01. Transportation Sector

A. Land Transportation (Roads, Bridges and Vehicles) Sub-sector

Organization Responsible

Level of Responsibility	Name of Ministry/Agency/Institution
Ministry	Highways and Higher Education Provincial Councils and Local Government
Department/ Agency	Road Development Authority Provincial Road Development Authorities/ Department (provincial roads) Local Authorities (for local roads)
District	
EE Division	EE Division for National Roads Divisional Engineer Divisions for Provincial Roads Particular Local Authority for Local Roads

Concepts and Definitions

Transportation Sector

The transportation sector is composed of the following sub-sectors:

a) ***Land transportation*** covering roads, bridges and other related structures like culverts, drainages, etc.;
b) ***Air transportation*** which will include airports, aircrafts and other structures and assets like warehouses, navigational equipment, spare parts, etc.;
c) ***Water transportation*** to include ports, water crafts and other structures and assets like warehouses, navigational equipment, stocks, etc.; and
d) ***Railroads*** which will include trains, railway tracks, stations or terminal and other related structures and equipment. It should be noted that boats used for fisheries are not included in this sector. They should be assessed in the agriculture sector.

This Guidance Notes will apply to roads, bridges and public and private transportation assets in Sri Lanka.

Damages

In the transportation sector, damages are cost of: a) repair of partially damaged assets and/or b) replacement of totally destroyed assets and infrastructure such as:

a. For land transport – all types of roads, bridges and other similar structures like culverts, drainages, shoulders, which are part of the land transportation system;
b. Transportation infrastructures like bus terminals, offices, warehouses, etc.;
c. For water transport - Ports, jetties, inland waterways, ferries and other assets;
d. For air transport – Airports, aircrafts, structures and equipment;
e. For railroads – Trains, railway tracks, structures and equipment;
f. Materials and supplies other equipment such as computers, tools, books, furniture, research works and other collections must also be included under this heading.

Damages in transport sector will occur at the time of, or shortly after the disaster although some damages may become obvious only after a longer period. Damages are measured in physical terms (such as kilometers of roads, number of structures, number of equipment) for which the monetary repair or replacement value is subsequently estimated at current prices.

Losses

Losses are the values of foregone revenues or income due to the change in economic flows (income and expenditures) during the period of recovery and reconstruction following the disaster. They are the current value of goods and services that were not and/or will not be produced over a time span due to the disaster until full recovery is attained. In the transport sector, losses will include the following:

- Urgent expenditures to re-establish traffic flows after transport assets have been affected like the cost of temporary Bailey-type bridges, removing of debris, cleaning of drainages, detours, etc.;
- Higher cost of transport due to the use of alternative, longer and lower quality roads over the recovery and reconstruction period;
- Losses in revenue of the enterprises – public and private – that operate the transport services like bus companies, airlines, shipping lines, trains as well as airports and ports, among others.
- The cost of dredging river channels to enable vessels to dock; and
- Other unexpected expenditures that may arise due to the disaster like clearing of debris.

Losses will take place during the entire period of recovery and reconstruction of the sector and may stretch even beyond the year that the disaster occurred. It is expressed in monetary value at current prices.

In conducting a post-disaster damager and loss assessment in the transport sector, the following steps are normally followed for every disaster-affected district.

Steps in Undertaking Post-Disaster Damage and Loss Assessment

Step 1. Collect and/or validate the baseline data for each of the disaster-affected district

Baseline information must be compiled and validated at the national, provincial or district levels before the field assessment or, if possible, prior to the occurrence of disaster. The tables below must be completed to be used for the baseline information in the online system for the transportation sector.

It should be remembered that in a PDNA, the values of damages and losses are approximate estimations for post-disaster planning and budgeting purposes. As such, the actual cost of reconstruction and repairs for damaged infrastructure will be determined when detailed engineering designs and estimates are completed.

- ***Roads and bridges and related structures*.** National roads and bridges should be assessed by RDA in coordination and consultation with the local engineers. Other structures related to roads and bridges like culverts,

drainage systems, etc. should be assessed as part of the damages. The provincial RDA will be responsible for provincial roads, while the appropriate local authority will assess local roads.

- ***Equipment and other machinery*.** There are various equipment like heavy equipment, metal fabrication workshops, materials testing, vehicles, office equipment, etc. that used in the land transportation sector which should be assessed.
- ***Buildings and other structures*.** Office buildings and other structures used by the agency in charge of roads and bridges at different levels (National/ Provincial/ Local) should be assessed as part of the sub-sector including the equipment that are part of the building itself, such as elevators, security equipment, air conditioning, internal communication systems, etc.
- ***Materials and supplies***. The structures of agency normally have stocks such as cement, steel, computers, paper, books, furniture, etc. Inventories of research, art works and other collections deposited in a given institution must also be included under this heading. Their value can be sufficiently high to warrant individual assessment.

The following table will be used as baseline information for roads and bridges. The information in this baseline are intended to be used for quick estimation of damages and losses.

A. Roads and Bridges

Table 1. Baseline of public roads, bridges and users

District								
Road Classification	**Average Replacement Cost per Km. (LKR/km)**				**Average Repair Cost per Km. (LKR/km)**			
	Concrete	**Asphalt**	**Gravel**	**Earth**	**Concrete**	**Asphalt**	**Gravel**	**Earth**
Class A								
Class B								
Class C								
Class D								
Class E								
Types of Bridges	**Average Replacement Cost per Meter**				**Average Repair Cost per Meter (LKR/m)**			

	(LKR/m)			
	2 lanes	**Multi-lanes**	**2 lanes**	**Multi-lanes**
Steel Bridges				
Wooden bridges				
Others				
Types of Culverts	**Average Replacement Cost per Meter (LKR/m)**		**Average Repair Cost per Meter (LKR/m)**	
Box Culvert				
Others				
Types of Retaining Walls				
RRM				
Others				
Types of Drains				
Concrete				
Bricks				
Earth				
Others				

Notes on Table 1.

- *National roads, comprising class A roads (trunk roads) and class B roads (main roads), are managed by the central government through the Road Development Authority (RDA). The provincial road network, comprising class C and D roads, is managed by the provincial councils. Class E roads are local government roads managed by the Road Maintenance Unit of Municipal/Urban Council or Local Authority. Thus, the appropriate authority must fill in the corresponding baseline information.*
- *Replacement costs are the actual costs if and when a similar road, bridge, culvert, retaining wall and drains will be reconstructed while repair costs are the average costs of repairs for the structures that were assessed.*

B. Land Transportation Assets

Table 2. Baseline information on the general types of land transportation assets

Name of District:				
Land transportation	**Number**		**Average Replacement Cost (LKR/Unit)**	**Average Repair Cost (LKR/Unit)**
	Public	**Private**		
Private Vehicles				
Cars				
Motorcycles				
Bicycles				
Other Vehicles				
Bus Companies				
Busses				
Garage				
Equipment				
Bus stations				
Taxi companies				
Taxis				
Garage				
Equipment				
Truck companies				
Trucks				
Garage				
Equipment				
Tuk tuk Companies				
Tuk tuks				
Garage				
Equipment				

C. Government Administrative Assets

Table 3. Baseline information on the assets of government agency in charge of land transportation

District			
Asset	**Average Replacement Cost per Square Meter (LKR/sqm)**		
Structure			
1 floor structure			
2.3 floors structure			
More than 3 floors			
	Average Repair Cost per Square Meter (LKR/sqm)		
Building Parts	**1 Floor**	**2-3 Floor**	**More than 3 floors**
Roof			
Walls			

Floors			
Doors			
Windows			
Electrical			
Plumbing			
Office Equipment	**Average Replacement Cost (LKR)**	**Average Repair Cost (LKR)**	
Computers			
Furniture			
Others (Enumerate)			
Machinery			
Vehicles			
Generators			
Elevators			
Others (Enumerate)			

Step 2. Estimate damages and losses

With the baseline information, field assessment should be undertaken in the affected districts after a disaster.

- ✓ *Step 2.1. Estimate the damages and losses*

The damages and losses of the government land transportation sub-sector can be summarized using the following table.

A. Roads and bridges

Table 4. Damages and losses for roads and bridges

District									
Road Classification	**Totally Destroyed (km)**				**Partially Damaged (km)**				**Damages (LKR)**
	Concrete	Asphalt	Gravel	Earth	Concrete	Asphalt	Gravel	Earth	
Class A									
Class B									
Class C									
Class D									
Class E									
Total									

Types of Bridges	**Totally Destroyed (m)**		**Partially Damaged (m)**		**Damages (LKR)**
	2 lanes	Multi-lanes	2 lanes	Multi-lanes	
Steel Bridges					
Wooden bridges					
Others					
Total					
Types of Culverts	**Totally Destroyed (m)**		**Partially Damaged (m)**		**Damages (LKR)**
Box Culvert					
Others					
Total					
Types of Retaining Walls	**Totally Destroyed (m)**		**Partially Damaged (m)**		**Damages (LKR)**
RRM					
Others					
Types of Drains	**Totally Destroyed (m)**		**Partially Damaged (m)**		**Damages (LKR)**
Concrete					
Bricks					
Earth					
Others					
Total					
TOTAL DAMAGES					

Losses			
	Year 1	**Year 2**	**Losses (LKR)**
Foregone income from toll fees			
Cleaning up of debris			
Higher operating costs			
Other unexpected expenses			
TOTAL LOSSES			

Notes on Table 4.

- *Only the lengths of the affected infrastructure are required. The online system will calculate the damages.*
- *For the losses from foregone income from fees, the assessment team must identify which roads and bridges collect fees and estimate the potential income losses up to the time when the roads and bridges can resume collection of fees at the pre-disaster level.*

B. Land transportation Assets

Direct interviews with officials involved in the construction and repair can also be conducted during the field visit in order to validate unit costs of repair and reconstruction. The private firms affected by the disaster can be given the data entry sheets of the online reporting system to enable them to provide the information required for the assessment. The assessment team will input the information provided by the firms in the data entry sheet of the online system.

Table 5. Damages and losses to other land transportation assets

Name of District:						
Damages						
Type of Land Transportation Vehicles	**Number of Totally Destroyed**		**Number of Partially Damaged**		**Total Damages (LKR)**	
	Public	**Private**	**Public**	**Private**	**Public**	**Private**
Private Vehicles						
Cars						
Motorcycles						
Bicycles						
Other Vehicles						
Total						
Bus Companies						

Busses						
Garage						
Equipment						
Bus stations						
Total						
Taxi companies						
Taxis						
Garage						
Equipment						
Total						
Truck Companies						
Trucks						
Garage						
Equipment						
Total						
Tuk Tuk Companies						
Tuk tuks						
Garage						
Equipment						
Total						
TOTAL DAMAGES						

Losses									
Transport Company	**Types of Losses and Their Values (LKR)**								**Total (LKR)**
	Foregone Income		**Cleaning up of debris**		**Higher operating costs**		**Other unexpected expenses**		
	Year 1	**Year 2**	**Year 1**	**Year 2**	**Year 1**	**Year 2**	**Year 1**	**Year 2**	
Public									
Bus									
Taxi									
Truck									
Tuk tuk									
Total									
Private									
Private vehicles									
Bus									
Taxi									
Truck									
Tuk tuk									
Total									
TOTAL LOSSES									

C. Government Administrative Assets

Table 6. Damages and losses to government agency in charge of land transportation

Name of District	
Damages	

Totally Destroyed				
Assets	**Number of Totally Destroyed**		**Number of Square Meters**	**Damages (LKR)**
Structures				
1 floor structure				
2-3 floors structure				
More than 3 floors				
Total				
Partially Damaged				
Assets	**Partially Damaged**	**Damaged in Square Meters**		**Damages (LKR)**
Structure	**Number**	**Roof**	**Walls**	**Floors**
1 floor structure				
2-3 floors structure				
More than 3 floors				
Total				
Assets	**Number of Totally Destroyed**		**Number of Partially Damaged**	**Damages (LKR)**
Office Equipment				
Computers				
Furniture				
Others				
Total				
Machinery				
Vehicles				
Generators				
Elevators				
Others				
Total				
TOTAL DAMAGES				
Losses (LKR)				
Type of Losses	**Year 1**		**Year 2**	**Total (LKR)**
Foregone income				
Cleaning up of debris				
Higher operating costs				
Other unexpected expenses				
TOTAL LOSSES				

✓ *Step 2.2. Summarize the damages and losses in the district*

Based on the information gathered in the previous tables, the summary table below can show the magnitude and scope of damages and losses to the sector.

Table 7. Summary of damages and losses to land transportation in a district

District	

Land Transportation	Damages (LKR)		
	Public	Private	Total (LKR)
Public Roads			
Public Bridges			
Culverts			
Retaining Walls			
Drains			
Private Vehicles			
Bus Companies			
Taxi Companies			
Truck Companies			
Tuk tuk Companies			
Government agency assets			
TOTAL			

	Losses (LKR)					
Losses	Year 1		Year 2		Total (LKR)	
	Public	Private	Public	Private	Public	Private
Roads and bridges						
Land transportation companies and vehicles						
Government agency						
TOTAL						

✓ *Step 2.3. Summarize damages and losses of the sector at the province*

The total estimated effects of the disaster in the province can be summarized by combining the values of damages and losses in the Districts. The following table is used in the online system.

Table 8. Summary of damage and losses in the land transportation sub-sector in a province

Province								
Districts	Year 1				Year 2		Total (LKR)	
	Damages (LKR)		Losses (LKR)		Losses (LKR)			
	Public	Private	Public	Private	Public	Private	Public	Private
District 1								
District 2								
District N								
TOTAL								

✓ *Step 2.4. Summarize damages and losses in the transportation sector at the national level*

A nationwide summary of the assessment will be created enumerating the damages and losses of the sector at each province. The data in the national summary should include all the information gathered by the various teams that assessed the

different disaster-affected districts. The following table will be used for the national summary.

Table 9. Summary of damage and losses in the land transportation sub-sector nationwide

Provinces	Year 1				Year 2		Total (LKR)	
	Damages (LKR)		Losses (LKR)		Losses (LKR)			
	Public	Private	Public	Private	Public	Private	Public	Private
Province 1								
Province 2								
Province N								
TOTAL								

Step 3. Analyze the impacts of the damages and losses to the economy and affected population

The assessment team must be able to analyze potential impacts to the people and the economy, among others, if the sector is not restored immediately. The following are some of the issues that should assessed, among others:

- ***The possible impacts on the welfare of the people.*** Living conditions, housing, health, education, access to services and resources.
- ***Economic impacts***. Business productivity (decline in output and income); reduction in employment; increase in prices; food supply; etc.
- ***Government services.*** Reduction in provision of services in education; health; security; administrative matters; etc.
- ***Added risks.*** The additional hazards and risks brought about by the disaster like the creation on new landslide-prone areas; epidemics; etc.
- ***Environment.*** The potential environmental risks like oil spills, destruction of watershed areas; etc.
- ***Gender and other cross-cutting issues and concerns.*** The potential impacts to vulnerable groups like women, children, elderly, indigenous peoples, etc.

Step 4. Identify the recovery strategies and estimate the recovery and reconstruction needs

The post-disaster needs must be based on a framework where policies and strategies are coherent and integrated. After analyzing the potential effects and impacts if no assistance will be provided to the sector, the aggregate needs of the sector must be estimated.

✓ *Step 4.1. Identify recovery and reconstruction strategies*

After the consolidation of the field assessment, the assessment team must identify or recommend the policies and strategies for the recovery and reconstruction for the sector. The following are some of the general policies and strategies that could be considered, among others.

- ***Tax breaks to business firms***. Exempting firms from paying certain taxes for a certain period, like temporary reduction in the collection of value-added tax, building permits and other related fees; temporary elimination of import duties on essential items required as inputs to recovery operations; etc.
- ***Credit.*** A credit scheme with soft terms, like low interest rate with longer repayment periods, which can provide firms the resources to buy machinery and equipment that will normalize operations.
- ***Equity*****.** In some special cases, the government may opt to provide equity in private firms instead of subsidy or credit or tax exemptions.

The following strategies can be adopted for the post-disaster recovery and reconstruction activities:

- ***Building Back Better (BBB).*** Recovery activities based on BBB principles will promote longer-term disaster risk reduction and management. BBB principle should look at the how to make infrastructure and facilities safer from future disasters like stronger engineering design, the advantages of resettlement of facilities in disaster-safe areas instead of rebuilding in the same disaster-prone areas, etc.

- ***Focus on the most vulnerable and socially disadvantaged groups such as children, women, and the disabled.*** Recovery programming should give priority to those that will benefit the most vulnerable groups, including women, female-headed households, children, the poor, and take into account those with special needs.

- ***Community Participation and Use of Local Knowledge and Skills.*** The participation of the community in all process (identification, planning, design and implementation) of recovery activities will help ensure the acceptability of projects and optimize the use of local initiatives, resources and capacities.

- ***Coordinated and coherent approaches to recovery.*** The effective coordination among all involved agencies should be established based on uniformity of policies, flexibility in administrative procedures, etc. In some instances, a special new agency may be needed to oversee, coordinate and monitor complex disaster recovery programs.

- ***Efficient use of financial resources.*** Fund sources from the national budget and the international donor partners that are suited for the recovery activities should be identified. Assistance to the recovery of the private sector, if any, should be clearly outlined.

- ***Transparency and accountability.*** The overall plan and implementation of projects for recovery must be transparent, especially to those affected, through open and wide dissemination of information on all aspects of the recovery process. An effective monitoring system must be established.

✓ *Step 4.2. Identify, estimate and prioritize recovery and reconstruction needs*

Recovery needs are intended to bring back normalcy to all affected areas and sectors as soon as possible while reconstruction needs are generally long-term in nature (3 years or more) and are intended to 'build back better' from the ruins of a disaster. The sector assessment team must identify and prioritize their recovery and reconstruction projects based on their impact assessment.

✓ *Step 4.3. Summarize the estimated needs and draft the implementation schedule*

Based on the prioritized recovery and reconstruction needs, a summary should be created by the assessment team enumerating the post-disaster projects for the recovery and reconstruction with a rough general schedule of implementation outlining at the very least the activities, timing and budget required. The following table can be used.

Table 10. Summary of needs

Name of Project	Estimated Budgetary Requirement (LKR)			Total (LKR)
	Year 1	Year 2	Year N	

Step 5. Draft the post-disaster damages, losses and needs (PDNA) report of the sector

With all the information gathered using the previous steps, a report can be drafted by the assessment team which will be the inputs of the sector in the overall recovery and reconstruction plan. The draft sector report should be submitted to the DMC for consolidation.