

Chapter 12: Roads

MCC will use the feasibility study for the roads project as the basis to examine the following to make a determination on what supplemental studies, if any, are required to develop the project sufficiently so that appraisal could commence:

- ★ Preliminary description of rationale, including nature and measure of benefits, and beneficiaries.
- ★ Confirmation, supported by appropriate data, that the proposed project is likely to deliver the stated benefits.
- ★ Identification of the role of the project in the national sector strategy and investment plan.
- ★ Information on whether the proposed road provides links within the context of the overall road network.
- ★ Available technical data, with particular emphasis on surveys, cadastral data establishing road alignments (if any exists), legal status of existing road alignments and road reserves.
- ★ Data on road-making material, in particular pavement materials and water (availability, location, action taken by applicant on approvals needed to extract gravel or water), as well as aggregate if a paved road is proposed.
- ★ Available data for drainage design, including catchment mapping, rainfall records, rainfall frequency, and intensity curves.
- ★ A preliminary description of the institutional arrangements in place to manage and maintain public roads, the responsible organization, funding arrangements, maintenance history, and general capability.
- ★ Identification of areas which require obtaining more detailed, current or reliable information. If a new road (or realignment of an existing road) is proposed, obtaining approvals from all relevant parties for land may be a significant and time consuming issue; identify the party responsible, process, who has to approve, and a timeline at commencement of the appraisal phase.
- ★ Collection and integration of satellite imagery and topographical maps at the appropriate scale (typically 1:25,000 for urban planning) identifying key elements of existing and proposed infrastructure, rights-of-way, and service areas. In addition, it may be appropriate for the appraisal process to identify other geo-spatial data – including but not limited to census data, water resources, and geological data – and combine them into a single GIS database.

Once MCC has made the determination to commence appraisal, the infrastructure group will conduct the following assessments and identify any key constraints:

Technical Assessment: Engineering (Major Roads)

- ★ Review all aspects of preliminary technical designs and proposed standards and confirm appropriateness for design criteria, demand requirements and environmental factors.
- ★ Review geological, seismic, survey, traffic, and mapping and rainfall data available and identify the need for further data.
- ★ Assemble cost data and prepare detailed cost estimates for materials (gravel, bitumen, aggregate, concrete, and bridge materials) and construction equipment.
- ★ Assemble data for drainage design and confirm completeness of rainfall intensity, frequency, and duration data.
- ★ Review traffic volume data and traffic design; identify any traffic counts needed to confirm assumptions. Evaluate traffic volume projections used in the economic analysis and estimate their accuracy.
- ★ Prepare a road safety report on the proposed road, identify potential issues, and confirm design and construction standards.
- ★ Prepare and assess economically justified alternative design options including vertical and horizontal alignments, pavement (balance of unbound, deep lift asphalt, and concrete), drainage structures, location and arrangements for intersections.
- ★ Prepare preliminary designs and plans for drainage structures, options, materials, and design standards.
- ★ Prepare preliminary designs for bridges, including approximate level, spans, and materials, and review special measures required for major floods and earthquakes. Prepare concept designs of standardized minor creek crossings, floodways and culverts. Relate the proposed level of service to proposed benefits. Describe the basis for estimating flood flows.
- ★ Assess secondary impact of the proposed project on other transport infrastructure, including proposed intersections on local road networks, and identify any need for a more detailed assessment.

- ★ Review maintenance requirements and costs, and compare against current maintenance arrangements (see the sustainability assessment section below).
- ★ Identify major project risks and quantify, as much as possible, the impact of these risks on project cost, timeline and quality. Develop mitigation measures and estimate the cost of mitigation
- ★ Develop project cost estimates of +/-35%, including all associated costs, such as costs relating to environmental mitigation, resettlement compensation, social safeguard measures, construction supervision, project management and technical audits.
- ★ Develop provisions to be included in project cost estimate, such as physical contingency, allowances for specific risks that were identified in appraisal, price contingencies, and allowance for the effects of foreign exchange rate fluctuations, and determine meaningful rates of inflation – local and foreign – to apply to base costs.

Technical Assessment: Engineering (Rural Roads)

- ★ Review all aspects of preliminary technical designs and proposed standards and confirm appropriateness for criteria, demand requirements and environmental factors.
- ★ Prepare preliminary design (20%) sufficient to confirm the road alignment, standard, constructability, estimated cost, maintenance requirements and to identify all issues to be addressed for the road to be constructed and maintained, such as land clearance.
- ★ Confirm details of design and construction standards applicable in the location, where such standards exist. Establish and justify proposed standards for horizontal and vertical geometry, design speed, design vehicle, and road design life.
- ★ Review traffic counts or other sources of information about traffic volumes. Evaluate traffic volume projections used in the economic analysis and estimate their accuracy. Where existing data is inadequate, arrange minimum seven day traffic counts for suitable locations to be completed by the end of the economic assessment.
- ★ In conjunction with the economic and financial assessment, assess levels of service that are economically justified based on traffic, economic growth potential and social factors.
- ★ Establish level of drainage serviceability and compare to similar roads and other segments of the proposed road, where appropriate. Prepare preliminary designs for bridges, including approximate level, spans, and materials, and review special measures required for major floods and earthquakes. Prepare concept designs of standardized minor creek crossings, floodways, and culverts. Relate the proposed level of serviceability to proposed benefits. Describe the basis of estimating flood flows.
- ★ Confirm availability of and identify sources for road making materials including expected quality based on previous experience of using material from the sources.
- ★ Prepare preliminary designs including horizontal alignment, typical cross section, major drainage structures, and location of minor drainage. Identify locations of all drainage outlets. Identify any locations where steep gradients may cause problems, extent of earthworks to reduce gradient and/ or drainage design to minimize erosion. Identify if earthworks can be contained in the road reserve. For upgrades to an existing road, identify any locations where the horizontal alignment will need to be changed to achieve an acceptable design standard.
- ★ Identify major project risks and quantify, as much as possible, the impact of these risks on project cost, timeline and quality. Develop mitigation measures and estimate the cost of mitigation.
- ★ Develop project cost estimates of +/-35%, including all associated costs, such as costs relating to environmental mitigation, resettlement compensation, social safeguard measures, construction supervision, project management and technical audits.
- ★ Develop provisions to be included in project cost estimate, such as physical contingency, allowances for specific risks that were identified in appraisal, price contingencies, and allowance for the effects of foreign exchange rate fluctuations, and determine meaningful rates of inflation – local and foreign – to apply to base costs.

Technical Assessment: Economic and Financial

The MCC economist responsible for the assessment of the project will work to ensure that the proposed road project complies with *MCC Guidelines for Economic and Beneficiary Analysis*. The economic rate of return for each project should be sufficiently high to warrant investment and eligible countries should have reviewed relevant governance practices, including laws and regulations, and undertaken reforms, as possible, to enhance the anticipated economic benefits generated by the road project. Infrastructure input to this analysis may include the following:

- ★ Provide a description of the economy of the catchment area and wider region, and the impact of road conditions. Quantify recent trends in economic activity for the catchment based on best available data and consultation with local organizations.
- ★ Identify benefits expected to flow from upgraded or new roads, focusing on increases in incomes for workers, firms, and households. Identify the beneficiaries, to the extent possible, disaggregated by income, gender, age, and ethnicity. Compare projected incomes and other benefits with and without the proposed project.
- ★ Summarize the design standards, design life and cost estimates (capital and maintenance) and confirm these are consistent with the assumed benefits and duration of the benefit stream. Note that the duration of the benefit stream is typically assumed to be twenty years. Assumptions that the duration is longer or shorter than this should be clearly justified.
- ★ Confirm that costs and project life are consistent with the engineering design.
- ★ Complete a financial analysis and FIRR for income generating subprojects (to the extent benefits contribute to EIRR of road project).

Technical Assessment: Environment, Social and Gender

MCC environment and social assessment and gender experts will review the proposed project for compliance with MCC's Environmental Guidelines, Gender Policy, and resettlement guidance, which include an expectation of compliance with host-country laws, regulations and standards, as well as requirements by which the host country is bound under international agreements. Particular attention must be paid to issues which generally arise, including, but not limited to, land ownership and right of way, incursion into sensitive areas (reserves, parks, wetlands, etc.), drainage and erosion control (especially in hilly or mountainous situations). Assessment will also inform design by including gender analysis of use, control of resources, design appropriateness, and how well gender is integrated into project design, participatory planning processes, and implementation.

- ★ Identify country-, region- or sector-level assessments, strategies and commitments with respect to climate change and their relevance to compact activities.
- ★ Identify climate change impacts (from the project) and risks (to the project) and corresponding mitigation and/or adaptation opportunities, as relevant.
- ★ Provide by income, gender, and age taking into consideration motor, non-motor, and pedestrian road use (including pedestrian crossing access, roadside commerce for men and women, access to health and education services, etc.), potential resettlement and persons and/or livelihoods impacted by resettlement.
- ★ Identification of potential social risks of road construction and operation, including HIV/AIDS, human trafficking, child and forced labor, impacts on local communities, and impacts on physical cultural resources.
- ★ Determine whether the local community has been consulted using participatory approaches in accordance with the MCC Gender Policy with mechanisms in place to ensure design takes into account findings from consultation with various stakeholders, including men, women, children, and vulnerable populations, including the elderly and the disabled.

Sustainability Assessment

- ★ Review a detailed description of current arrangements for ownership, management and maintenance of roads, including details of the legislative framework, administrative framework, funding arrangements and maintenance responsibilities.
- ★ Review existing performance with respect to clarity and acceptance of arrangements and responsibilities, acceptance of road reserves, road maintenance. Identify causes of inadequate performance including legislative or administrative arrangements, resources, technical capability and capacity, and funding.
- ★ Review road maintenance programs to ensure that such plans are suitable for the new road and wider road network including responsibilities, resources, funding. Identify shortfalls with current arrangements and

provide details of a program to strengthen road management and maintenance arrangements.

- ★ Review details of alternative road maintenance funding options, including details of income derived from road users and potential for increased cost recovery.
- ★ Prepare a summary of actions needed to maintain the road network to an acceptable level, including institutional strengthening, funding (responsibility and funding levels) and additional resources needed.
- ★ Review arrangements for transferring the road to the appropriate governmental entity at the end of the compact term.

Risk Management Assessment

- ★ Identify significant risks to the project with particular respect to construction cost increases, delays, sustainability of the road, local acceptance and take up of benefits, and other factors affecting economic performance and distribution of benefits
- ★ Identify and assess significant risks relating to durability, and confirm that design criteria adopted shall mitigate these risks within acceptable tolerance levels.
- ★ Prepare a risk management plan to minimize the negative impact of the risks.

Implementation Assessment

- ★ Provide a summary of the technical and construction resources available in country, and experience with projects of similar size, nature and type.
- ★ Details of implementation options available, including with respect to the appropriate implementing entity.
- ★ Identify local factors that may affect the timely completion of the works, including transport to/from the location for the contractor's equipment, fuel and other materials, seasonal weather patterns such as avoiding the wet season.
- ★ Prepare an implementation program including contract awards, any approvals and permits needed, construction times, cash flow, government commitments and other hold points as appropriate.
- ★ Recommend an appropriate procurement procedure, sequencing, and packaging.
- ★ Recommend suitable supervision and management arrangements.