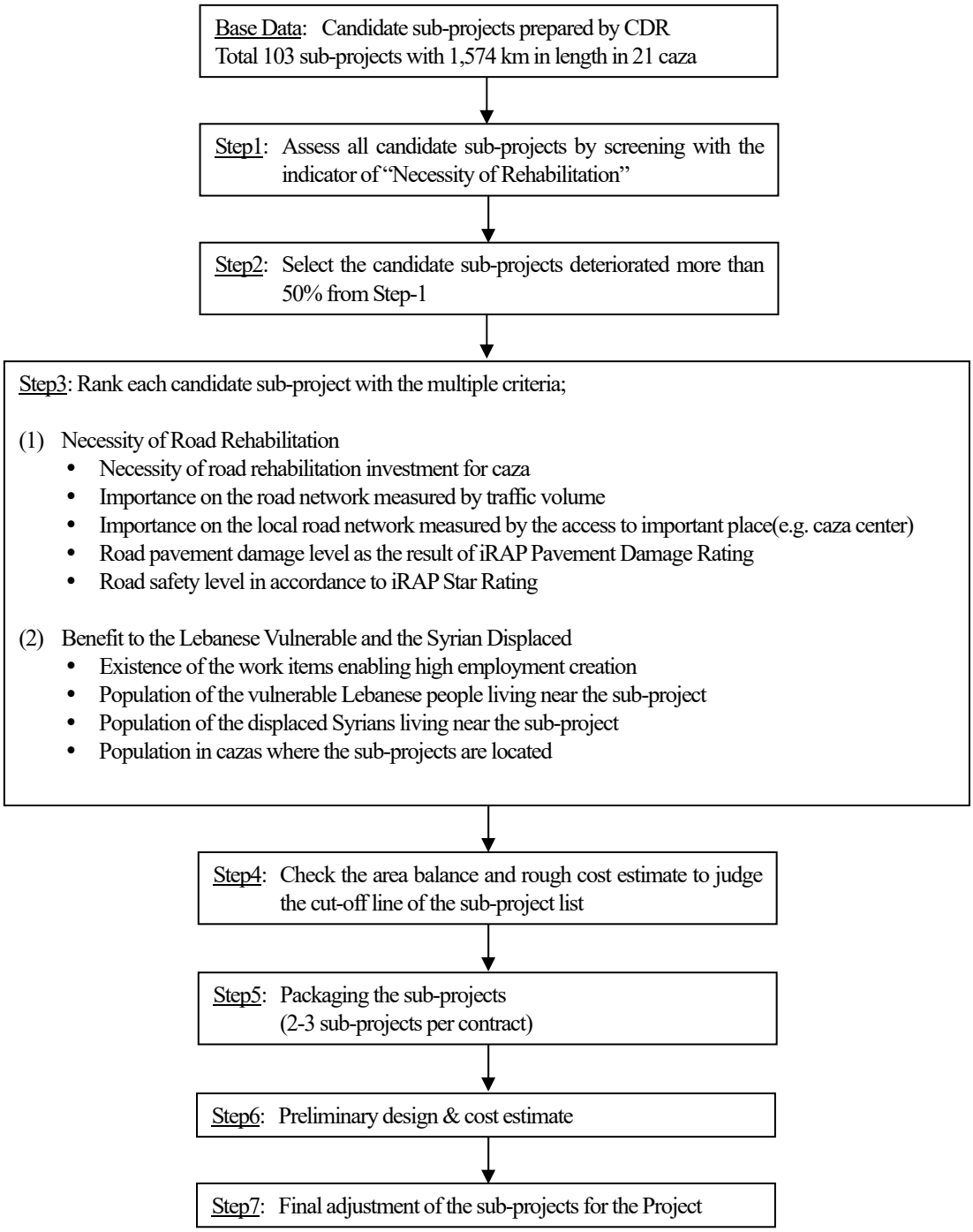


Figure S 3.1.1 Sub-project Selection Method and Procedure

Table S 3.1.1 and Figure S 3.1.2 shows the sub-project list for the Project.

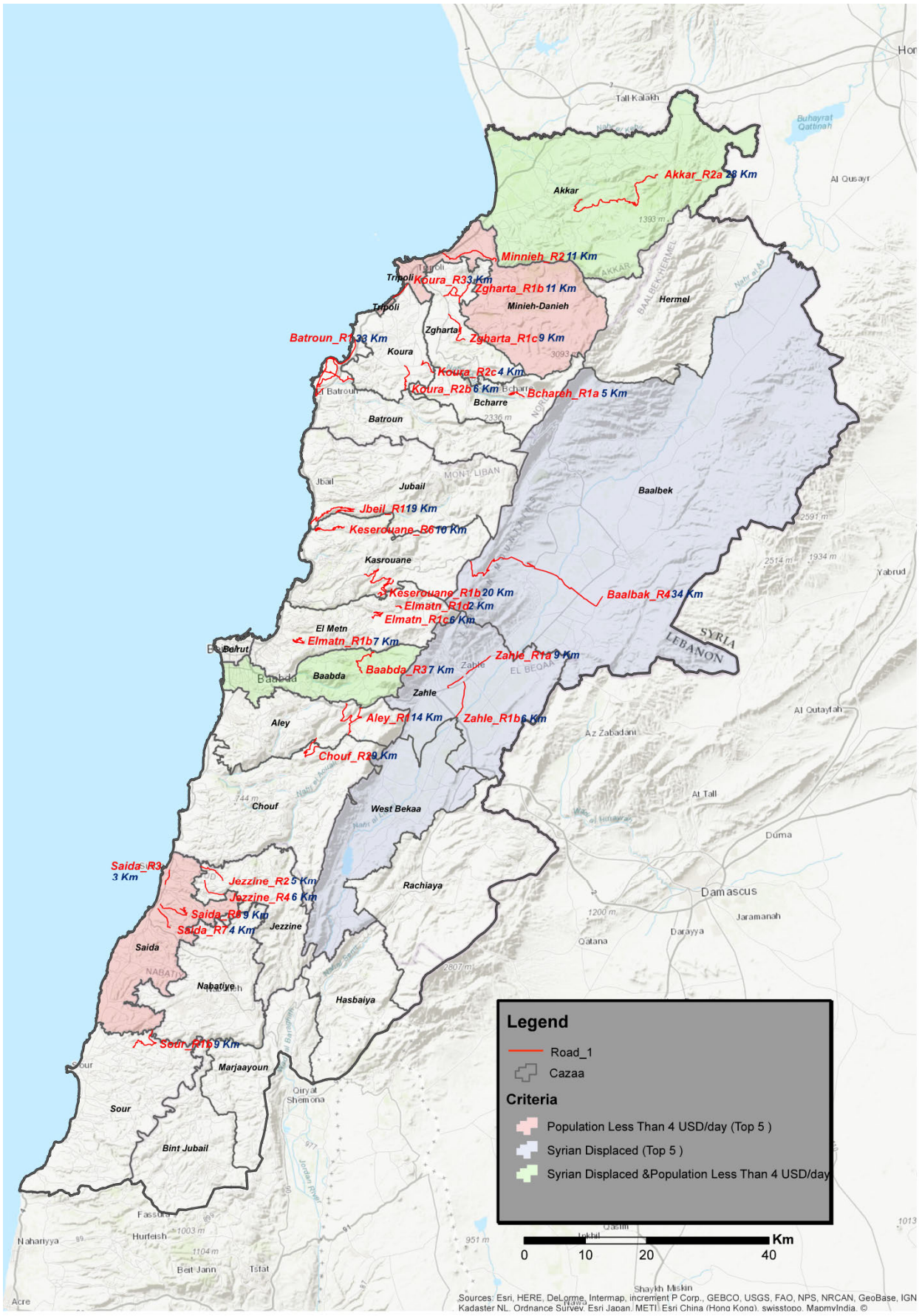


Figure S 3.1.2 Location Map for Sub-projects Selected

Table S 3.1.1 Sub-project List selected

NO.	Name	caza_na	Total length
1	Saida_7	Saida	3.1
1-2	Saida_7add	Saida	1.2
2	Saida_3	Saida	2.8
3	Akkar_2a	Akkar	28.0
4	Zahle_1b	Zahle	6.3
5	Zahle_1a	Zahle	8.7
6	Baalbek_4	Baalbek	33.7
7	Baabda_3	Baabda	7.4
8	Saida_6	Saida	8.6
9	Koura_3	Koura	3.5
10	Sour_1b	Sour	9.5
11	Koura_2b	Koura	5.6
12	El Metn_1c	El Metn	6.0
13	Koura_2c	Koura	4.1
14	El Metn_1d	El Metn	2.0
15	Jbail_1	Jbail	18.6
16	Bcharre_1a	Bcharre	5.2
17	Batroun_1	Batroun	32.8
18	Minie-Danniye_2	Minie-Danniye	11.5
19	Jezzine_2	Jezzine	5.1
20	Jezzine_4	Jezzine	6.0
21	Zgharta_1c	Zgharta	8.9
22	El Metn_1b	El Metn	6.7
23	Kesrouane_6	Kesrouane	9.9
24	Zgharta_1b	Zgharta	10.9
25	Kesrouane_1b	Kesrouane	20.1
26	Chouf_2	Chouf	8.6
27	Aley_1	Aley	14.3
Total			**289.1**

Source: JICA Study Team

4. PRELIMINARY DESIGN FOR SUB-PROJECTS

4.1 Basic Policies for Road Rehabilitation for Preliminary Design

The basic policies for the road rehabilitation works for the sub-project are indicated in Table S 4.1.1 as a result of consultation with CDR

Table S 4.1.1 Basic Policies for Road Rehabilitation

Design Item	Basic policy
Alignment	Application of horizontal alignment according to the design speed as defined by AASHTO will require a lot of land acquisition outside of the ROW and compensation. Therefore, there is no change of the current road center for the sub-project. However, road safety measures shall be taken at the places where the horizontal and vertical alignment does not satisfy the AASHTOs requirements. Accordingly, no land acquisition and compensation shall occur.
Pavement	Pavement work shall be required for the road sections with a rate of 3-5 of iRAP pavement rating. However, since the CBR test and future traffic volume calculation are not planned in the Study, the typical pavement thickness and structure shall be proposed considering traffic volume level and general the road bed condition in the sub-project areas.
Drainage Facilities	There is no change of the practice of the current drainage system in the urban areas. In the hilly and mountainous sections of the rural areas, if space is available, drainage facilities, concrete drainage channels, shall be installed at the road's mountain side. The transverse drain pipe culvert (φ 600) will be installed every 1 km .
Retaining Wall	・ The type of the retaining wall shall be with stone masonry, which is applicable LBT to the installation works. ・ The retaining walls at the mountain side shall be installed considering the topographical condition. ・ The retaining wall at the valley side shall be considered 5% of the total road section length due to the difficulty in judgement by video observation.
Road Safety Measures	・ Installation of regulatory/warning signs. ・ Installation of a curved mirror at sharp corners ・ Lane guidance by road marking ・ Installation of humps at the entrance of the towns and villages. (in secondary roads and local roads only) ・ Installation of a concrete barrier or guard rail along the cliff side in the mountain area.
Concrete Barrier	・ The Concrete Barrier will be installed 35% total length of the route due to the difficulty in judgement of height difference by video observation

5. PROMOTION OF LABOR EMPLOYMENT IN THE PROJECT

5.1 Legal Requirements for Syrians Working in Lebanon

The legal framework on the participation of Syrians in the Lebanese labor market is complex and somehow ambiguous. This is because, as has been mentioned in the previous section, applicable regulations cover a wide range of topics, and the decisions are newly issued and amended on frequent basis with relatively weak enforcement. The Lebanese Labor Law stipulates the principle of prioritization of Lebanese nationals to foreign workers in filling job vacancies, and this principal is embodied in various Ministerial decisions. Yet, foreigners can legally work in Lebanon in conformity with the Lebanese laws and regulations. Working formally in Lebanon, Syrians are requested to obtain work permits with the residence permits.

5.1.1 Residence Permits

(1) Entry Permits

Entering into the country, Syrians, same as any other foreigners, are required to obtain residence permits to stay in the country. Syrians are granted tentative residence permit good for six months when they enter into

Lebanon. However, the actual residence policy has been frequently changed over a few years.

In 2014, the General Security Office announced that Syrians need to present the reasons when they enter Lebanon. According to the announcement, Syrians can legally enter Lebanon for any one of the following reasons: tourism, work visit, trade, owning or leasing property, study, travel, health treatment, or embassy consultation. If none of these reasons applies, they need a Lebanese sponsor (October 2014, General Security).

The General Security Office published a more detailed directive introducing additional categories of people who might be entitled to an entry permit, among these holders of a residential rental agreement; holders of Lebanese residence permits and their family members; spouses of Lebanese nationals; children of Lebanese women; wives of Palestinian refugees registered in Lebanon; holders of residence permits in another Arab or foreign country; and diplomats (January 24, 2015, General Security).

From January 2015 to June 2016, the General Security Office announced that Syrians were required to pledge 'not to work' in order to obtain/ renew residence permits. Donors were affected by this announcement, as it indicated that Syrians who obtained UNHCR registration certificate could not be engaged in any economic activities in Lebanon. The announcement was lifted in 2016. Currently, GSO announces Syrians who entered into Lebanon should pledge to abide by Lebanese laws and regulations.

(2) Renewal of Residence Permits

Regarding the fees for the registration and renewal of residence permits, Syrians were entitled to have residence permits at 300,000 Lebanese Pounds (200 USD) renewable on yearly basis. At the beginning of 2017, however, the residency permit fee was lifted. Residency will be provided free of charge and be renewable to refugees holding UNHCR certificates or otherwise registered with UNHCR. This is not applicable to displaced Syrians under other categories such as those who are under the sponsorship of Lebanese citizens[1].

Displaced Syrian people have two options to obtain and renew residence permits; the first option is to get Lebanese sponsorship and the second option is to get residence permits by UNHCR certificates. However, as the Lebanese Government requested UNHCR to suspend the registration of refugees apart from the renewal and registration of new-born Syrian babies born in Lebanon since May 2015, those who are not registered to UNHCR should get residence permits only with Lebanese sponsorship.

Recent changes on the work permits policy are favorable for Syrians. The General Security amended the visa regulations for Syrian nationals in Lebanon by easing the process of renewal for work-related sponsorships, a General Security statement said. Until Dec. 31, under the new regulations, Syrians in Lebanon on work visas will have the option to transfer their sponsorships from one sponsor to another from within the country, as long as their current sponsor agrees to the change. In the past, Syrian laborers could only move from one employer to the next after departing Lebanese territory and returning under a new sponsorship. This change is welcomed by the Syrians, since they will not have to go back to Syria for dangerous journey when renewing work visas[2].

[1] ILO 'Towards the right to work: A guidebook for designing innovative Public Employment Programs', 2017, p. 15
[2] The Daily Star 'General Security eases permit rules for Syrians', Sep 13, 2017.

5.1.2 Work Permit

Irrespective that their status are economic migrants, UNHCR registered displaced or unregistered displaced people, Syrians are required to obtain work permits when they work in Lebanon.

Based on the Bilateral Agreement between the government of the Syrian Arab Republic and the government of the Lebanese Republic regarding employment of their nationals in the other country, some construction companies obtain seasonal work cards for their Syrian migrant workers with the following procedure. Syrian workers send photo copies of IDs to a sponsoring company during their stay in Syria. The sponsoring company submits the copy of the workers' ID and required documents (e.g. legal paper of the company) to General Security Office to get the registration number for the Syrians. Syrian workers go to the Syrian Authority to obtain an exit card (yellow card) by presenting the registration number sent by the sponsoring company. Syrian workers go to the joint office and obtain a white card to enter Lebanon. Syrian workers go to the General Security with the ID of the workers and registered number. The General Security approves their stay in Lebanon and issues a red card. Syrian workers are required to keep their ID, yellow card, white card, and red card in Lebanon[3].

Syrians, whether they are economic migrants or Syrian displaced people, can work in the agriculture, construction and environment (mostly cleaning) sectors in line with Lebanese laws and regulations, as long as they obtain work permits. However, there are cases where work permits are not granted in case the Minister judges there is severe job competition between Lebanese and Syrians[4].

In order to obtain work permit, legally required documents for Syrians to apply for work permits are as follows.

Table S 5.1.1 List of Required Documents for Application of Work Permits

Required Documents for Work Permits	
Employment contract certified form public notary stipulating salary, period of employment, type of work- all in line with Lebanese law	National Security Social Fund registry record.
A copy of exit permit issued at the Syrian borders while exiting Syria;	Medical laboratory results showing the individual does not have Tuberculosis, Malaria, Syphilis, Aids, Hepatitis B
A copy of entry card issued by GSO while entering Lebanon	Proof of completion of military service
Certificate from the Syrian Embassy confirming the authenticity of the documents provided by the applicant;	Insurance policy; commercial license & commercial registry
A copy of ID or passport and 2 photos	Copy of ID of company owner; employment registry record

Source: UN Interagency Coordination

In practice, contractors in the construction sector provide rather simpler requirements. According to a contractor, they submitted application documents (two passport photos, identity card or passport, return card/guarantee card, residency commitment, photocopy of ID of owner, and rent bond) to the General Security Office[5].

Some qualified five star contractors ensure their Syrian workers to obtain work permits as compliance matters. Yet, it might also be true that significant numbers of Syrians are estimated to work without work permits in Lebanon. It can be inferred from the situation that approximately 1,500 work permits are issued by the

[3] Minutes of Meeting with Council for Reconciliation and Development (November 4th, 2017)
[4] Minutes of Meeting with the Ministry of Labor, August 22, 2017.
[5] Minutes of Meeting with a Contractor, August 24 2017.

Ministry of Labor on yearly basis, while approximately 400, 000 Syrian working population are in the country[6]. The tables below show number of new and renewed work permits in 2016 issued by the Ministry of Labor.

Table S 5.1.2 Number of New Work Permits Issued for Foreign Workers (Syrians) (2016)

	Category 1	Category 2	Category 3	Category 4	
Owner	23	0	0	0	23
Cleaning company	0	0	45	0	45
Construction workers	0	0	75	0	75
Washing	0	0	15	0	15
Agriculture	0	0	3	0	3
Housecleaning	0	0	1	0	1
Female Housekeeping	0	0	2	0	2
Others	12	11	20	0	43
	35	11	161	0	207

*1 Category 1 includes business owners of institution with a capital above 50 million LBP, or an industry with more than ten employees, or a touristic corporation with more than five employees. Also includes an employee with a salary more than three times the minimum wage.

*2 Category 2: includes business owners not mentioned in category 1 and employees with a salary more than two times but less than three times the minimum wage.

*3 Category 3: includes employees with a salary ranging between the minimum wage and two times the minimum wage.

Source: Ministry of Labor

Table S 5.1.3 Number of Renewed Work Permits Issued for Foreign Workers (Syrians) (2016)

	Category 1	Category 2	Category 3	Category 4	
Owner	62	0	0	0	62
Cleaning company	0	0	300	0	300
Construction workers	0	0	416	0	416
Agriculture works	0	0	141	0	141
Washing works	0	0	14	0	14
Housekeeping (Male)	0	0	19	0	19
Housecleaning works	0	0	16	0	16
Housekeeping (Female)	0	0	41	9	50
Principal	6	0	0	0	6
Others	63	55	124	0	242
Concierge	0	0	95	0	95
	131	55	1,166	9	1,361

Source: Ministry of Labor

The cost of a work permit for foreign workers in Lebanon is dependent on the work category under which it falls. Syrians benefit from reduced fees, which are 75% lower than the standard work permit fees. Syrian labor in agriculture, construction and environment sectors usually falls in three work permits categories, which require them to pay 120,000 LBP (80 USD).

Table S 5.1.4 Work Permit Fees for Foreign Workers and Syrians for Each Category

Category		Standard Fee	Reduced Fee for Syrians
Category 1	high salaries*1	1,800,000 LBP(1,200USD)	450,000 LBP(300USD)
Category 2	medium salaries *2	960,000 LBP(640USD)	240,000 LBP(160USD)
Category 3	low salaries*3	480,000 LBP(320USD)	120,000 LBP(80USD)

Source: Interview with UNHCR

[6] Minutes of Meeting with ILO on August 22, 2017.

All Syrians, whether they are Syrian economic migrants and displaced people, are required to obtain work permits. Eight regional directorates of Ministry of Labor are established at the Governorate (Mouhafaza) level. The Ministry of Labor has the Department of Syrian Labor Affairs under the Department of human resources.

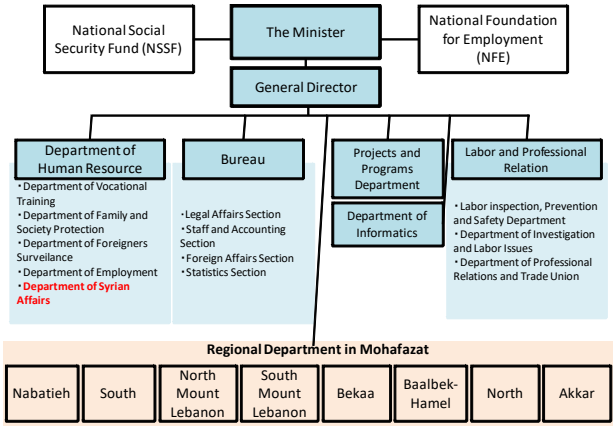


Figure S 5.1.1 Organigram of Ministry of Labor

There might be push and pull factors for limited numbers of issuance of work permits. In the first place, preparing documents for application of the work permits is not an easy task. Some key informants are concerned that Syrians are not willing to go and get the documents from the Syrian Embassy. Also, although Syrians are exempted from a deposit of 1,500,000 LBP (1,000 USD) with the Housing Bank, the cost to obtain work permits are one of the issues Syrians might face. Moreover, there are limited numbers of regional offices where workers have access to obtain work permits. Finally, it depends on the Minister of the Ministry of Labor who finally sign the permissions if applicants obtain work permits, due to lack of job opportunities and job competition between vulnerable Lebanese and Syrians.

Under such circumstance, ILO has been attempted to facilitate the procedure to obtain work permits by simplifying documents and decreasing the cost with the Ministry of Labor. As a result, Ministerial decision 1/299 was signed on November 2, 2017. Under the decision, the Ministry of Labor will issue three-month special work permits for Syrian workers working for a specific program (ILO Employment Intensive Investment Program: EIIP). This decision is applicable for the Syrian workers, including Syrian displaced people. Syrian workers are required to submit a personal ID (ID, Passport, Registry extract, UNHCR Card) and the medical report. On the other hand, sponsored companies are required to submit a temporary Employment contract for three months, a collective insurance policy, a document which proves the contract with the ILO under EIIP Lebanon, a commercial circular for the contracting companies, a power of attorney (if applicable). Syrian workers do not need to obtain a yellow and white card or a certificate that the Syrian Embassy has confirmed the authenticity of documents for the application, those of which are normally required to be obtained in order to apply for ordinary work permits. In addition, though it is compulsory for Syrian workers who reside in Lebanon to acquire and possess residence permits, the application for the special work permits of three-month in itself does not require Syrians to submit the residence permits. Syrian workers are to pay 120,000LBP (80USD) for the application for the work permits as well as that for Category 3 of ordinary work permits. ILO is promoting short-term job creation and decent work for Syrian workers including displaced Syrian people through implementation of EIIP and look for a stepping stone for longer term solution.

5.1.3 Ratio of Foreign Workers against Lebanese Workers

Lebanese Labor Law articulates the principle of preference of national workers over foreign workers. Yet, it allows foreign workers employment in the sectors which traditionally depend on foreign workers including

agriculture, construction and domestic work. Ministerial decision 1/49 article four sets out the recruitment ratio should keep one foreign workers against ten Lebanese workers. At the same time, it sets the exceptions on the cleaning and construction sectors, that the employers can employ one foreigner per three Lebanese and one foreign worker per one Lebanese worker respectively.

Although the Ministry of Labor clearly show its positions through decisions, the regulation on recruitment policies might not be strictly followed on the ground. This is because, in the first place, the decisions have been amended so frequently that they might not be fully announced. As a result, stakeholders do not follow the changes. In fact, some contractors do not grasp the decisions and inspections are sometimes being executed on work sites. Secondly, it is sometime perceived that the decisions do not reflect the real situation in the labor market. As for the construction sector, Lebanese contractors highly depends on Syrians for unskilled labor and substituting them for national unskilled workers are not feasible. In reality, approximately 70% to 90% of the workers are occupied by foreign workers, especially in the construction sector.

Article 6 of decision 1/49 therefore regulates the inspection by the Ministry of Labor. Article 6 has a dual meaning; on the one hand, those who violate the decision can be fined by the inspectors of the Ministry of Labor in regular inspections. Inspectors of the Ministry of Labor have been conducting monitoring activities on an ad hoc basis. The frequency of the work site inspections varies according to the political and economic situations, regions and the nature of companies. For instance, previous Ministers ordered frequent on-site inspections due to the serious influence of the Syrian Crisis, whereas the officers go to monitoring activities from few times a week to once a few months under the current Minister, due to the limited numbers of inspectors[7]. Also, according to the contractors in construction sector, the frequency of inspection varies according to the projects, possibly because of the numbers of foreign workers in the work sites. If employers violate it, they can be charged 250,000LBP (167 USD).

On the other hand, article 6 of decision 1/41 indicates the decision can be modified yearly when the Minister issue a new one in line with the reality of work site based on the reports of inspectors. In fact, there is no effective measure to be taken to adjust the number of workers in the construction sector where employers highly depend on Syrians. Donors are required to keep the accountability of the employment process of unskilled labors by announcing job opportunities to the host communities as well as to Syrians, for the purpose of creating jobs for the vulnerable Lebanese as well[8].

5.2 Present Employment Conditions for Syrian People

5.2.1 Condition of Formal Employment for Syrian Workers

The table below summarizes required documents and condition for formal employment of Syrian workers according to the legal status of Syrian workers (Syrian Nationals/ Economic Migrant, UNHCR Registered Refugees and others including (A) Syrians who stayed and worked in Lebanon before the Syrian Crisis and (B) displaced Syrians who fled from Syria after the suspension of the registration of refugees (May 2015).

[7] Minutes of Meeting with the Ministry of Labor on August 22, 2017.
[8] Minutes of Meeting with ILO on August 22, 2017.

Table S 5.2.1 Summary of Required Documents and Condition for Formal Employment of Syrians

	Residence Permit	Work Permit	Work	Working Environment	Challenges
(1) Syrian Nationals/ Economic Migrant	**Required** Syrians are granted tentative residence permit good for six months when they enter Lebanon. Applicants pay 300,000 LBP (USD 200) in order to renew them. Syrians can obtain residence permits if they have Lebanese sponsors (natural person or companies)	**Required** The cost of third category work permit is 20,000 LBP (60 USD), whose cost is one third of foreigners. Work permits can be extended to a maximum three years.	**Accepted to work** Syrian economic migrants are granted within the jurisdiction of Decision 1/41	(Formal labor) applicable to (1) (2) (3) The wage of unskilled labor is some 18-20USD. Semi-skilled labor earns 25~28USD, and the daily wage of construction supervisor can exceed 35~40USD. Working days are six days a week and working hours is eight hours per day. Subscription of workmen compensation is required in the contract. Workers take leave on official holidays. Employers pay for extra charge for extra working hours. Extra work requires approval. Child labor is prohibited.	Local stakeholders (Ministry of Labor and contractors) and donors (ILO, UNDP and UNHCR) have different perspectives on the accessibility of documents for work permits.
(2) UNHCR Registered Displaced People	**Required** Syrian registered displaced people can obtain residence work permits if they have (1) UNHCR certificates or (2) Lebanese sponsors (natural person or companies) Renewal fee is lifted for Syrian registered refugees.	**Required** The cost of third category work permit is 20,000 LBP (60 USD), whose cost is one third of foreigners. Minister of the Ministry of Labor can reserve approval of work permits when there is strong job competition in the certain sectors.	**Accepted to work** Syrian registered displaced people are granted within the jurisdiction of Decision 1/41 They can receive necessary assistance from UN agencies at the same time they are employed.		Local stakeholders (Ministry of Labor and contractors) and donors (ILO, UNDP and UNHCR) have different perspectives on the accessibility of documents for work permits. There is a possibility that those who have terminated the contract with a company cannot renew their work permits with the UNHCR certificate; instead they need to get work visa through sponsorship.
(3) Others **(A) Syrians who stayed and worked in Lebanon before Syrian Crisis** **(B) Displaced Syrians who fled from Syria after the suspension of the registration of refugees (May 2015)**	**Required** Syrians can obtain residence permits if they have Lebanese sponsors (natural person or companies)	**Required** The cost of a third category work permit is 20,000 LBP (60 USD), whose cost is one third of foreigners. Minister of the Ministry of Labor can reserve approval of work permits when there is strong job competition in certain sectors.	**Accepted to work** Syrian economic migrants are granted within the jurisdiction of Decision 1/41 They can receive necessary assistance from UN agencies as long as they report UNHCR at the same time they are employed.	(Informal Labor) Wage of the Syrian labor force is cheaper than that of Lebanese workers. Most Syrian informal labors are not covered by any of the insurance. They tend to work longer hours in hazardous working conditions.	It might be more difficult for Syrians under this category to work in the formal setting than other categories, as they need to find sponsors to obtain work permits.

5.3 World Bank Policy for the Project

In terms of the employment creation of the vulnerable Lebanese and Syrians, The World Bank follows Lebanese laws and regulations. Yet, it does not set any further conditions regarding the working conditions of them at this moment. Currently, the World Bank is planning to record workers' names, nationalities (Syrian, Lebanese or others), place of residence, gender, person with disability, occupation, year of birth and total workdays.

5.4 Findings and Recommendations on Employment Conditions of Labors for the Projects

5.4.1 Findings on the Employment Condition of Labors for the Project

(1) Regular Changes on Lebanese Policies and Regulations towards Labor Issues

Due to the changing realities of the Syrian Crisis and the influx of displaced Syrians, labor regulations have been altered in response to the Government's policy towards Syrian labor. Ministerial decisions can be either tightened or eased after their inspection or monitoring of the actual situation on the labor markets probably on yearly basis. It is advisable to check up-to-date labor related decisions and consult with the relevant agencies on a regular basis.

(2) UNHCR Registered Refugees and Work Permits

The Study found that UNHCR does not prevent any of the displaced Syrian people who get any assistance from UN agencies from working with work permits. In other words, they acknowledge that getting work permits itself does not affect the status of 'Syrian refugees' whether they are registered or not. However, it can be risky for short-term workers who need to renew their residence permits in a few months. Those Syrians who used to obtain work permit with UNHCR certificates might be required to renew the residence permits under sponsorship.

5.4.2 Recommendation on the Employment Condition for the Project

(1) Target of Employment Creation and Beneficiaries of the Project

Potential targets of the Project, in terms of employment creation, could be vulnerable Lebanese who live under 4 USD per day; and Syrians who are affected by the Syrian Crisis. However, it might be difficult to specifically target these categories of workers. As for unskilled labor, the Project will employ Lebanese and Syrians who are competent in construction work. However, given that UNHCR has the list of registered displaced Syrian people, the Project can possibly utilize the list to encourage them to work for the Project. However, since UNHCR has not been intently focusing on employment creation for Syrian displaced, the Project needs to continuously discuss and seek the plausible way of generating the Syrian employment with UNHCR.

It is worthwhile noting that there are significant numbers of displaced people of other nationalities, namely Iraqi, Palestinians, and Somali, etc., who could be possibly targets of the Project.

Regarding the beneficiaries, the Project should consider how women can benefit from the road rehabilitation sub-projects, given that the employment opportunities for women, at this moment, are considered to be minimal.

(2) Working Permits on Project Basis

As has been mentioned in the previous section, ILO, in cooperation with the Ministry of Labor, has introduced simplified work permits to facilitate formal employment under Employment Intensive Investment Program (EIIP). The Ministry of Labor has signed Decision 1/299, which enables Syrian workers under the Program to obtain special work permits with a shorter time span. For several sub-projects under EIIP, the trail application for the special work permits is currently under process. This decision can also assist other donors' projects in obtaining special work permits, if they develop a partnership with ILO. This Study recommends the coming Project to closely communicate with ILO to clear work permit issues.

(3) Monitoring Items

One of the objectives is to improve the livelihood of both the vulnerable Lebanese and the displaced Syrians by creating job opportunities in construction sector. Hence, the Project should monitor the short-term employment created by these sub-projects.

The World Bank is planning to record workers' names, nationalities (Syrian, Lebanese or others), place of residence, gender, person with disability, occupation, year of birth and total workdays. Yet, the Bank will not evaluate the number of employed displaced Syrians. If the Project aims at creating employment for the displaced Syrians as well, it should be either precluded in the monitoring sheet as a parameter.

Table S 5.4.1 List of Monitoring Items

Items	Verifiable Indicators	Types of Requirements	Means of Verification
Employment Creation	Numbers of Lebanese employed by the Project	Requirement	Monitoring sheet
	Numbers of Syrian employed by the Project	Requirement	Monitoring sheet
	Numbers of Syrian displaced employed by the Project	Recommendation	Monitoring sheet
Prohibition of child labor	Age of employment	Requirement	Monitoring sheet
Minimum Wage	Daily wage for the workers	Recommendation	Monitoring report from the contractor

As for the promotion of occupational health and safety, the Study recommends to include the articles on general safety and workmanship compensation in the general contract with the contractors of the Project. Regarding the possession of work permits, the Study recommends to cooperate with the Ministry of Labor and ILO to find a measure how to create employment in line with Lebanese laws.

6. CONSTRUCTION PLAN AND PROCUREMENT PLAN

6.1 Applicability of Labor Based Technology in Lebanon

6.1.1 Considerable construction items of applicability to LBT

The basic policies of the road rehabilitation for the Project, which was shown in Table S 4.1.1, are as follows:

a) the horizontal and vertical alignment follows the existing and any improvement shall not be made

b) the construction shall be done within the existing Right of Way and extra land procurement or demolition for the rehabilitation shall not be made

From this, it is considered that road rehabilitation work includes the following construction items.

Table S 6.1.1 Considered construction items from the basic policy of the rehabilitation work

Field	Construction Items	Specification
Pavement (Carriageway)	Overlay Reconstruction from the Subgrade or Base Course	bituminous wearing course bituminous binder and wearing course
Sidewalk	Interlocking Pavement	
Drainage	U-Shape Ditch Riprapped Ditch Pipe Culvert	B500 x H500 B500 x H500 D200 to D1200
Structure	Retaining Wall Masonry Wall Gabion Wall	H=1.0m x W=0.3m H=2.0m x W=0.5m
Slope	Slope Protection	H=2.0m x W=0.3m, Riprapped Protection
Safety Facilities	Reflective Road Studs Steel Guardrails Small Sign Road marking New Jersey Block Arrow Painting LED Lighting	

Since there is no experience applying LBT in the construction work, the applicability of LBT for each item shall be examined as shown in the next table.

Table S 6.1.2 Applicability of LBT by construction items

Item1	Item2	Construction Method	Applicability of LBT	Evaluation
Pavement	Overlay (Wearing Course)	Spraying tack coat and spreading pre-mix asphalt and compaction shall be done by machinery.	Since all construction work shall be done by machinery, applicability of LBT is very low.	Not Applicable
	Base Course	Trucks to haul materials and motor grader to spread material shall be used.	Use of machinery shall be the general method of the construction and hence applicability of LBT is very low.	Not Applicable
	Bituminous Layer (Wearing Course & Binder Course)	Finisher and macadam roller is considered to be used throughout construction due to scale of quantity.	Use of machinery shall be the general method of the construction and hence applicability of LBT is very low.	Not Applicable
	Interlocking pavement	Spreading base course is considered to be done by labor due to the narrow width of the construction area. Laying interlocking blocks should also carried out manually, however, difficult for unskilled laborers.	Although this item is operated manually, it is difficult for unskilled laborers. Hence, it is considered that the applicability of LBT is very low.	Not Applicable
Drainage	U-Shape Ditch (B500 x H500)	Bar arrangement and concrete form is carried out manually, however, these tasks should be done by skiledl laborers.	Bar arrangement and forming concrete panels are done by skilled laborers and hence the applicability of LBT is very low.	Not Applicable
	Riprapped Ditch (B500 x H500)	Excavation of soil is available with both machinery and manually. Placing stones on the wall shall be done manually.	Excavation of soil could be carried out by unskilled laborers, and placing stones with mortar as well.	**Applicable**
	Pipe Culvert (D200 to D1200)	Bar arrangement and placing concrete forms are done by manually. The concrete shall be procured from the nearby plant.	Bar arrangement and forming concrete panels are done by skilled laborers. Other work shall be done by machinery. Hence, the applicability of LBT is very low.	Not Applicable
Structure	Reinforced concrete wall (H1.0m, W0.3m)	Bar arrangement and placing concrete forms are done by manually. The concrete shall be procured from the nearby plant.	Bar arrangement and forming concrete panels are done by skilled laborers. Other works shall be done by machinery. Hence, the applicability of LBT is very low.	Not Applicable
	Masonry wall (H2.0m, W0.3m)	Hauling materials should be made by small trucks and offloading material and masonry work shall be done manually.	Since most of the works except haulage shall be done by laborers this item has a high expectation applying LBT.	**Applicable**
	Gabion wall (H=1.0m, W=2m)	Placing stones in the wire cage shall be done manually. Other works such as excavation shall be done by machinery.	Since the stones in the wire cage shall be placed nicely to grab each other, this task needs to be done manually. So, high applicability of LBT is expected.	**Applicable**
Slope	Slope Protection	Hauling stones shall be done by small trucks, and offloading materials and placing riprapped stones shall be done manually.	Laborers in Lebanon have experience in this task and hence a high applicability of LBT shall be expected.	**Applicable**
Safety Facilities	Reflective Road Studs	Construction of such safety facilities shall be done by skilled technicians with special equipment	Since intensive training and experience with operation of is equipment required, expectation of using LBT in this item is very low.	Not Applicable
	Steel Guardrails			
	Small Sign			
	Road marking			
	New Jersey Block			
	Arrow Painting			
	LED Lighting			

As shown in the table above, a high applicability of LBT can be observed in "Riprapped Ditch", "Masonry Wall", "Gabion Wall" and "Slope Protection". Further consideration shall be attempted by comparing between both Labor based Technology (LBT) and Equipment based Technology (EBT) in these items to observe benefit.

6.1.2 Comparison between Labor based technology (LBT) and Equipment Based Technology (EBT)

Comparison between LBT and EBT in the following three criteria for the four construction items chosen above shall be attempted. The numbers/values calculated in these criteria shall be given according to the norms of the Japanese Standards. The calculation shall be for one km and in one party as well for comparison.

a) Construction Cost
b) Working Days
c) Number of laborers can be hired

The following table gives the result of the comparison between LBT and EBT by each construction items.

Table S 6.1.3 Comparison of Labour based and Machinery based Technology

Items			LBT(A)	EBT(B)	(A)/(B)
Riprapped Ditch (B500 x H500)	Construction Cost	US$/km	53,877	31,179	173%
	Working Days	Days/km	158	77	205%
	Number of Hired Laborers	No./km	1,544	506	305%
Masonry Wall (H=2.0m, W=0.3m)	Construction Cost	US$/km	73,461	52,662	139%
	Working Days	Days/km	170	91	187%
	Number of Hired Laborers	No./km	1,700	903	188%
Gabion Wall (H=1.0m, W=2.0m)	Construction Cost	US$/km	42,563	29,387	145%
	Working Days	Days/km	83	58	143%
	Number of Hired Laborers	No./km	825	625	132%
Slope Protection (H=1.0m. W=0.3m)	Construction Cost	US$/km	53,277	35,041	152%
	Working Days	Days/km	139	78	178%
	Number of Hired Laborers	No./km	1,388	638	218%

The applicability of LBT shall be evaluated from the following perspective.

a) The difference between LBT and EBT on construction cost shall be small

Since the labor wage is higher than other countries where LBT is applied widely, generally the construction cost of LBT is higher than EBT. Hence, "difference between LBT and EBT on construction cost shall be small" means the construction cost will not be affected even when LBT is applied.

b) The difference between LBT and EBT on Construction Period shall be small

Generally, the construction speed of LBT is slower than that of EBT. Hence, "difference between LBT and EBT on Construction Period shall be small" means the construction speed will not be affected even when LBT is applied, and that means there will not be much difference on the total cost as well.

c) The difference between LBT and EBT on the number of hired laborers shall be large

Increase of employment opportunity is one of the highest expectations from the LBT method. Hence, "difference between LBT and EBT on the number of hired laborers shall be large" means a larger number of laborers will be hired when LBT is applied.

From Table S 6.1.3, the ranking of each criteria shall be given in the following table.

Table S 6.1.4 Ranking by each evaluation criteria

Item	Evaluation	1st (3 points)	2nd (2 Points)	3rd (1 Point)
Construction Cost	Lower percentage is superior	Masonry Wall (128%)	Gabion Wall (145%)	Slope Protection (152%)
Working Days	Lower percentage is superior	Gabion Wall (143%)	Slope Protection (178%)	Masonry Wall (187%)
Number of hired laborers	Higher percentage is superior	Riprapped Ditch (305%)	Slope Protection (218%)	Masonry Wall (188%)

From the table given above, regarding the construction cost and working days, it is evaluated that three working items which are the masonry wall, gabion wall and slope protection have high applicability of LBT. One the other hand, the working items which have high expectation of number of employment will be the riprapped ditch followed by slope protection and masonry wall. Since gabion is a simple task placing stones in a gage, it is considered difficult to generate a number of employees from this item to compare with others. The actual number of laborers that can be expected from the estimated quantity are given in the next paragraph.

6.2 Project Implementation Plan

6.2.1 Packaging the target roads to a Contract

The total 27 road sections are to be rehabilitated in the Project as shown in Table S 3.1.1. To simplify the tendering process, some of sub-projects shall be grouped as one package, avoiding a heavy work burden caused by one contract for one sub-project policy. The packaging arrangement is done by considering the administrative area, terrain and evenness of the contract price for each package. As a result of consultation with CDR, the total number of the packages (contracts) shall be proposed as eleven as shown in Table S 6.2.1 and Figure S 6.2.1.

Table S 6.2.1 Target Roads and Packaging in a Contract Group

Package	Road Number	Name of the Road	Distance (km)	Amount (MUSD)
1	1	Akkar_2a	28.0	9.88
	Sub-Total		28.0	9.88
2	2	Minie-Danniye_2	11.5	3.98
	3	Zgharta_1b	10.9	3.05
	4	Zgharta_1c	8.9	3.06
	Sub Total		31.3	10.09
3	5	Koura_2b	5.6	1.64
	6	Koura_2c	4.1	2.14
	7	Koura_3	3.5	2.17
	8	Bcharre	5.2	2.45
	Sub Total		18.4	8.40
4	9	Batroun_1	32.8	11.28
	Sub Total		32.8	11.28
5	10	Jbail_1	18.6	10.47
	11	Kesrouane_6	9.9	4.19
	Sub Total		28.5	14.66
6	12	El Metn_1c	6.0	1.81
	13	El Metn_1b	6.7	1.64
	14	El Metn_1d	2.0	0.72
	15	Kesouane_1b	20.1	8.27
	Sub Total		34.8	12.45
7	16	Baalbek_4	33.7	12.53
	Sub Total		33.7	12.53
8	17	Baabda_3	7.4	2.76
	18	Chouf_2	8.6	2.98
	19	Aley_1	14.3	4.94
	Sub Total	Zehle_1a	30.3	10.68
9	20	Zehle_1a	8.7	3.17
	21	Zehle_1b	6.3	2.21
	Sub Total		15.0	5.39
10	22	Saida_3	2.8	1.85
	23	Saida_6	8.6	2.64
	24-1	Saida_7	3.1	1.22
	24-2	Saida_7Add	1.2	0.45
	25	Jezzine_2	5.1	1.71
	26	Jezzine_4	6.0	1.67
	Sub Total		26.8	9.54
11	27	Sour_1b	9.5	2.86
	Sub Total		9.5	2.86
	Grand Total		289.1	107.76

Source: JICA Study Team

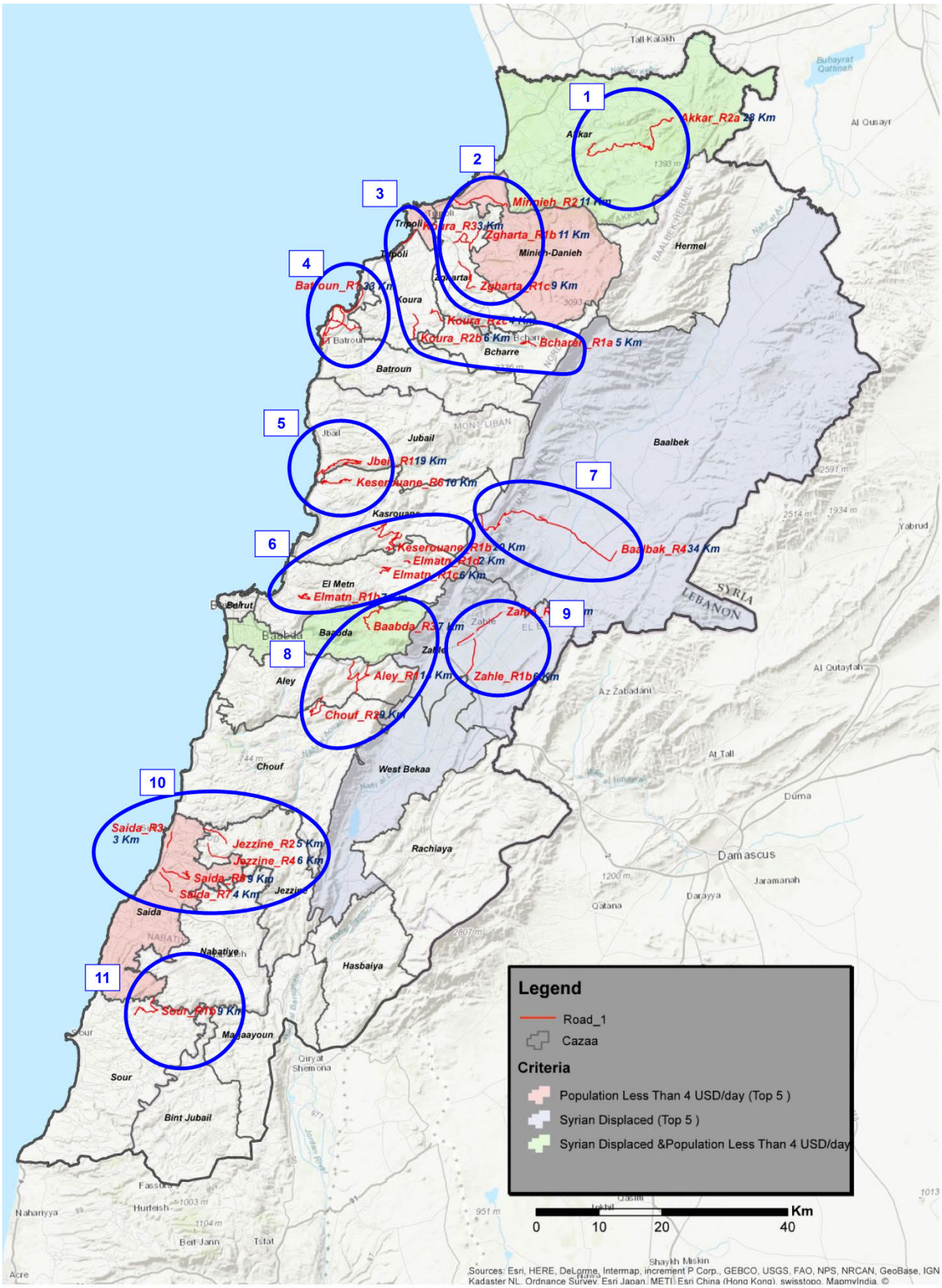


Figure S 6.2.1 Location of Sub-project Road Sections and their Packaging

6.2.2 Construction Period to Implement the Project

The summary is given in Table S 6.2.2.

Table S 6.2.2 Estimation of necessary construction period

Package	Route No.	Name	Length	Working Duration																								
				Months	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1	1	Akkar_2a	28.0	22.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
2	2	Minie-Denniye_2	11.5	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	3	Zgharta_1b	10.9	20.0					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	4	Zgharta_1c	8.9	19.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19					
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	5	Koura_2b	5.6	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	6	Koura_2c	4.1	21.0				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	7	Koura_3	3.5	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	8	Bcharre_1a	5.2	16.0									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4	9	Battroun_1	32.8		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
5	10	Jbail_1	18.6	24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	11	Kesrouane_6	9.9	20.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6	12	El_Metn_1c	6.0	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	13	El_Metn_1b	6.7	18.0							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	14	El_Metn_1d	2.0	13.0	1	2	3	4	5	6	7	8	9	10	11	12	13											
	15	Kesrouane_1b	20.1	20.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
7	16	Baalbek_4	33.7	24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	17	Baabda_3	7.4	19.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19					
	18	Chouf_2	8.6	18.0				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
	19	Aley_1	14.3	24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
9	20	Zahle_1a	8.7	24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	21	Zahle_1b	6.3	20.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	22	Saida_3	2.8	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	23	Saida_6	8.6	20.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
	24-1	Saida_7	3.1	21.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
	24-2	Saida_7Add	1.2	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	25	Jezzine_2	5.1	22.0		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
	26	Jezzine_4	6.0	21.0				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
11	27	Sour	9.5		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

6.2.3 Project Implementation Schedule

The necessary period for implementation of the Project is assumed 60 months and its breakdown is given in Figure S 6.2.2. Although the necessary duration of the construction for each package is estimated at 24 months, the entire period of the construction for each package become 29 months as a whole.

		月	Y1				Y2				Y3				Y4				Y5				Y6	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Local Consultant		59																						
	Procurement	3+3																						
	Survey and design	9																						
	Constrution Supervision	29																						
	Defect Liability	12																						
International Consultant		60																						
	Procurement	9																						
	Review of the desing	3																						
	Tendering Assistance	9																						
	Project Management	29																						
	Defect Liability	12																						
Contractor		40																						
	Construction	29																						
	Defect Liability	12																						

Figure S 6.2.2 Project Implementation Schedule

7. ESTIMATION OF COST AND EMPLOYMENT CREATION FOR THE PROJECT

7.1 Project Cost Estimate

7.1.1 Total Project Costs

The construction cost for each package and the Project costs are shown in Table S 7.1.1.

Table S 7.1.1 The Construction cost each package (JPY)

Package-1 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Akkar_2a	l.s	1	987,655	13,422,235,795	9,876,553
Total			**987,655**	**13,422,235,795**	**9,876,553**

Package-2 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Minie-Danniye_2	l.s	1	397,808	5,406,210,593	3,978,080
Zgharta_1b	l.s	1	305,018	4,145,200,009	3,050,184
Zgharta_1c	l.s	1	305,869	4,156,754,025	3,058,686
Total			**1,008,695**	**13,708,164,628**	**10,086,950**

Package-3 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Koura_2b	l.s	1	164,298	2,232,812,159	1,642,982
Koura_2c	l.s	1	214,201	2,910,991,996	2,142,010
Koura_3	l.s	1	216,892	2,947,556,852	2,168,916
Bcharreh_1a	l.s	1	245,063	3,330,399,924	2,450,625
Total			**840,453**	**11,421,760,931**	**8,404,533**

Package-4 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Batroun_1	l.s	1	1,128,254	15,332,976,408	11,282,543
Total			**1,128,254**	**15,332,976,408**	**11,282,543**

Package-5 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Jbeil_1	l.s	1	1,046,954	14,228,106,413	10,469,541
Keserouane_6	l.s	1	418,765	5,691,021,963	4,187,654
Total			**1,465,720**	**19,919,128,376**	**14,657,195**

Package-6 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
El Metn_1c	l.s	1	181,190	2,462,373,661	1,811,901
El Metn_1b	l.s	1	163,968	2,228,322,482	1,639,678
El Metn_1d	l.s	1	72,485	985,067,638	724,847
Keserouane_1b	l.s	1	827,463	11,245,224,032	8,274,631
Total			**1,245,106**	**16,920,987,813**	**12,451,058**

Package-7 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Baalbek_4	l.s	1	1,253,064	17,029,143,762	12,530,643
Total			**1,253,064**	**17,029,143,762**	**12,530,643**

Package-8 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Baabda_3	l.s	1	276,312	3,755,077,224	2,763,118
Chouf_2	l.s	1	297,890	4,048,331,168	2,978,904
Aley_1	l.s	1	493,530	6,707,066,604	4,935,296
Total			**1,067,732**	**14,510,474,996**	**10,677,318**

Package-9 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Zahle_1a	l.s	1	317,450	4,314,139,100	3,174,495
Zahle_1b	l.s	1	221,467	3,009,736,466	2,214,670
Total			**538,917**	**7,323,875,566**	**5,389,165**

Package-10 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Saida_3	l.s	1	185,241	2,517,418,888	1,852,405
Saida_6	l.s	1	264,072	3,588,739,816	2,640,721
Saida_7	l.s	1	121,564	1,652,052,124	1,215,638
Saida_7 add	l.s	1	45,332	616,063,976	453,322
Jezzine_2	l.s	1	171,249	2,327,269,446	1,712,487
Jezzine_4	l.s	1	166,796	2,266,752,570	1,667,956
Total			**954,253**	**12,968,296,821**	**9,542,529**

Package-11 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Sour_1b	l.s	1	286,464	3,893,047,506	2,864,641
Total			**286,464**	**3,893,047,506**	**2,864,641**

Source: JICA Study Team

Table S 7.1.2 The Project cost in the Study (USD)

1 USD=112 JPY
1 USD=1,510 LBP
1 LBP=0.0742 JPY

Breakdown of Cost	Foreign Currency Portion (millon USD)			Local Currency Portion (millon USD)			Total (millon USD)		
	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others
Package-1	0.99	0.99	0.00	8.89	7.41	1.48	9.88	8.40	1.48
Package-2	1.01	1.01	0.00	9.08	7.57	1.51	10.09	8.57	1.51
Package-3	0.84	0.84	0.00	7.56	6.30	1.26	8.40	7.14	1.26
Package-4	1.13	1.13	0.00	10.15	8.46	1.69	11.28	9.59	1.69
Package-5	1.47	1.47	0.00	13.19	10.99	2.20	14.66	12.46	2.20
Package-6	1.25	1.25	0.00	11.21	9.34	1.87	12.45	10.58	1.87
Package-7	1.25	1.25	0.00	11.28	9.40	1.88	12.53	10.65	1.88
Package-8	1.07	1.07	0.00	9.61	8.01	1.60	10.68	9.08	1.60
Package-9	0.54	0.54	0.00	4.85	4.04	0.81	5.39	4.58	0.81
Package-10	0.95	0.95	0.00	8.59	7.16	1.43	9.54	8.11	1.43
Package-11	0.29	0.29	0.00	2.58	2.15	0.43	2.86	2.43	0.43
Civil Works Sub Total	**10.78**	**10.78**	**0.00**	**96.99**	**80.82**	**16.16**	**107.76**	**91.60**	**16.16**
Price Escalation	0.65	0.65	0.00	3.41	2.84	0.57	4.06	3.49	0.57
Physical Contingency	0.57	0.57	0.00	5.02	4.18	0.84	5.59	4.75	0.84
Consulting Services	3.60	3.60	0.00	10.58	5.16	5.41	14.17	8.76	5.41
Utility Relocation / Land Lease	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Administration Cost	0.00	0.00	0.00	6.58	0.00	6.58	6.58	0.00	6.58
VAT / Income Tax / Corporate Tax	0.00	0.00	0.00	14.47	0.00	14.47	14.47	0.00	14.47
Import Tax	0.00	0.00	0.00	0.60	0.00	0.60	0.60	0.00	0.60
Interest during Construction	2.65	0.00	2.65	0.00	0.00	0.00	2.65	0.00	2.65
Front End Fee	0.22	0.22	0.00	0.00	0.00	0.00	0.22	0.22	0.00
Total	**18.47**	**15.82**	**2.65**	**137.64**	**93.01**	**44.64**	**156.11**	**108.82**	**47.29**

Source: JICA Study Team

7.2 Evaluation of Employment Creation in the Project

7.2.1 Estimation of the Number of Laborers to be Employed in Each Sub-project

The number of the workers estimated for each sub-project are shown in Table S 7.2.1. As mentioned in the previous section, it is possible to demonstrate an increase in approximately 123% employment creation when applying a partial inclusion of LBT, compared to ones by pure EBT.

Table S 7.2.1 Estimation of the Number of Labors

Package	No.	Road Name	Number of Employees		
			EBT	EBT and Partial LBT	
1	1	Akkar_2a	55,796	66,155	119%
2	2	Minie-Danniye_2	25,474	35,346	139%
	3	Zgharta_1b	17,025	17,733	104%
	4	Zgharta_1c	16,985	19,757	116%
3	5	Koura_2b	10,077	12,045	120%
	6	Koura_2c	9,259	9,929	107%
	7	Koura_3	9,281	10,318	111%
	8	Bcharre_1a	12,975	17,054	131%
4	9	Batroun_1	64,175	79,671	124%
5	10	Jbail_1	51,071	67,630	132%
	11	Kesrouane_6	22,169	28,631	129%
6	12	El Metn_1c	10,247	10,922	107%
	13	El Metn_1b	11,106	13,576	122%
	14	El Metn_1d	3,661	3,969	108%
	15	Kesrouane_1b	44,444	56,611	127%
7	16	Baalbek_4	71,748	94,849	132%
8	17	Baabda_3	14,984	18,962	127%
	18	Chouf_2	17,151	22,395	131%
	19	Aley_1	28,198	37,010	131%
9	20	Zahle_1a	15,529	16,043	103%
	21	Zahle_1b	10,987	11,366	103%
10	22	Saida_3	7,249	7,417	102%
	23	Saida_6	15,757	19,255	122%
	24-1	Saida_7	7,370	10,487	142%
	24-2	Saida_7add	3,232	5,317	165%
	25	Jezzine_2	10,358	11,595	112%
	26	Jezzine_4	11,319	12,874	114%
11	27	Sour_1b	18,085	23,231	128%
Total			**595,712**	**740,148**	**124%**

8. IMPLEMENTATION PLAN AND SUPPORT COMPONENTS

8.1 Implementation Management System

8.1.1 Roles and Responsibility of Each Stakeholder for Project Implementation

Since the total 68 sub-projects are assumed to be selected for both JICA and WB portions of the Project, a multiple number of neighboring sub-projects shall be gathered into one-package for bidding, considering the capability of local contractors, which would result in 25-30 packages for the Project.

PMU has authority for all necessary decisions for the project implementation in terms of both technical and financial matters on behalf of the CDR, supported by individual experts recruited and dispatched by WB. The major functions of the PMU are as follows;

- Overall project management,
- Procurement management,
- financial management including check of all accounting documents and preparation of disbursement requests according to LA,
- Monitoring and evaluation of the Project,
- Preparation of reports, such as Monthly Progress Report (MPR) and Quarterly Progress Report (QPR).

PMU will recruit a plural number of Lebanese local consultants to execute the detailed design as well as conduct the construction supervision of a certain package of the Project, and the local consultant(s) employed shall be designated as "The Engineer" for each package during the construction stage in order to inspect the quality of the works done by the Contractors, check and examine the implementation schedule and check and certify the payment invoices from the Contractor. The Contractor for each package shall be procured through the International Competitive Bidding (ICB) and execute the construction works under the Conditions of the Contract in conformity with "Standard Bidding Documents under JICA ODA Loan for Procurement of Works, 2012", which is equivalent to FIDIC Harmonization Version (pink book).

An International Consultant to be employed for the JICA portion shall be recruited by the CDR and supports the PMU to execute the detailed designs conducted by local consultants, partially prepare the tender documents except technical specifications and design drawings , provide the technical and contractual advice to the problems occurred in each package, and monitor the requirements set for the Project by JICA such as employment conditions/status of the targeted laborers and the progress of each sub-project, as a project management consultant. To perform such role, a PM of the International Consultant will regularly stay in PMU as advisor to PMU. Figure S 8.1.1 shows the implementation structure for the Project as well as a relation among stakeholders of the Project.

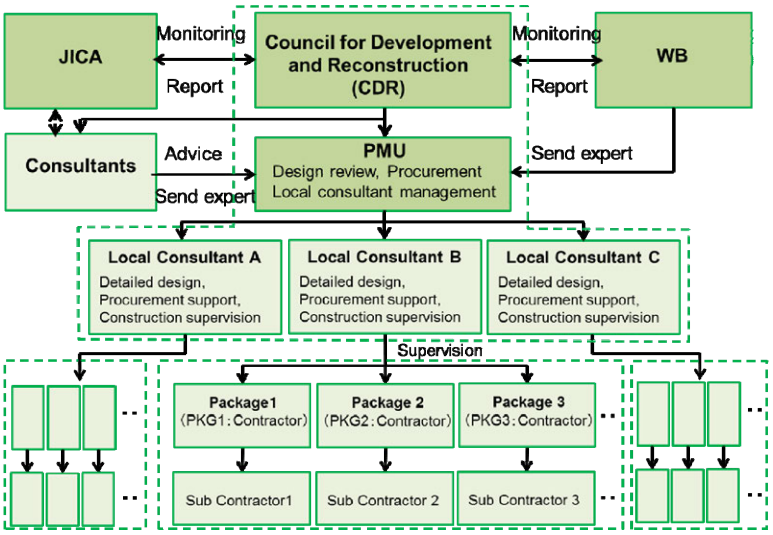


Figure S 8.1.1 Project Implementation Structure

8.1.2 Organization Structure of International Consultant

Detailed Design Review, Tender Document Preparation and Tender Assistance Stage

The International Consultant shall establish a main office for the consultant team within CDR HQ during the detailed design, tender document preparation and tender assistance periods in order to closely communicate with PUM or CDR.

Construction Stage

The International Consultant shall keep the main office within the CDR HQ as same in the tender stage and both the Project Manager (Group Leader) and Social Development Specialist of the Consultant will mainly stay in the main office. All packages for the JICA portion of the Project shall be divided into two groups and two international Regional Engineers shall be allocated to oversee each group containing some of the packages in order to oversee the activity of both contractors and the local construction supervision (CS) consultants. Those two Regional Engineers shall mainly stay at the regional office, with easy or convenient access to the construction site under their responsibility, while working in collaboration with local experts under the International Consultant team

8.2 Support Components

As studied in "Chapter 9 Operation and Maintenance", it can be said that an outstanding issue on the Project shall be operation and maintenance for the road sections rehabilitated by the Project after completion because it is the observed insufficiency of the implementation capacity of both MPWT and municipalities, who are the responsible organizations for operation and maintenance of the road network, particularly due to a lack of human resource and technical capacity. Accordingly, support to strengthening the road maintenance capacity can be judged as a candidate support component for the Project. However, although WB also plans the support to such fields as one of the components in the WB portion of the Project, there have been no further details on it at present. Due to avoiding the duplication of the project contents between JICA and WB, no support components including one to increasing the road maintenance capacity shall be planned at this stage. During

the implementation stage of the Project, in case that it is judged as appropriate to provide the support component on increase in operation & maintenance capacity of the Lebanese agencies after clarification of the WB's support plan on the same topic, the International Consultant will propose the such plan by applying JICA schemes other than Yen Loan.

9. OPERATION AND MAINTENANCE OF IMPROVED ROAD SECTIONS

9.1 Road Maintenance Issue

9.1.1 Strategic Road Maintenance and Rehabilitation

The road network plays an important role in the country's economy and it is critical for the country to keep its infrastructure in good condition. If roads are not properly maintained, the condition of roads would deteriorate, resulting in increased vehicle operating costs, vehicle travel time, a higher accident rate and a reduced reliability on transport services. In fact, a delayed intervention on road deterioration often requires a large scale of rehabilitation work, which is much more expensive than the simpler maintenance intervention to be undertaken in a timely manner. Given the precedence, the asset management concept should be introduced in order to realize strategic maintenance and rehabilitation for the road network.

For the strategic maintenance and rehabilitation, it's required to understand the road network and its condition. If these data are insufficient, it's difficult for the road authority to manage the proper maintenance work of roads based on the long term budgeting plan. Since MPWT has not updated the latest data of the road network and its conditions, WB plans to include soft component to support the update of RMMS in the WB portion of the Project.

9.1.2 Maintenance Capacity

According to MPWT staff, sufficient regular patrols and inspection of the road network by MPWT has not been conducted due to the shortage of human resources. Considering the situation that both MPWT and Municipalities, as the responsible agencies of the road maintenance for the road sections rehabilitated in the Project, have an issue on the shortage of human resources for the road maintenance, it is recommended to utilize the resources and technical capacity of the private sector, construction companies in Lebanon, to properly maintain the road sections rehabilitated in the Project in the future as a solution of the issue.

Thus, although there are concerns about the road maintenance for the road sections rehabilitated by the Project in the future, the JICA Study Team does not propose the capacity building component for the road maintenance in the Project because the road maintenance component by WB portion has not been elaborated at this stage. Accordingly, it is recommended to study the application of another JICA scheme such as a technical cooperation project for improvement of road maintenance capacity for Lebanese entities after confirming the details of the road maintenance components by WB portion for the Project.

10. ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

10.1 Result of the Environmental and Social Considerations Survey

Results of the environmental and social considerations survey are summarized in Table S 10.1.1. Detailed information of each sub-project road should be referred to the Annex of each IEE study report.

Table S 10.1.1 Summary of ESCs survey result

Environmental item	Result of the survey
Air pollution	It is confirmed that decision 52/1 "Specifying the National Standards for Environmental Quality and the Environmental Limit Values for Air and Water" regulates the threshold value against air pollution, and annual exposure threshold values for key parameters are NO_2: 100, O_3: 100, PM_{10}: 80, $PM_{2.5}$:80, SO_2:80, CO: 10,000 (unit: $\mu g/m^3$). Current ambient air quality data was gathered from the UNDP project "Air quality assessment in an East Mediterranean country: the case of Lebanon" which is based at the Ministry of Environment. As a result, annual concentrations are complying with the national limit values is confirmed. During the construction phase, sprinkling water to the ground, and appropriate maintenance of machinery, and idling-stop practice are needed because emission of exhausted gas and generation of dust due to operation of construction machinery are anticipated. As repeatedly mentioned earlier, the Project is rehabilitation of existing roads without widening so as adverse impact on ambient air quality during the operation phase is not expected.
Water pollution	Likewise, Lebanese regulation for effluent water discharge is mentioned in the above. Detailed info of parameters to be monitored is described in the Annex of IEE study report. Specifically, thirteen out of the 27 proposed sub-project roads for rehabilitation pass through major surface water resources, and all sub-project roads except three are located near major surface water resources. Most of the rivers are contaminated by several emission sources already. In particular, the environmental load is increased after influx of displaced people to the Lebanon. During the construction phase, the generation of turbid water, and other pollutants from the construction site where crossing rivers and locating nearby the other surface water resources area may enter to them. Similarly, many of the proposed roads lie on permeable formations which expose the groundwater aquifers to contamination. Therefore, it is necessary to conduct proper waste management, sedimentation treatment, and intensive training to the laborers etc., during the construction phase in order to mitigate the expected impact in the operation phase.
Solid waste	Law 64/68 "Protection against hazardous wastes that could harm air, water, biodiversity, soil, and people" and Decree 8735 "all generated construction solid wastes are to be properly collected, handled and disposed by the municipalities" are key legislative decrees which the Contractor has to comply with. Excavated soil and removed asphalt from the existing roads to be generated by the construction work shall be recycled as filling materials or pavement materials as much as possible.
Soil contamination	The contractors' machinery, if not properly maintained, may leak oil on the soil leading to pollution. In addition, the contractors' camp usually has a garage and fueling station which could lead to the contamination of soil. Therefore, appropriate maintenance of machinery and appropriate handling/storage of construction materials should be considered. Particular considerations are needed for the sub-project roads which are located close to protected areas and remain ecosystem and this should be emphasized to the workers.
Noise and vibration	MOE established noise regulation and set the maximum permissible noise level by time zone and land use condition in 1996. However, some of values are not transformed into reality - for example maximum permissible noise level is 35-45 dB in rural and residential areas, and as many studies pointed out, most of the traffic noise levels measured by the project targeted roads exceed the permissible level. In addition, existence of schools, universities, and hospitals are found around the some sub-project roads. Therefore, the selection of low-noise machinery, use of soundproof sheet, advance notice of construction schedule to the neighboring communities, etc., are needed to mitigate the expected impact. During the operation phase, reduction of the acceleration amplitude from the traffic is expected by improvement of road roughness by pavement rehabilitation as well as driving speed limitation by installation of traffic safety facilities.
Protected area	None of the sub-project roads cross the protected areas registered by country, but two roads cross the IBAs (one of two is a nominated site by Birdlife International). Certain impact to the birds due to increased number of workers and vehicles in the construction phase is a concern. On the other hand, the target roads already exist and cross the edge of IBAs boundary slightly. Moreover, there are grasslands and forests which can be become alternatives so a disjuncture of habitats and breeding sites is not expected.

Environmental item	Result of the survey
Ecosystem	As mentioned the earlier article, particular biotopes were noted when sub-project roads and river crossings, any contamination of soil and water can have severe irreversible impacts on the local biodiversity. Similarly, agricultural lands, grass lands, wooded lands have its own ecosystem. Land use conditions 200m right and left along the all sub-project roads are identified and attached on the beginning of Annexes. Therefore, appropriate management to prevent water pollution and soil contamination is needed in order to mitigate adverse impact to the local ecosystem.
Local economy , employment Local Conflict of Interest	Estimated impact of job creation opportunity for the vulnerable Lebanese as well as the displaced Syrians by the Project is 725,000 people (man-days). Through the survey, it is confirmed that MOL's regulation mentions the employment ratio of foreigner and Lebanese for the construction work is 1:1. However, realistic in the construction sector is 90% for foreigners and most of them are Syrians. In Lebanon, foreigners are allowed to work in (i) agriculture, (ii) construction, and (iii) environment (mainly garbage cleaning) sectors if work permit is issued and these sectors are known as uncompetitive with Lebanese. Therefore, LBT applicable works such as (a) masonry wall work, (b) gabion wall work and (c) drainage work will not create serious local conflict of interest. Road cleaning to be required during the operation phase is categorized to (iii) mentioned above and this will not become a source of conflict in the operation phase as well. Detailed information is available in the Chapter 5 "Promotion of labor employment in the Project".
Public infrastructures and services	Traffic congestion due to temporary road traffic regulation as well as temporary cut down of existing lifelines buried underground is expected. Such information is needed to confirm in the detailed design and construction stage together with the authorities concerned. If a temporary cut down is expected due to relocation of public utilities, a construction schedule should be announced to the communities well in advance. Regarding the operation phase, improved public infrastructure services (flat roads with traffic safety facilities) are to be provided to the public.
Gender	As a result of the hearing to the local contractors, employment of women for road construction work is very limited in Lebanon due to sociological and cultural reasons, though some sweeping work and desk work can be opened for women. Hence, the Project will not affect current gender status in the country and impact will be minimal.
Children's Rights	According to the report by Save the Children and UNICEF in 2015, more than half of the displaced Syrians were younger than 18 years. In principle, children should not participate in the labor market. In reality, however, due to hardships associated with being displaced and the need for households to earn at least a subsistence income, Syrian children younger than 18 years were also entering the labor market (UNDP, 2014). While the minimum legal working age is 16 years – provided that certain conditions are satisfied – younger children were also being employed. Many were working and serving as breadwinners for their families at extremely young ages – in Lebanon. Out of 27 sub-project roads, fourteen roads serve as important access to the educational and medical facilities for community. During the construction phase, accessibility to these facilities should be ensured and security guards should be assigned. In terms of traffic safety, it is recommended to install speed suppression facilities in front of or close to those facilities.
Working Conditions, Occupation Safety	If the contractors comply with all standards and legal requirement of occupational safety and health, provide appropriate safety goods such as goggles, dust mask, earmuff, etc., to the workers, and provide sensitization and safety training to the employees in a timely manner, a significant impact during the construction phase is not expected. Health checkup of all workers at hiring stage is important. Especially those who will engage in potentially hazardous activities should take specific health checkup when hiring or transferred from other site and need periodical check as well. Depending on type of work, the record of health check must be filed with appropriate period.
Sanitation	In Lebanon, water failure frequently happens and workers will easily face difficulty to access water on the construction site. Therefore, an adequate number of portable toilets as well as hand-wash stations with clean water should be secured on the construction site and yard.
Accident	During the construction phase, safety measures including the installation of signboards and barricades, assignment of safety patrol staff, provision of safety training, periodical maintenance of machinery, etc. must be enforced. In addition, the construction schedule should be announced to the community through the municipality well in advance so as potential risk of accident will be reduced. Reduction of traffic accidents in the operation phase is expected through the installation of road safety facilities, such as regulation/warning sign, curve mirror, road marking, rumble strip, hump, and concrete barrier or guardrail. Detailed information is available in the Chapter 4 "Preliminary Design for Sub-Projects".
Climate change	According to a study done by the University of "Transportation Centers Program" in 2014, an LCA study directed with efforts to quantify impacts of various pavement rehabilitation techniques on air quality, has shown that total asphalt reconstruction emits around 4.45 kg of CO2 equivalent/ m2 of road section rehabilitated. The Project is rehabilitation of existing roads without widening. Hence, traffic volume during the operation phase will not change significantly which means remarkable increase of CO2 emissions due to the Project is not expected.

10.2 Stakeholders Meeting

The public participation is a major requirement in environmental studies, which combines the concept of transparency with the rights of public awareness, and the involvement in any activity that may cause a change in existing conditions and environment. Public participation improves the quality of the information brought to the decision makers, and assists in identifying priorities and mobilizing local support.

For this purpose, stakeholder meetings at each proposed Caza were held from the middle to the end of December 2017. The participants were municipalities or a union of municipalities, relevant government and community leaders…etc. Considering the convenience of the participants, the meeting was sub-dividedly held for each municipality in case the roads cross several municipalities. On the other hands, stakeholder meeting was held for Union of municipality in case the road cross the area which is not administrated by any municipalities.

The meeting participants made positive comments to the road rehabilitation in general, and key discussion points were traffic safety facility, operation and maintenance, wastewater management including drainage, and road selection. In particular, reconsiderations of the several candidate roads were requested in the meetings, and later another meeting between CDR and JST was organized at DfR stage in January 2018. The basic policy applied to select candidate road / to change candidate road were (1) in case of candidate road were be rehabilitated whole road including surfacing, structure and safety items by municipality, the candidate road will be changed, and (2) Unclassified road will not be selected as a candidate road under the project. In addition, some roads were classified to the one to be rehabilitated by WB or EIB.

As a conclusion, replacement of Jezzine 3 (L=7.1km) by Jezzine4 (L=6.0km) and extension of Saida7 (Extension of L=1.2km) were agreed. It was also agreed that necessary environmental study for the replaced section shall be conducted by CDR where needed.

10.3 Schedule for obtaining Environmental License

Based on the current information, the Project requires neither EIA nor IEE. Meanwhile, CDR usually obtain the certificate for environmental approval for the project in its detailed design stage when the project scope and its environmental impact becomes clearer.

Therefore, based on the information at the detailed design stage, CDR will conduct required environmental procedures as necessary. The certificate for environmental approval by MOE will be issued within two weeks from receipt of the letter from the applicant if the project scope is not significantly changed from the preliminary design stage.

10.4 Other licenses necessary for the Project Implementation

Other licenses necessary for the proponent to implement the Project were not confirmed.

11. CONCULUSION AND RECOMMENDATIONS

11.1 Conclusions

The conclusions of the Study are as follows:

- The sub-projects for the Project were selected by multi-criteria comprising (i) Necessity of road rehabilitation: five criterion, and (ii) Benefit effects: four criterion, after screening the security level of the candidate road sections from 103 candidate road sections with 1,574km in the total length provided by CDR. As a result, 27 road sections with 289.1km in the total length located in seventeen cazas among 25 cazas excluding Beirut are selected.
- The scope of works for the sub-projects mainly concentrates to (i) pavement works: overlay or reconstruction of pavement from sub-base, (ii) drainage facility, (iii) retaining walls at both mountain and valley sides, (iv) traffic safety measures such as lane marking, warning and regulation sign boards, traffic mirrors, guard rail or wall, because the Project aims at rehabilitation and repairs of the existing road areas without improving neither horizontal and vertical alignment.
- There is little issue on both environment and social consideration for the sub-project road sections in the Project because no land acquisition and resettlement shall be identified at the preliminary design stage since the Project policy defines the road rehabilitation works are to be conducted within the present ROW. However, when the necessity of land acquisition/resettlement was identified at the detailed design stage, a resettlement action plan shall be prepared according to relevant laws and regulations on land acquisition and resettlement.
- The numbers of both the displaced Syrian and vulnerable Lebanese people, which are the target groups to be offered the employment opportunity as one of the objectives for the Project, are assumed approximately 180,000 and 49,000 people respectively based on literature review. Although the Lebanese labor regulation defines 1:1 ration between the Lebanese and the foreigners, it has been neglected because of a large occupancy by Syrian workers in the construction industry with 70-90 % in the ratio. Such regulated ratio shall be modified by MOL in reflecting the present situation in the near future. As a result of a series of interviews to the concerned international organizations, it was confirmed that the displaced Syrians who have registered as refugees with UNHCR are eligible to legally work for the Project with the acquisition of both a resident permit and work permit.
- It was confirmed that even a partial application of LBT, only to masonry work and rip-lap for a drainage facility, shall promote an effect on employment creation for the Project in consideration of no dissemination of LBT method in Lebanon so far. The LBT application in the Project is expected to increase employment opportunity at 123% compared to ones by pure EBT method, and it is estimated that the Project would provide 725,000 workers per day as the employment opportunity to both the displaced Syrian and vulnerable Lebanese people.
- No support component shall be carried out for the Project except road rehabilitation works in order to avoid duplication of support components planned in the WB portion since its content has not been elaborated at this stage, although the JICA Study Team has a concern on the insufficient capability of

road maintenance activities by either MPWT or a municipality due to mainly a shortage of human resources

- It is confirmed that whereas CDR shall be an implementation agency for the Project in consideration of his past rich experience of infrastructure projects financed by foreign donors, MPWT shall have the responsibility to deal with the operation and maintenance of the road sections rehabilitated by the Project, considering its past experience, although there has been a concern on its implementation capacity including human resources, organization structure and budget for maintenance.

11.2 Recommendations

The recommendations of the Study are as follows:

- It is necessary that an appropriate detailed design should be carried out, which is proposed to be executed by local consultants, after grasping actual damage level and area on the sub-project road sections through a careful site investigation since the preliminary design in the Study was executed by using satellite data and iRAP survey results within the limited time schedule.
- It is also recommended to execute the detailed public facility survey including electricity, telephone and water supply along the sub-project road sections in order to reflect its results to the detailed design output to be done by local consultants.
- It is recommended that the proposed work items with LBT method shall be clearly stated to be executed with the designated method in the contract conditions with the Contractor since it was confirmed its effect on employment creation in the Study. Otherwise the Contractor is likely to conduct such work items with EBT method considering the reduction of the work costs and time.
- JICA Study Team recommends to implement 27 sub-projects with eleven packages, considering its proximity, administrative jurisdiction and the capability of Lebanese contractors since the sub-projects are dispersed over the nation wide
- It is recommended to establish a PMU under Project Division of CDR prior to the Project commencement in order to be exclusively responsible for the Project because firstly, this is a co-financing project between WB and JICA and there are many stakeholders to be involved in, secondly, there as so many sub-projects to be rehabilitated over the nation
- Local consultants should be involved in both the detailed design and construction supervision activities for the sub-projects because the work items comprises ones executed in normal practice in Lebanon. However, since the Project is to be financed by JICA, it is recommended to incorporate an international consultant as Project Management Consultant to support the procurement of the Contractors, check the quality of works, advise PMU on issues occurred at site, and monitor the progress of each sub-project. Furthermore, the procurement of the Contractors should be executed through the International Competitive Bidding under the JICA guideline.
- It is necessary for CDR to timely provide the security information to both the Contractors and the Consultants working for the Project in order to enable them to provide the necessary security countermeasures in advance such as contact points in case of emergency because there has been

uncertainty of the security situation in Lebanon due to the continuity of the Syrian crisis and declaration of the US to approve Jerusalem as a capital of Israel in December 2017.

- It is recommended that JICA in collaboration with ILO should advocate the concerned Lebanese authorities and promote the simplification of the work certificate application for the displaced Syrians for enhancing legal employment in the sub-projects, which has been a trial for the ILO funded projects. Furthermore, although it is necessary for the JICA portion of the Project to monitor the employment situation of both the displaced Syrian and the Lebanese vulnerable people through the project implementation period, the monitoring items should be carefully selected and adopted while referring to ones prepared by WB because of both ambiguity of interpretation of relevant laws and regulations and actual practice at the site
- The JICA Study Team recommends utilizing the resources and technical capacity of the private sector, construction companies in Lebanon, to properly maintain the road sections rehabilitated in the Project in future because the Lebanese potential implementation agencies such as MPWT and municipality have a shortage of human resources for road maintenance at present, which makes them difficult to conduct the proper maintenance work. Furthermore, in case that the support component to the road maintenance by WB is clarified and elaborated and it is judged the necessity of the further support to the road maintenance activity for sustainability of the Project, it is recommended to conduct a study application of another JICA scheme such as technical cooperation project for improvement of road maintenance capacity for the Lebanese entities.

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Abbreviations

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
CAS	Central Administration of Statistics
CBR	California Bearing Ratio
CDR	Council for Development and Reconstruction
CFF	Concessional Financing Facility
CfW	Cash for Work
CS	Construction Supervision
DD	Detail Design
DG	Directorate Generals
DGLMT	Directorate General of Land and Maritime Transport
DGRB	Directorate General of Roads and Buildings
DGUP	Directorate General of Urban Planning
EBT	Equipment Based Technology
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIIP	Employment Intensive Investment Program
EMMP	Environmental Management and Monitoring Plan
FIA	Fédération Internationale de l'Automobile
FIDIC	Fédération Internationale des Ingénieurs-Conseils
GDP	Gross Domestic Product
GIZ	Deutschen Gesellschaft für Internationale Zusammenarbeit
GOL	Government of Lebanon
ICB	the International Competitive Bidding
IEE	Initial Environmental Examination
ILO	International Labour Organization
iRAP	the International Road Assessment Program
IRC	International Rescue Committee
JICA	Japan International Cooperation Agency
LBT	Labour Based Technology
LCRP	Lebanon Crisis Response Plan
LHSP	Lebanon Host-communities Support Program
MENA	Middle East and North Africa
MOA	Ministry of Agriculture
MOE	Ministry of Environment
MOFA	Ministry of Foreign Affairs
MONE	Ministry of National Economy
MOSA	Ministry of Social Affairs
MOU	Memorandum of Understanding
MPR	Monthly Progress Report
MPWT	Ministry of Public Works and Transportation
NGO	Non-Governmental Organization
NR	Nature Reserves
NS	Nature sites

ODA	Official Development Assistance
PAs	Protected Areas
PF	Protected forests
PMU	the Project Management Unit
PQ	pre-qualification
QPR	Quarterly Progress Report
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UOM	Union of Municipality
VASyR	Vulnerability Assessment for Syrian 'Refugees'
VAT	Value Added Tax
WB	World Bank
WFP	World Food Organization
WHO	World Health Organization
WSR	Work Suspension Ration

CHAPTER 1 BACKGROUND, OBJECTIVES AND IMPLEMENTATION OF THE SURVEY

1.1 Survey Background

In the Republic of Lebanon (hereinafter referred to as "Lebanon"), the inflow of the displaced Syrians has continued since March 2011 due to the Syrian crisis, and as of the end of December 2016, the number of the refugees reached nearly 1.01 million in the territory of Lebanon. Since the Lebanese government prohibits the establishment of refugee camps for the displaced Syrians, the Lebanese communities have been accepting such displaced Syrians as the host community. The influx of the displaced from Syria, which occupies about one-sixth of the Lebanese population of 5.9 million, has been suffering exhaustion of public services and deterioration of socio-economic infrastructures and causes a heavy economic burden on the Lebanese government. This resulted in the deterioration of the GDP growth from 2.5% in 2013 to 1.3 % in 2015.

87% of the labor productive population of the displaced Syrians, which range between the ages of 15 years old to less than 65 years old, have not completed secondary education. In addition, the Labor Law and regulations of Lebanon limit the employment of foreigners to only construction, agriculture and the cleaning industry. However, since displaced Syrias can mainly get jobs in informal sectors including housekeeping works, construction, wholesale/retail, manufacturing and agriculture sectors, etc., such labor forces result in the excessive situation in the unskilled labor market. As a result, the unemployment rate for the young generation has been rising, which this is one of the factors causing a conflict between the displaced Syrians and the Lebanese host communities.

To respond to the said situation, the Lebanese government formulated “the Lebanon Crisis Response Plan” in December, 2014, and has provided humanitarian assistance to the Syrian displaced. Furthermore, the Lebanese government set up the "Support Meeting on the Syrian Crisis" (London in February 2016) in order to respond to the ever-increasing support demand due to the prolonged Syrian crisis, and the deteriorating socio-economic conditions in Lebanon. The Support Meeting newly formulated a “Five-Year Plan for Employment Creation”, which aims at investing in the infrastructure sector in order to secure economic growth not only by developing infrastructure but also creating employment opportunities for the displaced Syrians and the vulnerable population of the Lebanese host communities. As a specific action of the said Plan, the

Lebanese government announced the implementation of a road rehabilitation project for the creation of employment opportunity at the First Steering Committee of the World Bank's MENA (Middle East and North Africa) Initiative Concessional Financing Facility "in July, 2016. The project comprises of the phase-1 stage to be financed by both the World Bank and JICA, which the former, with the utilization of CFF provides USD 200 million, and the latter finances USD 100 million as the "Road Rehabilitation Sector Loan for Employment Creation " to be financed by Japan International Cooperation Agency (hereinafter "JICA") (hereinafter" the Project "), and the phase-2 stage to be financed by the European Investment Bank (hereinafter "EIB")

Under such circumstances, JICA dispatched the Preparatory Study Team to Lebanon to conduct the necessary study and data collection to formulate the Project.

1.2 Project and Survey Objectives and Outline of the Project

The outline and objectives of the Project and the Survey are as shown in Table 1.2.1.

Table 1.2.1 The outline and objectives of the Project

Name of Project	Project for Road Rehabilitation Sector Loan for Employment Creation
Objectives of Project	• Contribute to both the improvement of the access to public services and markets as well as the road network for local residents, which leads to the improvement of their livelihood, by rehabilitating/repairing the deteriorated or damaged roads, and for the improvement of the road surface conditions and traffic safety • Contribute to the improvement of the livelihood of both the displaced Syrians and the vulnerable population of Lebanon by creating job opportunities for them in the Project with application of the work items that can create more employment of labor in road rehabilitation works
Outlines of the Project	• The sub-projects of the multiple sections (20km in length on average per sub-project) with the approximately 500km of the total length are selected for rehabilitation from approximately 6,000 km of the road network under the jurisdiction of MPWT but excluding the international roads. • The Lebanese government requested both JICA and the WB to provide loans for the implementation of the Project and the WB has already approved a loan of US $ 200 million in February 2017. • The sub-project shall be selected based on the criteria of (1) Traffic volume and the necessity of rehabilitation, 2) Effect on employment creation mainly for displaced Syrians, (3) Security situation in the sub-project area, and 4) Area balance of the selected sub-projects • The road rehabilitation works for the sub-projects are expected to include asphalt pavement work, drainage including culvert, base course/sub-base, slope stabilization, installation of retaining walls, and frontage road etc. • The consulting services for the Project shall comprise the design review, tender document preparation and support, construction supervision oversight, strengthening of the financial management capacity of the implementation agency, evaluation / monitoring of the Project, environmental social consideration, etc.
Survey Area	All over Lebanon. However, Japan shall be excluded from the level 4 areas according to the security information by the Ministry of Foreign Affairs.
Executing Agency/ Relevant Organization	Executing Agency： Council for Development and Reconstruction (CDR) Relevant Ministry： Ministry of Public Works and Transportation (MPWT)
Objective of the Survey	• Confirmation of the necessity and outline of the Project. • Formulation of the selection criteria (draft) for the sub-projects and selection of the sub-projects (draft) to be supported by JICA • Preparation of the project costs, project budget plan, project implementation schedule, and implementation methods such as procurement, construction plan and method for each sub-project (draft) to be supported by JICA. • Confirmation of the project implementation structure, operation & maintenance system, monitoring for environmental social consideration of each sub-project.

1.3 Survey Area

The survey area covers all over Lebanon (Figure 1.3.1). However, Japan shall be excluded from the level 4 areas according to the security information by Ministry of Foreign Affairs.

Source: the U.S. Central Intelligence Agency map 2002

Figure 1.3.1 Location of Survey Areas

1.4 Schedule and Flow of the Survey

The Survey schedule is summarized in Figure 1.4.1, including the timing of the report submission. According to the schedule, whereas a draft final report shall be submitted at the middle of January 2018 and a final report shall be handed over to the Lebanon side at the middle of March, 2018.

Main Work Item / Date		2017 8	9	10	11	12	2018 1	2	3
1	Peparation of **Inception Report**	☆							
2	Collection of **Basic Information** for the Project								
3	**Consultation with World Bank** about the Sub-projects Selection								
4	Study on the **Work Items** for Road Rehabilitation in each Sub-project								
5	Formulation of **Selection Criteria (draft)** for the Sub-projects	☆							
6	Formulation of the **Sub-projects** to be supported by JICA			☆					
7	Formulation of **Employment Condition and Criteria** for Employee's Selection for the Project								
8	Confirmation of **Implementation・Maintenance management system・Procurement method**								
9	**Environmental and Social** consideration survey								
10	Confirmation of **Gender Mains treaming Needs**								
11	Preparation of **Final Report**						☆		☆
Report		△ IC/R		△ IT/R	△ DF/R				△ FR

Source: JICA Survey Team

Figure 1.4.1 Survey Schedule (replace)

CHAPTER 2 GENERAL UNDERSTANING FOR THE PROJECT

2.1 Overview of Lebanon

2.1.1 Outline of the Country

The Republic of Lebanon (hereinafter called as Lebanon), is located in the Middle East Region, having a population of 4.648 million in 2015 and its territory is 10,452km^2, and the capital of the nation is Beirut. The country is bordered by Syria to the north and east and Israel to the south, while facing the Mediterranean Sea to the west (see Location Map). Lebanon's location at the crossroads of the Mediterranean Basin and the Arabian hinterland has facilitated its rich history and shaped a cultural identity of religious and ethnic diversity, having eighteen recognized religious sects. According the latest survey by a private firm in 2012[1], it is estimated that the population ratio among the religious sects is that Islam (Shia and Sunni) accounts for around 54%, Christianity (the Maronite Church, the Greek Orthodox Church, the Melkite Greek Catholic Church, the Protestant Church, and the Armenian Apostolic Church) shares approximately 40%, and Druze with around 6%.

Regarding the local administration system, Lebanon comprises 8 Governorates or Muhafaza, 26 Districts or Cazas, 51 Union of Municipalities, and 1108 Municipalities, which are under the jurisdiction of the Ministry of Interior.

The terrain of Lebanon can be categorized into four terrains from the west, the coastal area, the Lebanon Mountains, Beqaa Valley, and the Anti-Lebanon Mountain. In the coastal area, since plains spread to the both north and south, agricultural production has been very active. The Lebanon Mountains with an average height of 2,000m runs from north to south in parallel to the coastal line and its highest peak is Qurnet as Sauda, which is 3,086m in altitude.

In terms of the climate, Lebanon belongs to the Mediterranean climate, featuring a hot and dry climate in summer and rainy in winter. Whereas, average temperature ranges from 10 to 27 °C along the coastal area, it varies from 2 to 22 °C in the mountain area. Furthermore, the annual rainfall reaches for 720mm, of which approximately 70% of rainfall concentrates in the period from November to March.

[1] Lebanon 2012 International Religious Freedom Report, Statistics Lebanon, 2012

2.1.2 Socio-Economic Conditions

Lebanon had enjoyed economic prosperity before the Lebanese Civil War, which occurred from 1975 to 1990, as the center for business and finance in the Middle East, and its economic system was completely collapsed by the Civil War. Since then, recovery of the economy and its systems had almost been completed including the restoration of infrastructure and buildings in Beirut by the early 2000s. However, since the battle which occurred in 2006 between Israel and Hizbolla, who is a Shi'a Islamist militant group and political party based in Lebanon caused serious damage on the infrastructure over the nation and it resulted in a further huge amount of debt owed to the Government. In order to relieve the debt owned by the GOL, although the international community has been supporting the GOL after the "International Conference for Support to Lebanon" held in 2002 by providing funds, its achievement has been stagnant due to a delay in the implementation of the government administrative reform. As of 2012, the LOG debt has still been at a higher level, accounting for around 140% against the national GDP.

After almost two and a half years of a presidential vacancy, President Michel Aoun was elected in October 2016 and the subsequent formation of a national unity government has been established with hope for the resuscitation of the political process in Lebanon. Nonetheless, the prolonged Syrian conflict is markedly worsening the country's vulnerabilities and remains an impediment to the return to potential growth. For the fifth year of Syria Crisis, Lebanon persists as the largest host (on a per capita basis) for displaced Syrians.

The economic structure of Lebanon features the comparatively high ratio of the service sector such as finance, wholesale, retail, real estate and hotel, compared to the manufacturing and agricultural sectors. According to the World Bank data in 2015, whereas the nominal GDP of Lebanon is US$ 478.84 billion, the GDP per capita is US$8,047, which places it as a middle income country. Presently, the economy of Lebanon has mainly been supported by the said finance, tourism and real estate sectors in addition to money transfers from abroad etc., which are sensitive depending on the political and economic conditions in both domestic and foreign countries. Regarding the economic growth trend, real GDP growth in 2016 had a slight increase to reach an estimated 1.8%, compared to 1.3% in 2015. This was driven by i) an improvement in the real estate sector from a weak performance in 2015, ii) by cement supply expanded by 4.4% in 2016 compared to a contraction of 8.6% in 2015, and iii) by a continued increase in tourist arrivals, an indicator that registered an 11.2% growth in 2016. Nonetheless, economic activity persists below its potential, inhibited by geopolitical and security conditions caused by the Syrian Crisis. Table 2.1.1 shows the trend of the economic growth in the last nine years.

Table 2.1.1 GDP Growth Trend

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP Growth (%)	9.1	10.3	8.0	2.0	2.2	0.9	1.8	1.3	1.8

Source: World Bank

2.1.3 Political Status

Lebanon is a democratic republic country under the overall framework of consociationalism, in which the parliament and high offices are proportionately occupied by representatives from certain religious communities. Based on the system, it has been a practice that the Presidential power is given to a Maronite Catholic, the Prime Minister's one to a Sunni Islam, and the Speaker of the Parliament's one to a Shia Islam.

The Constitution of Lebanon grands the people the right to change their government and defines that whereas a direct elections must be held for the parliament every four years, the Parliament, in turn, elects a President every six years to a single term with prohibition of re-election, and the President and parliament choose the Prime Minister. However, because of the instability in politics, while the last parliamentary election was held in 2009, the last presidential one was conducted in 2016 after a two and half year absence of the President. Presently, there has been no consensus on the election laws and regulations for selecting the coming parliament members among the political parties and the bill to extend the term of the parliament member up to June 2017 was passed in the parliament. According to the latest information, an election for parliament is planned to be conducted next spring.

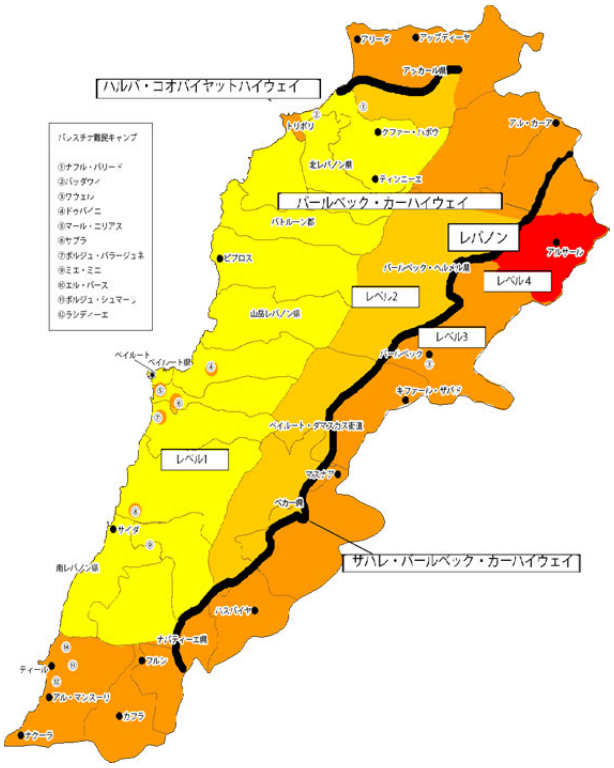
Based on the variety of the religious sects in Lebanon, there are numerous political parties supported by the religious sects and others. However, after the assassination of the former Prime Minister, Rafic Hariri in 2005, the political scene became polarized regarding the policy toward Syria, Pro-Syria and Anti-Syria, and the most major parties and movement separated into two big rival alliances, namely, the March 8 Alliance and the March 14 Alliance. However, there are still a number of independent political parties, who do not support either party.

On 4th November, 2017, the Prime Minister, Mr. Saad Hariri, announced his resignation of the prime minister's position due to the movement of assassination against him, while accusing Iran and Hezbollah. Accordingly, this event would cause the political instability in future.

2.1.4 Security Situation

According to the safety information to Japanese travelers offered from Ministry of Foreign Affairs, Japan, Lebanon is covered with a range from level 1 with yellow color area, which means " Recommendation to travel with due care, level 2 with light orange color area, which means "Recommendation to whether or not to travel", level 3 with dark orange color area, which means "Recommendation to defer all travel, and level 4 with red color area, which indicates "Evacuate and Avoid all Travels", shown in Figure 2.1.1. The level 4 areas are mainly spread around Arsal near the Syria border at the northeast area.

The Project area is all over Lebanon. However, the level 4 area based on the security information of the Ministry of Foreign Affairs shall be excluded from the project area.



Source: Ministry of Foreign Affair, Japan (28th December, 2017)

Figure 2.1.1 Safety Level of Lebanon by MOF, Japan

2.2 Effects of Syria Crisis on Lebanon

2.2.1 Syria Crisis

The Syrian Crisis originally started from a peaceful anti-government demonstration in March 2011 as a part of the Arab Spring. However, such protest immediately escalated after the government's violent crackdown, and armed opposition groups fighting back. By July 2011, army defectors had loosely organized the Free Syrian Army and many civilian Syrians joined the opposition to the Government force with arms. Enmity between secular and religious fighters, among the ethnic groups, and expansion of IS forces complicated the conflict. The situation in Syria went worse when outside foreign parties began launching airstrikes against the IS force in late 2015. In December 2016, fighting in Aleppo City intensified and East Aleppo, the final stronghold by IS, was finally recaptured by the Syrian government army. As of December, 2017, the battle has been continued.

2.2.2 Effects on Influx of Displaced Syrian People and Others

As of October 2016, it was estimated that Lebanon received 1.5 million displaced Syrians displaced who have fled the crisis in Syria, including 1.017 million registered as refugees with UNHCR, in addition to 31,502 Palestine Refugees from Syria, 35,000 Lebanese returners, and a pre-existing population of more than 277,985 Palestine Refugees in Lebanon against 4.5 million of the total Lebanese population according to the LCRP 2017-2020. Among them, more than half of the

displaced Syrians are women and children. Since the Lebanese constitution prohibits the settlement/integration of non-Lebanese within the country, the LoG allowed the Lebanese host community to receive the displaced Syrians instead of establishing refugee camps, while abiding by the principle of non-refoulement.

Thus, the influx of the displaced Syrians and others significantly impacted on Lebanon's social and economic growth, resulting in the deterioration of GDP growth from 2.5% in 2013 to 1.3% in 2015, deepening poverty and humanitarian needs, and exacerbated the pre-existing development constrains in the country. It also caused a heavy burden on the host communities of Lebanon who received the displaced people from Syria, which also resulted in adverse effects on vulnerable Lebanese people, with insufficient public service delivery or accessibility, such as access to schools, markets and hospitals, and an increase in unemployment particularly among the young generation. Such situations have intensified the tension between the Lebanese host community and the displaced Syrians.

2.3 National and Sector Development Plan

2.3.1 Lebanon Crisis Response Plan

"Lebanon Crisis Response Plan" (hereinafter referred to LCRP) was formulated in December 2014 as a joint multi-year plan for Lebanon in the context of the Syria Crisis, which the GoL and national and other international donors came together to focus on delivering integrated and mutually reinforcing humanitarian and stabilization intervention for the vulnerable Lebanese and displaced Syrians. For this purpose, LCRP has set the following three strategic priority objectives and provides assistance in nine sectors, including i) Food Security, ii) Energy & Water, iii) Education, iv) Basic Assistance, v) Health, vi) Livelihoods, vii) Shelter, viii) Social Stability, ix) Protection;

- Ensure humanitarian assistance and protection for the most vulnerable among the displaced from Syria and Lebanese
- Strengthen the capacity of national and local delivery systems to expand access and the quality of basic public services
- Reinforce Lebanon's economic, social, institutional and environmental stability by (a) expanding economic and livelihood opportunities for the benefit of local economies and the most vulnerable communities, (b) promoting confidence-building measures within and across institutions and communities to strengthen Lebanon's capacities.

The LCRP was also formulated in line with the commitments agreed at the London Conference in 2016, which are "strongly and continuously seeks to expand investments, partnerships and delivery models that ensure recovery and enable progress towards longer-term development strategies".

Table 2.3.1 shows the past record of the donor contribution to LCRP and it can be said that fund amounts by donors only account for approximately a half of the initial requirements.

Table 2.3.1 Donor Contribution to LCRP (Million US$)

Items/Year	2011	2012	2013	2014	2015	2016
Initial Requirements:a		106	1,700	1,900	2,140	2,480
Received Amounts:b	44	162	1,040	1,100	1,285	1,258
Fund Sufficency Ratio: b/a (%)	-	152%	61%	58%	60%	51%

Source: LCRP 2017-2020

According to the LCRP 2017-2020, the Plan targets 2.8 million people comprising 1.5 million of displaced Syrians, 1.03 million of vulnerable Lebanese, and 0.29 million of Palestinian Refugees, with US$2.75 billion of required funds, which is a 10% increase from that required in 2016. Table 2.3.2 shows the targeted population and required funds by sector in both 2016 and 2017. The table shows that there is no drastic shift in fund allocation to the sector and its trend is unchanged from 2016 to 2017.

Table 2.3.2 Targeted Population and Fund Requirements by Sector for 2017

Sector	Targeted Population	Requirement Funds In 2017 (Mil.US$)	Requirement Funds In 2016 (Mil.US$)
Social Stability	2,236,299	123.8	119.4
Water	1,959,429	280.0	391.4
Protection	1,887,502	163.8	178.3
Health	1,535,297	308.0	290.9
Basic Assistance	1,276,000	571.5	356.6
Energy	1,119,171	99.2	Including Water
Food Security	961,388	507.2	473.5
Education	543,616	372.6	388.2
Shelter	536,002	128.7	138.7
Livelihoods	65,557	195.7	143.3
Total	-	2,750.5	2,480.3

Source: LCRP 2015-2016 and LCRP 2017-2020

Since the LCRP aims at providing employment opportunities to the most vulnerable as one of its objectives as mentioned above, it can be justified that the Project is able to contribute to achieving the objective of the LCRP.

2.3.2 National Development Plan[2]

Due to the long term malfunction of the parliament for the Presidential election, there has been no approved national development plan and an updated national budget so far and the government administration has been operated on the basis of the Lebanese Government Declaration adopted in March 2014. The Government's declaration emphasized security and stability, including tackling the threat of terrorism, as issues of highest priority. Secondly, the GOL also stresses the importance of revitalizing the national dialogue and strengthening the economy to improve the livelihood of the Lebanese people. Reinforcement of the public administration system is also a priority, since it is a necessary precondition for achieving several government priorities. The GOL has also called

[2] United Nation Strategic Framework (UNSF) Lebanon 2017-2020, UN, 2016

for international support to develop the country's natural resources. Finally, the GOL asks for international support in meeting immediate humanitarian needs and other affected populations in Lebanon, and also points to the need to tackle the wider consequences of the Syrian crisis, which has longer-term impacts on almost all aspects of Lebanese society and economy.

2.3.3 Road Sector Development Policy and Plan

"A Comprehensive Sector Policy and Strategy for the Lebanese Land Transport Sector", which was prepared by the Ministry of Public Works and Transport (MPWT) with EURO Aid in February 2015, is an integrated study to formulate the policy and strategy covering all aspects of the land transport not only for technical items but also the legal system, financing and institutional development such as public transport, freight transport, road network development, safety mobility, green mobility, innovation & technology integration, development of standards and guidelines, facilitation of trade, communication campaign, tariffs & revenue and institutional capacity enhancement. The Land Transport Sector Policy and Strategy was formulated aiming to realize "an integrated and efficient land transport system supporting a prosperous economy that promotes sustainable growth, enables a healthier life style, provides safe and accessible mobility options, socially integrates all Lebanese people, and preserves the environment", and consists of four project areas; i) Physical projects, ii) ITS, iii) Awareness campaign for sustainable mobility, and iv) Sectoral & regulatory reform & capacity building under the twelve Programs mentioned above.

The Land Transport Sector Policy and Strategy also provided twelve guidelines for the strategy for the sector and the following four aspects are closely associated with the road sector among them:

- Create a transport system consistent with the real needs of people living in various Lebanese regions, and having different financial means.
- Ensure transport accessibility to disadvantaged areas, and reduce negative impacts.
- Increase safety and ease for cycling and walking (soft movement), and reduce traffic congestion in dense residential and commercial areas.
- Improve road and rail networks and ensure their maintenance, and facilitate traffic to provide access to the whole territory.

Physical projects were recommended on the basis of the related policy and strategy mentioned above for the road sector in the land transport sector as shown in Table 2.3.3.

Table 2.3.3 Recommended Project List in the Road Sector

Project Name	Outline of the Project	Implementation agency/ Financer
A1Highway Project	The A1 highway project aims at increasing the capacity of the highway that connects Beirut to Tripoli at the Keserwan coastal level by widening from the existing 2 lanes to 3 lanes with an approximately 10km long section and provision of service lane (Project cost €75Mil.)	CDR/EIB
Rehabilitation of Specific Roads	The project includes rehabilitation and maintenance of major road sections in the network, development of the standards, implementation system and funding mechanism for road maintenance.	No indication
Beirut Peripherique Highway Project	The project aims at construction of the full-controlled expressway bypassing the center of Beirut in order to save the travel time (20km long with 3-4 lanes for one direction)	CDR/No indication
Tripoli Eastern Ring Road Project	The project aims at construction of the eastern part of the circular expressway of Tripoli (9.4km long with USD 100 million of the project cost)	CDR/Islamic Development Bank
Pan Arab Highway project	The project aims at construction of a part of an international road network linking the Mashreq countries: Iraq, Jordan, Lebanon, Syria, West Bank and Gaza.	CDR/WB (planned)

Source: LCRP 2015-2016 and LCRP 2017-2020

From the guidelines of the sector policy and strategy and the project list for the road sector mentioned above, it can be judged that the Project fully meets the policy and strategy for the road sector with the following points:

- The necessity of road rehabilitation and its maintenance are stressed in the policy and strategy of the road sector in the Land Transport Sector's ones. Furthermore, the said policy and strategy also emphasizes to ensure the access and improve the accessibility in underdeveloped rural areas, which meets the objective of the Project stating "Contribute to both improvement of the access to public services and markets as well as the road network for local residents, which lead to the improvement of their livelihood, by rehabilitating/repairing the deteriorated or damaged roads for improvement of the road surface conditions and traffic safety".
- The recommended project list also picked up " Project for Rehabilitation of the Specific Roads," and its target roads shall fall in the same category of the candidate roads for the Project

The Support Meeting newly formulated a "Five-Year Plan for Employment Creation", which aims at investing in the infrastructure sector in order to secure economic growth not only by developing infrastructure but also creating employment opportunities for the displaced Syrians and the vulnerable population of the Lebanese host communities. As a specific action of the said Plan, the Lebanese government announced the implementation of a road rehabilitation project for the creation of employment opportunity at the First Steering Committee of the World Bank's MENA (Middle East and North Africa) Initiative Concessional Financing Facility "in July, 2016. The project comprises of the phase-1 stage to be financed by both the World Bank and JICA, which the former, with the utilization of CFF provides USD 200 million, and the latter finances USD 100 million as the "Road Rehabilitation Sector Loan for Employment Creation " to be financed by

Japan International Cooperation Agency (hereinafter “JICA”) (hereinafter" the Project "), and the phase-2 stage to be financed by the European Investment Bank (hereinafter “EIB”)

2.4 Overview of Road Sector

2.4.1 Road Network and its Conditions

Lebanon’s road network has a total length of approximately 21,700 km and almost all of the networks are have paved surfaces. Table 2.4.1 shows road length by road class and responsible agency. Whereas the classified road network, which categorizes into international, primary, secondary and tertiary, falls under the jurisdiction of Ministry of Public Works and Transport (MPWT) in terms of operation and maintenance, municipalities and local authority have responsibility of other un-classified roads.

Table 2.4.1 Lebanon's Road Network by Responsible Agency

Responsible Agency	Road Class/Territory	Length (km)	Remarks
MPWT	International	523	
	Primary	1,647	
	Secondary	1,278	
	Tertiary	2,809	
	Sub-Total	6,358	
Municipalities & Local Authority	Beirut	724	
	Other cities	601	Approximate figure
	Towns and Rural	14,000	Ditto
	Sub-total	15,325	Ditto
	Ground Total	21,683	Ditto

Source: Data offered by MPWT and Technical Assistance of the Support Program for Infrastructure Sector Strategies and Alternative Financing, MPWT, 2015

According to the data provided by MPWT, the road surface conditions of the road network under MPWT are evaluated as shown in Table 2.4.2. Table shows that 37.4% of the road network is deteriorated, poor and very poor condition.

Table 2.4.2 Road Surface Conditions of Road Network under MPWT

Road Class	Lentgh (km)	Very Good	Good	Deteriorated	Poor	Very Poor
International	523	34.4%	56.0%	8.3%	1.3%	0.1%
Primary	1,647	14.9%	54.8%	25.3%	4.7%	0.6%
Secondary	1,278	9.9%	51.4%	31.8%	5.9%	0.6%
Local	2,809	4.8%	44.8%	39.9%	9.0%	1.1%
Total	6,358	12.1%	50.2%	30.5%	6.2%	0.7%

Source: Answer to questionnaire from MPWT, 2017

The latest survey on both road surface conditions and road safety conducted by CDR with application of the evaluation methodology of the International Road Assessment Program (iRAP)[3] for the purpose of the Project preparation, which extracted the candidate road sections from the

[3] The detailed evaluation method by iRAP is described in Chapter 3.1.1

road network of Lebanon has been conducted. As a result, 43.8% of the road sections surveyed are classified as deteriorated, poor and very poor. Although Table 2.4.3 indicates a different road surface condition results compared to Table 2.4.2, it may be attributed from a difference in the evaluation method. In any case, it is obvious that approximately 40% of the road network requires intervention such as repair, overlay or reconstruction of the road base.

Table 2.4.3 Road Surface Conditions Assessed by iRAP

Road Class	Length Surveyed (km)	Very Good	Good	Deteriorated	Poor	Very Poor
International	628.6	33.99%	52.54%	12.97%	0.48%	0.01%
Primary	1399.8	14.63%	47.97%	35.35%	1.85%	0.20%
Secondary	1024.3	7.44%	47.21%	43.17%	2.02%	0.16%
Local	1761.8	4.69%	36.80%	54.48%	3.63%	0.39%
Un-classified	1259.4	10.26%	45.36%	41.98%	2.20%	0.20%
Total	6073.9			41.3%	2.3%	0.2%

Source: Final Pavement Condition Report, Preparation of iRAP Star Rating Scoring (SRS) and Pavement Condition Rating of Lebanese Road Network, CDR, 2017

2.4.2 Vehicle Ownership

Table 2.4.4 shows the record of the vehicle ownership by private individuals or the public. It is observed that approximately 1.76 million vehicles are registered in Lebanon, of which the privately owned vehicles account for 97% of the total. It may imply that there has been less development of the public transport service.

Table 2.4.4 Vehicle Ownership in 2016

	Car	Truck	Bus	Total
Private	1,555,333	142,864	9,748	1,707,945
Public	32,977	11,022	5,972	49,971
Total	1,588,310	153,886	15,720	1,757,916

Source: JICA Study team based on the data obtained from CDR.

2.4.3 Road Accidents

The number of road accidents has risen sharply with the increase in the number of cars from an estimate of 55,000 in 1960 to 1.76 million in 2016, leading to the increase of motorized trips in Lebanon. According to the information from the Internal Security Forces, whereas 508 fatalities and 6050 injuries were reported in 2012, 655 fatalities and 6,472 injuries occurred in 2014. This increase may attribute to the influx of the Syrians displaced after the Syria Crisis. The Road Safety Report in 2012 issued by YASA International stated that among the total fatalities, drivers accounted for 48% and pedestrians for 24%. In terms of the cause of the road accidents, high speeds combined with irresponsible driving have caused a large number of the accidents.

2.4.4 Responsible Agency for Road Network and Road Sector

(1) Responsible Agency for Road Network

Although some agencies have been involved in the road network management in Lebanon, MPWT is officially responsible for the main road network in terms of maintenance and rehabilitation. Meanwhile, the CDR is usually entrusted with the construction and reconstruction of the International and Primary roads in the road network, which is regarded as a large part of the project, upon the request for the Council of Ministers, considering its past experience and capacity of implementation.

For the local and un-classified roads, there has been unclear responsibility between the MPWT and municipalities, although MPWT stated that the secondary, local and un-classified roads are the responsibility of the municipalities. In reality, MPWT has often been compelled to manage the rehabilitation works and maintenance of a large part of the secondary, local and un-classified roads instead of the municipalities due to a lack of the municipality's capacity. Such road works are normally executed by local contractors under the supervision of CDR and/or the regional offices of MPWT.

Further details of both MPWT and CDR shall be described in Chapter 8.1.1 and Chapter 9.1.2 respectively.

(2) Responsible Agency for Road Sector

MPWT is composed of three Directorate Generals covering road, traffic and land transport, and among them, the Directorate General of Roads and Buildings (DGRB) is responsible for planning for roads infrastructure, environmental assessments for proposed projects, contracting and executing construction works and maintenance of the road network, according to Degree 13379 issued in 1998. Interestingly, no role and responsibility has been given to MPWT in terms of regulating and developing the private sector in the construction industry.

According to the interview with MPWT, the Ministry of Interior is responsible for regulating road safety and overloading control and countermeasures has been undertaken in collaboration with MPWT.

2.4.5 Private Sector

(1) Contractor

According to the contractor list for the general prequalification 2017 prepared by CDR (see Appendix-1), 338 firms are listed in the civil, roads and building category by class from one to five, including foreign firms. Among them, there are only 32 companies with class-1 category, who acquires the eligibility to participate in a bid with more than US$ 20 million of the estimated project cost. There is a contractor's association in Lebanon to advocate their rights and facilitate their business to the Government and approximately 4,000 firms have membership in the association.

According to an interview to a certain top class contractor listed in in the Class 1 category in all road, building and civil fields, they have around 60 years' experience after foundation and have an annual turn-over of approximately US$ 80 million, holding about 200 staff in the firm. Whereas the firm has a rich experience in road projects including flyover and cut & cover underground structures but not tunneling methods within the congested areas in Beirut in the domestic market, they also have been expanding their business to the neighboring countries such as Qatar, Saudi Arabia, etc.

Regarding the capacity of local contractors, although "A Comprehensive Sector Policy and Strategy for the Lebanese Land Transport Sector" assesses that although the local contractors have generally adequate capacity, it also pointed out that the works are sometimes executed without conformity regarding the standard specifications due to a lack of financial resources, resulting in frequent deviation of the works. From observation of road infrastructure in Beirut by the Study Team, since there are many complicated road structures including curved flyovers, underpasses and underground tunnels in the crowded urban areas, it can be judged that the top class of the Lebanese contractor has sufficient capability to secure a certain quality of the road rehabilitation works like the Project.

(2) Consultant

According to the consultant list for the general prequalification 2017 prepared by CDR, 178 firms are listed in all civil, roads, building and other categories. Among them, only 21 firms are listed into Class-1 category among four classes. According to an interview with a certain top consultant with Class-1 category, the firm has approximately 60 years' experience after foundation, holding 150 staff with approximate annual turn-over of US$ 10 million. The firm covers transportation & infrastructure, water & environment, and architecture & planning from planning, design to construction management service. One of their major projects is a design review and construction supervision for the construction of sixteen grade separations (overpasses and underpasses) at the city's highly congested intersections in Beirut.

From such experience, it can be judged that the Lebanese top consultants have sufficient capacity to implement normal scale of road rehabilitation work like the Project, including detailed design and construction supervision.

2.4.6 Procurement System for Road Project

(1) Introduction

A different system in the procurement of the contractor has been applied for the road project between MPWT and CDR. The following describes the procurement procedure and system for both under MPWT and CDR. The following sub-chapter describes both systems in different items related to the procurement of the contractor

(2) Responsible Agency at each Project Stage

MPWT

The MPWT Headquarters is mainly responsible for procurement of contractors for road works at design, tender document preparation, tender execution and construction supervision stage shown in Table 2.4.5, although, as mentioned before, the CDR mainly implements a large scale of road works such as new road construction and reconstruction of the International and Primary roads. However, the regional offices of the MPWT in each Governorate take a responsibility of the construction supervision. Actual design and construction supervision works for the road works are undertaken by the consultant procured by the MPWT.

At the tender stage, when the Engineer's estimate for the project is more than US$ 500,000, its tender shall be conducted by the Central Inspection under Prime Minister Office in order to secure transparency of the tender.

Table 2.4.5 Major Responsibility of Road Rehabilitation Works by Stage by MPWT

Activity	Responsibility
Design and Cost estimation	MPWT-Maintenance Department & Project Department
Preparation of Tender documents	Less than 500,000USD: Maintenance Department More than 500,000USD: Project Department
Tendering and Evaluation	Less than 500,000USD: MPWT More than 500,000USD: Central Inspection
Contract Signing	MPWT
Supervision and Execution/Inspection	Maintenance Department or Regional Office or Consultant entrusted by MPWT
Interim/Final Payment	MPWT
Variation Order	MPWT
Final Inspection and Evaluation	Less than 500,000USD: Supervision Team More than 500,000USD: Committee of each CAZA, comprising MPWT engineers and local authority
Inspection and Payment of Defect Liability Period	Committee for each CAZA

Source: JICA Study Team based on interview with MPWT

CDR

Whereas the Planning and Program Division of CDR is responsible for conducting the feasibility study including the conceptual design, the Project Division of the CDR is in charge of the detailed design, tender document preparation, procurement of both the contractor and the consultant and construction supervision. After one year of the Defect Liability period of the road project, the CDR shall hand over the improved road section to MPWT for their operation and maintenance activity.

Table 2.4.6 Major Responsibility of Road Rehabilitation Works by Stage by CDR

Activity	Responsibility
Feasibility Study	Planning & Program Division
Design and Cost estimation	Project Division, the consultant entrusted by CDR conducts the design and cost estimation.
Preparation of Tender documents	Ditto
Tendering and Evaluation	- Evaluated by Evaluation Committee, comprising members within CDR such as tender dept., commissioner etc. - Approved by Council Board
Contract Signing	Chairman of CDR
Supervision and Execution/Inspection	- PMU or Project Division, but the consultant entrusted by CDR perform as the Engineer instead of CDR
Interim/Final Payment	PMU or Project Division
Variation Order	Ditto
Final Inspection and Evaluation	Ditto
Inspection and Payment of Defect Liability Period	Ditto

Source: JICA study Team based on interview to CDR

(3) Registration and Classification System for Contractors

MPWT

As mentioned in Chapter 2.4.5, there is a registration and classification system for defining the eligibility of the tender participation for public works for both contractors and consultants. In the former, there are three categories in the technical field, comprising roads, building and civil works and contractors are classified into five classes depending on the technical capability for the designated technical field. The classification system has been applied in order to skip the Pre-Qualification stage for the tender and it defines that the Class-1 contractors are able to participate in a project with more than US$20 million of the estimated project costs, the Class-2 for ones with US$ 10 to 20 million, and the Class-3 for ones with US$ 5-10 million. In addition, registration to the system has to be renewed every six months. As mentioned in Chapter 2.4.5(1), as of 2017, the total 338 firms were registered in this system in all classes.

The similar system has been applied for consultants in terms of the said registration and classification. Only difference in the system for the consultant is a number of the classes in the classification system, of which four classes are applied to the consultants against five classes for the contractors.

CDR

The CDR has also been operating the similar registration and classification system for both the contractor and the consultant for projects under the CDR jurisdiction. The classification system can define the eligibility of tender participation depending on the project scale in terms of the project cost, which these thresholds of the class are completely same to the MPWT's ones. However, according to CDR, the registration and classification system does not means that a contractor will be automatically invited to a tender under the CDR. Whereas it has been utilized to provide a

potential tender list for a project depending on the project scale, complexity and location, it has also been used for assess the capability of the bidder at PQ stage of the project. A contractor who wishes to participate in the tender of a project under the CDR has to submit an application form and the contents of the form are described in Table 2.4.7. However, CDR does not disclose the requirements to pass the certain class registration and it is determined by the tender department of Project Division based on the information described in the application form. As of 2017, whereas a total of 338 firms were registered in this system in all classes, of which approximately 40 firms belong to Class 5, a total of 174 consultant firms are listed in the system. Considering the package scale for the Project, USD10-15 million, approximately 40 firms higher than Class 3 are assumed to be the potential bidders for the Project.

Table 2.4.7 Requirements of Application Form for Registration & Classification of the Contractor

Item	Contents
1. General	①Firm information, ②Firm registration, ③Organization, ④Year of experience, ⑤Description of technical capability
2. Financial	①Bank, ②Audit, ③Financial information, ④Value of works
3. Personnel & Equipment	①Number of staff, ②Computer Hardware & software, ③Equipment (type、year of manufacture, value, number, remarks of conditions), ④Key Personnel (Name, Position in company, Year of experience, Qualification), ⑤Administrative staff (Name, Position in company, Year of experience, Qualification)
4. Project Experience	①Previous experience (Project name, Client, Outline, Value of contract)
5. Registration & Classification	①Main or Sub contractor, ②Specific area ③Location of works

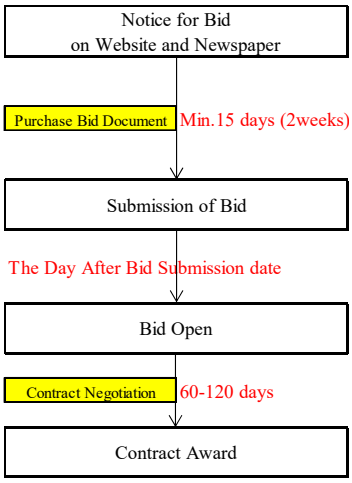
Source: CDR

In the international donor funded project, the PQ is normally undertaken on the basis of the donor's requirements or guideline. For example, in the WB funded project, the post-PQ procedure has been normally applied in Lebanon.

(4) Tender Procedures and Selection of Bidders

MPWT

Figure 2.4.1 shows the tender procedures for normal road works under MPWT. A tender notice normally is published in the newspaper or the web-site of the client, and an average of 30 days are given to the bidder for the bid preparation but it all depends on the project scale. Since the tender form only indicates the BQ table, all indirect costs such as overhead and profit should be included in the unit price for each work item. According to an interview with a certain contractor, the bidder generally considers its overhead and profit at 7% and 15% of the direct cost respectively. The pre-determined lowest price threshold, which is 18% lower than the engineer's estimate, has been set in order to secure the quality level of the works for public works. Since the MPWT discloses the updated unit price list for each work items, the concern on the bidder is only how much the bidder can discount from the unit prices disclosed. When the same bid price appears among the bidders, a drawn lot is applied to determine the winner.

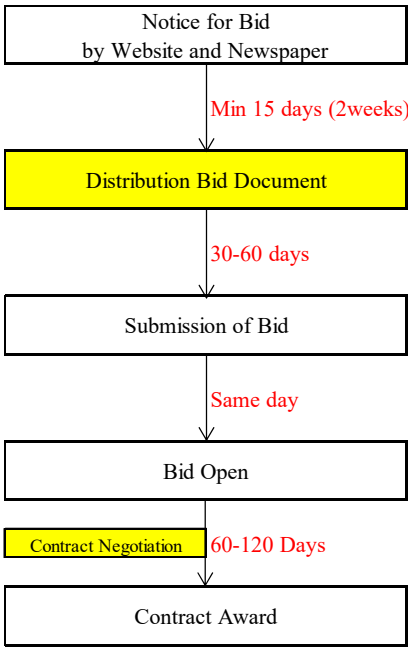


Source: JICA Study team

Figure 2.4.1 Flow Chart of the Tender for the Project under MPWT

CDR

Figure 2.4.2 indicates the tender procedures for normal road works under CDR. A tender notice is normally published in the newspaper or the web-site of the CDR, and 40-60 days from the date of the tender notice are given to the bidder for the bid preparation depending on the project scale. Since the tender form only indicates the BQ table, all indirect costs such as overhead and profit should be included in the unit price for each work items and the CDR requires the bidder to submit the breakdown of the unit price for each work items in order to assess the appropriateness of the unit price. Although there is no pre-determined lowest price threshold, in the bid evaluation stage, if the Evaluation Committee judges a certain unit price as inappropriate compared to other bidders, the Committee has authority to disqualify the said bidder. Unlike the project under the MPWT, the CDR normally provides the Engineer's estimate for the bid by using the consultant, which the consultant execute the cost estimate with his own experience and the latest market price since there is no official norm to estimate the cost for the project.



Source: JICA Study team

Figure 2.4.2 Flow Chart of the Tender for the Project under CDR

2.5 Other Donor's Portion in the Project

2.5.1 World Bank Portion

(1) Project Appraisal Documents by WB

According to the Project appraisal documents by WB in January 2017, the Project is to implement the rehabilitation of the total 500km of road network within five years in two phases. Whereas Phase 1 of the Project shall be conducted in the first three years with the budget of US$ 3 million, Phase 2 shall be implemented in the last two years with the remaining budget of US$ 2 million. WB has already approved a loan of US$ 2 million for Phase-1 for the three components shown in Table 2.5.1, and the remaining USD 1 million is to be financed by other donors.

Table 2.5.1 Project Components to be implemented by WB finance

Component	Contents of Component	Allocated budget (Mil.US$)	Remarks
1	Road rehabilitation & maintenance	185.0	
2	Improving road emergency response capacity	7.5	Purchase of road vehicles & equipment for snow removal
3	Capacity building & Implementation support	7.5	For Lebanese agency, contractor & workers
	Total	200.0	

Source: Combined Project Information Documents/Integrated Safeguards Datasheet, Roads and Employment Project, WB, Jan. 2017

Component 1: Road Rehabilitation & Maintenance, the appraisal documents stated that the sub-project road sections by the WB finance shall be selected with the criteria of i) road conditions, ii) the level of traffic, iii) balancing roads between regions and communities, iv) balancing of road

sections by road class (primary, secondary, tertiary), and v) the labor creation potential and broader socio-economic impacts. In addition to the above, it stressed that the sub-project road sections are non-urban roads from all Lebanese regions, particularly in rural areas and lagging regions, and that the Project targets both the Lebanese and Syrian laborers. Regarding the civil works of the sub-projects, it is expected to include asphalt overlays, drainage works, base and subbase reconstruction, slope stabilization works, retaining works and road side improvements on the sections crossing towns such as sidewalks, and planting trees and it will be implemented with fifteen packages, ranging from US$ 5 to US$15 million each in its value. This component also envisages to be involved in the maintenance activity for the rehabilitated roads by the Project by implementing a pilot project of multi-year routine maintenance contracts with the total budget of US$ 15 million.

Component 2: Improving Road Emergency Response Capacity plans to purchase vehicles and equipment for snow removal for MPWT, including fifteen wheel loaders, ten snow blowers, five salt spreaders and ten four wheel drive vehicles, in order to secure the accessibility in lagging regions where the significant number of the Syrian displaced also stay because the existing vehicles and equipment are outdated with average age of more than twenty years. This component will also assist in revising the existing emergency procedure of MPWT.

Component 3: Capacity Building and Implementation Support aims at not only building the capacity of the Lebanese agencies in planning and management of the road sector but also for contractors and works through the training for road construction and maintenance techniques and comprises the following five sub-components indicated in Table 2.5.2.

Table 2.5.2 Sub-components in Capacity Building & Implementation Support Component

Sub-Component	Name	Budget (Mil US$)	Contents
1	Road asset management	2.0	- to MPWT - Create road asset database and collect the information for the database
2	Traffic Safety planning and implementation	2.0	- to National Road Safety Council - Elaborate a national strategy and action plan for road safety and its implementation
3	Planning & Design Support	2.0	- to CDR - Prepare the planning and design for critical transport projects identified by LOG
4	Training for workers and small contractors	0.5	- to GOL and ILO or other donors - Support training for workers and small contractors for Labor Based Technique
5	Project implementation support	1.0	- to CDR - hiring necessary experts for implementation and monitoring the Project.

Source: Combined Project Information Documents/Integrated Safeguards Datasheet, Roads and Employment Project, WB, Jan. 2017

(2) Observation of the Project Formulation by WB

During the first and the second site visits in Lebanon, the Study Team found the following through a series of discussion with CDR;

- The WB side fully relies on the selection of sub-project road sections to be financed by WB to CDR but has a firm intention to implement the sub-projects in all 25 cazas except Beirut of Lebanon. As of January 2018, CDR proposes 41 subproject road sections with 547.7km in total length in 25 cazas. Regarding the approval of the subproject list for the Project, CDR will submit both sub-project lists to its Board Council after obtaining the official notice of the subproject list for JICA portion from JICA
- The WB side seems to follow the ad-hoc practice of the employment conditions of foreign labors in the Project, which has been widely tolerated in the construction sector, in terms of the necessity of work permit requested by Lebanese laws and the labor ration between the Lebanese and the foreigners designated in the ministry decision in 2017.
- There has been no detailed discussion on the intensive application of the LBT in the Project between WB and ILO so far and LBT in the road works has not spread in Lebanon because ILO has just started its activity in Lebanon from 2017. Furthermore, WB and ILO think that EBT shall be mainly utilized in the Project.

2.5.2 European Investment Bank Portion

(1) Present Status

According to the latest information from CDR, the negotiation between CDR and the European Investment Bank (EIB) for Phase-II of the Project is scheduled in January or February in 2018.

2.6 Other Relevant Humanitarian Projects

2.6.1 Lebanon Host-communities Support Program (LHSP)

Under the Lebanon Host-community Support Program, UNDP is implementing (a) capacity building of municipalities in the basic services, (b) livelihood improvement (poverty alleviation) and economic development, and (c) peace building projects. UNDP provides the construction and rehabilitation of small-scale infrastructure projects (water works, reservoirs, irrigation facilities etc.) ranging from USD 150 thousands to USD 2-3million[4].

LHSP aims at creating short-term employment opportunities for host communities in cooperation with ILO. Most of the beneficiaries are unskilled laborers including the displaced Syrian people.

2.6.2 UNHCR Cash Based Assistance

Cash based assistance is provided to the most vulnerable layer of Syrian refugees. UNHCR targets those who are categorized as severely vulnerable (USD 2.92/ day) as well as highly vulnerable

[4] UNDP is currently narrowing 16 candidate infrastructure projects.

(USD 3.84/ day). Severely vulnerable and highly vulnerable Syrian displaced people consist of 71% of the target refugees.

UNHCR, in cooperation with other UN agencies, introduces LUIS from 2017; those displaced Syrians who need assistance can use a one-stop card service by which the beneficiaries receive various cash based assistance from UNHCR (USD 175/ month), WFP (USD 77/month) and education support from UNICEF. This assistance is not sufficient for a stable life, yet they survive with this assistance.

UNHCR does not provide cash for work assistance in Lebanon, reflecting the severe reaction to Syrian employment.

2.6.3 ILO Employment Intensive Investment Program (EIIP)

The ILO launched an Employment-Intensive Investments Project (EIIP) in January 2017. The purpose of this project is to creating short to mid-term employment opportunities for the Lebanese host community and for displaced Syrian people through infrastructure works, such as road rehabilitation, water catchment cisterns and terracing. Implemented in partnership with UNDP, the project also includes a series of training sessions for contractors and public institutions. Notably, the Ministry of Labor will support to the promotion of a system for speedy and transparent issuance of work permits to Syrian refugees in Lebanon, allowing them to legally and formally take up employment[5]. According to an ILO officer, ILO attempts to introduce a type of work permit which allows contractors to obtain monthly renewable work permits for a list of workers on the project basis. In this scheme, workers are required rather simplified documents compared to the conventional system, yet the requirements for the contractors and employers basically remain the same. This process is still under discussion with relevant donors and ministries.

ILO is currently conducting a study on the application of labor intensive methods to road construction works. As Lebanon is a middle income country which has higher construction technology and can introduce construction machines and equipment in good condition with relatively reasonable prices, introducing labor intensive methods is not always cost-effective and advantageous in reducing the construction period. However, EIIP is seeking a way to create decent job opportunities while securing the quality of work at site through the training of Ministries and contractors (mainly small-scale contractors with working experiences with donor agencies) on the improvement of working conditions on labor, quality control of the works, cost estimation for the work items which can expect job creation for unskilled laborers (such as masonry work). Labor Based Technology is not pervasive in Lebanon at this moment (further details see Chapter 6).

Currently, on-going 11 subprojects in Lebanon are shown in Table 2.6.1. These subprojects are still at the initial stage of its implementation.

[5] ILO 'The ILO Response to the Syrian Refugee Crisis 2017 Update', p.6, 2017. http://www.ilo.org/wcmsp5/groups/public/---dgreports/---exrel/documents/publication/wcms_357159.pdf

Table 2.6.1 Employment Intensive Investment Program (EIIP) in Lebanon by ILP

No	Governorate/ Municipality	Type of work	Est cost (USD)	Status January 2018
1	Akkar Tal Abbas	Agricultural Roads approx. 5 km	500,000	Contract awarded in January 2018
2	North Lebanon Zgharta	Vegetable Market	600,000	Design completed, tender in January 2018
3	North Lebanon Tripoli/El Mina	Waterfront, sidewalk	1,700,000	Design completed, tender in January 2018
4	North Lebanon Tripoli	Rehabilitation of Street Median and Public Toilets	300,000	Contract awarded in November 2017
5	Bekaa, Baalbeck-Hermel Deir al Ahmar	Irrigation network part of 18 km	600,000	Tender documents ready Awaiting approval from MoEW
6	Bekaa, Baalbeck-Hermel Deir Al Ahmar	Potable water network	500,000	Awaiting approval from MoEW
7	Bekaa-Hermel	Public market and cold storage room in Nabi Chit	600,000	Design completed, tender in January 2018
8	Mt Lebanon Mazboud	Storm water drains 3km	400,000	Design completed, tender in January 2018
9	Mt Lebanon Jbeil	Sidewalk appr 1.5 km plus drains etc	300,000	Preliminary design available to be reviewed
10	Mt Lebanon Hammana	Water reservoir and water supply network	400,000	Contract awarded in December 2017
11	Mt Lebanon Ghobeiry	Channelizing Islands' for Circulation direction	300,000	Preliminary design available to be reviewed

Source: ILO document

2.6.4 Grant Assistance for Grass-roots Human Security Projects by Japanese Goverment

Table 2.6.2 shows Grant Assistance for Grass-roots Human Security Projects in Lebanon by Japanese Government in last three years from 2015 to 2017. Subprojects are mostly categorized into health and medical care, education, landmine removal fields.

Table 2.6.2 Grant Assistance for Grass-roots Human Security Projects in Lebanon by Japanses Goverment

No.	G/C Concluding Date	Field	Project Name	Amount of money (Unit: yen)
1	2017/3/16	Mine removal and explosives relic of war	Anti-personnel landmine removal plan in Marjayun County	¥75,537,720
2	2017/3/7	Medical service	Shuff County Ilfan Hospital medical equipment development plan	¥9,913,440
3	2017/3/6	Job training	Farnal village village system vocational training school renovation plan	¥9,826,800
4	2017/3/3	Medical service	Al-Lauda clinic and Dar Al Wafa clinic Medical equipment maintenance plan	¥9,582,720
5	2017/3/1	Medical service	Bar Elias Town Clinic Construction plan	¥24,889,080
6	2017/2/7	Medical service	Rafijk · Harry National University Hospital medical equipment Maintenance plan	¥10,902,000
7	2017/1/10	Educational facilities and training	Barb-Tabbane district Nure-Al-Mustakvall school renovation plan	¥10,510,560
8	2016/12/5	Mine removal and explosives relic of war	Plan for removing mines and cluster unexploded shells in southern Lebanon	¥63,536,640
9	2016/11/21	Mine removal and explosives relic of war	Cluster unexploded shell elimination plan in Sur County	¥48,965,520
10	2016/3/17	Conflict prevention and resolution, peace and security	Support plan for landmine and unexploded bullet removal activities in Battle County	¥28,382,200
11	2016/3/3	education	Expansion plan for disabled people support facilities in Navatie City	¥11,038,830
12	2016/2/29	Health	Navatie Province Social Development Center Medical Equipment Development Plan	¥8,642,700
13	2016/1/27	Conflict prevention and resolution, peace and security	Support plan for emergency mine / unexploded munition elimination activities in West Baka County	¥69,488,870
14	2016/1/26	Health	Burj-Hammud district social medical center medical equipment development plan	¥6,028,220
15	2016/1/25	Disaster prevention	Shuff Koriyama Fire Prevention / Firefighting Equipment Maintenance Plan	¥9,687,810
16	2016/1/20	Health	Shebaia Town Al Rafuma Clinic Medical Equipment Development Plan	¥11,594,770
17	2016/1/19	Health	Amatie Village Nadowa Medical Clinic Medical Equipment Development Plan	¥10,343,300
18	2016/1/18	education	Expansion plan for community center in Saida city	¥12,472,680

Source: Ministry of foreign affairs Japan HP
http://www.mofa.go.jp/mofaj/gaiko/oda/data/zyoukyou.html

2.6.5 Other Cash for Work (CfW) Activities

Table 2.6.3 illustrates the list of other cash for work activities conducted in Lebanon.

Table 2.6.3 List of Other Cash for Wok Activities

Implementing Agency/ Organization	Target area, time and beneficiaries	Purpose	Contents
World Food Organization (WFP)[6]	Bekaa Valley/2016 Summer ~/1,615 beneficiaries	Livelihood assistance for displaced Syrian people affected by the Syrian Crisis and Lebanese in host communities	When beneficiaries work for ten days, they get paid five times that of the cash assistance from that WFP originally provides. Only one person from a household can participate in the project at a time. Contents of the work are determined considering the benefit of the communities. Beneficiaries engage themselves the activities including construction of water bridges and canals and cleaning[7].
German Federal Enterprise for International Cooperation (GIZ)[8]	Lebanon, Turkey, Jordan, and Northern Iraq 39,000 beneficiaries (2016)	Short-term income generation for people affected by disasters and conflicts, provision of safety net and alleviation of traumatic stress.	Beneficiaries are provided the minimum wage of the country in cash. Beneficiaries work for garbage collection, recycling, development and rehabilitation of infrastructure such as roads, parks, sewage and schools.
Action Against Hunger (ACF)[9]	Tyre, Nabatieh in Northern Lebanon, three municipalities in Bekaa Valley Unemployed displaced Syrian people and Lebanese, 400 in total (January 2014-)	Improvement of public service provision to alleviate tension between refugees and host communities through interaction among displaced Syrians, host community residents and related stakeholders	Beneficiaries work ten days (six hours per day) and earn €15 / day (for maximum three months). Targets of the work are activities which fulfill the community needs such as infrastructure development. Most of the beneficiaries are male workers, as the activities include manual labor. However, family members can benefit from their income the beneficiaries earn[10]
Mercy Corps[11]	NA	NA	Rehabilitation of agricultural infrastructure.
International Rescue Committee, IRC[12]	59 beneficiaries (2014)	Provision of basic service and rehabilitation of local resources. Short-term income generation for displaced Syrians and vulnerable Lebanese.	Beneficiaries are selected based on economic vulnerability assessment and livelihood profiling. Contents of work include garbage collection, extension of information on public health and a baby sitting job.

Source: JICA Study Team

[6] http://www.un.org.lb/english/stories/world-food-programme-cash-for-work
[7] This program also support food provision since 2014. WFP charges 27 USD to E-card every month and Syrians can buy commodities in500 shops in Lebanon. This Program is co-sponsored by World Vision, ACF, SHEILD and Ministry of Agriculture.
[8] https://www.giz.de/fluchtundmigration/en/html/3567.html
[9] http://www.cashlearning.org/news-and-events/news-and-events/post/175-cash-for-work-in-southern-lebanon-a-acf-lebanonas-response-to-the-syrian-refugee-crisis
http://www.actionagainsthunger.org/blog/cash-work-program-aid-syrian-refugees-lebanon-launches
[10] This project provides financial assistance for income generation and cash assistance for vulnerable population (e.g. widows).
[11] International humanitarian NGO based on Oregon in USA https://www.mercycorps.org/countries/lebanon
[12] http://www.ennonline.net/fex/48/irclebanon

2.6.6 Coordination with Other Projects or Sinergy Effects between Projects

Whereas the Project is to rehabilitate 27 road sections over the nation wide of Lebanon, a various kind of social development projects are under implementation, including public facility, education and health care facilities by various donors including Japan. It is expected that implementation of the Project would improve the accessibility to such facilities by reducing the access time, which leads to improvement of social service delivery.

CHAPTER 3 SELECTION OF SUB PROJECT

3.1 Candidate Sub-Project Road Sections prepared by CDR

3.1.1 Candidate Sub-Projects Road Sections Selected with iRap Assessment Method

(1) Application of iRap Road Safety Assessment Method for Candidate Sub-Project Selection

CDR conducted an evaluation of a part of the entire road network in Lebanon with approximately 6,000km in length with the iRAP road safety assessment method for the selection of the candidate sub-projects for the Project. The following sections describe the application of the iRAP for the Project.

1) About iRAP

iRAP is an international organization to carry out various activities with an aim at reducing the fatality toll by traffic accidents, which occurs more than 3,500 deaths per day everywhere in the world. The fund for the activities by iRAP has been provided by FIA, WHO, World Bank / Global Road Safety Facility, and iRAP provides tools and training for road safety to road authorities, institutes, Automobile Associations, and NGOs related to the road safety in each country. By using such tools and their evaluation results, they also provide the online road safety software platform that enables open access through the Internet by outside users.

The main activities of iRAP are as follows:

- Evaluation of high-risk roads sections, traffic safety assessment on road sections, investment plan for road safety improvement, and preparation of road risk map;
- Provide training, technology and other support in order to build and maintain capacity of road organizations and its staff at national, regional and local levels;
- Conduct the follow-up survey on effects of road safety projects for the funding agencies .

In order to extract the candidate road sections to be rehabilitated in the Project, CDR entrusted Zagreb University in Croatia to conduct the road evaluation survey with the iRAP road safety evaluation method.

2) Visual survey for road pavement damage and traffic safety assessment

A Visual Survey was conducted by using a video camera on approximately 6,000 km of road sections along the entire road network of Lebanon.

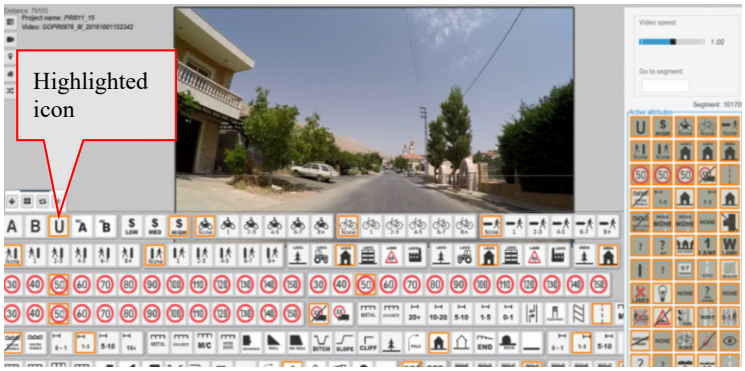


Figure 3.1.1 Visual survey results

The visual survey, which shot video while driving on the survey road sections, sequentially recorded items related to traffic safety such as road conditions, presence of pedestrians and traffic safety facilities, and the information recorded is compiled by each route. As shown in Figure 3.1.1, the road surface conditions and its facilities at any road section can be confirmed through the video recorded and the recorded information can be also recognized by each icon highlighted.

By using the information surveyed, traffic safety ratings are automatically generated for four different road users (Vehicle Occupant / Pedestrian / Motorcyclist / Bicyclist).

3) Results of road pavement damage and traffic safety assessment

CDR evaluated approximately 6,000km of the road sections in the entire road network by the iRAP road safety assessment method and its evaluation was conducted in two stages based on the results of the Visual Survey.

In the first stage, a Pavement Rating was made for each road section from the viewpoint of ride comfort and pavement condition etc., according to damage items and its condition level shown in Table 3.1.1.

Table 3.1.1 Evaluation Index of Road Pavement Damage

	RATINGS					
	1	**2**	**3**	**4**	**5**	
UNEVENNESS	0		3		12	ABSOLUTE VALUE
				12		**CONDITION**
RUTS	0		10		30	VALUE
			30			**CONDITION**
THE FINAL LAYER	0%	0< x <= 5%	5< x <=15%	15< x <=30%	>30%	VALUE
		>2,5%	**>10%**	**>20%**	**>30%**	**CONDITION**
FATIGUE/CROCODILE CRACKS	0%	0< x <= 15%	15< x <=30%	30< x <=50%	>50%	**VALUE**
		>7.5%	**>20%**	**>40%**	**>60%**	**CONDITION**
REPAIRS	0%	0< x <= 20%	20< x <=50%	50< x <=70%	>70%	VALUE

Source: Preparation of IRap Star Rating Scoring(SRS) and Pavement Condition Rating of Lebanese Road Network / Final Pavement Condition Report/Final Draft/CDRr

Table 3.1.2 shows the summary of the evaluation result of each road class and the damage level from Rate 3 to Rate 5, which requires a certain intervention such as repair or rehabilitation, occupies 43.8% of the total surveyed road length.

Table 3.1.2 Summary of Pavement Damage Level by Road Class

Pavement Rating	Road Classification(Total kilometers)					
	Inter national	Primary	Secondary	Local	C.N.A	TOTAL
1(Very good condition)	213.678	204.718	76.230	82.706	129.238	706.570
2(Good condition)	330.279	671.488	483.582	648.334	571.269	2704.952
3(Deteriorated condition)	81.510	494.845	442.161	959.753	528.685	2506.954
4(Poor condition)	3.099	25.946	20.684	64.007	27.734	141.470
5(Very poor condition)	0.050	2.770	1.659	6.952	2.480	13.911

Source: Preparation of IRap Star Rating Scoring(SRS) and Pavement Condition Rating of Lebanese Road Network / Final Pavement Condition Report/Final Draft/CDRr

In the second stage, the iRAP Star Rating (road safety level evaluation) was executed for each road section surveyed by using indices of the road condition recorded in the Visual Survey result by the Standard iRAP Coding Methodology.

The iRAP Star Rating assessed the road safety level for four different road users (Vehicle Occupant / Motorcyclist / Pedestrian / Bicyclist), which were evaluated by factors associated with road condition and facility such as road width, presences of median, footpath and road signs. Figure 3.1.2 shows a typical road condition by the rates with iRAP Star Rating. Since the road sections surveyed include many rural roads without a central lane, most road sections were evaluated with low rate such as 1-star and 2-stars.

Source: The strategic focus of the International Road Assessment Programme /1st European Road Infrastructure Congress | 18-20 October 2016 | Leeds, United Kingdom

Figure 3.1.2 Typical Road Conditions by iRAP Star Rating

As shown in Table 3.1.3, 85% of the total road length surveyed is evaluated at 1 star and 2 stars, which do not meet the minimum allowable level of traffic safety.

Table 3.1.3 Results of iRAP Star Rating by Road User

	Vehicle Occupant		Motorcyclist		Pedestrian		Bicyclist	
Star Ratings	Length(kms)	Percent	Length(kms)	Percent	Length(kms)	Percent	Length(kms)	Percent
5 Stars	0.14	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
4 Stars	51.59	0.85%	13.14	0.22%	0.86	0.01%	0.00	0.00%
3 Stars	862.32	14.26%	481.28	7.96%	108.19	1.79%	1.75	0.03%
2 Stars	1,420.08	23.49%	1,210.81	20.03%	697.49	11.54%	5.11	0.08%
1 Stars	3,705.81	61.30%	4,334.72	71.70%	2,285.66	37.81%	8.49	0.14%
Non applocable	5.36	0.09%	5.36	0.09%	2,953.12	48.85%	6,029.96	99.75%
Totals	6,045.31	100.00%	6,045.31	100.00%	6,045.32	100.00%	6,045.31	100.00%

Source: Preparation of Irap Star Rating Scoring (SRS) and Pavement Condition Rating of Lebanese Road Network /Final Report iRap Star Rating Scoring (SRS) Report/CDR

(2) Subproject selection by iRap

CDR selected the candidate road sections for the sub-projects of the Project in four cases based on the evaluation results of both the road pavement damage and traffic safety level by the iRap. By using mainly four parameters such as pavement damage score, traffic safety level, annual average daily traffic and available funds allocated by caza, CDR provided the candidate road sections for the sub-projects in four cases. As a result, CDR recommended the candidate sub-projects as the base for the road sections selected in 1st and 4th iterations.

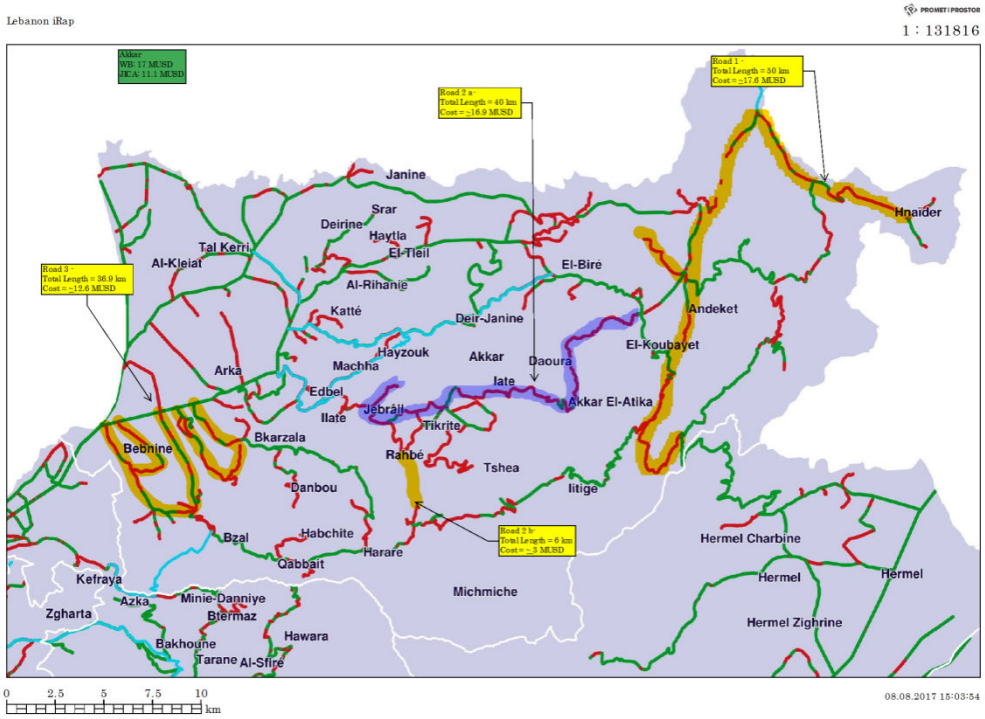
Table 3.1.4 Selection of Candidate Sub-projects by CDR

No.	Folder	Layer	Total length(km)
1	Final Selection – Road Clusters	Road clusters – 1 st iteration	1,383.49
2		Road clusters – 2 nd iteration	1,744.18
3		Road clusters – 3 rd iteration	817.68
4		Road clusters – 4 th iteration	752.54

Source: JICA Study team

3.1.2 Candidate Sub-projects selected by CDR

CDR conducted the further adjustment of the candidate sub-projects in 1st and 4th iterations in order to finalize the candidate sub-projects for the Project by eliminating the road sections covered by the MPWT road rehabilitation plan, the level of the road deterioration by caza and the requests from municipalities. Figure 3.1.3 shows the candidate sub-project road sections in Akkar caza.



Source: provided by CDR

Figure 3.1.3 An Example of a Sub-project Selected by CDR (AKKAR)

Table 3.1.5 shows the final list of the candidate sub-projects (1,574 km) finalized by CDR in 21 Cazas. The locations of the candidate sub-projects are also shown in Figure 3.1.4.

Table 3.1.5 Candidate Sub-projects List Prepared by CDR

NO.	Sub Project Name	Caza Name	Total Length(km)	NO.	Sub Project Name	Caza Name	Total Length(km)
1	Akkar_1	Akkar	42.8	51	Bcharre_1a	Bcharre	5.2
2	Akkar_2a	Akkar	28	52	Bcharre_1b	Bcharre	53.5
3	Akkar_2b	Akkar	2.24	53	Bcharre_2	Bcharre	2.6
4	Akkar_3	Akkar	33.6	54	Koura_1a	Koura	12.2
5	Aley_1	Aley	14.3	55	Koura_1b	Koura	7.5
6	Aley_2	Aley	20.3	56	Koura_2a	Koura	20.1
7	Aley_3	Aley	32.2	57	Koura_2b	Koura	5.6
8	Aley_4	Aley	26.1	58	Koura_2c	Koura	4.1
9	Baabda_1	Baabda	3.5	59	Koura_3	Koura	3.5
10	Baabda_2	Baabda	16.4	60	Koura_4	Koura	20.6
11	Baabda_3	Baabda	7.4	61	Koura_5a	Koura	11.3
12	Baabda_4	Baabda	22.1	62	Koura_5b	Koura	3.9
13	Chouf_1	Chouf	39.5	63	Minie-Danniye_1	Minie-Danniye	14.4
14	Chouf_2	Chouf	8.6	64	Minie-Danniye_2	Minie-Danniye	11.5
15	Chouf_3	Chouf	20.6	65	Minie-Danniye_3a	Minie-Danniye	12
16	Chouf_4	Chouf	36.6	66	Minie-Danniye_3b	Minie-Danniye	2.2
17	El Metn_1a	El Metn	28	67	Zgharta_1a	Zgharta	10.9
18	El Metn_1b	El Metn	6.7	68	Zgharta_1b	Zgharta	10.9
19	El Metn_1c	El Metn	6	69	Zgharta_1c	Zgharta	8.9
20	El Metn_1d	El Metn	2	70	Zgharta_2	Zgharta	15.7
21	El Metn_2	El Metn	21.4	71	Zahle_1a	Zahle	8.7
22	Jbail_1	Jbail	18.6	72	Zahle_1b	Zahle	6.3
23	Jbail_2	Jbail	32.5	73	Zahle_2	Zahle	33.1
24	Jbail_3	Jbail	19.2	74	Bent Jbail_1a	Bent Jbail	10.8
25	Jbail_4	Jbail	19	75	Bent Jbail_1b	Bent Jbail	10.7
26	Kesrouane_1a	Kesrouane	10.6	76	Bent Jbail_2	Bent Jbail	42.7
27	Kesrouane_1b	Kesrouane	20.1	77	Bent Jbail_3	Bent Jbail	4.6
28	Kesrouane_1c	Kesrouane	3.5	78	Hasbaiya_1	Hasbaiya	47.8
29	Kesrouane_1d	Kesrouane	11	79	Marjayoun_1	Marjayoun	60.5
30	Kesrouane_2	Kesrouane	43.6	80	Jezzine_1a	Jezzine	9.7
31	Kesrouane_3	Kesrouane	4	81	Jezzine_1b	Jezzine	17.4
32	Kesrouane_4	Kesrouane	23.2	82	Jezzine_1c	Jezzine	3.5
33	Kesrouane_5	Kesrouane	16	83	Jezzine_2	Jezzine	5.1
34	Kesrouane_6	Kesrouane	9.9	84	Jezzine_3a	Jezzine	7.1
35	Baalbek_1	Baalbek	33	85	Jezzine_3b	Jezzine	13.6
36	Baalbek_2	Baalbek	38.3	86	Saida_1	Saida	7
37	Baalbek_3	Baalbek	25.9	87	Saida_2	Saida	5.5
38	Baalbek_4	Baalbek	33.7	88	Saida_3	Saida	2.8
39	Hermel_1	Hermel	2.4	89	Saida_4	Saida	12.3
40	Hermel_2	Hermel	4.6	90	Saida_5	Saida	10.6
41	Hermel_4a	Hermel	4.4	91	Saida_6	Saida	8.6
42	Hermel_4b	Hermel	3.7	92	Saida_7	Saida	3.1
43	Hermel_4c	Hermel	2.3	93	Saida_8	Saida	11.3
44	Hermel_4d	Hermel	1.5	94	Saida_9	Saida	9.8
45	Batroun_1	Batroun	32.8	95	Saida_10	Saida	2.8
46	Batroun_2a	Batroun	8.6	96	Saida_11	Saida	5
47	Batroun_2b	Batroun	3.5	97	Saida_12	Saida	10.4
48	Batroun_3	Batroun	9.5	98	Sour_1a	Sour	15.9
49	Batroun_4	Batroun	8.6	99	Sour_1b	Sour	9.5
50	Batroun_5	Batroun	19.5	100	Sour_2a	Sour	21.9
				101	Sour_2b	Sour	12.7
				102	Sour_3a	Sour	9.5
				103	Sour_3b	Sour	15.6
				Total			1,574

Source: JICA Study Team based on CDR material

Source: JICA Study Team based on CDR material

Figure 3.1.4 Location Map for Candidate Sub-projects prepared by CDR

3.2 Sub-project Selection Policy, Method and Procedure

3.2.1 Selection Policy, Method, Procedures and Criteria to be Applied

The Project focuses on the rehabilitation of mainly rural roads with the application of the work items that can create more employment for laborers, but not rehabilitation of high standard roads including bridges and tunnels requiring high technology and the quality standard in order to promote employment of both the vulnerable Lebanese and displaced Syrians.

A list of the sub-project roads for the Project shall be formulated with its priority from the candidate sub-project list prepared by CDR by comprehensively assessing the candidates with the application of the following criteria agreed between JICA and CDR, (i) Security level, (ii) Necessity of road rehabilitation, and (iii) Benefits to both Lebanese and Syrian people. The sub-project road list formulated above shall be finalized by picking the sub-projects from the top up to one until the accumulated road rehabilitation costs for sub-projects reaches approximately USD 107 million. After that, the final list shall be checked from the viewpoint of the area balance and if necessary, the sub-project list shall be adjusted on the basis of discussion with CDR.

(i) Security Level

- The sub-projects to be funded by JICA are not located in the areas of Lebanon which are classified at level 4, which indicates “Evacuate and Avoid all Travels” by the Ministry of Foreign Affairs in Japan.

(ii) Necessity of Road Rehabilitation

- Importance on the road network measured by traffic volume
- Importance on the local road network measured by the access to important place (e.g. caza center)
- Road pavement damage level as the result of iRAP Pavement Damage Rating
- Road safety level in accordance to iRAP Star Rating

(iii) Benefits to Lebanese and the displaced Syrians

- Existence of the work items enabling high employment creation
- Population of the vulnerable Lebanese people living near the sub-project and the population of displaced Syrians displaced living near the sub-project
- Population in the cazas where the sub-projects are located

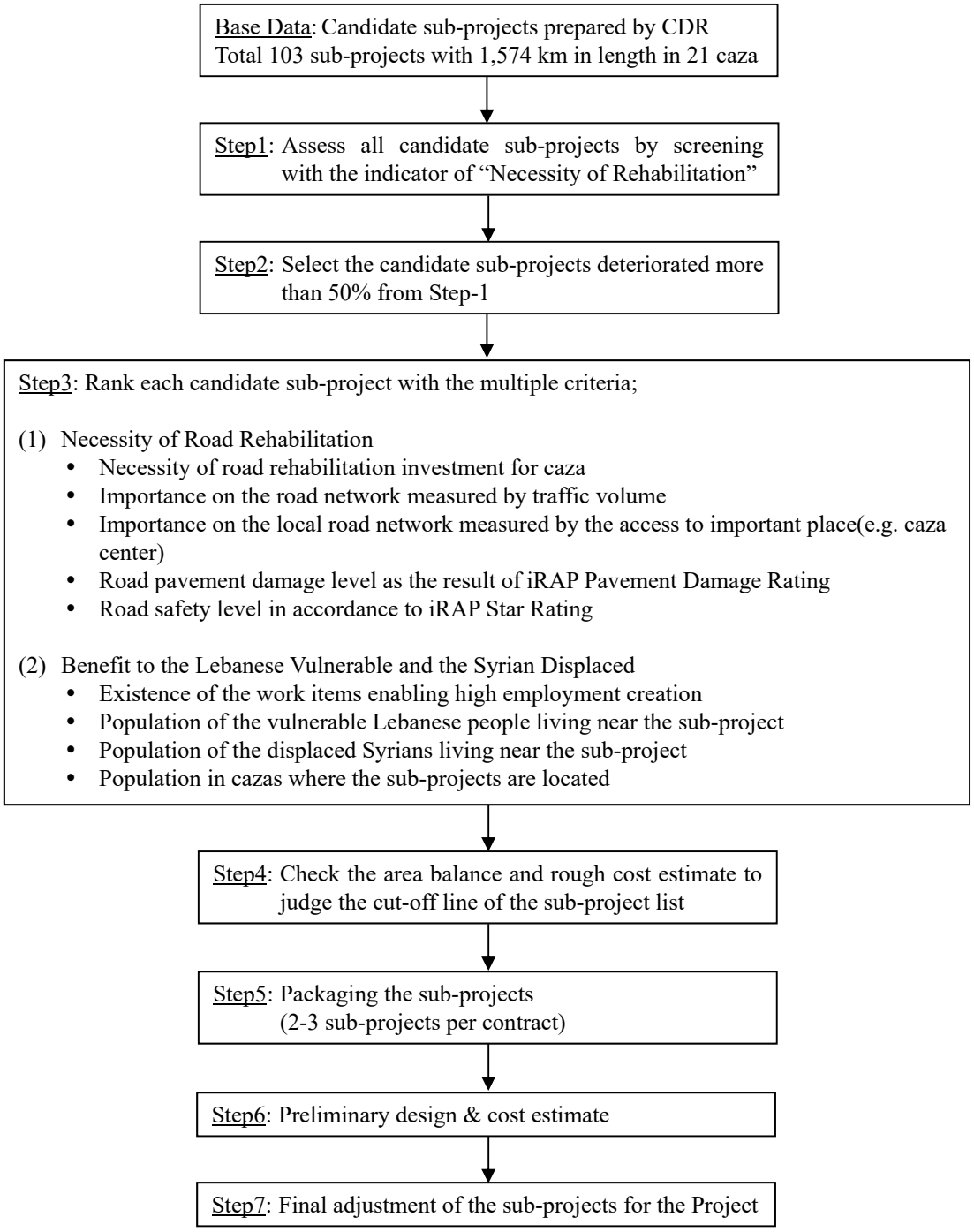


Figure 3.2.1 Sub-project Selection Method and Procedure

(1) Step-1: Assess all candidate sub-projects by screening with the indicator of necessity of rehabilitation

A road deterioration ratio, which the accumulated road length with iRAP pavement damage level at Rate 3, 4, 5 is divided by the total length, is calculated for each sub-project and applied as the screening indicator of necessity of rehabilitation.

(2) Step-2: Select candidate sub-projects deteriorated more than 50% from Step-1

Based on the road deterioration ratio calculated at Step-1, 73 candidate sub-projects, which have more than 50% of the road deterioration ratio, are screened from the original list (see Table 3.2.1)

Table 3.2.1 The List of Candidate Sub-projects in Step-2

NO.	Sub Project Name	Caza Name	Total Length	Ratio of detariorated condition	NO.	Sub Project Name	Caza Name	Total Length	Ratio of detariorated condition
1	Batroun_2b	Batroun	3.5	100%	38	Batroun_5	Batroun	19.5	71%
2	Hermel_1	Hermel	2.4	100%	39	Kesrouane_5	Kesrouane	16.0	70%
3	Jbail_4	Jbail	19.0	97%	40	Kesrouane_1d	Kesrouane	11.0	67%
4	Koura_2c	Koura	4.1	95%	41	Hermel_4a	Hermel	4.4	67%
5	El Metn_1d	El Metn	2.0	95%	42	Saida_11	Saida	5.0	66%
6	Koura_5b	Koura	3.9	95%	43	Jezzine_1a	Jezzine	9.7	66%
7	Kesrouane_1c	Kesrouane	3.5	94%	44	Batroun_4	Batroun	8.6	65%
8	Koura_3	Koura	3.5	94%	45	Koura_2b	Koura	5.6	64%
9	Kesrouane_6	Kesrouane	9.9	94%	46	Akkar_3	Akkar	33.6	64%
10	Saida_7	Saida	3.1	94%	47	Zgharta_1b	Zgharta	10.9	63%
11	Koura_1b	Koura	7.5	93%	48	Baalbek_4	Baalbek	33.7	63%
12	Batroun_2a	Batroun	8.6	93%	49	Kesrouane_1b	Kesrouane	20.1	63%
13	Saida_3	Saida	2.8	93%	50	Koura_4	Koura	20.6	62%
14	Jbail_1	Jbail	18.6	91%	51	Kesrouane_2	Kesrouane	43.6	62%
15	Bcharre_1a	Bcharre	5.2	88%	52	Zgharta_1c	Zgharta	8.9	62%
16	Batroun_3	Batroun	9.5	88%	53	Batroun_1	Batroun	32.8	61%
17	Akkar_2a	Akkar	28.0	87%	54	Chouf_2	Chouf	8.6	60%
18	Saida_6	Saida	8.6	86%	55	Kesrouane_4	Kesrouane	23.2	60%
19	Sour_1b	Sour	9.5	85%	56	Minie-Danniye_2	Minie-Danniye	11.5	60%
20	Saida_2	Saida	5.5	85%	57	Bent Jbail_1b	Bent Jbail	10.7	59%
21	Zahle_1b	Zahle	6.3	83%	58	Aley_1	Aley	14.3	58%
22	Zahle_2	Zahle	33.1	82%	59	Koura_5a	Koura	11.3	58%
23	Koura_1a	Koura	12.2	82%	60	El Metn_1b	El Metn	6.7	58%
24	Jezzine_2	Jezzine	5.1	81%	61	Baabda_3	Baabda	7.4	58%
25	Jezzine_3a	Jezzine	7.1	79%	62	Saida_9	Saida	9.8	57%
26	Koura_2a	Koura	20.1	78%	63	Baalbek_3	Baalbek	25.9	57%
27	Kesrouane_1a	Kesrouane	10.6	77%	64	Saida_10	Saida	2.8	57%
28	Hermel_2	Hermel	4.6	77%	65	Jezzine_3b	Jezzine	13.6	56%
29	Baalbek_1	Baalbek	33.0	76%	66	Minie-Danniye_3b	Minie-Danniye	2.2	56%
30	Zahle_1a	Zahle	8.7	76%	67	Bcharre_1b	Bcharre	53.5	55%
31	Jezzine_1b	Jezzine	17.4	73%	68	El Metn_2	El Metn	21.4	54%
32	Akkar_1	Akkar	42.8	73%	69	Baalbek_2	Baalbek	38.3	54%
33	Jbail_3	Jbail	19.2	72%	70	Aley_3	Aley	32.2	54%
34	Kesrouane_3	Kesrouane	4.0	72%	71	Saida_1	Saida	7.0	53%
35	Saida_12	Saida	10.4	72%	72	Saida_8	Saida	11.3	52%
36	Jbail_2	Jbail	32.5	71%	73	El Metn_1c	El Metn	6.0	50%
37	Saida_4	Saida	12.3	71%	**Total**			**1039.7**	

Souce: JICA Study Team

(3) Step-3: Rank all candidate sub-projects with the multiple criteria

To select the sub-projects to be funded by JICA, it is required to put a priority to all 73 candidate sub-projects screened in Step-2. For this purpose, two main criteria for the evaluation are employed, which comprises "Necessity of Road Rehabilitation" and "Benefit to the Lebanese Vulnerable People and the Syrian Displaced" and comprehensively assessed all 73 candidate sub-projects. The detailed sub-criteria under the main one are shown below, and the JICA Study Team comprehensively assessed each sub-project to the draft final candidate sub-project list by using the sub-criterion.

Necessity of Road Rehabilitation

- Necessity of investment for road rehabilitation by caza

  CDR has a basic policy that the investment for road rehabilitation should be distributed to a caza where the deteriorated level of its road network is high. Accordingly, road deterioration ratio per caza offered by CDR is applied as the sub-criterion.

- Importance on the road network measured by traffic volume

  Annual Average Traffic Volume counted in iRAP is applied as the sub-criterion.

- Importance on the local road network measured by the access to important place such as the caza center

  Connectivity to the important place e.g. caza center is applied as the sub-criterion.

- Road condition level in the result of iRAP Pavement Damage Evaluation

  The road deterioration ratio same as one in Step-1 is applied as the sub-criterion.

- Road safety level in accordance to iRAP Star Rating results

  iRAP Star Rating assessed the road safety level for four main road users including "Vehicle occupant", "Pedestrian", "Motorcyclist" and "Bicyclist". Since the road safety level is closely associated with the safety for Vehicle Occupant, iRAP Star Rating for Vehicle Occupant is applied as the sub-criterion.

Impact to the Lebanese Vulnerable and the Syrian Displaced

- Volume of the work items enabling high employment creation

  "Employment creation" is one of the objectives of the Project. There are many work items in road rehabilitation projects such as pavement, drainage, lane marking, retaining walls, etc. Among them, side ditch installation work can be regarded as one with a relatively high ratio of unskilled labor usage. Accordingly, as a representative work item for high employment creation, the installation length of the side ditch shall be estimated based on the satellite map or video observation taken in Visual Survey, and then, a side ditch ratio, which the side ditch length to be installed is divided by the total sub-project length, shall be applied as the sub-criterion.

- Population of the vulnerable Lebanese people living near the sub-project location

  Population of the Lebanese living on less than 4 USD/day in caza where the sub-project is located is applied as the sub-criterion.

- Population of the displaced Syrians living near the sub-project location

  Population of the displaced Syrians in the cazas where the sub-project is located is applied as the sub-criterion.

- Population of the cazas where the sub-projects are located

  Population in cazas where the sub-projects are located is applied as the sub-criterion.

Table 3.2.2 The List of Each Criterion and Rating Category for Necessity of Road Rehabilitation

	Road Deterioration Ratio per Caza	Annual Average Traffic Volume	Connectivity to important place (caza center)	Road deterioration ratio of sub-project	Vehicle Star Rating
Maximum	69%	41,300	-	100%	1.00
Minimum	17%	112	-	0%	2.84
Average	40%	11,988	-	55%	1.47
Median	40%	9,630	-	61%	1.37
Rate 5	60% - 70%	40,000 -	-	80% - 100%	1 - 0
Rate 4	50% - 60%	30,000 - 40,000	-	60% - 80%	2 - 1
Rate 3	40% - 50%	20,000 - 30,000	Connect	40% - 60%	3- 2
Rate 2	30% -40%	10,000 - 20,000	-	20% -40%	4 - 3
Rate 1	0% - 30%	0 - 10,000	Not connect	0% - 20%	5 - 4
Source	CDR	iRAP	JICA study team	iRAP	iRAP

Table 3.2.3 The List of Each Criterion and Rating Category for Creation of Employment Opportunity

	Side Ditch Ratio	Population of Lebanese living less than 4 USD/day	Population of the Syrian displaced	Population in caza
Maximum	100%	169,823	162,510	675,054
Minimum	0%	5,686	2,380	24,643
Average	31%	44,640	38,502	224,790
Median	28%	21,886	22,802	173,397
Rate 5	80% - 100%	140,000 -	130,000 -	550,000 -
Rate 4	60% - 80%	100,000 - 140,000	100,000 - 130,000	400,000 - 550,000
Rate 3	40% - 60%	70,000 - 100,000	70,000 - 100,000	300,000 - 400,000
Rate 2	20% -40%	30,000 - 70,000	30,000 - 70,000	150,000 - 300,000
Rate 1	0 %- 20%	0 - 30,000	0 - 30,000	0 - 150,000
Source	JICA study team	UNHCR	UNHCR	UNHCR* Syria Regional Refugee Response

* Syria Regional Refugee Response Inter-agency Information Sharing Portal
http://data.unhcr.org/syrianrefugees/country.php?id=122

Source: mentioned above

(4) Step-4: Check the Area balance and rough cost estimate to judge the cut-off line

Firstly, for estimating the total sub-project cost for the JICA portion, we utilizes the unit rate of USD 0.5 million/km for the road section with Rate 3, 4 and 5, and one of USD 0.1million/km for the road section with Rate 1 and 2, which are recommended by CDR. According to CDR, whereas the unit cost of USD 0.5million/km comprises both road rehabilitation works and installation of road safety facility, the unit cost of USD 0.1 million/km contains only for the road safety countermeasures.

Secondly, the prioritized candidate sub-projects list formulated at Step-3 are utilized to find out the cut-off line of the total USD 107million for the JICA portion. In this step, the JICA Study Team applied a concept, which is “one sub-project per caza but its total length with more than 10km”, to finalize the sub-project list to be funded by JICA to secure the fairness of the selection per caza. As a result, a total 27 road sections (sub-projects) are selected in seventeen cazas as shown in Table 3.2.4., which describes the breakdown of the evaluation scores.

To the end, the selected sub-projects by the JICA Study Team would be adjusted by CDR, considering the area balance of the sub-project distribution to each caza. Table 3.2.5 and Figure 3.2.2 shows the sub-project list in Step-4 for the Project.

Table 3.2.4 Evaluation Results of Candidate Sub-projects (colored yellows are selected subprojects)

Name	caza_na	caza_id	Total length	Length of Bad condition (rate 3,4,5)	Length of Good condition (rate 1,2)	Ratio of detariorated condition	Cost Estimation(MUSD) good condition: 0.1 MUSD/km bad condition: 0.5MUSD/km	Road deterioration ratio per caza Rate 5: 80% – 100% Rate 4: 60% – 80% Rate 3: 40% – 60% Rate 2: 20% – 40% Rate 1: 0% – 20%		AADT Rate 5: 40,000 – Rate 4: 30,000 – 40,000 Rate 3: 20,000 – 30,000 Rate 2: 10,000 – 20,000 Rate 1: – 10,000		Accessibility of caza center Rate 3: access Rate 1: not access	IRAP rating(Safety) Rate 5: 0 – 1 Rate 4: 1 – 2 Rate 3: 2 – 3 Rate 2: 3 – 4 Rate 1: 4 – 5		Road Condition Rate 5: 80% – 100% Rate 4: 60% – 80% Rate 3: 40% – 60% Rate 2: 20% – 40% Rate 1: 0% – 20%		LBT work volume drainage length Rate 5: 80% – 100% Rate 4: 60% – 80% Rate 3: 40% – 60% Rate 2: 20% – 40% Rate 1: 0% – 20%		Population Rate 5: 550,000 – Rate 4: 400,000 – 550,000 Rate 3: 300,000 – 400,000 Rate 2: 150,000 – 300,000 Rate 1: – 150,000		Syrians Displaced Rate 5: 130,000 – Rate 4: 100,000 – 130,000 Rate 3: 70,000 – 100,000 Rate 2: 30,000 – 70,000 Rate 1: – 30,000		Lebanese vainerables (Population less than 4USD) Rate 5:140,000 – Rate 4: 100,000 – 140,000 Rate 3:70,000 – 100,000 Rate 2: 40,000 – 70,000 Rate 1: – 40,000		Total Point	JICA amount	Length
Saida_7	Saida	25	3.1	2.9	0.2	94%	1.5	47%	3	7,815	1	1	1.3	4	94%	5	61%	4	402,542	4	44,462	2	114,190	4	28	1	3
Saida_3	Saida	25	2.8	2.6	0.2	93%	1.3	47%	3	20,832	3	3	2.4	3	93%	5	0%	1	402,542	4	44,462	2	114,190	4	28	1	3
Akkar_2a	Akkar	1	28.0	24.4	3.5	87%	12.6	54%	3	9,468	1	1	1.1	4	87%	5	16%	1	428,386	4	104,002	4	169,823	5	28	13	28
Zahle_1b	Zahle	18	6.3	5.2	1.1	83%	2.7	53%	3	13,050	2	1	2.2	3	83%	5	71%	4	429,278	4	162,510	5	39,279	1	28	3	6
Zahle_2	Zahle	18	33.1	27.2	5.9	82%	14.2	53%	3	16,299	2	1	1.9	4	82%	5	45%	3	429,278	4	162,510	5	39,279	1	28		
Zahle_1a	Zahle	18	8.7	6.6	2.1	76%	3.5	53%	3	34,975	4	3	2.4	3	76%	4	0%	1	429,278	4	162,510	5	39,279	1	28	4	9
Baalbek_4	Baalbek	8	33.7	21.2	12.5	63%	11.9	44%	3	10,760	2	1	1.9	4	63%	4	46%	3	416,087	4	117,924	4	74,309	3	28	12	34
Baabda_3	Baabda	3	7.4	4.3	3.1	58%	2.5	34%	2	13,351	2	1	1.6	4	58%	3	62%	4	675,054	5	81,324	3	127,721	4	28	2	7
Akkar_1	Akkar	1	42.8	31.1	11.7	73%	16.7	54%	3	8,258	1	1	1.4	4	73%	4	19%	1	428,386	4	104,002	4	169,823	5	27		
Akkar_3	Akkar	1	33.6	21.6	12.0	64%	12.0	54%	3	9,508	1	1	1.4	4	64%	4	16%	1	428,386	4	104,002	4	169,823	5	27		
Baalbek_2	Baalbek	8	38.3	20.7	17.6	54%	12.1	44%	3	10,047	2	1	1.5	4	54%	3	44%	3	416,087	4	117,924	4	74,309	3	27		
Saida_6	Saida	25	8.6	7.4	1.2	86%	3.8	47%	3	8,229	1	1	1.3	4	86%	5	23%	2	402,542	4	44,462	2	114,190	4	26	4	9
Baalbek_3	Baalbek	8	25.9	14.8	11.1	57%	8.5	44%	3	16,960	2	3	2.1	3	57%	3	18%	1	416,087	4	117,924	4	74,309	3	26		
Saida_1	Saida	25	7.0	3.7	3.3	53%	2.2	47%	3	10,021	2	1	1.1	4	53%	3	52%	3	402,542	4	44,462	2	114,190	4	26		
Saida_2	Saida	25	5.5	4.7	0.8	85%	2.4	47%	3	5,995	1	1	1.1	4	85%	5	7%	1	402,542	4	44,462	2	114,190	4	25		
Baalbek_1	Baalbek	8	33.0	25.2	7.8	76%	13.4	44%	3	18,504	2	1	2.5	3	76%	4	18%	1	416,087	4	117,924	4	74,309	3	25		
Saida_12	Saida	25	10.4	7.5	2.9	72%	4.0	47%	3	10,475	2	1	1.9	4	72%	4	13%	1	402,542	4	44,462	2	114,190	4	25		
Saida_4	Saida	25	12.3	8.7	3.6	71%	4.7	47%	3	8,679	1	1	1.2	4	71%	4	21%	2	402,542	4	44,462	2	114,190	4	25		
Saida_9	Saida	25	9.8	5.6	4.2	57%	3.2	47%	3	26,471	3	1	1.0	4	57%	3	0%	1	402,542	4	44,462	2	114,190	4	25		
Saida_8	Saida	25	11.3	5.8	5.5	52%	3.5	47%	3	5,658	1	1	1.7	4	52%	3	49%	3	402,542	4	44,462	2	114,190	4	25		
Koura_3	Koura	12	3.5	3.3	0.2	94%	1.7	69%	4	30,406	4	1	1.8	4	94%	5	49%	3	71,323	1	15,950	1	11,915	1	24	2	3
Sour_1b	Sour	26	9.5	8.1	1.4	85%	4.2	21%	2	8,871	1	1	1.2	4	85%	5	65%	4	314,079	3	27,424	1	73,155	3	24	4	9
Saida_11	Saida	25	5.0	3.3	1.7	66%	1.8	47%	3	7,791	1	1	1.5	4	66%	4	14%	1	402,542	4	44,462	2	114,190	4	24		
Koura_2b	Koura	12	5.6	3.6	2.0	64%	2.0	69%	4	8,047	1	3	1.1	4	64%	4	93%	5	71,323	1	15,950	1	11,915	1	24	2	6
Saida_10	Saida	25	2.8	1.6	1.2	57%	0.9	47%	3	13,765	2	1	1.1	4	57%	3	0%	1	402,542	4	44,462	2	114,190	4	24		
El Metn_1c	El Metn	5	6.0	3.0	3.0	50%	1.8	35%	2	8,618	1	1	1.0	4	50%	3	72%	4	504,838	4	41,593	2	47,873	2	23	2	6
Koura_2c	Koura	12	4.1	3.9	0.2	95%	2.0	69%	4	17,257	2	1	1.4	4	95%	5	45%	3	71,323	1	15,950	1	11,915	1	22	2	4
El Metn_1d	El Metn	5	2.0	1.9	0.1	95%	1.0	35%	2	4,098	1	1	1.0	4	95%	5	0%	1	504,838	4	41,593	2	47,873	2	22	1	2
Koura_1b	Koura	12	7.5	7.0	0.5	93%	3.5	69%	4	5,699	1	1	1.1	4	93%	5	74%	4	71,323	1	15,950	1	11,915	1	22		
Jbail_1	Jbail	6	18.6	17.0	1.6	91%	8.7	63%	4	22,014	3	1	1.3	4	91%	5	24%	2	90,008	1	6,151	1	12,436	1	22	9	19
Bcharre_1a	Bcharre	11	5.2	4.6	0.6	88%	2.4	51%	3	8,132	1	3	1.4	4	88%	5	48%	3	25,169	1	2,380	1	5,686	1	22	2	5
Koura_1a	Koura	12	12.2	10.0	2.2	82%	5.2	69%	4	2,404	1	1	1.3	4	82%	5	61%	4	71,323	1	15,950	1	11,915	1	22		
Batroun_1	Batroun	10	32.8	19.9	12.9	61%	11.2	62%	4	13,021	2	3	1.4	4	61%	4	33%	2	66,340	1	12,951	1	11,399	1	22	11	33
Minie-Danniye_2	Minie-Danniye	13	11.5	6.9	4.6	60%	3.9	40%	3	5,751	1	1	1.1	4	60%	3	51%	3	249,580	2	58,061	2	76,332	3	22	4	11
Bcharre_1b	Bcharre	11	53.5	29.3	24.2	55%	17.1	51%	3	14,510	2	3	1.1	4	55%	3	72%	4	25,169	1	2,380	1	5,686	1	22		
Batroun_2a	Batroun	10	8.6	8.0	0.6	93%	4.0	62%	4	10,238	2	1	1.6	4	93%	5	27%	2	66,340	1	12,951	1	11,399	1	21		
Jezzine_2	Jezzine	24	5.1	4.1	1.0	81%	2.2	41%	3	1,669	1	1	1.0	4	81%	5	78%	4	24,643	1	2,895	1	9,240	1	21	2	5
Jezzine_3a	Jezzine	24	7.1	5.6	1.5	79%	3.0	41%	3	219	1	3	1.0	4	79%	4	51%	3	24,643	1	2,895	1	9,240	1	21	3	7
Koura_4	Koura	12	20.6	12.8	7.8	62%	7.2	69%	4	12,630	2	1	1.9	4	62%	4	57%	3	71,323	1	15,950	1	11,915	1	21		
Zgharta_1c	Zgharta	15	8.9	5.5	3.4	62%	3.1	51%	3	12,200	2	1	1.1	4	62%	4	76%	4	72,914	1	14,982	1	13,988	1	21	3	9
El Metn_1b	El Metn	5	6.7	3.9	2.8	58%	2.2	35%	2	14,015	2	1	1.0	4	58%	3	12%	1	504,838	4	41,593	2	47,873	2	21	2	7
Batroun_2b	Batroun	10	3.5	3.5	0.0	100%	1.7	62%	4	4,468	1	1	1.0	4	100%	5	34%	2	66,340	1	12,951	1	11,399	1	20		
Kesrouane_6	Kesrouane	7	9.9	9.3	0.6	94%	4.7	54%	3	2,604	1	1	1.0	4	94%	5	26%	2	184,801	2	14,140	1	24,564	1	20	5	10
Batroun_3	Batroun	10	9.5	8.4	1.1	88%	4.3	62%	4	9,320	1	1	1.0	4	88%	5	38%	2	66,340	1	12,951	1	11,399	1	20		
Koura_2a	Koura	12	20.1	15.7	4.4	78%	8.3	69%	4	5,805	1	1	1.2	4	78%	4	58%	3	71,323	1	15,950	1	11,915	1	20		
Kesrouane_3	Kesrouane	7	4.0	2.9	1.1	72%	1.5	54%	3	1,106	1	1	1.3	4	72%	4	45%	3	184,801	2	14,140	1	24,564	1	20		
Batroun_4	Batroun	10	8.6	5.6	3.0	65%	3.1	62%	4	9,268	1	1	1.0	4	65%	4	41%	3	66,340	1	12,951	1	11,399	1	20		
Zgharta_1b	Zgharta	15	10.9	6.9	4.0	63%	3.9	51%	3	13,749	2	3	1.1	4	63%	4	13%	1	72,914	1	14,982	1	13,988	1	20	4	11
Kesrouane_1b	Kesrouane	7	20.1	12.5	7.5	63%	7.0	54%	3	11,960	2	1	1.4	4	63%	4	35%	2	184,801	2	14,140	1	24,564	1	20	7	20
Chouf_2	Chouf	4	8.6	5.2	3.4	60%	2.9	33%	2	7,350	1	1	1.5	4	60%	4	44%	3	242,043	2	50,097	2	34,884	1	20	3	9
Aley_1	Aley	2	14.3	8.3	5.9	58%	4.8	43%	3	18,393	2	1	1.6	4	58%	3	24%	2	251,025	2	55,801	2	37,471	1	20	5	14
Koura_5a	Koura	12	11.3	6.6	4.7	58%	3.8	69%	4	27,898	3	1	1.3	4	58%	3	30%	2	71,323	1	15,950	1	11,915	1	20		
Minie-Danniye_3b	Minie-Danniye	13	2.2	1.2	1.0	56%	0.7	40%	3	7,183	1	1	1.0	4	56%	3	0%	1	249,580	2	58,061	2	76,332	3	20		
El Metn_2	El Metn	5	21.4	11.6	9.8	54%	6.8	35%	2	7,678	1	1	1.2	4	54%	3	17%	1	504,838	4	41,593	2	47,873	2	20		
Hermel_1	Hermel	9	2.4	2.4	0.0	100%	1.2	18%	1	1,045	1	1	1.1	4	100%	5	79%	4	46,872	1	6,072	1	12,256	1	19		
Jbail_4	Jbail	6	19.0	18.4	0.6	97%	9.3	63%	4	6,239	1	1	1.4	4	97%	5	17%	1	90,008	1	6,151	1	12,436	1	19		
Koura_5b	Koura	12	3.9	3.7	0.2	95%	1.9	69%	4	8,670	1	1	2.5	3	95%	5	36%	2	71,323	1	15,950	1	11,915	1	19		
Kesrouane_1c	Kesrouane	7	3.5	3.3	0.2	94%	1.7	54%	3	2,586	1	1	1.5	4	94%	5	0%	1	184,801	2	14,140	1	24,564	1	19		
Jbail_2	Jbail	6	32.5	23.1	9.4	71%	12.5	63%	4	5,019	1	1	1.0	4	71%	4	29%	2	90,008	1	6,151	1	12,436	1	19		
Batroun_5	Batroun	10	19.5	13.8	5.7	71%	7.5	62%	4	5,456	1	1	1.1	4	71%	4	31%	2	66,340	1	12,951	1	11,399	1	19		
Kesrouane_5	Kesrouane	7	16.0	11.2	4.8	70%	6.1	54%	3	6,680	1	1	1.0	4	70%	4	27%	2	184,801	2	14,140	1	24,564	1	19		
Jezzine_1a	Jezzine	24	9.7	6.4	3.3	66%	3.5	41%	3	1,408	1	1	1.1	4	66%	4	58%	3	24,643	1	2,895	1	9,240	1	19		
Kesrouane_2	Kesrouane	7	43.6	27.0	16.6	62%	15.1	54%	3	12,363	2	1	1.0	4	62%	4	5%	1	184,801	2	14,140	1	24,564	1	19		
Kesrouane_4	Kesrouane	7	23.2	14.0	9.2	60%	7.9	54%	3	6,084	1	1	1.3	4	60%	4	21%	2	184,801	2	14,140	1	24,564	1	19		
Aley_3	Aley	2	32.2	17.3	14.9	54%	10.2	43%	3	6,245	1	1	1.1	4	54%	3	38%	2	251,025	2	55,801	2	37,471	1	19		
Kesrouane_1a	Kesrouane	7	10.6	8.1	2.5	77%	4.3	54%	3	8,196	1	1	1.2	4	77%	4	4%	1	184,801	2	14,140	1	24,564	1	18		
Jezzine_1b	Jezzine	24	17.4	12.8	4.6	73%	6.8	41%	3	2,588	1	1	1.0	4	73%	4	23%	2	24,643	1	2,895	1	9,240	1	18		
Jbail_3	Jbail	6	19.2	13.9	5.3	72%	7.5	63%	4	5,082	1	1	1.2	4	72%	4	13%	1	90,008	1	6,151	1	12,436	1	18		
Kesrouane_1d	Kesrouane	7	11.0	7.3	3.7	67%	4.0	54%	3	7,362	1	1	1.0	4	67%	4	10%	1	184,801	2	14,140	1	24,564	1	18		
Hermel_4a	Hermel	9	4.4	2.9	1.5	67%	1.6	18%	1	3,004	1	3	1.5	4	67%	4	30%	2	46,872	1	6,072	1	12,256	1	18		
Jezzine_3b	Jezzine	24	13.6	7.6	6.0	56%	4.4	41%	3	1,579	1	1	1.0	4	56%	3	43%	3	24,643	1	2,895	1	9,240	1	18		
Hermel_2	Hermel	9	4.6	3.5	1.1	77%	1.9	18%	1	1,164	1	1	1.2	4	77%	4	22%	2	46,872	1	6,072	1	12,256	1	16		
Bent Jbail_1b	Bent Jbail	19	10.7	6.3	4.4	59%	3.6	17%	1	112	1	1	2.4	3	59%	3	0%	1	77,871	1	7,605	1	17,389	1	13		
			1,040				**390**																			**112**	**289**

Souce: JICA Study Team

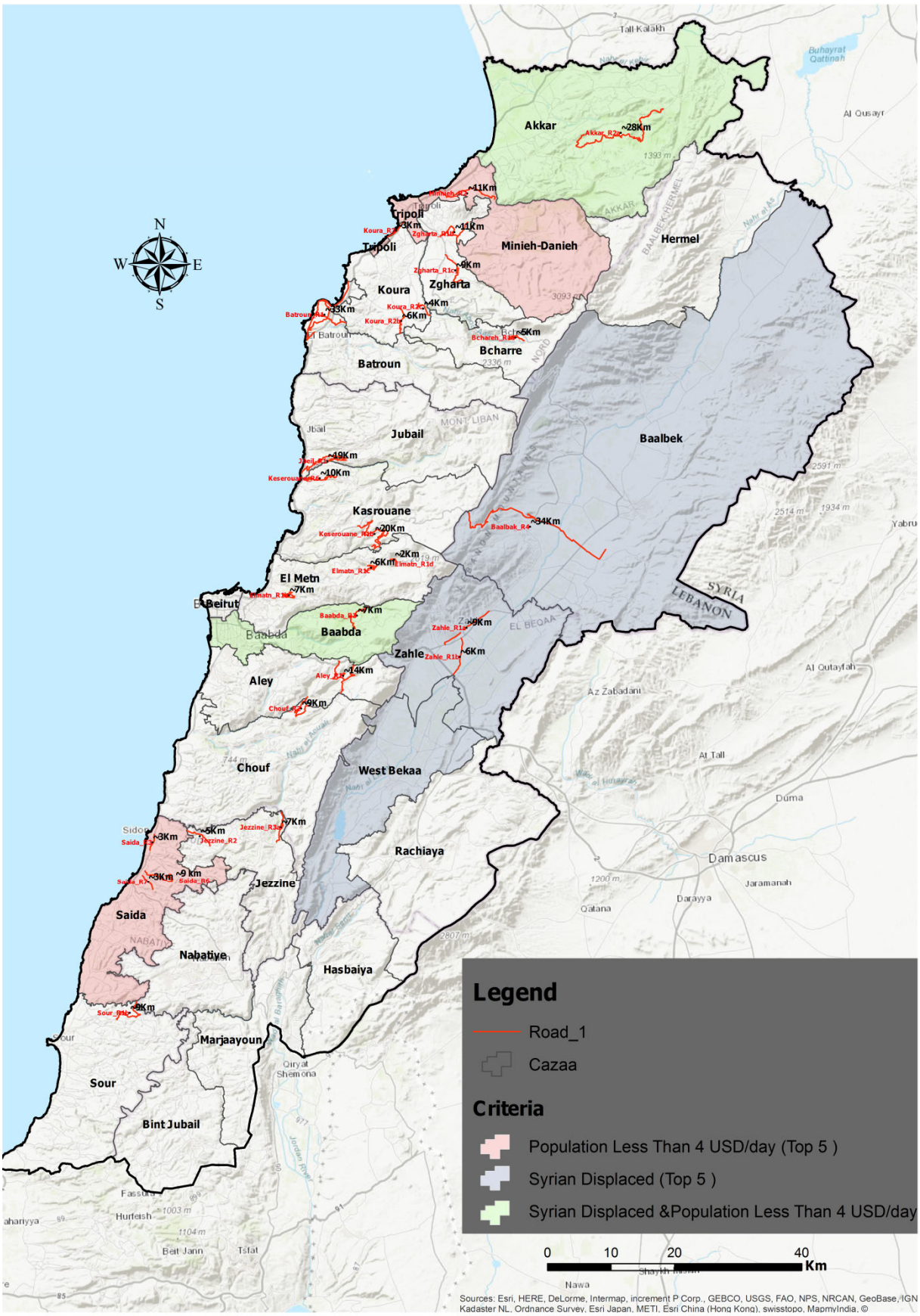


Figure 3.2.2 Location Map for Sub-projects Selected in Step-4

Table 3.2.5 Sub-project List selected in Step-4

NO.	Name	caza_na	Total length
1	Saida_7	Saida	3.1
2	Saida_3	Saida	2.8
3	Akkar_2a	Akkar	28.0
4	Zahle_1b	Zahle	6.3
5	Zahle_1a	Zahle	8.7
6	Baalbek_4	Baalbek	33.7
7	Baabda_3	Baabda	7.4
8	Saida_6	Saida	8.6
9	Koura_3	Koura	3.5
10	Sour_1b	Sour	9.5
11	Koura_2b	Koura	5.6
12	El Metn_1c	El Metn	6.0
13	Koura_2c	Koura	4.1
14	El Metn_1d	El Metn	2.0
15	Jbail_1	Jbail	18.6
16	Bcharre_1a	Bcharre	5.2
17	Batroun_1	Batroun	32.8
18	Minie-Danniye_2	Minie-Danniye	11.5
19	Jezzine_2	Jezzine	5.1
20	Jezzine_3a	Jezzine	7.1
21	Zgharta_1c	Zgharta	8.9
22	El Metn_1b	El Metn	6.7
23	Kesrouane_6	Kesrouane	9.9
24	Zgharta_1b	Zgharta	10.9
25	Kesrouane_1b	Kesrouane	20.1
26	Chouf_2	Chouf	8.6
27	Aley_1	Aley	14.3
Total			**289.0**

Source: JICA Study Team

(5) Step-5: Packaging the sub-projects

The sub-projects for the JICA portion will be packaged for tendering purposes, in which one package contains 2-3 sub-projects, based on the proximity of the sub-projects in consideration of the capability of the local contractors.

(6) Step-6: Preliminary design & cost estimate

Based on video data and satellite maps, the preliminary design of the selected sub-projects and cost estimation shall be conducted while defining the work items that can create more employment for laborers in sub-projects.

(7) Step-7: Final adjustment of the subprojects

Some sub-projects listed in Step-4 are requested to replace as a result of consultation with municipalities and relevant authorities. In response to the request, JICA Study Team and CDR had a meeting on replacement/modification of the said sub-projects, considering rehabilitation situation,

contents of the request, degree on consensus of the request among people concerned. CDR had a clear policy on the replacement of the sub-project road, which are 1) rehabilitation has been completed for all rehabilitation items planed, including pavement works and safety measure installation, 2) the sub-project road should be a classified road according to Lebanese road category. Based on such policies, the both side agreed the following replacement/modification of the subproject roads shown in Table 3.2.6

Table 3.2.6 Subproject Modification in Step-7

Sub-project in Step 4			Modification		
Sub-project	**Caza**	**Length (km)**	**Sub-project**	**Caza**	**Length (km)**
Jezzine 3	Jezzine	7.1	Jezzine 4	Jezzine	6.0
Saida 7	Saida	3.1	Saida 7	Saida	4.3

Source: JICA Study Team

To the end, Table 3.2.7 and Figure 3.2.3 show the final 27 sub-projects selected to be financed by JICA for the Project.

Table 3.2.7 Sub-project List selected

NO.	Name	caza_na	Total length
1	Saida_7	Saida	3.1
1-2	Saida_7add	Saida	1.2
2	Saida_3	Saida	2.8
3	Akkar_2a	Akkar	28.0
4	Zahle_1b	Zahle	6.3
5	Zahle_1a	Zahle	8.7
6	Baalbek_4	Baalbek	33.7
7	Baabda_3	Baabda	7.4
8	Saida_6	Saida	8.6
9	Koura_3	Koura	3.5
10	Sour_1b	Sour	9.5
11	Koura_2b	Koura	5.6
12	El Metn_1c	El Metn	6.0
13	Koura_2c	Koura	4.1
14	El Metn_1d	El Metn	2.0
15	Jbail_1	Jbail	18.6
16	Bcharre_1a	Bcharre	5.2
17	Batroun_1	Batroun	32.8
18	Minie-Danniye_2	Minie-Danniye	11.5
19	Jezzine_2	Jezzine	5.1
20	Jezzine_4	Jezzine	6.0
21	Zgharta_1c	Zgharta	8.9
22	El Metn_1b	El Metn	6.7
23	Kesrouane_6	Kesrouane	9.9
24	Zgharta_1b	Zgharta	10.9
25	Kesrouane_1b	Kesrouane	20.1
26	Chouf_2	Chouf	8.6
27	Aley_1	Aley	14.3
Total			**289.1**

Source: JICA Study Team

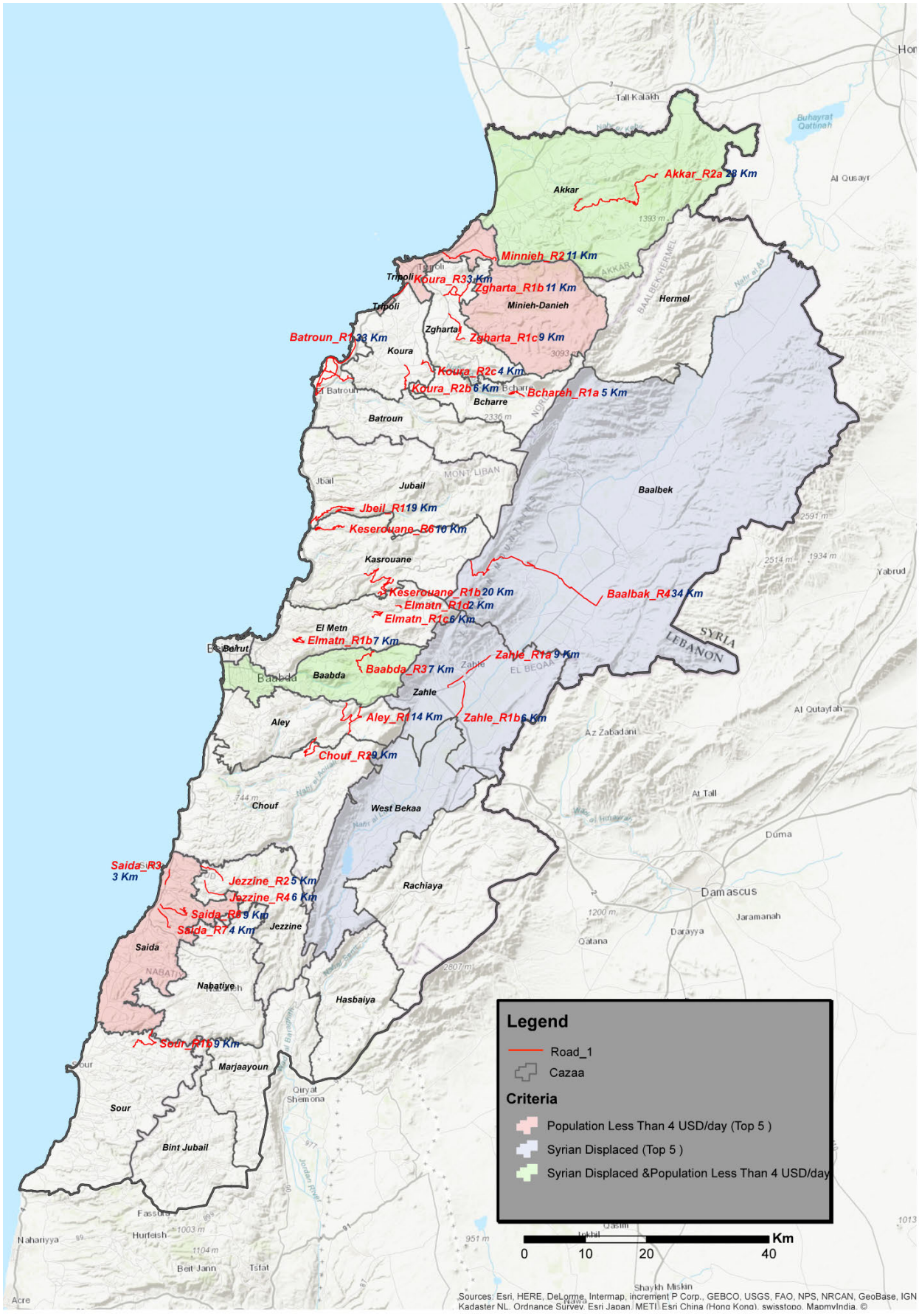


Figure 3.2.3 Location Map for Sub-projects Selected

CHAPTER 4 PRELIMINARY DESIGN FOR SUB-PROJECTS

4.1 Characteristics of Road Sections selected for Sub-projects

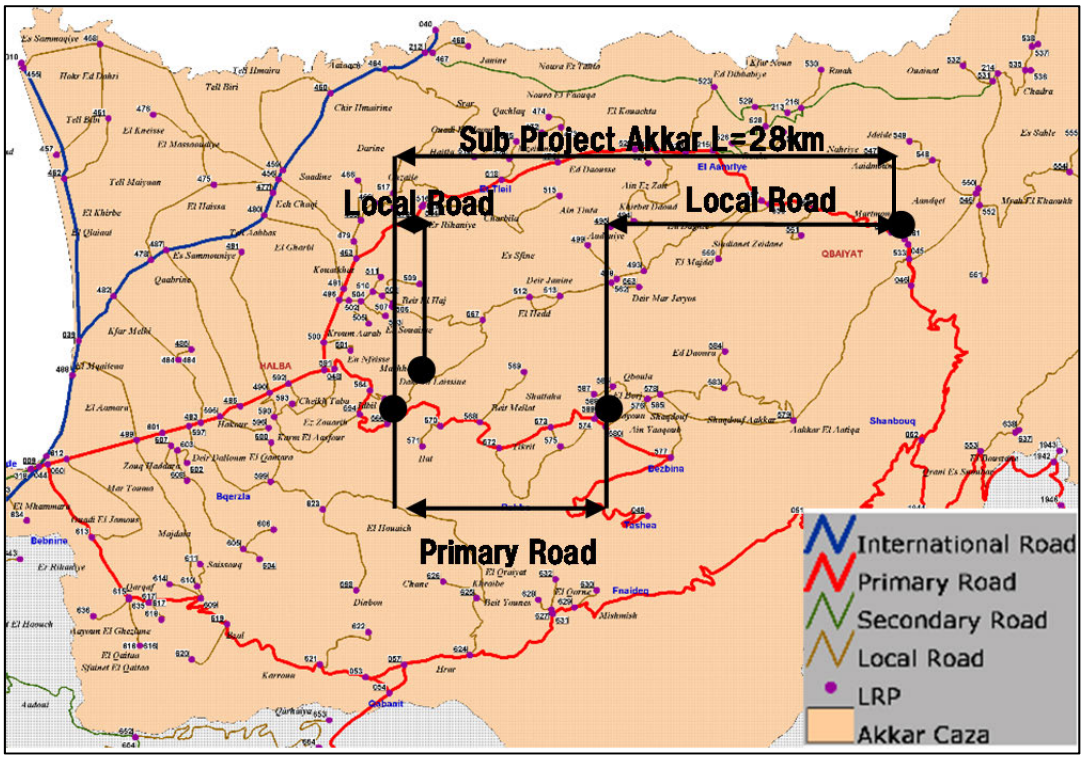
Road sections with a total of 289.1 km in length are selected as the sub-projects for the Project to be financed by JICA by using multiple criteria including pavement damage level, road safety level and the importance of the road network and impacts to vulnerable Lebanese citizens and the displaced Syrians, etc. The following sub-chapters describes the characteristics of the said road sections for the sub-projects including road classification, roadside conditions, and the damage status of pavement from the results of Visual Survey explained in Chapter 3.

4.1.1 Road Classification

Roads in Lebanon are mainly classified into the four categories mentioned below, although the road sections for the sub-projects do not include "Highway-International Road".

- Highway (International Road)
- Primary Road
- Secondary Road
- Local Road

The sub-projects to be financed by JICA have been determined by multiple criteria (including the approximate amount of the rehabilitation cost for JICA portion) from the candidate sub-project list prepared by CDR. The road length of each sub-project is examined by CDR and some sub-projects are comprised of road sections with different road classes. Accordingly, the design speed may vary within one sub-project.



Source: JICA Survey Team

Figure 4.1.1 Target section and road classification (Akkar 2a)

Thus, since the design speed may be varied by road sections where the road class is different, it is necessary to consider traffic safety measures in the preliminary design of each sub-project.

4.1.2 Roadside Conditions

The road length of each sub-project ranges from approximately 2km to 33km and there is a large difference in the road length among the sub-projects. A sub-project with a long road length passes through several local cities, towns and villages and the terrain along the sub-project changes in hilly and mountainous areas. The JICA Study Team grasped such roadside conditions from the results of the visual survey records. Figure 4.1.2 shows an example of changes in the road side conditions along the sub-project.

Zgharta 1a L=8.7km (Red Line)
Terrain: Urban and Town and Rolling

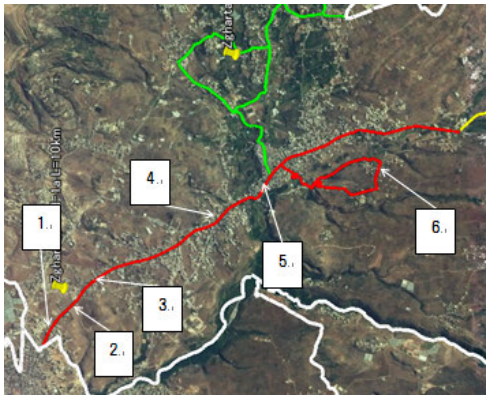


	
Photo 1 Urban Area	Photo 2 Town Area
	
Photo3 Town and Rolling Area	Photo 4 Urban Area
	
Photo 5 Urban Area	Photo 6 Rolling Area

Source: JICA Survey Team

Figure 4.1.2 Roadside Conditions along the Sub-project named Zgharta_1a

4.1.3 Current Road Conditions

(1) Pavement conditions

The iRAP pavement rating assesses the damage level of pavement on the road sections at every 10m and its evaluation items are comprised of (i) Unevenness; (ii) Ruts; (iii) The Final Layer, which describes the damage situation from the surface to the sub-base such as the presence of pot holes, etc.; (iv) Fatigue/Crocodile Cracks; and (v) Repair history. Such evaluation results for every 10m of the road section are converted to ones for every 100m of the road segment by a method of "pavement rating, smoothed". The following describes the said method;

In case that 100m of the road section comprises the following multiple 10m segments with the pavement rate, the worst score of Rate 5 shall be allocated as the one representing the entire 100m of the road section;

- 5 road segments are rated with a score of 3 among 10 segments – deteriorated pavement condition,
- 3 road segments with a score of 4 among 10 segments– poor pavement condition,
- 2 road segments with a score of 5 among 10 segments– very poor pavement condition

This rule means that the worst rate of a certain 10m segment represent the pavement conditions of the entire 100m road section.

The images of the pavement condition and its rating scores are shown in Table 4.1.1.

Table 4.1.1 The images of pavement condition with pavement rating

Photo Image	Pavement Rating
	**Rate 1: Very Good** Unevenness: Flat Ruts: No ruts The Final Layer: a damage to the subbase with 0%<X≤2.5% of the surface area Fatigue/Crocodile Cracks: 0%<X≤7.5% Repair history: no repair record, 0% Evaluation: Rehabilitation work on the pavement is not required, as the pavement is in very good condition
	**Rate 2: Good** Unevenness: Flat Ruts: No ruts The Final Layer: a damage to the subbase with 2.5%<X≤10% of the surface area Fatigue/Crocodile Cracks: 7.5%<X≤20% Repair history: 0%<X≤20% of the surface has been repaired before Evaluation: The pavement keeps in good condition. Although there are some cracks on the surface, the flatness of the road is not impaired.

Photo Image	Pavement Rating
	**Rate 3: Deteriorated** Unevenness: Visible Unevenness is observed Ruts: Visible ruts are observed The Final Layer: a damage to the subbase with 10%<X≤20% of the surface area Fatigue/Crocodile Cracks: 20%<X≤40% Repair history: 20%<X≤50% of the surface have been repaired before. Evaluation: The pavement deterioration is progressing, and the flatness of the road is impaired. Approximately 10% - 20% of the road bed is exposed and it is required to repair not only the road surface but also reconstruction from the subbase for the said section.
	**Rate 4: Poor** Unevenness: Visible Unevenness is observed Ruts: Visible ruts are observed The Final Layer: a damage to the subbase with 20%<X≤30% of the surface area Fatigue/Crocodile Cracks: 40%<X≤60% Repair history: 50%<X≤70% of the surface have been repaired before Evaluation: The pavement condition is in poor condition and the flatness of the road is impaired. Approximately 20% - 30% of the roadbed is exposed and there are a lot of cracks on the surface with approximately 50% of the area. Accordingly it is required to repair not only the road surface but also reconstruction from the subbase for the said section
	**Rate 5: Very Poor** Unevenness: Extremely Visible Unevenness is observed Ruts: Visible Extremely ruts are observed The Final Layer: a damage to the subbase with 30%<X of the surface area Fatigue/Crocodile Cracks: 60%<X Repair history: 70%<X of the surface area has been repaired before Evaluation: The pavement condition is in very poor condition and the flatness of the road is severely impaired. The roadbed is exposed at about 30% or more, and there are a lot of cracks on the surface of approximately 60% or more. Accordingly, it is required to repair from the subbase to the surface for the said section

(2) Conditions of Drainage Facility

In urban areas of Lebanon, a culvert drainage system is generally applied, although there are many places where drainage facilities are not installed, such as in hilly and mountainous areas. According to the information obtained from CDR, since the mountains run from the north to south in Lebanon, which results in formulating slopes to east or west from the center line of the mountain peak, they thought that drainage facilities along the hilly and mountainous roads is not required because rainwater is naturally discharged according to the slopes. However, in recent concepts, drainage (open ditches) facilities have been installed for newly constructed roads in the hilly and mountain areas in order to avoid pavement damage and slope erosion.

Table 4.1.2 Road Cross Sections in Rural Area

	
Photo 1 Road running in mountainous area	Photo 2 Road running in hilly area
	
Photo 3 Interviewing to the contractor working in Jbail	Photo 4 Road under construction in Jbail
	
Photo 5 Road under construction in Aley	Photo 6 Catch pit work in Aley

(3) Road Safety Measures

Through the joint site reconnaissance of the candidate sub-project road sections, it is observed that the current traffic safety measures on roads in Lebanon include regulation/warning signs, road markings, guardrails, concrete protection fences, lighting, humps, etc. In addition, continuous chatter bars are installed in the curved road sections to alert the driver. However, since the chatter bars have been used in Lebanon away from its original function which facilitates speed reduction to a driver for avoiding departure from the lane, the chatter bars can not be included as the road safety measure in the preliminary design for the Project.

Photo Chatter bar

4.2 Basic Policies for Road Rehabilitation for Preliminary Design

The basic policies for the road rehabilitation works for the sub-project are indicated in Table 4.2.1 as a result of consultation with CDR

Table 4.2.1 Basic Policies for Road Rehabilitation

Design Item	Basic policy
Alignment	Application of horizontal alignment according to the design speed as defined by AASHTO will require a lot of land acquisition outside of the ROW and compensation. Therefore, there is no change of the current road center for the sub-project. However, road safety measures shall be taken at the places where the horizontal and vertical alignment does not satisfy the AASHTOs requirements. Accordingly, no land acquisition and compensation shall occur.
Pavement	Pavement work shall be required for the road sections with a rate of 3-5 of iRAP pavement rating. However, since the CBR test and future traffic volume calculation are not planned in the Study, the typical pavement thickness and structure shall be proposed considering traffic volume level and general the road bed condition in the sub-project areas.
Drainage Facilities	There is no change of the practice of the current drainage system in the urban areas. In the hilly and mountainous sections of the rural areas, if space is available, drainage facilities, concrete drainage channels, shall be installed at the road's mountain side. The transverse drain pipe culvert (φ 600) will be installed every 1 km .
Retaining Wall	• The type of the retaining wall shall be with stone masonry, which is applicable LBT to the installation works. • The retaining walls at the mountain side shall be installed considering the topographical condition. • The retaining wall at the valley side shall be considered 5% of the total road section length due to the difficulty in judgement by video observation.
Road Safety Measures	• Installation of regulatory/warning signs. • Installation of a curved mirror at sharp corners • Lane guidance by road marking • Installation of humps at the entrance of the towns and villages. (in secondary roads and local roads only) • Installation of a concrete barrier or guard rail along the cliff side in the mountain area.
Concrete Barrier	• The Concrete Barrier will be installed 35% total length of the route due to the difficulty in judgement of height difference by video observation

4.2.1 Design Criteria on Road Geometry

Road classification and geometric criteria in AASHTO have been basically applied as Lebanon's design standards for the road design and major requirements are shown in Table 4.2.2, including the road class of the sub-project roads based on the Lebanon road classification system.

Table 4.2.2 Design Criteria

Classification	Primary Road	Secondary Road	Local Road
AASHTO	Collector Rd	Local Rd	Local Rd
Design Speed (km/h)	30-100	30-80	30-80
Carriageway (m)	6.0-7.2	5.4-7.2	5.4-7.2
Shoulder (m)	0.6-2.4	0.6-2.4	0.6-2.4
Min Curve Length (m) (Japanese Standard)	80-140	80-140	80-140
Min Curve Radius (m)	35-490	35-280	35-280

As shown in Table 4.2.3 and Table 4.2.4, the design speeds are defined by three attributes of road class, traffic volume, and terrain along a road in AASHTO.

Table 4.2.3 Design Speed of Collector Road

	Metric			US Customary		
	Design speed (km/h) for specified design volume (veh/day)			Design speed (mph) for specified design volume (veh/day)		
Type of terrain	0 to 400	400 to 2000	over 2000	0 to 400	400 to 2000	over 2000
Level	60	80	100	40	50	60
Rolling	50	60	80	30	40	50
Mountainous	30	50	60	20	30	40
Note: Where practical, design speeds higher than those shown should be considered.						

Source: AASHTO

Table 4.2.4 Design Speed of Local Road

	Metric						US Customary					
	Design speed (km/h) for specified design volume (veh/day)						Design speed (mph) for specified design volume (veh/day)					
Type of terrain	under 50	50 to 250	250 to 400	400 to 1500	1500 to 2000	2000 and over	under 50	50 to 250	250 to 400	400 to 1500	1500 to 2000	2000 and over
Level	50	50	60	80	80	80	30	30	40	50	50	50
Rolling	30	50	50	60	60	60	20	30	30	40	40	40
Mountainous	30	30	30	50	50	50	20	20	20	30	30	30

Source: AASHTO

4.2.2 Horizontal alignment

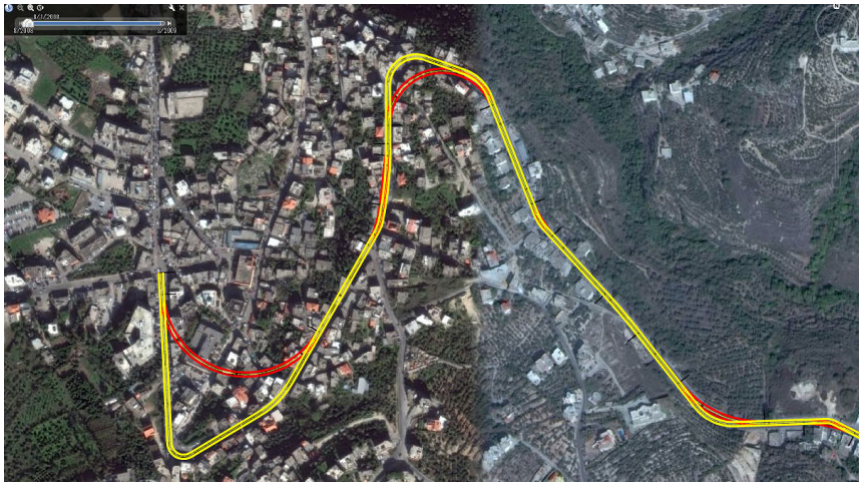
In case that horizontal alignment setting is executed based on the AASHTO geometric standards for the preliminary design for the sub-project, land acquisition and compensation shall be anticipated in many sub-projects. As mentioned in the previous chapter, since the rehabilitation policy for the Project includes avoiding the large-scale construction works for smooth implementation, the preliminary design for the sub-projects does not apply a change or modification of the horizontal and vertical alignment that satisfies the geometrical standards.

Therefore, the current road center lines of each sub-project are kept as they are. Figure 4.2.1 shows a difference in the horizontal alignment between the existing road center and the ideal alignment according to AASHTO standard as an example in the sub-project road section in the Akkar District.

(Example) Akkar District

[Design criteria by AASHTO]

Road Classification: Primary Road, Traffic Volume: 8,822 vehicle/day, Design Speed: 60km/h
Min curve radius: 130m



Source: JICA Survey Team

Figure 4.2.1 Comparison of Horizontal Alignment between the Existing and Ideal One

4.2.3 Pavement Design and Intervention

(1) Selection of countermeasures for pavement work corresponding to iRAP pavement rating

Although the iRAP Pavement Rating defines the five categories of the pavement conditions from "Rate 1" to "Rate 5", only the road sections with Rate 3, Deteriorating Pavement Condition, to Rate 5, Extremely Bad Condition, the pavement intervention shall be required.

Considering the definitions of the assessment items of both "The Final Layer" and "Fatigue / Crocodile Cracks", in pavement damage evaluation, remedy works for the pavement shown in Table 4.2.5 will be executed.

Table 4.2.5 Pavement Intervention Corresponding to iRAP Pavement Rating

Rating	Condition	Countermeasure work
1,2	Very good, Good	No measures
3	Deteriorated	Urban area: Cutting overlay, patching, reconstruction
		Hilly & Mountainous area: Overlay, Cutting overlay, patching, reconstruction
		The thickness of cutting overlay and overlay are 5cm. It assumes that the overlay portion occupies 70% and reconstruction on the pavement accounts for 30% in the “Deteriorated section” with Rate 3
4	Poor	Urban area: Cutting overlay, patching, reconstruction
		Hilly, Mountainous: Overlay, cutting overlay, patching, reconstruction
		The thickness of the cutting overlay and overlay shall be 5cm. It assumes that overlay portion occupies 50% and reconstruction accounts for 50% in the road section with Rate 4
5	Very Poor	Reconstruction

Note: Reconstruction: Pavement is reconstructed from the sub-base course

(2) Pavement composition for reconstruction work

The pavement composition shall be normally determined from the information shown in Table 4.2.6. However, since this study aims at formulating the Project including selecting a large number of sub-projects and estimating approximate project costs within a short period, the following investigations and surveys were not required for the pavement design. Accordingly, the JICA Study Team proposes a practical pavement composition considering the practice of the pavement works in Lebanon from CDR.

Table 4.2.6 Survey Items for Determining Pavement Composition

Survey item	Design content
CBR Test	This shows the strength of the subgrade and express it as the CBR values of the subgrade, and it is needed to determine the thickness of the entire pavement composition
Traffic Volume Survey	Necessary to calculate the cumulative axle load of heavy vehicles
Axle Load Survey	Necessary to calculate the cumulative axle load of heavy vehicles
Traffic Demand Forecast	Determining the growth rate of traffic, and necessary to calculate the future cumulative axle load

[The Interview Results with CDR]

- Lebanon's standard asphalt pavement is constructed by two layers with 4cm per layer and Pavement composition in the road improvement works in Jbail applies asphalt surfacing with 10cm in thickness, base course with granular crushed stones and subbase course with crushed stone.
- Granular crushed stones and crusher-runs are commonly used for both base course and subbase course. For new road projects, imported stones such as basalt, which shows the stable strength with high price as sub-base and base-course materials, are partially utilized. However, for the Project, it is assumed domestic stones will be utilized considering the project cost.
- There exist few soft subgrades areas requiring the replacement of the subgrade in Lebanon.

[Determination of Pavement Composition for the Sub-projects]

As a result of the consultation with CDR, for the Primary Road, the thicker pavement composition shall be applied for the Project shown in Table 4.2.7 , although there is an example of Jbail road rehabilitation project mentioned above. For both the Secondary Road and Local Road indicated in Table 4.2.7, the minimum pavement composition shall be applied referring to the current practice in Lebanon.

Table 4.2.7 Assumptions on Pavement Composition by Road Class

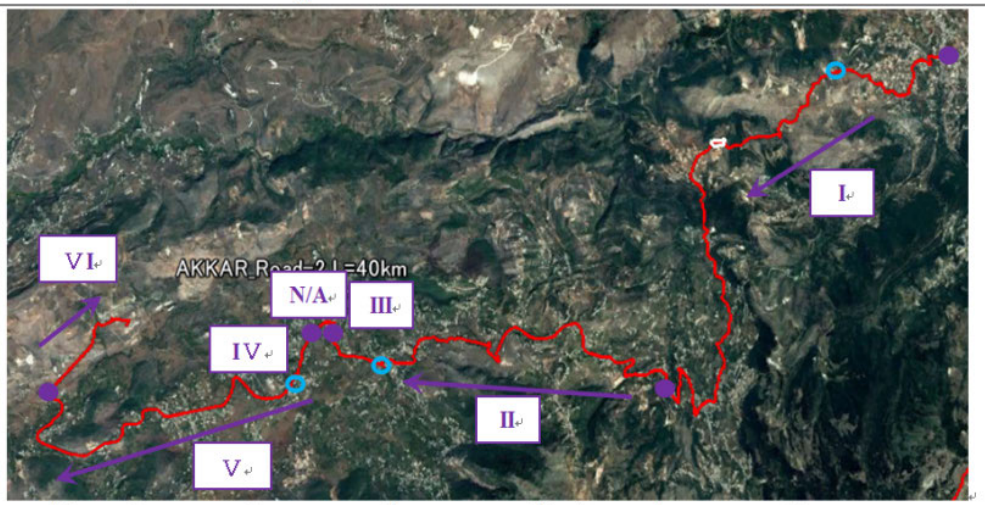
Road Classification	Large Vehicle (Number/day・one direction)	Design CBR	Wearing Course and Binder Course	Base Course	Sub-base	Thickness (cm)
			Asphalt	Graded grain crushed stone	Crushed stone	
Primary Road	250 < T < 1,000	6	15	25	30	70
Secondary Road	100 < T < 250	6	10	20	30	60
Local Road	T < 100	6	10	20	30	60

4.2.4 Drainage facility, Retaining wall and Barrier

(1) Drainage facility

From the visual survey records and aerial photogrammetry data, the JICA Study Team judges the necessity of drainage facilities and its scale, and drainage facilities shall be planned according to the following criteria:

- Open channels (in-situ concrete) will be installed on the mountain side of the road sections in the hilly and mountainous terrains. In addition, if a large slope cutting is required in order to install an open channel, it shall not be planned.
- Open channels will not be installed in urban, town and village areas in consideration of road safety to pedestrians



1: U-Ditch for Cut Slope, 2: U-Ditch + Retaining Wall, 3: Retaining Wall (+ Cleaning of Existing U-Ditch)
"I": (Blue)15+305~6+246
1: 11+700~11+180(L), 10+684~10+583(L), 7+128~6+782(L), 6+422~6+246(L)(*continue to be allocated in "II")
2: 13+598~13+172(L), 11+834~11+700(L)
II: 6+246~0+00(Blue)
1: 6+246(*continued)~6+123(L), 6+80~5+942(L)
III: 2+432(Blue)~1+333: unsuitable
IV: 1+141~0+00(Blue)
V:14+792~9+150: unsuitable
VI: 0+00~1+696
1: 0+00~0+902(L)

Source: JICA Survey Team

Figure 4.2.2 Location of drainage and retaining wall in Akkar area

(2) Retaining wall

When planning a drainage facility along the road, stone masonry wall will be installed at the edge of the ditch on the mountain side to avoid the inflow of soils on the slope.

(3) Concrete barrier or Guard rail

If there is a large height difference between the road level and the existing ground under the slope in the hilly and mountainous areas, a protective concrete fence will be installed. However, if the existing road width is small, then a guardrail will be applied.

4.2.5 Road Safety Facility

Road safety facilities will be planned and designed according to the concepts indicated in Table 4.2.8.

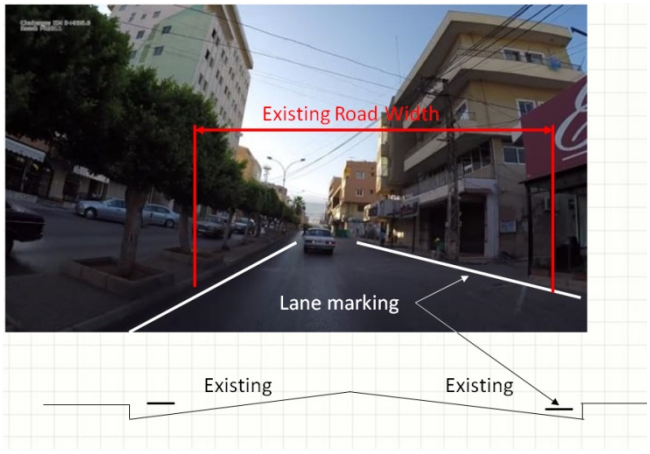
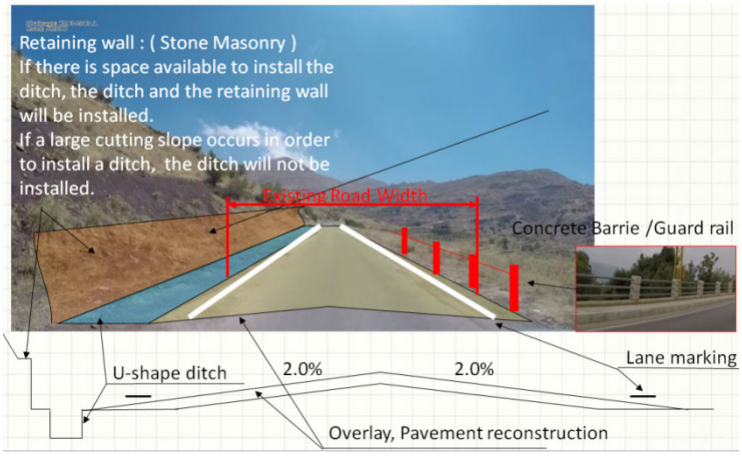
Table 4.2.8 Road Safety Facilities

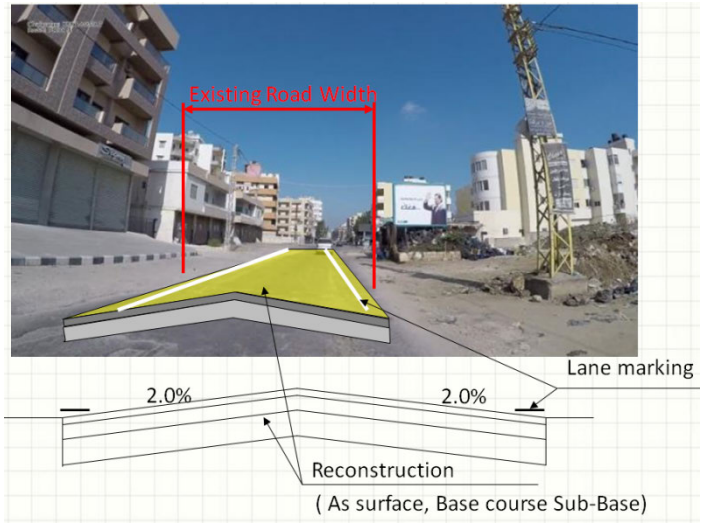
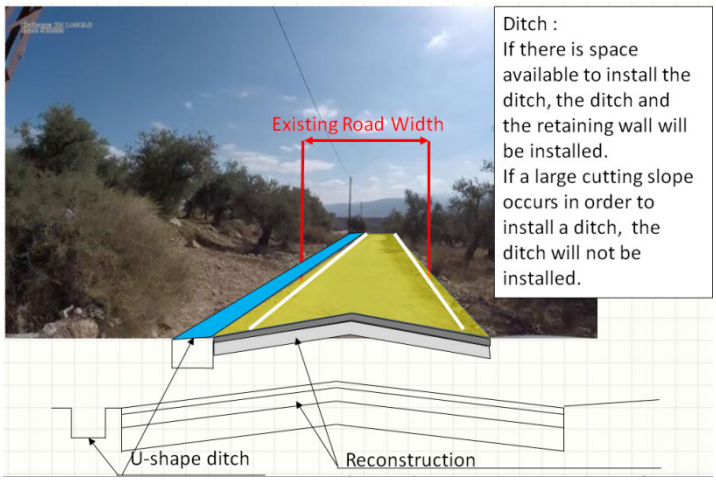
Road Safety Facility	Purpose	Installation Place
Regulation/ Warning sign	Regulatory signs regulate the restriction of traffic etc. to drivers and pedestrians. Also, the warning sign indicates to the driver the points of care on the road and the roadside	Curve section, Changing point of design speed, steep section
Curve mirror	The driver can observe the situation in the direction of a blind spot by objectives including a building etc.	Curve section
Road Marking	The road marking guides the traffic flow and indicates necessary guidance, warning, regulation to the driver.	Sub-project area （Out line, center line, stop line, pedestrian crossing etc.）
Rumble strip	When the driver passes through the rumble strip section, the rumble strip gives a shock sound and vibration to the driver, warning intentionally at the curve section.	Entrance of curve section
Hump	Warning the deceleration to the driver by giving up and down vibration when the car passes through the hump.	Entrance of town and village (Secondly Rd and Local Rd only)
Concrete barrier or Guard rail	Prevent deviation of vehicles drop of the road in hilly and mountainous areas	The place where a large height difference between the road and the existing ground under the slope

4.2.6 Typical Road Cross Sections

The typical road cross sections in various sub-projects are shown in Table 4.2.9.

Table 4.2.9 Typical Road Cross Sections in Various Sub-projects

Type	Intervention Images	Outline
1		Terrain: All Pavement Rating: Very good, Good Pavement works: No measure Other works: Marking, warning/regulation sign
2		Terrain: Urban, Town, Village Pavement Rating: Deteriorated, Poor Pavement works: Cutting overlay, reconstruction Other works: Marking, warning/regulation sign
3		Terrain: Hilly, Mountainous Pavement Rating: Deteriorated, Poor Pavement works: Overlay, Reconstruction Other works: Drainage, retaining wall, barrier, marking, warning/regulation sign

Type	Intervention Images	Outline
4		Terrain: Urban, Town, Village Pavement condition: Very Poor Pavement works: Reconstruction Other works: Marking, warning/regulation sign
5		Terrain: Hilly, Mountainous Pavement condition: Very Poor Pavement works: Reconstruction Other works: Drainage, retaining wall, barrier, marking, warning/regulation sign

4.3 Preliminary Design

4.3.1 Target section of Sub-Project

The sub-projects for the Project are comprised of 27 road sections with the total length of 289.1[1]km. In addition, the average pavement width of each sub-project is determined based on the existing pavement width measured on site and satellite data for preliminary design (Table 4.3.1).

[1] The sub-projects are changed in February 2018(mentioned in Chap3). Specifically, following two points are conducted, 1) replacement “Jezzine3 L=7.1km” by “Jezzine4 L=6.0km”, 2) extension of “Saida4” (add “Saida4 add L=1.2km”). With regard to additional section, it was carried out simple cost estimation without sub-contract (satellite map and drawings).

Source: JICA Survey Team

Figure 4.3.1 Survey of the Current Road Width (Saida 7)

Table 4.3.1 Road Length, Classification, Average Width of Sub-project

No.	1	2	3	3-2	4	5	6	7	8	9
Road Name	El metn 1d	Saida_3	Saida_7	Saida_7add	Koura_3	Jezzine_2	Koura_2b	El metn 1c	Zahle_1b	El metn 1b
Road Classification	Secondary	Local	Secondary	Local	Secondary	Secondary	Secondary	Primary	Local	Secondary
Length(km)	2.000	2.800	3.100	1.200	3.500	5.100	5.600	6.000	6.300	6.700
Average width(m)	6.5	19.7	7.5	4.0	11.3	5.4	5.9	7.2	8.9	8.7

No.	10	11	12	13	14	15	16	17	18	19
Road Name	Jezzine_4	Baabda_3	Saida_6	Zahle_1a	Zgharta_1c	Minnie_2	Jbeil_1	Baalback_4	Koura_2c	Bcharreh_1a
Road Classification	Secondary	Primary	Local	Local	Secondary	Secondary	Primary	Primary	Primary	Primary
Length(km)	6.000	7.400	8.600	8.700	8.900	11.500	18.600	33.700	4.100	5.200
Average width(m)	5.0	8.4	6.2	12.5	6.6	7.0	9.0	8.7	8.4	7.0

No.	20	21	22	23	24	25	26	27
Road Name	Sour_1b	Akkar_2a	Batroun_1	Chouf_2	Keserouane_6	Zgharta_1b	Alley_1	Keserouane_1b
Road Classification	Secondary	Local	Secondary	Primary	Local	Secondary	Primary	Primary
Length(km)	9.500	28.000	32.800	8.600	9.900	10.900	14.300	20.100
Average width(m)	8.7	10.7	7.6	5.8	9.3	8.0	8.6	8.0

4.3.2 Design Speed and Curve Radius

As stated in the basic concept of road rehabilitation in the previous chapter, whereas the design speed shall be determined by the road classification, topographic condition and traffic volume, the curve radius for the horizontal alignment design is determined by superelevation corresponding to both the design speed and the topography situation.

For the preliminary design, the design speed shall be set as the average design speed in AASHTO by each road classification. Furthermore, the superelevation corresponding to the design speed shall be 6% in consideration of overlay thickness and topographical conditions. Table 4.3.2 and Table 4.3.3 show the design speed and corresponding curve radius by road classification in AASHTO.

Table 4.3.2 Design speed byAASHTO

Collector Road

Type of terrain	Metric: Design speed (km/h) for specified design volume (veh/day)		
	0 to 400	400 to 2000	over 2000
Level	60	80	100
Rolling	50	60	80
Mountainous	30	50	60

Local Road

Type of terrain	Metric: Design speed (km/h) for specified design volume (veh/day)					
	under 50	50 to 250	250 to 400	400 to 1500	1500 to 2000	2000 and over
Level	50	50	60	80	80	80
Rolling	30	50	50	60	60	60
Mountainous	30	30	30	50	50	50

Source: JICA Survey Team

Table 4.3.3 Deesign Speed and Corresponding Curve Radius for Preliminaly Design

	Primary Road	Secondly Road	Local Road
Design Speed (km/h)	60	50	50
Curve Radius (m)	130	80	80

Source: JICA Survey Team

4.3.3 Traffic Safety Measures based on Horizontal Alignment

The horizontal alignments on the existing sub-project roads are traced based on satellite image data for preliminary design, and the curve radius for each sub-project road is verified its suitability to the standards. As the result, it is found that more than 30% of the total road length, 281,9km(excluding Saida_7add and Jezzine_4), belongs to the curve sections. Furthermore, although there are 2,268 curved sections in all sub-projects, 1,195 curved ones are not satisfied with the corresponding curve radius to the design speed set for each sub-project road. Accordingly, it is necessary to reduce traffic accidents by introducing traffic safety measures

Table 4.3.4 Design Speed and Curve Radius for Each Sub-Project

No.	Road Name	Road Class	Road Length (km)	Design Speed (Km/h)	Min Curve Radius (m) (AASHTO)	Number of Curcve	Number of curves not satisfying criteria	Total Curve Length(m)	Total Curve Length not satisfying criteria	Curve Ratio (%) (Curve/ Total Length)
R-1	El metn 1d	Secondary	2.000	50	80	38	29	794	597	39.7%
R-2	Saida_3	Local	2.800	50	80	9	0	939	0	33.5%
R-3	Saida_7	Secondary	3.100	50	80	50	18	1,726	411	55.7%
R-3-2	Saida_7add	Local								
R-4	Koura_3	Secondary	3.500	50	80	10	0	791	0	22.6%
R-5	Jezzine_2	Secondary	5.100	50	80	42	24	1,597	890	31.3%
R-6	Koura_2b	Secondary	5.600	50	80	62	26	2,233	721	39.9%
R-7	El metn 1c	Primary	6.000	60	130	90	64	2,917	1,763	48.6%
R-8	Zahle_1b	Local	6.300	50	80	27	0	2,020	0	32.1%
R-9	El metn 1b	Secondary	6.700	50	80	71	67	2,577	2,177	38.5%
R-10	Jezzine_4	Secondary								
R-11	Baabda_3	Primary	7.400	60	130	60	39	2,963	1,686	40.0%
R-12	Saida_6	Local	8.600	50	80	91	31	4,718	892	54.9%
R-13	Zahle_1a	Local	8.700	50	80	45	6	2582	127	29.7%
R-14	Zgharta_1c	Secondary	8.900	50	80	54	12	3,763	537	42.3%
R-15	Minnie_2	Secondary	11.500	50	80	139	84	3,556	1,893	30.9%
R-16	Jbeil_1	Primary	18.600	60	130	123	86	6,034	3,973	32.4%
R-17	Baalback_4	Primary	33.700	60	130	206	63	10,500	3,039	31.2%
R-18	Koura_2c	Primary	4.100	60	130	18	7	1,290	341	31.5%
R-19	Bcharreh_1a	Primary	5.200	60	130	74	53	2,429	1,361	46.7%
R-20	Sour_1b	Secondary	9.500	50	80	84	38	4,194	1,429	44.1%
R-21	Akkar_2a	Local	28.000	50	80	296	177	10,156	4,875	36.3%
R-22	Batroun_1	Secondary	32.800	50	80	224	77	12,502	2,685	38.1%
R-23	Chouf_2	Primary	8.600	60	130	77	48	4,156	2,051	48.3%
R-24	Keserouane_6	Local	9.900	50	80	75	30	3,685	1,159	37.2%
R-25	Zgharta_1b	Secondary	10.900	50	80	49	17	1,411	394	12.9%
R-26	Alley_1	Primary	14.300	60	130	92	68	4,865	2,719	34.0%
R-27	Keserouane_1b	Primary	20.100	60	130	162	131	8,383	6,108	41.7%
										Average
Total			281.900			2,268	1,195	102,783.018	41,825.324	37.5%
								36%	15%	

Source: JICA Survey Team

4.3.4 Vertical Alignment of Current Roads Condition

The situations of the vertical alignments on the existing subproject roads are roughly confirmed with satellite image data. As a result, it is found that 23 roads out of 26 sub-project roads (excluding

Saida_7add and Jezzine_4) are not satisfied the maximum grade corresponding to the design speed in AASHTO. However, since the preset safelight data does not have sufficient accuracy, the civil work cost for each sub-project is assumed to include the traffic counter measures necessitated by steep vertical alignment in the provisional sum. Accordingly, it is recommended to study the necessary traffic safety countermeasures caused by steep vertical alignment at the detailed design stage based on the topographical survey results.

Table 4.3.5 Existing Vertical Gradient of Sub-Project Roads

No.	Road Name	Road Class	A: Road Length (km)	Design Speed (Km/h)	Max Gradient (%) (AASHTO)	B: Road Length (7.0% > Verical Gradient) (m)	B / A (%)
R-1	El metn 1d	Secondary	2.000	50	7.0	90	4.50%
R-2	Saida_3	Local	2.800	50	7.0	0	0.00%
R-3	Saida_7	Secondary	3.100	50	7.0	835	26.94%
R-3-2	Saida_7add	Local					
R-4	Koura_3	Secondary	3.500	50	7.0	0	0.00%
R-5	Jezzine_2	Secondary	5.100	50	7.0	2,785	54.61%
R-6	Koura_2b	Secondary	5.600	50	7.0	355	6.34%
R-7	El metn 1c	Primary	6.000	60	7.0	2,882	48.03%
R-8	Zahle_1b	Local	6.300	50	7.0	0	0.00%
R-9	El metn 1b	Secondary	6.700	50	7.0	5,764	86.03%
R-10	Jezzine_4	Secondary					
R-11	Baabda_3	Primary	7.400	60	7.0	3,759	50.80%
R-12	Saida_6	Local	8.600	50	7.0	520	6.05%
R-13	Zahle_1a	Local	8.700	50	7.0	55	0.63%
R-14	Zgharta_1c	Secondary	8.900	50	7.0	5,600	62.92%
R-15	Minnie_2	Secondary	11.500	50	7.0	3,660	31.83%
R-16	Jbeil_1	Primary	18.600	60	7.0	11,913	64.05%
R-17	Baalback_4	Primary	33.700	60	7.0	10,825	32.12%
R-18	Koura_2c	Primary	4.100	60	7.0	710	17.32%
R-19	Bcharreh_1a	Primary	5.200	60	7.0	2,660	51.15%
R-20	Sour_1b	Secondary	9.500	50	7.0	3,882	40.87%
R-21	Akkar_2a	Local	28.000	50	7.0	10,980	39.21%
R-22	Batroun_1	Secondary	32.800	50	7.0	6,029	18.38%
R-23	Chouf_2	Primary	8.600	60	7.0	3,460	40.24%
R-24	Keserouane_6	Local	9.900	50	7.0	8,052	81.33%
R-25	Zgharta_1b	Secondary	10.900	50	7.0	1,457	13.37%
R-26	Alley_1	Primary	14.300	60	7.0	3,900	27.27%
R-27	Keserouane_1b	Primary	20.100	60	7.0	5,651	28.11%

Number of Sub-Project	26
Number of Sub-Project (7.0% > Verical Gradient)	23
A: Total Road Length (m)	281,900
B:Total Road Length (7.0% > Verical Gradient)	95,824
B/A (%)	33.99%

Source: JICA Survey Team

4.3.5 Preliminary Drawings

Prepared preliminary drawings are attached in Appendix-5.

CHAPTER 5 PROMOTION OF LABOR EMPLOYMENT IN THE PROJECT

5.1 Legal Framework for Labor Employment in Lebanon

5.1.1 Introduction

As has been mentioned in Chapter 1, the Project aims to contribute to the improvement of the livelihood of both the vulnerable Lebanese and the displaced Syrians by creating job opportunities in the construction sector. Chapter 5 will briefly describe the target population of those who could be possibly employed by the Project, namely vulnerable Lebanese and Syrians. Afterwards, it will explain the employment conditions of the Syrians in Lebanon in line with the Lebanese laws and regulations.

5.1.2 Vulnerable Lebanese and Syrians: Who are they?

There are 5.85 million people in Lebanon. Out of 4 million Lebanese, there are 1.16 million 'vulnerable Lebanese' who live in harsh conditions. The impact is somehow equivalent to some 1.5 million Syrians in Lebanon. These vulnerable populations can be concentrated on the regions due to proximity to the border, economic opportunities and affordability of life cost. According to the Most Vulnerable Locality Map, some 67% of deprived Lebanese and 87% of the displaced from Syria live in the 251 most vulnerable cadastres out of 1,653[1]. These populations can be potential beneficiaries of the Project.

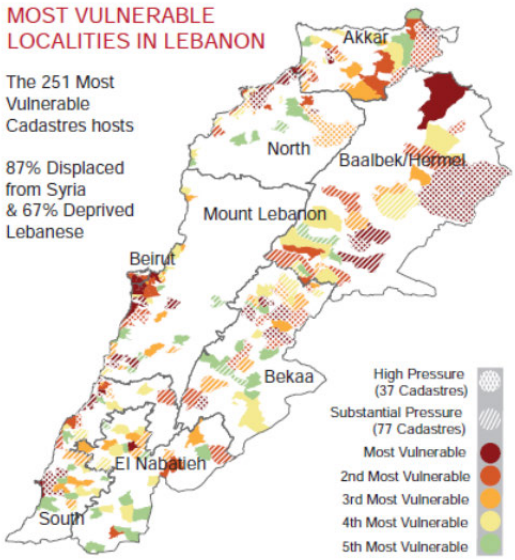


Figure 5.1.1 Most Vulnerable Localities in Lebanon

It is worthwhile noting that there are people from other nationalities, such as Iraqi and Palestinian displaced people[2], apart from the vulnerable Lebanese and Syrians, although they are not considered to be direct beneficiaries of the Project.

[1] UNDP, 'Lebanon Crisis Response Plan 2017-2020', 2017, p.11
[2] Lebanon is currently hosting 6,000 Iraqi, 31,502 Palestinian Refugees from Syria (PRS) and 277,985 Palestinian Refugees in Lebanon (PRL).

(1) Syrian Crisis and the Vulnerable Lebanese

Although Lebanon has been recognized as an upper middle income country, it has suffered from economic deterioration, especially after Syrian Crisis started. Being deprived of qualified job opportunities, vulnerable Lebanese in host communities are required to cope with harsher employment conditions than before.

Several statistics show more than one fourth of the Lebanese population can be relatively vulnerable to the pressure caused by the Syrian Crisis. Using the expenditure data of 2004/2005 by the Central Administration of Statistics (CAS), UNDP and Ministry of Social Affairs (MOSA) measured poverty line in Lebanon. According to this study, the higher poverty line is 4.00 USD/person/day and lower poverty line as 2.40 USD/person/day. Following this scale, the study estimated 28.6% of Lebanese households were living under the higher poverty line and some 8% of Lebanese were considered to live under extreme poverty[3]. The table below supports this, although it indicates that there is geographical variation in the intensity of vulnerability.

Table 5.1.1 Total Population in Lebanon and Vulnerable Lebanese Living below $4

Caza	Total Population	Lebanese Population	Population living below $4 (Estimate)	Percentage of Lebanese Population below $4 (Estimate)
Akkar				
Akkar	428,386	266,020	169,823	64
North				
Batroun	66,340	46,080	11,399	25
Bcharre	25,169	21,224	5,686	27
Koura	71,323	48,226	11,915	25
Minie-Danniye	249,580	118,640	76,332	64
Tripoli	350,215	265,553	157,018	59
Zgharta	72,914	55,139	13,988	25
Bekaa				
Rachaiya	47,743	33,350	9,915	30
Bekaa Ouest	158,975	66,735	20,201	30
Zahle	429,278	179,493	39,279	22
Baalbek-El hermel				
Baalbek	416,087	237,351	74,309	31
Hermel	46,872	38,220	12,256	32
Beirut				
Beyrouth	449,922	403,579	23,572	6
Mount Lebanon				
Aley	251,025	164,133	37,471	23
Baabda	675,054	520,012	127,721	25
Chouf	242,043	153,773	34,884	23
El Metn	504,838	427,534	47,873	11
Jbail	90,008	80,661	12,436	15
Kesrouane	184,801	161,109	24,564	15

[3] MOSA and UNDP, Poverty, Growth, and Income Distribution in Lebanon Executive Summary, 2008, p6.

Caza	Total Population	Lebanese Population	Population living below $4 (Estimate)	Percentage of Lebanese Population below $4 (Estimate)
South				
Jezzine	24,643	20,264	9,240	46
Saida	402,542	250,704	114,190	46
Sour	314,079	200,598	73,155	36
El Nabatyieh				
Bent Jbail	77,871	66,451	17,389	26
Hasbaiya	39,366	31,346	7,923	25
Marjayoun	63,460	53,040	13,560	26
Nabatiye	161,994	125,448	14,532	12
	5,844,529	4,034,638	1,160,631	(Average) 29.6

Source: UNHCR 'Planning figures for LCRP 2017-2020' and OCHA

Typical poor Lebanese households (five to eight members) are characterized by low income ranging between 4,000 USD to 8,400 USD/year; headed by a breadwinner with intermediate educational level; the breadwinner often works in informal sectors such as agriculture, construction, cleaning, driving and shop keepers. Their principal consumption (35% to 50%) is directed to food. They need to compensate the cost for education and medicines when they do not have sufficient income[4].

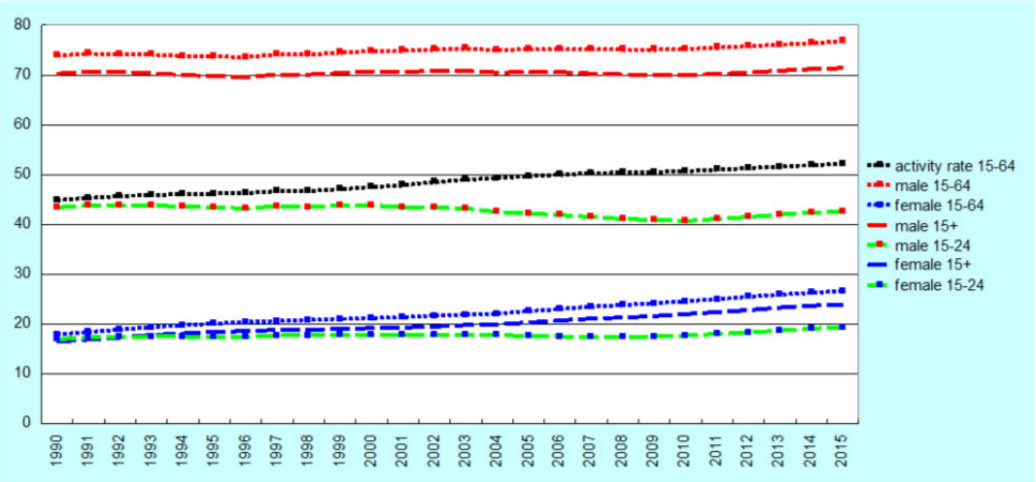
In Lebanon, the labor participation rate (+15 years old) in 2017 is projected to be 47.3%[5]. According to CAS in 2009, those who are working in the construction sector is 8.9% of the working population. Therefore, some 170,000 Lebanese in all sectors, especially 48,900 vulnerable Lebanese, can be the potential targets of the Project[6]. This type of vulnerable Lebanese are competing with Syrians for unskilled and often lower wage jobs[7].

[4] OXFAM and American University of Beirut, Policy Institute, 'Poverty, Inequality and Social Protection in Lebanon', p.8.

[5] The labor force participation rate is a measure of the proportion of a country's working-age population that engages actively in the labor market, either by working or looking for work; it provides an indication of the size of the supply of labor available to engage in the production of goods and services, relative to the population at working age (ILO).

[6] Lebanese population (4,034,638)×47.3% (labor participation rate) ×8.9 %(those who engage in construction work)≒ 169,846
Vulnerable Lebanese population (1,160,631) 47.3% (labor participation rate) ×8.9 % (those who engage in construction work)=48,859

[7] WFP 'Vulnerability Assessment of Syrian Refugees in Lebanon 2015'.



Source: ILO Key Indicators of the Labor Market, 2015

Figure 5.1.2 Labor Force Participation Rate for Lebanon

Table 5.1.2 Percentage Distribution of Employed (aged 15 years and above) according to Economic Activity Sector and Sex, Lebanon, 2009

Economic activity sector	Gender		
	Women	Men	Both
Agriculture	5.7	6.5	6.3
Industry	7.5	13.4	12.1
Construction	(*)	11.5	8.9
Trade	21.5	28.7	27.0
Transportation, Post and Telecommunication	(1.4)	8.4	6.8
Services	60.2	29.9	36.9
Financial Intermediation and Insurance	3.2	1.6	2.0
No response	(*)	(*)	(*)
Total	100	100	100

Source: CAS Multiple Indicators Cluster Survey 3, 2009.

(2) Syrian Crisis and Syrian Displaced People

As has been discussed in Chapter 1, there are 1,001,051 registered Syrian displaced people (231,530 households) as of June 30th 2017, out of which 42.6% can be categorized as employment population[8]. An ILO report estimated the actual Syrian labor force in Lebanon consists of some 384,000 people, and 36% of them are estimated to be unemployed. Even though they are currently working, two thirds of those displaced

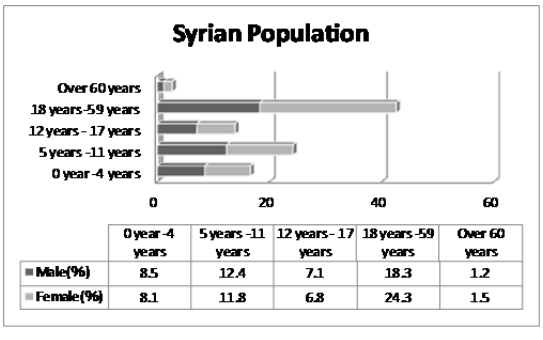


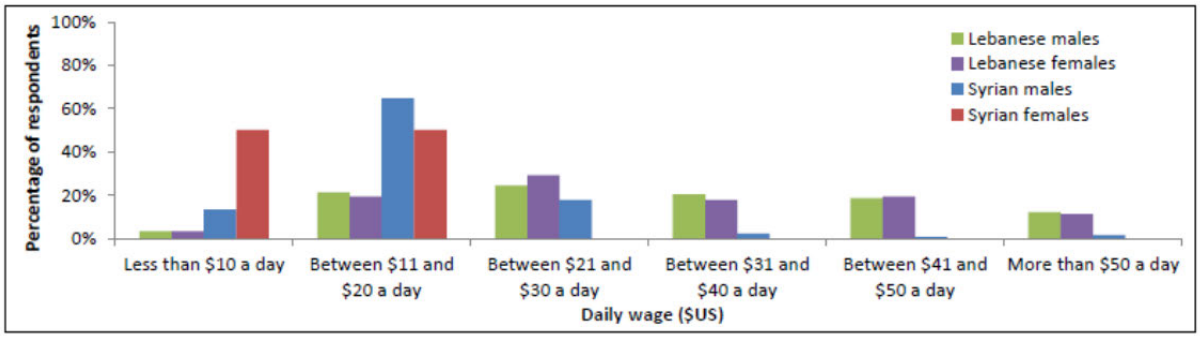
Figure 5.1.3 Population of Syrian Displaced

[8] UNHCR Syria Regional Refugee Response http://data.unhcr.org/syrianrefugees/country.php?id=122, last seen on June 30th, 2017.

Syrians are considered to work less than half a month, and 92% of them earn less than the survival standard, which suggests that they are underemployed[9].

Vulnerability Assessment for Syrian 'Refugees' (VASyR) in 2015 defined 3.84 USD/day/person, as a poverty line for displaced Syrians currently living in Lebanon. VASyR found that some 70% of Syrian displaced households live below the poverty line, and approximately 50% of households live below the Survival Minimum Expenditure Basket (2.92 USD/day/person).

The annual salary for a typical refugee household is below 5,000 USD[10]. Average monthly salary for a refugee is 418, 000 LBT (277USD), which is two thirds of the Lebanese average monthly salary (675,000 LBP/ 448USD)[11]. According to a study conducted by ACTED (2014), 65% of Syrian males earned between USD11 and 20USD a day. The average Syrian wage was USD19.81 for males and USD10.80 for females. On the other hand, the average salary for Lebanese males and females were USD45.70 and USD41.60 respectively[12].



Source: ACTED, 2014

Figure 5.1.4 Lebanese and Syrians Daily Wages

In most cases, Syrian households are more vulnerable than Lebanese households in terms of annual income. However, annual income of Syrian refugees is consisted not only of daily wages, but also of aid from donors. In fact, 40% of their income comes from humanitarian assistance, which indicates income earned from the labor market is as low as 3,000 USD a year[13].

Displaced Syrian people, despite the fact that they have been working in Lebanon as economic migrants or seasonal workers before the Syrian Crisis, are also working as daily workers, often in the informal sector without decent social protection, and indebted from multiple informal fund sources. Although they can receive some health assistance from Primary Health Centers, Social Development Centers and other donors with nominal charges, Syrians feel the medical assistance is still considered as costly[14]. Displaced Syrian people are 'urban refugees' in a sense that they live in informal (tented) settlements, apartments, unfinished buildings, and other types of shelters. Most

[9] ILO 'Towards the Right to Work: A guidebook for Designing Innovative Public Employment Programs', 2017, p2.
[10] OXFAM and American University of Beirut, Policy Institute, 'Poverty, Inequality and Social Protection in Lebanon', p. 9.
[11] ILO 'Syrian Refugees in Lebanon face harsh working condition', http://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_240126/lang--en/index.htm , last seen on October 4, 2017.
[12] ACTED 'Labor Market Assessment in Beirut and Mount Lebanon', 2014, p.11
[13] OXFAM and American University of Beirut, Policy Institute, 'Poverty, Inequality and Social Protection in Lebanon', p. 11
[14] OXFAM and American University of Beirut, Policy Institute, 'Poverty, Inequality and Social Protection in Lebanon', p. 13

displaced people live in these small and crowded housing with more than five household members, as it is costly to afford their life in urban cities. This informality puts displaced Syrian people into fragile situations. At the same time, Lebanese communities are becoming exhausted of hosting displaced Syrian people, leading to increased social and economic tensions.

It is therefore not surprising that the vulnerable Lebanese, who often work as intermediate or low skilled works, are facing job competition with the refugee population who are willing to work with a rather cheaper wage even in an extremely vulnerable situation.

5.1.3 Current Condition of Labor Market for Vulnerable Lebanese and Syrians

The Lebanese labor market has been facing serious challenges, especially since the beginning of the Syrian Crisis. The estimated unemployment rate in Lebanon is obscure; depending on the data sources, it seems to have increased by 5% from 6% in 2007 to 11% in 2011 (WB MILES), slightly increased (8.93% by ILO Regional Office of Arab States), or remained almost the same (6.4% by WB)[15]. Similar to other Arabic neighbors, Lebanon faces high youth unemployment rate. In a 2007 household survey, youth unemployment rate was 22.1%[16].

The Lebanese labor market in general is characterized by the following features; '1) low levels of job creation, especially in value added sectors, leading to a lack of employment opportunities; 2) significant numbers of workers engaging in the informal sector; 3) significant numbers of influx of economic migrants and forcibly displaced people from other parts of the Arab regions[17], particularly from Syria; 4) emigration or brain drain of young Lebanese skilled workers; and 5) strong occupational segregation and skills mismatch in the labor market'[18].

Historically, Lebanese skilled and unskilled workers have fled from the country during the civil war since 1976, and large numbers of lower paid Syrian skilled and unskilled laborers occupied the labor market[19]. They could not foster Lebanese apprentices due to the occupation. It is said that the Lebanese skilled and unskilled workers from the Akkar region were exceptionally engaged in the construction sector, due to the fact that the region was geographically close to Syria that Lebanese in Akkar accepted and shared Syrian culture and tradition.

Taking advantage of their cheaper labor cost than that of Lebanese workers, Syrians have dominated a few domains of the labor market, particularly in the agricultural and construction sectors, before the Syrian Crisis. Most Syrians were originally working as seasonal workers who go back to Syria after working for a while in Lebanon. They could afford their livelihood with cheaper wages, as the price of commodities were lower than Lebanon.

[15] GIZ 'Employment and Labor Market Analysis', 2016, pp27-29.
[16] UNDATA Youth Employment (both sex) http://data.un.org/DocumentData.aspx?id=264 last seen on September 2, 2017. Youth means the population between 15 years old to 24 years old. Adult: 25+
[17] Lebanon is currently hosting 6,000 Iraqi, 31,502 Palestinian Refugees from Syria (PRS) and 277,985 Palestinian Refugees in Lebanon (PRL).
[18] ILO 'Towards Coordinated Efforts for Effective Labor Market Information and Employment Service' in Lebanon, p.1, 2017
[19] Interview memo with a construction contractor on August 24, 2017.

However, as for the construction sector, contractors in the North of Lebanon (especially Akkar area) faced significant scale-down of sales (72% of the sales compared to 2010). In order to compensate the decreased revenue, contractors started to use more Syrians, who accepted lower wages, than Lebanese workers. In Northern Lebanon, right before the Syrian Crisis started in 2010, Syrians represented some 55% of unskilled labor (daily work) and 30% of skilled workers before the Crisis, while they composed 70% of both unskilled and skilled workers after 2012[20]. Generally, according to a Lebanese contractor, more than 90% of the unskilled labor force was occupied by Syrians. On the other hand, significant percentage of professional occupations (e.g. engineers) was performed by Lebanese.

5.1.4 Legal Framework for Syrians and Their Employment

Prior to the Syrian Crisis, the condition of Syrian workers in Lebanon were governed by a set of bilateral agreements in respect to Lebanese labor law. However, the Government of Lebanon modified treatment of Syrians with the massive influx of displaced people from Syria.

However, Lebanon officially adopts a stance where there is no Syrian 'refugees' in Lebanon by definition, as it has not ratified the Convention and Protocol relating to the Status of Refugees in 1951 and 1967. Therefore, Lebanon has not adopted any domestic legislation specifically addressing the status of refugees. Refugee status is at present determined mainly by the provisions of a Memorandum of Understanding (MOU) signed between Lebanon and the UNHCR.

The table below shows the summary of laws and regulations in relation to the status of Syrians and the labor laws.

Table 5.1.3 The List of International Conventions, National Laws and Regulation related to Syrian Displaced and Labor

Types of document	Title	Year	Contents
Convention, Protocol, International treaties	Convention Relating to the Status of Refugees	1951	Lebanon has not ratified the 1951 Refugee Convention.
	Protocol Relating to the Status of Refugees	1967	Lebanon has not ratified the 1967 Protocol Relating to the Status of Refugees.
	International Labor Standards		Lebanon has ratified 50 conventions (seven out of eight fundamental conventions, two out of four governance conventions, 41 out of 177 technical conventions) among 189 conventions. On the other hands, it has not ratified 49 conventions; notably, it has not ratified Migration for Employment Convention (Revised), 1949 (No.97) nor Migrant Workers (Supplementary Provision) Convention, 1975 (No.143). In relation to the protection of refugee status, Domestic Workers Convention 2011 (No.189) has not been ratified as well.

[20] ILO 'Matching Skills and Jobs in Lebanon; Main Features of the Labor Market – Challenges, Opportunities and Recommendation', p.4, 2007.

Types of document	Title	Year	Contents
Bilateral Agreement	Bilateral Agreement between the government of the Syrian Arab Republic and the government of the Lebanese Republic regarding employment of their nationals in the other country.	October 1994	(Article 5) Joint office on the border shall be in charge of delivering provisional work cards for seasonal workers. For other categories of workers, they shall be given a card allowing them to obtain a work permit. (Article 8) Required items for the contract agreement
Memorandum of Understanding, Technical Notes etc.	Memorandum of Understanding between Lebanon and the UNHCR	Sep. 2003	The MOU provides for the issuing of temporary residence permits to asylum seekers, normally limited to a period of three months, during which the asylum claim is reviewed by UNHCR. Upon recognition, the residency permit is extended for a further 6-9 months allowing UNHCR to find a durable solution for the refugee (generally resettlement in a third country)[21]. This Memorandum was originally said to be targeted at Iraqi asylum seekers.
National Law	Lebanese Labor Law	1946 (revised in 1996)	(Article 31) Working time cannot exceed 48 hours a week. (Article 34) Each male worker has the right to have at least a one hour break in every six consecutive hours worked and each female worker in every five hours respectively. (Article 36) Every employee has the right to a weekly break which cannot be inferior to 36 consecutive hours. (Article 44) The salary cannot be inferior to the official minimum wage previously determined by a multipartite commission. In January 2012, the minimum wage was set to 675,000 LL a month (or 450$)[22]. (Article 62) Working places must be arranged to ensure the employees' security.
	Entry and Exit Law	July 10th , 1962	(Article 32) Foreigners employed without a work residency permit can be subjected to one month to three year's imprisonment, to a minimum fine of 250, 000 and to expulsion from Lebanon.
Decree	Decree no. 17561 Regulation of work of foreigners	September, 1964	The status of foreign employers and employees (Article 2) Any foreigner seeking into Lebanon is required to obtain the prior approval by the Ministry of Labor and Social Affairs. (Article 6) Any foreigner who has prior approval is required to a petition for the release of a work permit within 10 days. Ministry may cancel the approval in case the beneficiary has not entered Lebanon within a maximum period of three months. The prior approval shall be canceled in case the beneficiary fails to come to the Ministry within ten days. (Article 14) Foreigners wishing to work should have the working permit and working permit can be issued or renewed up to a maximum of three years. Syrians are exempted from a deposit of 1,500,000 Lebanese pound (LBP) (1,000 USD) with the housing bank and can apply for work permits even after they have entered the country.

[21] UNHCR 'Country Operations Plan Regional Office in Lebanon 1 January – 31 December 2004' < http://www.unhcr.org/3fd9c6a14.pdf > Last seen on July 12, 2017.

[22] "Cabinet Approves Raising Lebanon's Minimum Wage to 675,000 LL", AlManar, 19th January 2012, available at: http://www.almanar.com.lb/english/adetails.php?eid=42609&cid=23&fromval=1

Types of document	Title	Year	Contents
	Decree no. 3273/2000		(Article 2) Penalties for labor inspection Any violation of the provisions of this law, the decrees and decisions taken to apply and execute it could brought the responsible person before the competent courts and shall be punished by a fine of between 250, 000 (167 USD) and 2, 500, 000LBP (1,670USD) and from one month to three years imprisonment or with one of these two penalties where they will be doubled when repeated within one year.
	Decree No. 8987 The prohibition of employment of minors under the age of 18 in works that may harm their health, safety or morals	October 2, 2012	(Article 1) Minors under the age of 18 shall not be employed in the works and activities which, by their nature harm the health, safety or morals of children, limit their education and constitute one of the worst forms of child labor included in Annex No. (1). (Article 2) Minors under the age of 16 shall not be employed in works which, by their nature or the circumstances in which they are carried out, are likely to harm the health, safety or morals of children. These works are included in Annex No. (2). (Article 3) Minors of more than 16 years of age may be employed in the works indicated in Annex No. (2) provided they are offered full protection for their physical, mental and moral health and provided these minors receive a special education or appropriate vocational training in the field of these works, unless the type of work or the hazard is totally prohibited for those under the age of 18 as specified.
Decision	Decision 1/41	January 31, 2017	(Article 2) Jobs confined to Lebanese citizens Agriculture, environment and the construction are the only sectors in which there are particular exemptions for Syrians from regular provision of Labor Law. (Article 3) Syrians still need work permits from the Ministry of labor. The Minister of Labor may exclude some foreigners from the provision of this decision if they meet the conditions…"Expert or technical expert whose job may not be filled with by a Lebanese as long as this is proven through a statement issued by the National Employment Office after the person requesting the foreigner presents evidence that he/she failed to find a Lebanese for this position after three months of searching" Limitation to professions as employer Occupations of manager, store keeper and trade professions, hair dressing and barbers, among others, as well as any profession or job which proves to compete with Lebanese employers are confined to Lebanese.
	Decision 1/49 Procedures of Issuance and Renewal of Work Permits for Foreign Workers from all Categories	March 1st, 2017	(Article 4) …the heads of the relevant departments are requested to adhere to one foreigners versus ten Lebanese workers, … except to the institutions that conduct construction work or equivalent, whereby the ratio will be one Lebanese vs one foreigner. (Article 6) …In case of the non-compliance from the relevant persons regarding the specific ratios, the request that exceed the specific ratios will be forwarded to the Minister of Labor in order to take the proper decision.
	Decision 1/49 Prohibition of the Use of Children and Juveniles in Non-industrial work	February, 1997	(Article 1) Children and juveniles under the age of 18 years are not allowed to work in non-industrial occupations unless a precise medical examination is performed showing they are capable.

Types of document	Title	Year	Contents
	Decision 1/129 To determine the deadlines for completion of paperwork in the ministry of Labor	September 19th, 2015	(Article 2) Deadlines to deliver paperwork that meet the conditions in the General Directorate of Labor are determined as follows: 1. Pre-approval: Male - Female: Three days from the date of delivery to the competent department. 2. Work permit (First time – renewal): The first category: seven days from the date of delivery to the competent department. The second, third and fourth categories: three days from the date of delivery to the competent department.
	Decision 1/130 To determine the time of completion of paperwork in the Syrian Labor Affairs Department	September 19th, 2015	(Article 1) Contrary to any other provision, the time of completion of the paperwork of Syrian workers who meet the conditions is limited to seven days from the date of registration in the competent department. (Article 2) The paperwork referred to the investigation shall be given an additional maximum period of fifteen days.
	Decision1/299 Granting the Syrian Nationals working under EIIP Lebanon Special Work Permits and Documents Required for these Permits to be Granted	November 2nd, 2017	This decision is applicable only to ILO Employment Intensive Infrastructure Program Lebanon EIIP (Article 2) Until a decree organizing the seasonal work cards mentioned in the Bilateral treaty in the area of Labor signed between the Government of the Republic of Lebanon and the government of the Syrian Arab Republic on 18/10/1994 is issued, the Ministry of Labor shall, through its competent divisions, grant the Syrian Workers on behalf of whom contractors under the project apply for work authorizations, work permits. (Article 3) The Competent Unit at the Ministry of Labor shall grant work permits regarding the subject matter project (Article 4) The documents that shall be submitted with the request : By the worker: 1. An application, 2. A personal ID (ID, Passport, Registry extract, UNHCR Card) 3. Medical report that gives feedback on the Health status of the applicant or a Medical certificate. These should be signed by a Medical Doctor that could be among the MDs funded by the UNHCR), 4. 2 pictures By the Contractor: 1. A temporary Employment contract for three months, 2. A Collective Insurance policy for the duration of the Project issued by one of the Insurance companies accepted in Lebanon, 3. What proves the contract with the ILO under EIIP Lebanon (a copy of the contract), 4. A commercial Circular for the Contracting companies with the ID of the person who has signing capacity, 5. A Power Of Attorney in the case the signatory is an attorney (Article 5) All who are mentioned in art. 4 of this decision shall, in the case of any change of the place of work or stop of work for any reason, notify the Syrian Workers Affair Unit at the Ministry of Labor through one of the regional Units of Ministry & shall submit either the original Work Permit for cancellation or a new employment contract under the subject matter project within the term of a month from date of beginning of the new work..

Types of document	Title	Year	Contents
	Decision 2/56 Determination of the value of the certificate of the people with special needs	April 9th, 2013	(Article 1) Disabled persons and persons with special needs are those with disabled card issued from the ministry of social affairs. (Article 2) Determine the value of the certificate of deposit required to bring a worker in the domestic service to help disabled people and people with special needs as one hundred fifty Lebanese pounds. (Article 3) In order to benefit from the above two articles applicants who want to hire a worker in the domestic service must be the disabled person or with special needs or his wife, if any, or one of his parents, brothers or sisters who live with him or their legal guardians.

5.1.5 Legal Requirements for Syrians Working in Lebanon

The legal framework on the participation of Syrians in the Lebanese labor market is complex and somehow ambiguous. This is because, as has been mentioned in the previous section, applicable regulations cover a wide range of topics, and the decisions are newly issued and amended on frequent basis with relatively weak enforcement. The Lebanese Labor Law stipulates the principle of prioritization of Lebanese nationals to foreign workers in filling job vacancies, and this principal is embodied in various Ministerial decisions. Yet, foreigners can legally work in Lebanon in conformity with the Lebanese laws and regulations. Working formally in Lebanon, Syrians are requested to obtain work permits with the residence permits.

(1) Residence Permits

1) Entry Permits

Entering into the country, Syrians, same as any other foreigners, are required to obtain residence permits to stay in the country. Syrians are granted tentative residence permit good for six months when they enter into Lebanon. However, the actual residence policy has been frequently changed over a few years.

In 2014, the General Security Office announced that Syrians need to present the reasons when they enter Lebanon. According to the announcement, Syrians can legally enter Lebanon for any one of the following reasons: tourism, work visit, trade, owning or leasing property, study, travel, health treatment, or embassy consultation. If none of these reasons applies, they need a Lebanese sponsor (October 2014, General Security).

The General Security Office published a more detailed directive introducing additional categories of people who might be entitled to an entry permit, among these holders of a residential rental agreement; holders of Lebanese residence permits and their family members; spouses of Lebanese nationals; children of Lebanese women; wives of Palestinian refugees registered in Lebanon; holders of residence permits in another Arab or foreign country; and diplomats (January 24, 2015, General Security).

From January 2015 to June 2016, the General Security Office announced that Syrians were required to pledge 'not to work' in order to obtain/ renew residence permits. Donors were affected by this announcement, as it indicated that Syrians who obtained UNHCR registration certificate could not be engaged in any economic activities in Lebanon. The announcement was lifted in 2016. Currently, GSO announces Syrians who entered into Lebanon should pledge to abide by Lebanese laws and regulations.

2) Renewal of Residence Permits

Regarding the fees for the registration and renewal of residence permits, Syrians were entitled to have residence permits at 300,000 Lebanese Pounds (200 USD) renewable on yearly basis. At the beginning of 2017, however, the residency permit fee was lifted. Residency will be provided free of charge and be renewable to refugees holding UNHCR certificates or otherwise registered with UNHCR. This is not applicable to displaced Syrians under other categories such as those who are under the sponsorship of Lebanese citizens[23].

Displaced Syrian people have two options to obtain and renew residence permits; the first option is to get Lebanese sponsorship and the second option is to get residence permits by UNHCR certificates. However, as the Lebanese Government requested UNHCR to suspend the registration of refugees apart from the renewal and registration of new-born Syrian babies born in Lebanon since May 2015, those who are not registered to UNHCR should get residence permits only with Lebanese sponsorship.

Recent changes on the work permits policy are favorable for Syrians. The General Security amended the visa regulations for Syrian nationals in Lebanon by easing the process of renewal for work-related sponsorships, a General Security statement said. Until Dec. 31, under the new regulations, Syrians in Lebanon on work visas will have the option to transfer their sponsorships from one sponsor to another from within the country, as long as their current sponsor agrees to the change. In the past, Syrian laborers could only move from one employer to the next after departing Lebanese territory and returning under a new sponsorship. This change is welcomed by the Syrians, since they will not have to go back to Syria for dangerous journey when renewing work visas[24].

(2) Work Permit

Irrespective that their status are economic migrants, UNHCR registered displaced or unregistered displaced people, Syrians are required to obtain work permits when they work in Lebanon.

Based on the Bilateral Agreement between the government of the Syrian Arab Republic and the government of the Lebanese Republic regarding employment of their nationals in the other country, some construction companies obtain seasonal work cards for their Syrian migrant workers with the following procedure. Syrian workers send photo copies of IDs to a sponsoring company during their stay in Syria. The sponsoring company submits the copy of the workers' ID and required

[23] ILO 'Towards the right to work: A guidebook for designing innovative Public Employment Programs', 2017, p. 15
[24] The Daily Star 'General Security eases permit rules for Syrians', Sep 13, 2017.

documents (e.g. legal paper of the company) to General Security Office to get the registration number for the Syrians. Syrian workers go to the Syrian Authority to obtain an exit card (yellow card) by presenting the registration number sent by the sponsoring company. Syrian workers go to the joint office and obtain a white card to enter Lebanon. Syrian workers go to the General Security with the ID of the workers and registered number. The General Security approves their stay in Lebanon and issues a red card. Syrian workers are required to keep their ID, yellow card, white card, and red card in Lebanon[25].

Syrians, whether they are economic migrants or Syrian displaced people, can work in the agriculture, construction and environment (mostly cleaning) sectors in line with Lebanese laws and regulations, as long as they obtain work permits. However, there are cases where work permits are not granted in case the Minister judges there is severe job competition between Lebanese and Syrians[26].

In order to obtain work permit, legally required documents for Syrians to apply for work permits are as follows.

Table 5.1.4 List of Required Documents for Application of Work Permits

Required Documents for Work Permits	
Employment contract certified form public notary stipulating salary, period of employment, type of work- all in line with Lebanese law	National Security Social Fund registry record.
A copy of exit permit issued at the Syrian borders while exiting Syria;	Medical laboratory results showing the individual does not have Tuberculosis, Malaria, Syphilis, Aids, Hepatitis B
A copy of entry card issued by GSO while entering Lebanon	Proof of completion of military service
Certificate from the Syrian Embassy confirming the authenticity of the documents provided by the applicant;	Insurance policy; commercial license & commercial registry
A copy of ID or passport and 2 photos	Copy of ID of company owner; employment registry record

Source: UN Interagency Coordination

In practice, contractors in the construction sector provide rather simpler requirements. According to a contractor, they submitted application documents (two passport photos, identity card or passport, return card/guarantee card, residency commitment, photocopy of ID of owner, and rent bond) to the General Security Office[27].

Some qualified five star contractors ensure their Syrian workers to obtain work permits as compliance matters. Yet, it might also be true that significant numbers of Syrians are estimated to work without work permits in Lebanon. It can be inferred from the situation that approximately 1,500 work permits are issued by the Ministry of Labor on yearly basis, while approximately 400, 000 Syrian working population are in the country[28]. The tables below show number of new and renewed work permits in 2016 issued by the Ministry of Labor.

[25] Minutes of Meeting with Council for Reconciliation and Development (November 4th, 2017)
[26] Minutes of Meeting with the Ministry of Labor, August 22, 2017.
[27] Minutes of Meeting with a Contractor, August 24 2017.
[28] Minutes of Meeting with ILO on August 22, 2017.

Table 5.1.5 Number of New Work Permits Issued for Foreign Workers (Syrians) (2016)

	Category 1	Category 2	Category 3	Category 4	
Owner	23	0	0	0	23
Cleaning company	0	0	45	0	45
Construction workers	0	0	75	0	75
Washing	0	0	15	0	15
Agriculture	0	0	3	0	3
Housecleaning	0	0	1	0	1
Female Housekeeping	0	0	2	0	2
Others	12	11	20	0	43
	35	11	161	0	207

*1 Category 1 includes business owners of institution with a capital above 50 million LBP, or an industry with more than ten employees, or a touristic corporation with more than five employees. Also includes an employee with a salary more than three times the minimum wage.
*2 Category 2: includes business owners not mentioned in category 1 and employees with a salary more than two times but less than three times the minimum wage.
*3 Category 3: includes employees with a salary ranging between the minimum wage and two times the minimum wage.

Source: Ministry of Labor

Table 5.1.6 Number of Renewed Work Permits Issued for Foreign Workers (Syrians) (2016)

	Category 1	Category 2	Category 3	Category 4	
Owner	62	0	0	0	62
Cleaning company	0	0	300	0	300
Construction workers	0	0	416	0	416
Agriculture works	0	0	141	0	141
Washing works	0	0	14	0	14
Housekeeping (Male)	0	0	19	0	19
Housecleaning works	0	0	16	0	16
Housekeeping (Female)	0	0	41	9	50
Principal	6	0	0	0	6
Others	63	55	124	0	242
Concierge	0	0	95	0	95
	131	55	1,166	9	1,361

Source: Ministry of Labor

The cost of a work permit for foreign workers in Lebanon is dependent on the work category under which it falls. Syrians benefit from reduced fees, which are 75% lower than the standard work permit fees. Syrian labor in agriculture, construction and environment sectors usually falls in three work permits categories, which require them to pay 120,000 LBP (80 USD).

Table 5.1.7 Work Permit Fees for Foreign Workers and Syrians for Each Category

Category		Standard Fee	Reduced Fee for Syrians
Category 1	high salaries*1	1,800,000 LBP(1,200USD)	450,000 LBP(300USD)
Category 2	medium salaries *2	960,000 LBP(640USD)	240,000 LBP(160USD)
Category 3	low salaries*3	480,000 LBP(320USD)	120,000 LBP(80USD)

Source: Interview with UNHCR

All Syrians, whether they are Syrian economic migrants and displaced people, are required to obtain work permits. Eight regional directorates of Ministry of Labor are established at the Governorate (Mouhafaza) level. The Ministry of Labor has the Department of Syrian Labor Affairs under the Department of human resources.

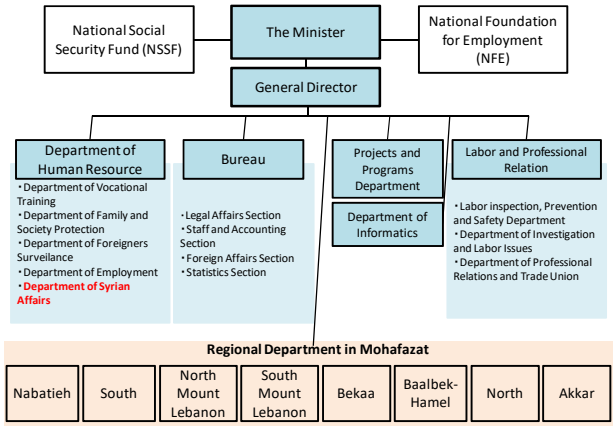


Figure 5.1.5 Organigram of Ministry of Labor

There might be push and pull factors for limited numbers of issuance of work permits. In the first place, preparing documents for application of the work permits is not an easy task. Some key informants are concerned that Syrians are not willing to go and get the documents from the Syrian Embassy. Also, although Syrians are exempted from a deposit of 1,500,000 LBP (1,000 USD) with the Housing Bank, the cost to obtain work permits are one of the issues Syrians might face. Moreover, there are limited numbers of regional offices where workers have access to obtain work permits. Finally, it depends on the Minister of the Ministry of Labor who finally sign the permissions if applicants obtain work permits, due to lack of job opportunities and job competition between vulnerable Lebanese and Syrians.

Under such circumstance, ILO has been attempted to facilitate the procedure to obtain work permits by simplifying documents and decreasing the cost with the Ministry of Labor. As a result, Ministerial decision 1/299 was signed on November 2, 2017. Under the decision, the Ministry of Labor will issue three-month special work permits for Syrian workers working for a specific program (ILO Employment Intensive Investment Program: EIIP). This decision is applicable for the Syrian workers, including Syrian displaced people. Syrian workers are required to submit a personal ID (ID, Passport, Registry extract, UNHCR Card) and the medical report. On the other hand, sponsored companies are required to submit a temporary Employment contract for three months, a collective insurance policy, a document which proves the contract with the ILO under EIIP Lebanon, a commercial circular for the contracting companies, a power of attorney (if applicable). Syrian workers do not need to obtain a yellow and white card or a certificate that the Syrian Embassy has confirmed the authenticity of documents for the application, those of which are normally required to be obtained in order to apply for ordinary work permits. In addition, though it is compulsory for Syrian workers who reside in Lebanon to acquire and possess residence permits, the application for the special work permits of three-month in itself does not require

Syrians to submit the residence permits. Syrian workers are to pay 120,000LBP (80USD) for the application for the work permits as well as that for Category 3 of ordinary work permits. ILO is promoting short-term job creation and decent work for Syrian workers including displaced Syrian people through implementation of EIIP and look for a stepping stone for longer term solution.

(3) Ratio of Foreign Workers against Lebanese Workers

Lebanese Labor Law articulates the principle of preference of national workers over foreign workers. Yet, it allows foreign workers employment in the sectors which traditionally depend on foreign workers including agriculture, construction and domestic work. Ministerial decision 1/49 article four sets out the recruitment ratio should keep one foreign workers against ten Lebanese workers. At the same time, it sets the exceptions on the cleaning and construction sectors, that the employers can employ one foreigner per three Lebanese and one foreign worker per one Lebanese worker respectively.

Although the Ministry of Labor clearly show its positions through decisions, the regulation on recruitment policies might not be strictly followed on the ground. This is because, in the first place, the decisions have been amended so frequently that they might not be fully announced. As a result, stakeholders do not follow the changes. In fact, some contractors do not grasp the decisions and inspections are sometimes being executed on work sites. Secondly, it is sometime perceived that the decisions do not reflect the real situation in the labor market. As for the construction sector, Lebanese contractors highly depends on Syrians for unskilled labor and substituting them for national unskilled workers are not feasible. In reality, approximately 70% to 90% of the workers are occupied by foreign workers, especially in the construction sector.

Article 6 of decision 1/49 therefore regulates the inspection by the Ministry of Labor. Article 6 has a dual meaning; on the one hand, those who violate the decision can be fined by the inspectors of the Ministry of Labor in regular inspections. Inspectors of the Ministry of Labor have been conducting monitoring activities on an ad hoc basis. The frequency of the work site inspections varies according to the political and economic situations, regions and the nature of companies. For instance, previous Ministers ordered frequent on-site inspections due to the serious influence of the Syrian Crisis, whereas the officers go to monitoring activities from few times a week to once a few months under the current Minister, due to the limited numbers of inspectors[29]. Also, according to the contractors in construction sector, the frequency of inspection varies according to the projects, possibly because of the numbers of foreign workers in the work sites. If employers violate it, they can be charged 250,000LBP (167 USD).

On the other hand, article 6 of decision 1/41 indicates the decision can be modified yearly when the Minister issue a new one in line with the reality of work site based on the reports of inspectors. In fact, there is no effective measure to be taken to adjust the number of workers in the construction sector where employers highly depend on Syrians. Donors are required to keep the accountability

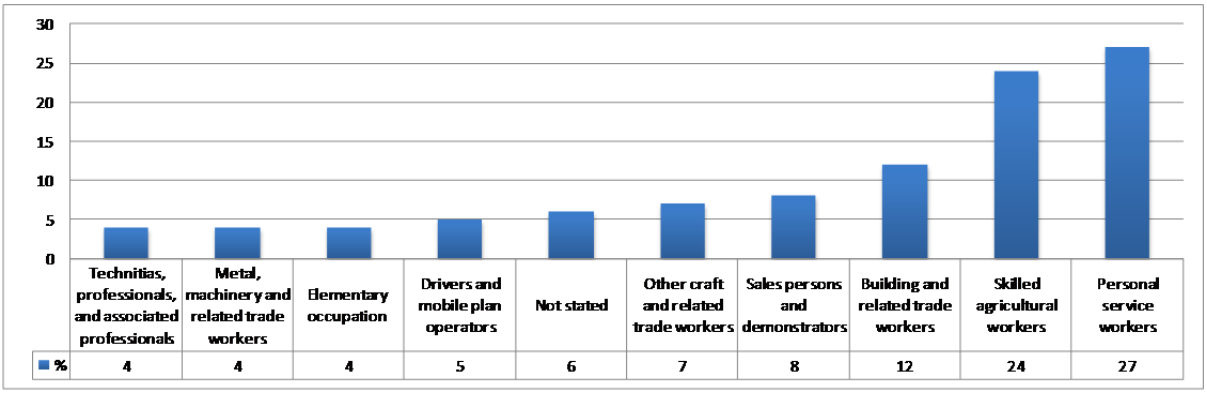
[29] Minutes of Meeting with the Ministry of Labor on August 22, 2017.

of the employment process of unskilled labors by announcing job opportunities to the host communities as well as to Syrians, for the purpose of creating jobs for the vulnerable Lebanese as well[30].

5.2 Present Employment Conditions for Syrian People

5.2.1 General Work Situation of Syrian Workers in Construction Sector and Summary of Condition for Formal Sector

Syrians who have been working in Lebanon entered the country over the border of the two countries and worked as seasonal or immigrant workers. Although a majority of them seemed to be engaged in the agriculture, construction and environment (cleaning) sectors, Syrians used to and have been working in other sectors, such as the service sector (e.g. small groceries). The table below shows distribution of Syrian displaced people by occupation in Akkar, Tripoli, Bekaa and South Lebanon. According to the study, 12 % of Syrian displaced people are estimated to work for construction sector.



Source: ILO, 2013

Figure 5.2.1 Distribution of the Syrian Displaced by Type of Occupation

The severe influx of Syrian displaced since 2011 affects and somehow distorts the labor market in various ways. Syrian seasonal workers became displaced people. A significant number of the displaced people had worked in Lebanon as migrant or seasonal workers before. They began and continued to work in these jobs since the Crisis started. They brought their family members from Syria who are naturally registered as Syrian 'refugees' whereas the family head is not. This explains part of the discrepancies in the registration within families[31].

Unskilled laborers in construction sector are introduced from acquainted Syrians hired by the contractors. Syrian economic immigrants tend to come to Lebanon as a group, and they employ some of the workers among them. Although Syrian displaced people literally can work, Lebanese qualified contractors refrain from hiring those who are seemingly difficult to obtain work permits legally[32] .

[30] Minutes of Meeting with ILO on August 22, 2017.
[31] GIZ 'Employment and Labor Market Analysis Lebanon', February, 2016.
[32] Minutes of Meeting with a Lebanese Contractor, August 24, 2017.

Donors in Lebanon understand most Syrians are working in the informal sectors without work permits. They basically leave the management of workers to the contractors. Considering the sensitive labor policy, they do not set a condition on whether workers are granted work permits. However, at the same time, they try to improve the working conditions of Lebanese vulnerable and Syrians through advocacy on a legal framework as well as the implementation of projects.

5.2.2 Working Condition

Whether they are vulnerable Lebanese or Syrians, those who work in informal sectors are employed in rather precarious working conditions. It is therefore important to consider decent working conditions, when the Project is to employ Syrian workers.

(1) Minimum Wage

The minimum wage in Lebanon is set LBP 675, 000 (450 USD) per month[33]. The range of workers' wage in the construction sector is based on the experiences and competencies of the employees. According to a contractor, the wage of unskilled labor is some 18 to 20 USD. Semi-skilled laborers earn 25 to 28USD, and the daily wage of construction supervisor can exceed 35 to 40 USD. Regarding the salary in construction sector, wages on skilled laborers have dropped by 33% in the Northern part of Lebanon, due to the increase in the number of unskilled laborers after the Syrian Crisis started, which indicates the wage of unskilled labor is 20% to 50% lower than that of the Lebanese[34].

Table 5.2.1 Estimated Wages by Job Category for Lebanese and Syrian Workers

	Lebanese	Syrians
Professionals (LBP/ month)	900,000 - 2,250,000 (600-1,500USD)	900,000 - 1,200,000 (600-800USD)
Skills (LBP/day)	50,000 - 130,000 (34-86.7USD)	40,000 - 70,000 (26.7-46.7USD)
Unskilled (LBP/ day)	35,000 - 50,000 (23.3-33.3USD)	25,000 - 35,000 (16.7-23.3USD)

Source: International Rescue Committee

It is difficult to set an appropriate wage for skilled labor. This is because the wage of workers can reflect the price of regional labor markets as well. The wage can also be fluctuated by the nationalities of the workers. Some donors set 20 USD for minimum wage with the adjustment of regional labor market price[35] to balance the situation.

(2) Working Conditions

In Lebanon, working days are six days a week and the working hours is eight hours per day. Overtime work can be granted if it is approved. Displaced Syrians can work in the same working conditions. For all workers including unskilled workers, workmen compensation is generally required in the contracts between the client and the contractor.

[33] ILO 'Towards the Right to Work: A guidebook for designing innovative Public Employment Programs', 2017, p.18
[34] ILO 'Labor Market Information Review and Analysis: In focus of Northern Lebanon ', 2017, p.41
[35] Minutes of Meeting with a Lebanese Contractor, August 24, 2017.

In reality, displaced Syrian people are still afflicting by the informality of labor condition. ILO reports that 56% of displaced Syrian workers are employed as seasonal, weekly or daily basis and 92% of displaced Syrians in Lebanon are currently engaging work without a formal contract[36]. It is reported that Syrians were required to tolerate low income, long working hours, working without breaks and late payment of wages[37].

(3) Recruitment Age

The Lebanese labor law stipulates that the legal minimum working age is thirteen, provided that such children are fully protected, instructed, and trained. Different provisions apply for different ages between thirteen and seventeen years[38]. However, children under eighteen years old are generally perceived to be prohibited to work, given that any work can interfere with their schooling and there is no clear demarcation on the 'light' work and hazardous work.

(4) Occupational Health and Safety

Syrians often work in an unsafe and unhealthy environment where they are exposed to hazardous work places. In this Study, according to a contractor, it did not pose any hazardous work nor abuse against the workers in their offices and work sites. Yet, Syrian workers often reported severe fatigue, back and joint pain caused by the work, and are affected by the work related hazards such as dust and fumes of the work sites, excessive heat and cold and dangerous tools[39].

Projects implemented by donors take preventive measures from the occupational accidents. In the case of UNDP, in order to prevent hazardous work and unexpected injuries, general safety measures are included in the general condition of the contract. In the work site UNDP requests contractors to follow general security rules and to provide workers with Personal Protective Equipment (PPE)[40].

5.2.3 Gender Mainstreaming in Construction Sector

There are few examples for female unskilled laborers employed in the construction sector. Employment of women in this sector has not been promoted due to social and cultural limitation. On the other hand, there are certain numbers of Lebanese female skilled workers or professionals, such as project managers, design engineers and secretaries.

In order for women to work in the construction sites, employers are required to take measures such as the promotion of fair payment irrespective of gender, consideration for child bearing, and the work that could be dangerous and hazardous for women, all of which are not so easy to initiate[41].

[36] ILO 'Syrian Refugees in Lebanon face harsh working condition', http://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_240126/lang--en/index.htm , last seen on October 4, 2017.
[37] ILO 'Assessment of the Impact of Syrian Refugees in Lebanon and Their Employment Profile', p.32, 2013.
[38] ILO 'Towards the right to work: A guidebook for designing innovative Public Employment Programs', 2017, p.19
[39] ILO 'Assessment of the Impact of Syrian Refugees in Lebanon and Their Employment Profile', p.32, 2013.
[40] Meeting memo with UNDP on August 22, 2017.
[41] Meeting memo with UNDP on August 22, 2017.

At the same time, they need to consider the prevention of workplace harassment[42]. Some contractors introduce shorter working hours for working mothers.

Some donors suggest concrete measures to utilize female workers in small infrastructure projects. ILO suggests women, who have traditionally been working in the agricultural sector, can be absorbed to farm to market roads or irrigation construction, considering the impact of the Syrian Crisis which has increased job competition in the sectors women have traditionally worked for[43]. Also, ILO sets certain numerical indicators (e.g. female employment ratio) in small infrastructure projects.

5.2.4 Condition of Formal Employment for Syrian Workers

The table below summarizes required documents and condition for formal employment of Syrian workers according to the legal status of Syrian workers (Syrian Nationals/ Economic Migrant, UNHCR Registered Refugees and others including (A) Syrians who stayed and worked in Lebanon before the Syrian Crisis and (B) displaced Syrians who fled from Syria after the suspension of the registration of refugees (May 2015).

[42] Meeting memo with ILO on August 22, 2017.
[43] Meeting memo with ILO on August 22, 2017.

Table 5.2.2 Summary of Required Documents and Condition for Formal Employment of Syrians

	Residence Permit	Work Permit	Work	Working Environment	Challenges
(1) Syrian Nationals/ Economic Migrant	**Required** Syrians are granted tentative residence permit good for six months when they enter Lebanon. Applicants pay 300,000 LBP (USD 200) in order to renew them. Syrians can obtain residence permits if they have Lebanese sponsors (natural person or companies)	**Required** The cost of third category work permit is 20,000 LBP (60 USD), whose cost is one third of foreigners. Work permits can be extended to a maximum three years.	**Accepted to work** Syrian economic migrants are granted within the jurisdiction of Decision 1/41	(Formal labor) applicable to (1) (2) (3) The wage of unskilled labor is some 18-20USD. Semi-skilled labor earns 25~28USD, and the daily wage of construction supervisor can exceed 35~40USD. Working days are six days a week and working hours is eight hours per day. Subscription of workmen compensation is required in the contract. Workers take leave on official holidays. Employers pay for extra charge for extra working hours. Extra work requires approval. Child labor is prohibited.	Local stakeholders (Ministry of Labor and contractors) and donors (ILO, UNDP and UNHCR) have different perspectives on the accessibility of documents for work permits.
(2) UNHCR Registered Displaced People	**Required** Syrian registered displaced people can obtain residence work permits if they have (1) UNHCR certificates or (2) Lebanese sponsors (natural person or companies) Renewal fee is lifted for Syrian registered refugees.	**Required** The cost of third category work permit is 20,000 LBP (60 USD), whose cost is one third of foreigners. Minister of the Ministry of Labor can reserve approval of work permits when there is strong job competition in the certain sectors.	**Accepted to work** Syrian registered displaced people are granted within the jurisdiction of Decision 1/41 They can receive necessary assistance from UN agencies at the same time they are employed.		Local stakeholders (Ministry of Labor and contractors) and donors (ILO, UNDP and UNHCR) have different perspectives on the accessibility of documents for work permits. There is a possibility that those who have terminated the contract with a company cannot renew their work permits with the UNHCR certificate; instead they need to get work visa through sponsorship.
(3) Others **(A) Syrians who stayed and worked in Lebanon before Syrian Crisis** **(B) Displaced Syrians who fled from Syria after the suspension of the registration of refugees (May 2015)**	**Required** Syrians can obtain residence permits if they have Lebanese sponsors (natural person or companies)	**Required** The cost of a third category work permit is 20,000 LBP (60 USD), whose cost is one third of foreigners. Minister of the Ministry of Labor can reserve approval of work permits when there is strong job competition in certain sectors.	**Accepted to work** Syrian economic migrants are granted within the jurisdiction of Decision 1/41 They can receive necessary assistance from UN agencies as long as they report UNHCR at the same time they are employed.	(Informal Labor) Wage of the Syrian labor force is cheaper than that of Lebanese workers. Most Syrian informal labors are not covered by any of the insurance. They tend to work longer hours in hazardous working conditions.	It might be more difficult for Syrians under this category to work in the formal setting than other categories, as they need to find sponsors to obtain work permits.

5.3 World Bank Policy for the Project

In terms of the employment creation of the vulnerable Lebanese and Syrians, The World Bank follows Lebanese laws and regulations. Yet, it does not set any further conditions regarding the working conditions of them at this moment. Currently, the World Bank is planning to record workers' names, nationalities (Syrian, Lebanese or others), place of residence, gender, person with disability, occupation, year of birth and total workdays.

5.4 Findings and Recommendations on Employment Conditions of Labors for the Projects

5.4.1 Findings on the Employment Condition of Labors for the Project

(1) Regular Changes on Lebanese Policies and Regulations towards Labor Issues

Due to the changing realities of the Syrian Crisis and the influx of displaced Syrians, labor regulations have been altered in response to the Government's policy towards Syrian labor. Ministerial decisions can be either tightened or eased after their inspection or monitoring of the actual situation on the labor markets probably on yearly basis. It is advisable to check up-to-date labor related decisions and consult with the relevant agencies on a regular basis.

(2) UNHCR Registered Refugees and Work Permits

The Study found that UNHCR does not prevent any of the displaced Syrian people who get any assistance from UN agencies from working with work permits. In other words, they acknowledge that getting work permits itself does not affect the status of 'Syrian refugees' whether they are registered or not. However, it can be risky for short-term workers who need to renew their residence permits in a few months. Those Syrians who used to obtain work permit with UNHCR certificates might be required to renew the residence permits under sponsorship.

5.4.2 Recommendation on the Employment Condition for the Project

(1) Target of Employment Creation and Beneficiaries of the Project

Potential targets of the Project, in terms of employment creation, could be vulnerable Lebanese who live under 4 USD per day; and Syrians who are affected by the Syrian Crisis. However, it might be difficult to specifically target these categories of workers. As for unskilled labor, the Project will employ Lebanese and Syrians who are competent in construction work. However, given that UNHCR has the list of registered displaced Syrian people, the Project can possibly utilize the list to encourage them to work for the Project. However, since UNHCR has not been intently focusing on employment creation for Syrian displaced, the Project needs to continuously discuss and seek the plausible way of generating the Syrian employment with UNHCR.

It is worthwhile noting that there are significant numbers of displaced people of other nationalities, namely Iraqi, Palestinians, and Somali, etc., who could be possibly targets of the Project.

Regarding the beneficiaries, the Project should consider how women can benefit from the road

rehabilitation sub-projects, given that the employment opportunities for women, at this moment, are considered to be minimal.

(2) Working Permits on Project Basis

As has been mentioned in the previous section, ILO, in cooperation with the Ministry of Labor, has introduced simplified work permits to facilitate formal employment under Employment Intensive Investment Program (EIIP). The Ministry of Labor has signed Decision 1/299, which enables Syrian workers under the Program to obtain special work permits with a shorter time span. For several sub-projects under EIIP, the trail application for the special work permits is currently under process. This decision can also assist other donors' projects in obtaining special work permits, if they develop a partnership with ILO. This Study recommends the coming Project to closely communicate with ILO to clear work permit issues.

(3) Monitoring Items

One of the objectives is to improve the livelihood of both the vulnerable Lebanese and the displaced Syrians by creating job opportunities in construction sector. Hence, the Project should monitor the short-term employment created by these sub-projects.

The World Bank is planning to record workers' names, nationalities (Syrian, Lebanese or others), place of residence, gender, person with disability, occupation, year of birth and total workdays. Yet, the Bank will not evaluate the number of employed displaced Syrians. If the Project aims at creating employment for the displaced Syrians as well, it should be either precluded in the monitoring sheet as a parameter.

Table 5.4.1 List of Monitoring Items

Items	Verifiable Indicators	Types of Requirements	Means of Verification
Employment Creation	Numbers of Lebanese employed by the Project	Requirement	Monitoring sheet
	Numbers of Syrian employed by the Project	Requirement	Monitoring sheet
	Numbers of Syrian displaced employed by the Project	Recommendation	Monitoring sheet
Prohibition of child labor	Age of employment	Requirement	Monitoring sheet
Minimum Wage	Daily wage for the workers	Recommendation	Monitoring report from the contractor

As for the promotion of occupational health and safety, the Study recommends to include the articles on general safety and workmanship compensation in the general contract with the contractors of the Project. Regarding the possession of work permits, the Study recommends to cooperate with the Ministry of Labor and ILO to find a measure how to create employment in line with Lebanese laws.

CHAPTER 6 CONSTRUCTION PLAN AND PROCUREMENT PLAN

6.1 Applicability of Labor Based Technology in Lebanon

6.1.1 Current circumstances of LBT application in Lebanon

Labor Based Technology (LBT) is one of the construction methods that constructs social infrastructures by intensive labor. The field that can apply LBT is not small and so it is able to construct buildings, bridges, tunnel as well as roads, however, in principal, not on a large scale. In this Project, examining the applicability of LBT in road construction will be the target. According to the interview to the organizations that are in charge of infrastructure construction and maintenance in Lebanon, such as CDR, MPTW and ILO, it was found that Lebanon does not have any experience which applied LBT to their work before. This is figured out because LBT does not have economical feasibility in Lebanon due to relatively high personal wages compared to other countries applying LBT nationwide. However, the explanation of using LBT just from the economic aspect is inappropriate and all construction items are not constructed by equipment only. For this, further examination to find out the applicability using LBT in Lebanon shall be made.

6.1.2 Benefit and applicability of LBT in Lebanon

(1) Benefit from the LBT

The benefit to apply LBT from the economic side can be summarized as follows:

a) the money dropped by the construction goes directly to the local market. Conversely, in equipment based technology, most of the cost is applied to the machinery and eventually goes overseas

b) since the construction method is simple, the local community could maintain the facility by their own resources

These benefits are obtained based on a low personal cost. As in African countries where LBT is applied widely, the labor wage is approx. 2 to 3 US$ per day which is extremely low compared to Lebanon. Therefore, the advantages of using LBT could be found in places such as developing counties or post conflict areas.

However, other functions which could also be expected from LBT is the enhancement of job opportunity and the restoration of the community is representative of other functions in LBT. For this, considering that the minimum personal wage is 20US$ in Lebanon, which is much higher than other countries where LBT is widely introduced, the latter function shall be the a strong reason to apply LBT in Lebanon. This function shall meet the objective of the Project as creating employment opportunities for the displaced Syrians and the vulnerable members of the Lebanese host communities.

(2) Considerable construction items of applicability to LBT

The basic policies of the road rehabilitation for the Project, which was shown in Table 4.2.1, are as follows:

a) the horizontal and vertical alignment follows the existing and any improvement shall not be made

b) the construction shall be done within the existing Right of Way and extra land procurement or demolition for the rehabilitation shall not be made

From this, it is considered that road rehabilitation work includes the following construction items.

Table 6.1.1 Considered construction items from the basic policy of the rehabilitation work

Field	Construction Items	Specification
Pavement (Carriageway)	Overlay Reconstruction from the Subgrade or Base Course	bituminous wearing course bituminous binder and wearing course
Sidewalk	Interlocking Pavement	
Drainage	U-Shape Ditch Riprapped Ditch Pipe Culvert	B500 x H500 B500 x H500 D200 to D1200
Structure	Retaining Wall Masonry Wall Gabion Wall	H=1.0m x W=0.3m H=2.0m x W=0.5m
Slope	Slope Protection	H=2.0m x W=0.3m, Riprapped Protection
Safety Facilities	Reflective Road Studs Steel Guardrails Small Sign Road marking New Jersey Block Arrow Painting LED Lighting	

Since there is no experience applying LBT in the construction work, the applicability of LBT for each item shall be examined as shown in the next table.

Table 6.1.2 Applicability of LBT by construction items

Item1	Item2	Construction Method	Applicability of LBT	Evaluation
Pavement	Overlay (Wearing Course)	Spraying tack coat and spreading pre-mix asphalt and compaction shall be done by machinery.	Since all construction work shall be done by machinery, applicability of LBT is very low.	Not Applicable
	Base Course	Trucks to haul materials and motor grader to spread material shall be used.	Use of machinery shall be the general method of the construction and hence applicability of LBT is very low.	Not Applicable
	Bituminous Layer (Wearing Course & Binder Course)	Finisher and macadam roller is considered to be used throughout construction due to scale of quantity.	Use of machinery shall be the general method of the construction and hence applicability of LBT is very low.	Not Applicable
	Interlocking pavement	Spreading base course is considered to be done by labor due to the narrow width of the construction area. Laying interlocking blocks should also carried out manually, however, difficult for unskilled laborers.	Although this item is operated manually, it is difficult for unskilled laborers. Hence, it is considered that the applicability of LBT is very low.	Not Applicable
Drainage	U-Shape Ditch (B500 x H500)	Bar arrangement and concrete form is carried out manually, however, these tasks should be done by skiledl laborers.	Bar arrangement and forming concrete panels are done by skilled laborers and hence the applicability of LBT is very low.	Not Applicable
	Riprapped Ditch (B500 x H500)	Excavation of soil is available with both machinery and manually. Placing stones on the wall shall be done manually.	Excavation of soil could be carried out by unskilled laborers, and placing stones with mortar as well.	**Applicable**
	Pipe Culvert (D200 to D1200)	Bar arrangement and placing concrete forms are done by manually. The concrete shall be procured from the nearby plant.	Bar arrangement and forming concrete panels are done by skilled laborers. Other work shall be done by machinery. Hence, the applicability of LBT is very low.	Not Applicable
Structure	Reinforced concrete wall (H1.0m, W0.3m)	Bar arrangement and placing concrete forms are done by manually. The concrete shall be procured from the nearby plant.	Bar arrangement and forming concrete panels are done by skilled laborers. Other works shall be done by machinery. Hence, the applicability of LBT is very low.	Not Applicable
	Masonry wall (H2.0m, W0.3m)	Hauling materials should be made by small trucks and offloading material and masonry work shall be done manually.	Since most of the works except haulage shall be done by laborers this item has a high expectation applying LBT.	**Applicable**
	Gabion wall (H=1.0m, W=2m)	Placing stones in the wire cage shall be done manually. Other works such as excavation shall be done by machinery.	Since the stones in the wire cage shall be placed nicely to grab each other, this task needs to be done manually. So, high applicability of LBT is expected.	**Applicable**

Item1	Item2	Construction Method	Applicability of LBT	Evaluation
Slope	Slope Protection	Hauling stones shall be done by small trucks, and offloading materials and placing riprapped stones shall be done manually.	Laborers in Lebanon have experience in this task and hence a high applicability of LBT shall be expected.	**Applicable**
Safety Facilities	Reflective Road Studs	Construction of such safety facilities shall be done by skilled technicians with special equipment	Since intensive training and experience with operation of is equipment required, expectation of using LBT in this item is very low.	Not Applicable
	Steel Guardrails			
	Small Sign			
	Road marking			
	New Jersey Block			
	Arrow Painting			
	LED Lighting			

As shown in the table above, a high applicability of LBT can be observed in "Riprapped Ditch", "Masonry Wall", "Gabion Wall" and "Slope Protection". Further consideration shall be attempted by comparing between both Labor based Technology (LBT) and Equipment based Technology (EBT) in these items to observe benefit.

(3) Comparison between Labor based technology (LBT) and Equipment Based Technology (EBT)

Comparison between LBT and EBT in the following three criteria for the four construction items chosen above shall be attempted. The numbers/values calculated in these criteria shall be given according to the norms of the Japanese Standards. The calculation shall be for one km and in one party as well for comparison.

a) Construction Cost

b) Working Days

c) Number of laborers can be hired

The following table gives the result of the comparison between LBT and EBT by each construction items.

Table 6.1.3 Comparison of Labour based and Machinery based Technology

Items			LBT(A)	EBT(B)	(A)/(B)
Riprapped Ditch (B500 x H500)	Construction Cost	US$/km	53,877	31,179	173%
	Working Days	Days/km	158	77	205%
	Number of Hired Laborers	No./km	1,544	506	305%
Masonry Wall (H=2.0m, W=0.3m)	Construction Cost	US$/km	73,461	52,662	139%
	Working Days	Days/km	170	91	187%
	Number of Hired Laborers	No./km	1,700	903	188%
Gabion Wall (H=1.0m, W=2.0m)	Construction Cost	US$/km	42,563	29,387	145%
	Working Days	Days/km	83	58	143%
	Number of Hired Laborers	No./km	825	625	132%
Slope Protection (H=1.0m. W=0.3m)	Construction Cost	US$/km	53,277	35,041	152%
	Working Days	Days/km	139	78	178%
	Number of Hired Laborers	No./km	1,388	638	218%

The applicability of LBT shall be evaluated from the following perspective.

a) The difference between LBT and EBT on construction cost shall be small

Since the labor wage is higher than other countries where LBT is applied widely, generally the construction cost of LBT is higher than EBT. Hence, "difference between LBT and EBT on construction cost shall be small" means the construction cost will not be affected even when LBT is applied.

b) The difference between LBT and EBT on Construction Period shall be small

Generally, the construction speed of LBT is slower than that of EBT. Hence, "difference between LBT and EBT on Construction Period shall be small" means the construction speed will not be affected even when LBT is applied, and that means there will not be much difference on the total cost as well.

c) The difference between LBT and EBT on the number of hired laborers shall be large

Increase of employment opportunity is one of the highest expectations from the LBT method. Hence, "difference between LBT and EBT on the number of hired laborers shall be large" means a larger number of laborers will be hired when LBT is applied.

From Table 6.1.3, the ranking of each criteria shall be given in the following table.

Table 6.1.4 Ranking by each evaluation criteria

Item	Evaluation	1st (3 points)	2nd (2 Points)	3rd (1 Point)
Construction Cost	Lower percentage is superior	Masonry Wall (128%)	Gabion Wall (145%)	Slope Protection (152%)
Working Days	Lower percentage is superior	Gabion Wall (143%)	Slope Protection (178%)	Masonry Wall (187%)
Number of hired laborers	Higher percentage is superior	Riprapped Ditch (305%)	Slope Protection (218%)	Masonry Wall (188%)

From the table given above, regarding the construction cost and working days, it is evaluated that three working items which are the masonry wall, gabion wall and slope protection have high applicability of LBT. One the other hand, the working items which have high expectation of number of employment will be the riprapped ditch followed by slope protection and masonry wall. Since gabion is a simple task placing stones in a gage, it is considered difficult to generate a number of employees from this item to compare with others. The actual number of laborers that can be expected from the estimated quantity are given in the next paragraph.

6.2 Construction Method and Procurement Plan

6.2.1 Construction Method

(1) Management of the construction area

Due to the mountainous terrain of Lebanon, the construction should consider the narrow construction area of the work. Because of obeying the alignment of the existing road is the basic policy of the rehabilitation, and steep slope or cliff at both sides of the road can be observed, it is difficult to prepare diversion to separate the existing traffic completely out from the existing road. Therefore, the construction work should be done within the right of way in principal which is typically approx. 6 to 7m in width. Secure diversion out of the existing road shall require many temporary work and will raise the total construction cost.

The dominant construction item of the work is the pavement that consists of base course and bituminous surface. These works shall be operated together with management of the existing traffic control as well as work within the right of way. Hence, the existing road needs to be separated into two parts so that the traffic shall drive one lane while constructing another half-part of the road. The following illustration gives explanation of the construction method.

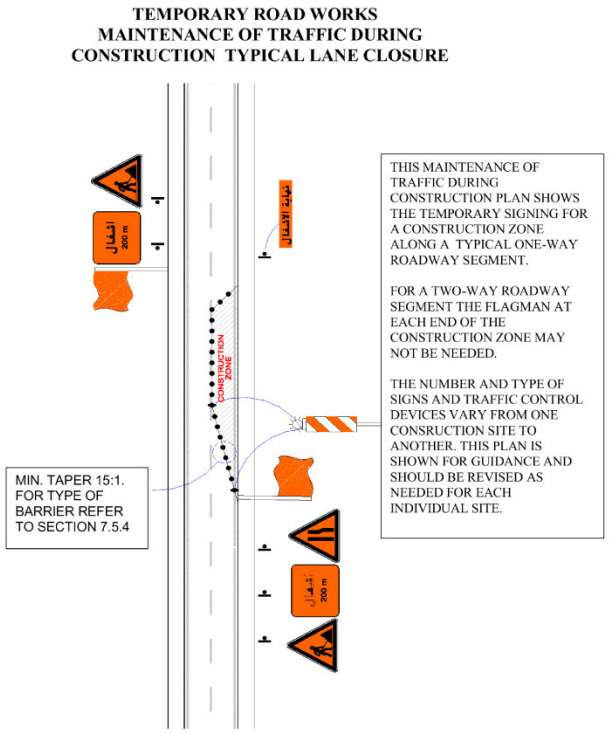


Figure 6.2.1 Traffic regulation during construction

6.3 Procurement Plan

6.3.1 Contract Documents for the Project

(1) General

The Contract documents of CDR consist of the following four documents. Among these four documents, the technical aspect is based on AASHTO which is the American Highway Standards. The Contract Agreement is based on FIDIC which is as same as indicated in the JICA's guideline. For this, it is considered that support of the tendering procedure for the contractor is not required for the GOL.

- Volume-1 : Contract Agreement
- Volume-2 : Technical Specification
- Volume-3 : Bill of Quantities
- Vulume-4 : Drawings

(2) Additional Condition of the Contract

The condition of the contract of CDR is as follows.

- Advance Payment : 15% of the contract price
- Performance security : 10% of the contract price
- Liquidated damage : 0.1% per day and maximum 10%
- Retention : Maximum 10%
  (5% refund at end of the construction and rest refund at end of defect liability period)
- Defect liability period : One year after completion of the construction

These conditions are typical and might be amended according to the tendering situation.

(3) Requirements to the Contractor

As described in Chapter 6.1.2 (1) and (2), it is difficult to explain the benefit of using LBT just from the economic aspect in spite of high expectation of job creation to the displaced Syrians. For this, without any regulations, it can be considered that the contractor prefers to apply EBT rather than LBT from its economic reasonability. Therefore, it is recommended to clearly indicate the use of LBT in the contract document for such working items.

6.3.2 Procurement Plan

(1) Procurement of the Consultant

The expected roll of the consultant is as follows.

a) Conduct the Detail Design (DD) and Construction Supervision (CS) as well.

b) Conduct the Project Monitoring on behalf of CDR

The Consultant for a) shall be procured from the domestic consulting firms, whereas b) would be procured from the international consulting firms including Japanese companies. The procurement procedure shall follow the "Standard request for proposals under Japanese ODA Loans (Selection of Consultants) (Oct. 2012)". The outline of the procedure is given in the following table.

Table 6.3.1 Procedure of Consultant Procurement and its activity organization

	Items	Action	
		GOL	JICA
	<Procurement of the Consultants>		
1	Short list of Consultant	X	
2	Review and Concurrence of JICA		X
3	Request for Proposal (RFP)	X	
4	Review and Concurrence of JICA		X
5	Preparation of Technical and Financial Proposal	X	
6	Evaluation of Technical Proposal	X	
7	Review and Concurrence of JICA		X
8	Contract Negotiation	X	
9	Review and Concurrence of the Contract		X
10	Contract Signing	X	
11	JICA's approval of Contract		X
12	Letter of Credit (L/C), L/Com	X	
	<Consulting Services>		
13	Review of the Detailed Design	X	
	<Tender Assistance>		
14	Preparation of Tender Documents and JICA's Approval	X	X
15	Tender Period	X	
16	Evaluation of Bids	X	
17	JICA's Approval of Evaluation of Bids		X
18	Contract Negotiation	X	
19	JICA's Approval of Contract		X
20	L/C, L/Com	X	
	<Construction Overview>		

(2) The task of the Consultant and Necessary Input

Both Local and International Consultants shall be procured for the implementation of the Project. The Local Consultant is procured under the Lebanese government's procedure and employed with the local government budget. International tendering shall be held for the procurement of the International Consultants which requires JICA's approval. Assumed major tasks and necessary input by the Consultants are given in Table 6.3.2. The Local Consultants for the detail design and the construction supervision shall be procured separately.

Table 6.3.2 The Task and necessary man-dates of each Consultants

Type of Consultant	Task	Period
Local Consultant	Procurement for the detail design	3 Months
	Procurement for the Construction Supervison	3 Months
	Topographic/Soil Investigation + Deailed design	9 Months
	Construction Supervision+DL	29 Months +12 Months
International Consultant	Review of the DD	3 Months
	Tendering Assistance (TA)	9 Months
	Project Management+DL	29 Months +12 Months

(3) Normal Practice of the Contractor's Procurement in Lebanon

The Contractor shall be procured under ICB based on JICA Procurement Guideline. According to CDR, CDR normally doesn't carry out Pre-Qualification as well as Pre-Bid Meeting for a project funded by a local fund, and instead procures the contractor from group, which is categorized into five levels described in Chapter 2. The public notice is made open but there will be a regulation allowing joining the tender only possible to contractors with the designated level. In the international donor funded project, this procedure accords with the donor's regulation, however, it is possible to squeeze the duration before construction by following the CRD's methodology.

A tender for infrastructure projects under CDR is normally done by 2-envelope system, one for the technical documents and another for the financial bid. The financial bid shall be opened after the technical evaluation. The evaluation is done by the Evaluation Committee which consists of three members such as the tender department and General Commissioner. The General Commissioner joins as a representative of the Government and he/she is from the prime minister's office.

Generally, a bidder which presents the lowest price shall be a potential contractor for the project. However, the Evaluation Committee evaluates the appropriateness of the unit rates by comparing among the all competitor's proposals. The final decision and approval shall be made by the Council Board of CDR. Although the minimum bid price method has not been applied for the project under CDR, in case of the bid price from the lowest offer is judged as too low for the work, the Council Board has right to disqualify the tenderer.

(4) Procurement Policy for the Contractor

Since the procurement of the contractor for the Project is made under ICB, it seems unsuitable to apply the pre-qualification (PQ) system normally applied by CDR. Accordingly, PQ should be applied to avoid bidders with poor performance. However, in order to shorten the tender period, either option should be applied: (i) PQ shall be conducted during the detailed design stage or (ii) PQ documents shall be submitted with the bid documents, Post PQ method. The details of the methodology shall be determined at the detailed design stage.

To provide the working opportunity in the Project for many contractors as much as possible, it is considered by CDR to set a limited number of the packages that a single contractor can take, which

maybe limited to allow a single contractor to take the maximum two to three packages

Since CDR proposes to implement the tender for the sub-projects one package a week to apply the limitation policy for single contractor's participation for the Project mentioned above, it is necessary to take the total eleven weeks to complete all tenders for the sub-projects..

(5) Procurement Procedure of the Contractor and its Period

The necessary procedure and procurement duration of the Contractor under the JICA Guideline is given in Table 6.3.3 in case of the fastest process.

Table 6.3.3 Necessary Procedure and Period for Contractor's Procurement

Procedure	Duration
Preparation of Tender Documents and JICA Approval	9 Months
Tender Period	
Evaluation of Bids	
JICA Approval of Bid Evaluation	
Contract Negotiation	
JICA Approval of Contract	
L/C and L/Com Issuance	

6.4 Project Implementation Plan

(1) Packaging the target roads to a Contract

The total 27 road sections are to be rehabilitated in the Project as shown in Table 6.4.1. To simplify the tendering process, some of sub-projects shall be grouped as one package, avoiding a heavy work burden caused by one contract for one sub-project policy. The packaging arrangement is done by considering the administrative area, terrain and evenness of the contract price for each package. As a result of consultation with CDR, the total number of the packages (contracts) shall be proposed as eleven as shown in Table 6.4.1 and Figure 6.4.1.

Table 6.4.1 Subproject Road Sections and Packaging in a Contract Group

Package	Road Number	Name of the Road	Distance (km)	Amount (MUSD)
1	1	Akkar_2a	28.0	9.88
	Sub-Total		28.0	9.88
2	2	Minie-Danniye_2	11.5	3.98
	3	Zgharta_1b	10.9	3.05
	4	Zgharta_1c	8.9	3.06
	Sub Total		31.3	10.09
3	5	Koura_2b	5.6	1.64
	6	Koura_2c	4.1	2.14
	7	Koura_3	3.5	2.17
	8	Bcharre	5.2	2.45
	Sub Total		18.4	8.40
4	9	Batroun_1	32.8	11.28
	Sub Total		32.8	11.28
5	10	Jbail_1	18.6	10.47
	11	Kesrouane_6	9.9	4.19
	Sub Total		28.5	14.66
6	12	El Metn_1c	6.0	1.81
	13	El Metn_1b	6.7	1.64
	14	El Metn_1d	2.0	0.72
	15	Kesouane_1b	20.1	8.27
	Sub Total		34.8	12.45
7	16	Baalbek_4	33.7	12.53
	Sub Total		33.7	12.53
8	17	Baabda_3	7.4	2.76
	18	Chouf_2	8.6	2.98
	19	Aley_1	14.3	4.94
	Sub Total	Zehle_1a	30.3	10.68
9	20	Zehle_1a	8.7	3.17
	21	Zehle_1b	6.3	2.21
	Sub Total		15.0	5.39
10	22	Saida_3	2.8	1.85
	23	Saida_6	8.6	2.64
	24-1	Saida_7	3.1	1.22
	24-2	Saida_7Add	1.2	0.45
	25	Jezzine_2	5.1	1.71
	26	Jezzine_4	6.0	1.67
	Sub Total		26.8	9.54
11	27	Sour_1b	9.5	2.86
	Sub Total		9.5	2.86
	Grand Total		289.1	107.76

Source: JICA Study Team

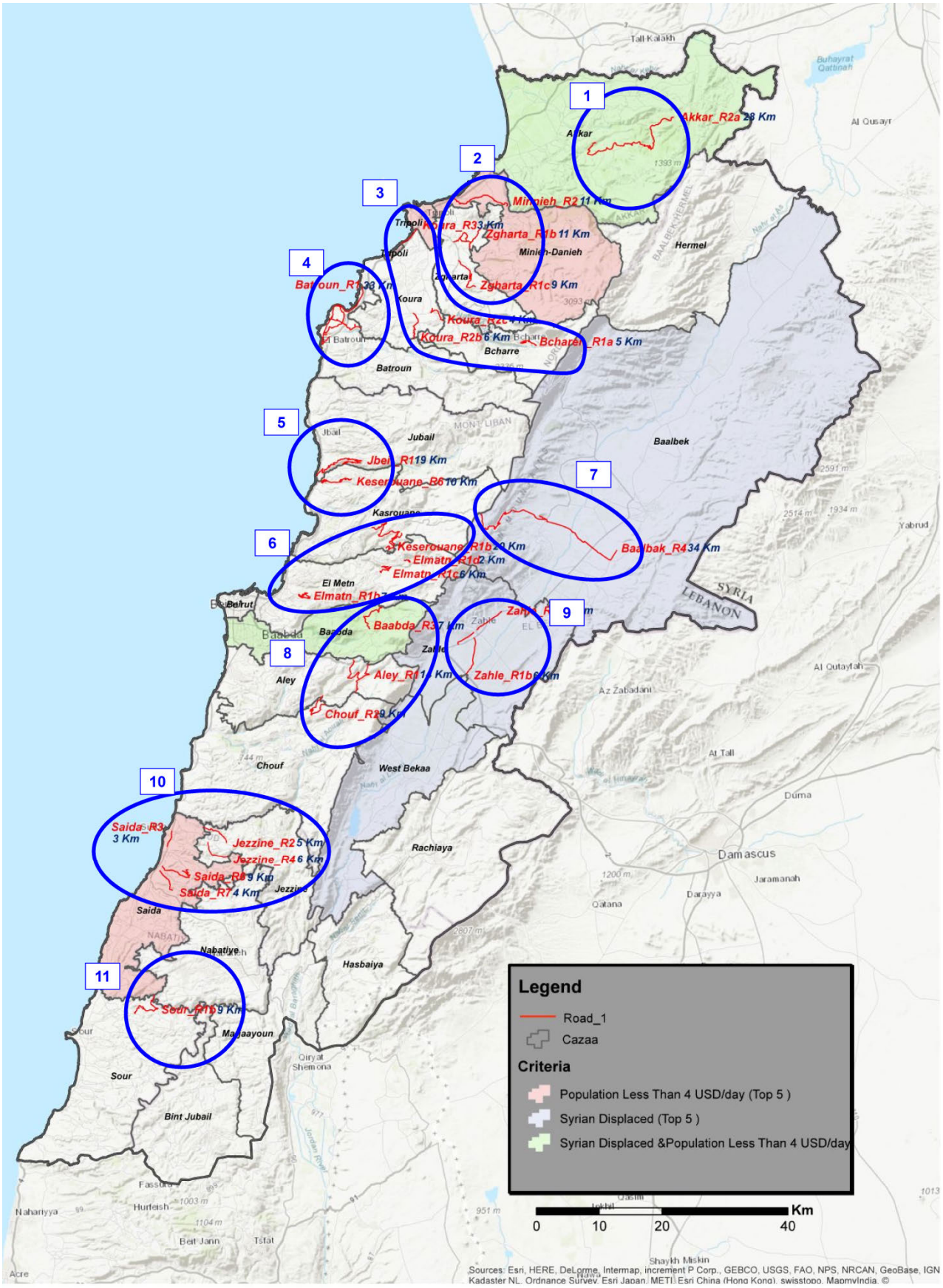


Figure 6.4.1 Location of Sub-project Road Sections and Packaging

(2) Operation Ratio

To set an appropriate construction period, it is necessary to determine both the task rate and the operation ratio. Sundays, national holidays, and rainy and snowy days shall be considered as periods of suspension of the work at the sites. As a result, the operation ratio is given as 69.6%. Comparing with 74%, which is normally set in the Grant Aid projects by JICA, it can be said that the ratio is adequate considering the number of holidays and the seasonal climate in Lebanon, although 69.6% is less than JICA's standard.

Table 6.4.2 Determination of Operation Rate

Item	Number of days	Source
Sunday	52	Annual number
Holiday	19	Refer to Table 6.4.3
Rain	30	Hearing to CDR
Snow	10	Hearing to CDR
Total	111	
Operation Rate	(365-111) /365=69.6%	

Source: JICA study team

Table 6.4.3 National holiday of Lebanon

S/N	Date in 2017	Name of national holiday
1	January 01	New Year's Day
2	January 06	American Orthodox Christmas Day
3	February 09	St. Maroun Day
4	February 14	Rafik Hariri Memorial Day
5	March 25	Feast of the Annunciation
6	April 14	Good Friday
7	April 16	Easter Sunday
8	May 01	Labor Day
9	May 25	Resistance and Liberation Day
10	June 25	Eid Al-Fitr (Ramadan)
11	June 26	Eid Al-Fitr Holiday
12	August 15	Assumption Day
13	September 01	Eid Al-Adha
14	September 04	Eid Al-Adha Holiday
15	September 25	Hiji New Year
16	September 30	Ashoura
17	November 22	Independence Day
18	December 01	Birthday of Prophet Muhammad
19	December 25	Christmas Day

Source: JICA study team

(3) Construction Period to Implement the Project

The construction period for each sub-project shall be estimated from both the task rate of each work item and the operation ratio. Further, the required contract period for each package shall be estimated. The basic concepts to determine the said construction periods are given as follows:

- A number of construction parties shall be one in principle. However, additional parties shall be allocated when necessary then making a balance to other work items. Even in that case, the number of parties shall be minimized.
- The efficient use of an asphalt finisher (paver), which is exclusively applied only for paving, shall be considered.
- One month for the preparation period before commencement of actual work and one month for the cleaning up period of the site after completion of the permanent work.
- The critical pass of the construction procedure shall be as follows.

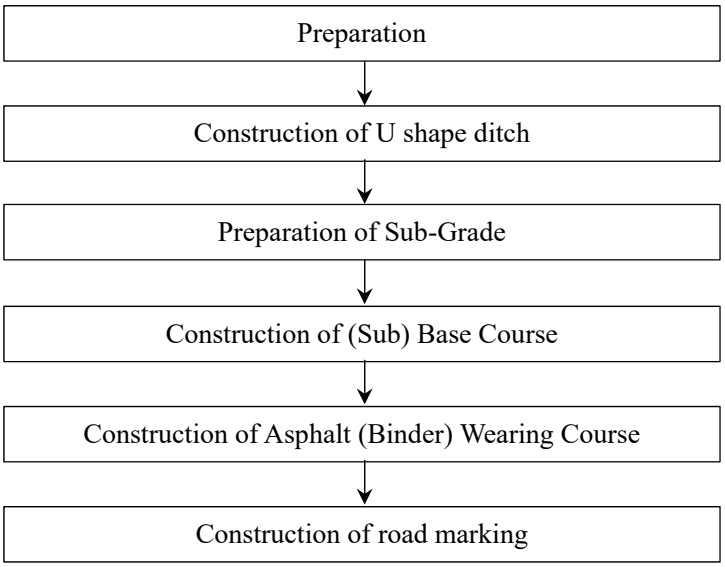


Figure 6.4.2 Assumed Critical Pass of the Construction Procedure

As a result, it was confirmed that at least 24 months are necessary as a construction period of any package. The summary is given in Table 6.4.4.

Table 6.4.4 Estimation of necessary construction period

Package	Route No.	Name	Length	Working Duration																								
				Months	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1	1	Akkar_2a	28.0	22.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
2	2	Minie-Denniye_2	11.5	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	3	Zgharta_1b	10.9	20.0					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	4	Zgharta_1c	8.9	19.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19					
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	5	Koura_2b	5.6	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	6	Koura_2c	4.1	21.0				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	7	Koura_3	3.5	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	8	Bcharre_1a	5.2	16.0									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4	9	Battroun_1	32.8		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
5	10	Jbail_1	18.6	24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	11	Kesrouane_6	9.9	20.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6	12	El_Metn_1c	6.0	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	13	El_Metn_1b	6.7	18.0							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	14	El_Metn_1d	2.0	13.0	1	2	3	4	5	6	7	8	9	10	11	12	13											
	15	Kesrouane_1b	20.1	20.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
7	16	Baalbek_4	33.7	24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	17	Baabda_3	7.4	19.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19					
	18	Chouf_2	8.6	18.0				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
	19	Aley_1	14.3	24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
9	20	Zahle_1a	8.7	24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	21	Zahle_1b	6.3	20.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	22	Saida_3	2.8	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	23	Saida_6	8.6	20.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
	24-1	Saida_7	3.1	21.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
	24-2	Saida_7Add	1.2	17.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17							
	25	Jezzine_2	5.1	22.0		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
	26	Jezzine_4	6.0	21.0				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
11	27	Sour	9.5		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Contract Period		24.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

(4) Project Implementation Schedule

The necessary period for implementation of the Project is assumed 60 months and its breakdown is given in Figure 6.4.3. Although the necessary duration of the construction for each package is estimated at 24 months, the entire period of the construction for each package become 29 months as a whole.

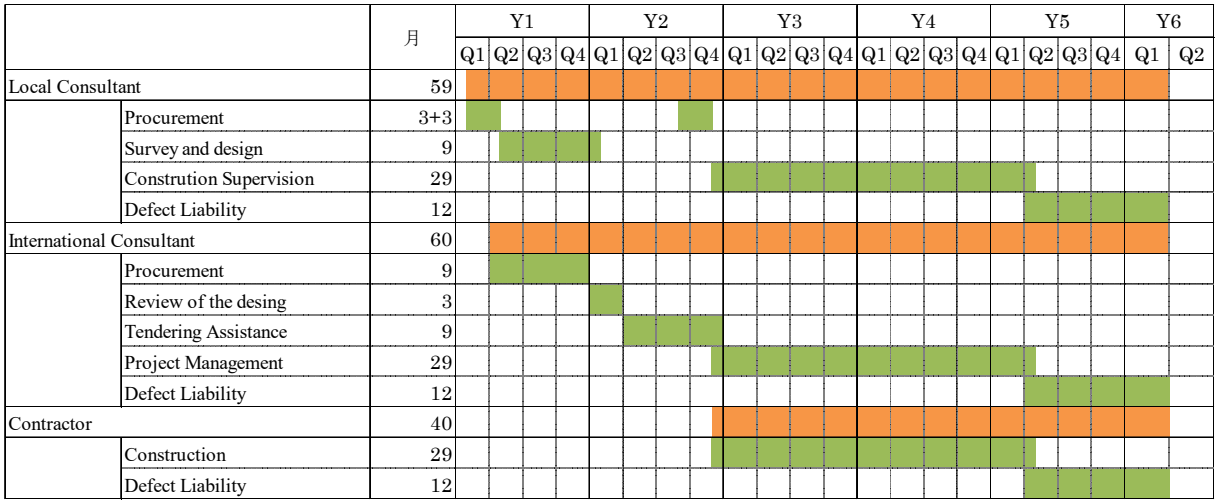


Figure 6.4.3 Project Implementation Schedule

CHAPTER 7 ESTIMATION OF COST AND EMPLOYMENT CREATION FOR THE PROJECT

7.1 Project Cost Estimate

7.1.1 Prerequisites for Project Cost Estimate

This chapter describes the methodology, the procedure and the result of estimating the Project cost on the basis of relevant documents of similar projects implemented by CDR and/or MPWT. The assumptions of the Project cost estimate are as follows:

- The composition of the Project cost shall be the same as ones in the project cost estimate kit with JICA ODA loan indicated in 7.1.2.
- The exchange rates are 1 USD = 1,510 LLB, and 1 USD = 112 JPY
- Demarcation of the work items by EBT or LBT set for the Project as shown Chapter 6
- Cost estimation by Sub-project and Package

7.1.2 Composition of Project Cost

It is assumed that the structure of estimation includes the following items finally.

- Civil Works
- Price Escalation
- Physical Contingency
- Consulting Services
- Utility Relocation / Land Lease
- Administration Cost for Executing Agency
- Taxes including VAT / Income Tax / Corporate Tax
- Import Tax
- Interest during Construction
- Front End Fee

7.1.3 Settings Unit Prices for Estimation of Construction Cost

(1) Settings of Unit cost

The unit prices for estimating the construction cost for each package shall be set on the basis of the Japanese norm of "Civil Engineering Estimation Standard of the Ministry of Land, Infrastructure, Transport and Tourism of Japan" and" Supplement Manual for Design and Cost Estimate for JICA Preparatory Study (Civil works) " as well as the market unit prices of labor, material and machinery in Lebanon. However, the said unit prices shall be justified on its appropriateness by comparing them to ones adopted in past similar projects in Lebanon, which are obtained from CDR. In addition, two types of the unit prices for each work item, one with EBT and one with LBT, shall be estimated in order to justify the appropriateness of the LBT application in some work items for the Project.

Table 7.1.1 and Table 7.1.2 shows the road project list and its project cost respectively implemented in 2017 FY by CDR. Whereas in the project cost by MPWT, the construction cost includes the indirect ones, and the project cost by CDR comprises the direct construction costs and indirect costs such as overhead ones. Since the Project is to be implemented by CDR, we will prepare the construction cost for each sub-project, separating the direct and overhead costs the same as the CDR method. The construction cost for a sub-project shall be calculated by multiplying the unit price of each work item by the bill of quantities calculated on the basis of the preliminary design output.

With regard to the overhead costs such as common temporary expenses, on-site administrative expenses, general administrative expenses, etc., we assume it as 5% of the direct construction cost on the basis of the analysis results shown in Table 7.1.2.

Table 7.1.1 Road Project List by CDR in 2017

No.	Project Name	Client	Remarks
A	NOTHERN MOTORWAY BEDDAWA-ABBOUDIEH	CDR	Bill of Quantities
B	THE REHABILITATION OF AIN EL HOUR-AANOUT-	CDR	Bill of Quantities
C	REHABILI TATION OF TANNOURIE EJ TAHTA-TANNOURIE EL FAWKA ROAD	CDR	Bill of Quantities
C1	MOUAWAD-EDDE	CDR	Bill of Quantities
C2	NAZIH BRAIDY	CDR	Bill of Quantities
C3	NICOLAS SROUJI	CDR	Bill of Quantities

Source: JICA Study Team

Table 7.1.2 Analysis of Overhead Costs in the Construction Cost

Bill No.		A	
		Price	Ratio
1	General Requirements	743,000.00	**2.7%**
2	Erth Works	5,326,350.00	19.5%
3	Sub base and Base course	1,600,000.00	5.8%
4	Bituminous Construction	5,501,500.00	20.1%
5	Concrete, Steel and Structures	10,459,560.00	38.2%
6	Incidental Construction	3,571,855.00	13.0%
10	Environmental Works	182,125.00	0.7%
11	Dayworks	Included	
	Sub total	27,384,390.00	
	VAT 10%	2,738,439.00	
	Total	30,122,829.00	

Bill No.		B	
		Price	Ratio
1	General Requirements	140,400.00	**2.3%**
2	Site Works	1,102,457.50	18.2%
3	Bituminous Construction	1,644,916.50	27.1%
4	Concrete, Steel and Structures	1,647,535.00	27.1%
5	Incidental Construction	337,000.00	5.6%
6A	Street Lightnig	66,660.00	1.1%
6B	Power	192,070.00	3.2%
6C	Telephone	56,550.00	0.9%
7A	Drainage works	78,900.00	1.3%
7B	Water works	285,375.00	4.7%
7C	Sewerage works	507,865.00	8.4%
	Dayworks	11,080.00	0.2%
	Sub total	6,070,809.00	
	VAT 10%	607,080.90	
	Total	6,677,889.90	

Bill No.		C1		C2		C3	
		Price	Ratio	Price	Ratio	Price	Ratio
1	General Requirements	455,000.00	**3.9%**	425,000.00	**4.0%**	682,000.00	**4.8%**
2	Site Works	2,378,327.00	20.1%	1,483,841.00	14.1%	2,885,627.11	20.1%
3	Bituminous Construction	2,015,968.60	17.1%	1,286,280.00	12.2%	1,549,309.02	10.8%
4	Concrete, Steel and Structures	4,454,769.00	37.7%	4,312,286.50	41.0%	5,081,754.85	35.4%
5	Incidental Construction	1,383,662.00	11.7%	1,882,914.50	17.9%	2,768,858.55	19.3%
6A	Street Lightnig	134,921.00	1.1%	145,865.00	1.4%	110,842.20	0.8%
6B	Power	336,558.00	2.9%	204,929.00	1.9%	262,454.50	1.8%
6C	Telephone	65,170.00	0.6%	101,180.00	1.0%	101,166.25	0.7%
7A	Drainage works	113,592.00	1.0%	86,618.00	0.8%	101,746.20	0.7%
7B	Water works	124,696.00	1.1%	193,450.00	1.8%	273,035.30	1.9%
7C	Sewerage works	311,084.00	2.6%	384,948.00	3.7%	498,236.75	3.5%
	Dayworks	29,964.00	0.3%	19,680.00	0.2%	23,380.00	0.2%
	Sub total	11,803,711.60		10,526,992.00		14,338,410.73	
	VAT 10%	1,180,371.16		1,052,699.20		1,433,841.07	
	Total	12,984,082.76		11,579,691.20		15,772,251.80	

A NOTHERN MOTORWAY BEDDAWA-ABBOUDIEH
B THE REHABILITATION OF AIN EL HOUR-AANOUT-ZAAROURIEH JUNCTION ROAD
C REHABILI TATION OF TANNOURIE EJ TAHTA-TANNOURIE EL FAWKA ROAD
C1 MOUAWAD-EDDE
C2 NAZIH BRAIDY
C3 NICOLAS SROUJI

(2) Unit Prices to be adopted for the Project

As mentioned in the previous sub-chapter, although we will basically set the unit prices for the construction cost estimate for a sub-project based on the norm of "Civil Engineering Estimation Standard of the Ministry of Land, Infrastructure, Transport and Tourism of Japan" and " Supplement Manual for Design and Cost Estimate for JICA Preparatory Study (Civil works) ", we will apply the unit prices of labor, materials and machinery based on the information obtained from both CDR and MPWT and the market prices of such items (see Table 7.1.3 and Table 7.1.4).

Table 7.1.5 shows the unit prices by both EBT and LBT. It can be said that the table can justify the appropriateness of the unit prices set by EBT in the method mentioned above because it gives similar unit prices adopted for past CDR projects. Furthermore, there is tendency to show the similarity of the unit prices in the work items between EBT and LBT, which major activities of the work items are made mainly by manpower such as guardrail installation work and concrete retaining walls.

On the other hand, with regard to the excavation work, whereas the unit cost by EBT is approximately 4 USD / m3, the one by LBT is 19.5 USD / m3, which is five times higher. This is mainly because of the high minimum labor wage (approximately 20-25 USD / day) in Lebanon. It should be noted that the work items to be mainly conducted by machinery such as milling of defected existing asphalt pavement etc., will cause the cost increase by applying the LBT method, although it contributes to providing the creation of high employment opportunity (see Appendix-5, 6).

Table 7.1.3 Unit Prices of Major Materials

No.		Item	Discription	Unit	Unit Price		Remarks
					(LBP)	(USD)	
001	Concrete Material	Portland Cement (OPC)		t		105	
002		Fine aggregate for Concrete	<5mm	m3		15	
003		Coarse aggregate for concrete	5-25mm	m3		15	
004		Coarse aggregate for concrete	5-40mm	m3		15	
005	Steel	High Yield Steel Bars	D13-D25	t		850-1200	inclusive Manpower
006	Asphalt	Asphalt		t		87	inclusive Manpower
007		Bitumin		t		300	
008	Road Base	Crushed Run for Sub-base	C0-40	m3		20	inclusive Manpower
009		Crushed Stone for Base	M30	m3		20	inclusive Manpower
010	Slope and Drainage	Masonry and Riprap Stone	Side ditch Wall	m3		80-100	inclusive Manpower t=30cm
011		Paving Stone	300-500mm Flat stane	m3		15	
012		Flat plate block	300mm×150mm×150mm	m2		17-20	inclusive Manpower
013		Seed of plant		nos		5-10	inclusive Manpower
014		Grass		nos		5-10	inclusive Manpower
015		Plant	Tree	nos		100-500	inclusive Manpower
016	Gabion	Gabion Net	2x1x1m	m3		75	inclusive Manpower
017		Stone for Gabion	200mm	m3		15	
018		Geotextile sheet	t=10mm	m2		5	inclusive Manpower
019	Boundary Brock	Boundary Brock between walkway and carryway	H300*W200	m		18	inclusive Manpower
020		Boundary Brock between walkway and carryway	H150*W150	m		20	inclusive Manpower
021		Boundary Brock between walkway and carryway	H100*W100	m		20	inclusive Manpower
022	Concrete pipe	Hume concrete pipe	φ200-350	m		110	inclusive Manpower
023		Hume concrete pipe	φ400-600	m		140	inclusive Manpower
024		Hume concrete pipe	φ600-1000	m		200	inclusive Manpower
025	Other	Auto Diesel		l	715		
026		Petrol		l	1150		
027		Kerrosene		l	770		
028		Engine oil		l	715		

Table 7.1.4 Unit Prices of Labors

Labour Rate

No.	Item	Standard	Unit	Unit Price (USD)	Remarks
001	Foreman		Day	75	
002	Skilled Labour		Day	55	
003	Semi-skilled Labour		Day	35	
004	Unskilled Labour		Day	25	
005	Scaffolder		Day	55	
006	Rebar Worker		Day	55	
007	Operator	Machine	Day	50	
008	Carman	Truck	Day	35	
009	Carpenter		Day	55	
010	Plasterer		Day	55	
011	Mason		Day	55	
012	Electrician		Day	50	same as Mechanic
013	Mechanic		Day	50	
014	Plumber		Day	55	
015	Guard Man		Day	500	25USD/day×20day
016	Landscaper		Day	55	

Engineer Rate

No.	Item	Standard	Unit	Unit Price (USD)	Remarks
101	Engineer A	Exp. 20 Ys.	Month	7000	
102	Engineer B	Exp. 15 Ys.	Month	6000	
103	Engineer C	Exp. 10 Ys.	Month	5000	
104	Engineer D	Exp. 5 Ys.	Month	N/A	
105	Surveyor		Month	N/A	
106	Assitant Surveyor		Month	N/A	
107	Draftman		Month	1000	
108	Accountant		Month	3000	
109	Administrator		Month	4000	
110	Assitant Administrator		Month	-	
111	Driver		Month	700	35USD/day×20day
112	Guard Man		Month	500	25USD/day×20day
113	Office Boy		Month	700	35USD/day×20day
114	Electrician (Special Grade)		Month	1000	50USD/day×20day
115	Assistant Technician A	Exp. 20 Ys.	Month	5000	
116	Assistant Technicianr B	Exp. 15 Ys.	Month	3500	
117	Assistant Technician C	Exp. 10 Ys.	Month	2000	

Source: JICA Study Team

Table 7.1.5 Unit Prices to be Applied for Estimating Construction Cost in the Study (USD)

Work Items	Unit	Qty	CDR			ivil engineering estimation standard		Adoption Unit Price	
						EBT	LBT	EBT	LBT
			Min		Max	Price	Price	Price	Price
Overlay (W=11.0m)	**m**	**1,000**	**69,850.00**	**～**	**111,870.00**	**104,146.80**	**139,875.53**	**105,000.00**	**140,000.00**
Bituminous Tack Coat	m2	11,000	3,850.00	～	9,020.00	included	included		
Bituminous Wearing Course	m2	11,000	66,000.00	～	102,850.00	104,146.80	139,875.53		
Overlay (W=7.0m)	**m**	**1,000**	**44,450.00**	**～**	**71,190.00**	**66,275.24**	**89,011.70**	**67,000.00**	**90,000.00**
Bituminous Tack Coat	m2	7,000	2,450.00	～	5,740.00				
Bituminous Wearing Course	m2	7,000	42,000.00	～	65,450.00	66,275.24	89,011.70		
Reconstruction (W=11.0)	**m**	**1,000**	**198,110.00**	**～**	**340,032.00**	**333,706.46**	**746,549.63**	**334,000.00**	**747,000.00**
Milling of defected existing asphalt pavement	m2	11,000	16,500.00	～	22,000.00	6,570.67	175,946.65		
Unclassfied Common Excavation of any type	m3	4,400	13,200.00	～	26,400.00	11,366.38	85,800.00		
Subgrade preparation	m2	11,000	2,750.00	～	7,700.00	2,810.31	47,142.45		
Sub base course construction and material	m3	2,750	13,750.00	～	36,520.00	70,825.44	108,926.89		
Base course construction and material	m3	1,650	13,860.00	～	21,912.00	42,447.69	57,517.28		
Bituminous Prime Coat	m2	11,000	2,200.00	～	10,780.00	included	included		
Bituminous Tack Coat	m2	11,000	3,850.00	～	9,020.00	included	included		
Bituminous Wearing Course (Barsat) t=5cm	m2	11,000	66,000.00	～	102,850.00	104,146.80	139,875.53		
Bituminous Binder Course t=5cm	m2	11,000	66,000.00	～	102,850.00	95,539.17	131,340.84		
Reconstruction (W=7.0)	**m**	**1,000**	**127,120.00**	**～**	**218,484.00**	**213,262.80**	**481,902.04**	**214,000.00**	**482,000.00**
Milling of defected existing asphalt pavement	m2	7,000	10,500.00	～	14,000.00	4,181.34	111,966.05		
Unclassfied Common Excavation of any type	m3	3,150	9,450.00	～	18,900.00	8,137.29	61,425.00		
Subgrade preparation	m2	7,000	1,750.00	～	4,900.00	1,788.38	29,999.74		
Sub base course construction and material	m3	1,750	8,750.00	～	23,240.00	45,070.73	69,317.11		
Base course construction and material	m3	1,050	8,820.00	～	13,944.00	27,012.16	36,601.90		
Bituminous Prime Coat	m2	7,000	1,400.00	～	6,860.00	included	included		
Bituminous Tack Coat	m2	7,000	2,450.00	～	5,740.00	included	included		
Bituminous Wearing Course (Barsat) t=5cm	m2	7,000	42,000.00	～	65,450.00	66,275.24	89,011.70		
Bituminous Binder Course t=5cm	m2	7,000	42,000.00	～	65,450.00	60,797.65	83,580.53		
U-Shape Ditch (H500× W500×T150)	**m**	**1,000**	**21,808.20**	**～**	**31,495.20**	**37,084.53**	**50,453.03**	**38,000.00**	**51,000.00**
Unclassfied Common Excavation of any type	m3	1,000	3,000.00	～	6,000.00	4,304.58	19,500.00		
Base course construction and material	m3	90	756.00	～	1,195.20	2,317.92	558.18		
Bliding Concrete Class C (110/25)	m3	270	18,052.20	～	24,300.00	30,462.02	30,394.85		
Ripraped Ditch (H500 ×W 500×L500)	**m**	**1,000**	**19,536.20**	**～**	**29,695.20**	**31,179.52**	**53,876.67**	**32,000.00**	**54,000.00**
Unclassfied Common Excavation of any type	m3	1,200	3,600.00	～	7,200.00	5,165.50	23,400.00		
Base course construction and material	m3	90	756.00	～	1,195.20	2,317.92	558.18		
Bliding Concrete Class C (110/25)	m3	70	4,680.20	～	6,300.00	7,897.56	7,880.15		
Grouted Riprap	m3	300	10,500.00	～	15,000.00	15,798.54	22,038.35		
Retaining Wall (H=1.0m,W=0.3m)	**m**	**1,000**	**77,000.00**	**～**	**101,000.00**	**141,997.97**	**148,765.08**	**142,000.00**	**149,000.00**
Form work	m2	2,000	included			50,456.25	50,456.25		
Cast in Reinforced Concrere Class B (250/20) for ditch,channels	m3	500	50,000.00	～	71,000.00	64,596.47	64,472.08		
High tensile Steel bar	ton	50	27,000.00	～	30,000.00	26,945.25	33,836.75		
Masonary Wall (H=2.0m,W=0.5m)	**m**	**1,000**		**～**	**50,000.00**	**52,661.81**	**73,461.16**	**53,000.00**	**74,000.00**
Masonary Wall (H=2.0m)	m3	1,000		～	50,000.00	52,661.81	73,461.16		
Gabion Wall	**m**	**1,000**	**20,500.00**	**～**	**29,250.00**	**29,386.62**	**42,562.50**	**30,000.00**	**43,000.00**
Unclassfied Common Excavation of any type	m3	1,000	3,000.00	～	6,000.00	4,304.58	11,500.00		
Gabion wall	m3	500	17,500.00	～	23,250.00	25,082.04	31,062.50		
Ripraped slope H=2m t=30cm	**m**	**1,000**	**23,400.00**	**～**	**67,800.00**	**35,040.75**	**53,276.70**	**36,000.00**	**54,000.00**
Unclassfied Common Excavation of any type	m3	800	2,400.00	～	4,800.00	3,443.67	9,200.00		
Grouted riprap	m3	600	21,000.00	～	63,000.00	31,597.08	44,076.70		
Reflective Road Studs (Catseye)	**m**	**1,000**	**1,570.00**	**～**	**2,200.00**		**2,150.00**		**3,000.00**
	Nor	200	1,570.00	～	2,200.00		2,150.00		
Steel Guardrail single	**m**	**1,000**	**57,500.00**	**～**	**75,000.00**	**50,225.52**	**57,618.42**	**51,000.00**	**58,000.00**
Post	no	500	32,500.00	～	50,000.00	5,607.10	13,000.00		
Guardrail	m	1,000	25,000.00	～	25,000.00	44,618.42	44,618.42		
Small signs (less than 1m2)	**Nor**	**100**	**7,600.00**	**～**	**15,150.00**	**10,653.45**	**16,455.37**	**11,000.00**	**17,000.00**
Unclassfied Common Excavation of any type	m3	200	600.00	～	1,200.00	860.92	3,900.00		
Transportation	m3	200	included		～	237.17	3,000.00		
Sign	Nor	100	7,000.00	～	13,950.00	9,555.37	9,555.37		
Thermoplastic reflectorized Road paint (t=3mm) yellow and white	**m**	**1,000**	**5,625.00**	**～**	**8,550.00**	**3,648.61**	**5,557.26**	**4,000.00**	**6,000.00**
Cleaning of surface by manpower	m2	1,500		～		1,439.25	1,439.25		
Thermoplastic reflectorized Road paint	m	3,000	5,625.00	～	8,550.00	2,209.36	4,118.01		
New Jersey block	**m**	**1,000**	**100,000.00**	**～**	**142,000.00**	**169,124.75**	**179,603.14**	**170,000.00**	**180,000.00**
Concrete work	m	1,000	100,000.00	～	142,000.00				
Form work	m2	2,433	included			61,380.03	61,380.03		
Cast in Reinforced Concrere Class B (250/20) for ditch,channels	m3	513	included			66,275.98	66,148.36		
High tensile Steel bar	ton	77	included			41,468.74	52,074.76		
Chevron Sign	**Nor**	**100**	**625.00**	**～**	**1,106.00**		**2,400.00**		**3,000.00**
Sign	Nor	100	625.00	～	1,106.00		2,400.00		
LED Light	**Nor**	**100**		**～**			**48,555.37**		**49,000.00**
Installing	Nor	100		～			48,555.37		
Inter rocking block for walkway	**m**	**1,000**	**26,600.00**	**～**	**45,590.00**		**32,820.06**		**33,000.00**
Curb stone h=30cm	m	1,000	11,000.00		20,390.00		11,036.25		
Concrete for curb	m3	60	included				6,754.41		
Concrete tile	m2	1,200	15,600.00		25,200.00		15,029.40		
Pipe culvert ϕ 150-1200	**m**	**1,000**	**16,000.00**	**～**	**166,000.00**	**210,744.78**	**107,872.51**	**211,000.00**	**108,000.00**
Install pipe	m	1,000	13,000.00		160,000.00	203,282.26	82,466.50		
Unclassfied Common Excavation of any type	m3	1,000	3,000.00	～	6,000.00	4,304.58	19,500.00		
Backfilling	m3	804	included			3,157.94	5,906.01		
※φ150-200（LTB), φ200-φ1200(ETB)									

Source: JICA Study Team

(3) Other Assumptions for Estimating Construction Cost

There are many miscellaneous work projects in the road rehabilitation work particularly in the urban and town areas, such as the temporary or permanent relocation of public utilities under the ground, including water supply and electricity pipes. Furthermore, sidewalk construction and repair of the street lighting are often requested from municipalities. Considering such miscellaneous works in the road rehabilitation work, we will include 20% of the direct construction cost as the Contingency and Provisional Sum because the bill of quantities for such work cannot be identified at the preliminary design stage.

7.1.4 Other Project Cost Details

The Project cost details shall be set as follows:

- Price Escalation (FC:1.7%, LC:1.0%)
- Physical Contingency (5%)
- VAT / Income Tax / Corporate Tax (11%)
- Import Tax (5%)
- Loan Interest during Construction (1.00%)
- Loan Interest during Construction of Consulting Survice (0.01%)
- Front End Fee (0.20%)

7.1.5 Total Project Costs

The construction cost for each package and the Project costs are shown in Table 7.1.6. and Table 7.1.7 respectively.

Table 7.1.6 The Construction cost each package

1 USD=112 JPY
1 USD=1,510 LBP
1 LBP=0.0742 JPY

Package-1 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Akkar_2a	l.s	1	987,655	13,422,235,795	9,876,553
Total			**987,655**	**13,422,235,795**	**9,876,553**

Package-2 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Minie-Danniye_2	l.s	1	397,808	5,406,210,593	3,978,080
Zgharta_1b	l.s	1	305,018	4,145,200,009	3,050,184
Zgharta_1c	l.s	1	305,869	4,156,754,025	3,058,686
Total			**1,008,695**	**13,708,164,628**	**10,086,950**

Package-3 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Koura_2b	l.s	1	164,298	2,232,812,159	1,642,982
Koura_2c	l.s	1	214,201	2,910,991,996	2,142,010
Koura_3	l.s	1	216,892	2,947,556,852	2,168,916
Bcharreh_1a	l.s	1	245,063	3,330,399,924	2,450,625
Total			**840,453**	**11,421,760,931**	**8,404,533**

Package-4 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Batroun_1	l.s	1	1,128,254	15,332,976,408	11,282,543
Total			**1,128,254**	**15,332,976,408**	**11,282,543**

Package-5 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Jbeil_1	l.s	1	1,046,954	14,228,106,413	10,469,541
Keserouane_6	l.s	1	418,765	5,691,021,963	4,187,654
Total			**1,465,720**	**19,919,128,376**	**14,657,195**

Package-6 **Loan Coverage Ratio; 85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
El Metn_1c	l.s	1	181,190	2,462,373,661	1,811,901
El Metn_1b	l.s	1	163,968	2,228,322,482	1,639,678
El Metn_1d	l.s	1	72,485	985,067,638	724,847
Keserouane_1b	l.s	1	827,463	11,245,224,032	8,274,631
Total			**1,245,106**	**16,920,987,813**	**12,451,058**

Package-7 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Baalbek_4	l.s	1	1,253,064	17,029,143,762	12,530,643
Total			**1,253,064**	**17,029,143,762**	**12,530,643**

Package-8 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Baabda_3	l.s	1	276,312	3,755,077,224	2,763,118
Chouf_2	l.s	1	297,890	4,048,331,168	2,978,904
Aley_1	l.s	1	493,530	6,707,066,604	4,935,296
Total			**1,067,732**	**14,510,474,996**	**10,677,318**

Package-9 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Zahle_1a	l.s	1	317,450	4,314,139,100	3,174,495
Zahle_1b	l.s	1	221,467	3,009,736,466	2,214,670
Total			**538,917**	**7,323,875,566**	**5,389,165**

Package-10 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Saida_3	l.s	1	185,241	2,517,418,888	1,852,405
Saida_6	l.s	1	264,072	3,588,739,816	2,640,721
Saida_7	l.s	1	121,564	1,652,052,124	1,215,638
Saida_7 add	l.s	1	45,332	616,063,976	453,322
Jezzine_2	l.s	1	171,249	2,327,269,446	1,712,487
Jezzine_4	l.s	1	166,796	2,266,752,570	1,667,956
Total			**954,253**	**12,968,296,821**	**9,542,529**

Package-11 **Loan Coverage Ratio;** **85.0**

Item	Unit	Q'ty	Unit Price		Total
			Foreign	Local	
			USD	LBP	Comb. USD
Sour_1b	l.s	1	286,464	3,893,047,506	2,864,641
Total			**286,464**	**3,893,047,506**	**2,864,641**

Source: JICA Study Team

Table 7.1.7 The Project cost in the Study (USD)

1 USD=112 JPY
1 USD=1,510 LBP
1 LBP=0.0742 JPY

Breakdown of Cost	Foreign Currency Portion (millon USD)			Local Currency Portion (millon USD)			Total (millon USD)		
	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others	Total Cost	JICA Portion	Others
Package-1	0.99	0.99	0.00	8.89	7.41	1.48	9.88	8.40	1.48
Package-2	1.01	1.01	0.00	9.08	7.57	1.51	10.09	8.57	1.51
Package-3	0.84	0.84	0.00	7.56	6.30	1.26	8.40	7.14	1.26
Package-4	1.13	1.13	0.00	10.15	8.46	1.69	11.28	9.59	1.69
Package-5	1.47	1.47	0.00	13.19	10.99	2.20	14.66	12.46	2.20
Package-6	1.25	1.25	0.00	11.21	9.34	1.87	12.45	10.58	1.87
Package-7	1.25	1.25	0.00	11.28	9.40	1.88	12.53	10.65	1.88
Package-8	1.07	1.07	0.00	9.61	8.01	1.60	10.68	9.08	1.60
Package-9	0.54	0.54	0.00	4.85	4.04	0.81	5.39	4.58	0.81
Package-10	0.95	0.95	0.00	8.59	7.16	1.43	9.54	8.11	1.43
Package-11	0.29	0.29	0.00	2.58	2.15	0.43	2.86	2.43	0.43
Civil Works Sub Total	**10.78**	**10.78**	**0.00**	**96.99**	**80.82**	**16.16**	**107.76**	**91.60**	**16.16**
Price Escalation	0.65	0.65	0.00	3.41	2.84	0.57	4.06	3.49	0.57
Physical Contingency	0.57	0.57	0.00	5.02	4.18	0.84	5.59	4.75	0.84
Consulting Services	3.60	3.60	0.00	10.58	5.16	5.41	14.17	8.76	5.41
Utility Relocation / Land Lease	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Administration Cost	0.00	0.00	0.00	6.58	0.00	6.58	6.58	0.00	6.58
VAT / Income Tax / Corporate Tax	0.00	0.00	0.00	14.47	0.00	14.47	14.47	0.00	14.47
Import Tax	0.00	0.00	0.00	0.60	0.00	0.60	0.60	0.00	0.60
Interest during Construction	2.65	0.00	2.65	0.00	0.00	0.00	2.65	0.00	2.65
Front End Fee	0.22	0.22	0.00	0.00	0.00	0.00	0.22	0.22	0.00
Total	**18.47**	**15.82**	**2.65**	**137.64**	**93.01**	**44.64**	**156.11**	**108.82**	**47.29**

Source: JICA Study Team

7.2 Evaluation of Employment Creation in the Project

7.2.1 Assumptions for Estimating the Number of Workers in the Project

The number of workers to be employed in each sub-project shall be estimated by using the said norms of "Civil engineering estimation standard of the Ministry of Land, Infrastructure, Transport and Tourism of Japan" and" Supplement Manual for Design and Cost Estimate for JICA Preparatory Study (Civil works) ". However, the norm associated with the task ratio by manpower and machinery in any work item should be calibrated by reflecting the difference in the work ratio between Japan and the developing countries are as follows:

- A coefficient of the task ratio by unskilled labor: 2.0
- A coefficient of the task ratio by skilled labor: 3.5
- A coefficient of the task ratio by simple machinery and equipment: 70%
- A coefficient of the task ratio by general machinery and equipment: 70%

Table 7.2.1 shows the comparison in the task ratio between the one prepared by the JICA Study Team and the one by ILO. Although there are some differences in the figures between the unskilled workers and the skilled workers, it can be judged that the differences are at an acceptable level. Since there has been no application of the LBT for the road works so far, ILO expressed that those figures are the tentative ones and they plan to accumulate the data including the task ratio and unit rates for the works with LBT through the projects experience in Lebanon.

ILO believes that the application of LBT to the road works is an effective method for poverty reduction and booming local economy and in Africa and elsewhere, the economic rationality of LBT application has resulted in the dissemination of LBT. However, since Lebanon is classified as a middle-income country and the construction industry of Lebanon can obtain high construction technology as well as can procure inexpensive machinery, the LBT application to the road works cannot enjoy advantages, which it was admitted in African countries, in terms of cost and construction period, etc.

Given these facts, the JICA Study Team will recommend the LBT method to only the work items (e.g. masonry work, drainage one) in the Project that enables to secure the higher employment opportunity to unskilled laborers to meet the objective of the Project.

Table 7.2.1 Comparison of Task Rate for Each Work Item

A. Guidelines for Labour Task Rates for Earthwork / gravling work of agricultural road and irrigation canal/stormwater

Item No.	Description of works	Unit	Daily Task Rate			
			Unskilled Labour			Semi-skilled Labour
			ILO	Study team	ILO	Study team
2.1	Clear vegetation & grass and removal of rute	m²	100-150	352	1400 - 1800	790
2.3	Removal of top soil	m²	20 - 25	-	360 - 440	-
2.4	Removal of isolated rocks	m^3	0.3 - 0.5	1.2	5 - 10	-
3.1	Cut(excavate) to spoil in soft soil	m^3	2-2.5	1.3	30 - 40	35
3.2	Cut (excavate) to spoil in hard soil	m^3	1.5 - 1.8		20 - 30	
3.3	Cut (excavate) to spoil in rock	m^3	0.3 - 0.5	-	6 - 10.	-
3.5	Ordinary soil to fill within 50 m	m^3	-	-	50 - 60	-
3.5.1	Unskilled labour - excavation and haul	m^3	1.2-2.0	2.9	-	-
3.5.2	Unskilled labour - spread for leveling	m^3	5-7	2.2 (with compaction)	-	-
3.6	Cambering spreading	m^3	5 - 7	10.7	60 - 80	26.3 (with compaction)
4.1	Gravel wearing course (excavating, loading, spreading)	m^3	-	7.5	20 - 25	18.5 (with compaction)
4.1.1	Unskilled labour - excavation	m^3	1.5-1.8	1.3	-	-
4.1.2	Unskilled labour - loading	m^3	4 - 5	3.8	-	-
4.1.3	Unskilled labour - spreading and levelling	m^3	6 - 7	4.0	-	3.0
4.1	Gravel wearing course (excavating, loading by equipment, spreading and compact)	m^3	6-7	7.5	100-120	27.8 (with compaction)
4.2	Crushed stone road base spreading and leveling	m^3	6- 7	6.3	80-100	23.4 (with compaction)
4.3	Place Hand-packed stone for road base	m^3	2 - 3	2.7	40-50	-

B. Guidelines for Labour Task Rates for structure works

Item No.	Description of works	Unit	Daily Task Rate			
			Unskilled Labour		Semi-skilled Labour	
			ILO	Study team	ILO	Study team
5.2	Cement-stone Masonry(mixing cement mortar and placing stone)	m^3	4 - 5	1.7	1.5 - 1.8	3.6
5.3	Placing Dry masonry	m^3	3 - 3.5	-	5	-
5.4	Pointing	m^2	8-10	-	8-10	-
5.5	Plastering	m^2	8-10	-	8-10	-
5.6	Gabion work	m^3	2 - 3	1.8	4 - 5.	5.6
5.7-5.9	Mix and place Concrete (mixing with small concrete mixer of capacity 0.2 m^3)	m^3	1.0 - 1.2	2.5	4 - 6.	5.2
5.10	Bendding and placing reinforcement Steel	Kg	140 - 160	68	50 - 60	108

C. Guidelines for Task Rates of Equipment for agricultural road irrigation canal/storm water works

Item No	Type of Equipment	Unit	Task rate per day	
			ILO	Study team
D.1	Hand tools (as percentage of labour cost)	%	3% to 5% of labour cost	-
D.2	3 TO 5 Ton Roller	m^2	1000 - 1200	1,000 (t=10cm)
D.3	Light truck for haulage up to 10 km	Trips	7 - 8	7
D.4	Light truck for haulage materials from 11 to 15 km distance	Trips	9 - 11	11
D.5	Excavator (0.6 m^3)- excavate soild to medium soil	m^3	120 - 150	180 - 220
D5.1	Excavator (0.6 m^3)- excavate hord soil	m^3	90 - 120	130-160
D.6	Pedestrian Roller	m^2	600 - 650	700 (t=10cm)
D.7	Concrete Mixer	m^3	8 - 10	less than 10
D.8	Pocker vibrator	m^3	8 - 10	less than 10

Source: JICA Study Team

7.2.2 Evaluation of an Effect of Employment Creation for the Project

(1) Comparison in an Effect of Employment Creation between ETB and LBT partial introduction

Table 7.2.2 shows the comparison in an effect of employment creation between ETB application and partial application of LBT. The comparison results find that it is possible for the application of pure LBT to create 3-5 times of employment of the laborers in various work items, compared to the application of pure EBT. However, since whereas many road rehabilitation projects have been executed with mainly EBT in Lebanon, there has been no LBT application to the road rehabilitation works in Lebanon, it shall be an appropriate idea that LBT shall be partially introduced in the stone masonry works, riprapped drainage in the Project, although the remaining works shall be conducted with EBT. In this case, the effect of employment creation, the number of labor employment, shall be increased by approximately 50%.

Table 7.2.2 Comparison of the Effect of Employment Creation between pure ETB and partial LBT

Type											
Type		1		2		3		4		5	
		All		Urban or Town		Rolling or Mountainous		Urban or Town		Rolling or Mountainous	
		EBT	LBT	EBT	LBT	EBT	LBT	EBT	LBT	EBT	LBT
Overlay	md/km					**106**	424	**120**	475		
Reconstruction (Primary Rd)	md/km					**265**	2,605	**671**	6,606	**884**	8,682
Road Marking	md/km	24	160	24	160	**24**	160	**24**	160	**24**	160
Ripraped Ditch (H500 ×W 500×L500)	md/km					**506**	**1,544**	**0**	0	**506**	**1,544**
Masonary Wall (H=2.0m,W=0.5m)	md/km					**903**	**1,700**	**0**	0	**903**	**1,700**
Sign	md/km	16	66	16	66	**16**	66	**16**	66	**16**	66
Chevron Sign	md/km	4	4	4	4	**4**	4	**4**	4	**4**	4
Guard Rail	md/km					**144**	1,645			**144**	1,645
New Jersey Barrier	md/km					**1,244**	1,300			**1,244**	1,300
Total		44	230	44	230	**3,213**	9,446	**834**	7,311	**3,725**	15,100

(2) Estimation of the Number of Laborers to be Employed in Each Sub-project

The number of the workers estimated for each sub-project are shown in Table 7.2.3. As mentioned in the previous section, it is possible to demonstrate an increase in approximately 124% employment creation when applying a partial inclusion of LBT, compared to ones by pure EBT.

Table 7.2.3 Estimation of the Number of Labors

Package	No.	Road Name	Number of Employees		
			EBT	EBT and Partial LBT	
1	1	Akkar_2a	55,796	66,155	119%
2	2	Minie-Danniye_2	25,474	35,346	139%
	3	Zgharta_1b	17,025	17,733	104%
	4	Zgharta_1c	16,985	19,757	116%
3	5	Koura_2b	10,077	12,045	120%
	6	Koura_2c	9,259	9,929	107%
	7	Koura_3	9,281	10,318	111%
	8	Bcharre_1a	12,975	17,054	131%
4	9	Batroun_1	64,175	79,671	124%
5	10	Jbail_1	51,071	67,630	132%
	11	Kesrouane_6	22,169	28,631	129%
6	12	El Metn_1c	10,247	10,922	107%
	13	El Metn_1b	11,106	13,576	122%
	14	El Metn_1d	3,661	3,969	108%
	15	Kesrouane_1b	44,444	56,611	127%
7	16	Baalbek_4	71,748	94,849	132%
8	17	Baabda_3	14,984	18,962	127%
	18	Chouf_2	17,151	22,395	131%
	19	Aley_1	28,198	37,010	131%
9	20	Zahle_1a	15,529	16,043	103%
	21	Zahle_1b	10,987	11,366	103%
10	22	Saida_3	7,249	7,417	102%
	23	Saida_6	15,757	19,255	122%
	24-1	Saida_7	7,370	10,487	142%
	24-2	Saida_7add	3,232	5,317	165%
	25	Jezzine_2	10,358	11,595	112%
	26	Jezzine_4	11,319	12,874	114%
11	27	Sour_1b	18,085	23,231	128%
Total			**595,712**	**740,148**	**124%**