

## CHAPTER 14

### OPERATIONS AND MAINTENANCE OF THE PROJECT



## CHAPTER 14 OPERATIONS AND MAINTENANCE OF THE PROJECT

### 14.1 OPERATION AND MAINTENANCE OF THE TUNNEL

#### 14.1.1 O&M Activities for Tunnel

Major O & M activities are classified as follows;

#### MAJOR O&M ACTIVITIES

- 1) Inspection
- 2) Maintenance; tunnel structure and facilities
- 3) Monitoring of traffic movement, traffic accident, fire incident, etc.
- 4) Immediate actions when some incidents are found or reported
- 5) Vehicle Control (vehicles carrying hazardous materials, vehicle height, and overloaded trucks.)

#### 14.1.2 Inspection

Inspection of a tunnel must be undertaken daily by an inspection team, and check the following:

- Facilities inside the tunnel such as lighting facility, jet fans, etc. are properly functioning.
- Cleanliness of the tunnel wall, road surface, facilities, etc.
- Any cracks on concrete lining and pavement, water seepage from concrete lining, etc.
- Drainage facility (no clogging, etc.)
- Deformation of the tunnel arch.
- Any other problems.

Inspection items for civil work components and electrical/communication facilities are shown in **Table 14.1-1**.

**TABLE 14.1-1 INSPECTION ITEMS**

Component		Inspection Items	
Civil work Component	Road Surface	Pavement (1) Surface roughness, (2) Cracks, (3) Joint failure, (4) Heaving, (5) Pumping, (6) Local settlement	
	Tunnel Portion	Tunnel Portal	(1) Cracks, (2) Drainage, Water Flow, (3) Any deformation, (4) Slope condition
		Lining	(1) Cracks, (2) Leakage of water, (3) Free Lime, (4) Delamination, (5) Difference at a joint
		Interior Wall	(1) Damage, (2) Damages to the accessories
		Drainage	(1) Clogging, (2) Damage
Electrical/ Mechanical/ Communication Component	Jet Fans	Abnormal noise, vibration, cable connection and voltage. Interlocking with visibility index (VI) sensors and carbon dioxide (CO) sensors.	
	Lighting Facilities	Intensity of illumination. As for distribution board, checking abnormal heating, looseness and breaking of wire etc. by visual check and check with measuring instrument.	
	Power supply system and distribution equipment and buck up generator	Appearance (dirt, damage), looseness, breaking of wire, oil leakage, pipe damage, abnormal noise and vibration etc. by visual check and check with measuring instrument.	
	Information collection and provision equipment	Performance, communication and appearance (dirt, damage) of each equipment. Facility/equipment which also defined as ventilation, information collection and provision should be inspected.	

Component		Inspection Items
	Emergency Facilities	Performance and appearance (dirt, damage) of each equipment. As for signal receiving and control board, abnormal noise and heating etc. are checked by visual check etc.

Source: NEXCO-WEST and JICA Survey Team

### 14.1.3 Maintenance of Tunnel

Routine maintenance activities are summarized in **Table 14.1-2**. Routine maintenance should be implemented based on the findings of inspection and regular requirements.

**TABLE 14.1-2 ROUTINE MAINTENANCE ACTIVITIES**

Component		Routine Maintenance Activity
Civil work Component	Road Surface	Pavement (1) Crack sealing, (2) Joint repair, (3) repair of heaving, pumping and local settlement (4) Road surface cleaning
	Tunnel Portion	Tunnel Portal (1) Crack sealing, (2) Cleaning of drainage facilities, (3) Repair of Slope protection work
		Lining (1) Lining cleaning, (2) Crack sealing, (3) Water leakage prevention, (4) Reinforcement work for the cavity at the back of lining, (5) Joint repair, (6) Delamination repair
		Interior Wall (1) Wall cleaning
		Drainage (1) Drainage cleaning
Electrical/ Mechanical/ Communication Component	Jet Fans	(1) Cleaning, (2) Check the stability, (3) Replacement and overhauling of aged jet fan
	Lighting Facilities	(1) Cleaning, (2) Change a light, (3) Check the stability, (4) Replacement of lighting facility in case of luminance reduction
	All kinds of Signboards	(1) Cleaning, (2) Change a light, (3) Check the stability, (4) Replacement of deteriorated facility
	Emergency Facilities such as Fire Hydrant, Fire Detector, Fire Extinguisher, etc.	(1) Cleaning, (2) Functioning or not, (3) Replacement of facility depending on the deterioration or the damage of the parts
	CCTV, Control system	(1) Cleaning, (2) Check the stability, (3) Functioning or not, (4) Replacement of deteriorated facility
	Other Equipment such as CO Sensor, Visibility Index Sensor, Wind Velocity Sensor	(1) Cleaning, (2) Check the stability, (3) Functioning or not, (4) Replacement of deteriorated facility
	Back Up Generator	(1) Cleaning filters, spark plug, nozzle, (2) Functioning or not, (2) Fuel Amount, (3) Replacement of deteriorated facility

Source: JICA Survey Team

### 14.1.4 Monitoring Traffic Movement, Traffic Accident, Fire Incidents, etc.

This work must be undertaken for 24-hours a day for 365 days a year. Traffic movements are monitored through CCTV, report from a patrol group and road users. Information shall be compiled at a traffic control center of the Tunnel Management Office, and necessary actions shall be quickly decided and informed to proper agencies and the action team.

Monitoring will be focused on the following:

- Reckless driving

- Overtaking
- Over speeding
- Stopped (stalled)/parked vehicles
- Vehicle breakdown
- Obstacles dropped from vehicles
- Accident
- Fire

Information collected shall be properly recorded and necessary information shall be provided to road users through Variable Information Signboards and a Loudspeaker.

Monitoring is quite important to assure safe operation of a tunnel and to protect road users' lives.

Emergency actions shall be made in accordance with the instructions of the head of the monitoring team.

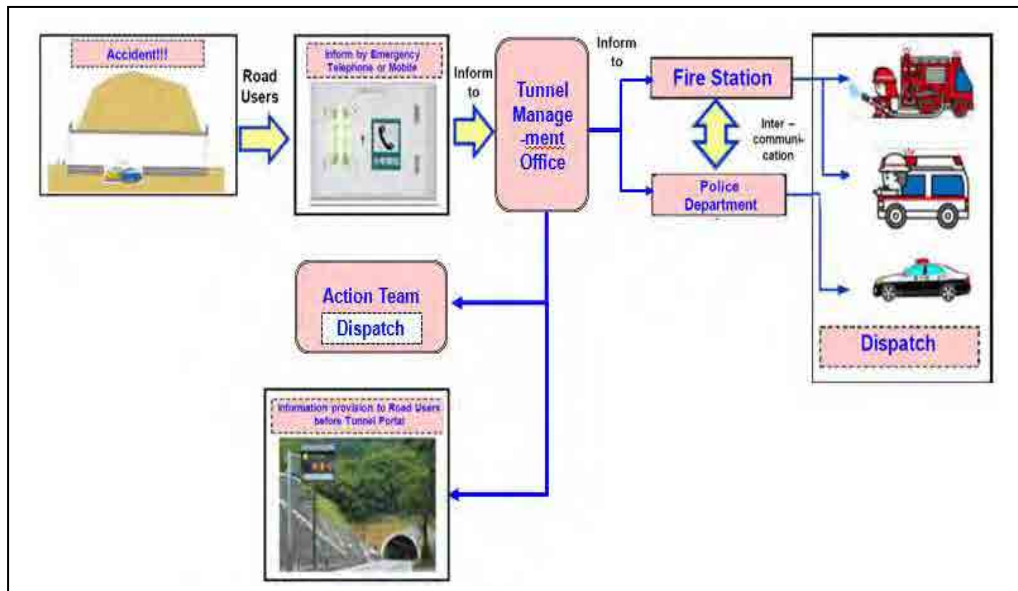
#### 14.1.5 Immediate Actions when some incidents are found or reported

The head of the monitoring team shall immediately decide what to do when some incidents are found or reported from road users. He must decide whether a case must be informed to Action Team, Fire Department and/or Police.

Major incidents are as follows;

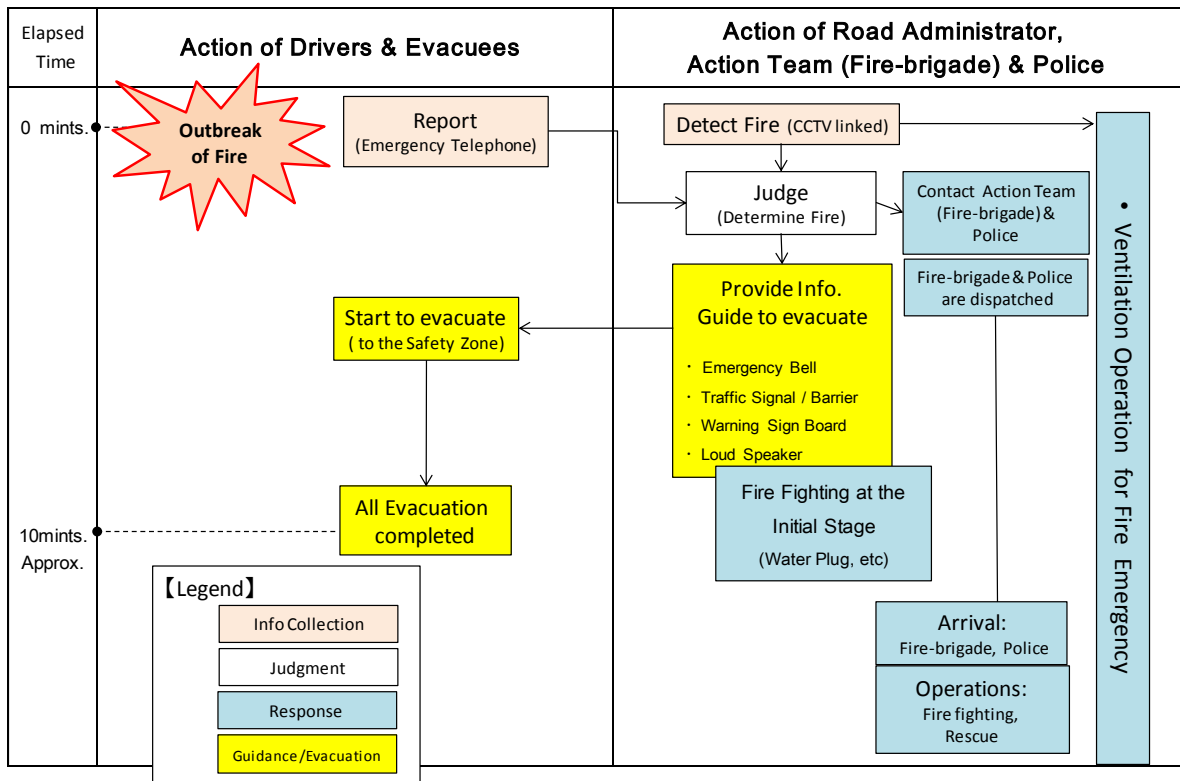
- Traffic accident
- Fire
- Vehicle breakdown
- Obstacle dropped from vehicles
- Parked/stopped (stalled) vehicles

Actions to be taken during emergency cases are illustrated in **Figure 14.1-1**.



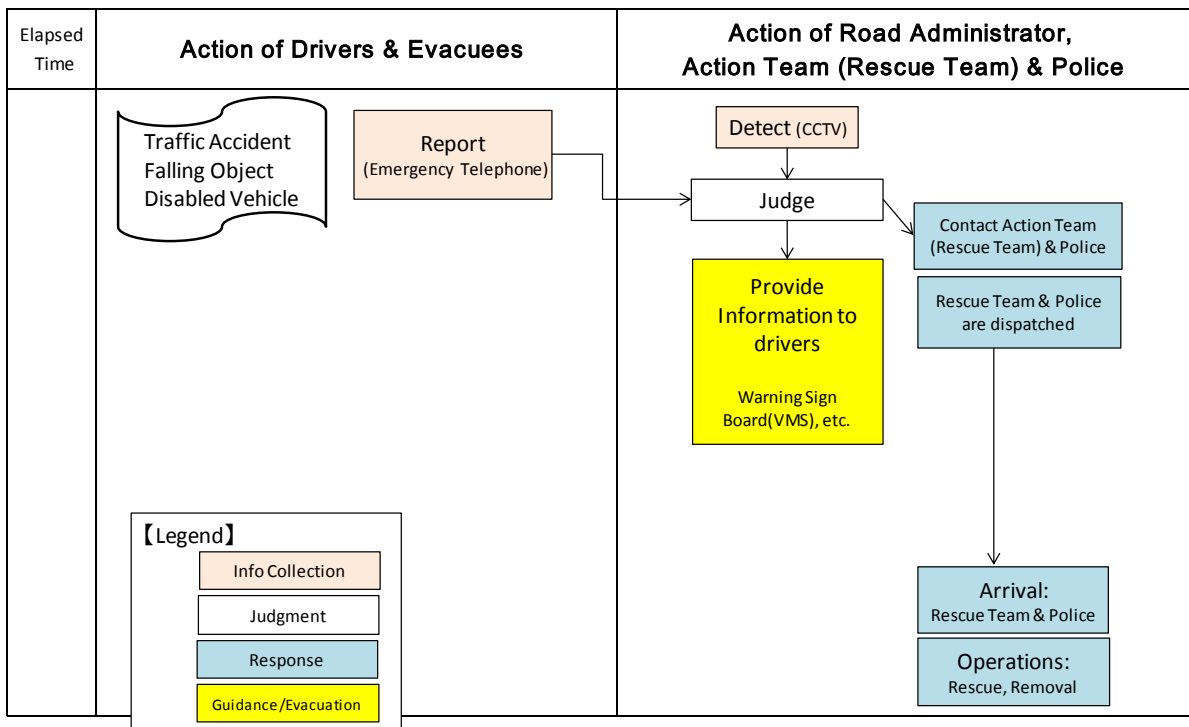
**FIGURE 14.1-1 ACTIONS TO BE TAKEN DURING EMERGENCY**

Action flows in case of a fire and traffic accident/vehicle breakdown/falling objects are shown in **Figure 14.1-2** and **Figure 14.1-3**.



Source: JICA Survey Team

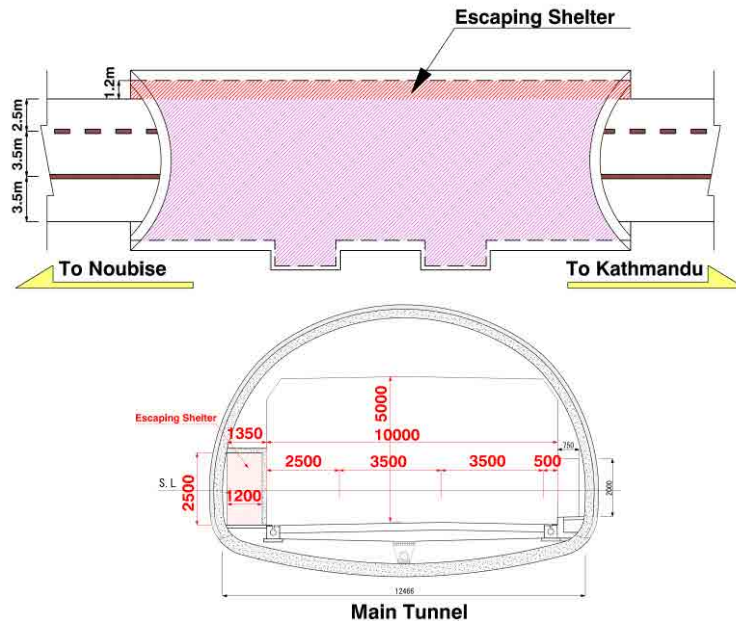
**FIGURE 14.1-2 ACTION FLOW IN CASE OF FIRE**



Source: JICA Survey Team

**FIGURE 14.1-3 ACTION FLOW IN CASE OF TRAFFIC ACCIDENT, FALLING OBJECT AND VEHICLE BREAKDOWN**

In case of fire, Tunnel Management Office will provide the evacuation instruction to people inside the tunnel via loud speaker. The tunnel will be constructed the escaping shelter shown in **Figure 14.1-3**.



**Main Tunnel +Escaping Shelter (W=1.2m)**  
**FIGURE 14.1-4 ESCAPING SHELTER INSIDE TUNNEL**

#### 14.1.6 Vehicle Control

The following vehicles should not be allowed to use a tunnel, thus these vehicles should be controlled before entering a tunnel;

- Two and three wheelers(motorbikes and tricycles[Tempo]) – high probability incidence of causing traffic accident
- Vehicles carrying hazardous materials such as vehicles carrying oil or highly inflammable items– when these get an accident or a fire, it will be dangerous to people and tunnel facilities causing much disaster
- Overloaded trucks – high risk of vehicle breakdown, weighing scale will be installed at toll gates
- Vehicles of which height is exceeding the limit – these will damage jet fans and other facilities. Height Restricting Devices must be installed at toll gates.
- Others (Mechanically defected vehicles, pedestrians and animals)

It is necessary to coordinate with Department of Transport Management and Traffic Police Department prior to the tunnel opening.

#### 14.1.7 Equipment Needed for Tunnel O&M

**Table 14.1-3** shows the equipment needed for tunnel O&M.

**TABLE 14.1-3 EQUIPMENT NEEDED FOR TUNNEL O & M**

Name of Equipment		No. of Unit
Inspection & Maintenance Work	Road Sweeper	1
	Wall Cleaning Vehicle	1
	Water Supply Equipment for Cleaning	1
	High Platform Mounted Vehicle	1
	Station Wagon	1
	Inspection Machinery, Measuring Instrument and Tools	1 set

Name of Equipment		No. of Unit
Traffic Monitoring and Information Provision	Monitor System	1 set
	Patrol Car	2
	Traffic Control Devices	2 set
Emergency Case	Towing Vehicle	2
	Air Jack	2
	Truck for Transport of Air Jack	2
	Fire Truck	2
	Ambulance Car	2
Vehicle Control	Weight Scale (Mat Type)	2
	Height Restricting Device (Gate Type)	2

Source: JICA Survey Team

## 14.2 TUNNEL O&M ORGANIZATION, COST AND FUND SOURCE

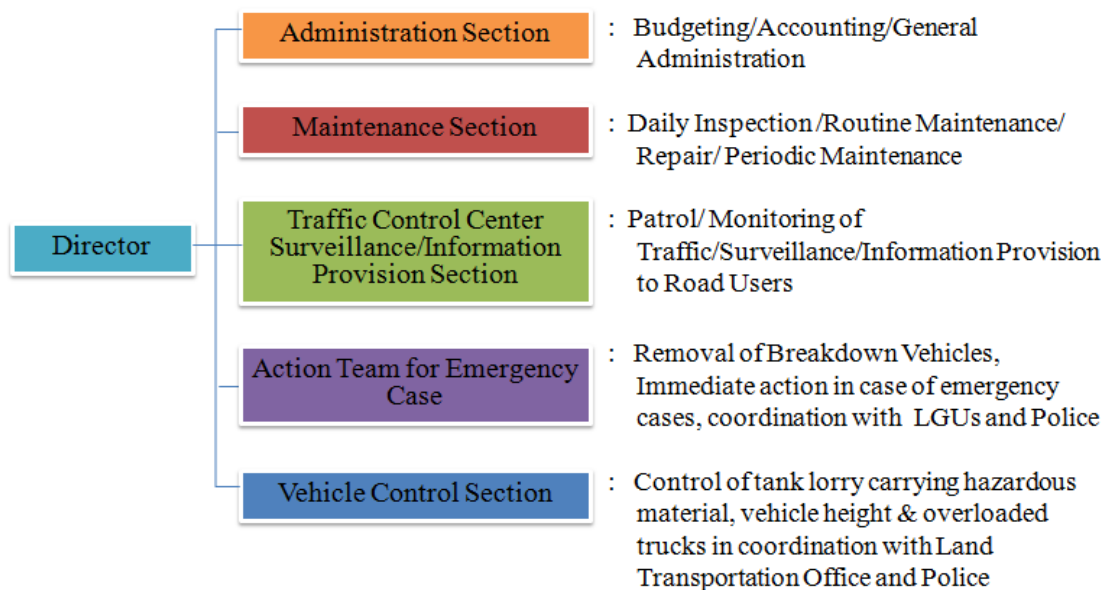
### 14.2.1 Tunnel O&M Organization

Nagdhunga Tunnel will be the first tunnel in Nepal, there is no organization which has an experience of tunnel O&M, thus the Government is required to create responsible organization for tunnel O&M.

In order to assure safe operation inside a tunnel and to save road users' lives in case of critical incidents, the “**Tunnel Management Office**” must be established. The proposed structure of Tunnel Management Office is shown in **Figure 14.2-1**.

If a toll is collected to produce fund for tunnel O&M cost, **Toll Collection Section** must be organized.

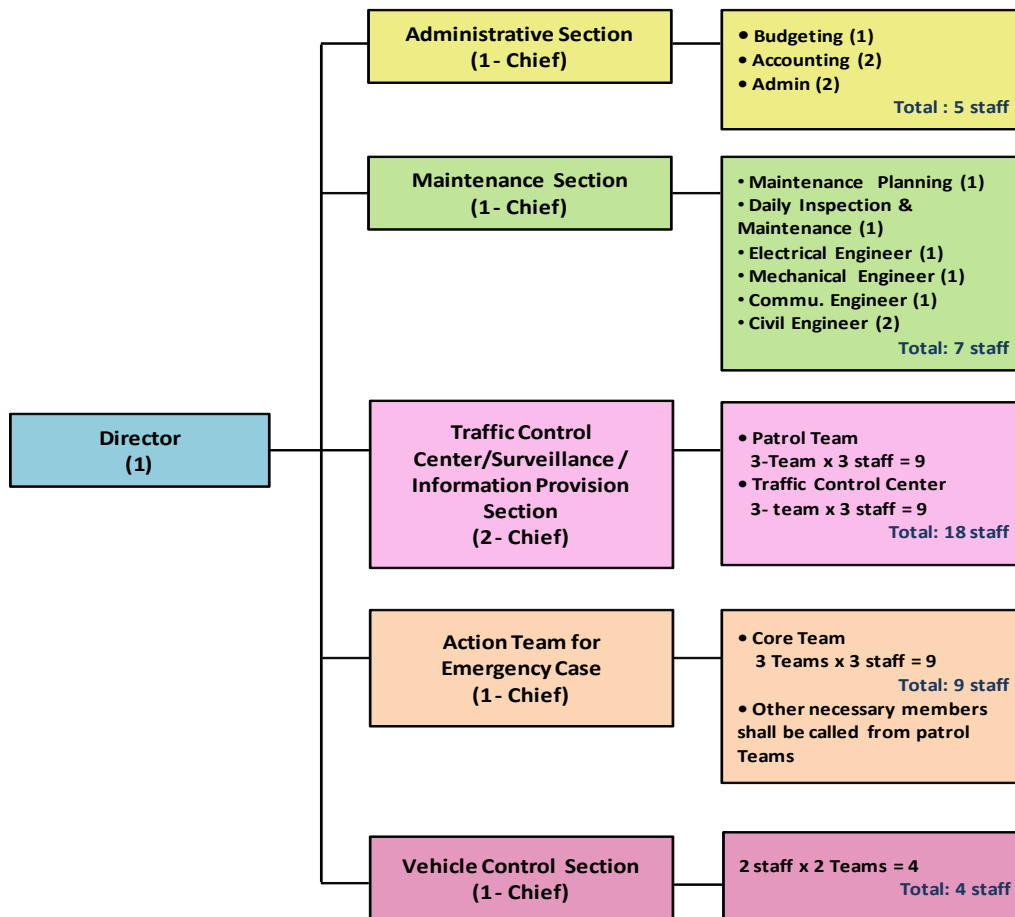
Number of staff required will be fifty (50) comprising of one (1) Director, six (6) Chiefs and forty three (43) staff as shown in **Figure 14.2-2**.



Source: JICA Survey Team

**FIGURE 14.2-1 PROPOSED ORGANIZATION OF TUNNEL MANAGEMENT OFFICE**





No. of Staff: 1 Director, 6 Chiefs, 43 Staff  
**Total Staff = 50 staff**

Source: JICA Survey Team

**FIGURE 14.2-2 ESTIMATED STAFF REQUIREMENT**

### 14.2.2 O&M Cost Estimate

O & M cost was estimated as follows;

**(1) Tunnel Management Office O & M**

● Staff Cost	12.5 Million NPR
● Office Running Cost	0.5 Million NPR
<b>Sub-total</b>	<b>13.0 Million NPR</b>

**(2) Electricity Cost**

● Jet fan @ 1,000,000 <sup>1</sup> kwh x 20	20.0 Million NPR
● Lighting and others	5.0 Million NPR
<b>Sub-total</b>	<b>25.0 Million NPR</b>

**(3) Maintenance Work/Replacement of Parts, etc**

500,000 NRP/month x 12 months = **6.0 Million NPR**

**(4) Toll Collection**

● Staff Cost	4.5 Million NPR
● Others(running cost, etc.)	0.5 Million NPR
<b>Sub-total</b>	<b>5.0 Million NPR</b>

<sup>1</sup> 230kw x 12 hrs x 365days=1,000,000kwh

(5) Total = 49.0 Million NPR /year

### 14.2.3 Fund Source of Tunnel O&M Cost and Tunnel Management Office Operator

#### (1) Fund Source

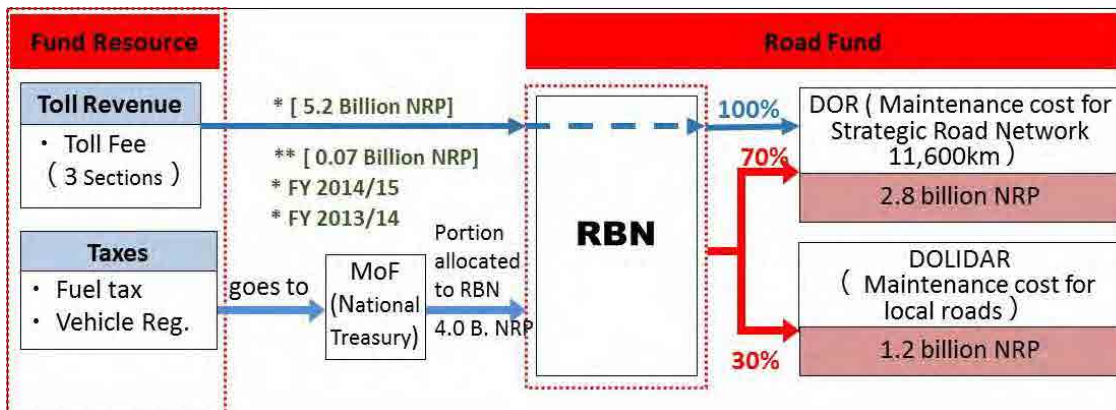
There are two (2) possible fund sources as follows;

Case-1: To be allocated from Road Fund

Case-2: A toll is collected from tunnel users

#### Case-1: To Be Allocated from Road Fund

Road Fund is being collected from fuel tax and vehicle registration fee and is used for road maintenance fund. A toll is also collected by RBN at the specific road section and is used exclusively for the designated section where a toll is collected. **Figure 14.2-3** shows the amount and flow of road fund.



Source: Prepared by JICA Survey Team based on RBN Information

**FIGURE 14.2-3 FLOW OF ROAD FUND**

DOR receives 2.8 Billion NPR in FY2014/15 for maintenance of 11,600km of roads. An average road maintenance budget allocation to DOR from Road Fund is 241,400 NPR per km per year. If tunnel O&M budget is allocated from Road Fund, tunnel O&M budget consumes the maintenance budget of 183km of road, or 2.5km tunnel consumes the 183km road maintenance budget. Since it is said that current road maintenance budget is far from satisfactory level, it is not advisable to utilize Road Fund for tunnel O&M.

#### Case-2: A Toll is collected from Tunnel Users

If a toll is collected from a tunnel user, a toll fee was estimated as follows;

TOLL FEE FOR TUNNEL USERS	
Light Vehicle	25 NPR
Heavy Vehicle	35 NPR

The interview survey on willingness-to-pay revealed that about 90% of passenger car users are willing to pay a toll and a big truck company owner answered that he is willing to pay even if a toll rate is higher than 35 NPR.

Road users are willing to pay a toll for tunnel utilization, since they can save higher cost than a toll by passing through a flatter and smoother tunnel.

It is recommended that a toll should be collected from tunnel users to be able to raise tunnel O&M cost.

#### (2) Toll Collection by RBN

RBN is the only public entity which is authorized to collect a toll from road users. RBN is at present collecting a toll at three (3) locations to raise road maintenance fund. RBN is currently

outsourcing toll collection activities to the private sector. The same system can be applied to this tunnel project.

RBN and DOR should agree on toll collection to raise tunnel O&M fund and toll revenue shall be exclusively used for a tunnel O&M.

### **(3) Tunnel Management Office Operator**

Tunnel Management Office should be operated and managed by DOR. Since this is the first tunnel construction project in Nepal, DOR has no experience for tunnel management. Prior to opening of the tunnel, DOR staff should undergo various capacity development programs.

Although there is an option that tunnel O&M be carried out by a private sector, it is not recommended, simply because a private sector still has no experience of public infrastructure management.

#### **14.2.4 Financial Study of Tunnel O&M Cost and Toll Collected from Road Users**

Based on the following conditions, Tunnel O&M cost and toll revenue was estimated.

[Common]

- Price escalation 4%
- Base year 2014

[O&M Cost]

- Routine and Periodic Maintenance Cost: 49.5 Million NRP in 2014 price/year
- Periodic Maintenance Cost: 400 Million NRP in 2014 price / 10 year (Replacement of deteriorated facility such as jet fans, lightings, other equipment and etc.)

[Revenue]

- Toll Setting: 25 NRP for Light vehicle and 35 NPR for Heavy vehicle in 2014 price
- Consideration of price escalation, toll rate starts from 33 NPR in 2021.
- Toll rate is assumed to raise every 2years based on the price escalation.

Estimated Toll Revenue is shown in **Table 14.2-1** and cash flow of tunnel O&M cost is shown in **Table 14.2-2**. Though the balance of periodic maintenance year (year 2030 and year 2040) will become minus, these periodic maintenance costs will be covered by the previous year's saving cost.

**TABLE 14.2-1 ESTIMATED TOLL REVENUE**

	AADT		Toll Rate		No. Day	Revenue Mil. NPR/year
	Light Vehicle	Heavy Vehicle	Light Vehicle	Heavy Vehicle		
2021	3,235	3,872	33	47	180	52.0
2022	3,335	4,008	33	47	365	108.9
2023	3,435	4,144	36	50	365	120.8
2024	3,538	4,284	36	50	365	124.7
2025	3,644	4,429	39	54	365	139.2
2026	3,753	4,580	39	54	365	143.7
2027	3,866	4,735	42	59	365	161.2
2028	3,982	4,896	42	59	365	166.5
2029	4,102	5,063	46	64	365	187.1
2030	4,225	5,235	46	64	365	193.2
2031	3,828	3,715	49	69	365	162.0
2032	3,921	3,808	49	69	365	166.0
2033	4,016	3,903	53	74	365	183.1
2034	4,113	4,000	53	74	365	187.6
2035	4,213	4,100	57	80	365	207.4
2036	4,213	4,100	57	80	365	207.4
2037	4,213	4,100	62	87	365	225.5
2038	4,213	4,100	62	87	365	225.5
2039	4,213	4,100	67	94	365	243.7
2040	4,213	4,100	67	94	365	243.7
2041	4,213	4,100	73	101	365	263.4
2042	4,213	4,100	73	101	365	263.4
2043	4,213	4,100	78	110	365	284.6
2044	4,213	4,100	78	110	365	284.6
2045	4,213	4,100	85	119	365	308.8

Source: JICA Survey Team

**TABLE 14.2-2 ESTIMATED TOLL REVENUE**

Unit: Million NPR

	Year	(Inflow)	(Outflow)	(Inflow-Outflow)	(Cumulative )	Remarks
		Revenue(a)	O&M Cost(b)	Balance(b-a)		
1	2021	52.0	32.1	19.9	19.9	Open on July,2021
2	2022	108.9	67.7	41.2	61.0	
3	2023	120.8	70.5	50.3	111.3	
4	2024	124.7	73.3	51.4	162.7	
5	2025	139.2	76.2	63.0	225.7	
6	2026	143.7	79.3	64.4	290.1	
7	2027	161.2	82.4	78.8	369.0	
8	2028	166.5	85.7	80.8	449.7	
9	2029	187.1	89.1	98.0	547.7	
10	2030	193.2	654.6	-461.4	86.4	Facility's Exchange
11	2031	162.0	96.4	65.6	152.0	
12	2032	166.0	100.3	65.7	217.7	
13	2033	183.1	104.3	78.8	296.5	
14	2034	187.6	108.5	79.2	375.7	
15	2035	207.4	112.8	94.6	470.2	
16	2036	207.4	117.3	90.1	560.3	
17	2037	225.5	122.0	103.5	663.8	
18	2038	225.5	126.9	98.7	762.5	
19	2039	243.7	132.0	111.7	874.2	
20	2040	243.7	969.0	-725.3	148.9	Facility's Exchange
21	2041	263.4	142.7	120.7	269.6	
22	2042	263.4	148.4	115.0	384.6	
23	2043	284.6	154.4	130.2	514.8	
24	2044	284.6	160.5	124.0	638.8	
25	2045	308.8	167.0	141.8	780.6	

Source: JICA Survey Team

## **14.3 CAPACITY DEVELOPMENT FOR TUNNEL O&M**

### **14.3.1 Necessity of Capacity Development**

Since DOR staffs have no experience of tunnel O&M, capacity for tunnel O&M must be developed prior to opening of the tunnel. Capacity development should cover various aspects in relation to tunnel O&M as follows;

### **14.3.2 Legal Aspects in relation to Tunnel O&M**

For the management of this tunnel, the following issues should be confirmed:

- What kind of powers will be required?
- Which agencies have these powers?
- What kind of powers can be delegated to Tunnel Management Office (TMO)?

After confirmation, define the act of TMO and the request of the related agencies.

#### **(1) Violation of traffic rules (coordination with traffic police)**

Confirm rules and regulations included in the “Road Safety Rules”, an example follows:

- Legal speed limit
- Prohibition of motorbikes passing in tunnels
- Prohibition of overtaking in tunnels
- Obligation of vehicle maintenance
- Prevention of load shifting and falling objects
- Obligation of relief activities in accidents

Basically, TMO, against violating vehicles of these traffic rules, will request related agency (traffic police) to control them (arrest, penalty, etc.), and as a part which keeps constant monitoring, will engage to ‘call attention, give instruction and remove’ to them for the delegated matters, and for the undelegated matters, will request the related agency (traffic police) to dispatch.

#### **(2) Traffic accident (coordination with traffic police)**

Request the related agency (traffic police) to investigate the cause of the accident and to take legal actions. At the same time, TMO will conduct lane regulation, close the road and remove (tow away) damaged vehicles immediately for prevention of the secondary accidents and restoration of the normal traffic. TMO will also conduct necessary emergency repairs to restore the traffic.

#### **(3) Fire incident (coordination with Fire Department of LGUs)**

Confirm which powers are necessary for fire-fighting activities at a fire incident, an example follows:

- Right-of-way
- Order to remove vehicles
- Rights regarding damage, etc

And coordinate with the related agency (fire department of LGUs) to determine which tasks could be delegated to TMO.

TMO carries out fire-fighting activities within the delegated powers. If TMO cannot extinguish the fire within its delegated powers, it will request the fire department to dispatch.

If fire-fighting activities within the delegated powers are difficult and the arrival of the fire department may take time, consider to request for establishing a fire department in proximity (or within TMO).

**(4) Vehicle control (coordination with Land Transportation Department and Police Department)**

Confirm rules and regulations included in the “Rules to Protect Road Structures”, an example follows:

- Height limitations of a vehicle
- Weight limitations of a vehicle
- Width limitations of a vehicle
- Prohibition of passage of the vehicles carrying hazardous materials

TMO will give warnings to and remove vehicles which violate these rules within its delegated powers. It will take joint actions in coordination with the related agency (traffic police) for issues outside its delegated powers.

**(5) Lane regulation and Road closing (coordination with traffic police)**

Confirm which powers is necessary for lane regulation and road closing, and will coordinate with the related agency (traffic police) to identify which actions are necessary for TMO to conduct lane regulation and road closing.

**14.3.3 Inspection and Maintenance Work**

The performance of inspection and maintenance work often depends on the five physical senses of the worker. Therefore, it is required for the worker to have advanced knowledge and experience.

For this reason, the following topics should be covered in the field of inspection and maintenance work.

- Responsibilities of the Maintenance Section and coordination with other sections.
- Inspection frequency
- What to inspect and how to record findings of inspection
- Preparation of Inspection and Maintenance Manual
- Traffic Control/Management during maintenance work

The details are as follows:

- An “Inspection Manual” will be developed which covers the following objects:
  - Contents of an inspection
  - Frequency of an inspection
  - Criteria of an inspection
  - How to record the results
  - How to report the results
- The manual will be distributed to workers and a training course will be held to familiarize them with the manual.
- A training course will be held to familiarize workers with usage of vehicles, measuring instruments, tools and equipment for an inspection based on their instruction manuals and through usage demonstrations of the actual machine.
- Inspection and maintenance work may be dangerous because of work on the road currently in use, in high places, related to electricity and oil, etc. For this reason, safety training will be conducted, a check sheet will be developed and a safety manager will be appointed. A safety manager in this context is a person who is responsible for safe work by supervising workers.
- Prior to opening, field training and an initial inspection will be held at the actual objects for inspection in order to obtain actual experience and to understand and record the initial condition of the objects.
- Some work require joint work with other sections, such as lane regulation (coordination with Patrol Team), and confirmation of signal reception/concerted work (coordination with

Traffic Control Center). Therefore, necessary tasks for smooth work should be identified and organized.

- Documents useful for understanding details of the object should be compiled as a reference so that they could be referred to as necessary during the maintenance work.

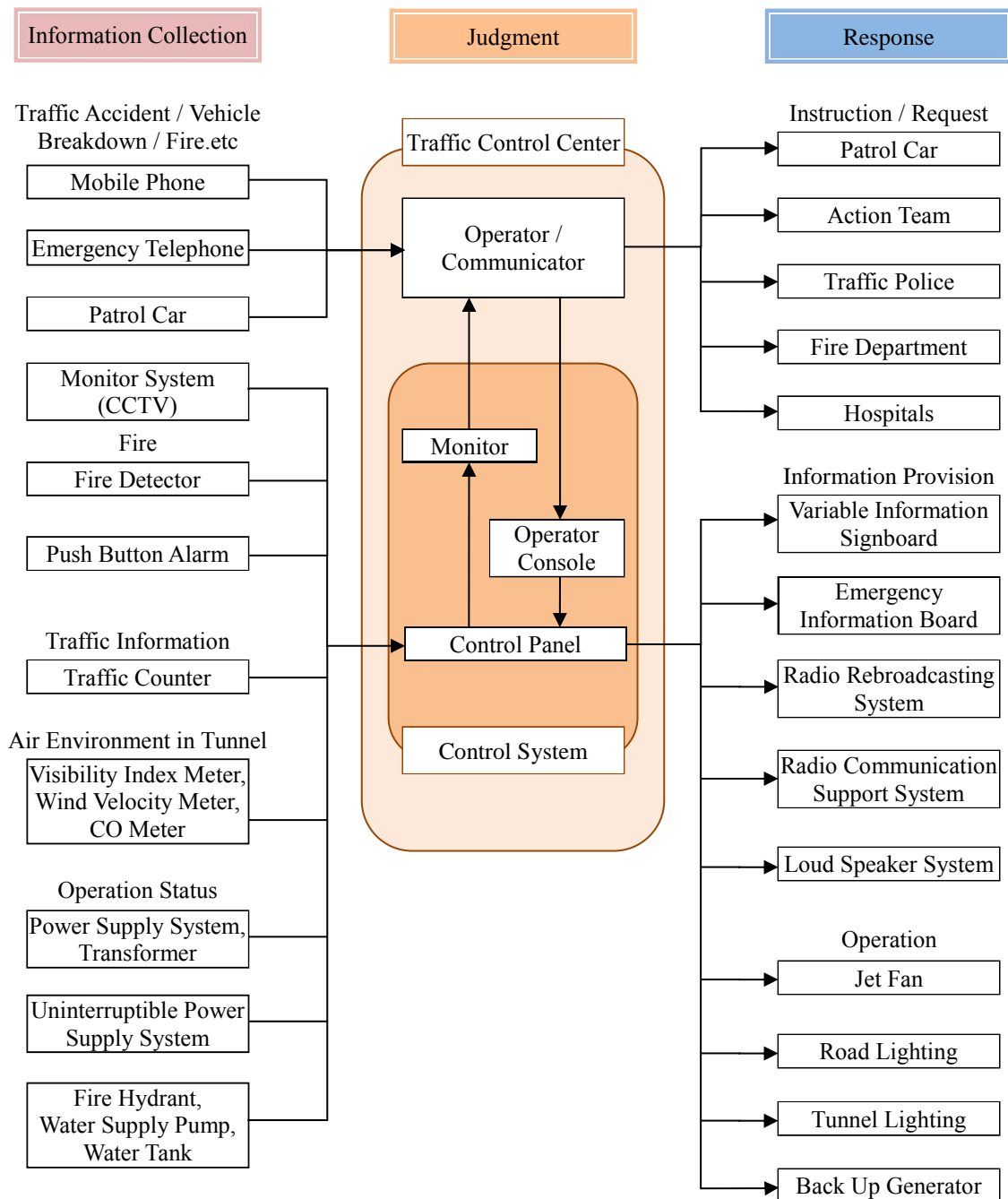
#### **14.3.4 Traffic Monitoring and Information Provision**

Traffic Control Center gathers various information continuously and makes judgment as shown in **Figure 14.3.4-1** and takes actions (i.e. provide information, operate, instruct and request) accordingly.

The following topics should be covered in the field of traffic monitoring and information provision.

- Responsibilities of Patrol Teams and Traffic Control Center
- What kinds of equipment installed and functions of each equipment
- What to be monitored by Traffic Control Center and Patrol Teams
- What information to be collected and what information to be provided to tunnel users
- What actions to be made when some irregularities are found
- What to be coordinated with other sections/teams and traffic police/fire department of LGUs/hospitals
- What communication systems to be established with other sections, traffic police, concerned LGUs and hospitals

Show the summary of Traffic control center in **Figure 14.3-1**.



**FIGURE 14.3-1 SUMMARY OF TRAFFIC CONTROL CENTER**

The details in Traffic Control Center are as follows:

- Develop an "Operation Manual" which summarizes the following items:
  - Details of the information gathered in the control system
  - Content of the monitor display
  - Functions of each facilities
  - Content of the automatic control of facilities
  - Install location of facilities
  - How to operate from the control system
  - Handling of alarms
  - Content of information providing in a certain situation
  - Handling of reckless driving vehicles and parked/stopped (stalled) vehicles



- List of contacts for individual situations.
- Hold a training course including usage demonstrations of the actual system and equipment.
- Establish communication measures with relevant sections, cars and related agencies (traffic police/fire department of LGUs/hospitals).
- Develop an “Emergency Manual” for handling emergency situations and hold a training course. Conduct an emergency drill including how to contact related agencies.
- Include multiple scenarios in the “Emergency Manual” and clarify the standard to instruct/request related sections/teams and related agencies.
- Inspection and maintenance of the control system will be conducted by the Maintenance Section. Cooperation with the Maintenance Section will be requested to conduct joint work such as confirmation of communication.

The details in Patrol Team are as follows:

- Patrol Team will report Traffic Control Center upon encountering irregularities on the road during the patrol. Irregularities in this context include existence of reckless driving vehicles, parked/stopped (stalled) vehicles, obstacles dropped, the damages of road structures or facilities which may disorder traffic flows.
- Develop a “Patrol Manual” which includes as follows:
  - Frequency
  - Routes
  - Equipment and its usage of patrols
  - Examples of irregularities
  - Responses to individual situations (instruction from Traffic control center)
  - Rules regarding prohibited vehicles on the road
  - How to handle vehicles violating the rules during the patrol
  - How to handle obstacles dropped from vehicles
  - How to conduct lane regulation and close the road
- Hold a training course to familiarize members of patrol with the manual.
- Also include how to handle obstacles dropped from vehicles, how to conduct lane regulation and how to close the road in the “Patrol Manual”. Conduct field training on top of a training course for these topics.
- Road lane regulations may be necessary not only for emergency situations but also for work by the Maintenance Section. Cooperation and joint work will be requested in such occasions.

#### **14.3.5 Actions to be taken during emergencies**

In the case of an emergency, it is important that not a single section/team but multiple sections/teams cooperate and coordinate to handle the situation.

For this reason, the following topics should be covered for actions against the emergency.

- What to be done and how to do these during emergencies (traffic accident, fire incident, vehicle breakdown, obstacles dropped from vehicles and parked/stopped vehicles).
- Coordination required with other sections, traffic police and LGUs

All information should be gathered at Traffic Control Center. Other teams should act according to the instruction by Traffic Control Center.

If necessary, Traffic Control Center will request dispatch of the related agencies (traffic police/fire department of LGUs/hospitals).

An “Emergency Manual” will be developed (as mentioned in the previous section 14.3.4) and a training course will be held so that relevant teams are well informed about the scope of their responsibility during an emergency. Relevant teams will cooperate and conduct emergency

drills for different situations. In particular, Action Team will conduct drills for removal of vehicles and fire-fighting using the actual machines and equipment.

**(1) Traffic accident, Vehicle breakdown**

Upon receiving a report of (or confirming via CCTV) traffic accident (vehicle breakdown), Traffic Control Center communicates with Patrol Team and confirms details of the incident on site, then conducts lane regulation and other regulations to prevent further incidents. At the same time, it also displays information on the emergency information board.

If necessary, it requests Action Team to remove accident vehicles, instructs dispatch of ambulance, communicates with related agencies (traffic police, hospitals), and instructs the Maintenance Section to conduct emergency repair to restore traffic.

**(2) Fire**

Upon receiving a report of (or confirming via a fire detector/CCTV) outbreak of fire, Traffic Control Center provides information about the fire on the emergency information board, etc., and change the mode of ventilation operation to the fire mode. At the same time, Traffic Control Center instructs Patrol Team to close the tunnel, Action Team to extinguish fire/rescue/provide first-aid services.

Traffic Control Center will also provide evacuation guidance for those who remain in the tunnel and communicate with related agencies (traffic police/fire department of LGUs/hospitals).

**(3) Obstacle dropped from vehicles**

Upon receiving a report of (or confirming via CCTV) the obstacles dropped from vehicles, Traffic Control Center communicates with Patrol Team and confirms details on site, and instructs removal of the obstacles dropped from vehicles. At the same time, it also displays information on the emergency information board.

**(4) Parked/stopped (stalled) vehicles**

Upon receiving a report of (or confirming via CCTV) parked/stopped (stalled) vehicles, Traffic Control Center communicates with Patrol Team and instructs the team to confirm details on site (a cause of the vehicle stop). At the same time, it also displays information on the emergency information board.

If the accident vehicle cannot move by itself, Traffic Control Center instructs Action Team to remove the vehicle.

**14.3.6 Vehicle control**

- In cooperation with the related agency (traffic police), identify vehicles which may endanger road traffic (e.g. motorbikes, reckless driving vehicles, dangerous vehicles with unstable loads) or which may damage road structures (e.g. overweight vehicles, vehicles with excessive height, vehicles carrying hazardous materials) on a regular basis and remove them before entering into the tunnel.
- Develop a “Vehicle Control Manual” which covers vehicles to be removed (based on legal requirements) and control methods (e.g. stop, guide, confirm and remove), and hold a training course and a field training.
- Also conduct a training course and a field training regarding how to use tools/equipment for controlling vehicles.

**14.3.7 Safety Driving Campaign to Drivers**

This is the first road tunnel built in Nepal, and passing through a tunnel will be a new experience for many local drivers. Therefore, it is necessary to well inform them with precautions regarding passing through a tunnel.

At the same time, drivers should also be informed about “Road Safety Rules” and “Rules to Protect road Structures” as mentioned in the previous **section 14.3.2**.

In order to achieve these goals, the following safety driving campaign will be conducted.

- Develop fliers and brochures which contain outlines of the tunnel, driving rules, precautions regarding passing through, how to behave in emergency situations as well as contact details, and distribute them to drivers using the relevant road currently in use and the neighborhood.
- Establish an administrative office to receive questions and provide answers via telephone, etc.
- Develop sign boards which outline the tunnel and the contact information and set them next to or near the relevant road currently.
- Conduct several training sessions for general drivers and encourage general/commercial drivers and responsible persons from truck/bus companies to receive the training.
- Continue to distribute fliers about safe driving on a regular basis after opening of the tunnel.

#### 14.3.8 Drills for Emergency Cases

- As a culmination of various emergency drills, conduct a full-scale disaster prevention drill based on the assumption of a fire incident within the tunnel prior to opening of the tunnel.
- All relevant staff from TMO should participate in this drill. Other related agencies (traffic police/fire department of LGUs/hospitals) will also be invited to join.
- The drill not only includes fire-fighting but also evacuation training.
- This training will be opened to mass media so that safety of the tunnel will be promoted.
- The fire-fighting (from outbreak to extinguishing of fire through to completion of rescue activities) will be timed (including the time difference between the estimated time and actual time) and taped so that the data will be used as a reference for future improvement and training purposes.

#### 14.3.9 Training in Japan

Actual practices in Japan will be experienced for proposed staff to be assigned to the TMO.

	Content	Venue	Total time required
1	Outline of management, operation and maintenance of highways in Japan (lecture)	—	Half day – 1 day
2	Management, operation and maintenance of tunnels (lecture) -Inspection and maintenance of tunnel structures -Patrol and vehicle control (legal requirements, patrol and vehicle control) -Emergency handling (monitor, information provision, traffic operation and communication structure)	—	1 day – 2 days
3	Tunnel emergency facilities (e.g. ventilation, fire-fighting, alarms, evacuation routes)	tunnel	Half day – 1 day
4	Inspection and maintenance of structures and facilities inside a tunnel	Maintenance office	Half day – 1 day
5	Traffic control (monitoring, information provision, facility operation)	Traffic control center	1 day – 2 days
6	Traffic management (patrol, accident handling, tow-away, balloon air jack)	Patrol office	Half day – 1 day
7	Vehicle control (on-site)	On-site	Half day – 1 day
8	Training for emergency (inspection of emergency facilities of a tunnel, disaster prevention drill)	On-site, etc.	Half day – 1 day
		Total 1 -2 week(s)	

The combination of and allocated time for the training contents are subject to change according to the availability of the trainer and venue.

#### **14.3.10 Lessons from Previous Projects**

Facility not working or in a malfunctioning state inside a tunnel can result into disastrous circumstances. Therefore regular and proper maintenance of the tunnel facilities is very important for safe and smooth operation inside the tunnel. But, it is easy said than done. Like other road facilities, negligence in maintenance of tunnel facilities is often found in developing countries. Some examples and reasons of such negligence in maintenance reported in other tunnel projects are as follows;

- i) Only the surface of electrical equipment is cleaned, whereas the inner part or portions not easily reachable are left unattended due to lack of proper manual.
- ii) The inspector or the person in charge of maintenance lack sufficient technical knowledge making them unable to detect technical defects.
- iii) The life span of big facilities such as jet-fans and sensors in general are 20 years and 10 years respectively, given that it is properly managed. An overall replacement of all these facilities required huge amount of budget and procedure for obtaining the budget takes long period.
- iv) Operation and maintenance manual exists, but not put into practice.

The above mentioned examples and reasons should be considered as lessons learned from the past similar projects and effort should be made by DOR to prevent such cases with regard to the Nagdhunga Tunnel in its operation stage.

## CHAPTER 15

### PROJECT IMPLEMENTATION PLAN



## **CHAPTER 15**

### **PROJECT IMPLEMENTATION PLAN**

#### **15.1 PROJECT SCOPE OF WORK**

Scope of the project is listed below;

- i) Civil Work Component
  - Construction of a Tunnel (L=2,450m, 2lanes and wide shoulder)
  - Construction of Approach Road (L=2,600m) and two Bridge
  - Disposal Area Development of Excavated Rocks/Soils (near West Tunnel Portal)
  - Power Supply dedicated line installation for tunnel operation
  - Other facilities (including toll facility, control office)
- ii) Consulting Services
  - Detailed Design
  - Tender Assistance
  - Construction Supervision
  - Capacity Development for Tunnel Operation and Maintenance
- iii) Right-of-Way Acquisition and RAP Implementation

#### **15.2 IMPLEMENTATION STRATEGY INCLUDING APPROVAL OF THE PROJECT**

Estimated construction cost and ROW acquisition cost are as follows;

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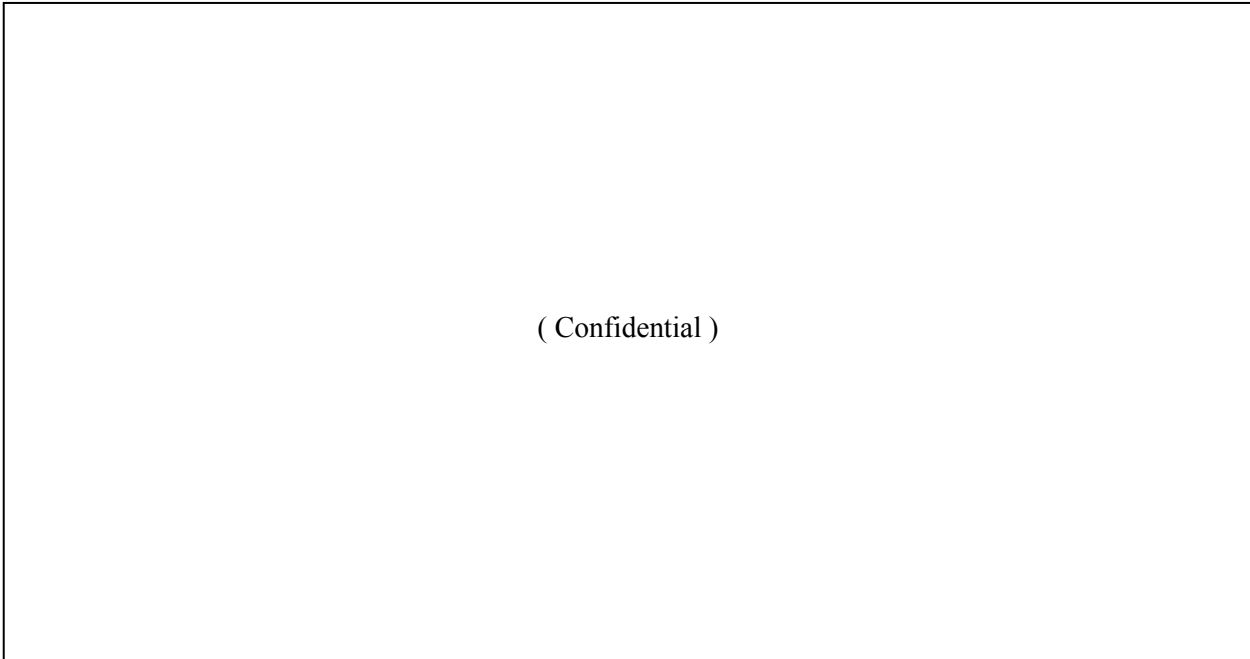
As shown above the project scale in terms of cost is quiet big and this is the first road tunnel construction project. This project is recommended to be implemented by Japan's ODA. Especially, JUMP (Joint Undertaking for Multi-Partnership) Loan is recommended for this project due to the following reasons;

- JUMP is a new type of Japanese Yen Loan.
- JUMP is applicable to projects of sophisticated infrastructure which require special and advanced technology in construction.
- JUMP requires a joint venture between (a) capable and experienced Japanese contractors and (b) local contractor(s).
- Japanese contractors' know-how and technologies are transferred to Nepal contractors through execution of a project. Nepal contractors can receive an on-the-job training throughout the construction period, thus Nepal contractors can obtain enough know-how and technologies from Japanese contractors.
- Nepal contractors can challenge similar nature of projects in the near future.

The implementing agency is the Department of Roads (DOR) and Operation and Maintenance Agency is also DOR.

Since huge amount of electricity cost for tunnel operation is necessary, toll fee will be collected. Toll collection will be implemented by Roads Board of Nepal (RBN).

**15.3 IMPLEMENTATION SCHEDULE**





( Confidential )

## 15.4 CIVIL WORK CONTRACT PACKAGING

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## 15.5 CONSTRUCTION EXECUTION PLAN

### 15.5.1 Construction Schedule

( Confidential )

### 15.5.2 Major Materials To Be Used

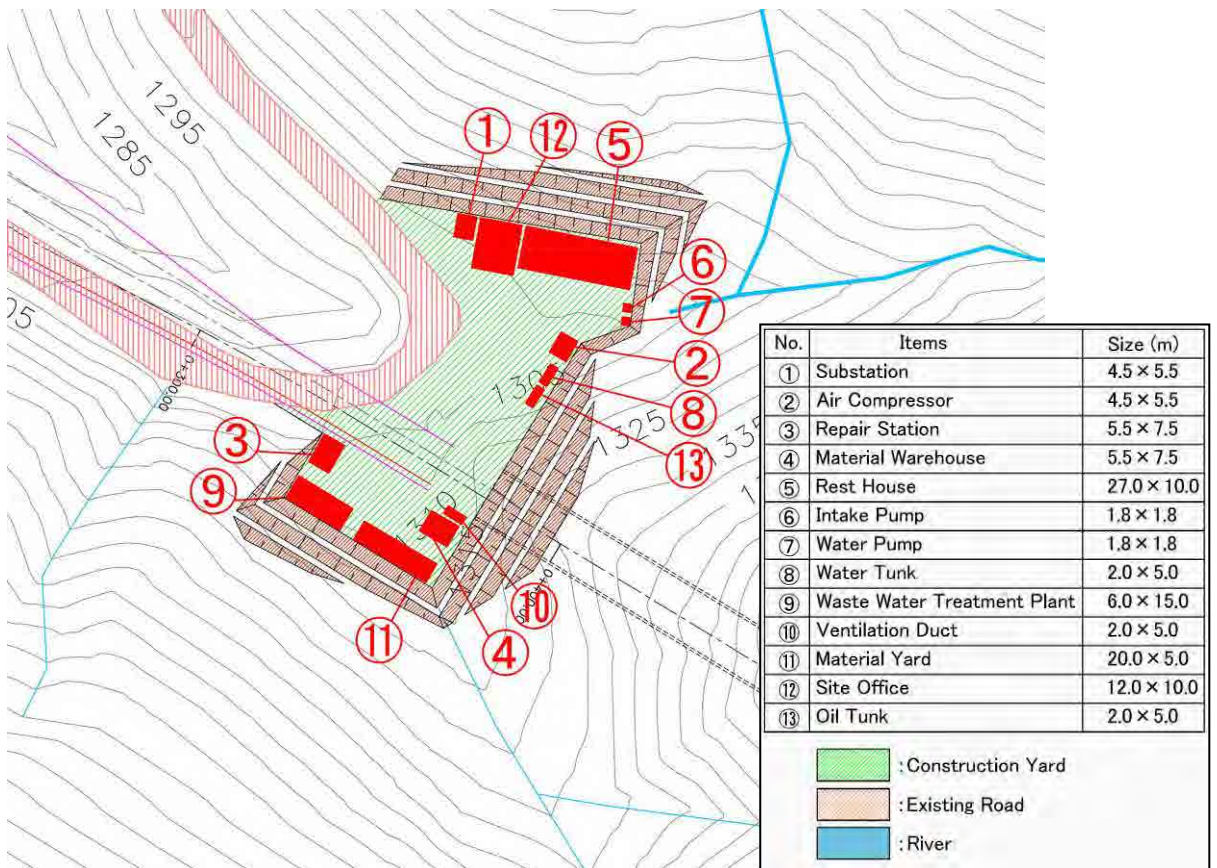
Major materials to be used is shown in **Table 15.5-2**.

### 15.5.3 Major Equipments To Be Used

Major equipments to be used is shown in **Table 15.5-3**.

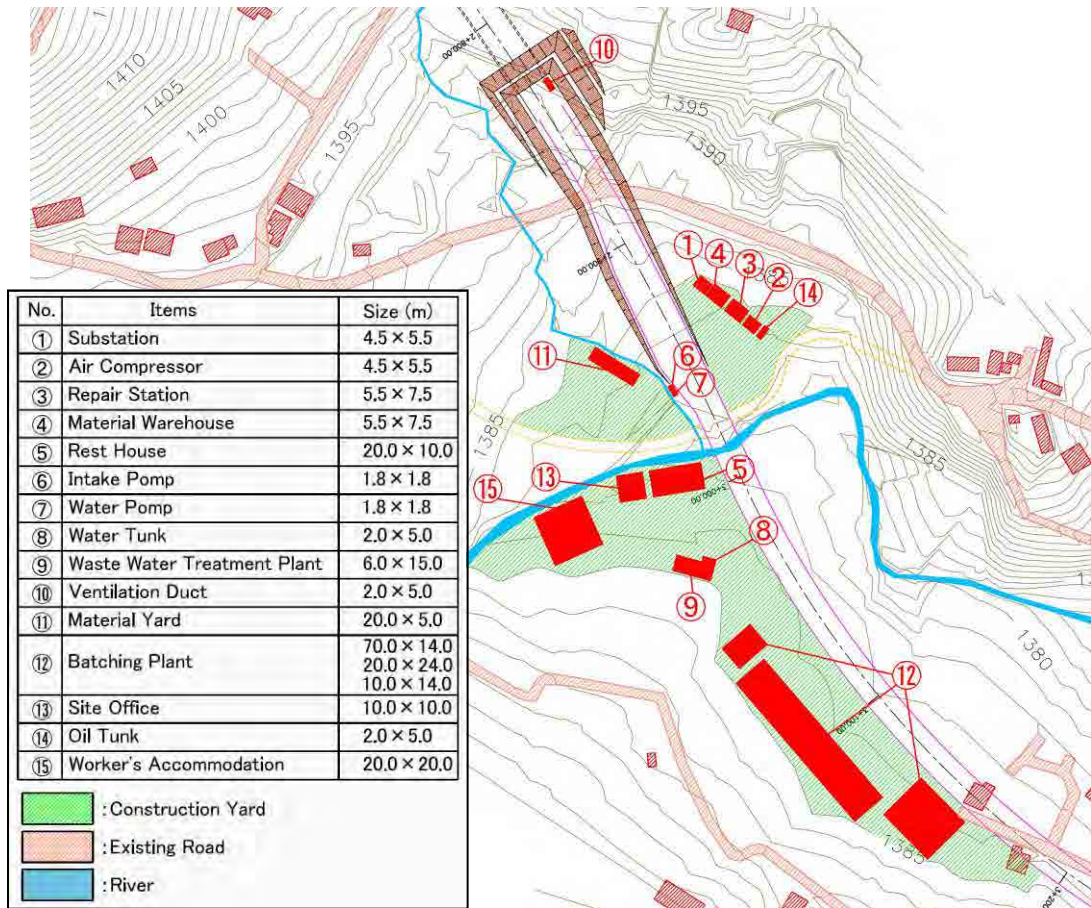
### 15.5.4 Construction Camps and Temporary Roads for Construction

Construction camp will be established as shown in **Figure 15.5-1**. Roads to be used during construction are also shown in **Figure 15.5-2**. Area within the acquired road right- of-way (50m and 60m) shall be fully utilized as temporary roads for construction.



Source: JICA Survey Team

**FIGURE 15.5-1 CONSTRUCTION CAMP**



Source: JICA Survey Team

**FIGURE 15.5-2 CONSTRUCTION CAMP SHOWING EXISTING ROADS**

( Confidential )

**TABLE 15.5-2 MAJOR MATERIAL LIST FOR NAGDHUNGA TUNNEL**

No	Name of Material	Specification	Unit	Quantity		
				West	East	Total
1	Mesh for shotcrete		m <sup>2</sup>	9,936	8,064	18,000
2	Water proof sheet		m <sup>2</sup>	50,180	13,520	63,700
3	Steel rib	H-125	t	146	233	379
4	Steel rib	H-150	t	22	125	147
5	Rock bolt	TD24 L=3m	no	23,525	7,400	30,925
6	Rock bolt	TD24 L=4m	no	467	2,667	3,134
7	AGF Pipe	Dia. 114.3mm, L=12m	no	0	1,879	1,879
8	FP Bolt	TD24 L=3m	no	4,133	2,280	6,413
9	Silica resin		t	0	280	280
10	Dry mortar		m <sup>3</sup>	187	88	275
14	Air supplying tube	Dia. 1,700mm	m	520	520	1,040
15	Compressed air supplyin pipe	Dia. 2"	m	520	520	1,040
16	Lighting system		m	1,930	520	2,450
17	Water supplying pipe	Dia. 2"	m	520	520	1,040
18	Power cable		m	520	520	1,040
19	Corrugated pipe	Dia. 2,000mm	m	400	0	400
20	Stee board for temporary stage		m <sup>2</sup>	360	0	360
21	Steel structures for temporary state		t	196	0	196
22	Concrete for arch		m <sup>3</sup>	13,483	3,732	17,215
23	Concrete for invert		m <sup>3</sup>	1,245	2,448	3,693
24	Concrete for shotcrete		m <sup>3</sup>	5,259	1,873	7,132
25	Concrete for cutting face		m <sup>3</sup>	1,895	1,631	3,526
26	Concrete for pavement		m <sup>3</sup>	4,860	1,309	6,169
27	Concrete for drain and pavement		m <sup>3</sup>	2,221	599	2,820
28	Concrete for road structures		m <sup>3</sup>	0	1,200	1,200
29	Reinforced steel bar		t	26	264	290
30	Asphalt concrete		m <sup>3</sup>	0	910	910
31	Asphalt concrete binder		m <sup>3</sup>	0	910	910

Source: JICA Survey Team

**TABLE 15.5-3 MAJOR EQUIPMENT TO BE USED**

No	Name	Specification	Quantity		
			West	East	Total
1	Boom type Road header	300kW (MRH-S300)	1	1	2
2	Drilling Jumbo, 2 booms	Wheel 2boom 150kg	1	1	2
3	Wheel loader	full bucket 2.3m <sup>3</sup>	1	1	2
4	Wheel loader	full bucket 1.4m <sup>3</sup>	1	0	1
5	Shotcrete Spreading Machine	6~20m <sup>3</sup> /hr	1	1	2
6	Shotcrete plant	25m <sup>3</sup> /hr	1	1	2
7	Dump truck	10t	4	4	8
8	Dust collector	3,000m <sup>3</sup> /min	1	1	2
9	Giant Breaker	1,300kg	1	1	2
10	Excavator (back-hoe)	full bucket 0.45m <sup>3</sup>	1	1	2
11	Concrete pump (with boom)	90~110m <sup>3</sup> /hr	1	1	2
12	Concrete transit lorry	25m <sup>3</sup> /hr	4	4	8
13	Bulldozer	32t	1	0	1
14	Bulldozer	15t	1	1	2
15	Tire roller	8~20t	1	1	2
16	Sliding center (invert)	L = 10.5m	1	1	2
17	Sliding center (arch)	L = 10.5m	1	1	2
18	Stage truck for Water Proof Sheet	4ton truck and stage	1	1	2
19	Crane	25ton	1	0	1
20	Truck mounted crane	4.9ton	1	0	1
21	Generator	500KVA	1	0	1
22	Generator	300KVA	2	3	5
24	Contra Fan	1,000 or 3,000m <sup>3</sup> /min	1	1	2
25	Compressor	11~12.4m <sup>3</sup> /min	1	1	2
26	Waste water treatment plant	30m <sup>3</sup> /hr	1	1	2
27	Concrete spreader	pavement purpose	0	1	1
28	Concrete finisher	pavement purpose	0	1	1
29	Concrete leveler	pavement purpose	0	1	1
30	Water Tanker	5ton	1	0	1
31	Fuel Tanker	5ton	1	0	1
32	Winch	temporary work	1	0	1
33	Batching Plant	concrete production	1	0	1
34	Submergible pump	Dia.2"	2	4	6
35	Submergible pump	Dia. 3"	2	4	6
36	Turbine pump	Dia. 4"	2	2	4



Boom type Road header



Drilling Jumbo, 2 booms



Dust Collector



Shotcrete Spreading Machine

## 15.6 NEPAL AND JAPAN CONTRACTER

### 15.6.1 NEPAL CONTRACTORS

#### 15.6.1.1 Classification of Nepal Contractors

Nepal contractors are classified into Class A, B, C and D based on their Bid Capacity as shown in **Table 15.6-1**.

**TABLE 15.6-1 CLASSIFICATION OF NEPAL CONTRACTORS**

Class	No. of firms (as of 2008)	Bid limit (1999 price level)
A	173	Above 20 Million NPR
b	337	Up To 20 Million NPR
c	1,328	Up To 6 Million NPR
d	10,268	Up To 3 Million NPR

Source: DOR

#### 15.6.1.2 Questionnaire Survey of Nepal Contractors

Questionnaire survey was undertaken to grasp Nepal contractor's characteristics. Form of Questionnaire is shown in **Table 15.6-2**.

**TABLE 15.6-2 FORM OF QUESTIONNAIRE**

QUESTIONNAIRE ON NEPALI CONTRACTOR	
1	Name of company
2	Head office Address
3	Year Established
4	Capital
5	Number of Board Members
6	Number of Employees
7	Amount of ANNUAL scale
	year 2013
	year 2012
	year 2011
	year 2010
	year 2009
8	Specialized Fields of work of Your company (please check in box)
	<input type="checkbox"/> Road Construction (Earth work)
	<input type="checkbox"/> Road Construction (Pavement)
	<input type="checkbox"/> Bridge Construction
	<input type="checkbox"/> Building Construction
	<input type="checkbox"/> Dam Construction
	<input type="checkbox"/> Power Related work (Transmission Line, etc.)
	<input type="checkbox"/> Others, please specify

12	Do you have any experiences working together with Foreign Contractors other than Japanese contractor(s)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If Yes, please list up names of Foreign contractors; 1) 2) 3) 4) 5)
13	Are you interested in Tunnel Construction?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No, please explain why you are not interested;     
14	Do you want to acquire tunnel construction technology by working jointly with Japanese contractors?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No, please explain why you do not want;   
15	Do you have any comments/opinions/suggestions on Naghdhunga Pass Tunnel Construction Project?		Please write your comments, suggestions below:   
	Thank you very much for answering this Questionnaire!		

Source: JICA Survey Team



TABLE-A WORK EXPERIENCE(on-going & Completed Projects in the past 5 years)

Name of project	Client	Contract Amount	Single or J.V/Association	Contract Period		Name of Japanese or Foreign Contractor Involved
				Start	End	

(Please use another sheets, if you have more projects)

TABLE-B NAME OF EQUIPMENT YOU OWN

Name of Equipment	Capacity	Model (year)	No. of Unit	Condition (No. of Unit)	
				Functional	Under Repair
1)					
2)					
3)					
4)					
5)					
6)					
7)					
8)					
9)					
10)					
11)					
12)					
13)					
14)					
15)					

Source: JICA Survey Team

Contractors were selected based on the following criteria;

- To be Class A Contractor
- Contractors recommended by DOR
- Contractors recommended by Federation of Contractors' Associations of Nepal

- Contractors recommended by JICA Nepal Office

A total of 18 contractors were selected and questionnaire was sent to them. Among the 18 contractors, 10 contractors responded to questionnaire and summarized in **Table 15.6-3**.

**TABLE 15.6-3 SUMMARY OF ANSWERS FROM RESPONDENT CONTRACTORS**

1 ID	2 Year Established	3 Capital(000 NPR)	4 No. of Board members.	5 No. of Employees	6 Amount of Annual Sale		7 No. of Major Pro in 5 years	8 Experience of working with Japanese Firm	9 Experience working with Foreign Firms		10 Willingness of tunnel technology
					Max. Amount for 5yrs (000NPR)	Ave.Amount for 5yrs (000NPR)			Company Name	Country	
1	1974	25,000	5	50	344,200	241,052	34	N/A		1)China 2)China	yes
2	1981	53,500	3	23	125,957	56,490	9	N/A		1)India 2)India	yes
3	1974	20,000	3	65	956,114	674,559	28	one(1)		1)China 2)China 3)India 4)China	yes
5	1966	150,000	8	300	1,087,590	818,718	20	one(1)		1)China 2)China 3)China 4)China 5)India 6)German 7)Austrian	yes
7	1984	300,000	5	400	1,029,522	764,625	28	1)Marucsin shikta construction		1)Spain 2)India 3)India 4)China 5)China 6)India	yes
8	1966	200,000	5	100	215,655	86,734	3	three(3)		1)China 2)Neitherlan 3)India 4)India 5)UK	yes
9	1987	500,000	3	968	835,400	603,254	21	three(3)		1)Korea 2)China 3)India 4)China 5)China	yes
10	1984	350,000	3	60	620,000	456,000	24	one(1)		1)China 2)India 3)Spain	yes
14	1976	100,000	3	60	262,991	179,285	40	one(1)		1)China 2)Bhutan 3)UK 4)Germany 5)France	Yes
17	1992	50,000	5	215	1,640,000	481,527	9	three(3)		1)Bhutan	yes

Source: JICA Survey Team

Features of Nepal contractors are summarized as shown below;

Amount of Capital		No. of Employees		
Range	No. of Contractors	Range	No. of contractor	of
Less than 49 Million NPR	2	Less than 100	5	
50 ~ 99 Million NPR	2	100 ~ 199	1	
100 ~ 199 Million NPR	2	200 ~ 299	1	
200 ~ 299 Million NPR	1	300 ~ 399	1	
Over 300 Million NPR	3	400 ~ 499	2	

Max. Annual Sale for the past 5 Years		Average annual Sale for the past 5 Years	
Less than 249 Million NPR	2	Less than 249 Million NPR	4
250 ~ 499 Million NPR	2	250 ~ 499 Million NPR	2
500 ~ 749 Million NPR	1	500 ~ 749 Million NPR	2
750 ~ 999 Million NPR	2	750 ~ 999 Million NPR	2
1,000 ~ 1,499 Million NPR	2	1,000 ~ 1,499 Million NPR	0
1,500 ~ 1,999 Million NPR	1	1,500 ~ 1,999 Million NPR	0
Over 2,000 Million NPR	0	Over 2,000 Million NPR	0

- Number of Contractors who have experience(s) working with Japanese Contractor(s) ..... 8
- Number of Contractors who have experience(s) working with foreign contractors other than Japanese Contractor(s) ..... 10

#### 15.6.1.3 Summary of Nepal Characteristics of Nepal Contractors

- Scale of Nepal contractors is not so big in terms of capital, annual sale and number of employees.
- Most contractors have an experience(s) working with Japanese contractors and/or foreign contractor(s).
- All contractors are eager to acquire tunnel construction technology.

#### 15.6.2 JAPAN CONTRACTORS

Based on the hearing from the major construction companies in Japan, mountain road tunnel's experiences were summarized below.

Major Japan contractors have many experiences of longer mountain road tunnel, Especially Company C has 31 projects of more than 2,000m mountain road tunnel.

As they also have experiences of many road/bridge or tunnel projects at overseas, it is expected to work well at Nepal.

**TABLE 15.6-4 NUMBER OF MOUNTAIN ROAD TUNNEL EXPERIENCES IN PAST 10 YEARS (ON-GOING AND COMPLETED WORKS)**

Company	Number of Mountain Road Tunnel(NATM)			Number of AGF method in mountain road tunnel
		More than 1000m Tunnel	More than 2000m Tunnel	
A	40	12, (10)	10	17(16)
B	83	46(39)	12	19(19)
C	91	61	31	Many
D	110	71(38)		44(24)
E	More than 60	14(9)	11(7)	18(11)
F	55	26(21)	10	39(33)
G	122	55	10	53

H	21	11(11)	4(4)	8(8)
I	49	22	5	32

Note; ( ) the number of only completed construction works  
Hearing results from Japan contractors

**TABLE 15.6-5 NUMBER OF ROAD/BRIDGE OR TUNNEL WORKS EXPERIENCES IN PAST 10 YEARS AT OVERSEAS (OUTSIDE JAPAN)**

Company	Road Projects	Bridge Projects	Tunnel Projects	Total
A	5	7	10	22
B	15	18	1	34
C	16	8	5*	29
D	6	16	Mountain 6 Shield 9	37
E	21	9	6	39
F	7	21	0	28
G	3	2	1	6
H	0	2	0	2
I	5	3	0	8

Note:\* Shield tunnel works excluded.  
Hearing results from Japan contractors

## 15.7 CONSULTING SERVICES

( Confidential )

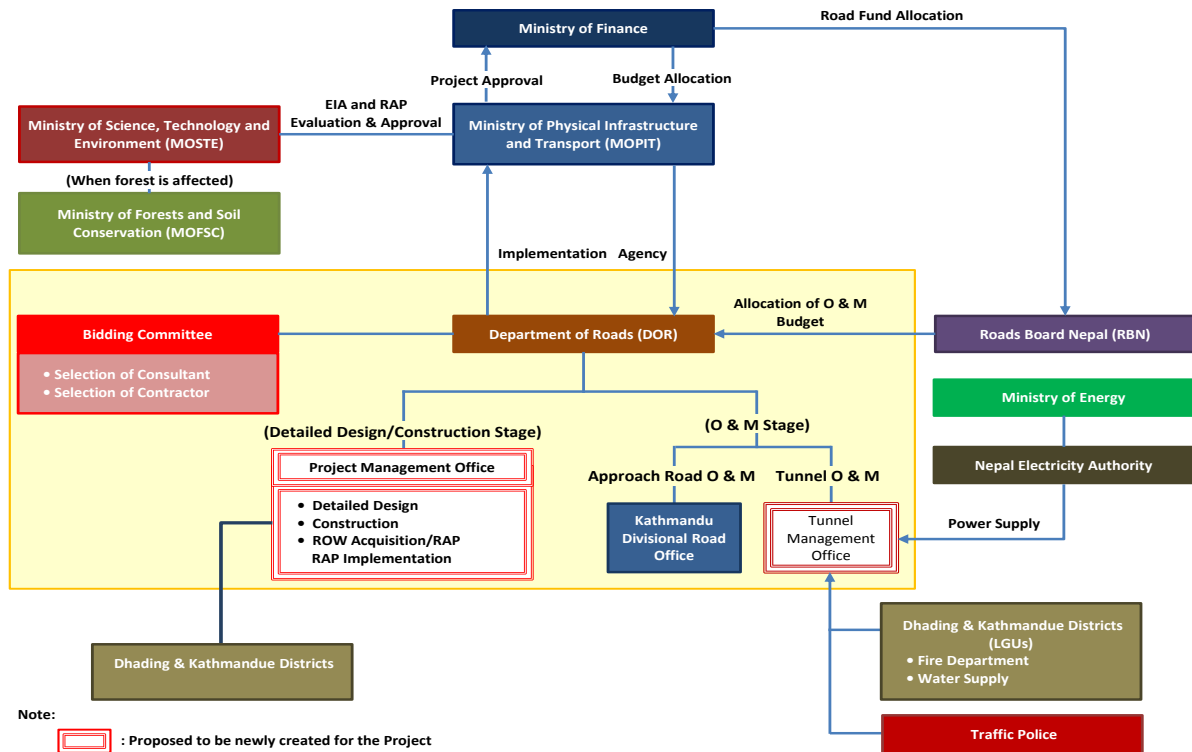
( Confidential )

### 15.8 PROCUREMENT PLAN

( Confidential )

### 15.9 PROJECT IMPLEMENTATION ORGANIZATION STRUCTURE

Overall project implementation organization is shown **Figure 15.9-1** Implementing Agency is Department of Roads (DOR) Implementing office is created Project Management Office.



Source: JICA Survey Team

FIGURE 15.9-1

PROJECT IMPLEMENTATION ORGANIZATION

## **15.10 FINANCIAL PLAN**

Confidential

## CHAPTER 16

### OPERATION AND EFFECT INDICATORS





## CHAPTER 16 OPERATION AND EFFECT INDICATORS

### 16.1 SELECTION OF OPERATION AND EFFECT INDICATORS

Based on the JICA guideline about “the evaluation of operation and effect indicators”, indicators to be applied are selected in this tunnel construction project shown in **Table 16.1-1**. This is the indicators to identify the effect and achievement by this project monitoring the change of situations between a case before project and a case around 3 years after project. And also, the operation and effect indicators should be used as benchmarks for the appropriate O&M of tunnel and road.

The indicator was adopted indicators of 2023 that is after 3 year from service of new tunnel section.

**TABLE 16.1-1 OPERATION AND EFFECT INDICATORS**

Classification	Indicator	Purpose
Basic indicator	AADT: Annual average daily traffic	To evaluate the growth of traffic volume for evaluation period.
Basic indicator	Reduction of travel time	To evaluate the reduction of travel time compare to the business as usual case
Sub. indicator	Reduction of travel cost	To evaluate the reduction of travel cost including TTC :travel time cost, and VOC: vehicle operation cost compare to the business as usual case
Sub. indicator	Increase of average travel speed	To evaluate the upgrading of average travel speed of project road section compare to the existing road section.
Sub. indicator	Reduction of traffic accident	To evaluate the reduction of number of traffic accidents between new road section and existing road.

Source: JICA Survey Team

### 16.2 OPERATION AND EFFECT INDICATORS

#### (1) AADT: Annual average daily traffic

The indicator for annual average daily traffic is set the value shown in **Table 16.2-1**.

**TABLE 16.2-1 ANNUAL AVERAGE DAILY TRAFFIC**

	Current (2014)	2023	2030
Existing road section	7,700	2,600	3,200
Tunnel section	-	7,600	9,500
Total of Nagdhunga section	7,700	10,200 (1.3)	12,700 (1.6)

Source: JICA Survey Team

#### (2) Reduction of travel time

The indicator for reduction of travel time is set the value shown in **Table 16.2-2**.

**TABLE 16.2-2 REDUCTION OF TRAVEL SPEED**

		Current (2014)	2023	2030
Eastbound (To Kathmandu)	Travel time	30 min	7 min	8 min
	Reduction time	-	23 min	22 min
Westbound (From Kathmandu)	Travel time	20 min	6 min	7 min
	Reduction time	-	14 min	13 min

Source: JICA Survey Team

### (3) Reduction of travel cost

The indicator for reduction of travel cost in 2023 is set the value shown in **Table 16.2-3**, reduction of travel time cost, and in **Table 16.2-4** for reduction of vehicle operating cost of 2014 value.

**TABLE 16.2-3 REDUCTION OF TRAVEL TIME COST IN 2023**

(NPR million/year)

	TTC of without project case (NPR/year)	TTC of with project case (NPR/year)	Reduction of cost (Rate of reduction)
Eastbound (To Kathmandu)	2,239	514	1,725 (77%)
Westbound (From Kathmandu)	1,281	481	800 (62%)
Total	3,520	995	2,525 (72%)

Source: JICA Survey Team

**TABLE 16.2-4 REDUCTION OF VEHICLE OPERATING COST IN 2023**

(NPR million/year)

	VOC of without project case (NPR/year)	VOC of with project case (NPR/year)	Reduction of cost (Rate of reduction)
Eastbound (To Kathmandu)	1,233	463	770 (62%)
Westbound (From Kathmandu)	1,007	397	610 (61%)
Total	2,239	860	1,380 (62%)

Source: JICA Survey Team

### (4) Increase of average travel speed

The indicator for increase of average travel speed in 2023 is set the value shown in **Table 16.2-5**.

**TABLE 16.2-5 INCREASE OF AVERAGE TRAVEL SPEED**

	Current (2014)	2023	Reduction (2014-2023)
Eastbound (To Kathmandu)	15 km/hr	40 km/hr	25 km/hr
Westbound (From Kathmandu)	25 km/hr	50 km/hr	25 km/hr

Source: JICA Survey Team

### (5) Reduction of traffic accident

The improvement of poor vertical, poor horizontal curvature and narrow road width by tunnel project contributes to reduce the number of accidents. In this study, it is expected the reduction of half by the project.

**TABLE 16.2-6 REDUCTION OF NUMBER OF TRAFFIC ACCIDENTS**

	Current (2014)	2023	Reduction (2014-2023)
Num. of vehicle involved in accidents	240	120	120(50%)
Num. of people involved in accidents	130	65	65 (50%)

Source: JICA Survey Team

## CHAPTER 17

### VARIOUS ISSUES AND MOU TO BE AGREED



## CHAPTER 17 VARIOUS ISSUES AND MOU TO BE AGREED

### 17.1 UNINTERRUPTED ELECTRICITY SUPPLY FOR TUNNEL O&M

For the routine operation of the tunnel, stable electricity supply will be critically required especially for running of ventilation fan and lighting facilities.

In this regard, it is necessary arrangement such as Memorandum of Understanding (MOU) between related parties (ex. MOPIT, DOR, Ministry of Energy (MOE) and Nepal Electricity Authority (NEA)) in order to assure that MOE and NEA will put priority to supply electricity to the tunnel 24 hours per day by isolating from load shedding. In principle, MOPIT will request the work for electric supply to MOE, and install the transmission line. In order to enhance the necessary process, the draft MOU on Uninterrupted Power Supply and Dedicated Feeder including grid connection for Tunnel was prepared.

#### Memorandum of Understanding

on

#### Uninterrupted Power Supply and Dedicated Feeder for Tunnel

This MoU on Uninterrupted Power Supply and Dedicated Feeder for Tunnel has been signed on this .....<sup>th</sup> day of August 2014

#### By and Between

**Ministry of Physical Infrastructure and Transport**, having its address ....., duly represented by its authorized ..... Mr. .... (hereinafter referred to as MoPIT, which expression, unless repugnant to the context or meaning thereof shall be deemed to include its successors and permitted assign) of the other part,

**And**

**Ministry of Energy**, having its address Singhadurbar, Kathmandu, duly represented by its Secretary Mr. .... (hereinafter referred to as MoE, which expression, unless repugnant to the context or meaning thereof shall be deemed to include its successors and permitted assign) of the other part,

**Whereas, MoPIT** in coordination with DoR and RBN intends to construct underground tunnel highway of 2.5 kilo Meters starting from Badbhanjyang of Nagdhunga to Sisnekhola, Dhading District and intends to have uninterrupted 24 hours power supply for the operation of the same.

**Whereas MOE**, being the authority in respect of energy sector in Nepal intends to coordinate with Nepal Electricity Authority (hereinafter referred to as NEA) for the supply and distribution of electricity in Nepal, which has formulated a policy guideline for 24 hours uninterrupted power supply to highly sensitive area vide the resolution of 671<sup>st</sup> Meeting of the Board of Directors of NEA dated 2070/9/16 (corresponding to ..... ) and in accordance therewith NEA has vide its decision of the Board of Directors dated ..... approved the application for 24 hours uninterrupted power supply as may be required for the operation of the said Nagdhunga – Naubise tunnel highway project being implemented by Government of Nepal in coordination with MoPIT, RBN and DoR.

**NOW THEREFORE**, in consideration of the premises and the mutual covenants made and contained herein, the Parties hereto hereby agree as follows:

**1. Classification of Dedicated Feeder:**

The tunnel highway being under the ownership of Government of Nepal and also being highly sensitive place, this project has been categorized for the supply of uninterrupted power for 24 hours a day year through .

**2. Supply through Dedicated Feeder High Voltage Cable/ACSR:**

The supply of 2 MW of electricity for the tunnel highway for its operation and maintenance shall be carried out through High voltage cable and in the case of non existence of problems in respect of Right of Way (ROW), the supply may be given through overhead lines also. While constructing dedicated feeder, MOPIT, in coordination with RBN and DOR shall be responsible for necessary ROW. All costs pertaining to the construction of dedicated feeder in accordance with the norms, specification and construction standards of NEA shall be borne by MOPIT. The specification of the equipment to be installed during the construction of dedicated feeder shall be as per NEA standards. Upon request from MOPIT, MoE shall, in coordination with NEA, provide the specification of NEA by charging onetime fee of Rs. 20,000.00 (in words Rupees twenty thousand only) payable to NEA.

**3. Construction and Maintenance of Transmission Line:**

It shall be the responsibility of MoPIT to construct the transmission line necessary for the operation and maintenance of the tunnel. Under the authority and instructions of MoPIT, DoR shall have the transmission line constructed through a contractor selected through appropriate procedure, who shall, through nominated sub-contractor of NEA, have the transmission line constructed as per NEA guideline and supervision. Upon request of MoPIT or DoR; NEA shall issue the certificate for the same. Subsequent to the completion of the construction of the transmission line, such shall be handed over to NEA and it shall be the responsibility of NEA to effect timely maintenance of the transmission line from time to time as and when so required.

While constructing transmission line, DoR shall select, through appropriate procedures of laws of Nepal, the Contractor and Consultant for the Tunnel Project.

**4. Rent for necessary space and equipment operation:**

- a) Necessary space for the installation of control building and control relay panel at the substation of NEA shall be provided by MOE in coordination with NEA for the construction of dedicated feeder. Annual rent of such space payable to NEA by MOPIT shall be Rs. 108,000.00 (Rupees one hundred eight thousand only).
- b) The operation of control building and control relay panel within the switchyard of NEA shall be operated by NEA and annual fixed cost in respect of the operation thereof shall be Rs. 108,000.00 (Rupees one hundred eight thousand only) payable to NEA. MOPIT shall make necessary arrangements in this respect.
- c) The abovementioned amount shall be paid by MOPIT to NEA on 12 equal monthly installments in a year.

**5. Maintenance of Dedicated Feeder:**

It shall be the responsibility of MOPIT to timely effect maintenance of dedicated feeder regularly.

**6. Compensation:**

In case of substantial loss or damage to NEA due to non maintenance of dedicated feeder on time, the compensation thereof shall be provided by MOPIT to NEA. The amount of loss or

damage due to the reason attributable to non maintenance of the dedicated feeder shall be as determined by the technical committee as specified in Annex 1 of this MoU

7. **Shutdown Charge:**

In case of any obstruction in the supply of NEA due to Busbar shutdown and crossing etc during the construction of dedicated feeder, the shutdown charge for the period of such shutdown shall be paid by MOPIT in accordance with Electricity Distribution Bylaws of NEA.

8. **Construction of Busbar Extension & Line Bay:**

If it is necessary to expand the bay in the switchyard while constructing dedicated feeder, the requisite land for the same shall be arranged by MOPIT. However, if the land of NEA within its switchyard can be used, MOPIT shall be responsible to pay the rent of Rs. .... per year to NEA.

9. **Tariff:**

Tariff for extra supply of electricity through dedicated feeder shall be as determined by the Tariff Commission from time to time. Unless otherwise determined by the Tariff Commission, the tariff for the supply of the electricity shall be Rs. .... per unit.

10. **Capacity of the Dedicated Feeder:**

The capacity of the dedicated feeder shall be maximum 5 MW in 11 Kv.

11. **Supervision Charge:**

If MOPIT intends to construct the dedicated feeder by itself instead of through NEA under rechargeable works, an amount equivalent to 1.5 percent of total cost estimate shall be payable by MOPIT to NEA as supervision charge. If MOPIT decides to have the construction of the dedicated feeder by itself, MOE in coordination with NEA shall be responsible for the supervision of construction works of the dedicated feeder.

12. **Metering and other specifications:**

Provision in respect of metering and other arrangements shall be carried out by MOPIT in accordance with the standards as specified by NEA from time to time.

12. **Validity:**

This MoU shall be valid for a period of one year from the date of signing of these understanding. The validity hereof may be extended for a period as may be determined through mutual consent of all the parties hereto.

13. **Confidentiality :**

(a) The Parties hereto agree to keep confidential all information furnished to them by the other party which are designated as confidential by the other party or considered desirable to remain confidential. With respect to all such Confidential Information, however obtained, each Party shall:

(i) maintain the secrecy and confidentiality of all such information;

- (ii) not disclose any such information directly or indirectly, by any means, to any person or entity, except to its directors and other personnel engaged in the management of or providing assistance to the Company and who need to know such information to perform their responsibilities;
  - (iv) not use any such information for any purpose other than the implementation of this MoU.
- (b) Notwithstanding anything contained in Clause (a), the provisions of Agreement shall not be deemed to have been breached if:
- (i) such information have been disclosed prior to receiving by the Party and are in public domain;
  - (iii) it was obtained by the receiving Party from a third party having no obligation of confidentiality with respect to such information; or
  - (iii) it is required to be disclosed by applicable law and specifically in compliance of a Party's obligations under the applicable law.
- (c) Each Party shall be responsible to ensure that its directors, staff and other employees, and those of its Affiliates, who may receive such information, comply with the obligations set out in Clause (a).

**14. Exclusivity:**

Subsequent to the execution of this Understanding, the First Party shall be not be entitled to appoint any other party or parties, whether individually or in partnership on in cooperation with any other third party, as the distributor of the products within the territory.

**15. Governing Law :**

The formation, validity, interpretation and implementation of this MoU, shall be governed by the laws of Nepal. The courts at Nepal shall have exclusive jurisdiction in all matters arising out of and/or concerning this Agreement.

**16. Settlement of Disputes:**

- (a) In case of any dispute arising in connection with this interpretation or implementation of this understanding the Parties shall endeavor to settle such dispute amicably through consultations and negotiations between the Parties.
- (b) If no settlement could be reached through consultations and negotiations of the senior corporate management of each Party within 35 days of either Party delivering a notice of the dispute to the other Party, then such matter shall be finally referred to the court of Nepal having competent jurisdiction.
- (c) Contract Act, 2056 shall be the governing laws in respect of settlement of disputes between the parties

**17. Waiver and Severability:**

- (a) Any failure or delay on the part of any Party to exercise any right under this MoU



shall not operate as a waiver thereof; nor shall a single or partial exercise of any right preclude any other future exercise thereof.

- (b) If any provision of this MoU shall be determined to be invalid or unenforceable under applicable laws, all other provisions of this MoU shall continue in full force and effect unless such invalidity or unenforceability adversely affects the underlying intent of this Agreement or unless the invalid or unenforceable provision comprises an integral part of, or is inseparable from the remainder of this Agreement.

**18. Amendment:**

Any amendment to this MoU shall come into force only when it is executed in writing by all the Parties.

**19. Language:**

This MoU is executed in English language, which shall be deemed to be original. In case of any discrepancy between any translation and the above version the English version shall be considered in all respects.

**20. Matters not Included in this MoU:**

Matters referred to this MoU shall be duly carried out and in regard to the matters not mentioned in this MoU the same shall be addressed and resolved in mutual consultation.

**21. No Partnership or Agency:**

Nothing contained or implied in this MoU shall constitute or be deemed to constitute a partnership or agency between the Parties hereto and none of the Parties hereto will have any authority to bind, commit or make any representations on behalf of any of the other Parties hereto.

**22. Representation and Warranties:**

(a) Each Party hereby represents and warrants to the other Party that:

- (i) it is duly organised and validly existing under the laws of the jurisdiction of its establishment or incorporation;
- (ii) it has all necessary consents, approvals, powers, licenses, waivers, exemptions and authorities and approvals to enter into and perform its obligations under this MoU;
- (iii) its representative whose signature is affixed below hereto is fully authorised to sign this Agreement and to bind it pursuant to a valid authorisations or resolutions passed by their respective Board of Directors;
- (iv) this MoU shall constitute the legal, valid and binding obligations of such Party, enforceable against it in accordance with its terms;
- (v) neither the execution of, nor the performance of its obligations under, this MoU will conflict with, or result in a breach of, or constitute a default under respective incorporation document or Acts, Articles of Association, of either

of the parties, or any law, rule, regulation, authorisation or approval of any government agency or body, or of any agreement to which it is a party or is subject; and

(vi) there is no lawsuit, arbitration, or legal, administrative or other proceedings or governmental investigation pending or, to the best of the knowledge of such Party, threatened, against it with respect to the subject matter of this MoU that would affect in any way its ability to enter into or perform its obligations under this MoU.

(b) The Parties acknowledge and agree that the representations and warranties mentioned in Clause (a) are true, accurate, complete and not misleading at the date of this MoU. Each Party further agrees and acknowledges that the other Party is entering into this MoU on the faith and basis of these representations and warranties and is relying on their *bona fides*, accuracy and completeness.

(c) Each Party undertakes and agrees to compensate, indemnify, defend and hold harmless the other Party for all liability, losses, damages and claims, including, without limitation, fines, penalties, interest, legal, engineering, or consultants' fees and other costs arising out of any liability of such Party and any misrepresentation or breach of any warranty.

**23. Termination:**

This Understanding may be terminated by any of the Parties by providing a prior notice of ..... months and final settlement of accounts.

**24. Notice :**

All notices, consents, confirmations, or other communications between the Parties provided for in this Agreement shall be in writing, in English and delivered personally, by courier, registered airmail, facsimile or email to the Parties at the following addresses or fax numbers or email id:

**to MOE**

Attn.:  
Address: .....  
.....  
Telephone: .....  
Facsimile: .....  
Email: .....

**to MoPIT:**

Attn.: .....  
Address: .....  
.....  
Telephone: .....  
Facsimile: .....  
Email: .....

**to RBN:**

Attn.: .....  
Address: .....  
.....  
Telephone: .....  
Facsimile: .....  
Email: .....

- (b) All notices and other communications required or permitted under this MoU that are addressed as provided in Clause (a) will be deemed to have been delivered:
- (i) if delivered personally or by courier;
  - (ii) if delivered by facsimile and electronically confirmed; and
  - (iii) if sent by registered air mail, and received by the addressee four days after the same is dispatched.
- (c) If a Party changes its address such Party may give notice to the other Party.

**25. Entire Understanding:**

This MoU (included with all addendum, amendment referred to herein) shall constitute the entire understanding between the Parties and supersede any previous all written or oral statements, arrangement, representation and warranties which may have been made between them or on behalf of either party to the subject matter hereof.

**26. Counterparts:**

This MoU shall be executed in the English in separate counterparts, each of which when so executed and delivered shall be an original and all such counterparts shall together constitute one and the same instrument.

**IN WITNESS WHEREOF**, the Parties have caused their duly authorized representatives to execute this MoU on the date set forth below.

For and on behalf of MOE		For and on behalf of MoPIT	
Signature:		Signature:	
Name:		Name:	
Designation:		Designation:	
Date:		Date:	
Witnesses:			
Signature:	Signature:	Signature:	Signature:
Name:	Name:	Name:	Name:
Address: DoR	Address: RBN	Address: NEA	Address:
Date:	Date:	Date:	Date:

**Annex 1**

**Technical Committee**

The Technical Committee shall be constituted as under:

There shall be following three members in the Technical Committee

- 1.....
- 2.....
- 3.....

ToR of Technical Committee:

**17.2 TUNNEL O&M**

Annual operation and maintenance cost for 2.45km tunnel is assumed to be approximately 49.0 Million Nepali Rupee (NPR) while electricity fee is about 25.0 Million NPR, although road maintenance cost is covered by Road Fund and managed by Roads Board Nepal (RBN). In this regard, it is proposed to apply the toll rate system for tunnel users to allocate the annual operation and maintenance cost and the collected fee from this toll will be used for this Project. In this regard, the Project will be designed with toll facility including the road expansion before tollgate. Toll will be collect by RBN and DOR will undertake O&M. RBN and DOR agreed on toll collection to raise tunnel O&M fund and toll revenue shall be exclusively used for a tunnel O&M. The draft MOU for Toll Collection for Operation and Maintenance of Tunnel was prepared.

**Memorandum of Understanding**

**For**

**Toll Collection For Operation and Maintenance of the Tunnel**

This MoU has been signed on this 15<sup>th</sup> day of November 2014

**By and Between**

**Ministry of Physical Infrastructure and Transport**, having its address ....., duly represented by its authorized ..... Mr. ....(hereinafter referred to as MoPIT, which expression, unless repugnant to the context or meaning thereof shall be deemed to include its successors and permitted assign) of the other part,

**And**

**Ministry of Finance**, having its address at duly represented by its authorized ..... Mr. ....(hereinafter referred to as MoF, which expression, unless repugnant to the context or meaning thereof shall be deemed to include its successors and permitted assign) of the other part,

**Whereas, MoPIT** in coordination with DoR and RBN intends to construct underground tunnel highway of 2.5 kilo Meters starting from Badbhanjyang of Nagdhunga to Sisnekhola in Dhading District, in accordance with the decision of Government of Nepal dated ..... and intends to have the same operated and maintained

**NOW THEREFORE**, in consideration of the premises and the mutual covenants made and contained herein, the Parties hereto hereby agree as follows:

**1. Construction of the Tunnel:**

MoPIT shall, with the appropriate decision and permit from Government of Nepal, construct a 2.5 Kilo meters long tunnel starting from Badbhanjyang of Nagdhunga to Sisnekhola with

all facilities installed therein through the contractor selected by DoR through appropriate procedures as per the laws of Nepal. While having construction through the contractor, DoR shall appoint the consultant for the project.

**2. Land Acquisition:**

MoPIT shall take all necessary steps to acquire the land over the proposed tunnel. For the purpose, MoPIT shall fully acquire the land over the tunnel having earth cover between top of tunnel and the existing ground level is 2D or less (D is tunnel diameter and 20 meter, for this project) for ROW. The landowners of such land shall be compensated as per the decision of Compensation Determination Committee formed as per the provisions of amended Land Acquisition Act, 2034. For lands where earth cover between top of tunnel and the existing ground level is more than 2D (20m for this project), ROW shall not be acquired. However, any development on the land above the tunnel shall be restricted. As there exists no law in Nepal to restrict the development on such land, MoPIT shall take necessary steps to have the Land Acquisition Act, 2034 amended to enable it to restrict certain developments on such land and the land owner be compensated as per the decision of Compensation Determination Committee as established in accordance with amended Land Acquisition Act, 2034. Accordingly MoPIT shall take necessary steps to have tunnel location indicated in the Cadastral Map of each land owner and the Tunnel Management Office as established in accordance with the MoU shall periodically monitor the development on such land.

**3. Authority:**

Government of Nepal, vide its decision dated ..... empowers DoR for the operation and maintenance of the tunnel highway through "Tunnel Management Office for Tunnel" to be formulated under its auspices.

**4. Scope:**

Subject to and in accordance with the provisions of this MoU, the Applicable Laws and the Applicable Permits and the decision of Government of Nepal dated ..... DoR has been entrusted with the authority set forth herein including the exclusive right, license and authority during the subsistence of this MoU to operate and maintain the tunnel highway by way of raising tolls through RBN from the specified vehicles plying through the tunnel for a period of ..... years commencing from the date of this MoU and DoR hereby accepts the obligations and agrees to implement operation and maintenance of the tunnel highway subject to and in accordance with the terms and conditions set forth herein.

**5. Operation and Maintenance (O&M):**

It has been agreed that DoR shall formulate O&M manual that may be required for the operation and maintenance of tunnel highway in accordance therewith.

**a) Inspection:**

It shall be the responsibility of DoR to carryout daily routine inspection of the tunnel through its personnel.

**b) Routine Maintenance:**

DoR shall be responsible for the routine maintenance of the structure of the tunnel as well as the facilities installed therein.

**c) Repair/Replacement:**

DoR shall during its routine checkup programme, repair and replace the facilities installed in the tunnel to keep it always in good condition.

**d) Monitoring:**

DoR shall monitor the traffic movement, traffic accident, fire incidents, all the time. It shall be the responsibility of DoR to implement appropriate round the clock monitoring throughout the validity period of this MoU.

**e) Immediate Action:**

In order to take immediate action that may be required due to breakdown of vehicles or accidents, fire incidents and/or any damage or malfunctions of the installed facilities, DoR shall always keep ready an immediate action team in order to smooth functioning of the tunnel.

**f) Vehicle Control:**

DoR shall be responsible to control the vehicles carrying dangerous materials, vehicle height and overloaded trucks and shall have authority to stop the vehicles, movement of which in its opinion, is detrimental to the safety of the tunnel.

**6. Operation and Maintenance Organization:**

DoR shall, with the permission from Government of Nepal, if so required, constitute a separate unit named "Tunnel Management Office for the Tunnel" exclusively for the purpose of operation and maintenance of the tunnel. DoR shall deploy sufficient numbers of personnel as may be required from time to time. For the purpose it shall have one Director looking after the following Sections with their scopes specified as hereunder:

**a) Administration Section:**

Administration Section shall have the responsibility on Budgeting, Accounting, General Administration and other functions as may be directed by the Director from time to time.

**b) Maintenance Section:**

Maintenance Section shall have the responsibility on daily Inspection, routine maintenance, repair, periodic maintenance works and other functions as may be directed by the Director from time to time.

**c) Surveillance and Information Section:**

Surveillance and Information Section shall have the responsibility to carryout effective Patrolling, surveillance, information provision to Road Users round the clock throughout the validity period of this MoU.

**d) Action Team for Emergency Cases:**

Action Team shall be responsible for removal of breakdown Vehicles, immediate action during emergency cases, coordination with Police, Fire Brigade, ambulance, local governments, etc.

**e) Vehicle Regulation Section:**

Vehicle Regulation Section shall be responsible for regulation of tank lorry or other vehicles carrying hazardous material, over height as well as overloaded vehicles in coordination relevant authorities.

**7. Toll:**

- a) Subject to and in accordance with the provisions of this MoU, the Applicable Laws and other necessary permits from Government of Nepal, RBN shall raise the toll from different categories of vehicles using the tunnel highway in accordance with the toll rate as determined by Government of Nepal from time to time. While collecting tolls, RBN shall, by itself or through selection of private sector operators as per the procedure as determined by Roads Board Act, 2058 Road Board Rules, 2060, Roads Board Directive, 2061, Procedure for Raising toll Rules, 2060 and its first amendment 2061 as well as other requisite permits from Government of Nepal, shall raise the toll from the users of the tunnel. RBN shall have the power to refuse the entry of any such vehicles to the tunnel, which it deems detrimental to the structure and safety of the vehicle.
- b) RBN may not collect the tolls from certain categories of vehicles such as Government vehicle, ambulance, fire brigade, etc., and other vehicles as may be instructed by Government of Nepal from time to time.
- c) For the purpose of raising toll, the vehicles are categorized as specified in Annex III.

**8. Funds for Operation and Maintenance of the Tunnel:**

In order to meet the requirement of the operation and maintenance cost, RBN shall, after deducting its administrative costs, provide DoR the following funds from following sources:

- a) 100% of the funds collected through toll after the deduction of the administrative costs of RBN.
- b) .....% of the amount raised by Government of Nepal in one fiscal year against fuel tax as well as vehicle registrations. MoF shall be responsible for providing such fund to DoR.

The funds from both the sources shall be provided by RBN to DOR in every 6 months for its exclusive use in the tunnel operation and maintenance.

However, during the first year of the operation and maintenance of the tunnel, DoR would not have sufficient resources for the operation and maintenance of the tunnel. Therefore, MoF vide its decision dated ..... decided to provide the amount of Rs. .... (in words Rupees ..... ) to DoR for initial 6 months. RBN, from time to time, effect periodical monitoring to check as to whether or not the toll revenue provided by RBN to DOR has been exclusively used for tunnel operation and maintenance and instruct DOR in order to use the fund exclusively for the tunnel operation and maintenance, should there be any discrepancy in the use of the fund and it shall be the duty of DOR to abide by such instructions of RBN.

**9. Road Furniture, Safety Signs and Information Boards:**

It shall be the responsibility of the DoR to place appropriate numbers of appropriate road furniture, safety signs and information boards in appropriate places.

**10. Closure of the Tunnel:**

DoR may close the tunnel for a period as may be required for the periodic repair and maintenance of the tunnel to keep the structure, facilities installed therein as well as condition of the tunnel vehicle worthy.

**11. Insurance:**

It shall be the responsibility of DoR to effect appropriate insurance policies that may be

required for the safety of the structure, facilities, personnel etc.

**12. Audit:**

It shall be the responsibility of DoR to maintain appropriate books of accounts clearly reflecting day to day incomes and expenses of the Operation and Maintenance Unit (i.e. Tunnel Management Office for the Tunnel) and have them audited as per the laws and Government instructions.

**13. Inspection and Monitoring:**

RBN shall be responsible to inspect and monitoring of toll collection by the third party, operation and maintenance of the tunnel by DoR and proper utilization of collected fund by DoR exclusively for operation and maintenance of the tunnel.

**12. Validity:**

This MoU shall be valid for a period of ..... years from the date of signing of these understanding. The validity hereof may be extended for a period as may be determined through mutual consent of all the parties hereto.

**13. Confidentiality :**

(a) The Parties hereto agree to keep confidential all information furnished to them by the other party which are designated as confidential by the other party or considered desirable to remain confidential. With respect to all such Confidential Information, however obtained, each Party shall:

- (i) maintain the secrecy and confidentiality of all such information;
- (ii) not disclose any such information directly or indirectly, by any means, to any person or entity, except to its directors and other personnel engaged in the management of or providing assistance to the Company and who need to know such information to perform their responsibilities;
- (iv) not use any such information for any purpose other than the implementation of this MoU.

(b) Notwithstanding anything contained in Clause (a), the provisions of Agreement shall not be deemed to have been breached if:

- (i) such information have been disclosed prior to receiving by the Party and are in public domain;
- (iii) was obtained by the receiving Party from a third party having no obligation of confidentiality with respect to such information; or
- (iii) it is required to be disclosed by applicable law and specifically in compliance of a Party's obligations under the applicable law.

(c) Each Party shall be responsible to ensure that its directors, staff and other employees, and those of its Affiliates, who may receive such information, comply with the obligations set out in Clause (a).



- 14. Exclusivity:**  
Subsequent to the execution of this Understanding, the First Party shall be not be entitled to appoint any other party or parties, whether individually or in partnership or in cooperation with any other third party, as the distributor of the products within the territory.
- 15. Governing Law :**  
The formation, validity, interpretation and implementation of this MoU, shall be governed by the laws of Nepal. The courts at Nepal shall have exclusive jurisdiction in all matters arising out of and/or concerning this Agreement.
- 16. Settlement of Disputes:**
- (a) In case of any dispute arising in connection with this interpretation or implementation of this understanding the Parties shall endeavor to settle such dispute amicably through consultations and negotiations between the Parties.
  - (b) If no settlement could be reached through consultations and negotiations of the senior corporate management of each Party within 35 days of either Party delivering a notice of the dispute to the other Party, then such matter shall be finally referred to the court of Nepal having competent jurisdiction.
  - (c) Contract Act, 2056 shall be the governing laws in respect of settlement of disputes between the parties
- 17. Waiver and Severability:**
- (a) Any failure or delay on the part of any Party to exercise any right under this MoU shall not operate as a waiver thereof; nor shall a single or partial exercise of any right preclude any other future exercise thereof.
  - (b) If any provision of this MoU shall be determined to be invalid or unenforceable under applicable laws, all other provisions of this MoU shall continue in full force and effect unless such invalidity or unenforceability adversely affects the underlying intent of this Agreement or unless the invalid or unenforceable provision comprises an integral part of, or is inseparable from the remainder of this Agreement.
- 18. Amendment:**  
Any amendment to this MoU shall come into force only when it is executed in writing by all the Parties.
- 19. Language:**  
This MoU is executed in English language, which shall be deemed to be original. In case of any discrepancy between any translation and the above version the English version shall be considered in all respects.
- 20. Matters not Included in this MoU:**  
Matters referred to this MoU shall be duly carried out and in regard to the matters not mentioned in this MoU the same shall be addressed and resolved in mutual consultation.
- 21. No Partnership or Agency:**  
Nothing contained or implied in this MoU shall constitute or be deemed to constitute a partnership or agency between the Parties hereto and none of the Parties hereto will have any authority to bind, commit or make any representations on behalf of any of the other Parties

hereto.

**22. Representation and Warranties:**

- (a) Each Party hereby represents and warrants to the other Party that:
- (i) it is duly organised and validly existing under the laws of the jurisdiction of its establishment or incorporation;
  - (ii) it has all necessary consents, approvals, powers, licenses, waivers, exemptions and authorities and approvals to enter into and perform its obligations under this MoU;
  - (iii) its representative whose signature is affixed below hereto is fully authorised to sign this Agreement and to bind it pursuant to a valid authorisations or resolutions passed by their respective Board of Directors;
  - (iv) this MoU shall constitute the legal, valid and binding obligations of such Party, enforceable against it in accordance with its terms;
  - (v) neither the execution of, nor the performance of its obligations under, this MoU will conflict with, or result in a breach of, or constitute a default under respective incorporation document or Acts, Articles of Association, of either of the parties, or any law, rule, regulation, authorisation or approval of any government agency or body, or of any agreement to which it is a party or is subject; and
  - (vi) there is no lawsuit, arbitration, or legal, administrative or other proceedings or governmental investigation pending or, to the best of the knowledge of such Party, threatened, against it with respect to the subject matter of this MoU that would affect in any way its ability to enter into or perform its obligations under this MoU.
- (b) The Parties acknowledge and agree that the representations and warranties mentioned in Clause (a) are true, accurate, complete and not misleading at the date of this MoU. Each Party further agrees and acknowledges that the other Party is entering into this MoU on the faith and basis of these representations and warranties and is relying on their *bona fides*, accuracy and completeness.
- (c) Each Party undertakes and agrees to compensate, indemnify, defend and hold harmless the other Party for all liability, losses, damages and claims, including, without limitation, fines, penalties, interest, legal, engineering, or consultants' fees and other costs arising out of any liability of such Party and any misrepresentation or breach of any warranty.

**23. Termination:**

This Understanding may be terminated by any of the Parties by providing a prior notice of ..... months and final settlement of accounts.

**24. Notice :**

All notices, consents, confirmations, or other communications between the Parties provided

for in this Agreement shall be in writing, in English and delivered personally, by courier, registered airmail, facsimile or email to the Parties at the following addresses or fax numbers or email id:

**to MoPIT:**

Attn.: .....  
Address: .....  
.....  
Telephone: .....  
Facsimile: .....  
Email: .....

**to MoF:**

Attn.: .....  
Address: .....  
.....  
Telephone: .....  
Facsimile: .....  
Email: .....

- (b) All notices and other communications required or permitted under this MoU that are addressed as provided in Clause (a) will be deemed to have been delivered:
  - (i) if delivered personally or by courier;
  - (ii) if delivered by facsimile and electronically confirmed; and
  - (iii) if sent by registered air mail, and received by the addressee four days after the same is dispatched.
- (c) If a Party changes its address such Party may give notice to the other Party.

**25. Entire Understanding:**

This MoU (included with all addendum, amendment referred to herein) shall constitute the entire understanding between the Parties and supersede any previous all written or oral statements, arrangement, representation and warranties which may have been made between them or on behalf of either party to the subject matter hereof.

**26. COUNTERPARTS:**

This MoU shall be executed in the English in separate counterparts, each of which when so executed and delivered shall be an original and all such counterparts shall together constitute one and the same instrument.

**IN WITNESS WHEREOF**, the Parties have caused their duly authorized representatives to execute this MoU on the date set forth below.

For and on behalf of  
MoPIT

Signature:  
Name:  
Designation:  
Date:

For and on behalf of  
MoF

Signature:  
Name:  
Designation:  
Date:

**Witnesses:**

For and on behalf of  
DoR

Signature:  
Name:  
Address:  
Date:

For and on behalf of  
RBN

Signature:  
Name:  
Address:  
Date:

**Annex 1**

**Technical Committee**

The Technical Committee shall be constituted as under:  
There shall be following three members in the Technical Committee

- 1.....
- 2.....
- 3.....

ToR of Technical Committee:

**Annex-II  
Time Schedule**

- a) Finalization of the concept for setting the toll policy by MOPIT by Mid-September, 2014.
- b) Finalization of MOU for toll collection among MOPIT and MOF by Mid-November, 2014.
- c) Submission of the signed MOU above to JICA by Mid- November, 2014.
- d) Decision by RBN on who collect tolls (RBN by itself or outsourcing) by Mid-2019.
- e) Decision by MOPIT, DOR and RBN on toll rates to be collected by Mid-2019.
- f) Recruitment and training of toll collection work or selection of a private toll collection company by RBN by Mid-2020.
- g) Creation of Toll Management Office by DOR by Mid-2020.
- h) Start of O&M of the tunnel by DOR and collection of a toll by RBN when the tunnel is opened for traffic which is expected August 2021.

### **Annex III**

#### **Toll Rate (per entry)**

Heavy Vehicles – NRs. 35.00

Light Vehicles – NRs. 25.00

### **17.3 DRAFT GUIDELINE FOR UNDERGROUND RIGHT OF LAND OWNERS**

For the construction for tunnel, the rule and/or guideline for area of above tunnel are necessary for the management of safety surrounding tunnel area. Especially it is necessary to confirm the underground right of surface land owner and confirmation among related parties (ex. MOPIT, DOR, Ministry of Law and Justice(MOLJ).) In order to enhance the necessary process, the concept paper was prepared and option 4 as “no land acquisition by Government but certain activities restricted with the payment of compensation” was recommended. In order to realize the above situation, survey team prepared the draft documents for amendment in Land Acquisition Act, 2034.

#### **Draft concept note for Rule of Tunnel Construction (Draft ROW acquisition, underground right for tunnel)**

##### **Right-of-Way (ROW)**

As per the laws of Nepal, the landowner shall have exclusive right on the lands held by them. However, the Government may exercise its right of eminent domain for the acquisition of the land by the payment of appropriate compensation as determined by the Compensation Committee to the landowner and disallow the landowners to use their land.

The land owners have unlimited underground right on their land and the only provision in respect of underground findings are mentioned in Mines and Minerals Act, which categorically specified that the ownership on findings of any mines and minerals under the land of the landowner shall be of Government of Nepal. No other such specific underground restrictions to the landowner are available as of now.

ROW in respect of electricity transmission lines are however to some extent clear. According to the practice, the landowners are restricted from planting trees, construction of buildings etc, under the stretch of transmission lines. However, the land required for the construction of transmission towers are required to be acquisitioned. The land owners under the stretch of transmission lines are however, allowed for cultivation of crops and also allowed to sell the land to any other person, if they want. As regards the compensation for disturbance to the landowners, a compensation equivalent to 10% of the land value has been determined.

Despite of this, now problems are coming up as the landowners feel that the provision of 10% of the land value are not adequate and do not compensate their problems. Khimti-Dhalkebar transmission line project has recently seen such problem and ultimately the government has come up with the proposal to acquire 100% of the land under the stretch of transmission line. But land acquisition has not yet been effected.

In respect of tunnel, no such norms have yet been determined by Government of Nepal. It may be appropriate to either acquire 100% of the land through the exercise of Eminent Domain by

Government of Nepal and fully compensate the landowners and rehabilitate the landowners to other place, or with proper arrangements with the local landowners, relevant local governments, the landowners be compensated as disturbance fee and let the landowners remain there itself and carryout general cultivations. The amount of compensation as well as restriction to the landowner may be determined through mutual discussion with the committee of landowners and local government.

However, while doing so, the Government must restrict the landowners from carrying out certain underground activities which may be detrimental to the structure of the tunnel, such as piling works, digging of well, or any other activities to extract ground water, construction of high rise buildings etc. The local government should always monitor the construction works in such places and not approve any construction plans hampering the tunnel. Besides, it should always monitor illegal constructions on such demarcated land property.

### **Constitutional Provision on Eminent Domain:**

#### **Interim Constitution of Nepal, 2063**

#### **Article 19**

#### **Right to property:**

(1) Every citizen shall, subject to the laws in force, have the right to acquire, own, sell, dispose of, and otherwise deal with, property.

(2) The State shall not, except in the public interest, requisition or acquire, or otherwise create any encumbrance on, the property of any person.

Provided that, this Clause shall not apply to any property acquired in an illicit manner.

(3) Compensation shall be provided for any property requisitioned, acquired or encumbered by the State in the course of enforcing a scientific land reform program or in the public interest, in accordance with law. The amount and basis of compensation and the procedure therefor shall be as determined by law.

In accordance with the Constitutional provision, the power to acquire the land is vested with the State. However, right to property being the fundamental right of the citizen of Nepal, the state is restricted to exercise its power of eminent domain only for the purpose of public interest. At the time of acquisition of the land in public interest by the State, the aggrieved party is entitled by the Constitution to the compensation as determined by the law.

From the above, it can be well deduced that the State can acquire the land as per the law with the payment of compensation as determined by the law.

The law of Nepal in respect of acquisition of the land containing legal provision for the determination of compensation is Land Acquisition Act, 2034.

#### **Major Highlights of Land Acquisition Act, 2034**

#### **Section 2 (a)**

"**Land**" shall mean, any land under the ownership and possession of any person and building, wall, trees fixed thereon. It shall also include anything that are permanently fixed to the land.

**Section 2 (b)**

"Public Works" shall mean the work that may be carried out in public benefit, interest and use or any works that is carried out on behalf of Government of Nepal. It shall also include the following works:

- 1) Projects approved by Government of Nepal.
- 2) Projects to be implemented by local government.

**Section 2(c)**

"Local Officer" shall mean the officer specified by Government of Nepal. It shall mean Chief District Officer, If such officer is not specified.

**Section 3**

**Right of Government of Nepal to acquisition the land for the purpose of public works:**

If Government of Nepal deems necessary to acquire any land for any public works, Government of Nepal may, subject to the availing of the compensation thereof, acquire the land of any place in any quantity.

**Section 4**

**Land may be acquisitioned for institutions:**

- (1) In the case of application to Government of Nepal by any institution for the acquisition of land for the following purposes, subject to the bearing of all other expenses and the compensation in accordance with the Act by it, Government may effect the decision for the acquisition of the land for such institutions:
  - a) For the construction of residential buildings for the employee, workers of such institution or in order to make arrangement for other facilities for them or for any other works of public welfare.
  - b) For the operation of project related to the institution fully owned by Government of Nepal or for the purpose of construction of storage facility for the goods related to or produced by such institution.
- (2) No proceeding on the acquisition of the land in accordance with the Act shall be initiated unless a deed of consent on the following subject matter is not executed by such institution:
  - a) To avail to Government of Nepal, the expenses that is incurred or to be incurred in the course of land acquisition,

**Section 5**

**Decision on land acquisition and officer to initiate preliminary proceedings:**

- (1) Subsequent to the decision by Government of Nepal on the acquisition of land for the purposes of Section 3 and 4, ..... the concerned project in charge, if the land is to be acquisitioned for project, shall initiate the preliminary proceeding to determine the land to be acquisitioned.
- (2) If the concerned institution requests to Government of Nepal in order to have the employee of the institution nominated for the purpose of preliminary proceedings as per Sub Section (1), Government of Nepal may issue an order entitling the employee at least of officer level of such institution to initiate such preliminary proceedings.

**Section 6**

**Preliminary proceeding on land acquisition**

- (1) The land acquisition officer as per Section 5 shall, for the purpose of information to the

concerned person, affix a copy of notice at each of following offices and places:

- a) The place near the concerned land to be acquisitioned where there is a high movement of general people.
  - b) Office of concerned Village Development Committee or Municipality.
  - c) On the gate or compound wall , if the building and the surrounding land is to be acquisitioned.
- (2) The land acquisition officer may, within three days from the date of affixation of notices, enter the land or building to be acquisitioned, along with necessary employee and workers for
- a) Carrying out survey works
  - b) collect the sample of soil, stones, to dig a pit or carry out boring for the purpose to examination as to whether such land is appropriate for acquisition or not.
  - c) demarcation of land appropriate for acquisition
  - d) to install any equipment

### **Section 8**

#### **Reporting on preliminary proceedings**

- (1) The land acquisition officer shall, within fifteen days from the date of initiation of preliminary proceedings, complete such works of preliminary proceedings and determine the land appropriate for acquisition and submit a report thereof along with necessary details to local officer at the earliest.
- (2) Such report shall contain the complete detail of amount of compensation and the damages for loss

### **Section 9**

#### **Notice of land acquisition**

- (1) The local officer shall, subsequent to the receipt of report on preliminary proceedings, issue a notice specifying the following matters
  - (a) Purpose of land acquisition
  - (b) Whether only the land is to be acquisitioned or even the building constructed thereon is to be acquisitioned.
  - (c) Name of Village Development Committee or Municipality and the Ward No. where the land is located.
  - (d) Plot number, if survey has been conducted.
  - (e) any other particulars for the identification of the land, if survey has not been conducted.
  - (f) area of the land
  - (g) other necessary particulars
- (2) A copy of notice shall be affixed on each of the following place or office:
  - (a) local office of the project for which the land is being acquisitioned
  - (b) District Administration Office
  - (c) office of concerned Village Development Committee or Municipality
  - (d) Land Administration Office or Land Revenue Office
  - (e) The place near the concerned land to be acquisitioned where there is a high movement of general people.
  - (f) Other places deemed necessary by local officer.

### **Section 10**

#### **Necessary matters to be specified in the Notice**

- a) The notice shall mention the time period and office of distribution of compensation, if the amount of compensation has already been determined. Such notice shall also



- mention about the time period of 15 days for the submission of application to claim the compensation along with the documents substantiating the ownership.
- b) Standing crops, trees, building, wall etc., entitled to be cleared and collected by the owner.

### **Section 11**

#### **Complaint by the land owner**

- 1) The concerned land owner may, if he has any reason in order not to have the land acquisition, file the complaint at Government of Nepal, Ministry of Home Affairs, through local officer, within 7 days from the date of affixation of notice as per Section 9 specifying the reasons thereof.
- 2) Government of Nepal, Ministry of Home Affairs shall, before reaching the decision thereon, consult the officer to effect preliminary proceeding and the local officer, if such is deemed necessary.
- 4) The decision thereon shall generally be taken within 15 days from the date of filing of complaint.

### **Section 12**

#### **Right to acquisition the land**

- (1) Subsequent to the issue of notice as per Section 9(1) and final settlement on complaint as per Section 11 (1) or subsequent to the elapse of notice period, if no complaint has been filed, the local officer may at any time acquire the possession of the concerned land and provide the land to the institution for which the land has been acquisition, if the land is acquisitioned for any institution. Subsequent thereto, the land so acquisitioned may be used for the specified purpose.

### **Section 13**

- (1) The amount of compensation for land acquisitioned as per the Act shall be provided in cash.
- (2) There shall be a Compensation Committee consisting following officers to determine the amount of compensation:
  - a) Chief District Officer
  - b) Chief of Land Administration or Land Revenue Office
  - c) Project in charge, if the land is acquisitioned for project, or any officer deputed by Chief District Officer, if such land is being acquisitioned for any other purposes.
  - d) a representative of District Development Committee

### **Section 22**

#### **Transfer of title to the land**

Subsequent to the possession of the land as per Section 12, the title to such land shall be transferred to the Government or the institution for which the land has been acquisitioned.

### **Section 25(7)**

The person dissatisfied on the amount of compensation may file the complaint with Government of Nepal, Ministry of Home Affairs within 15 days from the date of issue of notice on compensation. The decision of Ministry of Home Affairs shall be final in respect thereof.

### **Section 27**

#### **Land may be acquisitioned through negotiation**

Notwithstanding anything specified anywhere in the Act, Government of Nepal may acquisition any land for public works through negotiation with concerned land owner. Other formalities of the Act is

not necessary to be fulfilled while acquisitioning the land through negotiation.

#### **Section 40**

##### **Officer to hear the case and appeal**

- 1) Chief District Officer shall be the officer to hear preliminary proceeding and decide on the matter pertaining to offences under the Act.
- 2) An appeal may be filed on the decision of Chief District Officer within 35 days at the concerned Appellate Court.

#### **Electricity Act, 2049**

#### **Section 33**

##### **Utilization or Acquisition of Other's Land and House:**

- (1) If it is required that the land and house of any person be used or acquired for the purpose of generation, transmission, or distribution of electricity, the licensee may submit an application to Government of Nepal.
- (2) On receipt of an application pursuant to Sub-section (1), Government of Nepal may, after conducting necessary enquiries into the matter, make available such land and house in the same manner as it makes available to any corporate body under the prevailing laws. If the land is owned by the government, such premises shall be made available on lease for the period up to the term of license.
- (3) If a construction work relating to the generation, transmission, or distribution of electricity has been performed by Government of Nepal or a licensee, Government of Nepal may prohibit to use the premises of a house or land located in the area where such construction work is performed or the premises of a house or land located in the prescribed distance from such place of construction by any other person for any specified purpose. Government of Nepal or the licensee shall pay compensation, as prescribed, to the concerned person for such damage or loss caused due to such prohibition.

#### **Forest Act, 2049**

#### **Section 68**

##### **Forest May be Used:**

- (1) Notwithstanding anything stated elsewhere in the Act, if there is no alternate than to use the forest for national priority project, and if there is no substantial adverse impact in the environment, the Government of Nepal shall grant the permit for the use of any part of such Government Managed Forest, Protected Forest, Community Forest, Contract Forest or Religious Forest.
- (2) While granting such permit, if such causes any loss or damage to any person or community, the Government of Nepal shall make appropriate arrangement in that regard.

#### **Procedure for the Availing of Forest Land for Other Purposes, 2063**

- (1) The forest area shall not be made available for the implementation of other purposes other than for the project of national priority of Government of Nepal. If various authorities of Government of Nepal specifically require forest area for the implementation of the project, such authorities shall request for the forest area along with the fact based information details and a letter from National Planning Commission stating such project to be project of national

priority. The decision as to whether or not a project is of national priority shall be made by Government of Nepal (Council of Ministers).

- (5) If there is no other alternative other than the use of forest land for the implementation of the projects with profit motive having national priority such as hydropower, telecommunication, etc., such project shall, at its own cost effect the plantation on the land, equivalent to the land covered by its physical infrastructure, as designated by the concerned District Forest Office as a compensation and the same shall be handed over to District Forest Office subsequent to their conservation for 5 years. If the project is unable to effect such works, the estimated cost for the plantation and conservation for 5 years as per norms shall be made available to the concerned District Forest Office and the District Forest Office shall, in accordance therewith, effect the plantation and conservation thereof.

For all the forest area to be used by the project shall, unless provided otherwise, be charged a sum equivalent to the charges as specified for Contract Forest as per schedule 20 of Forest Rules, 2051 and such shall be deposited in the concerned revenue account. If the trees at the area designated to the project by obtaining charges are found essential to cut down for the construction and implementation of the project, such project shall, without the decrease in the area of forest area of which the trees have been fallen down, effect plantation of trees in a number 25 times of the number of fallen down trees (of radius more than 10 cm) at its own cost at the place designated by the same to concerned District Forest Office subsequent to the conservation thereof for 5 years. If the above works could not carried out by the project, such project shall make available the amount as per the estimate to the concerned District Forest Office and the District Forest Office shall effect plantation and conservation thereof accordingly.

#### **RoW in respect of Electricity Transmission Projects**

In respect of transmission line projects, applicable and enabling laws in respect of RoW are Electricity Act and Electricity Rules. The provisions of the Act and Rules are illustrated in the case as mentioned hereunder. For your information, the compensation of 10% is nowhere specified in policy, Acts or Rules. It is the amount determined by Compensation Determination Committee formed under Electricity Rules. In this particular case the title to the land was not transferred to Government. Only certain activities of the land owners were restricted. The Supreme Court of Nepal validated the compensation of 10% of land value being provided to the landowners.

***Binod Prasad Mainali and others Vrs. Cabinet Secretariat of Government of Nepal and others (case no. 3427 of 2053 BS, date of decision 2055.5.25 / 10 September 1998, Full Bench; decision published in Nepal Kanoon Patrika 2056 decision no. 6680)***

Supreme Court of Nepal refused to issue an order as demanded by the petitioners to invalidate gazetted notification with reference to land acquisition for Nepal Electricity Authority (NEA) for the transmission line strengthening project. The petitioner had demanded for compensation as per market rates for land under the transmission line, instead of 10%. The decision observed the followings:

- that section 33(3) of Electricity Act, 2049 allows Government of Nepal to prohibit use of premises of a house or land located in the area where construction work of transmission line etc. is performed, for which compensation as prescribed, has to be paid.

- that rule 66 of Electricity Rules, 2050 provides for issuance of notice for the purpose of Section 33(3) of the Act, Rule 87 grants compensation, Section 88 provides for formation of Compensation Determination Committee. The objective of such provision in Act and Rules is to regulate, operate and ensure safety of the generation, transmission and distribution related works;
- that such construction and operation of transmission line is not attributable to provide more benefit to any limited number of people but for public at large and that all in the affected area have to be treated equally.
- that the restrictions are for construction and to plant trees, for which compensation has been provided, however use of land for agriculture has not been prohibited.
- that the notice in accordance with Electricity Act and Rules has not infringed the constitutional right to equality and also that the right to property under Article 17 of the constitution, where such property may be acquired or expropriated for public benefit.
- that there the **land may be used for purpose other than those restricted, that 10% compensation is being paid for such restriction** and that the ownership on land shall remain unchanged, therefore the plea that there is an infringement of fundamental right cannot be accepted.

**Verdict of the Court:**

**"Upon analysis of the above mentioned legal provisions and the notice issued in accordance therewith, there is no factual basis to conclude that the acts are against the constitution. The petitioner's plea and their attorneys submission that there has been an infringement of rights granted by the constitution is not acceptable on the basis that those are in accordance with the provisions of Electricity Act and the Electricity Rule formulated under its authority for electricity survey, generation, transmission and distribution are matters of public benefit and interest and enacted to manage and to make it safe".**

**RoW for Tunnel**

As of now, there is no Act, Rules, Policies in Nepal which regulate the RoW for tunnel works. In order to have the RoW for tunnel works, there may be the following options:

**Option No. 1**  
**Total Acquisition**

For the exercise of this option, the Government shall have to exercise the Power of Eminent Domain and acquire the lands in question with the payment of compensation equivalent to 100 percent of the land value in accordance with Land Acquisition Act, 2034.

The provisions of Land Acquisition Act have already been mentioned hereinabove and the said law is therefore, an enabling law in this respect.

**Though this option can be exercised through existing legal provisions, this is a costly affair.**

**Compensation in respect of the land in this option is determined by legally constituted Compensation Determination Committee.**

**Option No. 2**  
**Partial Acquisition and Partial Restrictions:**

For the exercise of this option, the lands above the tunnel can be categorized in two categories:

- a) Lands for total acquisition
- b) Lands with limited rights

While exercising this option, the Government shall, instead of acquiring whole of the land, acquire those lands identified under group (a) above, which is most necessary for tunnel safety and have the title thereon transferred in the name of Government of Nepal.

The lands which have the cover less than 20 Meters above the tunnel are identified as the lands wherein all activities of the surface landowners are required to be restricted and therefore necessary to be acquisitioned by the Government.

**Existing legal provisions shall not hinder the implementation of this part (a) of Option No. 2.**

**Compensation in respect of the land in this option is determined by legally constituted Compensation Determination Committee.**

While exercising part (b) of this option, the Government of Nepal shall not acquire the identified land, but places certain restrictions on the land with the payment of compensation to concerned land owners.

**There are legal hurdles in the exercise of this part (b) of the option. In the absence of any enabling legal provisions in respect of placing of restrictions to surface land owners, the option could be challenging one. Placing of restriction shall, in the absence of enabling legal provision as mentioned in Electricity Act and Electricity Rules, constitute an infringement of the legal rights of the landowners.**

**There shall be another question in respect of determination of amount of compensation. In the absence of legal provisions, Compensation Determination Committee cannot be constituted legally.**

**Third problem may come up if the landowner sells the land to any third party after obtaining the compensation.**

**Mitigation measures:**

The enabling legal provisions may be incorporated either through new enactment or through amendment in Land Acquisition Act, 2034.

**Option No. 3**  
**Full acquisition of the land but possessory rights with landowners**

In this option, the Government shall acquire whole of the land and the title to the land shall be transferred in the name of Government of Nepal. Government of Nepal shall place restriction on the activities but allow the person to effect only the agricultural activities on the acquired

land. The amount of the compensation shall be negotiated by Government with the individual landowners and contract shall be effected with every individuals.

While implementing this option, legal hurdle is lesser and the amount of compensation to be provided to the landowners can be negotiated and minimized. Having already transferred the title to the land, the landowners cannot sell or lease the land to any third party.

**This option may be less costly than that of Option No. 1, but costlier than that of Option No. 2. Secondly entering into agreement with each individual landowner may be cumbersome process.**

#### **Option No. 4**

#### **No land acquisition by Government but certain activities restricted with the payment of compensation**

In the absence of legal provisions to restrict the landowners from uninterrupted use of the land, and also in the absence of legal provisions on determination of compensation, this option, despite being suitable (as in the case of electricity transmission line projects), cannot be implemented.

#### **Mitigation measures:**

The enabling legal provisions may be incorporated either through new enactment or through amendment in Land Acquisition Act, 2034.

#### **Option No. 5**

#### **Long Term Lease (of maybe 100 years)**

While implementing this option, Government of Nepal shall enter into long term lease agreement with individual landowners and the amount of compensation is mutually determined. In this option the landowners shall have the facility to use the land for agricultural purpose but are restricted to carry out certain activities.

There will not be legal issues while obtaining the land on lease by government and allowing the landowners to use the land for agriculture purpose during the lease period. However, there will be legal issues after the expiry of lease period. If the landowner's successor does not intend to extend the lease period, it will be a problem in the operation of tunnel in safe manner.

#### **Conclusion:**

We can observe from the above cited case decided by the Supreme Court, the basis of the decision to confirm and validate the compensation amount to be 10% of the land value, has been the enabling Clause of Electricity Act and Electricity Rules.

In conclusion, there is a lack of enabling legal provision for the acquisition of RoW specifically for tunnel. Though there exists enabling provisions in Electricity Act and Rules, those provisions are not applicable in respect of tunnel. Therefore, in the case of tunnel, new enactment of legislative framework to restrict the concerned landowners from carrying out certain activities or amendment in the existing Land Acquisition Act, 2034, incorporating the provision to pose specific restriction on concerned landowners in respect of major infrastructure works is necessary in order to address long term problem associated therewith.

**If any new enactment can be achieved or if some legal provision could be incorporated in existing Land Acquisition Act, 2034 by way of amendment in the Act, in our opinion, the most suitable option shall be Option No. 4, wherein government shall not acquire the land and the landowners shall have limited rights and the landowners are paid minimum compensation for their restricted use of land.**

**ORIGINAL PROVISIONS IN LAND ACQUISITION BILL**

**Section 2 (d)**

"Land Acquisition" shall mean expropriation or acquisition or creation of any right on the land of any person in permanent, temporary or any other manner by the state for the purpose of public interest.

**Section 12**

Restriction on transfer of title:

Subsequent to the affixation of the notice as per Section 10, the officer to initiate the initial proceeding shall, within three days, write to the concerned office in order not to register the deed for the transfer to title and upon such letter, the concerned office shall also stop the registration of transfer of title on such land.

**Section 14(3)**

The notice as per Sub-Clause (2) shall specify the following matters:

- (b) Whether only the land is to be acquisitioned or the building and walls are also to be acquisitioned.

**Section 29**

Notice to acquisition the land:

- (b) Whether only the land is to be acquisitioned or the building and walls are also to be acquisitioned.

**Section 51**

Entire land is to be acquisitioned:

If only a portion of the land is to be acquisitioned, or if the land is to be acquisitioned by acquiring some of the rights thereon, the proceeding shall be initiated to acquire any land remaining after social impact assessment or the entire land, if such land cannot be used commercially.

**AMENDMENT REQUIRED TO READ AS FOLLOWS:**

**Section 2 (d)**

"Land Acquisition" shall mean expropriation or acquisition or creation of any right *OR LIMIT THE RIGHT OF THE LANDOWNER* on the land of any person in permanent, temporary or any other manner by the state for the purpose of public interest.

**Section 12**

Restriction on *CERTAIN ACTIVITIES OR* transfer of title:

Subsequent to the affixation of the notice as per Section 10, the officer to initiate the initial proceeding shall, within three days, write to the concerned office in order not to register the deed for the transfer of title *OR EFFECTUATE THE RESTRICTION ON CERTAIN ACTIVITIES OF THE LANDOWNER* and upon such letter, the concerned office shall also stop the registration of transfer of title on such land *OR EFFECTUATE THE RESTRICTION ON CERTAIN ACTIVITIES OF THE LANDOWNER. WHILE DOING SO, THE OFFICER SHALL ALSO WRITE TO THE CONCERNED AUTHORITY IN ORDER TO MARK THE LAND IN QUESTION IN THE CADESTERAL MAP.*



**Section 14(3)**

The notice as per Sub-Clause (2) shall specify the following matters:

- (b) Whether only the land is to be acquisitioned or the building and walls are also to be acquisitioned *OR ONLY CERTAIN RIGHTS OF THE LANDOWNER SHALL BE RESTRICTED.*

**Section 29**

Notice to acquisition the land:

- (b) Whether only the land is to be acquisitioned or the building and walls are also to be acquisitioned *OR ONLY CERTAIN RIGHTS OF THE LANDOWNER SHALL BE RESTRICTED.*

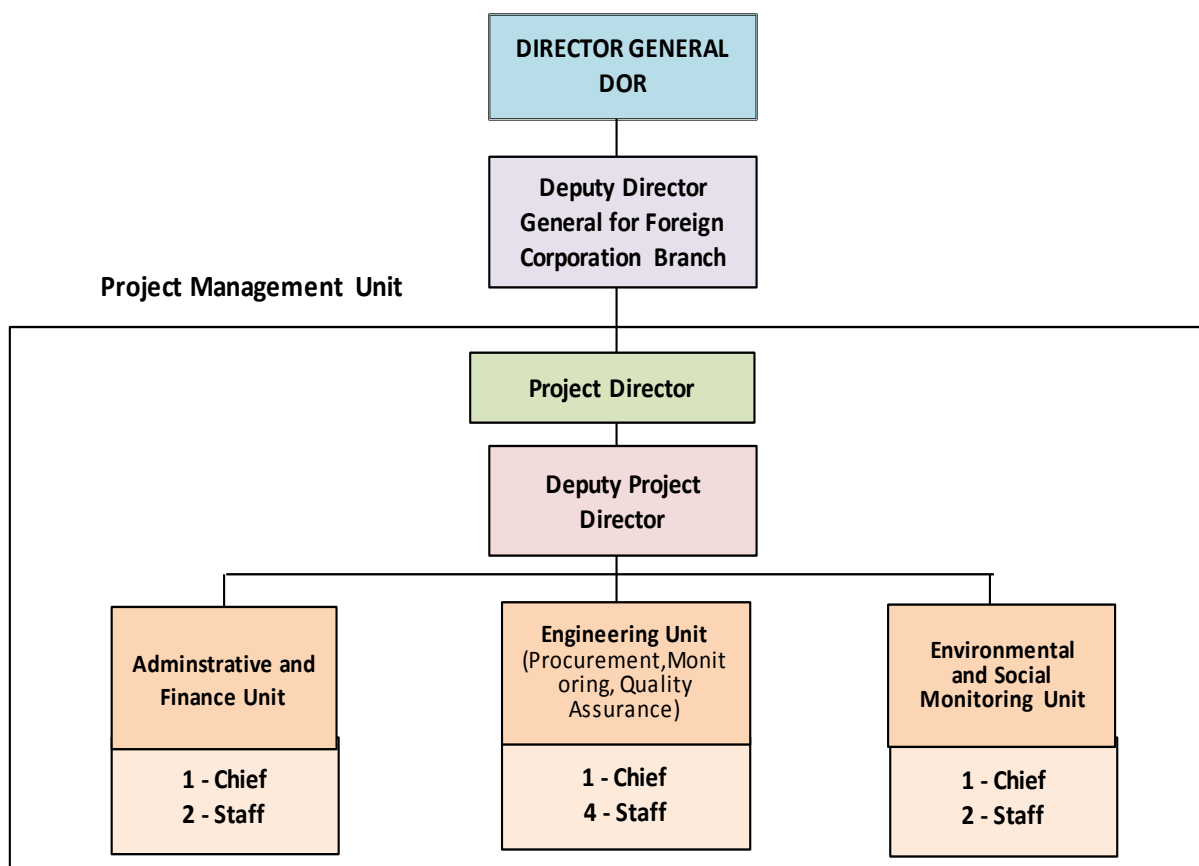
**Section 51**

Entire land is to be acquisitioned:

If only a portion of the land is to be acquisitioned, or if the land is to be acquisitioned by acquiring some of the rights thereon, the proceeding shall be initiated to acquire any land remaining after social impact assessment or the entire land, if such land cannot be used commercially. *IF LAND IS NOT TO BE ACQUISITIONED WHILE EFFECTUATING RESTRICTIONS ON CERTAIN ACTIVITIES OF THE LANDOWNER, NONE OF THE LAND SHALL BE ACQUIRED, BUT THE COMPENSATION AS DETERMINED IN ACCORDANCE WITH THIS ACT SHALL BE PROVIDED TO THE AFFECTED LANDOWNER.*

## 17.4 CREATION OF PROJECT IMPLEMENTATION UNIT (PIU)

Survey Team proposed to create Project Implementation Unit (PIU) shown **Figure 17.4-1** and **Table 17.4-1**.



**FIGURE 17.4-1 PROJECT MANAGEMENT UNIT ORGANIZATION CHART**

**TABLE 17.4-1 ROLES AND FUNCTION OF UNIT/ STAFF**

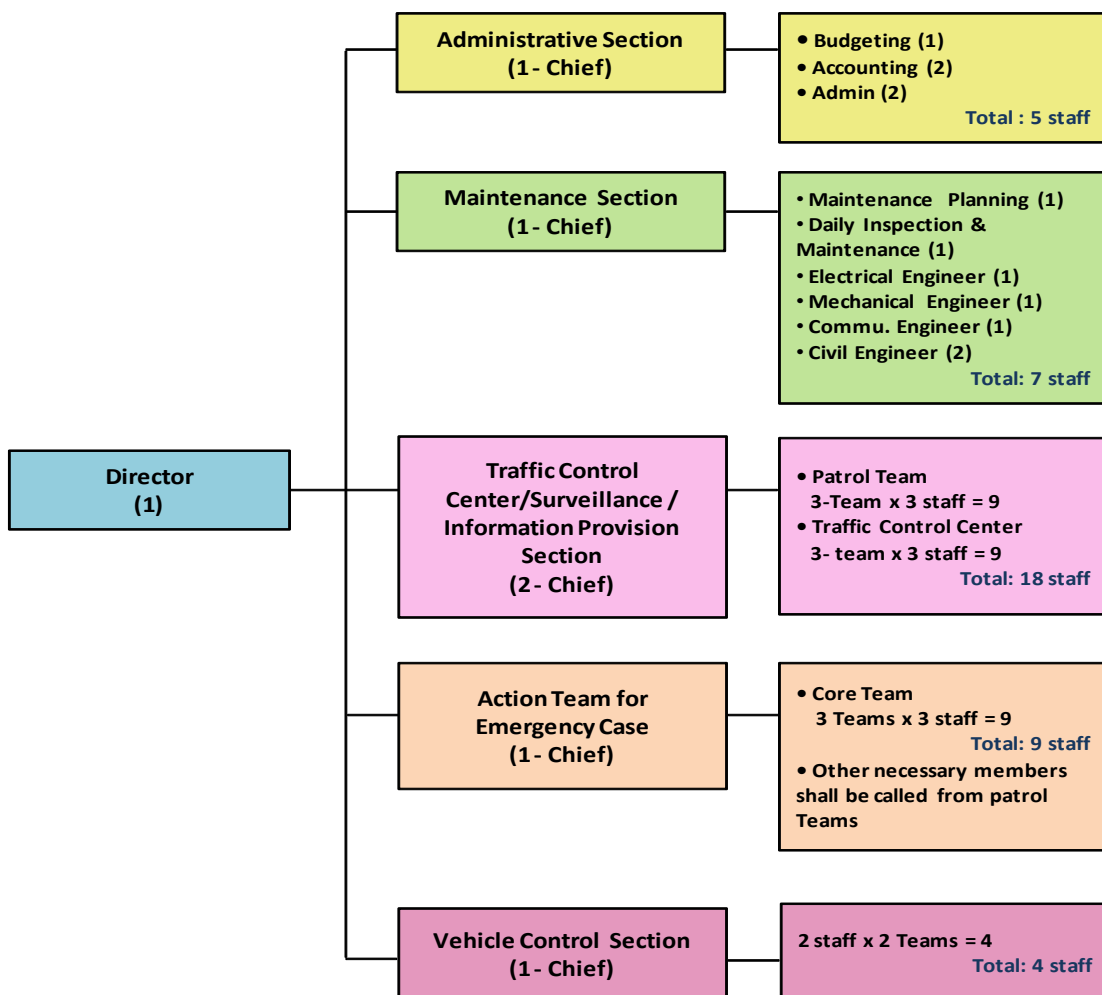
Unit	Roles and Function of Unit	Roles and Function of Staff
Project Director	<ul style="list-style-type: none"> <li>Responsible for overall activities of Project Management Unit</li> </ul>	
Deputy Project Director	<ul style="list-style-type: none"> <li>Deputy for Project Director</li> </ul>	
Administrative and Finance Unit	<ul style="list-style-type: none"> <li>General administrative work</li> <li>Budgeting and payment of expenditure</li> <li>Evaluate monthly billings from the Consultant and the Contractor and make recommendation on payment</li> <li>Evaluate claims from the Consultant and the Contractor</li> </ul>	<ul style="list-style-type: none"> <li>Chief : Responsible for overall activities of this unit</li> <li>Budget: In charge of budget planning and book keeping</li> <li>Accountant: In charge of management of monthly billings and claims from the consultant and the contractor</li> </ul>
Engineering Unit (Procurement, Monitoring, Quality Assurance)	<ul style="list-style-type: none"> <li>Assist tendering of Consultant and Contractor procurement</li> <li>Evaluate the detail design based on the established design criteria</li> <li>Monitor quality of work of the contractor</li> <li>Assess the monthly progress report submitted by the Consultant and the Contractor</li> </ul>	<ul style="list-style-type: none"> <li>Chief Engineer : Responsible for overall activities of this unit</li> <li>Engineer for tender : In charge of assisting tendering</li> <li>Engineer of design review: In charge of evaluation of detailed design and assessment of monthly progress report</li> <li>Engineer of supervision : In charge of monitoring of quality of works</li> </ul>

Unit	Roles and Function of Unit	Roles and Function of Staff
Environmental and Social Monitoring Unit	<ul style="list-style-type: none"> <li>Assess Environmental Monitoring Reports from the Consultant and the Contractor</li> <li>Undertake periodic environmental monitoring</li> <li>Attend the stakeholders' meeting</li> <li>Keep close dialogue with PAPs</li> </ul>	<ul style="list-style-type: none"> <li>Chief : Responsible for overall activities of this unit</li> <li>Engineer of environment: In charge of monitoring of environmental requirement by EIA</li> <li>Public relations officer: In charge of monitoring social aspects and dialogue with PAPs.</li> </ul>

### 17.5 CREATION OF TUNNEL MANAGEMENT OFFICE

Survey Team proposed to create the Tunnel Management Office.

Figure 17.5-1 shows the organization and staff of O&M for tunnel and Table 17.5-1, Table 17.5-2 shows the Roles and function of section.



No. of Staff: 1 Director, 6 Chiefs, 43 Staff  
**Total Staff = 50 staff**

*If a toll is collected to produce fund for tunnel O&M cost within this, Toll Collection Section must be organized.*

**FIGURE 17.5-1 ORGANOGAM AND STAFFS OF O&M FOR TUNNEL**

**TABLE 17.5-1 ROLES AND FUNCTION OF SECTION/ STAFF**

Section	Roles and Function of Section	Roles and Function of Staff
Director	Responsible for overall activities of tunnel management office (2 <sup>nd</sup> lank officer)	
Administration Section	<ul style="list-style-type: none"> <li>General Administration</li> <li>Budgeting</li> <li>Accounting</li> </ul>	<ul style="list-style-type: none"> <li>Chief : Responsible for overall activities of this unit</li> <li>Admin: In charge of general affairs for tunnel management office</li> <li>Budget: In charge of budget planning and book keeping</li> <li>Accountant: In charge of accounting</li> </ul>
Maintenance Section	<ul style="list-style-type: none"> <li>Daily Inspection</li> <li>Routine Maintenance</li> <li>Repair</li> <li>Periodic Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Chief : Responsible for overall activities of this unit</li> <li>Maintenance Planner: In charge of planning of maintenance.</li> <li>Inspector &amp; Maintenance engineer: In charge of daily inspection and maintenance</li> <li>Electrical Engineer: In charge of maintenance of Electrical facilities</li> <li>Mechanical Engineer: In charge of maintenance of Mechanical facilities</li> <li>Communication Engineer: In charge of maintenance of communication facilities</li> <li>Civil Engineer: In charge of maintenance of civil structure</li> </ul>
Traffic Control Center/Surveillance/Information Provision Section	<ul style="list-style-type: none"> <li>Patrol</li> <li>Monitoring of traffic</li> <li>Surveillance</li> <li>Information provision to road users</li> </ul>	<ul style="list-style-type: none"> <li>Chief : Responsible for overall activities of this unit</li> <li>Patrol Team: In charge of daily patrol in tunnel</li> <li>Traffic Controller: In charge of monitoring of traffic, of surveillance activity and of information provider to road users.</li> </ul>
Action Team for Emergency Case	<ul style="list-style-type: none"> <li>Removal of breakdown vehicles</li> <li>Immediate action in case of emergency cases</li> <li>Coordination with LGUs and Police</li> </ul>	<ul style="list-style-type: none"> <li>Chief : Responsible for overall activities of this unit</li> <li>Action team: In charge of Removal of breakdown vehicles, Immediate action in case of emergency cases and coordination with LGUs and police</li> </ul>
Vehicle Control Section	<ul style="list-style-type: none"> <li>Control of tank lorry carrying hazardous material</li> <li>Vehicle height &amp; overloaded trucks in coordination with Land Transportation office and police</li> </ul>	<ul style="list-style-type: none"> <li>Chief : Responsible for overall activities of this unit</li> <li>Vehicle controller: In charge of vehicle control and of controlling with Land Transportation office and police</li> </ul>

**TABLE 17.5-2 SECTION IN CHARGE OF EQUIPMENT**

	Name of Equipment	Section in Charge
Maintenance Work	Road Sweeper	Maintenance Section
	Wall Cleaning Vehicle	
	Water Supply Equipment for Cleaning	
	Aerial Work Platform	
	Station Wagon	
	Inspection Machinery and Tools	

Name of Equipment		Section in Charge
Traffic Monitoring and Information Provision	Tunnel Monitoring Facilities	Traffic Control Center/Surveillance/Information Provision Section
	Patrol Car	
	Traffic Control Devices	
Emergency Case	Towing Vehicle	Action Team for Emergency Case
	Air Jack	
	Truck for Transport of Air Jack	
	Fire Truck	
	Ambulance Car	
Vehicle Control	Weight Scale (Mat Type)	Vehicle Control Section
	Height Restricting Device (Gate Type)	

## 17.6 PROJECT IMPLEMENTATION RISKS AND COUNTERMEASURES

Table 17.6-1 shows the Risk Matrix of Project Implementation.

**TABLE 17.6-1 RISK MATRIX**

No.	Associated Risk	Responsibility	Measures
<b>1</b>	<b>Preparatory Stage</b>		
1.1	Delay in organizing Project Management Unit (PMU) for the Project	DOR	<ul style="list-style-type: none"> <li>DOR should establish PMU as soon as possible.</li> <li>PMU staff should be trained on Yen Loan procedures.</li> </ul>
1.2	Delay in Selection of the Consultant	DOR	<ul style="list-style-type: none"> <li>Consultant selection schedule shall be firmly established and strictly followed.</li> <li>Selection criteria shall be firmly established and evaluated in accordance with the established criteria.</li> </ul>
1.3	Delay in the Detailed Design	DOR	<ul style="list-style-type: none"> <li>Competent Consultant shall be selected.</li> </ul>
1.4	Delay in selection of Contractor	DOR, Consultant	<ul style="list-style-type: none"> <li>Bid schedule shall be firmly established and strictly followed.</li> <li>Detailed bid documents shall be prepared so as to avoid confusion, misinterpretation, and so on.</li> </ul>
1.5	Delay in Right-of-Way Acquisition and relocation of affected people	DOR, Consultant	<ul style="list-style-type: none"> <li>During preparation of Final RAP, constant dialogues shall be exercised to obtain consents from affected people.</li> <li>Acquisition unit cost shall be based on the fair market value.</li> <li>Budget for ROW acquisition and relocation shall be prepared in time.</li> <li>Start ROW acquisition and relocation of people as early as possible.</li> </ul>
1.6	Design error, over design and/or under design	DOR, Consultant	<ul style="list-style-type: none"> <li>Competent Consultant shall be selected.</li> <li>Careful design checks shall be exercised by the Consultant.</li> </ul>
1.7	Objection to the Project by people	DOR, Consultant	<ul style="list-style-type: none"> <li>Constant dialogue with people shall be made.</li> </ul>
<b>2</b>	<b>Implementation Stage</b>		
2.1	Delay in work schedule and completion	Contractor, DOR, Consultant	<ul style="list-style-type: none"> <li>Competent Contractor shall be selected.</li> <li>Progress of work shall be strictly monitored by the Consultant.</li> <li>Any signs of delay such as negative slippage of progress, delay in delivery of materials, etc. shall be</li> </ul>

No.	Associated Risk	Responsibility	Measures
			noticed as early as possible by both the Consultant and the Contractor. Recovery plan/measures shall be established and agreed by DOR, the Consultant and the Contractor and implemented accordingly.
2.2	Encountering unexpected geological conditions and ground water conditions.	Contractor, Consultant, DOR	<ul style="list-style-type: none"> <li>Advanced boring shall be implemented.</li> <li>As soon as the unexpected geological conditions are observed, the Contractor shall propose countermeasures and the Consultant shall evaluate and recommend countermeasures to DOR,</li> <li>Necessary change order shall be approved by DOR.</li> </ul>
2.3	Poor quality of material and work	Contractor, Consultant, DOR	<ul style="list-style-type: none"> <li>Quality of materials and works shall be strictly monitored by the Consultant.</li> <li>When these are found, materials and works shall be refused.</li> </ul>
2.4	Accidents	Contractor, Consultant, DOR	<ul style="list-style-type: none"> <li>The Contractor must exercise all kinds of countermeasures to prevent accidents.</li> <li>The Consultant shall always evaluate the safety measures by the Contractor, and necessary cautions shall be issued to the Contractor.</li> </ul>
2.5	Delay in transportation of materials and equipment due to the Third Country's condition	Contractor, Consultant, DOR	<ul style="list-style-type: none"> <li>The Contractor shall always collect information on the Third Country's economic and political situations. Enough time shall be allocated for delivery of materials and equipment.</li> </ul>
2.6	Cost overrun due to change orders	Contractor, Consultant, DOR	<ul style="list-style-type: none"> <li>Unnecessary change order shall not be approved.</li> <li>When change orders become necessary, the Consultant shall study if there is any negative change order.</li> </ul>
2.7	Cost overrun due to unexpected high rate of inflation and other economic conditions	DOR, Consultant, Contractor	<ul style="list-style-type: none"> <li>This shall be fairly treated in accordance with Terms and Conditions of contract.</li> </ul>
2.8	Suspension or abandonment of construction works due to Contractor's own reasons	Contractor, DOR, Consultant	<ul style="list-style-type: none"> <li>Sanctions against the Contractor shall be specified in the contract.</li> <li>Competent and faithful Contractor should be selected.</li> </ul>
2.9	Failure to follow Environmental Requirements	Contractor, Consultant, DOR	<ul style="list-style-type: none"> <li>The Consultant shall strictly monitor environmental requirements.</li> </ul>
2.10	Traffic Management of existing roads	Contractor, Consultant, DOR	<ul style="list-style-type: none"> <li>The Contractor shall pay extra care to maintain smooth flow of traffic during construction, particularly at West Portal area.</li> </ul>
<b>3</b>	<b>Operation Stage</b>		
3.1	Delay in establishment of Tunnel Management Office (TMO)	DOR	<ul style="list-style-type: none"> <li>DOR shall establish TMO at least a year ahead of opening of tunnel and necessary staff shall be recruited.</li> <li>TMO staff shall be trained on how to operate and maintain a tunnel safely.</li> <li>DOR shall allocate budget for TMO staff capacity development.</li> </ul>
3.2	Delay in preparation of Toll Collection	RBN	<ul style="list-style-type: none"> <li>RBN should determine if it will outsource toll collection to the private sector.</li> <li>If so determined, a company should be selected at least six (6) months ahead of tunnel opening.</li> <li>Selected company shall finish preparation of toll</li> </ul>

No.	Associated Risk	Responsibility	Measures
			collection at least three (3) months ahead of tunnel opening.
3.3	Insufficient coordination with Traffic Police and LGUs	DOR	<ul style="list-style-type: none"> <li>DOR shall complete coordination with Traffic Police and LGUs at least three (3) months ahead of tunnel opening.</li> </ul>
3.4	Bad driving manner of drivers inside the tunnel	DOR	<ul style="list-style-type: none"> <li>DOR should undertake safety driving campaigns to private car users and trucks/bus drivers</li> </ul>
3.5	Lack of Toll Revenue	RBN	<ul style="list-style-type: none"> <li>In case of shortage of toll revenue for tunnel O&amp;M, RBN shall allocate additional fund to DOR from Road Fund.</li> </ul>
3.6	New Development above land of a tunnel	DOR	<ul style="list-style-type: none"> <li>TMO should periodically monitor if there is any new development above land of a tunnel.</li> </ul>
3.7	Lack of environmental monitoring	DOR	<ul style="list-style-type: none"> <li>DOR through TMO should monitor environmental condition required in EIA periodically.</li> </ul>
3.8	Insufficient electricity supply	NEA	<ul style="list-style-type: none"> <li>In accordance with MOU exchanged between DOR and NEA, NEA shall supply electricity for tunnel O&amp;M.</li> </ul>





## CHAPTER 18

### HIGH OFFICIAL'S VISIT TO JAPAN



## CHAPTER 18 OTHER ACTIVITIES

### 18.1 HIGH OFFICIALS' VISIT TO JAPAN

#### 18.1.1 BACKGROUND

There are no road tunnels in Nepal yet. Most roads in the mountainous area are long and winding requiring unnecessarily long travel time. This tunnel project expects construction of a tunnel, first of its kind in the road history of Nepal. Literally, the responsible agency (DOR) and other relevant authorities have little or no knowledge and experience regarding construction, operation and maintenance of a road tunnel. For realization of this project, enhancing understanding of decision makers on the demand and importance of road tunnels is important. Equally important is the enhancement of knowledge regarding advanced technology on tunnel construction and sound management of the tunnel during and after its construction.

Geologically, Japan resembles Nepal in that the geology is very fragile, complicated and consists of faults and fractured zone. However, Japan has rich, safe and reliable road network consisting numerous tunnels in the mountain areas. Japan has so far successfully constructed more than 9000 road tunnels by year 2011. Such achievement and experience have enabled the construction industry to develop innovative methods of tunnel construction.

Under such circumstances, inviting concerned officials of Nepal to visit actual tunnel construction sites and management centers were planned under this project. The visits have been organized and implemented twice so far and the third visit is presently scheduled for February. Outline of these visits is briefly discussed hereunder.

#### 18.1.2 VISITS

##### 18.1.2.1 First Visit

###### (1) Period

The first visit was conducted for a period of six days from August 16 to August 21, 2014.

###### (2) Objective

The objectives of the visit are;

- i) To enhance understanding of the concerned officials regarding the importance of tunnels,
- ii) To understand the technological level of Japanese contractors through observation of tunnel construction sites and operation and maintenance centers, and
- iii) To share views with private companies related to construction of tunnels

###### (3) Participants

The team was headed by Honorable Minister of Ministry of Physical Infrastructure and Transport (MoPIT) and was composed of nine high ranking officials from Office of Prime Minister and Council of Ministers (OPMCM), Ministry of Foreign Affairs (MoFA), Ministry of Finance (MoF), MoPIT, Department of Roads (DoR) and Roads Board Nepal (RBN). The organization and position of the participants are listed in **Table 18.1-1**.

**TABLE 18.1-1 LIST OF PARTICIPANTS**

No.	Organization	Position
1.	MOPIT	Honorable Minister
2.	OPMCM	Secretary
3.	MOFA	Joint Secretary/Director General
4.	MOPIT	Joint Secretary
5.	DOR	Deputy Director General
6.	DOR	Deputy Director General/Superintendent Engineer
7.	MOF	Under Secretary
8.	RBN	Executive Director
9.	MOPIT	Technical Officer

Five out of nine members were from Ministry of Physical Infrastructure and Transport (MOPIT), and Department of Roads (DOR) and the rest were from other related organizations, such as Office of Prime Minister and Council of Ministers (OPMCM), Ministry of Foreign Affairs (MOFA) and Ministry of Finance (MOF) and Roads Board Nepal (RBN).

#### (4) Program

The participants belonged to different organizations. Some of the participants have no technical background. Therefore, emphasis was given to undertake observation of different construction sites and management centers (control centers). To supplement learning from observing, lectures and meetings were adequately inserted in the program. The outline of the program is summarized in **Table 18.1-2**.

**TABLE 18.1-2 OUTLINE OF PROGRAM**

Date		Program hours	Program Location	Training items		Stay
Date	Day			Type	Contents	
16, Aug.	Sat	Travel (15 <sup>th</sup> 13:30 Kathmandu→16 <sup>th</sup> Narita, 08:10 Tokyo)				
		17:00-21:00	Tokyo	Interaction	Nepalese Community (Japan)	Tokyo
17, Aug.	Sun	9:00-15:00	Site	City Tour	City tour of Tokyo	Shizuoka
		16:00-17:00	Site	Move	Move to Shizuoka (Briefing)	
18, Aug.	Mon	9:00-12:00	Site	Visit	Tarutoge Tunnel	Tokyo
		12:00-14:00	Site	Observe	Neopasa (Parking Area)	
		14:00-17:00	Site	Lecture	Communication Plaza Fuji (NEXCO)	
19, Aug.	Tue	9:00-12:00	Site	Visit	Yamate Tunnel, (MEX)	Tokyo
		14:00-15:00	MOFA	Visit	Courtesy Call on MOFA	
		15:15-16:00	JICA	Visit	Courtesy Call	
20, Aug.	Wed	10:00-14:00	Site	Observe	Aqua-line (Umihotaru)	Tokyo
		14:00-14:45	MLITT	Visit	Courtesy Call	
		15:00-18:00	MEX	Lecture	Traffic Control Center	
		18:30-21:00	EON	Interaction	Embassy of Nepal, Tokyo	
21, Aug.	Thur	Leave Japan – Arrive Bangkok/Kathmandu (22 <sup>nd</sup> at 12:15)				-

#### (5) Expected Outcome

The participants are expected to have;

- i) Understood the topographic similarities between Nepal and Japan and understand the role (importance) of tunnels in the road network,
- ii) Experienced advanced tunneling technology of Japan that has been innovated and developed from basic tunneling methods by Japanese contractors for adaptability to the distinct topography, geology, and natural conditions of Japan. Also, see the construction quality including health and safety control measures during construction, and
- iii) Enhanced knowledge on the operation and maintenance of tunnel.

#### 18.1.2.2 SECOND VISIT

##### (1) Period

The second visit was conducted for a period of five days (not including travel from/to Nepal) from September 17, 2014 till September 21, 2014.

##### (2) Objective

The objectives of the visit are similar to the first visit, except that the main participants of this

visit were targeted for the high ranking officials of the ministry of finance. Therefore, the objective of the visit was more focused on enhancing understanding of the role and importance of tunnels rather than focusing on the technical matters.

### (3) Participants

The list of the participants is shown in **Table 18.1-3**. The list shows only two participants; one from MOF and the other from MOPIT. However, initially, the visit team was composed of four officials. On contrary to the first visit, which included officials from various organizations, the second visit was targeted for the ministry of finance. The team was scheduled to be headed by the Finance Minister and composed of four members. However, due to other important national issues, the minister was compelled to postpone the visit.

**TABLE 18.1-3 LIST OF PARTICIPANTS**

No.	Organization	Position
1.	MOF	Joint Secretary
2.	MOPIT	Deputy Director General/ Superintendent Engineer

### (4) Program

The program was composed of three main activities. Visits to tunnel construction site, attend to lectures and conducting meetings. The outline of the program is summarized in **Table 18.1-4**.

**TABLE 18.1-4 OUTLINE OF PROGRAM**

Date	Day	Schedule	Stay
Sep 16	Tue	Leave Kathmandu (13:30) - Arrive Bangkok (18:15) Leave Bangkok (23:50)	On board
Sep 17	Wed	AM: Arrive Narita (08:10) PM: Communication Plaza Fuji (NEXCO) Leave Fuji (15:40), Arrive Tokyo (18:00)	Tokyo
Sep 18	Thr	Site Observation of Shimoshiobara 2 <sup>nd</sup> Tunnel Construction site PM: Return to Tokyo	Tokyo
Sep 19	Fri	AM: Courtesy Calls on JICA PM: Tokyo Metropolitan Expressway O & M	Tokyo
Sep 20	Sat	AM: Aqualine (Umihotaru) PM: Reception at Embassy of Nepal	Bangkok
Sep 21	Sun	Bangkok Site visit	Bangkok
Sep 22	Mon	Leave Narita (12:15) Arrive Bangkok/Kathmandu (Sept 23 at 12:15)	-

### (5) Expected Outcome

The participants are expected to have;

- i) understood the topographic similarities between Nepal and Japan and understand the role (importance) of tunnels in the road network,
- ii) Experienced advanced tunneling technology of Japan that has been innovated and developed from basic tunneling methods by Japanese contractors for adaptability to the distinct topography, geology, and natural conditions of Japan. Also, see the construction quality including health and safety control measures during construction

#### 18.1.2.3 THIRD VISIT

##### (1) Period

The third and final visit was conducted for a period of nine days (not including travel from/to Nepal) from February 5, 2015 till February 13, 2015. The delegation of the visit was divided in to two groups. The first group was from the Ministry of Finance visited and the second group

was from MoPIT and DoR. The first group visited Japan for six days (not including travel from/to Nepal). The second visited Vietnam and Japan and the visit lasted for a period of nine days (not including travel from/to Nepal). The second group departed Kathmandu on February 4, 2015, while the first group departed on February 7, 2015.

**(2) Objectives**

The objectives of the visit are;

- i) To enhance understanding of the concerned officials regarding the importance of tunnels,
- ii) To understand the technological level of Japanese contractors through observation of tunnel construction sites and operation and maintenance centers,
- iii) To provide technical knowledge and hands-on experience on design, construction, operation and maintenance of tunnel to the would-be staffs of the Project Management Unit (PMU) that will be established for smooth implementation of this project

**(3) Participants**

The delegation consisted of two high ranking officials from MoF and DoR and four engineers from MoPIT, and DoR. The participation from MoPIT and DoR were targeted for would-be or having higher chances to be nominated as the member of the PMU of this project. In fact, two out of the six participants are presently PMU members –Project Director and Deputy Project Director .The delegation of the third visit was led by the Finance Minister. The participants were divided into two groups. The first group consisted of high ranking officials from MoF and the second group consisted of officials from MoPIT and DoR.

**(4) Program**

The program of the third visit was different for participants from the MoF and MoPIT/DoR. Where participants from MoF only visited Japan, the MoPIT/DOR participants visited Vietnam on their way to Japan to observe Hai Van Tunnel, designed and constructed under the assistance of Japan. The outline of the program for respective groups is summarized in **Table 18.1-4**.

**Table 18.1-5 OUTLINE OF PROGRAM**

Day		(MOF) Nepal-Japan-Nepal	(MOPIT/DOR) Nepal-Vietnam-Japan-Nepal
4	Wed		KTM-BKK
5	Thur		BKK-HCM, HCM-Da Nang
6	Fri		Hai Van Tunnel Observation (10:00 am) & Discussions Da Nang-Hanoi JICA Hanoi Courtesy Call (4:00 pm)
7	Sat	KTM-HKG	Hanoi-BKK (1 PMU Official will return to KTM)
8	Sun	HKG-Tokyo PM: Observation (Umihotaru)	BKK-Tokyo(morning) PM: Observation (Umihotaru)
9	Mon	Site Observation (Tunnel Construction Site)	Site Observation (Tunnel Construction Site)
10	Tue	Site Observation/Courtesy Calls	Site Observation/Discussions
11	Wed	Site visit or Discussion	Site visit or Discussion
12	Thur	Courtesy Calls/Discussions	Site Observation/Discussions PM: Leave Japan for BKK
13	Fri	Leave Tokyo- HKG-KTM (arrive)	BKK-KTM (arrive)

**(5) Expected Outcome**

In addition to the outcomes similar to those expected to have been achieved during the first and the second visits, the participants are further expected to;

- i) Enhance understanding in formulation and smooth proceeding of the project,
- ii) Accumulate knowledge and understanding of the PMU staffs for smooth implementation of the project.
- iii) Understand the importance of proper operation and maintenance of a tunnel

18.1.3 Activity Pictures

**FIRST VISIT (August 16 to August 21, 2014)**



Conducting briefing of the visit program



Explaining the process of construction using miniature models at Communication Plaza Fuji



Orientation at construction site office



Observation of Tarutouge Tunnel Construction Site



Observation (from inside car) of tunnel in operation



Metropolitan Expressway Traffic Control Center in Nagatacho

**SECOND VISIT (September 17, 2014 till September 21, 2014)**



Explaining the process of construction using miniature models at Communication Plaza Fuji



Briefing on the Shimoshiobara Tunnel and the rules and regulations to be followed during site observation



Orientation at construction site office



Explanation of Shimoshiobara 2<sup>nd</sup> Tunnel Portal



Observation of On-going Construction Work Inside Shimoshiobara 2<sup>nd</sup> Tunnel



Metropolitan Expressway Traffic Control Center in Hakozaki



**THIRD VISIT (February 5, 2015 till February 13, 2015)**



Presentation and discussion with HAPACO, operation & maintenance company of Hai Van Tunnel



Observation of Hai Van Tunnel in Da Nang



Observation of control room of Hai Van Tunnel



Explanation of Asagiri Michi-no-Eki



Explaining the process of construction using miniature models at Communication Plaza Fuji



Observation of On-going Construction Work of Tarutouge Tunnel

## 18.2 TECHNICAL EXPLANATORY MEETING

### 18.2.1 Background

There are no road tunnels in Nepal till date, although there are a couple of hydro-tunnels. Therefore, it is not exaggeration to say that neither the authority responsible for development of roads nor the contractors have sufficient knowledge regarding construction of tunnels. Under such circumstances, it is considered very important to provide such knowledge to the possible extent under this survey such that the technical knowledge is transferred to the concerned authorities and companies.

### 18.2.2 Objective of the Meeting

The objective of the technical explanatory meeting is to;

- i) Enhance understanding of the implementing agency (ies) about the importance of the project (importance of the tunnel).
- ii) Share the findings and the results of the survey carried out by the Survey Team as well as interact with Japanese contractors to enhance knowledge and understanding regarding construction technology of tunnels.

### 18.2.3 Target Organizations

High officials from concerned ministries, management level officers and engineers from implementing agencies and other related organizations were targeted for the meeting.

### 18.2.4 Program

With the above background and objective, the explanatory meeting was conducted for two days on 28 and 29 January, 2015 at Everest Hotel in Baneswor, Kathmandu. The number of attendees was about 61 persons, mostly engineers from the DoR and local contractors. Also present during the program were DG and DDGs of the DoR, engineers from MoPIT, officials from RBN, representatives from the World Bank and local consultants. **Table 18.2-1** shows the program of the meeting.

**Table 18.2-1 Program of Technical Explanatory Meeting**

<b>DAY1: January 28, 2015 (Wed)</b>			
TIME	PROGRAM/TOPICS		SUB-TOPICS
SPEAKER			
9:00 - 9:30	Registration		-
9:30 - 9:40	Welcome Speech		Representative JICA Nepal Office
9:40 - 9:50	Opening Remarks		MOFIT Secretary
9:50 - 10:00	Introduction of Program		Team Leader, JICA Study Team
10:00 - 10:25	Session-1	Nagdhunga Tunnel Construction	1.Objective of Technical Meeting
10:25 - 10:55			2. Video Presentation by Data collection survey
10:55 - 11:10			3. Outline of Nagdhunga Tunnel Project
			Team Member, JICA Study Team
			Question / Answer
11:10 - 12:10	<i>Lunch Time</i>		
12:10 - 15:30	Session-2	Nagdhunga Tunnel Site Observation	All participants will go to the proposed tunnel construction site for observation.
<b>DAY2: January 29, 2015 (Thr)</b>			
9:00 - 9:40	Session-3	Japan's Tunnel Construction	4.Japan's New Tunnel Technologies
9:40 - 9:55			Question / Answer
9:55 - 10:35			5.Hai Van Pass Tunnel Construction Project
10:35 - 10:45			Question / Answer
10:45 - 11:15	Session-4	Nepal Road Plan	6.National Road Network Plan and Major Road Project in Nepal
11:15 - 11:30			Question / Answer
11:30 - 12:30	<i>Lunch Time</i>		
12:30 - 13:00	Session-5	Japan and Nepal Contractors Info. Exchange	7.Nepal Construction Industry
13:00 - 13:15			Question / Answer
13:15 - 13:45			8.Introduction of Japan's Contractor
13:45 - 14:10	Fill-up Questionnaire		-
14:10 - 14:30	Wrap-up		Deputy Project Director Nagdhunga Tunnel Construction Project
14:30 - 14:45	Closing Remarks		-
			Director of General, DOR

The first day consisted of two sessions followed by a field trip. A video clip highlighting the present condition and the intrinsic problems of the existing road in and around the survey objective area including effective measures was aired in Session-1. This video was prepared under the previous project “Data Collection Survey on Thankot Area Road Improvement in Nepal”. The outline of the Survey was presented during Session-2. After the two sessions, all attendees were escorted to the field for observation of the site and to see the actual location where the tunnel is being planned. Question and answer session followed after each session, including the field trip.





The programs of the second day were focused on introduction of Japanese tunneling technology in regards to the construction of mountain road tunnels by Japanese construction companies. Also introduced were the present condition of the road network in Nepal and the present status of local contractors of Nepal.

### 18.3 MINIATURE MODEL PREPARATION

One of the components of the project is to make a miniature model of the post-construction perspective of Nagdhunga Tunnel, showing the inner and the outer portion of the tunnel including the landscape of the objective area.

Two sets of models have been prepared. Each set is composed of four models. These models including its general explanation is shown in **Table 18.3-1**. The models will be exhibited

**Table 18.3-1 Types of Models and its description**

No.	Model Description		Picture/Image
	Name	Dimensions/description	
1	Landscape	<ul style="list-style-type: none"> <li>• 1.1m x 0.5m</li> <li>• 3-dimension concept model of the survey area.</li> <li>• Approximate scale 1:5000</li> <li>• 2 parts (divided along the centerline of the alignment)</li> <li>• Featuring topography with existing roads and houses</li> </ul>	
2	Tunnel (structure)	<ul style="list-style-type: none"> <li>• 30cm x 15cm (height 15cm)</li> <li>• Cross section of tunnel</li> <li>• Featuring inner and outer structure of tunnel showing rock bolting</li> <li>• Approximate scale 1:100</li> </ul>	
3	Tunnel (Diorama)	<ul style="list-style-type: none"> <li>• 30cm x 15cm (height 31cm)</li> <li>• Cross section of tunnel (at portal and inside tunnel)</li> <li>• Featuring inner and outer structure of tunnel showing facilities used inside tunnel</li> <li>• Scale: none</li> </ul>	
4	Michi-no-Eki	<ul style="list-style-type: none"> <li>• 10cm x 15cm (height 5cm)</li> <li>• Featuring Michi-no-Eki and its vicinity</li> <li>• Approximate scale 1:1000</li> </ul>	



## **List of Annex**

- |              |  |
|--------------|--|
| Annex 13.1-1 | Environmental Protection Act   |
| Annex 13.1-2 | Environmental Protection Rule  |
| Annex 13.3-1 | Request for the Permission from the Ministry of<br>Forest prior to the commencement of EIA |
| Annex 13.3-2 | JICA EIA Checklist   |



**EPA Amendment**

(Gazette- Section 58, No. 44, Part 5)

Date-16<sup>th</sup> February, 2009 AD (2065/11/05)

The GON has established the following Environment Protection Council under the **Rule 14** of EPA, 2053 to provide policy guidance and suggestion and also to have cooperation between different agencies.

1. Establishment of Environment Protection Council: (1) Following will be the members in the Environment Protection Council:-

a) Prime Minister	Chairman
b) Minister, Ministry of Science, Technology and Environment	Vice Chairman
c) Minister, Ministry of Finance	Member
d) Minister, Ministry of Foreign Affaires	Member
e) Minister, Ministry of Home	Member
f) Minister, Ministry of Water Resource	Member
g) Minister, Ministry of Local Development	Member
h) Minister, Ministry of Health and Population	Member
i) Minister, Ministry of Industry	Member
j) Minister, Ministry of Forest and Soil Conservation	Member
k) Minister, Ministry of Land Reform and Management	Member
l) Vice Chairman, National Planning Commission	Member
m) Chairman, Constitutional Committee (Environmental) Parliament	Member
n) Secretary, Prime Minister, Office of Ministry Council	Member
o) Seven Nominated persons including two women who had remarkable contribution in the field of environment	Member
p) One representative from Political Parties of Constituent Assembly	Member
q) Secretary, Ministry of Science, Technology and Environment	Member

2. The tenure of the members mentioned in section (o) will be two years maximum.

3. Meeting of the Environment Protection Council:

- (a) Meeting of the Environment Protection Council will be carried out minimum once a year.  
 (b) Subjects related to Environmental Policies will be put forwarded in the meeting of Environment Protection Council.  
 (c) Other work procedure regarding meeting of Environment Protection Council will be as determined by the council itself.

4. Dissolve: The Environment Protection Council established under the Ministry of Population and Environment with the announcement dated 1997 September, 8<sup>th</sup> (2054/5/23) in gazette-Section 47, Sub-number 24(Ga), Part 4 has been dissolved.

EPR AMMENDMENT  
Schedule -2  
(Relating to EPR SECTION 3)  
Proposals Requiring Environmental Impact Assessment

**Amendments 2010 October 4**

**A. Forest Sector:**

1. Plantation of indigenous plants of a single species in a single block covering an Area of more than 500 hectares in the Terai and more than 100 hectares in the hills.
2. Plantation of such imported species of plants as are deemed suitable for the purposes, following their test, in the concerned place, more than 100 hectares in the Terai and more than 50 hectares in the Hills.
3. Handover of forests with an area of more than 200 hectares in the Terai and more than 50 hectares in the hills as leasehold forests.
4. Clear felling or rehabilitation of forests with an area of more than 30 hectares.
5. Rosin and turpentine, rubber, plywood and veneer, catechu, and timber-based matches, pulp and paper industries to be established within one Km. inside the forest area which depend on forests for their raw material and use processing techniques and cardamom and medium and large tea industries which use large quantities of firewood.
6. Commercial and industrial processing of medicinal herbs and aromatic plants which emit garbage and pollution.
7. Establishment of hotels, resorts, safaris with the capacity of 50 beds, or the construction of medium and large scale educational institution, hospital and Industries of other construction activities inside forest areas, national parks, sanctuaries, conservation areas, buffer zones and environment conservation Zones.

Formulation of Watershed Management Plan of Protected Areas.

8. Collection of forest related products including NTFPs and roots of more than 50 ton per species per year in different period of time from a forest of a district or from different forest areas in a single time if the exact extraction amount is not mentioned in forest or protection area management plan.
9. Collection of forest related products such as tree bark of more than 100 ton per species per year in different period of time from a forest of a district or from different forest areas in a single time if the exact extraction amount is not mentioned in forest or protection area management plan.
10. Collection of more than 100 ton of root and bark from a district in single time or from time to time from a forest or forest area in a single or in many seasons if the exact extraction amount is not mentioned in forest or protection area management plan except for Salcid, Rittha, Amala, Tendupat, Bhorla and Tejpat.
11. Collection and export of forest related products more than 50 ton per year of processed extracts of



a species permitted as per prevalent laws from a forest or many forest areas in a single time or in different period of time in a single or in many seasons. Establishment of different invasive species of wildlife.

12. Proposal implementing through other organization instead of forest related government agencies clearing more than 5 hectares of forest.
13. Handover of more than 500 hectares of forest to a single community for its management.

#### **B. Industrial Sector:**

1. Establishment of breweries and wineries equipped with boiling and fermentation facilities with a production capacity of more than Fifty Hundred Thousand liter per day.
2. Production of primary chemicals such as corrosive, acid and alkali etc. (except citric Tartaric, acetic, acid.) with a production capacity of more than One Hundred metric tons per day.
3. Processing of hides more than 10,000 sq. ft. Per day.
4. Establishment of mineral based industries with a investment of more than Rs. Fifty millions fixed capital.
5. Production of petro chemical and processing (diesel, kerosene, lubricant plastics, Synthetic rubbers etc.)
6. Production of 50 ton per day of ferrous and non ferries metals (except resoling, re-melting and fabrication) by the process of primary smelting.
7. Establishment of industry producing more than Three Thousand metric ton of rude sugar and sugar per day.
8. Establishment of cement industries with a production capacity of more than Thirty metric tons per hour based on line stone and with a production capacity of more than Fifty metric tons per hour based on clinker.
9. Establishment of lime industries having production capacity of more than 500 metric tons per day.
10. Production of asbestos.
11. Establishment of radioactive emission (nuclear and automatic processing) industries.
12. Formulation of 50 metric tons of primary compound (Bulk drugs) for medicine daily.
13. Production of extremely hazardous Substances such as Isocyanine, mercury compound etc.
14. Production of ammunitions and explosives including gunpowder except than the production made by Nepal Army or Nepal police forever or to be established by them.
15. Establishment of industries of pulp or paper with a production capacity of more than One Hundred metric tons per day.
16. Establishment of brick and tiles industries with a production capacity of more than Twenty million pieces per year.
17. Chemical processing of bone, horn with 50 metric tons per day.
18. Establishment of sawmill with the use capacity of more than Fifty Thousand cubic feet of wood per year.

### **C. Mining Sector:**

1. Relocation or resettlement of permanent residence of more than 100 people for the purpose of mine excavation.
2. Underground Mines:
  - a. Excavation of radioactive minerals in any scale.
  - b. Underground excavation of other minerals of 200 ton daily and surface excavation of 400 ton daily.
  - c. Underground extraction of non-metal minerals of 200 ton daily and 400 ton of surface excavation.
  - d. Extraction of simple construction related stones, decorative stones, sand, gravel and industrial soil of more than 300 cubic meters per day.
  - e. Underground excavation of 200 ton per day and surface excavation of 400 ton per day for the production of coal and crude coal.
  - f. Production of more than One Hundred Thousand cubic meter Biogenic natural gas per day.
  - g. Activities related to extraction of petroleum products and its processing.
  - h. Extraction of sand, gravel and soil at the rate of more than 250 cubic meters per day from the surface of river and revolute.

### **D. Road Sector:**

1. Construction of the following roads:
  - (a) National highways.
  - (b) Main feeder roads.
2. Construction of more than 50 Km. long ropeway.
3. Construction of more than 5 Km. long cable car routes.

### **E. Housing, Building and Urban Development Sector:**

1. Construction of Residential, Commercial and their Combination as a Built up Area or Floor Area in more than Ten Thousand Sq. Meter area.
2. Construction of Cinema Hall, Theater, Community Hall, Stadium, Concert Hall, Sport Complex with the capacity of entry and exit of more than 2000 people.
3. Development of Apartment in more than 4 hectare area or with a capacity of 50 households.
4. Operation of Land Development Project in more than 100 hectare.
5. Construction of 16 Storey building or more than 50 meter in height.

### **F. Water resources and Energy sector:**

1. Operation of electricity generation project with a capacity of more than 50 mw.

2. Under Electricity Generation:

- a. Operation of project that generates more than 1 mw electricity from coal and nuclear plant.
- b. Operation of project that generates 5 mw of electricity from mineral oil or gas.

3. Under the new systems of irrigation:

- (a) Irrigating more than 2000 hectares in the Tarai and inner Terai.
- (b) Irrigating more than 500 hectares in the hill valleys.
- (c) Irrigating more than 200 hectares in the hill areas with a steep gradient and Mountain areas.

4. Any water resources development activity which displaces more than One Hundred people with permanent residence.

5. Construction of multipurpose reservoirs.

6. Inter-basin water transfer and use from one watershed area to another.

**F1.**

- a. Operation of electricity generation project from solar energy with a capacity of more than 10 mw.
- b. Operation of electricity generation project from wind energy with a capacity of more than 10 mw.
- c. Operation of electricity generation project from biomass energy with a capacity of more than 2 mw.

**G. Tourism Sector:**

- 1. Establishment and operation of hotels with more than One Hundred beds.
- 2. Establishment and development of new airports.

**H. Drinking water:**

- 1. Collection of rain-water in an area of more than Two Thousand hectares and use of water sources (springs/wetlands) located within the same area.
- 2. Surface water sources with more than 1cs. safe yield, and the use of its entire part during the dry season.
- 3. Recharging of more than Fifty percent of the total aquifer for the development of underground water sources.
- 4. Displacement of more than One Hundred persons for the operation of water supply scheme.
- 5. Settlement of more than Five hundred persons on the upper reaches of water sources.
- 6. Supply of drinking water to a population of more than Fifty Thousand.
- 7. Supply of drinking water to a population of more than One Hundred Thousand upon connecting of new sources.
- 8. Over mining of biologically or chemically polluted point and non-point sources or underground water sources that may be affected by them.
- 9. Operation of multi-purpose projects relating to sources of drinking water which consumes the sources at the rate of more than 25 liters per second.

## **I. Waste Management:**

1. Waste management activities to be undertaken with the objective of providing services to a population of more than Ten Thousand.
2. Following activities relating to waste emitted from houses and residential areas: -
  - (a) Filling of land with more than Five Thousand tons of waste per year.
  - (b) Activities relating to transfer station and resources recovery areas spread over an area of more than Ten hectares.
  - (c) Selecting, picking, disposing and recycling wastes through chemical, mechanical or biological techniques' in an area spread over more than Ten hectares.
  - (d) Activity relating to compost plants spread over an area of more than Ten hectares.
  - (e) Burying of waste emitted from an urban area with a population of at least Ten Thousand.
3. Following construction activities relating to hazardous waste of the following nature in any scale:-
  - (a) Construction of waste plant.
  - (b) Construction of waste recovery plant.
  - (c) Constructing of a site for filling, accumulating or burying waste.
  - (d) Construction of a site to store the waste.
  - (e) Construction of a waste treatment facility.
4. Following activities relating to lethal waste:-
  - (a) Emission and management of any radioactive Substance with a half life exceeding Twenty Five years.
  - (b) Emission and management of any lethal chemical with Fifty lethal dose.
  - (c) Final disposal management of biological lethal Substances emitted from Health Center, Hospital, or Nursing Home with at least Twenty Five beds.
  - (d) Any activities relating to One hectare or more of land and energy for the purpose of incinerating or recycling any lethal Substance

## **J. Agriculture Sector:**

1. Clearing of forest covering more than One hectare in the Hills and Five hectares in the Terai and using it for agricultural purposes.
2. Urbanization plan in cultivable lands.
3. Establishment of Plant for Toxic Pesticide (only those which are listed).

## **K. Health:**

1. Operation of hospitals or nursing homes with more than Hundred beds, or medical profession (study and teaching also).

**L. If any proposal is to be implemented in the following areas;**

1. Historical, Cultural and archeological sites.
2. National Parks, wild life sanctuaries and conservation areas.
3. Areas with main sources of public water supply.

**L.1.** Operation of any plan, project or programme relating to any developmental work physical activity or change in land use except the proposals mentioned in Clause (a) to Clause (K) and those below the standards of such proposals as well as the proposals below the standards of those mentioned in schedule -1 with a cost of more than Two Hundred Fifty millions.

Date : Thursday, June 26, 2014

### Request for the Permission from the Ministry of Forest prior to the commencement of EIA.

#### 1. Name of the Project

The Naghdunga Tunnel Construction Project



Project Location Map



General Location and Size of Tunnel Portal and Potential Yard Site

## 2. Name of the Proponent and Address

Geo-Environmental and Social Unit,  
Department of Roads,  
Ministry of Physical Infrastructure and Transport  
Babarmahal, Kathmandu  
Contact : 01-426-2996

JICA Contractor Consultant  
CTI Engineering International Co., Ltd.  
Tachibana Annex Building  
2-25-14 Kameido Koto-ku, Tokyo 136-0071, Japan  
Project Office : Rama House, Summit Hotel, Lalitpur, Kathmandu, Nepal  
Telephone : 1-552-1810/552-4694 (Ms. Sandya)  
Contact : Mr. Robinson Shrestha, Mobile : 981 326 5203 (Project general)  
Ms. Ide Kakiko, Mobile : 981 326 5202 (EIA)

(Local consulting firm as the project counterpart to be procured within one month)

## 3. Four Direction area and alignment coordinate (GPS Points) of the directly affected Forest Area.

- A) Northern most and Eastern most point: 27.42'26.11" N 85.12'07.12" E
- C) Southern most point: 27.42'22.04" N, 85.12'05.31" E
- D) Western most point: 27.42'24.37" N, 85.12'03.64" E



Aerial Photo of the Directly Affected Forest Area



Close-up Photo of the Clearance Area

Coordination of the Boundary of the Clearance Area

Point	Latitude	Longitude
A	N 27.42'26.11"	E 85.12'07.12"
B	N 27.42'23.63"	E 85.12'06.48"
C	N 27.42'22.04"	E 85.12'05.31"
D	N 27.42'24.37"	E 85.12'03.64"
E	N 27.42'24.72"	E 85.12'04.99"
F	N 27.42'25.71"	E 85.12'04.85"

4. Name and Address of the project implemented place.

Ward 9, Baad Bhanjyan VDC, Kathmandu District

5. Type of Forest Conservation Area according to Forest Act (1993) (first ammendment 1999) and National Park and Wild Life Conservation Act (1972).

Community Forest



6. Main Flora and Fauna

Flora :

The vegetation is *Schima wallichii* - *Castanopsis indica* - *Castanopsis tribuloides* forest, mainly consisted of oak trees and camellia trees. The major associates are *Engelhardtia spicata*, *Acer oblongum*, *Pyrus pashia*, *Eurya acuminata*, *Myrica esculenta* etc.

*Pinus roxburghii* and *Alnus nepalensis* are the most common tree species.

Fauna : (To be surveyed in the EIA process)

7. Estimated Area of the Forest to be Affected (ha.)

Area to be affected by the Project : Approximately 2 ha  
(Tentative. To be determined within one month)

8. Sensitive area according to forest, plant resources, diversity and soil conservation; if any.

None.

9. Other issues if any.

None.

End.

## JICA EIA CHECKLIST

### 3-2-1. Environmental Checklist for the Project

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process?	(a) N	(a) EIA study for MOSTE approval was started June 2014. Scoping Document and EIA TOR approval by MOSTE is expected on Oct. 31.
		(b) Have EIA reports been approved by authorities of the host country's government?	(b) N	(b) Not yet. TOR for EIA study is under review by MOSTE as of November 2014.
		(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	(c) N	(c) Not yet approved.
		(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(d) N	(d) EIA commencement approval related to national forest clearance is expected from MOFSC by the end of November 2014.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?	(a) Y	(a) During the preparation of the Scoping Document, 2 public consultations were conducted with attendances of VDC secretaries, health workers, local residents, etc. and project information was disclosed. After the consultations, the letters from VDC secretaries were collected stating basic understanding of the Project and specific concerns from each secretary. Prior to the commencement of the Census Survey, additional 2 consultations were conducted with attendances of property owners to be surveyed. Smaller meetings with PAPs were conducted during the preliminary Census work to provide further detail of the project to all the PAPs.
		(b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(b) N	(b) Based on local procedure, official direct contacts with the Project Affected Persons will be able to start after the MOSTE approval of the EIA study TOR. In the preliminary Public Consultations, comments are taken, but their requests, such as conservation of river flow and irrigation canals, are already taken into the project design.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Information Collection Study examined 3 alignment alternatives. In this Survey, alternatives for following 3 issues/locations were studied : 1) East end of the Approach Road, 2) East Portal, 3) Tunnel alignment. In the study of 1) East end of the Approach Road and 2) East Portal, avoidance and minimization of involuntary resettlement was taken into consideration. In the study of 3) Tunnel alignment, to secure the structure stability as well as to minimize the impact on groundwater were the main points of decision.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken?	(a) Y	(a) Since the east Approach Road is planned in the farming area, with the traffic on the Road, the ambient air quality shall be changed. The future air quality can be expected to be the similar level on the existing highway. In this EIA study, measurement of the air quality on the existing highway is proposed. It will be found whether the existing condition complies with the local air quality standards. Based on the results of those air quality measurement, mitigating measures may be proposed.
		(b) Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	(b) N/A	(b) No industrial area exists in the Project Area.
	(2) Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas?	(a) Y	(a) The rivers and tributaries in the Project Area are small, and soil runoff from the bare lands resulting from earthmoving activities during construction, when an intensive heavy rain event occurs, may cause high turbidity of the water. The similar muddy runoff is already occurring from many brick factories located in the Project Area.
		(b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater?	(b) N	(b) Surface runoff from roads less likely contaminate water sources, such as groundwater since surface runoff would be infiltrated by roadside vegetation and agriculture field.
		(c) Do effluents from various facilities, such as parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will not comply with the country's ambient water quality standards?	(c) N	(c) Effluents from construction facilities shall be collected into ditches and treated at the waste water treatment facilities at East and West Portals. There is no ambient water quality standards in Nepal. Only standards for effluents and drinking water are available.
	(3) Wastes	(a) Are wastes generated from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) Private waste collection contractor shall be hired and the wastes shall be disposed at the official disposal site. Necessary approval procedure to bring the wastes to the disposal site is under survey.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(4) Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) N	(a) Baseline noise condition measured at 3 locations on the Alignment surpasses the noise guideline for mixed use area. Additional impacts from construction vehicles and machines will be negligible.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project site is not located in protected areas designated by the country's laws or international treaties and conventions.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	(a) N	(a) The project site does not encompass primeval forests, tropical rain forests, or other ecologically valuable habitats, such as alpine meadows or Important Bird Areas.
		(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?	(b) N	(b) The project site does not encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions.
		(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?	(c) N/A	(c) No significant ecological resources are located in the Project Area.
		(d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock?	(d) Y	(d) Box culverts and bridges will be provided for livestock and animals as well as people to cross the east Approach Road on embankment.
		(e) Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered?	(e) Y	(e) 0.25 ha of a Community Forest, where local residents are harvesting non-timber forest products, shall be cleared to construct the West Portal. The forest type and existing condition, however, are the most common in the area. The impacts of clearance on flora, fauna, and local resource use, will be minimal.
	(3) Hydrology	(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	(a) Y	(a) The tunnel is located to run through sandstone below the aquifer to minimize the impacts on surface and ground water flows. During the construction phase and operation phase, however, there is possibility of reducing the water resource currently used by local residents and businesses.
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed?	(a) N	(a) Soft ground is not observed.
		(b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides?	(b) N	(b) The east Approach Road, and East and West Portals require cutting and filling, thus cutting and embankment slope is properly designed to prevent failure.
		(c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(c) N/Y	(c) Cut and fill areas and soil disposal sites are designed to prevent soil runoff.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?	(a) Y	(a) Involuntary resettlement and loss of lands are expected. The east Approach Road alignment was decided to minimize the number of structures to be resettled. For loss of lands, replacement cost compensation will be made.
		(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?	(b) Y	(b) During the preparation of the Scoping Document, 2 public consultations were conducted with attendances of VDC secretaries, health workers, local residents, etc. and project information was disclosed. After the consultations, the letters from VDC secretaries were collected stating basic understanding of the Project and specific concerns from each secretary. Prior to the commencement of the Census Survey, additional 2 consultations were conducted with attendances of property owners to be surveyed. Final explanation on compensation and resettlement assistance prior to resettlement shall be held in the Detailed Design Phase.
		(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards, developed based on socioeconomic studies on resettlement?	(c) N	(c) Not yet developed. After obtaining the approval of TOR, RAP, and Vulnerable Community Development Plan (assistance plan for marginalized and under privileged groups), if necessary, will be prepared based on the DOR guideline (ESMF), World Bank's safeguards policy O.P.4.12 and JICA guidelines.
		(d) Are the compensations going to be paid prior to the resettlement?	(d) Y	(d) As described in the DOR guideline (ESMF) 7.10 (v).
		(e) Are the compensation policies prepared in document?	(e) N/Y	(e) The Project specific compensation policy shall be prepared as the Resettlement Action Plan, which is not yet prepared. General compensation policies are published as the Environmental and Social Management Framework (ESMF), 2007, by GESU, DOR, which is applied to all MOPIT project.
		(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?	(f) Y	(f) ESMF requires to prepare the Vulnerable Community Development Plan for special attention and assistances to socially vulnerable people such as people of below poverty line, women, youth, and elderly people, Dalit groups.
		(g) Are agreements with the affected people obtained prior to resettlement?	(g) N/Y	(g) Based on local procedure, official direct contacts, including population census and asset survey, with the Project Affected Persons will be able to start after the MOSTE approval of the EIA study TOR. ESMF requires that agreements with the affected people to be obtained prior to resettlement.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?	(h) N/Y	(h) RAP is under preparation and not yet approved. The standard organizational framework is established to properly implement resettlement according to the ESMF. Many WB and ADB assisted projects are implemented accordingly.
		(i) Are any plans developed to monitor the impacts of resettlement?	(i) N/Y	(i) RAP is under preparation and not yet approved. In many WB and ADB assisted projects, external and internal monitoring are planned and implemented accordingly based on the ESMF.
		(j) Is the grievance redress mechanism established?	(j) Y	(j) DOR has regular grievance redress mechanism through their web-site as well as at the Division Offices. In many WB and ADB assisted projects, more local grievance redress mechanism are planned and implemented accordingly based on the ESMF.
	(2) Living and Livelihood	(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts?	(a) N	(a) The Project is to provide a bypass to the existing highway, and will not affect the existing means of transportation and the associated workers. Since the Project Area is located in the Kathmandu Valley, urbanization of the land use is already obvious in the area, and shall be accelerated by the Project.
		(b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary?	(b) N	(b) In this stage of the Project, the Project Affected Persons are mainly those who would lose houses or business structures, farming lots/income from farming, and those who will receive less traffic customers on existing highway.
		(c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?	(c) Y	(c) Spreads of communicable and infectious diseases, such as diarrhea by project workers when the living environment is not kept in sanitary condition. Control of sanitary environment at houses and work places shall be the responsibility of the Contractor. In Nepal situation, female who were victim of human trafficking are found with high percentage of infection with HIV virus. Also, drug users and male Terai workers who worked in India are often found with the virus. Although there is no statistical evidence of spreading sexually transmitted diseases by construction workers or immigrants in Nepal available so far, education program regarding such issues shall be developed by the project proponent and contractor.
		(d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)?	(d) N	(d) The Project shall reduce traffic congestions on the existing highway.
		(e) Is there any possibility that roads will impede the movement of inhabitants?	(e) N	(e) Foot paths and over bridges shall be provided at existing roads and major corridors.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	(f) Y	(f) Road embankment may cause shading to northerly neighboring farming land.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) The Project will not affect such facilities, nor accessibility to those.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) The Project is located in the suburb of Kathmandu metropolitan area, and will not produce significant change in local landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?	(a) N/Y	(a) No specific community, or concentrated residential area, of ethnic minorities and indigenous people was identified. For people who belong to minorities and marginalized group, VCDP shall provide specific assistance according to their necessities.
		(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(b) N/Y	(b) No specific community, or concentrated residential area, of ethnic minorities and indigenous people was identified. For people who belong to minorities and marginalized group, VCDP shall provide specific assistance according to their necessities.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?	(a) N	(a) Not violating. The project proponent follows the Labour Act, 2048 (1992), Labour Rules, 2050 (1993), and The Child Labour (Prohibition and Regulation) Act, 1999.
		(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?	(b) Y	(b) The contractor is required to establish and implement safety measures at construction sites.
		(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?	(c) Y	(c) The contractor is required to establish and implement safety measures at construction sites.
		(d) Are appropriate measures being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(d) Y	(d) The contractor is responsible for the design and implementation of the safety measures.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?	(a) Y	(a) Mitigation measures will be proposed in the EIA Report and DOR will be mandated to comply the environmental protection and mitigation measures by MOSTE.
		(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?	(b) N/A	(b) No significant ecological resources are located in the Project Area.
		(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(c) Y	(c) Monitoring role of VDCs shall be clearly stated in the EIA Report and DOR will be mandated to respond to the grievances and complaints to reduce impacts.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?	(a) Y	(a) The monitoring program for the environmental items that are considered to have potential impacts will be carried out by DOR through out construction and operation phases as stated in the EIA report.
		(b) What are the items, methods and frequencies of the monitoring program?	(b) To be decided	(b) All will be described in the EIA report and will be approved by MOSTE.
		(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?	(c) Y	(c) Monitoring and evaluation framework is established in ESMF 7.6. Although Chapter 7 of ESMF is titled 'Resettlement Policy Framework,' the same framework is applied for environmental monitoring by DOR. Budget for the monitoring activities are coordinated in each project.
		(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(d) Y	(d) The ESMF 7.6.2 requires quarterly reports of Internal Monitoring. Also, External Monitoring agency hired by the Project Implementing Units will conduct bi-annual review of EMP and RAP implementation. Both reports will be sent to the finding agency.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).	(a) N/A	(a) Main check items in the Forestry Projects checklist were examined. Since the area of tree clearance in the Project is small, the items are not applicable to the Project.
		(b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(b) Y	(b) Main check items in the Power Transmission and Distribution Lines checklist were the same with the Road checklist.
	Note on Using Environmental Checklist	(a) The impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N/A	

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.

In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.