ECONOMIC ANALYSIS

A. Introduction

1. The government requested the Asian Development Bank (ADB) to help finance the proposed Second Greater Mekong Subregion Highway Modernization Project along the Greater Mekong Subregion (GMS) East–West Economic Corridor (EWEC). The proposed project is to construct a new highway over 64 kilometers (km) long between Bago and Kyaikto and includes a bridge over the Sittaung River. The route will commence from national highway (NH) NH-1 (the Yangon–Mandalay road) just south of Bago to NH-8 (the Yangon–Mawlamyine road) just north of Kyaikto. The EWEC is a key overland transportation route between Myanmar and Thailand and is an international trunk road that also connects to Viet Nam and the Lao People's Democratic Republic. While Thailand has developed the corridor so that heavy vehicles can travel along it smoothly, in the Myanmar portion of the corridor there are still unimproved sections and as a result travel between Yangon and Bangkok (870 km) takes approximately 3.5 days and is about three times more expensive than maritime transportation for freight.

2. The project is aligned with the following impact: establish an arterial highway network in support of economic development, regional economic growth, and international industrial competitiveness in a way that is environmentally friendly; and efficient all-weather and safe road infrastructure developed. The proposed project is in line with the National Transport Sector Development Master Plan (2015) and the Master Plan for Arterial Road Network Development (2016) produced by the Ministry of Construction. The project's outcome is more efficient and safer movement of goods and people between Bago and Kyaikto along the GMS EWEC.

B. Macroeconomic Context

3. The Myanmar economy has a narrow base with agriculture accounting for nearly 50% of total employment but only 21% of gross domestic product (GDP) in fiscal year (FY) 2019. Industry contributed 38% of GDP and 16% of employment, while the service sector's share was 42% of GDP and 34% of employment. The economic performance during the initial reengagement period was strong, driven largely by private consumption and export demand. The average growth rate for FY2017–FY2019 was 6.3%, somewhat slower than previous years for both external reasons (e.g., sluggish global economic growth and volatile international commodity prices) and internal ones (e.g., impacts of adverse weather on agricultural production and plateaued foreign direct investment inflows). The country runs a deficit for fiscal and external balances of about 2%–6% of GDP, which is considered manageable. Inflation peaked at 11.4% in 2015, fell in 2016–2017, but started to pick up again in 2018 to reach 8.6% in FY2019, alongside moderately high growth of 6.8% and higher global fuel prices. The kyat depreciated significantly against the United States dollar in 2017 and 2018, reflecting the global currency fluctuations and weaker domestic market sentiments, but largely held its value in 2019.

4. Through the implementation of comprehensive strategies to address poverty, Myanmar had made significant progress in reducing the poverty rate with a growing economy in recent years. The national poverty rate decreased markedly to 24.8% in 2017 from 42.4% in 2010. Gender equality has also improved, accompanied by a growing rate of female participation in the labor force, significantly expanded electricity consumption and mobile phone use, and use of quality housing materials. Notable progress in Myanmar's poverty reduction has been shadowed by a persistently high poverty rate in rural areas, and persisting inequality. Poverty is more than double in rural areas, where 70% of the total population lives; it was 30.2% in 2017 while the rate in urban areas was only 11.3%. Moreover, the risk of the near-poor population falling into poverty

remains high because of the country's socioeconomic vulnerability to external and internal risks and shocks, including climate change and natural disasters, volatile international prices of key commodities, and economic performance of major trading partners, which determines export demand and availability of imported capital goods and raw materials.

5. Myanmar is located at the western end of the GMS and is considered a gateway to South Asia. Despite its GMS membership since 2002, decades of isolation from the international community prevented Myanmar from benefitting from and contributing to enhanced connectivity, competitiveness, and community within the GMS. Since Myanmar's reengagement, efforts have been accelerated to fill the "last missing mile" in the GMS physical and virtual infrastructure network within Myanmar to complete the GMS transport corridors and strengthen the provision of regional public goods such as cross-border trade facilitation, subregionwide transport safety, and collective climate change and disaster resilience.

C. Project Rationale

6. The government has committed to improving the nation's road transport infrastructure as a means of stimulating national economic growth. A critical part of this has been its collaboration with neighboring countries in developing the GMS EWEC. The expressway will be a link in the Myanmar road network, connecting Yangon to the south and east including Mon state, and internationally to Thailand. The expressway will interact with the existing road network and there will be several socioeconomic development opportunities, resulting in indirect benefits. The upgraded arterial highways will provide the opportunity to improve access to and from the adjacent rural areas.

7. The proposed highway will contribute to (i) improving connectivity between Myanmar and Thailand, which will contribute to Myanmar's further integration within and beyond the GMS; (ii) supporting ongoing ADB transport infrastructure and cross-border transport facilitation activities to enhance trade between Myanmar and the rest of Southeast Asia; (iii) enhancing road access to Mon and Kayin states; (iv) supporting the government's commitment to improve the well-being of people in areas that have long been affected by conflict; (v) improving access to Kyaikto, a major tourism and pilgrimage site; (vi) building the government's capacity to develop and manage expressways and highways at international standards; and (vii) ensuring road safety in the Bago–Kyaikto corridor.

8. The technical due diligence undertaken during project preparation confirmed that the project's technical designs are appropriate for roads in these locations—in terms of alignment, cross-sections, structural characteristics, and road safety provisions—and for the projected traffic volume. Pavement structures have been selected to enable a 10-year design life for asphalt concrete, with 100-year flood (a flood with a frequency of 100 years) for all drainage structures. The underlying traffic projection is based on present traffic volumes, with growth rates that consider the likely rapid increase in traffic that will occur as Myanmar's economy continues to develop.

D. Project Alternatives

9. The proposed Second GMS Highway Modernization Project will address capacity issues on the Bago–Kyaikto section of the EWEC, where the current two-lane road experiences high traffic volumes and congestion. A prefeasibility study financed by the Japan International Cooperation Agency (JICA) showed that the section of the existing road between Bago and Kyaikto would reach capacity between 2020 and 2025. Upgrading the existing road is not the

preferred solution, as it would come with high resettlement impacts and because the alignment is long and winding in several areas. In addition, the existing national highway is partially submerged by flooding for part of the year, which prevents traffic from traveling on NH-8 between Phayargyi and Kyaikto. The new road will be above the 20-year flood height, thus allowing road to remain open throughout the wet season. The project will construct a new arterial highway with full access control which is 32 km shorter than the current alignment and will hence halve the travel time.

E. Economic Analysis

10. **Methodology and assumptions**. The economic analysis was carried out following ADB's guidelines and through a cost–benefit analysis. The costs of the civil works were estimated with the proposed design including all necessary work for the road and the bridge, land acquisition and resettlement, detailed design and supervision costs, and contingencies. Estimated costs were added for operation and maintenance with suitable intervals. The vehicle operating costs for different vehicle types and the time costs for goods and passengers were calibrated to 2018 values. To calculate the benefits, the future traffic volumes on the expressway and the expected future traffic demand in the whole road network were estimated, taking into account the likely changes by time, first without and then with the expressway. Traffic modeling considered base, generated, and diverted traffic. The value of time saving resulting from the reduced distance and increased speeds of the highway and the road safety benefits were estimated. The following general assumptions and conventions are used throughout this analysis: (i) all costs and benefits are in dollars, assuming an exchange rate of MK1,523.2 = $1 and fixed values as per the exchange rate in September 2019; (ii) the opportunity cost of capital is 9%; (iii) the total costs of all road works, including resettlement, supervision, and contingencies, are assumed to be distributed over 2018–2025, partly differently between different years because of the different types of work; and (iv) the road will open in January 2025 and the benefits to be evaluated will cover 2025–2044.

11. **Traffic demand projection**. The traffic model was developed for the existing and future proposed road network, which covers the project study area comprising Yangon north and its eastern and southeastern outskirts, Bago, and Kyaikto, and the road links connecting them. This road network was prepared after studying many previous reports, such as the National Transport Sector Development Master Plan. The consultant also undertook 10 classified count location and origin–destination surveys and journey time measurement surveys. Data was also supplied by JICA so that the forecasts developed were generally consistent and coordinated with the JICA study for the bridge. The baseline year was 2018 and the model ran forecasts for four milestone years: baseline (2018), opening (2027), 10 years after opening (2037), and 20 years (2047) after opening. The situations with and without the subprojects were considered, and four different alterative toll rate systems were tested. The forecast traffic volumes are shown in Table 1.

Table 1: Traffic Volumes Forecast for Bago–Kyaikto Expressway, Two-Way Flow
(Passenger car units per day)

Year	Forecast Traffic Volume
2027 initial traffic (assumed year for road opening)	24,288
2037 (10 years after opening)	66,422
2045 (20 years after opening)	83,855

Source: Asian Development Bank estimates.

12. **Economic costs**. The project economic cost is estimated at $422.5 million, including civil works, physical contingencies, consulting services, land acquisition and compensation, and administration cost. The breakdown and total costs are summarized in Table 2.

Table 2: Project Economic Cost
($)

Estimated Costs	ADB Road Project	JICA Sittaung Bridge Project	Total Expressway Project
Civil works subtotal	**319,386,680**	**159,000,000**	**478,386,680**
Physical contingencies	47,908,000	19,000,000	66,908,000
Consulting services	12,703,981	14,450,000	27,153,981
Land acquisition and compensation	37,988,990	0	37,988,990
Administration cost	4,469,300	0	4,469,300
Total	**422,456,951**	**192,450,000**	**614,906,951**

ADB = Asian Development Bank, JICA = Japan International Cooperation Agency.
Source: ADB estimates.

13. **Economic benefits**. Four categories of benefits were considered and calculated as the direct economic benefits of the new road: road safety, vehicle operating costs (VOC) savings, travel time cost (value of time [VOT]) savings, and carbon dioxide emissions savings. Road safety benefits are estimated at $26.3 million in 2025, $70.0 million in 2035, and $75.1 million in 2045. VOC savings are estimated at $41.1 million in 2025, $110.0 million in 2035, and $133.8 million in 2045. VOT savings are projected to be $24.8 million in 2025, $74.5 million in 2035, and $129.2 million in 2045. Carbon dioxide emissions savings are estimated at $1.5 million in 2025, $5.2 million in 2035, and $9.3 million in 2045. The significant road safety benefit reflects a shift from the current high risk of road accidents to improved safety along the country's first fully access-controlled highway that the project is designed to bring about.

14. **Results of economic analysis**. The economic costs and benefits of the project are summarized in Table 3.

Table 3: Summary of Costs and Benefits
($ per year)

	Cost		Benefit				
Year	Construction Cost	Operating and Maintenance Cost	Road Safety Savings	VOC Reduction	VOT Reduction	CO_2 Reduction	Benefit– Cost
2020	48,882,850	0				0	(48,882,850)
2021	97,275,697	0				(4,205,727)	(101,481,424)
2022	152,969,310	0				(6,613,647)	(159,582,956)
2023	135,933,939	0				(5,877,120)	(141,811,059)
2024	179,845,156	0				(7,775,627)	(187,620,783)
2025	0	4,891,778	**26,332,000**	**41,138,262**	**24,818,065**	**1,514,744**	**88,911,293**
2026	0	5,424,472	29,038,101	45,392,048	27,701,292	1,713,317	98,420,286
2027	0	5,445,982	32,022,305	50,085,685	30,919,477	1,937,922	109,519,406
2028	0	5,470,806	35,313,190	55,264,654	34,511,533	2,191,971	121,810,542
2029	0	5,499,529	38,942,275	60,979,140	38,520,894	2,479,324	135,422,104
2030	0	5,533,796	42,944,316	67,284,516	42,996,041	2,804,347	150,495,425
2031	0	5,573,476	47,357,641	74,241,883	47,991,087	3,171,978	167,189,112
2032	0	5,619,543	52,224,517	81,918,655	53,566,429	3,587,804	185,677,862
2033	0	5,673,159	57,591,554	90,389,224	59,789,484	4,058,141	206,155,244
2034	0	37,355,746	63,510,154	99,735,667	66,735,500	4,590,137	197,215,712

Year	Cost		Benefit				
	Construction Cost	Operating and Maintenance Cost	Road Safety Savings	VOC Reduction	VOT Reduction	CO_2 Reduction	Benefit– Cost
2035	0	5,703,056	**70,037,000**	**110,048,553**	**74,488,466**	**5,191,873**	**254,062,837**
2036	0	5,779,081	70,525,790	112,217,150	78,706,433	5,503,141	261,173,433
2037	0	5,868,070	71,017,991	114,428,482	83,163,244	5,833,069	268,574,717
2038	0	5,973,563	71,513,628	116,683,390	87,872,426	6,182,778	276,278,659
2039	0	6,098,771	72,012,723	118,982,733	92,848,269	6,553,452	284,298,407
2040	0	6,247,535	72,515,302	121,327,386	98,105,873	6,946,350	292,647,376
2041	0	6,424,457	73,021,388	123,718,242	103,661,193	7,362,803	301,339,169
2042	0	6,635,048	73,531,006	126,156,213	109,531,087	7,804,223	310,387,481
2043	0	6,885,906	74,044,181	128,642,225	115,733,369	8,272,108	319,805,977
2044	(308,284,612)	50,067,505	74,560,937	131,177,227	122,286,859	8,768,044	595,010,173

( ) = negative, CO_2 = carbon dioxide, VOC = vehicle operating cost, VOT = value of travel time.
Source: Asian Development Bank estimates.

15. The economic internal rate of return is 17.8% for the period 2025–2044 (Table 4).

Table 4: Economic Internal Rate of Return, Net Present Value, and Benefit–Cost Ratio

Item	Value
Economic internal rate of return (%)	17.80
Net present value ($)	624,469,208.00
Benefit–cost ratio	2.33
Discount rate (%)	9.00

Source: Asian Development Bank estimates.

16. **Sensitivity analysis**. A sensitivity analysis was carried out with respect to adverse changes in the costs and benefits: (i) construction cost increased by 20%, (ii) benefits (VOC, travel time savings, and road safety savings) reduced by 20%, (iii) construction cost increased by 20% and benefits reduced by 20%, (iv) a 1-year delay in project starting, and (v) no road safety benefits. The analysis demonstrates that the economic appraisal results are robust across the range of variations in the main parameters considered.

Table 5: Sensitivity Analysis

Sensitivity Analysis Scenario	EIRR (%)	NPV ($ million)	Switching Value (%)
Base case	17.8	624.471	
Construction costs increase 20%	15.7	530.571	133.0
All benefits reduce 20%	15.2	405.677	(57.1)
Costs increase 20%, benefits reduce 20%	13.2	311.778	cost 40.0, benefits (40.0)
1-year delay in construction	18.9	645.733	
No road safety benefits	14.2	332.195	

( ) = negative, EIRR = economic rate of return, NPV = net present value.
Source: Asian Development Bank estimates.