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R2019-0087/1

April 19, 2019

Closing Date: Wednesday, May 8, 2019 at 6:00 p.m.

FROM: Acting Vice President and Corporate Secretary

Armenia - Lifeline Road Network Improvement Project
Second Additional Financing and Restructuring

Project Paper

Attached is the Project Paper regarding a proposed additional loan to Armenia for and restructuring of the Lifeline Road Network Improvement Project (R2019-0087/1), which is being processed on an absence-of-objection basis.

Distribution:
Executive Directors and Alternates
President
Bank Group Senior Management
Vice Presidents, Bank, IFC and MIGA
Directors and Department Heads, Bank, IFC, and MIGA

Document of

The World Bank

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Report No: PAD3259

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT PAPER

ON A

PROPOSED ADDITIONAL LOAN AND A RESTRUCTURING

IN THE AMOUNT OF EUR 13.4 MILLION

TO THE

REPUBLIC OF ARMENIA

FOR THE

LIFELINE ROAD NETWORK IMPROVEMENT PROJECT

April 16, 2019

Transport Global Practice
Europe and Central Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective March 31, 2019)

Currency Units	EURO (€)
US$1.12	EUR 1

FISCAL YEAR

January 1 - December 31

ABBREVIATIONS AND ACRONYMS

AF	Additional Financing
ARD	Armenian Roads Directorate
CADaS	Common Accident Data Set
CARE	Community Database on Accident on the Road in Europe
CER	Contingent Emergency Response
CERC	Contingent Emergency Response Component
CPF	Country Partnership Framework
CW	Civil Works
DA	Designated Account
DBST	Double Bituminous Surface Treatment
DO	Development Objective
EaP	Eastern Partnership
EIRR	Economic Internal Rate of Return
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
EUR	Euro
FM	Financial Management
FY	Fiscal Year
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GoA	Government of Armenia
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
HDM-4	Highway Development and Management Model
IFR	Interim Financial Report
IPF	Investment Project Financing
IRI	International Roughness Index
LRN	Lifeline Road Network
LRNIP	Lifeline Road Network Improvement Project
MoF	Ministry of Finance
MoTCIT	Ministry of Transport, Communication, and Information Technologies
NPV	Net Present Value

NRSS	National Road Safety Strategy
NGO	Nongovernmental Organization
PBC	Performance-Based Contract
PDO	Project Development Objective
POM	Project Operational Manual
PP	Procurement Plan
PPSD	Project Procurement Strategy for Development
RAMS	Road Asset Management System
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
RSA	Road Safety Audit
SEA	Sexual Exploitation and Abuse
ToR	Terms of Reference
TPIO	Transport Project Implementation Organization
WHO	World Health Organization

Regional Vice President:	Cyril E Muller
Country Director:	Mercy Miyang Tembon
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Armenia
Lifeline Road Network Improvement Project - Second Additional Financing

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BASIC INFORMATION – PARENT (LIFELINE ROAD NETWORK IMPROVEMENT PROJECT - P126782)

Country	Product Line	Team Leader(s)		
Armenia	IBRD/IDA	Nargis Ryskulova		
Project ID	Financing Instrument	Resp CC	Req CC	Practice Area (Lead)
P126782	Investment Project Financing	GTR03 (9382)	ECCSC (7000)	Transport

Implementing Agency: Ministry of Transport, Communications and Information Technologies

Is this a regionally tagged project?	

Bank/IFC Collaboration

No

Approval Date	Closing Date		Original Environmental Assessment Category	Current EA Category
31-Jan-2013	30-Dec-2019		Partial Assessment (B)	Partial Assessment (B)

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach [MPA]	[ ] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Disbursement-Linked Indicators (DLIs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a Non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made disaster
[ ] Alternate Procurement Arrangements (APA)	

Development Objective(s)

The Project Development Objective is to improve access of rural communities to markets and services through

upgrading of selected lifeline roads, and to strengthen the capacity of the Ministry of Transport and Communication to manage the lifeline road network.

Ratings (from Parent ISR)

	Implementation				
	24-Jan-2017	31-Aug-2017	16-Dec-2017	27-Jun-2018	21-Dec-2018
Progress towards achievement of PDO	MS	MS	MS	MS	S
Overall Implementation Progress (IP)	MS	MS	MS	MS	S
Overall Safeguards Rating	MS	MS	MS	MS	MS
Overall Risk	M	M	M	M	M

BASIC INFORMATION – ADDITIONAL FINANCING (LIFELINE ROAD NETWORK IMPROVEMENT PROJECT - Second Additional Financing - P169158)

Project ID	Project Name	Additional Financing Type	Urgent Need or Capacity Constraints
P169158	LIFELINE ROAD NETWORK IMPROVEMENT PROJECT - Second Additional Financing	Restructuring, Scale Up	No
Financing instrument	Product line	Approval Date	
Investment Project Financing	IBRD/IDA	08-May-2019	
Projected Date of Full Disbursement	Bank/IFC Collaboration		
29-Apr-2022	No		
Is this a regionally tagged project?			
No			

Financing & Implementation Modalities

[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Disbursement-Linked Indicators (DLIs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a Non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made disaster
[ ] Alternate Procurement Arrangements (APA)	
[✓] Contingent Emergency Response Component (CERC)	

Disbursement Summary (from Parent ISR)

Source of Funds	Net Commitments	Total Disbursed	Remaining Balance	Disbursed
IBRD	85.00	72.05	12.95	85 %
IDA				%
Grants				%

PROJECT FINANCING DATA – ADDITIONAL FINANCING (LIFELINE ROAD NETWORK IMPROVEMENT PROJECT - Second Additional Financing - P169158)

FINANCING DATA (US$, Millions)

SUMMARY (Total Financing)

	Current Financing	Proposed Additional Financing	Total Proposed Financing
Total Project Cost	106.25	18.75	125.00
Total Financing	106.25	18.75	125.00
of which IBRD/IDA	85.00	15.00	100.00
Financing Gap	0.00	0.00	0.00

DETAILS - Additional Financing

World Bank Group Financing	
International Bank for Reconstruction and Development (IBRD)	15.00
Non-World Bank Group Financing	
Counterpart Funding	3.75
Borrower/Recipient	3.75

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any other Policy waiver(s)?

[ ] Yes [✓] No

INSTITUTIONAL DATA

Practice Area (Lead)

Transport

Contributing Practice Areas

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

Yes

b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment

Yes

c. Include Indicators in results framework to monitor outcomes from actions identified in (b)

Yes

PROJECT TEAM

Bank Staff

Name	Role	Specialization	Unit
Nargis Ryskulova	Team Leader (ADM Responsible)	Transport	GTR07
Nato Kurshitashvili	Team Leader	Gender	GTR03
Armine Aydinyan	Procurement Specialist (ADM Responsible)	Procurement	GGOPC
Lusine Grigoryan	Financial Management Specialist (ADM Responsible)	Financial Management	GGOEE
Darejan Kapanadze	Environmental Specialist (ADM Responsible)	Environmental Safeguards	GENEC
Sanjay Agarwal	Social Specialist (ADM Responsible)	Social Safeguards	GSU03
Graciela A. Tejeda	Team Member	Administation	GTR03
Irina Tevosyan	Team Member	Administation	ECCAR
Nora Mirzoyan	Team Member	Operations	GSU09
Rodrigo Archondo-Callao	Team Member	Engineering	GTR02
Tanvir Hossain	Team Member	Procurement	GGOPC
Zaruhi Hayrapetyan	Team Member	Social Safeguards	GSU03

Extended Team

Name	Title	Organization	Location
David Silcock	Consultant, Road Safety		

I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING

1. **This Project Paper seeks the approval of the Executive Directors to provide an additional loan in the amount of EUR 13.4 million to the Republic of Armenia and restructure the Lifeline Road Network Improvement Project (LRNIP) in response to a request received from the Government of Armenia (GoA) dated January 31, 2019.** The financing is requested for additional World Bank (the Bank) support to enhance the country's transport connectivity by scaling up the development effectiveness of the LRNIP and introducing new activities to improve climate resilience of the road network and road safety management in the country.

2. **Despite Armenia's strides to improve its road network, about 40 percent of the country's classified roads[1] are still in poor condition. Approximately one-third of Armenia's rural population does not have access to an all-weather road.** The global competitiveness report for 2017–2018 ranks Armenia's quality of roads 85 out of the total 137 countries; this is a drop from the 2015–2016 rank of 75 out of 140 countries. The deterioration of the road network is primarily due to (a) underfinancing of the road sector; (b) inefficient use of available resources, focusing priorities on capital investments rather than investing in maintenance; and (c) lack of attention to defining and maintaining sustainable institutional arrangements to preserve the road network.

3. **The country's road sector is supported by multiple development partners; however, the Bank and the state budget are the only supporters of the Lifeline Road Network (LRN).** The LRN consists of about 4,000 km of secondary and local roads that feed and distribute to the republican and interstate network and provide communities with access to markets and services. The parent project is supporting the Ministry of Transport, Communication, and Information Technologies (MoTCIT) in addressing challenges of sustaining the deteriorating road network by promoting a holistic and systematic approach to increase the efficiency of road expenditures. This is done through a number of activities, including strategic evaluation of the LRN, introduction of the road asset management system (RAMS), and initiation of new contracting modalities, such as rehabilitation and maintenance and performance-based contracts (PBCs).

4. **The proposed Additional Financing (AF) will improve accessibility of more communities to markets and services as well as contribute to improving climate resilience of the road network and road safety management.** The scaled-up activities of the proposed AF will augment the impact of the LRNIP through rehabilitation of an additional 61 km of the LRN to complete the priority rehabilitation program of 2015–2017. This will improve access to markets and services to an additional 60,000 people, who will also benefit from safe village schemes, which include road safety engineering improvements and awareness programs.

5. **Improving climate resilience of the road network.** In recent decades, there has been a significant temperature increase in Armenia: in 1935–1996 the annual mean temperature increased by 0.4°C, in 1935–2007 by 0.85°C, and in 1935–2012 by 1.03°C. Over the various seasons, the ambient air temperature change shows different trends and the precipitation trend is decreasing overall, while the spatial distribution of changes in precipitation is irregular. Most hazardous natural phenomena—including landslides, floods, rock falls, and flash floods—are directly or indirectly associated with specific climatic

[1] All roads in the country are classified as interstate, republican, or local roads (7,500 km).

conditions and extraordinary weather events that are growing in scope and intensity, resulting in increased frequency of high-risk situations affecting transport infrastructure. The high degree of settlement and infrastructure vulnerability in Armenia is also due to abrupt relief, critical steep slopes, and unfavorable ground conditions. There are high-risk zones in the country as some settlements, including major cities and the most important communication routes in Armenia, are in deep canyons, river valleys, and unstable parts of steep hillsides. Road network deterioration, for the most part related to these natural hazards, is exacerbated by insufficient maintenance practices. The proposed AF will support the GoA in building more resilient road infrastructure by considering adequate climate-resilient features during construction, based on the technical designs of road rehabilitation works (designs recently completed or to be completed under the parent project with clear guidance and support from the project team to incorporate climate-resilient measures) to be financed under this project, and in carrying out technical audits which will include incorporation of climate resilient features as one of the areas to be audited. It will also support the GoA in screening road infrastructure for climate risks in areas prone to natural hazards (including landslides, rockfalls, flash floods, mudflows, floods, and avalanches). A risk assessment of natural hazards to road infrastructure (for the entire network) will be prepared together with a prioritization program of remedial actions.

6. **Improving Armenia's road safety management.** Armenia is facing challenges in the provision of road safety. According to the latest World Health Organization (WHO) Global Status Report on Road Safety,[2] the WHO estimate of road traffic fatalities in Armenia is considerably higher than the official figure (499 fatalities versus 267 in 2016). Applying a general approximation rule that each death costs around 70 times gross domestic product (GDP) per person and each serious injury around 17 times GDP per person[3] to Armenia, results in a cost estimate of 5.9 percent of GDP, which is not a sustainable figure. One of the challenges in the country's delivery of better road safety is the information vacuum that surrounds road crash related death and injuries. The country does not have a consolidated crash database that would link the crash data from all road safety stakeholders.[4] This is one of the main reasons for underreporting, especially for non-fatal crash injures which are not reported in the country statistics, in part because the Ministry of Health is not part of the crash data collection system. Unless there is data to demonstrate the real number of people severely injured in road crashes, policy makers will continue to be unaware of the real cost of road crashes to people's life and the country's economy, and provision of better road safety will continue to be out of the country's development priorities.

7. To decrease the number of fatalities and injuries as a result of crashes on increasingly motorized roads of Armenia, it is becoming increasingly important to have reliable data to diagnose which parts of the road safety system are underdelivering and the reasons behind the underdelivering. Reliable data enable proper analysis of failures and design of appropriate response methods. Another challenge is relatively low capacity of road safety professionals in safety management. The proposed AF will help address these challenges by connecting all key road safety stakeholders with a consolidated modern crash data collection and management system and capacity building in road safety management. The project will also design and implement a black spot improvement program of limited scope.

[2] World Health Organization. 2018. *Global Status Report on Road Safety 2018*. Geneva: WHO. License: CC BYNC-SA 3.0 IGO.
[3] McMahon, K., and S. Dahdah. 2008. *The True Cost of Road Crashes: Valuing Life and the Cost of Serious Injury*. Hamshire, UK: iRAP.
[4] Including the Traffic Police, the MoTCIT, the Ministry of Health, the Ministry of Emergency Situations, insurance companies, general public.

8. **Parent project.** The LRNIP is financed through two loans totaling US$85 million. The original loan in the amount of US$45 million (Loan IBRD-82290) was approved on January 31, 2013. The Project Development Objective (PDO) is to improve access of rural communities to markets and services through upgrading of selected lifeline roads, and to strengthen the capacity of the MoTCIT to manage the lifeline road network. To increase the project scope, an AF of US$40 million was approved on July 31, 2015 (Loan IBRD-85230). At the same time, the project was restructured to extend the original closing date of the project from June 30, 2017 to the current closing date of December 30, 2019, a new Contingent Emergency Response (CER) subcomponent was added, and the Results Framework was revised to reflect these changes. On June 12, 2017, the project was restructured (Level 2) to reflect the institutional reorganization within the MoTCIT, the implementing agency for the project, and its Transport Project Implementation Organization (TPIO).

9. **Progress to date.** The project is on track to meet its development objectives; both the progress toward achievement of the development objective as well as the implementation progress are currently assessed as Satisfactory. The project implementation was significantly delayed in 2017 due to the TPIO reorganization. However, implementation pace has since improved and the project is back on track to meet its objectives. Overall, project management is satisfactory. The project is compliant with the legal covenants, including environmental and social safeguards, audit and financial management (FM), and other provisions of the Loan Agreements. As of March 2019, the project has disbursed 85 percent of loan funds (for both loans combined). Implementation of both components is progressing well.

(a) **The results under Component 1 (Lifeline Road Improvement) have been significant.** To date, 274 km of lifeline roads have been rehabilitated and the rehabilitation of another 114 km is in progress. By December 30, 2019, the current closing date of the project, the total number of km rehabilitated under the project would be 388 km, exceeding the project target of 360 km.[5] This translates into improved access to markets and services for nearly 270,000 people. The project was successful with rolling out the safe village pilot, which focuses on vulnerable road users by delivering road safety engineering improvements around populated project areas. To date, safe village schemes are implemented in 66 communities. By December 30, 2019, the total number of safe village schemes will amount to 84, versus the target of 30.

(b) **Some of the notable results of the technical assistance activities under Component 2 (Project Management and Institutional Strengthening)** include preparation and endorsement of the Road Financing Strategy by the Government, purchase of the road asset management and survey equipment, and initiation of road surveys of the entire road network of Armenia (a scale-up to 7,500 km versus the originally planned 4,000 km of the LRN only). Road surveys will provide data for RAMS, which is an important step forward toward achieving the PDOs. Several pilot rehabilitation and maintenance contracts have been completed and positively evaluated. The progress was also made on conceptualizing of the PBC pilot. In 2018, the Bank received the MoTCIT's decision on the selection of a road section for the PBC pilot and agreed with the ministry's decision that the selected road was appropriate for the pilot from technical and economic perspectives. Consequently, the draft

[5] Number of kilometers rehabilitated under both loans

terms of references (ToRs) are being discussed and the TPIO is also preparing a concept note detailing contract modalities.

10. **World Bank value added.** To date, through the implementation of the LRNIP, the Bank's engagement in Armenia's transport sector has been adding value through several channels including (a) bringing global experience on road investments and associated technical assistance, (b) promoting construction quality control, (c) helping Armenia address environmental and social safeguard issues and risk management, (d) supporting sustainable road maintenance through performance-based construction and maintenance contracts, (e) ensuring proper procurement and FM practices, and (f) promoting systematic road sector planning. The proposed AF is expected to continue strengthening these areas. Additionally, it will enable better road safety management, improve use of analytical tools and techniques toward a climate resilient road network, and contribute to addressing gender gaps in the labor market through the project.

11. **The rationale for the public provision/financing of the proposed project is the recognition that low traffic volume road transport infrastructure is a public good.** Efficient access to roads in underserved regions is crucial to the socioeconomic development of Armenia's rural population. Private sector financing of the proposed investments is not available and not considered a viable alternative as, given the limited traffic volume on lifeline roads, the proposed investments cannot be recovered through other road financing mechanisms.

12. **The proposed AF is consistent with the Country Partnership Framework (CPF) and with the Bank's institutional goals of reducing poverty and boosting shared prosperity.** The proposed AF is fully aligned with the World Bank Group CPF for Armenia for FY19–FY23. Most notably, the project supports CPF Objective 3 'Enhanced access to reliable infrastructure (energy, transport, digital)' under Focus Area 1: Boosting Export Enablers and Firm Competitiveness. It is also strongly aligned with the GoA's new program adopted by the Parliament in June 2018, which highlights the country's objectives of making 'consistent improvements to road quality, providing proper countrywide transport infrastructure and quality and safe services, comfortable, accessible and adapted means of transport'. The ongoing engagement of the Bank in lifeline roads and the proposed AF make an important contribution to promoting spatial equity and inclusion of the bottom 40 percent, while at the same time improving the quality of life and competitiveness of rural inhabitants.

II. DESCRIPTION OF ADDITIONAL FINANCING

13. **Revisions to the PDO.** The PDO is proposed to be revised to remove the specific reference to the name of the MoTCIT. This change is necessitated by frequent structural reorganizations within the MoTCIT and to prevent project restructuring if the government structure changes in future. The PDO is proposed to be revised to keep the references neutral: The Project Development Objective is to improve access of rural communities to markets and services through upgrading of selected lifeline roads, and to strengthen the capacity of the Borrower's line ministry in charge of roads to manage the lifeline road network.

14. **Project components and costs.** The LRNIP will continue to have two (existing) components, which will be scaled up to incorporate new activities. A new third component will be introduced as Component 3: Contingent Emergency Response (CER). Currently, CER is a subcomponent, which will become a stand-alone component through the proposed project restructuring. The restructuring will also include revisions to the categories of eligible expenditures, results framework and monitoring indicators, and project

closing date. The increased scope of the project and the proposed restructuring will be reflected in the project components as described in the following paragraphs.

15. **Component 1: Lifeline Road Improvement (Total cost: €15.06 million; IBRD €12.05 million).** This component comprises civil works for the rehabilitation of roads, design and civil works for safe villages schemes and black spot improvement program, supervision and technical designs for road rehabilitation works, independent technical audit covering resilience to climate risks and road safety aspects, and design of future projects. This component will rehabilitate about 61 km of additional roads, raising the total length of lifeline roads to be rehabilitated under the project to about 450 km. The first batch of roads is five road sections totaling 27 km for which the detailed designs have already been prepared under the parent project; the second batch of seven road sections totaling about 34 km has also been selected to be designed over spring/summer of 2019. The AF will also scale up the Safe Village Program (by about 16–20 additional safe village schemes) as one of the most successful means of managing speeds along the LRN. A limited program of black spot improvements will be added. This program will not be limited to the LRN. It will include priority black spots on the entire road network, except for urban roads.

- **Climate resilience.** In relevant locations, as needed, works under Component 1 will include upgrading and rehabilitation of drainage systems, including ditches and culverts, as well as slope stabilization measures as appropriate. These structures will enhance resilience to handle heavy rains, prevent erosion, as well as prevent road deterioration due to potential landslides. Specific attention will be given to the provision of sufficient cross drainage and road height. As construction uses a significant amount of the same shared scarce resource, the project design will, to the extent possible, consider specifications that require the minimum amount of water. More importantly the design will look at the adjacent catchment and design outflows from the road drainage system to convey it to the lowest point to harvest storm water for use by nearby communities, animals and wildlife.

- **Mitigation.** Rehabilitation of the selected road sections will help reduce fuel consumption by road users due to the enhancement of the road condition and flow of traffic, with increased vehicle speed and decreased idle time. This will thus contribute to a net reduction in greenhouse gas (GHG) emissions (detailed figures are presented in the economic analysis).

- **Removal of Subcomponent 1.6: Contingent Emergency Response (Total cost: €0.00 million, IBRD: 100 percent).** To have the project better respond to the updated World Bank Guidance Note on Contingent Emergency Response (CER), issued in 2017, the proposed project restructuring will include removing this subcomponent from Component 1: Lifeline Road Improvement and adding it as a stand-alone Component 3: Contingent Emergency Response.

16. **Component 2: Project Management and Institutional Strengthening (Total cost: €1.65 million; IBRD €1.32 million).** The project will finance incremental project management costs including financial audit and training as well as increased scope under the road safety and disaster risk preparedness technical assistance.

- **Revisions to Subcomponent 2.3: Road Safety Technical Assistance.** The proposed AF will support the development and installation of a new modern crash data collection and management system. This crash database will be designed in a hierarchical structure,

whereby different road safety stakeholders have difference user rights. In the absence of a Road Safety Agency, the database will be housed in the Traffic Police[6]—an agency responsible for traffic safety on behalf of the GoA (RA Law 166-N on Ensuring Road Traffic Safety). The Traffic Police will be responsible for collecting and entering crash data, maintaining the overall software, and running analytics. Key road safety stakeholders, including the MoTCIT, the Ministry of Health, the Ministry of Emergency Situations, and others as required, will have access to work with the crash database based on their responsibilities in the provision of road safety[7]. Related training on the usage of the database will be provided to all stakeholders as part of this subcomponent. This subcomponent will also include capacity building of road safety stakeholders in overall road safety management.

- **Revisions to Subcomponent 2.4: Technical Assistance.** Enhancing disaster risk preparedness for the road sector (2.4/vi) will include a Risk Assessment of Natural Hazards to Road Infrastructure. The assessment will include a visual survey of the primary road network (interstate, republican, and local if need be) to identify road sections vulnerable to natural hazards such as landslides, rockfalls, flash floods, mudflows, floods, and avalanches. The survey results will then be analyzed to produce hazard and risk maps and risk prioritization table. The hazard and risk maps will be layered on the new digital map of the road network, currently being finalized by the MoTCIT. The risk ratings will be included in the RAMS multicriteria analysis, currently being implemented under the parent project. This will further enhance the ministry's efforts to prioritize road investments.

17. **Component 3: Contingent Emergency Response (Total cost: €0.00, IBRD: 100 percent).** The CER is proposed to be transformed into a standalone project component. This component is designed to provide swift response in the event of an eligible crisis or emergency, defined as "an event that has caused, or is likely to imminently cause, a major adverse economic and/or social impact to the Borrower associated with natural or man-made crisis or disaster. Including a CERC in the project minimizes the time and effort needed to make available uncommitted funds from the project to finance urgent needs in the event of a crisis or emergency. This is achieved by defining all key aspects of the CERC as fully as possible during the preparation. The CERC is activated without needing to first restructure the project, thus facilitating rapid implementation. Formal restructuring is deferred to within three months after the CERC is activated. Once the requirements for activating the CERC are met, uncommitted funds from the project are reallocated to the CERC and made available for crisis or emergency response. CERC will continue to have zero funds allocated to it. However, because the CER has become a standalone component, this necessitates revisions to the Categories of Eligible Expenditures, discussed below.

[6] All equipment and training financed by the project for the crash data collection and management system is directly related to the Traffic Police and does not include weapons, lethal equipment, or any other police or military equipment of such nature or support for specific case investigations. This intervention is critical to the project and to the overall road safety improvements in Armenia and falls within the Bank's development mandate. The risk of abuse of authority by the Traffic Police in utilizing equipment provided under the project for purposes other than what is described in this document is low. Mitigation measures to be implemented by the project are (a) closely monitoring the envisaged activities and (b) ensuring that personal information collected by the Traffic Police for the purposes of the crash database is handled in accordance with the Personal Data Protection Law of the Republic of Armenia.

[7] E.g. the MoTCIT for data analysis from design, construction, and maintenance points of view to prevent crashes; Ministry of Health for reporting non-fatal injuries, which is usually not reported by the Traffic Police; and the Ministries of Health and Emergency Situations for analyzing post-crash statistics to improve post-crash response.

18. The Borrower will update the existing Project Operational Manual (POM) to ensure the arrangements for the CERC are strengthened. The existing sections of the POM related to the CER will be presented in a dedicated Annex on Emergency Response Operations Manual. This Annex will lay out, in as much detail as possible, the provisions for activating and implementing the CERC. To facilitate CERC implementation during changing post-disaster circumstances, the Annex—which can be periodically revised during the project while it is active, with the Bank's no objection—will include the operational, fiduciary, and technical details of the CERC, and will describe the arrangements on designation of, and resources to be allocated to, the entity ("Coordinating Authority") to be responsible for coordinating and implementing the CERC. The Environmental and Social Management Framework (ESMF), the Project Procurement Strategy for Development (PPSD), and the Financial Management Manual will also be updated. Update of the POM acceptable to the Bank will be an effectiveness condition of the proposed AF loan. Update and disclosure of the ESMF and of other safeguard documents, as needed, will be a CERC disbursement condition.

19. **Front end fee of 0.25 percent will be applied (Total cost: €0.03 million, IBRD €0.03 million).**

Table 1. Project Financing

Description	IBRD Financing	GoA Financing	Total Financing
	EUR mln		
Component 1: Improvement of Lifeline Roads			
Road Rehabilitation Works	**9.40**	**2.35**	**11.75**
Road Rehabilitation Works Batch 1	3.15	0.79	3.94
Road Rehabilitation Works Batch 2	5.80	1.45	7.25
Black Spot Improvement Works	0.45	0.11	0.56
Design and Supervision Services	**2.65**	**0.66**	**3.31**
Technical Supervision	1.05	0.26	1.31
Technical Audit of Road Rehabilitation Works	0.15	0.04	0.19
Black Spot Improvement Designs	0.20	0.05	0.25
Risk Assessment of Natural Hazards to Road Infrastructure	0.35	0.09	0.44
Design of Future Projects	0.90	0.23	1.13
Total Component 1	**12.05**	**3.01**	**15.06**
Component 2: Project Management and Institutional Strengthening			
Crash Data Collection and Management System	0.45	0.11	0.56
Road Safety Capacity Building (including public awareness)	0.09	0.02	0.11
Social Monitoring and Evaluation Study	0.08	0.02	0.10
Operating Costs, Goods, Training, Audit of Project Accounts	0.70	0.18	0.88
Total Component 2	**1.32**	**0.33**	**1.65**
Component 3: Contingent Emergency Response			
Total Component 3	0.00	0.00	0.00
Front end fee (0.25%)	0.03	0.00	0.03
TOTAL PROJECT FINANCING	**13.40**	**3.35**	**16.75**

20. **Revisions to the Categories of Eligible Expenditures.** Transforming the CER Subcomponent 1.6 into Component 3 as detailed earlier will necessitate changes to the categories of eligible expenditures in the legal documents. The CERC will continue to have zero-fund allocation; however, Category 2 will be revised to update references from Subcomponent 1.6 to Component 3.

21. **Implementation arrangements.** Implementation arrangements are not proposed to be changed. The MoTCIT will continue to be the implementing agency for the project. The installation and usage of the crash data collection and management system will introduce several new ministries and agencies into the project, including the Traffic Police, and the Ministries of Health and Emergency Situations. There will be no transfer of loan funds to any of these entities. All parts of the road crash data collection and management system will be procured through the existing project arrangements by the TPIO. The TPIO will also procure consulting services and other technical assistance type activities to design the crash database, design and deliver capacity-building activities, and so on. Within one month following project effectiveness, the MoTCIT and the Traffic Police will enter into a Collaboration Agreement, which will specify arrangements, roles, and responsibilities of all parties in relation to the crash data collection and management system.

22. **Revisions to the Results Framework and Monitoring Indicators.** The Results Framework is suggested to be revised to reflect the increased scope of the project and new activities.

- **Revised indicators.** The following indicators are revised to reflect the increased scope of the project: share of rural population with access to an all-season road (PDO); number of rural people with access to an all-season road/disaggregated by gender (PDO); roads rehabilitated, rural (intermediate results indicator); and number of 'safe village' projects completed (intermediate results indicator). The intermediate results indicator 'number of km of lifeline roads fed into RAMS' will no longer be limited to lifeline roads but will include the entire road network of Armenia. The target dates for most of the indicators have been revised to align these dates with the proposed new closing date of the Project.

- **New indicators.** Black spot improvement program designed and implemented; development and use of crash data collection and management system; female graduates recruited in a paid six-month internship program in the implementing agency in the area of engineering, road design, road safety, and/or related fields.

23. **Closing date.** The closing date of the project is proposed to be extended by two years, from December 30, 2019 to December 30, 2021. No more than a two-year extension is proposed based on the assessment of the disbursement projections of the two ongoing loans and the readiness for implementation of the proposed AF: (a) the undisbursed amount under the two ongoing loans is fully committed in contracts/procurement processes and is expected to be disbursed by December 30, 2019 and (b) with regard to the proposed additional loan, the detailed designs of the first batch of roads (€3.15 million) have already been prepared under the parent project. The preparation of the designs for the second batch of roads, also financed through the parent project, is under procurement now and is expected to start in the spring of 2019. Typical duration of design and construction contracts under the project are around 6 months (without accounting for weather conditions).

III. KEY RISKS

24. With the allocation of the proposed AF, the overall risk rating for the project continues to be rated Moderate. There are three risks that are rated Substantial: (a) political and governance, (b) institutional capacity for implementation and sustainability, and (c) fiduciary risk.

a) **Political and governance risks are rated Substantial given the past year's changes in the Government**. While the political transition process may have slowed down the implementation of critical reforms, Armenia's transition from a semi-presidential system to a parliamentary republic and the incoming Government's commitment to good governance establish the political basis for substantive reforms in many areas. The risk is rated substantial because the reforms are yet to be implemented. The CPF sets specific steps to monitor and mitigate the mentioned risks through governance-focused interventions in respective areas: public expenditure, investment management and corporate governance practices in the area of insolvency, and oversight over corporate financial reporting both through the ongoing investment operations as well as through technical assistance activities.

b) **Institutional capacity for implementation and sustainability risk is rated Substantial.** Frequent structural changes as well as turnover of the leadership and staff of the MoTCIT, Armenian Roads Directorate (ARD), and the TPIO slow down the capacity building and the sustainability agenda. While the MoTCIT is improving the existing structure, it is important to continue building the overall institutional capacity within the roads subsector, both in terms of policy and implementation of reforms and physical improvements of road infrastructure and its consequent maintenance. To mitigate these risks from the institutional and human development perspective, the project is supporting a package of technical assistance to improve the capacity and the sustainability within the road sub-sector. The POM will be revised to describe transition mechanisms for ensuring adequate continuity of key staff and preservation of institutional memory in a way acceptable to the Bank.

c) **The fiduciary risk is also rated Substantial.** The assessment of the fiduciary risk includes the FM risk, which is rated moderate, and the procurement risk, which is rated substantial, therefore the overall fiduciary risk is assessed as Substantial. The procurement risk is assessed as substantial for two main reasons: (a) the procurement of goods, works, non-consulting services, and consulting services under the proposed AF will be governed by the new Procurement Regulations for IPF Borrowers. While the TPIO has received training on the new procurement framework, those are new concepts and the TPIO needs time and guidance to advance their knowledge and practical skills; (b) the procurement capacity of the TPIO is stretched due to the daily workload of the procurement staff who share responsibility to manage procurement under all projects. At the recommendation of the Bank, the TPIO hired a procurement specialist to work exclusively on the LRNIP. However, this is a relatively new development, which is yet to demonstrate results. To address potential knowledge and skills gaps, capacity-building activities will be provided.

IV. APPRAISAL SUMMARY

A. Economic Analysis

25. **To ensure that the project generates sufficient economic benefits that warrant the investments, a cost-benefit analysis was conducted for the project's first batch of roads using the Highway Development and Management Model (HDM-4).** For the HDM-4 calculations, the following assumptions were applied: (a) a discount rate of 12 percent and an evaluation period of 20 years; (b) a conversion factor of 0.83 to convert financial costs into economic costs; (c) the road works will commence in 2020; (d) the average daily traffic annual increase rate was assumed conservatively as 3.8 percent on average for all vehicles from 2020 to 2025 and 3.3 percent thereafter; and (d) social cost of carbon of US$40 per ton equivalent in 2020 increasing to US$61 per ton equivalent in 2039, based on the low scenario for the social cost of carbon derived from the 2017 World Bank guidance note on shadow price of carbon in economic analysis.

26. **Road prioritization analysis.** Roads to be rehabilitated under the proposed AF will be lifeline roads, whereby lifeline roads are roads which provide a minimum of one transport connection between a community and a main road or between a community and a Marz[8] center, excluding interstate roads. This definition of lifeline roads was established at the initiation by the GoA of the LRN concept in 2009 and will continue to be applied under the proposed AF. The selection of roads was done using the same multi-criteria prioritization analysis that was developed and used under the parent project, which considers the following indicators: (a) economic criteria (economic internal rate of return [EIRR]), (b) social criteria (beneficiary population), (c) poverty criteria (percent of poor population), and (d) road condition criteria (percent of network in poor condition).

27. **The LRN prioritization study was prepared by the ARD in 2015 and updated in 2017.** The study evaluated 110 road sections, totaling 493 km, of which 33 priority roads have been or are being rehabilitated under the LRNIP. Another 15 priority road sections were selected in 2017 to be rehabilitated under the parent project in the spring of 2019. The cost of works in the detailed designs turned out to be higher than the estimated costs, and the funds remaining under the parent project could only finance 10 of these road sections. Therefore, the remaining five sections will form the first-batch program of the proposed AF. The second-batch project roads were also selected from the prioritization list of 2017. The second batch will comprise seven priority road sections totaling about 34 km in five Marzes (the list of roads is presented in Annex 1). The preparation of the detailed designs and the Environmental Management Plans for these road sections will be financed through the parent project and will be completed by September 2019.

28. **Five road sections have been selected to be rehabilitated under the first investment batch, totaling 26.7 km.**[9] The existing roads are paved roads in poor condition with an average roughness of 12.5 international roughness index (IRI), m/km. The current average annual daily traffic on the existing roads

[8] Regional territorial administrative unit of Armenia.

[9] This number does not include road links (2 km), which are short connections between the rehabilitated road and schools, kindergartens, and community centers. In places where the rehabilitated road sections are within 500 m from schools and other social objects, the road designs envisage building these links. However, road links are not counted toward number of kilometers rehabilitated under the project because they are built in lower design standards primarily for convenience of pedestrians. This was introduced into the project to respond to community feedback.

ranges from 152 to 1,794 vehicles per day of which around 5 percent are trucks. The existing roads are 5.5 m to 7.3 m wide two-lane roads. After the project road works, the project roads are expected to be asphalt concrete roads in good condition.

29. **The total financial capital cost for the first-batch road works is estimated at US$4.38 million.** The pavement of project roads will be rehabilitated with the reconstruction of subbase, base, and asphalt concrete base layers. A section of the M11-Akhpradzor (3.78 km) is an unpaved road that will be upgraded to double bituminous surface treatment (DBST) standard.

30. **The overall EIRR of the first-batch project roads is 38.9 percent and the net present value (NPV) is US$5.87 million, at 12 percent discount rate, corresponding to a benefit-cost ratio of 6.1.** Reduction in vehicle operating cost benefits account for 71 percent of the project benefits, reduction in travel time cost benefits for 28 percent, and reduction in CO_2 emission benefits for 1 percent. High economic returns are achieved because the project roads are in poor condition and have high traffic. Table 2 presents the economic evaluation results per road section.

Table 2. Economic Evaluation Results

No.	Road	EIRR (%)	NPV at 12% (US$, millions)	Benefit-Cost Ratio
1	T-2-30-Norahsen-Dvin-H9	57.5	1.09	7.9
2	T-2-38-Aygezard	51.2	0.89	6.7
3	Lukashin-H17	41.8	0.97	5.4
4	Dastakert-Nzhdeh-Tsghuni	12.8	0.04	1.2
5	M11-Akhpradzor	41.5	2.88	7.5
Total		38.9	5.87	6.1

31. **Sensitivity analysis shows that the project is economically justified even if construction cost is 20 percent higher or if the project benefits are 20 percent lower or both.** If construction costs were 20 percent higher and the project benefits were 20 percent lower, the EIRR would drop to 27.9 percent. A switching values analysis shows that construction costs would have to increase by 282 percent for the EIRR to reach 8 percent.

32. **The total gross CO_2 emissions over the 20-year evaluation period under the 'without-project scenario' are estimated at 46,764 tons and under the with-project scenario at 44,606 tons resulting in net CO_2 emissions of about −2,158 tons or −108 tons per year**. The reduction in greenhouse gas (GHG) emissions can be attributed to the reduction in fuel consumption due to the increase of vehicle speeds with the project.

B. Technical

33. **Similar to the roads already rehabilitated under the LRNIP, the roads to be financed through the proposed AF are roads in fair to very poor condition and in need of rehabilitation or reconstruction.** Rehabilitation in this project will include road works designed to repair and/or strengthen the pavement of a road, for example, by resealing or overlaying a road or milling and replacing the pavement. No widening, upgrading surface type, or improvement of geometric characteristics is included in

rehabilitation works. Reconstruction will include road works designed to replace the entire pavement layers of a road (subbase, base, and surface layer) that is in very poor condition with new ones. No widening, upgrading surface type or improvement of geometric characteristics is included in reconstruction works. As much of the deterioration is related to environmental factors, and exacerbated by poor drainage design and maintenance practice, the design will include provision of climate resilient features. The project will repair pavements on the existing alignment, including the repair and/or upgrade of the drainage facilities within the alignments, as well as small bridges/culverts if needed. The design will also include provision of safety features such as guardrails, pavement markings, sidewalks, and speed calming measures in populated areas. The design will use international design standards rather than Armenian standards to get solutions appropriate for the actual and forecast traffic volumes and local conditions. Typical contract duration is about six months.

C. Financial Management

34. **The FM function under this AF will be handled by the TPIO**, which will be responsible for planning and budgeting, flow of funds, accounting, financial reporting, internal controls, and external auditing. There will be no change in the current FM and disbursement arrangements under the project.

35. **The FM arrangements at the TPIO have been reviewed periodically as part of the ongoing project FM implementation support (with the latest conducted in May 2018) and have been consistently found satisfactory.** There is adequate FM staffing for the implementation of this AF. The overall FM risk of the project is moderate. The TPIO will update the project's Financial Management Manual as part of the POM to reflect the specific activities under this AF.

36. **The parent project does not have overdue audits or unaudited Interim Financial Reports (IFRs).** As a result of the latest financial audit, the auditor issued an unmodified (clean) opinion on the consolidated project's financial statements. Similar audit arrangements will be adopted for this AF, which will be included in the overall project's audit. The TPIO will prepare a single set of consolidated annual financial statements for the project including this AF. The audit of the project will be conducted (a) by an independent private auditor acceptable to the Bank on ToRs acceptable to the Bank and (b) according to the International Standards on Auditing issued by the International Auditing and Assurance Standards Board of the International Federation of Accountants. The annual audited project consolidated financial statements will be submitted to the Bank within six months of the end of each fiscal year and also at the closing of the project. The audit will be procured by the TPIO, and the cost of the audit will be financed from the proceeds of the loan. The project audit reports will be posted on the website of the TPIO.

37. **Project management-oriented IFRs will be used for monitoring and supervision purposes.** The existing formats of the IFRs will be used and the TPIO will produce a consolidated set of IFRs for the parent project and AFs every calendar semester throughout the life of the project and will submit them to the Bank no later than 45 days after the end of each semester.

38. **This AF's funds will flow to the TPIO's segregated Designated Account (DA) in the Single Treasury Account (the Treasury) of the Ministry of Finance (MoF)** maintained by the Central Bank of Armenia, which is holding almost all DAs for active Bank-financed projects in Armenia. Government counterpart funding for this AF will flow to a separate account opened in the State Treasury for this AF. The country's treasury system is being used to maintain DAs of Bank-financed projects, including this project. In

addition, the country's budget system will be used for this AF. For all the other FM elements, the TPIO's respective systems will be used.

D. Procurement

39. **There are a few positive changes in the country's public procurement legislation, practices, and overall procurement environment in Armenia.** Key positive changes are (a) mandatory use of Armenian electronic government procurement system for all types of procurement, (b) establishment of real-time procurement data analytical system to capture key procurement and contract management issues, and (c) strengthening of the capacity of Government procurement audit by Chamber of Control, and so on. These provisions will help the implementing agency and the Bank to identify key procurement issues and take proactive mitigation measures to ensure better procurement outcome. Procurement capacity of the TPIO is not adequate in terms of procurement process and contract management specifically to follow the 'Procurement Regulation for IPF Borrowers'. The TPIO is managing projects funded by different development partners, and procurement professionals have shared responsibility to manage procurements under all projects. To ensure adequate procurement outcome, full-time service of a procurement specialist dedicated for this project is required. Considering the above, the procurement risk is assessed as 'substantial'.

40. **The procurement of goods, works, non-consulting services, and consulting services should be governed by the Procurement Regulations for IPF Borrowers** (July 2016 and revised as of November 2017 and August 2018). The Borrower will ensure that all procurement/selection activities are in line with the arrangements presented in the PPSD, which was prepared with this AF. Standard procurement documents are available online. The Systematic Tracking of Exchanges in Procurement tool will be used for recording the data on procurement procedures and procurement-related communications with the Bank. National procurement procedures will be followed using the ARMEPS (electronic government procurement system) managed by the MoF. The bidding documents will be adjusted for application of the e-procurement procedures.

41. **A major part of loan funds will be executed through civil works contracts (road rehabilitation works) and technical supervision of those rehabilitation works.** The TPIO has experience in implementation of civil works under national procurement procedures. Considering that the AF loan is subject to Procurement Regulations for IPF Borrowers, to ensure value for money, the TPIO should apply innovative approaches towards new arrangements indicated in the PPSD and adjust the procurement documents accordingly.

42. **A Procurement Plan (PP) as a part of the PPSD has been prepared and submitted to the Bank.** The selection and procurement method and approach for each activity, time schedule of procurement procedures, as well as the Bank's review method will be specified in the PP. Considering the small value of envisaged contracts and procurement risk level, all activities will be subject to the Bank's post review, except the first request for bid with international competition (works/goods) and first quality- and cost-based selection. Any modifications of the Bank's standard and sample documents are subject to the Bank's procurement due diligence (prior review).

43. **CERC and PPSD.** If the project faces urgent need of assistance or capacity constraints, it may be processed under special procurement arrangements referred to in the World Bank's Guidance on 'Procurement in Situations of Urgent Need of Assistance or Capacity Constraints' (effective July 1, 2016).

The PPSD will be updated to include additional provisions on using of flexible arrangements for the selection of consultants and for procurement of goods, works, and non-consulting services. A procurement risk assessment will need to be conducted if implementation arrangements for the CERC will differ from those of the parent project.

E. Social (including Safeguards and Citizen Engagement)

44. **Additional investments proposed to be financed under the AF will be of the same nature and scale as, and the social impacts are expected to be similar to, those of the parent project.** The proposed AF is expected to have positive social impacts in terms of improved access to markets, social services, and nearby towns, and opportunities for temporary employment through civil works. There appear to be no significant social risks and/or impacts related to land acquisition, physical relocation, asset or income loss of local population. Negative social impacts of the construction phase are expected to be minimal. They are limited to noise pollution, temporary disruption of municipal services, traffic, and/or access to houses, lands, and other buildings. Further, traffic accidents due to high speeds on rehabilitated roads may increase. These adverse impacts, risks, and corresponding mitigation measures have been identified and captured in the ESMF, updated for this AF. The TPIO will continue processing proposed individual investments according to the ESMF and national legislation. Site-specific Environmental and Social Management Plans (ESMPs) will capture these mitigation measures to avoid or minimize negative social (and environmental) impacts.

45. **No land acquisition or resettlement is anticipated; however, OP 4.12 has been triggered as a precautionary measure and the parent project's Resettlement Policy Framework (RPF) has been updated and publicly disclosed.** The parent project triggered OP 4.12 on involuntary resettlement, and an RPF for the project was prepared and disclosed in 2012 and updated and redisclosed in 2015 for the first AF. To date, no land acquisition, physical relocation, asset or income loss of local population has occurred in any of the subprojects. All roads selected for rehabilitation under the project follow existing road alignment and where needed, the road and/or sidewalk width is varied, as per the design, to avoid damage to any property and avoid adverse impacts on any asset, land, and/or crops. Consequently, no Resettlement Action Plan (RAP) has been required/prepared so far. The proposed AF will continue to trigger OP 4.12 as the road sections included in the AF may encounter some minor land acquisition and resettlement impacts. The existing RPF has been updated to reflect the additional investments to be financed under the AF and disclosed before appraisal. If any individual investment results in involuntary resettlement, which appears to be unlikely based on experience, a full or abbreviated RAP will be prepared in accordance with the RPF.

46. **The parent project's grievance redress mechanism (GRM) has been strengthened and will be expanded in the AF.** The TPIO has established a formal GRM to accept, assess, and address community feedback or complaints on the design and construction process. Potential users are provided with information on grievance redress procedures and TPIO contacts during public consultations. The TPIO and contractors keep grievance logs. In the proposed AF, the existing GRM will be expanded to include channels to receive complaints on gender-based violence (GBV), procedures on confidential reporting, and safe and ethical documentation, referral, and resolution of GBV cases to existing service providers.

47. **The proposed AF will continue with and further strengthen the existing practice of consultations and information disclosure.** Apart from public consultations on the safeguard instruments, the TPIO also conducts public consultations with affected communities during design preparation and implementation

of construction works. It also ensures that contractors erect information billboards at the beginning and at the end of the construction road sections which provide basic project information and contacts, and display road safety signs. In several cases in the parent project, designs were revised in accordance with the suggestions of the communities to their satisfaction.

48. **The project provides several opportunities for citizens to engage.** As noted earlier, the project has a GRM which will be further strengthened and expanded in this AF. An indicator, percentage of project-related grievances addressed, will measure the TPIO's responsiveness in grievance redress. Furthermore, the project will capture users' perception of improved access to markets and services (disaggregated by gender) through user satisfaction surveys that are part of annual Social Monitoring and Evaluation Surveys. In this survey, users will be interviewed before and after the road sections are rehabilitated, and a scale from 1 to 5 will be used to measure users' perception. The project's Safe Village Program also serves as another entry point for citizen engagement. The program will engage beneficiaries, including vulnerable groups of population, before the design to further inform road design measures and at completion to solicit feedback on the construction process as well as increase public awareness of increased speeds and the need to adjust road user behaviors accordingly.

49. **The project's rating for compliance with social safeguard policies has been within the Satisfactory range during the life of the project.** In the past, shortfalls related to the limited stakeholder engagement during implementation, omission of registration of social impacts in some ESMPs, inadequate dissemination of project information, and the limited publicity and use of a grievance mechanism have been observed. However, there have been notable improvements by the TPIO in the throughout 2018 to work on these shortfalls. The TPIO is committed and will continue to improve social risk management through strengthening grievance management, improving communication with beneficiary communities, enhancing the public consultation process, monitoring ESMP implementation, and building capacity of contractors' staff on managing social risks.

F. Gender

50. **Projects involving civil works across the world can increase the risk of GBV, particularly Sexual Exploitation and Abuse (SEA).** GBV is considered a challenge in Armenia although it is barely recognized on a wider public scale. It is difficult to measure the prevalence of violence against women largely because of the latency of the issue and high rates of underreporting. According to the United Nations Global Database on Violence against Women, lifetime physical and/or sexual intimate partner violence rate in Armenia is 8 percent and physical and/or sexual intimate partner violence is 4 percent. There exists no official national statistics on lifetime non-partner sexual violence. On December 13, 2017, the Government adopted the Law 'On the Prevention of Family Violence, Protection of Persons Subjected to Family Violence, and the Restoration of Family Peace'. Currently, respective stakeholders are in the process of developing all necessary bylaws and procedural regulations to ensure smooth implementation of the law based on the Action Plan by the decision of the Prime Minister.

51. **At present there is no coordinated referral mechanism for GBV in Armenia with clear division of responsibilities, defined procedures for data collection, and cooperation among all entities.** In line with the abovementioned law, the state is obliged to adopt a referral mechanism for provision of services to domestic violence survivors. Aside from the repetition of functions by service providers, there is a significant gap in professional capacity of service providers (social worker, health care employees, case managers, and so on). In addition to the services provided by the state, there are nongovernmental

organizations (NGOs) working with women, children, and persons subjected to violence. Their quality and coverage vary though. There are several regions (for example, Vayots Dzor, Ararat, and Aragatsotn) with almost no representation of the NGOs.

52. **To address potential risks of GBV/SEA that can emerge in projects involving civil works**, this AF will incorporate the recommendations of the World Bank's Good Practice Note 'Addressing Gender-Based Violence in Investment Project Financing involving Major Civil Works'.[10] This follows the Bank's heightened focus on identifying and addressing potential SEA risks that can emerge in projects involving civil works contracts. According to the Bank's GBV Risk Assessment Tool, which looks at both the country and the project context, the AF is considered 'Low' risk on GBV. The project will put in place measures that are commensurate to this risk level, such as, mapping GBV service providers in the project-affected and adjoining[11] communities, enhancing the project GRM to integrate specific procedures for GBV, undertaking GBV-sensitive consultations with the project-affected communities, and strengthening contractor obligations to address GBV risks (for example, adopting Code of Conduct by the contractors that defines obligations of all their staff regarding policies related to GBV, particularly SEA and workplace sexual harassment).

53. **In Armenia, about 52 percent of women and 76 percent of men are economically active.**[12] There is a high level of horizontal segregation in the labor market underpinned by societal norms regarding 'acceptable' jobs for women with transport and construction being one of the most 'male-dominated' sectors of the economy. Women are concentrated in traditionally 'female fields' of study, such as health and education, whereas men tend to enter a more diverse array of technical fields, such as construction, transport, and computer engineering which often tend to be one of the highest paid. Not surprisingly, gender segregation in education is translated into the labor market where only 2 percent of all the employed in construction is women.[13] While more women than men are employed in the TPIO (21 women out of 39 employees), men in the TPIO are mainly engineers while women are concentrated in the roles that are traditionally considered 'women's professions', for example, the positions of environmental and social specialist, procurement specialist, translator, and accountant.

54. **The project proposes to offer six-month paid internships to eight female graduates in the TPIO workforce** (raising the number of interns from zero to eight) in areas that are in demand in the TPIO—for example, engineers, designers, and road safety specialists—by reaching out to the universities that prepare graduates in the related fields. Given the low share of women employed in the sector and the fact that the TPIO is the only Government agency implementing transport projects with the Bank and other financial institutions, the proposed activity promises to create demonstration effect and challenge gender stereotypes about 'acceptable' jobs for women. At the same time, it will facilitate establishing education-employment pathways between the TPIO and the universities, which is currently missing. As the TPIO houses many other transport projects, these interns will have wider opportunities to find employment within the agency and the line ministry in future.

[10] World Bank. 2018. http://pubdocs.worldbank.org/en/399881538336159607/Good-Practice-Note-Addressing-Gender-Based-Violence.pdf
[11] Some works are envisaged in small remote villages. GBV service providers are unlikely to be identified in these communities but rather at the adjoining communities/Marz level and in Yerevan.
[12] World Bank Gender Data, 2018, ages 15 and plus. ILO Estimates
[13] National Statistics Service of the Republic of Armenia.

G. Environment (including Safeguards)

55. **Activities to be supported by the proposed AF will be similar to those implemented under the parent project.** The environmental rating, given to the project in accordance with OP 4.01 Environmental Assessment, remains category B, and no additional safeguard policies are triggered.

56. **The ESMF developed by the Borrower for the parent project has been updated for the proposed AF.** The updates are not substantial and do not add risks either from the project management in general or to its environmental compliance. The TPIO will continue processing proposed individual investments into upgrading of various sections of roads throughout the country according to the ESMF and the national legislation. This would imply environmental and social screening and risk identification. No high-risk category A activities will be considered for inclusion in the work program. The screening procedure becomes more rigorous by including mandatory assessment of risks to safe transportation due to rockfall from the nearby slopes. Respective mitigation measures will be built into the road rehabilitation design for addressing such risk, if present. Site-specific ESMPs will carry these and other measures to avoid or minimize negative impacts on the health of project-affected people and the natural environment. Compliance of physical works with the ESMPs and the national environmental legislation will be monitored by a supervision consultant to be hired by the TPIO. The TPIO will retain overall responsibility for ensuring good environmental performance under the project.

57. **CERC in the ESMF.** The project's ESMF will include a description of the potential emergencies and the types of activities likely to be financed and the potential risks and mitigation measures associated with them. It will also identify likely vulnerable locations and/or groups and include, where needed, a social assessment to guide emergency responses. The ESMF will include a screening process for the potential activities, the institutional arrangements for environmental and social due diligence and monitoring, any needed capacity-building measures, and generic guidance on emergency civil works. If the implementation arrangements for the CERC are different from those of the parent project, the Bank will verify whether a different implementing agency has the requisite skills and capacity to undertake due environmental and social diligence regarding CERC activities and if any additional safeguard instruments would be required for implementing the CERC. The ESMF will indicate which kinds of emergency response actions can proceed with no additional environmental or social assessment and which ones would require an assessment (and at what level) before being initiated. Updating the ESMF in the described manner acceptable to the Bank and redisclosing it will be a disbursement condition for CERC.

58. **The LRNIP's rating on the compliance with OP 4.01 has been within the satisfactory range throughout the life of the project.** Currently, the environmental rating continues to be assessed as satisfactory. Earlier, shortfalls were observed in on-site management of waste and its final disposal, sanitary conditions at work bases of individual contractors, and reporting on the outcomes of environmental monitoring by supervision consultant. While quality of reporting has improved, work site management remains a relative weakness and calls for continuous follow up by the TPIO and its supervision consultant; especially aspects related to health and safety of workers and project-affected communities.

V. WORLD BANK GRIEVANCE REDRESS

59. Communities and individuals who believe that they are adversely affected by a World Bank supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service.
For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VI SUMMARY TABLE OF CHANGES

	Changed	Not Changed
Project's Development Objectives	✓	
Results Framework	✓	
Components and Cost	✓	
Loan Closing Date(s)	✓	
Disbursements Arrangements	✓	
Safeguard Policies Triggered	✓	
Implementing Agency		✓
Cancellations Proposed		✓
Reallocation between Disbursement Categories		✓
EA category		✓
Legal Covenants		✓
Institutional Arrangements		✓
Financial Management		✓
Procurement		✓

VII DETAILED CHANGE(S)

PROJECT DEVELOPMENT OBJECTIVE

Current PDO

The Project Development Objective is to improve access of rural communities to markets and services through upgrading of selected lifeline roads, and to strengthen the capacity of the Ministry of Transport and Communication to manage the lifeline road network.

Proposed New PDO

The Project Development Objective is to improve access of rural communities to markets and services through upgrading of selected lifeline roads, and to strengthen the capacity of the Borrower's line ministry in charge of roads to manage the lifeline road network.

COMPONENTS

Current Component Name	Current Cost (US$, millions)	Action	Proposed Component Name	Proposed Cost (US$, millions)
Lifeline Road Improvement	99.10	Revised	Lifeline Road Improvement	115.43
Project Management and Institutional Strengthening	6.91	Revised	Project Management and Institutional Strengthening	9.29
	0.00	New	Contingent Emergency Response	0.00
TOTAL	**106.01**			**124.72**

LOAN CLOSING DATE(S)

Ln/Cr/Tf	Status	Original Closing	Current Closing(s)	Proposed Closing	Proposed Deadline for Withdrawal Applications
IBRD-82290	Effective	30-Jun-2017	30-Dec-2019	30-Dec-2021	30-Apr-2022
IBRD-85230	Effective	30-Dec-2019	30-Dec-2019	30-Dec-2021	30-Apr-2022

DISBURSEMENT ARRANGEMENTS

Change in Disbursement Arrangements

Yes

Expected Disbursements (in US$)

Fiscal Year	Annual	Cumulative
2013	0.00	0.00
2014	15,476,066.77	15,476,066.77
2015	6,700,000.00	22,176,066.77
2016	19,373,986.26	41,550,053.03
2017	10,783,372.98	52,333,426.01
2018	11,499,404.02	63,832,830.03
2019	7,000,000.00	70,832,830.03

2020	15,000,000.00	85,832,830.03
2021	10,000,000.00	95,832,830.03
2022	4,167,169.97	100,000,000.00

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Latest ISR Rating	Current Rating
Political and Governance	Substantial	Substantial
Macroeconomic	Moderate	Moderate
Sector Strategies and Policies	Moderate	Moderate
Technical Design of Project or Program	Low	Low
Institutional Capacity for Implementation and Sustainability	Substantial	Substantial
Fiduciary	Substantial	Substantial
Environment and Social	Low	Low
Stakeholders	Low	Low
Other		
Overall	Moderate	Moderate

COMPLIANCE

Change in Safeguard Policies Triggered

Yes

Safeguard Policies Triggered	Current	Proposed
Environmental Assessment OP/BP 4.01	Yes	Yes
Performance Standards for Private Sector Activities OP/BP 4.03	No	No
Natural Habitats OP/BP 4.04	No	No
Forests OP/BP 4.36	No	No
Pest Management OP 4.09	No	No

Physical Cultural Resources OP/BP 4.11	No	No
Indigenous Peoples OP/BP 4.10	No	No
Involuntary Resettlement OP/BP 4.12	Yes	Yes
Safety of Dams OP/BP 4.37	No	No
Projects on International Waterways OP/BP 7.50	No	No
Projects in Disputed Areas OP/BP 7.60	No	No

LEGAL COVENANTS – LIFELINE ROAD NETWORK IMPROVEMENT PROJECT - Second Additional Financing (P169158)

Sections and Description
A Collaboration Agreement on road crash data collection and management is signed between the MoTCIT and the Traffic Police under terms and conditions acceptable to the Bank not later than one month after the Effective Date of the Project

Conditions

Type	Description
Effectiveness	The Operational Manual is updated and adopted by the Borrower, through MoTCIT, in a manner acceptable to the Bank;
Effectiveness	The key staff referred to in Section I.A.1 of Schedule 2 to the Legal Agreement has been hired;

VIII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Armenia

LIFELINE ROAD NETWORK IMPROVEMENT PROJECT - Second Additional Financing

Project Development Objective(s)

The Project Development Objective is to improve access of rural communities to markets and services through upgrading of selected lifeline roads, and to strengthen the capacity of the Borrower's line ministry in charge of roads to manage the lifeline road network.

Project Development Objective Indicators by Objectives/ Outcomes

Indicator Name	DLI	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Improve access of rural comm. to markets and services through upgrading of selected lifeline roads *(Action: This Objective has been Revised)*											
Average speed on lifeline roads in project areas (Kilometers)		20.00	25.00	30.00	35.00	40.00	40.00	40.00	40.00	40.00	40.00
Action: This indicator has been Revised											
Share of rural population with access to an all-season road (Percentage)		51.00	53.00	56.00	58.00	60.00	63.00	68.00	71.80	74.10	76.80

Indicator Name	DLI	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Action: This indicator has been Revised											
Number of rural people with access to an all-season road (Number)		600,000.00	632,000.00	668,000.00	690,000.00	710,000.00	750,000.00	800,000.00	850,000.00	877,800.00	909,200.00
Action: This indicator has been Revised											
Strengthen the capacity of the line ministry to manage the lifeline road network *(Action: This Objective has been Revised)*											
Users' perception of improved access to markets and services (disaggregated by gender) (Number)		0.00	0.00	3.00	4.00	4.00	4.00	4.50	4.50	4.50	4.50
Action: This indicator has been Revised											
Development and use of RAMS within the line ministry to support decision making on LRN (Text)		Need for RAMS							RAMS installed	Data on 7500km transferred	RAMS used by the line ministry
Action: This indicator has been Revised											

Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Lifeline Road Improvement ***(Action: This Component has been Revised)***											
Roads rehabilitated, Rural (Kilometers)		0.00	49.00	104.00	136.00	205.00	250.00	270.00	330.00	390.00	450.00
Action: This indicator has been Revised											
Black spot improvement program designed and implemented (Yes/No)		No									Yes
Action: This indicator is New	***Rationale:*** ***Black spots are road sections that are prone to crashes. This program will not be limited to the LRN. It will include priority black spots on the entire road network, except for urban roads.***										
Project Management and Institutional Strengthening ***(Action: This Component has been Revised)***											
Number of km of lifeline roads fed into RAMS (Kilometers)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	4,500.00	7,500.00	7,500.00
Action: This indicator has been Revised											
Number of ”Safe Village” projects completed (Number)		0.00	0.00	2.00	15.00	30.00	66.00	66.00	84.00	92.00	100.00
Action: This indicator has been Revised											
PBC pilot designed and endorsed by the line ministry (Yes/No)		No	No	No	No	No	No	No	No	Yes	Yes

Indicator Name	DLI	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Action: This indicator has been Revised											
Road Financing Study completed and endorsed by GoA (Yes/No)		No	No	No	Yes	Yes					Yes
Action: This indicator has been Revised											
Roads in good and fair condition as a share of total classified roads (Percentage)		50.00	51.20	52.60	53.40	55.10	56.30	59.00	59.00	59.00	59.00
Action: This indicator has been Revised											
Size of the total classified network (Kilometers)		4,000.00	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00
Action: This indicator has been Revised											
Percentage of project related grievances addressed by the line ministry (Percentage)		0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Action: This indicator has been Revised											
Pilot on rehabilitation and maintenance contract designed, implemented, and evaluated (Text)		Need to test the concept								Concept tested and decision taken	Concept tested and decision taken

Indicator Name	DLI	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Action: This indicator has been Revised											
Development and use of crash data collection and management system (Yes/No)		No									Yes
Action: This indicator is New											
Female graduates recruited in a paid six-month internship program in the implementing agency in the area of engineering, design, road safety and/or related fields (Number)		0.00								4.00	8.00
Action: This indicator is New											

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Average speed on lifeline roads in project areas	Average speed is expressed in km/hour and is calculated by distance of lifeline road section / time travelled	Semi-annual			Line ministry

Share of rural population with access to an all-season road	Percentage of rural people in the project area who live within 2 kilometers (typically equivalent to a 20-minute walk) of an all-season road. This indicator is also known as Rural Access Index (RAI). An all-season road is motorable all year by the prevailing means of rural transport (often a pick-up or a truck which does not have four-wheel-drive). Predictable interruptions of short duration during inclement weather (e.g. heavy rainfall) are acceptable, particularly on low volume roads. Please note that this indicator requires supplemental information Supplemental Value: Number of rural people with access to an all-season road The Supplemental Value is the total number of rural people with access to an all-season road. An all-season road is a road that is motorable all year by the prevailing means of	Semi-annual			Line ministry

	rural transport (often a pick-up or a truck which does not have four-wheel-drive).				
Number of rural people with access to an all-season road	Please indicate the absolute number of rural people with access to an all-season road.	Semi-annual			Line ministry
Users' perception of improved access to markets and services (disaggregated by gender)	A scale from 1 to 5 will be used to measure users' perception. User Satisfaction Survey as part of Social Monitoring and EvaluationSurvey (users will be interviewed before and after the road sections are rehabilitated). More details on the survey methodology are provided in the Project Operations Manual.	Semi-annual	Social Monitoring and Evaluation Survey		Line ministry
Development and use of RAMS within the line ministry to support decision making on LRN	The Ministry will use the latest version of the HDM-4 as RAMS to support the decision making. While the decision making in this project indicator is limited to the LRN, the entire network will be surveyed and inputted to RAMS.	Semi-annual			Line ministry

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Roads rehabilitated, Rural	Kilometers of all rural roads reopened to motorized traffic, rehabilitated, or upgraded under the project. Rural roads are roads functionally classified in various countries below Trunk or Primary, Secondary or Link roads, or sometimes Tertiary roads. Such roads are often described as rural access, feeder, market, agricultural, irrigation, forestry or community roads. Typically, rural roads connect small urban centers/towns/settlements of less than 2,000 to 5,000 inhabitants to each other or to higher classes of road, market towns and urban centers.	Semi-annual			Line ministry
Black spot improvement program designed and implemented	Black spots are road sections that are prone to crashes. This program will not be limited to the LRN. It will include priority black spots on the entire road	Semi-annual			Line ministry

	network, except for urban roads.				
Number of km of lifeline roads fed into RAMS	Data on road inventory, condition, and traffic per each kilometer of lifeline road network is collected and then transferred into RAMS.	Semi-annual			Line ministry
Number of ”Safe Village” projects completed	Unit of measure: cumulative number. Projects completed means both works and road safety campaigns.	Semi-annual			Line ministry
PBC pilot designed and endorsed by the line ministry	PBC – Performance-Based Contract. This pilot intends to introduce the MOTC to the concept of PBC and build the capacity of MOTC in designing the pilot (including related bidding documents), but the pilot itself will not be financed through the proceeds of this Project.	Semi-annual			Line ministry
Road Financing Study completed and endorsed by GoA	The objectives of this study are to recommend: the level of financing needed for maintenance and rehabilitation works; how all types of roads and types of road works should be	Semi-annual	Progress Reports		Line Ministry

	financed; improvements in managing the all types of roads and all types of road works; and improvements of the legal framework for managing roads.				
Roads in good and fair condition as a share of total classified roads	Percentage of the total classified road network in the project area that is in good and fair condition depending on the road surface and the level of roughness. Classified roads are the roads that have been included in the roads legislation as public roads. The Supplemental value is the total classified network in the project area. For the purposes of this Project, classified roads are lifeline roads.	Semi-annual			Line ministry
Size of the total classified network	Classified roads are the roads that have been included in the roads legislation as public roads. For the purposes of this Project, classified roads are lifeline roads.	Semi-annual			Line ministry
Percentage of project related grievances addressed by the line ministry	All grievances received by the line ministry need to be addressed at 100 percent.	Semi-annual			Line ministry

	The MoTCIT has established a formal GRM to accept, assess, and address community feedback or complaints on the design and construction process. Potential users are provided with information on grievance redress procedures and MoTCIT contacts during public consultations. The MoTCIT and contractors keep grievance logs. In the proposed AF, the existing GRM will be expanded to include channels to receive complaints on gender-based violence (GBV), procedures on confidential reporting, and safe and ethical documentation, referral, and resolution of GBV cases to existing service providers.				
Pilot on rehabilitation and maintenance contract designed, implemented, and evaluated	Rehabilitation and Maintenance Contract is a new concept for Armenia. Once the pilot is implemented, the line ministry will evaluate the results and take a decision	Semi-annual			Line ministry

	on applicability of this concept in Armenia.				
Development and use of crash data collection and management system	This crash database will be designed in a hierarchical structure, whereby different road safety stakeholders have difference user rights. the database will be housed in the Traffic Police. The Traffic Police will be responsible for collecting and entering crash data, maintaining the overall software, and running analytics. Key road safety stakeholders, including the MoTCIT, the Ministry of Health, the Ministry of Emergency Situations, and others as required, will have access to work with the crash database based on their responsibilities in the provision of road safety.	Semi-annual	To be designed	To be designed	Traffic police, with input from the line ministry, Ministry of Health, Ministry of Emergency Situations
Female graduates recruited in a paid six-month internship program in the implementing agency in the area of engineering, design, road safety and/or related fields	Each year, the implementing agency will recruit 4 female interns, totaling 8 interns by the end of the project.	Semi-annual			Line ministry

Annex 1. Economic Analysis

1. **To ensure that the project generates sufficient economic benefits that warrant the investments, a cost-benefit analysis was conducted for the project's first batch of roads using HDM-4 that computes annual road agency and users' costs for each project alternative over the evaluation period.** The quantities of resources consumed and vehicle speeds are calculated first and then multiplied by unit costs to obtain total vehicle operating costs, travel time costs, and CO_2 emission costs. The resources consumed and vehicle speeds are related to traffic volume and composition, road surface type, geometric characteristics, and roughness.

2. **The quantified benefits computed by HDM-4 comprise savings in vehicle operating costs, travel time costs, road maintenance costs due to the road improvements and a reduction in costs of CO_2 emissions with the project.** For the HDM-4 calculations, the following assumptions were applied:

- A discount rate of 12 percent and an evaluation period of 20 years.
- A conversion factor of 0.83 to convert financial costs into economic costs to remove taxes from financial costs.
- The road works will commence in 2020 and will have a duration of one year.
- The average daily traffic annual increase rate was assumed conservatively 3.8 percent on average for all vehicles from 2020 to 2025 and 3.3 percent thereafter, based on estimated GDP growth projections.[14] No generated traffic was considered on the evaluation.
- Social cost of carbon of US$40 per ton equivalent in 2020 increasing to US$61 per ton equivalent in 2039, based on the low scenario for the social cost of carbon derived from the 2017 World Bank guidance note on shadow price of carbon in economic analysis.[15]

3. Table 1.1 presents the vehicle fleet economic unit costs, basic characteristics, and the average traffic composition on the first-year project roads.

[14] The GDP has grown on average at 4.2 percent per year from 2010 to 2018 in constant prices. The IMF predicts that the GDP will increase on average by 4.6 percent per year from 2020 to 2023.
[15] The guidance note presents low and high scenarios of the social cost of carbon over time, from which the high scenario was used due to negative net CO_2 emission of the project.

Table 1.1. Vehicle Fleet Economic Unit Costs and Characteristics

	Car	Wagon	Medium Truck	Heavy Truck	Articulated Truck	Mini Bus	Bus
New vehicle cost (US$)	15,000	25,000	35,000	60,000	100,000	25,000	35,000
New tire cost (US$)	75	120	350	350	350	120	200
Fuel cost (US$/liter)	1.20	1.20	1.20	1.20	1.20	0.80	0.80
Lubricant cost (US$/liter)	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Maintenance cost (US$/hour)	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Crew COST (US$/hour)	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Annual Overhead (US$/year)	1500	1500	1500	1500	1500	1500	1500
Interest rate (%)	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Work time (US$/hour)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Non-work time (US$/hour)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cargo time (US$/hour)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Annual utilization (km)	25,000	30,000	40,000	86,000	86,000	47,000	70,000
Annual utilization (hours)	550	1300	1,200	2600	2050	2,100	1,750
Service life (years)	10	8	12	14	14	8	7
Private use (%)	90	75	30	10	0	10	10
Number passengers (number)	2	2	0	0	0	12	25
Working time (%)	75	90	0	0	0	75	90
Operating weight (tons)	1.2	2	7.5	13	28	2.5	6
Standard axle loading (number)	2E-04	0.02	1.0	1.202	1.202	0.0	0.251
Traffic composition (%)	82	9	3	1	1	3	1

4. **The first-batch project roads were selected based on a prioritization study.** The ARD selected 15 lifeline roads to be rehabilitated under the LRNIP AF Year 3 road works program based on a lifeline roads network prioritization study done in 2017 that considered the following multi-criteria indicators: (a) the EIRR of the road work, (b) the beneficiary population of the road section, (c) the percent population in poor condition in the Marz, and (d) the percent of lifeline roads in poor condition in the Marz. The first-batch project roads are the 5 roads among the 15 roads, selected in 2017, which are not being rehabilitated under the LRNIP AF Year 3 road works program due to lack of funds.

5. **The first-batch project roads to be rehabilitated under the project totals 26.7 km.** The existing roads are paved roads in poor condition with an average roughness of 12.5 IRI, m/km. The current average annual daily traffic on the existing roads ranges from 152 to 1,794 vehicles per day of which around 5 percent are trucks. The existing roads are 5.5 m to 7.3 m wide two-lane roads. After the project road works, the project roads are expected to be asphalt concrete roads in good condition.

6. Table 1.2 presents the current basic roads characteristics.

Table 1.2. Basic Road Characteristics

No	Road	Road Length (km)	Access Roads (km)	Total (km)	Width (m)	Roughness (IRI)	Traffic (AADT)
1	T-2-30-Norahsen-Dvin-H9	1.94	0.88	2.82	6.9	11.8	1,794
2	T-2-38-Aygezard	1.90	0.26	2.16	7.3	12.6	1,320
3	Lukashin-H17	3.15	0.00	3.15	6.6	14.0	982
4	Dastakert-Nzhdeh-Tsghuni	5.18	0.25	5.43	5.5	12.4	152
5	M11-Akhpradzor	14.48	0.77	15.25	6.6	12.4	558
Total		26.7	2.2	28.8	6.5	12.5	674

7. **The total financial capital cost for the first-batch road works is estimated at US$4.38 million.** The pavement of project roads will be rehabilitated with the reconstruction of subbase, base, and asphalt concrete base layers. A section of the M11-Akhpradzor (3.78 km) is an unpaved road that will be upgraded to DBST standard.

8. Table 1.3 presents the road works characteristics.

Table 1.3. Road Works Characteristics and Costs

No	Road Work	Total Cost (US$, millions)	Total Cost Per Km (US$/km)
1	Rehabilitation with AC	0.67	237,693
2	Rehabilitation with AC	0.49	227,099
3	Rehabilitation with AC	0.64	202,081
4	Rehabilitation with AC	0.88	161,290
5	Rehabilitation with AC and DBST	1.71	112,168
Total		4.38	152,168

Note: AC = Asphalt concrete.

9. **The overall EIRR of the first-batch project roads is 38.9 percent and the NPV is US$5.87 million, at 12 percent discount rate, corresponding to a benefit-cost ratio of 6.1.** Reduction on vehicle operating cost benefits account for 71 percent of the project benefits, reduction in travel time cost benefits for 28 percent, and deduction on CO_2 emission benefits for 1 percent. High economic returns are achieved because the project roads are in poor condition and have high traffic.

10. Table 1.4 presents the economic evaluation results per road section.

Table 1.4. Economic Evaluation Results

No	Road	EIRR (%)	NPV at 12% (US$, millions)	Benefit-Cost Ratio
1	T-2-30-Norahsen-Dvin-H9	57.5	1.09	7.9
2	T-2-38-Aygezard	51.2	0.89	6.7
3	Lukashin-H17	41.8	0.97	5.4
4	Dastakert-Nzhdeh-Tsghuni	12.8	0.04	1.2
5	M11-Akhpradzor	41.5	2.88	7.5
Total		38.9	5.87	6.1

11. **Sensitivity analysis shows that the project is economically justified even if construction cost is 20 percent higher or if the project benefits are 20 percent lower or both.** If construction costs were 20 percent higher and the project benefits were 20 percent lower, the EIRR would drop to 27.9 percent. A switching values analysis shows that construction costs would have to increase by 282 percent for the EIRR to reach 8 percent.

12. Table 1.5 presents the sensitivity analysis results.

Table 1.5. Sensitivity Analysis Results

	Sensitivity Analysis			
	Base	A: Costs + 20%	B: Benefits – 20%	C: A + B
EIRR (%)	38.9	32.8	33.4	27.9
NPV at 8% (US$, millions)	5.87	5.23	4.48	3.84

13. **The total gross CO_2 emissions over the 20-year evaluation period under the without-project scenario are estimated at 46,764 tons and under the with-project scenario at 44,606 tons resulting in net CO_2 emissions of about −2,158 tons, or −108 tons per year.** The reduction in GHG emissions can be attributed to the reduction in fuel consumption due to the increase of vehicle speeds with the project.

14. **The second-batch project roads were selected from the prioritization list of 2017.** The second batch of civil works program will comprise seven road sections totaling about 34 km in five Marzes as presented in table 1.6. The consultancy services to produce detailed designs and ESMPs for these road sections will be procured in March 2019 to have the designs and ESMPs completed by early September 2019. The detailed designs will be financed through the parent project.

Table 1.6. List of Roads Selected for the Second-year AF2 Roads

No.	Name of Road	Marz	Region	Number of Beneficiaries	Road Length (km)
1	M1-Nerkin Sasnashen-Metsadzor	Aragatsotn	Talin	2,800	9.0
2	H12-Noramarg-Hovtashen-M2	Ararat	Masis	3,250	4.1
3	M4-Sevan-Akhtamar complex-M4	Gegharkunik	Sevan	1,650	5.8
4	M6-Yeghegnut-Debed	Lori	Gugarq	2,150	5.0
5	M2-Noravan	Syunik	Sisian	2,744	3.3
6	T-5-32-Katnajur	Lori	Spitak	2,484	4.5
7	H46-Khot	Syunik	Goris	1,260	2.4
Total					34.1

Annex 2. Road Safety

Background

1. Road safety in Armenia is poor by European standards, with road deaths per 100,000 people estimated[16] by WHO at 17. This can be compared with the best countries' rate of 3 to 4 road deaths per 100,000 people. In absolute numbers, road deaths during the last decade are shown in table 2.1. In addition to the human cost and suffering imposed, these deaths and injuries impose real economic costs on the nation. A study of many countries identified a general approximation rule that each death costs around 70 times GDP per person and each serious injury around 17 times GDP per person.[17] Applying this methodology to Armenia results in an annual cost approaching 6 percent of GDP.

Table 2.1. Road Deaths in Armenia 2008–2018

Year	Crashes	Fatalities	Casualties
2008	2202	407	3,125
2009	2002	325	2,753
2010	1974	294	2,670
2011	2319	327	3,354
2012	2602	311	3,739
2013	2824	316	3,994
2014	3156	267	4,479
2015	3399	346	4,738
2016	3203	267	4,451
2017	3535	279	5,179
2018	4111	343	5,950

Source: Police records.

2. It has been established in many countries, including Armenia, that improvements to this situation can be achieved with focused efforts targeting the main risk factors. To provide focused actions by the main road safety stakeholders, international good practice is to designate a lead agency responsible for generating Action Plans and coordinating activities to meet the plan's targets. In Armenia, the Bank initiated the support for the road safety agenda through the Lifeline Road Improvement Project as well as with grant financing from the Global Road Safety Facility during 2009–2010. With financial support through these investments, but more importantly under the leadership of a road safety champion within the Government, the country saw reductions in annual fatalities from 407 in 2008 to 294 in 2010. This improvement stemmed from establishing a Secretariat for the National Road Safety Council as lead agency to coordinate implementation of a National Road Safety Strategy (NRSS), investment in safe villages, enforcement of seat belt wearing, and building capacity in key agencies.

[16] World Health Organization. 2018. *Global Status Report on Road Safety 2018*. Geneva: WHO.
[17] McMahon, K., and S. Dahdah. 2008. *The True Cost of Road Crashes: Valuing Life and the Cost of Serious Injury*. Hamshire, UK: iRAP.

3. It should be noted, however, that while reported fatalities reduced, the number of crashes and injuries increased. This may be a result of improved protection for vehicle occupants—for example, seat belt wearing, such that the severity of injury during a crash is reduced—but it may also be due to poor data collection. The Eastern Partnership (EaP) Transport Panel Secretariat's analysis[18] of Armenia's data collection procedure reveals that the quality of data concerning injury levels is not checked; there is no well-developed monitoring system linking the status of patients with the level of injuries; and there is no exchange of information on injury levels between hospitals and the Police.

4. The sections below summarize the activities proposed to be undertaken within the road safety component of the proposed AF.

Professional Development and Training

5. Through the proposed AF, the Bank will increase awareness and capacity building of road safety stakeholders in road safety good practices that has progressed significantly in recent years, in particular the adoption by international agencies and leading countries of a 'Safe System'[19] approach. In essence this asserts that no deaths should occur on the road. It accepts that human errors will always occur, and the design and operation of the road system (including infrastructure, vehicles, and road user behavior) should aim to minimize the risk of death and injury if a crash occurs. Ultimately, there will be a need for the Government to update the NRSS and Action Plan, which should adopt the Safe System approach and have a dedicated road safety agency.

6. Safe Systems approach is a systematic, multisectoral response to address road safety including interventions that improve the safety of road infrastructure, vehicles, road user behavior, and post-crash services. Key principles of the Safe System approach aim at (a) developing road transport systems' prevention, reduction, and accommodation of human error; (b) considering social costs and impacts of road trauma in the development and selection of an investment program; (c) establishing shared responsibility for road safety among all stakeholders; (d) creating effective and comprehensive management and communications structures for road safety; and (e) aligning safety management decision making with broader societal decision making to meet economic, human, and environmental goals and to create an environment that generates demand for safe road transport products and services.[20]

7. However, it is important to first ensure that the Safe System approach is fully understood and accepted by all stakeholders. Successful road safety activities depend as much on the professional skills available as they do on financial resources; part of the road safety component funding will be used to build capacity within road safety stakeholders. The project will assist in building professional capacity within the key road safety stakeholders, including the Traffic Police, MoTCIT, and other stakeholders.

[18] Eastern Partnership Transport Panel Secretariat, Crash data system in the EaP countries, country notes on Armenia. EU (undated).
[19] See, for example, Austroads. 2018. "Towards Safe System Infrastructure, a Compendium of Current Knowledge.".
[20] See, for example, Global Road Safety Facility Strategic Plan 2013–2020

8. Another important area of professional development suggested to be covered by the project is a road safety audit (RSA). An RSA[21] is a formal, robust technical assessment of road safety risks associated with road transport projects. The objective of an RSA is to identify foreseeable hazards for all road users. The RSA process provides a reasonable, but not absolute, hazard identification method for all road users with particular focus on the reduction in fatal and serious injuries. RSAs (a) are completed by independent and qualified audit teams; (b) are completed by applying Safe System principles while seeking to ensure that roads will operate as safely as practicable by eliminating fatal and serious injury crash potential; (c) consider the safety of all road users (unless specified within the audit brief), and (d) can be conducted on proposed or existing roads.

9. It is suggested to focus the professional development on the Safe System approach to road safety and RSA; however, other topics could be considered as needed.[22] Training courses and seminars will be provided by a combination of international and local consultants and, if appropriate, a limited amount of overseas training will be considered.

Crash Data Collection and Management System

10. To be effective, investment of funds and professional efforts in road safety demand good data. Knowledge of the factors contributing to crashes, where and when they occur, vehicle details, prevailing conditions, and aspects of driving behavior are vital. The current crash data collection system of the Traffic Police is outdated. It is based on paper records completed at the crash scene by an investigating officer and the subsequent manual entry of the information into a simple database.

11. A computerized road crash database is a collection of data related to road safety which electronically stores properly coded and processed data. At a minimum, a good road crash database should capture nearly all crashes that result in death and a significant proportion of those that result in serious injuries; provide adequate details on the vehicle, the road user, and the road/environment to assist with identification of causes and selection of countermeasures; include accurate crash location information; and provide reliable output on time to facilitate evidence-based decisions. As a good practice, road crash databases include the following features: built-in quality checks (for example, algorithms and logic checks); geographic information system (GIS) linkage to allow accurate identification of crash location; ability to add new data fields without redeveloping the database; database navigation features such as dropdown menus and clickable maps; predefined queries and reports; options for customized, user-defined queries and reports; mapping ability - for data entry, crash selection, and presentation of aggregated crash information; ability to export data to third-party applications (for example Microsoft Excel, Statistical Analysis Software, for further statistical analysis); inclusion of crash narrative, sketches of crash scene, photographs and videos linked to crash, and automatically generated collision diagrams.[23]

[21] Austroads. 2019. “Guide to Road Safety Part 6: Managing Road Safety Audits.”
[22] Capacity-building activities could include the following topics: for Traffic Police - data collection protocol (use of handheld devices), data analysis system, and how to make most effective use of data; for other road safety stakeholders - (a) safe systems approach; (b) black spot identification and design of remedial measure, design using better data; (c) road safety audit; and (d) target setting (for action plan).
[23] WHO, FIA Foundation, GRSP and the World Bank. 2010. “Data Systems: A Road Safety Manual for Decision-Makers and Practitioners.”

12. Armenia's crash database system is an MS SQL-based system. It lacks GIS features but allows for point location (currently location is identified by the number of road kilometers). The crash database is only used for internal tasks and is only accessible through the Traffic Police's internal network. It is used to handle the online and/or daily collection of data. The institution in charge of software development is the Traffic Police, Planning, Registration, and Analysis unit. The software in use has not been updated since 2015.[24]

13. Most road crashes have multiple causes or factors contributing to the crash. It is understood that currently only a single cause is recorded based on the reporting officer's judgement. Precise location of crashes is rare, due to lack of global positioning system (GPS) data to pinpoint the location. There are also understandable concerns over confidentiality of certain information—principally personal information about drivers and injured victims. All of these issues are addressed in modern road crash data systems.

14. Armenia's Traffic Police are aware of these points and have been working with the European Road Safety Observatory to improve crash data collection. The aim is to follow the guidance of CADaS—The Common Accident Data Set—developed under the auspices of the European Commission.[25] CaDaS is a common structure including a minimum set of standardized data elements. In this way, more variables and values with a common definition will be added to allow more in-depth analysis. It is also then possible to add the data to those contained in the CARE database,[26] thus maximizing the potential value of the CARE database and allowing for more detailed and reliable analyses and international comparisons.

15. Given a more comprehensive set of crash data, it is also necessary to make the collection process much easier and to minimize the extent of paper records. Current good practice achieves this by using handheld data capture devices (even a modern smartphone could be used) and utilizes the Internet to transfer the data captured directly to a central database. This can be done in real time if connectivity is available at the location for the device used (for example, a 4G phone network) or the data can be downloaded subsequently onto a computer at the Traffic Police station and transmitted over the Internet to the Traffic Police headquarters.

16. Critically this data set will include GPS coordinates of the crash location. Systematic analysis of the data collected will then provide a basis for black spot identification and subsequent treatment, and it will identify frequently occurring contributory factors (such as alcohol consumption, speeding, or lack of seatbelt use) to inform national policy decisions. Access to the data will follow an agreed protocol. Some data fields, particularly those containing personal information, will be available only to the Traffic Police. However, other stakeholders will have access, through the Internet, to most of the non-anonymous information to enable them to conduct analyses relevant to their responsibilities.

17. To assist the Traffic Police in moving forward along this path, it is proposed to employ an international consultant to advise on the hardware and software needed and to review Internet connectivity available to the Police in their stations and through telephone networks. The consultant will review 'off-the-shelf' systems available and the changes needed to meet Armenian conditions and Police

[24] Eastern Partnership Transport Panel Secretariat, Crash data system in the EaP countries, country notes on Armenia. EU (undated).
[25] European Commission. 2015. "Care Database CaDaS - EC Directorate-General for Mobility and Transport."
[26] CARE - Community database on Accidents on the Roads in Europe, European Commission.

requirements and compare these with open source software now available. It should be noted that while open-source software is by definition 'free', this means only no purchase cost, but it will require IT support to customize the software for Armenian conditions, maintain and update the programs, and train users. The project includes a component to finance the consultancy and to implement recommendations with subsequent purchase of hardware and software needed to meet Police requirements. Training for Police and other users will be provided, either as part of an agreement with a commercial supplier or through IT support for open source software use.

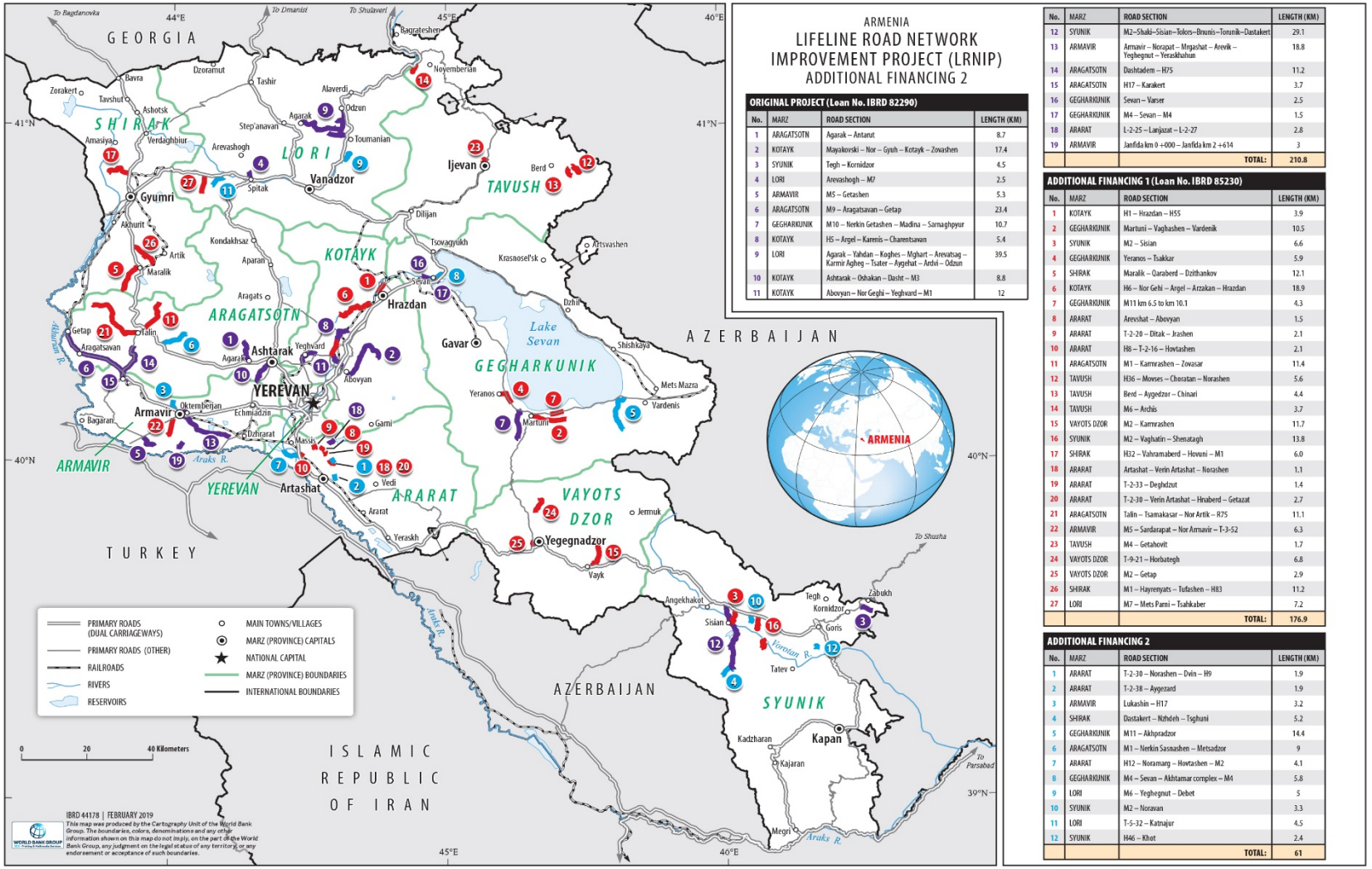
18. The EaP has supported the development of a work program to improve the data collection process to meet CADaS standards by end of 2019 and to have an improved database in place by end of 2020. Close work with the EaP team will be an essential part of the work under the proposed AF.

Safe Village Program

19. The Safe Village Program began under the initial LRNIP and will be continued with the AF. The Safe Village Program is a combination of traffic calming measures around schools, kindergartens, and community centers (commonly referred to as safe village schemes) and road safety awareness campaigns in villages benefitting from road rehabilitation works. Initially, the project started with a pilot of four safe village schemes in 2013, which was scaled up to 30 with the approval of the first AF in 2015. By the end of 2019, the estimated number of safe village schemes will almost triple the target value: about 84 schemes would have been treated in the project catchment area, which is a great testament of how important this program is for the project beneficiaries. The proposed AF will finance about 16 more safe village schemes.

20. In addition, the Safe Village Program will benefit and will be enriched from engaging citizens in frequent public hearings, which will be organized before road rehabilitation works start. The hearings will collect community opinions, further inform traffic calming measures and road safety awareness campaigns, and pay attention to invite people from vulnerable groups (for example, youth, women, and young parents.). Follow-up public hearings will be organized at completion of works to give an opportunity to the communities to provide feedback on the results and other feedback as needed.

Annex 3. Map



ORIGINAL PROJECT (Loan No. IBRD 82290)

No.	MARZ	ROAD SECTION	LENGTH (KM)
1	ARAGATSOTN	Agarak – Antarut	8.7
2	KOTAYK	Mayakovski – Nor – Gyuh – Kotayk – Zovashen	17.4
3	SYUNIK	Tegh – Kornidzor	4.5
4	LORI	Arevashogh – M7	2.5
5	ARMAVIR	M5 – Getashen	5.3
6	ARAGATSOTN	M9 – Aragatsavan – Getap	23.4
7	GEGHARKUNIK	M10 – Nerkin Getashen – Madina – Sarnaghpyur	10.7
8	KOTAYK	H5 – Argel – Karenis – Charentsavan	5.4
9	LORI	Agarak – Yahdan – Koghes – Mghart – Arevatsag – Karmir Aghbg – Tsater – Aygehat – Ardvi – Odzun	39.5
10	KOTAYK	Ashtarak – Oshakan – Dasht – M3	8.8
11	KOTAYK	Aboyan – Nor Geghi – Yeghvard – M1	12
12	SYUNIK	M2–Shaki–Sisian–Tolors–Brunis–Tonunik–Dastakert	29.1
13	ARMAVIR	Armavir – Norapat – Mrgashat – Arevik – Yeghegnut – Yeraskhahun	18.8
14	ARAGATSOTN	Dashtadem – H7/5	11.2
15	ARAGATSOTN	H17 – Karakert	3.7
16	GEGHARKUNIK	Sevan – Varser	2.5
17	GEGHARKUNIK	M4 – Sevan – M4	1.5
18	ARARAT	L-2-25 – Lanjazat – L-2-27	2.8
19	ARMAVIR	Janfida km 0 +000 – Janfida km 2 +614	3
		TOTAL:	210.8

ADDITIONAL FINANCING 1 (Loan No. IBRD 85230)

No.	MARZ	ROAD SECTION	LENGTH (KM)
1	KOTAYK	H1 – Hrazdan – H55	3.9
2	GEGHARKUNIK	Martuni – Vaghashen – Vardenik	10.5
3	SYUNIK	M2 – Sisian	6.6
4	GEGHARKUNIK	Yeranos – Tsakkar	5.9
5	SHIRAK	Maralik – Qaraberd – Dzithankov	12.1
6	KOTAYK	H6 – Nor Gehi – Argel – Arzakan – Hrazdan	18.9
7	GEGHARKUNIK	M11 km 6.5 to km 10.1	4.3
8	ARARAT	Arevshat – Aboyvan	1.5
9	ARARAT	T-2-20 – Ditak – Jrashen	2.1
10	ARARAT	H8 – T-2-16 – Hovtashen	2.1
11	ARAGATSOTN	M1 – Kamrashen – Zovasar	11.4
12	TAVUSH	H36 – Movses – Choratan – Norashen	5.6
13	TAVUSH	Berd – Aygedzor – Chinari	4.4
14	TAVUSH	M6 – Archis	3.7
15	VAYOTS DZOR	M2 – Kamrashen	11.7
16	SYUNIK	M2 – Vaghatin – Shenatagh	13.8
17	SHIRAK	H32 – Vahramaberd – Hovuni – M1	6.0
18	ARARAT	Artashat – Verin Artashat – Norashen	1.1
19	ARARAT	T-2-33 – Deghdzut	1.4
20	ARARAT	T-2-30 – Verin Artashat – Hnaberd – Getazat	2.7
21	ARAGATSOTN	Talin – Tsamakasar – Nor Artik – R75	11.1
22	ARMAVIR	M5 – Sardarapat – Nor Armavir – T-3-52	6.3
23	TAVUSH	M4 – Getahovit	1.7
24	VAYOTS DZOR	T-9-21 – Horbategh	6.8
25	VAYOTS DZOR	M2 – Getap	2.9
26	SHIRAK	M1 – Hayrenyats – Tufashen – H83	11.2
27	LORI	M7 – Mets Parni – Tsahkaber	7.2
		TOTAL:	176.9

ADDITIONAL FINANCING 2

No.	MARZ	ROAD SECTION	LENGTH (KM)
1	ARARAT	T-2-30 – Norashen – Dvin – H9	1.9
2	ARARAT	T-2-38 – Aygezard	1.9
3	ARMAVIR	Lukashin – H17	3.2
4	SHIRAK	Dastakert – Nzhdeh – Tsghuni	5.2
5	GEGHARKUNIK	M11 – Akhpradzor	14.4
6	ARAGATSOTN	M1 – Nerkin Sasnashen – Metsadzor	9
7	ARARAT	H12 – Noramarg – Hovtashen – M2	4.1
8	GEGHARKUNIK	M4 – Sevan – Akhtamar complex – M4	5.8
9	LORI	M6 – Yeghegnut – Debet	5
10	SYUNIK	M2 – Noravan	3.3
11	LORI	T-5-32 – Katnajur	4.5
12	SYUNIK	H46 – Khot	2.4
		TOTAL:	61

Source: Map Design Unit of the World Bank (ARM44178)