20.2.2 Natural Environment

1) Groundwater

New market-Stadium road is proposed to pass through the protected and sanitary zones of UB City water sources for centralised water supplies. As the stated in the Mongolian Law on Water, "Sanitary zones shall be set not less than 100 meters from the water sources for centralised water supplies" (Article 13, item 3 and 4). "Regime in protected and sanitary zones of water sources for water supply" (Directive of the Ministries of the Nature and Environment, Infrastructure and Health, 1995, 167/335(a)/171) sets main rules for establishment of protected zones boundary and regime in the specified zones. The protected zone boundaries of the area are set 500 meters due to underground water sources for centralised water supplies. Sanitary zone is strictly set 50 meters with fences. To construct and to locate any construction, moving and other equipment, facilities except for water supply purpose are prohibited as the Directive.

Proposed New market-Stadium road also will cross the special road to Ikhtenger. Government and Special service authorities regulate any construction in area of this special road. Special agreement with Environmental Department, UB City and Special service authorities will be required so as to construct New market-Stadium road.

It is necessary to consider the following items:

- to establish the proper drainage along the new road in order to avoid negative impacts of rain water with oil and grease by automobiles
- to establish net fences along the new road in order for service facilities and gets not to encroach the restricted area.
- to establish a proper intersection
- to execute environmental monitoring of groundwater periodically

2) Hydrological situation

West Naran-Ard Ayush new road will pass through dry beds of the catchment area. These areas have catchment areas for rain flood and flood from snow melting in the spring season. Maximum flood discharge may reach 9.8-14.8 m³/sec. Also it may have flash floods. Roads and bridges in this area should be designed and constructed to prevent flood damage. It is necessary for road planning in this area to cope with those floods.

3) Landscape

It is necessary for improving the environment of UB to consider greenery and individuality. The function of greenery in road planning is to improve the scenery, conserve the natural environment, enhance traffic safety, provide shade and prevent disasters. It is necessary for promoting greening activities to select an arrangement and facility types keeping in mind the

functions applied to the road and the region. It is important when aiming to improve the scenery to express the individuality of the area.

20.2.3 Environmental pollution

1) Air pollution

During Construction Period

Primary impacts on air quality will reflect on high dust loading of ambient air spreading towards the prevailing wind direction. There will be deposits of dust on all objects on surface, such as soil, water, plants and other man-made objects along the alignment route. Therefore, countermeasures during construction and transport of earth should be provided such as establishment of dust proofing fences and sprinkling water to control dispersion of dust when necessary.

During Operation Phase

The prediction of pollutant concentration of Nox (Nitrogen Oxides) and CO (Carbon Monoxide) caused by vehicle transportation in the future is calculated using the following process. A 1-hour concentration in the case of transverse wind and parallel wind by Plume model is used as the prediction method. The prediction formula is as follows:

```
a. In case of transverse wind (as line source model) C(x) = (2l\pi)^{1/2} \cdot (Q_L/U \sigma_z) \cdot \exp(-He^2/2 \sigma_z^2) where, U: Average wind speed (m/sec) Q_L : \text{Emission intensity of pollutant (mg/m·s)} He: Effective emission source height (m) \sigma_z : \text{Width of diffusion in vertical direction} b. In case of parallel wind C(y) = Q/(\pi U \sigma_y \sigma_z) \cdot \exp(-y^2/2 \sigma_y^2) \cdot \exp(-He^2/2 \sigma_z) where, Q: Emission intensity of pollutant (mg/m) Q = \Delta x \cdot Q_L \sigma_y(x) : \text{Width of diffusion in horizontal direction } x = \Delta x \cdot i \sigma_z(x) : \text{Width of diffusion in vertical direction } x = \Delta x \cdot i C(y) = \sum Q/(\pi U \sigma_y(\Delta xi) \sigma_z(\Delta xi)) \cdot \exp(-y^2/2 \sigma_y(\Delta xi)^2) \cdot \exp(-He^2/2 \sigma_z(\Delta xi)^2) where, i : i = 1, n \quad (n=50) \Delta x : \Delta x = 10 \text{m}
```

The concentration of vehicle exhaust gas in 2010 is thought to be higher than that of Japan, and it is assumed that the near future condition of Ulaanbaatar will be close to the former one of Japan. Therefore, Japanese emission rates in 2000 are used as Ulaanbaatar rates in 2010 and those in 2010 are used as in 2020. Using the Pasquill-Gilfford Chart of width of diffusion, the air stability percentage B,D,E were calculated. The wind speed is taken as 1.5 m/s which is the average wind speed for Ulaanbaatar, and height of emission source is assumed as 1 m in consideration of

predicting safely as the roads are low embankment. Hourly traffic volume, classification of vehicle type and speed are specified as follows:

- i) Hourly traffic volume: peak hourly traffic volume is assumed to be the daily traffic on the future network multiplied by 0.08 as a peak hourly coefficient.
- ii) Classification of vehicle type: vehicle types are classified as large and small. However motorcycles may be disregarded because of their small volume of emission.
- iii) Speed: speeds are assumed to match practical speeds based on design speeds.

The above calculation conditions are shown in Table 20.2.1.

Table 20.2.1 Calculation Conditions

	20	10	2	020
	Саг	Truck + Bus	Car	Truck + Bus
Teeverchid Rd				
Running Speed (km/h)	5	0		50
Hourly Traffic Volume	419	191	559	261
Emission Coefficient NOx	0.175	2.832	0.168	2.040
(g/km/unit) CO	1.173	1.370	1.155	1.370
Emission Intensity NOx	0.020	0.150	0.026	0.148
(mg/m/sec) CO	0.137	0.073	0.179	0.099
Total. Emission Int. NOx	0.1	70	0.	174
(mg/m/sec) CO	0.2	10	0.278	
South Tolgoit Rd				
Running Speed (km/h)	4	0	4	1 0
Hourly Traffic Volume	796	351	1041	452
Emission Coefficient NOx	0.165	3.093	0.159	2.228
(g/km/unit) CO	1.288	1.549	1.269	1.549
Emission Intensity NOx	0.036	0.302	0.046	0.280
(mg/m/sec) CO	0.285	0.151	0.367	0.194
Total. Emission Int. NOx	0.3	38	0.	326
(mg/m/sec) CO	0.4	36	0.	561

The future concentrations are caused by the roads and background concentrations. The calculation results are as shown in Table 20.2.2 and the distribution of pollutant level of Teeverchid Rd is shown in Figure 20.2.1. Beyond the border which is 40 m far from the centre of the road, concentration of NOx is in the range 0.08 - 1.05 mg/m³ and that of CO is in the range 0.167 - 0.229 mg/m³.

The future concentration of CO is nearly equal to the standard on account of high background concentrations, however, contributions from vehicle emission to the air is small. The concentration of NOx (NO2+NO: composition ratio is about 50 % each) near the border may exceed the Standard in case of its air stability D(neutral), E(stable) in transversal winds. As concentration is affected by change of wind speed, wind direction and air stability, high concentrations are anticipated in a short term and especially in the winter. However, it is difficult to diffuse the air effectually because of the low embankment road. Therefore, if settlement exists

along the proposed road, adequate afforestation planning of road sides will be required to promote the air diffusion function.

Table 20.2.2 Calculation Results at Border

Terms S		Substances	Concentration in the future (mg/m³)		Background Concentration	Standard (mg/m³)
Tom		Substances	Trans. Wind Parallel. Wind		(mg/m³)	(g)
Te assemble:	2010	NOx	0.055-0.072	0.038-0.063	0.017	NO2:Max. 0.50
Teeverchi hd Road	2010	CO	1.417-1.437	1.395-1.426	1.37	Daily Ave. 0.03
nu Koau	2020	NOx	0.056-0.073	0.038-0.064	0.017	,
	2020	CO	1.433-1.459	1.404-1.445	1.37	:
NW	2010	NOx	0.054-0.071	0.035-0.062	0.017	CO: Max. 8.0
Tolgoit	2010	CO	2.052-2.075	2.028-2.063	2.0	Daily Ave. 3.0
Road	2020	NOx	0.052-0.069	0.034-0.060	0.017	
Road	2020	CO	2.068-2.096	2.063-2.081	2.0	

(Teeverchid Rd.)

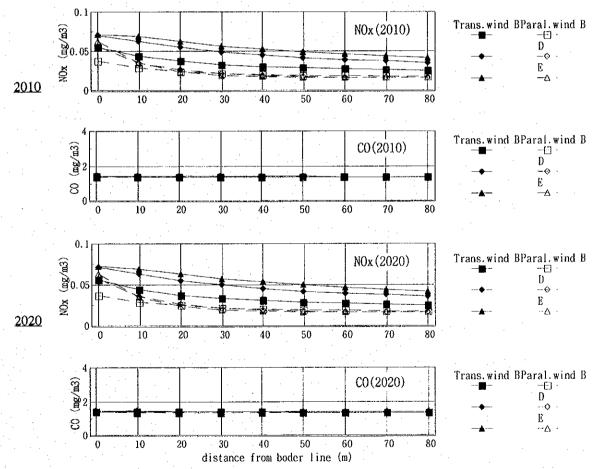


Figure 20.2.1 Distribution of Pollutant Level

Test Calculation for the Environmental Effect of Proposed Future Road Network

The environmental effect of proposed future road network is predicted for 2010 and 2020 with the following calculation conditions:

- 1. Emission rates of UB City in 2010,2020 used are those of Tokyo Government in 2000, 2010 respectively.
- 2. Items NOx, CO (pollutants) and CO₂ (global warming effect)
- 3. Result of analysis on road network in 2010 and 2020 daily traffic volume
- 4. Road length of road network section, analysed running speed and 3 types of traffic volumes
- 5. Traffic volumes of "No trolleys and Buses + Trolleys" are tabulated by finding that current trolleys on their running sections are 20% of the total of buses + trolleys. If trolleys are replaced by buses, the 20% is used for the additional air pollution caused by buses on the trolley operation sections.
- The case with the proposed future road network, and the without case of no improvement on the road network are studied.

Results of test calculation in 2010 and 2020 reach the following conclusion as shown in

Table 20.2.3 and Figure 20.2.2 respectively:

- 1. The traffic flow will be improved because of implementation of proposed future road network, as a result volume of air pollutants such as NOx, CO, CO2 will decrease by 40 % compared to the case of no read improvement. Therefore, the proposed future road network will contribute to improvement of air conditions in UB City.
- 2. NOx: 3411/5916=0.58, CO: 4337/7169=0.60, CO2: 875379/1556637=0.56
- 3. Because running distance of buses is one-tenth compared with that of other vehicles, air pollutant volume emitted from buses can hardly contribute to the whole volume.
- 4. Even if trolley buses are abolished or remain, their effect is no more than 1% of the total daily emission.

NOx: (369-328)/3411=0.012, CO: (169-151)/4377=0.004.

CO2: (45874-40794)/875379=0.006

Table 20.2.3 Calculation Results (Unit; kg/day)

	Items	4.3	Condition	Car	Truck	Bus	Total
-:-	NOx	With	Bus+Trol	315	2,219	281	2,815
2010	CO	With	Bus+Trol	2,082	1,307	132	3,521
	CO2	With	Bus+Trol	394,145	294,353	34,838	723,336
		With	All Bus	380	2,703	369	3,452
	NOx		Bus+Trol			328	3,411
2020		Without	All Bus	767	4,742	455	5,964
2020	ļ		Bus+Trol			406	5,916
	1	With	All Bus	2,650	1,536	169	4,355
	CO		Bus+Trol			151	4,337
	1	Without	All Bus	3,664	3,292	238	7,194
	L		Bus+Trol			213	7,169
		With	All Bus	472,194	362,390	45,874	880,458
	CO2		Bus+Trol		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40,794	875,379
		Without	All Bus	910,844	596,135	55,665	1,562,644
	<u> </u>		Bus+Trol			49,658	1,556,637

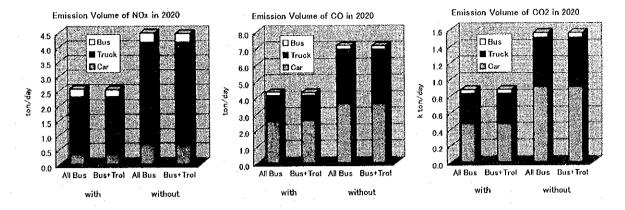


Figure 20.2.2 Comparison between With and Without Future Road Network

2) Water pollution

During Construction Period

As regards plans to rebuild a bridge over the Selbe River, muddy waters will be caused during construction of foundations. Therefore, it is necessary to consider time of construction such as a period of water shortage and plan the proper execution.

During Operation Phase

No effect on water quality is anticipated during operational phase except for certain amounts of runoff containing suspended solids from road surface into the natural drainage channels or onto open surface during the rainy seasons. The impact due to the runoff will be negligible, however, to be sure, provision will have to be made for drains of adequate volume preventing direct discharge of any oil/grease contaminated waters into the water supply area.

3) Noise

During Construction Period

Noise levels in the vicinity of any construction activity increases due to running of heavy earth moving equipment such as bull-dozers, excavators, transport vehicles, portable generators, etc. Noise and vibration of the existing construction equipment in Mongolia were measured. Regarding these construction works which will affect the environs, noise produced by construction equipment is predicted. The prediction point is at the edge of the site. The relationship between main construction equipment and distance are shown in Figure 20.2.3. As a prediction method, construction equipment is properly allocated and each noise level is synthesised as follows.

$$L = 10\log_{10}(10^{L1/10} + 10^{L2/10} + \cdots + 10^{Ln/10})$$

Calculation conditions and results are shown in Table 20.2.4. Although the Standard for construction is still not enacted, high noise levels caused by construction equipment will be anticipated. Where housing developments or dwellings are localised close to the site, therefore, it is necessary to establish a noise barrier along the borderline of the site, to reduce impact.

Table 20.2.4 Calculation Condition and Result

110			
Noise Level (dB) 8 8 90			Concrete breaker → Bulldozer → Power shovel ▼ Air compressor → Roller △ Concrete plant → Asphalt plant
2 70			Concrete mixer
60 50			
	1	10	100
		Distance (m)	

	Noise Level	Distance	
Name	(dB)	(m)	
Concrete breaker	77	30	
Bulldozer	. 78	5	
Power shovel	74	- 10	
Air compressor	77	30	
Roller	70	5	
(Concrete plant)	81	30	
Asphalt plant	81	30	
(Concrete mixer car)	82	. 10	
Total Noise Level	85		

Regulatory Standards for construction in Japan

85 dB at borderline of the site

Prohibition Items: Night time, Holiday

Figure 20.2.3 Noise Level of Construction Equipment

During Operation Phase

The prediction of noise impact caused by vehicle transportation in the future is performed by the following process. For the noise calculations, the noise level L50 based on the prediction method of the Acoustical Society of Japan (AJS) is used. The prediction method of the ASJ is as follows:

Lso = Lw - 8 - 20
$$\log_{10}$$
l + 10 \log_{10} (π l/dtanh2 π l/d) + α d+ α i where:

L50	Median of traffic noise level (dBA)	
Lw	Average noise power level of vehicles	(dBA)
1	Distance from sound source (m)	
d	Average interval between vehicle (m)	d = 1000 V/N
V	Average running speed (km/hour)	
N	Traffic volume (Vehicle/hour)	
α d	Adjustment factor of diffraction	
αi	Adjustment factor of various causes	

The formula of noise power level in 2010 used is based on the calculation results by this power level survey. Noise power levels in 2020 are expected to be reduced from the present level due to the regulatory standards for vehicle noise and improvement of vehicle efficiency. Today, the vehicle noise is assumed to be slightly higher than that in Japan, however it is assumed that the future conditions in Ulaanbaatar will be close to the present ones in Japan.

$$Lw_{2010} = 68.9 + 20 \log_{10}V + 10 \log_{10}(a_1 + 3.7 a_2)$$

 $Lw_{2020} = 65.1 + 20 \log_{10}V + 10 \log_{10}(a_1 + 4.4 a_2)$

Using the above power level formula, the distribution of noise level in 2010 and 2020 were calculated. Hourly traffic volumes, vehicle type proportions and speed were assumed to be the same as in the case of the air pollution calculations. Using these data, the results of calculation predicted using the ASJ are shown in Figure 20.2.4. Leq is about L50 plus 2–3 dB.

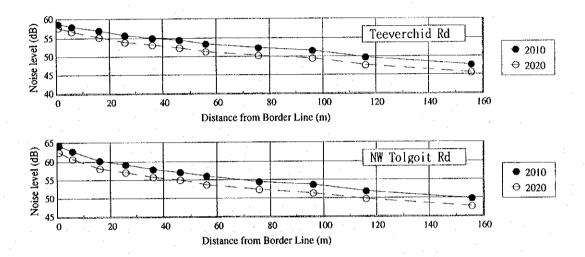


Figure 20.2.4 Distribution of Noise Level

In the above figures, the noise norm in residential areas is 55 dB in daytime, therefore noise level from proposed roads meets the standard narrowly in the area far from 20-40 m. With continued traffic growth after 2010, the noise levels will not decrease even though power level is reduced. Therefore, if conservation objects such as residences and schools exist along the routes, countermeasures will be needed to reduce the noise level. To achieve this, sound barriers with shrubs for landscaping on the edge of embankment is recommended, with a height in proportion to the traffic volumes. The effects of barrier height (in case of receiving height 1.2m) are shown in figure 20.2.5. 1m-barrier height produces a decrease effect of 2-3 dB.

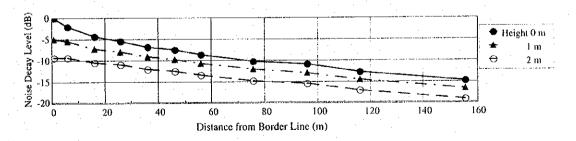


Figure 20.2.5 Effects of Noise Barrier

Regarding high rise residences such as apartments, a low barrier produces little effect in higher receiver positions, as shown in Figure 20.2.6. However, it is difficult to cope with sound

insulation in the case of low embankment roads, because a high barrier, which is effective, has a negative effect on road function and scenery. Most apartments have double-paned windows, so the transmission loss is very high. Therefore, a low barrier together with shrubs, which reduces noise levels by 2-3dB in lower receiver position, is recommended.

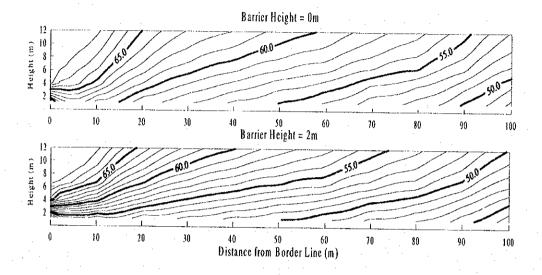


Figure 20.2.6 Comparison between Without Barrier and With 2m-height Barrier (NW Tolgoit Rd. in 2020)

4) Vibration

During Construction Period

Regarding earthworks and foundation works which will affect the environs, vibration produced by construction equipment is predicted. The prediction point is the border of the site. The relationship between main construction equipment and distance are shown in Figure 20.2.7. In relation to a prediction method, construction equipment is properly allocated and each vibration level is synthesised as follows.

$$L = 10\log_{10}(10^{L1/10} + 10^{L2/10} + \cdots + 10^{Ln/10})$$

Calculation conditions and results are shown in Table 20.2.5. Although the Mongolian Standard for construction is still not enacted, the vibration level caused by construction equipment will meet the Japanese Standard.

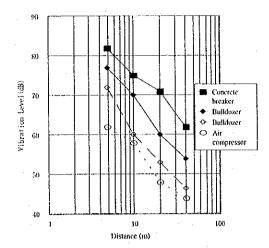


Table 20.2.5 Calculation Condition and Result

Name	Vibration	Distance
	Level(dB)	(m)
Concrete breaker	71	20
Roller	70	10
Bulldozer	60	10
Air compressor	44	30
Total Vibration level	74	dB

Regulatory Standards for construction in Japan 75dB at borderline of the site Prohibition Items: Night time, Holiday and etc.

Figure 20.2.7 Vibration Level of Construction Equipment

During Operation Phase

Regarding the improved roads, road traffic vibration levels are predicted in addition as noise levels. As a prediction model, the following formula is defined by the Ministry of Construction in Japan for embankment road is used.

```
L_{10} = a \cdot \log(\log Q^*) + b \cdot \log V + c \cdot \log M + d + \alpha \sigma + \alpha f - \alpha I
  where, L<sub>10</sub>: Vibration level which is upper value of 80% range (dB)
          Q*: Equivalent traffic per one lane during 500sec (unit/500sec/lane)
      Q^* = 500/3600 \cdot 1/M \cdot (Q_1 + 13Q_2)
          Q<sub>1</sub>: Hourly traffic volume of small vehicle (unit/hour)
    Q2: Hourly traffic volume of large vehicle (unit/hour)
    V : Average running speed (km/h)
    M: Number of whole lanes
    \alpha \sigma: Adjustment factor for flat characteristics of pavement (dB)
              \alpha \sigma = 14\log \sigma (asphalt pavement \sigma = 5mm)
    \alpha f: Adjustment factor of soil proper vibration (dB)
           f =8.4N<sup>1/3</sup> f: soil proper frequency (Hz), N: Average N value (surface-10m)
      f \ge 8Hz: \alpha f = -20\log f, 8Hz > f \ge 4Hz: \alpha f = -18,4Hz > f: 10\log f - 24
    \alpha s: Adjustment factor for height of structure \alpha s: 1.4H-1.3 (H: Height(m))
       \alpha r : Value of decay by distance (dB) \alpha r = \beta \cdot \log(r/5+1)/\log 2
       \beta = 0.077(L_{10}' + \alpha s) - 1.8
   a, b, c, d: Constant a = 65, b = 6, c = 4, d = 35
```

The establishment of traffic condition is the same as that for noise. Calculation results of the vibration level at the border between roads and housing sites are shown in Table 20.2.6 and Figure 20.2.8. These values are below the threshold of vibration sensation (0.01 m/s²=60dB).

Table 20.2.6 Calculation Results at Border between Roads and Housing Site

Locations		Hot	Vib. Level		
		Small vehicle volume(U)	Large vehicle volume(U)	Av. Speed(km/h)	(dB)
Teeverchid Rd.	2010	419	191	50	45
	2020	559	261	50	47
NW Tolgoit Rd.	2010	796	351	40	48
	2020	1041	452	40	50

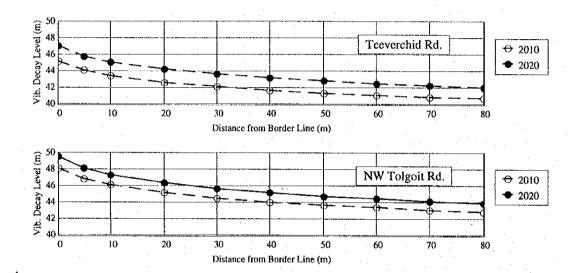


Figure 20.2.8 Distribution of Vibration Level

20.3 Environmental Management Program

20.3.1 Mitigation Measures

1) Air pollution

During Construction Period

In order to prevent the fugitive dust emission and its dispersal, it is proposed to provide a water sprinkling system at the construction site, particularly for intersection at Geser temple and for residential areas along NW Tolgoit Road. Dust covers may be required over the beds of trucks, which will be used for transportation of materials. Low emission construction equipment must be used wherever feasible.

During Operation Phase

Due to the basic reason that the present traffic will be divided in two parts and the speed of the vehicles will be higher and smoother on rehabilitated roads, the air pollution levels will be reduced considerably in comparison with the present level in the inner city. Even though specific environmental control measures cannot be implemented, efforts will be made to mitigate the impact by the following means.

Improvement of automobiles: Improvement of automobiles involves emission gas regulations applied to both new models and vehicles in use. It is important to strengthen regulations in the future. As for countermeasures for gasoline engines, the use of catalysts is effective for reduction of CO, HC, NOx. In addition, the use of electric controlled carburetors will reduce the volume of emission gas. In Thailand the installation of catalysts on new cars of over 1,600cc has been required from Jan.1993. In addition, the promotion of the use of gasoline without lead and diesel oil with little sulfur by means of price incentive has contributed to reduce the environmental load caused by increased fuel consumption.

Improvement of road structures: The concentration of automotive emissions decreases by diffusion as the distance from the road increases. Therefore, it is important to maintain distance between roads and dwellings by the establishment of buffer zones and greenbelts. Comparison of air pollutants' concentration decay by distance under same traffic conditions applied to basic types of road structure are shown in Figure 20.3.1 (receiver height 1.5m, wind direction transversal). In case where the height of the emission source is low, such as grade level, concentration on the roadside is high. Therefore, when the height of the emission source increases, diffusion is more effective. Use of barriers as countermeasures against noise and street trees will theoretically increase the emission height, and they are effective for the diffusion of pollutants.

On the other hand, some plants are able to absorb and fix air pollutants. For instance, a 7m-wide greenbelt with trees on both sides has the capability to absorb 5% of NOx emitted from a traffic volume of 30,000 vehicles per day. Figure 20.3.2 shows that a row of trees along a roadway has the effect of promoting diffusion by disturbing the airflow.

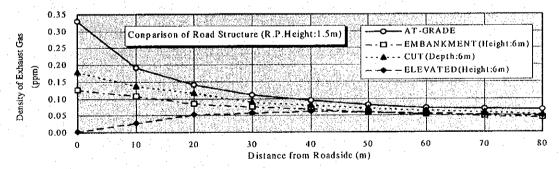


Figure 20.3.1 Air Pollutants Concentration Decay by Distance

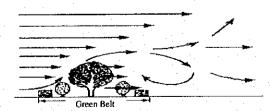


Figure 20.3.2 Function of Diffusion Concerning Greenbelt with Trees

Improvement of traffic flow; It is particularly important for achieving air pollutant reduction to plan and maintain smooth and safe traffic flow. The relation between vehicle velocity and emission volume is shown in Figure 20.3.3. As a result of the master plan, the combination of improvement of speed and control of starting and stopping is expected to reduce the concentration of exhaust gas from vehicles. This will be especially effective for large dieselengine vehicles. However, the growth of traffic volume in the future will counter this effect unless suitable measures are taken. Therefore, as mentioned above, it is necessary to promote such measures as exhaust gas regulations and traffic demand management.

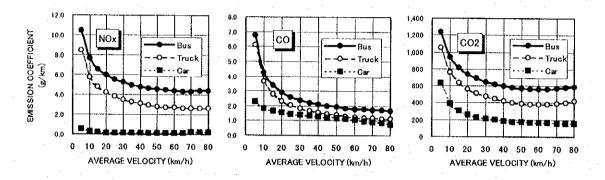


Figure 20.3.3 Emission Coefficient of Bureau of Environmental Protection, Tokyo Metropolitan Government in 2000

Noise and vibration

During Construction Period

The plant and machinery to be used during the construction period will be properly maintained. Low noise producing equipment such as vibrator driver (instead of pile driver) will be used. Engine and generator with cover will be used. With regard to use of equipment emitting high noise and vibration such as concrete breakers, it is necessary to reduce the effect on inhabitants in consideration of controlling daily operation hours.

During Operation Phase

The following measures will be adopted for the prevention of noise propagation.

- Plantation of trees along both sides of the roads.
- Construction of noise barriers along the roadways particularly where the road passes through the settlement or habitat areas.
- Regulating the smooth flow of traffic, thereby preventing the traffic jams and the subsequent use of horns.

Strength of regulations: Traffic noise will rise because of increasing traffic volumes in the future. Therefore, there is a need to strengthen the regulations and controls over the noise level from all vehicles contributing to road traffic noise.

Basic measures: Various measures should be promoted include:

- Controls of total traffic volume by improving efficiency of physical distribution systems as well as by controlling the number of vehicles used privately.
- Controlling large vehicles driving into the center of the city by placing distribution facilities in appropriate locations.
- Appropriate use of the roadside land.
- Controls of passing-by traffic driving through the center of the city by improving roads with consideration to the preservation of the roadside environment.

Traffic controls: Establishing and maintaining safe and smooth traffic flow is critical in reducing the levels of air pollution, noise, and vibration caused by road traffic. The following are the measures which should be taken to prevent road traffic pollution:

- On urban roads, measures such as improvement of traffic signal control technologies, and inspection and review of traffic rules, should be taken to reduce the frequency of starts and stops at intersections. These measures are part of the effort to reduce levels of nitrogen oxides and carbon dioxide, which is causing global warming, noise, and vibration.
- Establishment of bus lanes and priority lanes for other public transportation means should be promoted in order to encourage switching from private cars to public transportation to help reduce the overall traffic volume. Buses should be kept in good condition to minimize pollution and noise.
- To eliminate illegal parking which hinders smooth traffic flow in urban areas. Parking areas should be improved.

3) Plantation program

It is recommended to plant at least a 5-m wide green belt on both sides of the roads in residential areas. The green belt also creates turbulence in the airflow across it hence enhancing the diffusion. The total stretch of the proposed roads in residential areas will be covered under the plantation scheme.

Areas in Ulaanbaatar City are characterized by thin soil cover not exceeding 10-20 cm depth. Biological activity in such soils is very low and structure is poor. Nutritional status, moisture reaction and base exchange capacity are generally poor.

According to the general rule followed at UB city Greening company, the total area under the plantation, the number of required trees and budgets are calculated as shown in Table 20.3.1. Tariff used at Greening Company is given in Table 20.3.2.

Table 20.3.1 Plantation Area and Required Plants

	Green belt size			Plantation		
Road	Length m	Width m	Area m ₂	Trees	Bushes	small bushes
Tolgoit	4,300	10	43,000	614	717	21,500
TV-	450	5	2,250	64	75	2,250
Teeverchid	2,450	5	12,250	350	408	12,250
Total	-	~	57,500	1,029	1,200	36,000

Table 20.3.2 Budget for Plantation

_	Cost for total plants 1000 Tug.				
Road	Trees	Bushes	Small bushes	Total 1000 Tug.	Total US\$
Tolgoit	1,843	136	5,375	7,354	8,453
TV-	193	14	563	770	885
Teeverchid	1,050	. 78	3,063	4,191	4,817
Total	3,086	228	9,000	12,315	14,156

The selection of trees to be planted has to be done judiciously keeping in mind the adaptability of trees to the climate of the region. As already mentioned, the trees, which are found in relative abundance as compared to the other species as well as species with proven survival rate should be preferred. Consultation with experts in the field will further help to identify the exact species to be planted and these can be obtained from the nurseries in the nearby areas. The trees and bushes suitable for the plantation are pine, larch and wild oats, thorny currant and yellow acacia. Plantation along the road should be done with the permission of UB City Environment Monitoring Department.

20.3.2 Implementation and Monitoring

Success of any environmental management program depends upon the efficiency of the organisational set-up responsible for the implementation of the program. Regular monitoring of the various environmental parameters is also necessary to evaluate the effectiveness of the management program so that necessary corrective measures could be taken in case there are some drawbacks in the proposed program. A specially made Environmental Management team will be responsible for:

- i. Collecting and analysing air samples.
- ii. Monitoring noise level.
- iii. Implementing control and protective measures.
- iv. Co-ordinating the environment related activities within the project as well as with outside agencies.
- v. Collecting statistics of health of workers and population of the surrounding villages.
- vi. Carrying out avenue plantation and its monitoring.
- vii. Monitoring the progress of implementation of environmental management program.

1) Monitoring Schedule and Parameters

To evaluate the effectiveness of environmental management program regular monitoring of the important environmental parameters will be taken up by an outside agency. The schedule of duration and parameters to be monitored by environment cell are summarised in Table 20.3.3.

Table 20.3.3 Monitoring Program during Operation Phase

No	Description of parameters	Schedule and duration of monitoring	Implementing organization	Budget 1000 US\$
1	Ambient air quality (SPM, S O2, CO and NOx) at roads: W/N Tolgoit, Naran-Ard Ayush, Teeverchid, Ajilchin-Chinggis, South PS4, Old market, New market-Stadium	24 hourly sample once a season	UB city Municipality Central Laboratory for Environmental Monitoring Auto road Department Laboratory of Hygiene Institute of Social Health	5.0
2	Ambient noise levels, power level	Twice a year	UB city Municipality Institute of Social Health Auto road Department	2.0
3	Traffic volume	Once a year	Auto road Department	2.0
4	Green belt maintenance	Throughout year	UB city Municipality City Greening Company Forestry Institue	25.0
5	Soil contamination along the road corridor, near to water sources (Lead, Heavy metals, 4 Ethyl Lead, etc.)	Twice a year	Ministry for Nature and Environment Ministry of Health and Social Care UB city Municipality	8.0
		Total		42.0

Note: Based on the results of improvement in the environmental parameters further monitoring will be structured after consulting Ministry of Nature and Environment.

2) Cost for Environmental Monitoring/Management

The investment for implementation of the environmental management plan is given in Table 20.3.4.

Table 20.3.4 Cost for Environmental Mitigation / Management

Particulars	Cost in Tug. Thousand
Avenue plantation ¹	12,315
Net-fence ²	96,000
Monitoring program ³	36,540
Total	144,855

Note

- 1. See Table 20.3.2
- 2. Net-fence along New market-Stadium Rd.: 1,600m*2*30,000=96,000,000
- 3. See Table 20.3.3

The recurring cost for environmental monitoring viz. ambient air quality, noise level, etc. will depend upon the number of locations, samples and times to be analysed by an outside agency assigned for the purpose.

Chapter 21 Maintenance and Repair of Roads and Bridges

21.1 Existing Condition of Ulaanbaatar city

21.1.1 Organization

Organization for the maintenance and repair of roads in UB city is shown in Fig 21.1.1.

Only one staff is now engaged at the road section in the supervision division for the maintenance and repair.

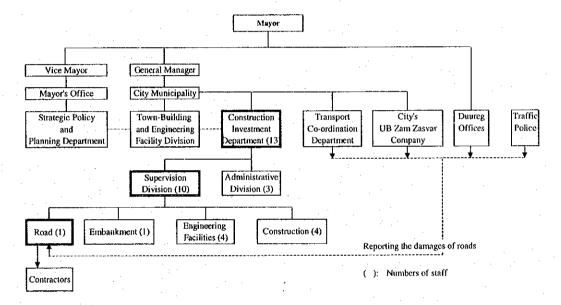


Fig. 21.1.1 Organization Related to Maintenance and Repair of Roads of UB City

UB city budget for roads is formed mainly from the allocation made by Road Department, but that is not enough for not only maintenance but also for new construction of roads. After 1990, the budget of UB city became very tight and the budget for the maintenance and repair was reduced. The budget in 1998 is none as shown in Table 21.1.1.

Table 21.1.1 Budget Related to Roads of UB City in 1998 (million Tg)

		Requested	Actual
New construction and Improvement	1.2km roads and underground pipes at 13th, 14th Khoroolol	491	200
	18.6m Gachuurt Bridge widening	37	0
	Berkh road 2.5km	200	0
Maintenance and Repair		272	0
	Total	1,000	200

Source: Ulaanbaatar city

There is a shortage of pavement repair equipment as well as of materials procured from abroad. Under such situation, the function and serviceability of roads, structures, etc are gradually decreasing. The road maintenance and management could not be observed during the study period. New cracks, pot holes are occurring. The life expectancy of road pavement, structures, etc is obviously shortened due to complicated intertwining of unfavorable conditions as weather and poor performance in road administration.

Urgent repair works and periodical maintenance works should be conducted to save the future extraordinary costs.

21.1.2 Activity for Maintenance and Repair

1) Inspection

In UB city the budget for the maintenance and repair of following year is decided as follows:

a) The joint committee of 5 organizations inspects each road of "Duureg" of the city every October

The traffic	the city	"Duureg"office	City	Supervision
police office	transport co	s of the city	construction	division
	ordination		company	
	department			

b) Report to the supervision division for preparing the next budget planning.

2) Maintenance and repair works

The maintenance and repair work is mainly ordered to the registered 5 construction companies shown in Table 21.1.2, out of which "UB ZAM ZASVAR" is the UB city's own company.

Table 21.1.2 Construction Company for Maintenance and Repair of Roads and Bridges in Ulaanbaatar City

No	Company name	Establis E	engi eers		Others	Total	Main works
1	ASBI	1991	9	88	13	110	Road construction /repair
2	BAT ZAM	1991	6	15	14	35	
3	GAN GUUR	1992	8	58	34	100	Bridge construction/repair
4	KHUCHIT ZAM	1991	6	38	14	58	Road construction /repair
5	UB-ZAM ZASVAR (Old name :TOKHIJILT)	1998	5	100	30	135	Road maintenance /repair

Source: UB city

21.2 Maintenance and Repair of Roads for the Medium and Long Term Periods

This chapter shows important concept of maintenance and repair, and the recommendation of necessary equipment and selection of maintenance and repair works.

21.2.1 Life Cycle of Pavement

The concept of the life cycle of pavements is shown in Figure 21.2.1. The serviceability of pavement will gradually reduce year by year. However it will be recovered by suitable repairing.

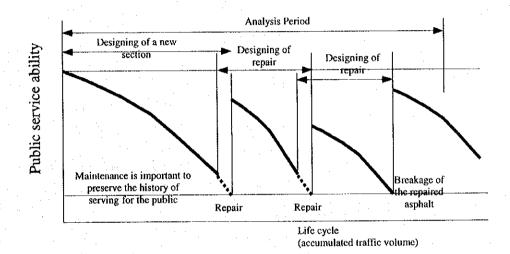


Figure 21.2.1 Concept of Life Cycle of Pavement

21.2.2 Inspection

Inspection of roads and bridges is important to repair them quickly for keeping their serviceability and for making the repairing costs less.

Examples of inspection sheet is shown in Appendix 4.1-4.3 which were used for the inventory survey in this project with Mongolian companies.

21.2.3 Execution Procedure of Maintenance and Repair of Roads

The flow chart is shown in Figure 21.2.2 for roads, Figure 21.2.3.for bridges.

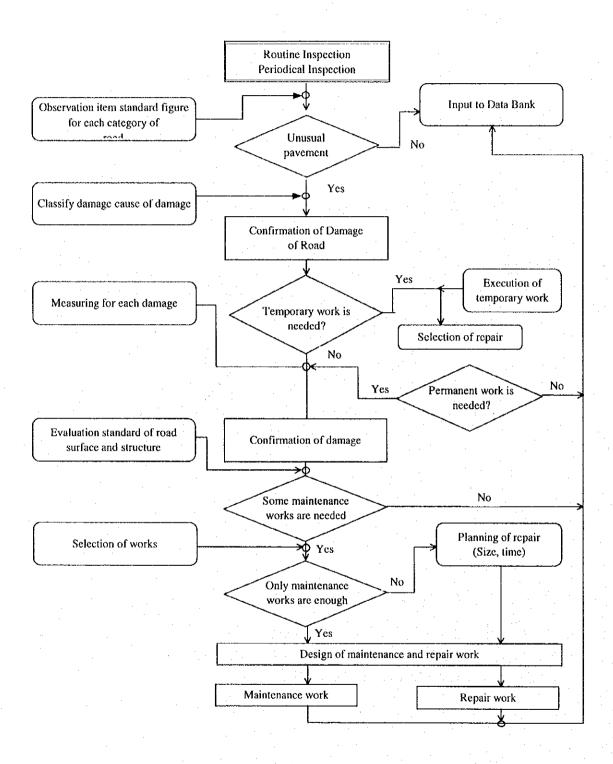


Figure 21.2.2 Flow Chart of Maintenance and Repair for Roads

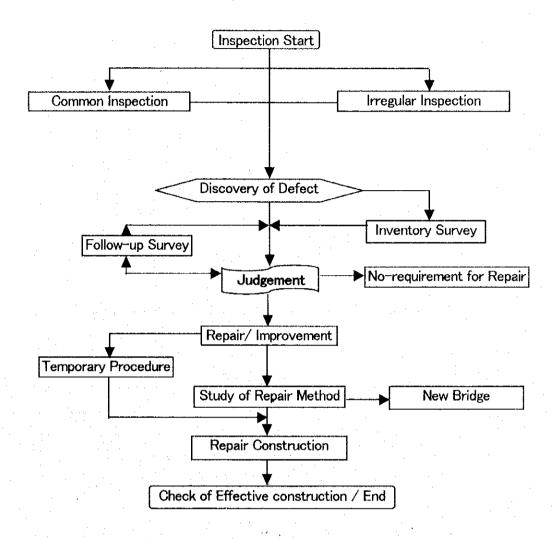
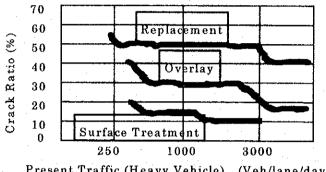


Figure 21.2.3 Flow Chart of Maintenance and Repair for Bridges

Selection of Maintenance and Repair Works

1) Roads

Figure 21.4.4 shows the classification of repair works by the ratios of cracks and Figure 21.4.5 shows the stage of maintenance and repair works of asphalt pavement.



Present Traffic (Heavy Vehicle) (Veh/lane/day)

Figure 21.2.4 Crack Ratio, Preset Traffic and Repair Work

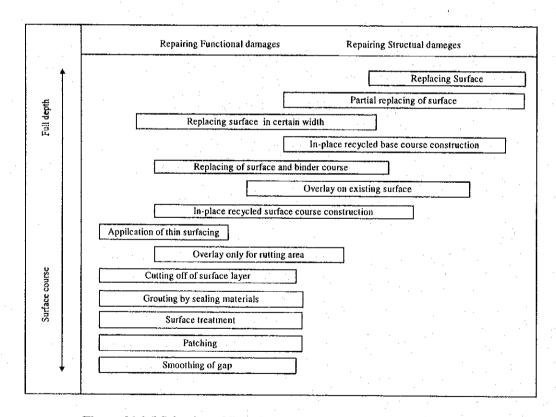


Figure 21.2.5 Selection of Repair Works for Asphalt Pavement

2) Bridges

The selected maintenance and repair works are shown in Figure 21.2.6.

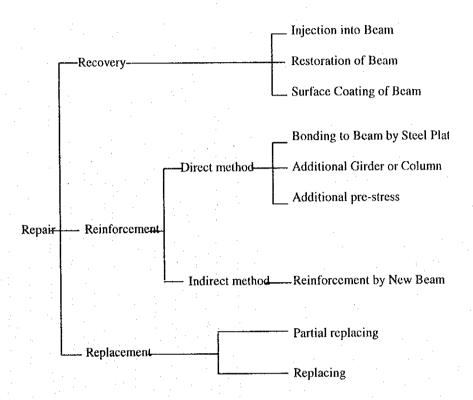


Figure 21.2.6 Repairing Works for Bridges

21.2.5 Equipment for Maintenance and Repair

Many kinds of equipment are needed against various kinds of maintenance and repair works. The list of necessary equipment is shown in Table 21.2.3. "©" shows the important ones among them.

Table 21.2.3 Equipment for Maintenance and Repair of Roads

Model	OInspection	Gravel road	Concrete pavement	Asphalt pavement	Shoulder	Structure	Guard rail	Sign board	Weeding	Road cleaning	Snow removal	O Management
Patrol car Road service car Dump truck Water lorry Motor grader Road stabilizer Back hoe Wheel loader Belt conveyer Roller Rammer, compactor Distributor Joint cleaner Asphalt finisher Road maintenance vehicle Concrete breaker Pavement breaker Compressor Generator Welder Bridge inspector Truck crane Line rnarker Motor grader with snow plow Radio communication equipment Vehicle weight measuring equipment	00	0000000000	00 0 0000@ 0000	@@ O O@@O @@ @	00 000 0	© 0000 0 00000	0 000 0	0 000 0	000	000	0000 0	0

21.2.6 Problems on Maintenance and Repair

1) Lack of budget

The budget for maintenance and repair of roads of UB city is small or actually none.

UB city is proposing the Mongolian Government to utilize the revenue from the vehicles at the gates of UB city as their own resource according to new regulation of city road fund.

2) Lack of staff in the city road department

The staff of road maintenance is only one. UB city have a plan to increase the staff to 5 for proper maintenance and repair of roads considering the long term road maintenance and repair plan. Latest regulation defined the road owner responsibility system for the traffic accidents.

The maintenance and repair work shall be divided into two categories. One is routine or urgent work and the other one is comparatively large sized work such as periodical improvement works. The latter one is desirable to be ordered to the construction companies in each contract base from the view point of efficiency. However the former one is better to be conducted by the UB city directly.

Categories	Work to be done	be executed by
Routine and urgent works	Inspection, small scale repairing	City own organization
Comparatively large sized works	Overlay, improvement, widening	Commit to construction companies on contract base

3) Capability of the construction companies

Quality control and work efficiency are important factors of the construction companies. 5 registered companies have 120 units of construction equipment and trucks. (Table 21.1.4 in Appendix shows the equipment of these companies.) They have been used for more than 10 years and became superannuated. Their work availability is 20-40%, and their performances have decreased 50% and less. Actual available number of the equipment are only 12-25 units for urgent and qualified works. It means 0.04-0.08 units per km to consider 300km of main road length in UB city. It is much smaller comparing the case of Japan, where there are more than 0.2 units per km were owned for routine repair and urgent works.

21.2.7 Organization for Routine and Urgent Repair Works

UB city has some working parties in their organization for routine and urgent requirements. Generally speaking, the number of the necessary party are considered as one per 400-800 thousand m2 of pavement area. UB city has a 600km length of roads as shown in Table 4.1.1. If assumed total area of the pavement is 6 million m2, it will need 10 parties. However UB roads need less maintenance in winter and the necessary numbers may be reduced to 5parties. Numbers of the crews and equipment in a party are shown as an example in Table 21.2.4.

Table 21.2.4 Example of Numbers of the Crews and the Equipment in the Party for Repairing of Roads

<staff></staff>	Nos.	
Foreman	1	
Driver	2	Staff transport, materials transport
Operator	1	Roller
Shoveler	2	Unloading materials
Raker	2	Raking
Painter	1	Tack coating
Sweeper	1	Cleaning up damaged place
Flagman	1	traffic control
Total	- 11	
<equipment></equipment>		
Cargo truck	1	Doule cab, 2-4 ton,
Dumptruck	i	4 ton
Car	1	Van type, 4WD
Vibration Roller	1	0.5 ton
Sprayer	. 1	25liters/min.
Hand heater	1	
Small instrument	1	Rake, shovel and etc.
Radio comunication	3	each vehicles

21.2.8 Repairing Works

The following show the illustration of repairing works.

Figure 21.2.7 shows the patching method for road and bridge surface.

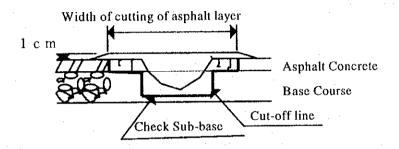


Figure 21.2.7 Patching Method

Figure 21.2.8 shows the partially replace method

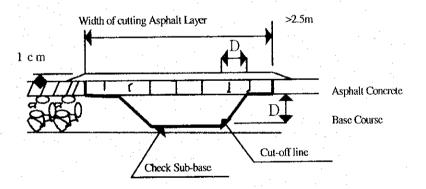


Figure 21.2.8 Partial Replacement Method

Repairing method for the pavement at approach section of bridge is shown in Figure 21.2.9.

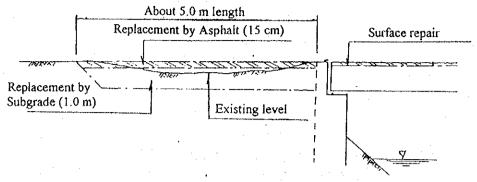


Figure 21.2.9 Repair at Approach to Bridge

Applying cross beam and repairing slab method for the superstructure is shown in Figure 21.2.10.

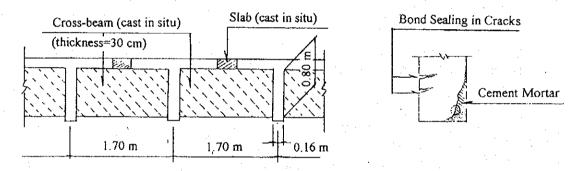


Figure 21.2.10 Applying Cross Beam & Reforming Beam

Repairing and reinforcing method for the substructure is shown in Figure 21.2.11.

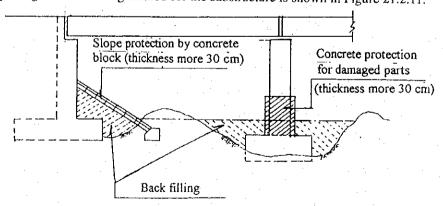


Figure 21.2.11 Repairing & Reinforcing of Substructures

21.3. Cost Estimation for Maintenance and Repair

The annual cost for maintenance and repair of main existing paved roads is assumed to be one tenth of the cost for the construction of these roads as shown in Table 21.3.1. The annual cost for maintenance and repair of F/S project is also assumed to be one tenth of the cost of construction as shown in Table 21.3.2.

Table 21.3.1 Maintenance and Repair Cost for Existing Pavement Roads

	*Total area of	Estimated unit cost	Estimated cost	**Estimated
	each roads	(yearly)	(yearly)	cost by ADB
Evaluation	m²	\$ / m ² / year	\$ / year	\$ / m ² / year
of road				
4	570,960	0.15	85,644	
3	1,284,880	0.73	937,962	1.16
2	70,050	3.33	233,267	х
1	93,500	6.50	607,750	186000
Total:	1,860,000		1,864,623	=2,160,000

Source: JICA study team.

Table 21.3.2 Maintenance and Repairs Cost for Roads in F/S projects

Group (Route)	UB Rd No.	Road name	Road Length (km)	Pave Width (m)	Pave area (m2)	Estimated unit cost (Financial) (\$/m2.year)	Estimated unit cost (Financial) (1000\$/year)	Cost of Group (Financial) (1000\$/year)
Central	new	Tolgoit~Sonsgolon cross	0.413	18	7434		41	240
Route	new	South Tolgoit Rd	0.346	18	6228	5.59	34	
	82	South Tolgoit Rd	1.671	18	30078		165	
Northern	3	Tolgoit-Sonsgolon cross	0.413	18	7434		41	747
Route	84,85	N/W Tolgoit	3.627	18	65286	5.49	359	
	New	WestNaran~ArdAyush	3.006	. 18	54108		297	
	new	South of TV~N/Rd.88	0.391	11.5	4496.5		25	
	88	N/Rd.88~IS 11	0.454	10.5	4767		26	
<u>_</u>	41	Teeverhid Rd.	8.368	18	150624		827	1,584
Southern	new	Teeverchid SW Ext.	0.71	18	12780	5.49	70	
Route	117	Dund Gol River Side Rd	1.00	18	18000		99	•
•	39	South of PS4	5.942	18	106956		587	
Middle Ring Route	new	Stadium~New Market	3.12	18	56160		308	308
							Total	2,880

^{*:} based on the Road inventory sheet

^{**:} Second Roads development Project(F/S), August 1998

Chapter 22 Implementation Program for F/S Projects

22.1 Projects to be Implemented at the First Stage

For the realization of the whole of projects selected for feasibility study in Chapter 15, it needs a huge amount of the cost. Implementation schedule of the projects shall be studied under the consideration of the following items:

- 1) Execution of high priority projects in early occasion, which are selected from the most appropriate long-term road network for 2020.
- 2) Maintenance and repair works for existing and future road networks.
- 3) Measures to sustain current public transportation systems in future.

22.1.1 Execution of High Priority Road Development Projects

Current road network will become congested in 2020 as mentioned in Chapter 8. Traffic congestion is forecasted especially on "the west part of Enkh Taivan Avenue", "the roads to the satellite towns" including "road to airport (Nadamehin Rd)" and "access road to northern ger villages".

The current "access road to northern ger villages" shall be maintained, however without new road development, from engineering and environment points as mentioned in Chapter 3 and 7.

"Access road to satellite towns" shall be developed in parallel with the regional development. It will not be effective to put large amounts of investment to the roads only. As the scope of this FS study is limited within urbanized UB, actual execution plan for these access roads is expected to be studied in detail by another project.

The role of Enkh Taivan road will become more important as the transverse trunk road between east and west of UUB. As mentioned in Chapter 8, the development of alternative routes of east-west transverse road will contribute to the solution of the congestion by dispersing the traffic rather than the widening of the Enkh Taivan alone. Three alternative routes were studied in Chapter 10. The result of economic evaluation shows that, for all routes together, the B/C is 0.94 and EIRR of is 9.3%, which is close to the values required for project to be economically viable.

From the view point of cost and benefit, the improvement of the West End of the Central route has the best cost-efficiency followed by the southern route. The economic performance of Northern Route is low at B/C of 0.71 and IRR of 6.4%. This is because of its high cost. This route passes through mountainous terrain and there are 6 bridges on this route. Middle ring route is economically viable at B/C of 1.03 and IRR of 10.5%.

Total construction periods are assumed to be about 8 years as mentioned in 17.4 of Chapter 17 of Main Text. While the total cost of FS projects is about US\$ 116 million. Whole of the projects would be divided into 3 implementation stages and average expenditure for one stage should be about US\$ 30 to 40 million.

Considering the above budgetary implementation constraint, current developing conditions of the lands along the expected project roads and the urgency, especially against the opening of new central market, following 3 projects are selected as the most high priority projects to be implemented at first stage.

Projects	Cost/Term	Reasons	Remarks
Improvement of irregular Cross section with railway at western part of Enkh Taivan and development or road for the access to northern route.	million	The largest efficiency is ensured by small cost. It will contribute to solve the forecasted traffic congestion in the Central route and to prevent accidents with railway.	The efficiency may become larger after the completion of the northern route in future. EIRR=14.7%
Widening of Teeverchid Road (Length:8.4km)	US\$ 17.0 million 4years	First, this widening is effective for the solution of traffic congestion immediately due to the opening of new central market in 1999.	Recently the development of the land along the road is in good progress and the acquisition of land is
		Second, this project has a position as the part 1 of Southern route, which should be completed as the alternative route of the congested central route in 2020.	becoming difficult. EIRR=11.3%
Fly-over on East cross intersection	US\$ 2.4 million 3years	This is a part of Middle Ring Road and the flyover will contribute to the solution of traffic congestion due to the opening of new central market.	
			EIRR=10.5%
Total Cost	US\$ 25	.0 million	

Simultaneously the development of the following facilities is expected in early occasion from the view point of safety of which cost were included in future road network study of Chapter 12, but not in Feasibilty Study of Chapter 18. Any of them shall be implemented, if budgetary allocation is available.

•	Improvement of 2 intersections	US\$ 0.7 million
•	Development of Traffic Signal	US\$ 4.4 million
•	Traffic Sign and Road Marking	US\$ 1.0 million
•	Improvement of Existing Bus Stops	US\$ 0.7 million

22.1.2 Maintenance and Repair Works for Existing and Future Road Network.

There is a general tendency of making a political decision in favor of new roads but not of maintenance during the planning of road network within very limited budget. However in the long term, it means to waste the precious budget if new roads are left without maintenance. While there is an international tendency to seek the responsibility of road management / maintenance of government, if accidents occurr.

The roads in UB are under rapid destruction even at this moment. They need urgent repair work.

The following	idea is	proposed	as the	priority	for the	maintenance	and repair

Pri	ory	Length of road	Expected yearly maintenance cost (Assumed: \$5/ m2-year:width 10m)
1.	The roads for public bus routes	158km	1,580,000*5= US\$7.9 million
2.	Busy roads	About 60km	600,000*5= US\$3.0 million
3.	Political important roads	About 20km	200,000*5= US\$1.5 million
4.	District roads	95km	950,000*5= US\$4.7 million

Note: Total length of UB road is about 450km as mentioned in Chapter 4. While the above figures of road length has double counting.

22.1.3 Measures to Sustain Public Transportation System for the Future

As discussed in Chapter 5 and 9, the existing 4 bus companies were separated from the city organization into self-supported ones in 1996. Their total annual income is TG 7 billion (US\$8.4 million), and expenditure is TG 9.2 billion (US\$11.0 million) in the first half of 1998. Therefore the annual loss would be US\$ 2.6 million.

School children receive a discount of a half of the passenger tariff. And Tug570 million (US\$0.68 million) comes as a subsidy from city office in 1997 for the discount of university students (approximately 8% of the total revenue). While free bus service is provided for aged or handicapped persons without any subsidy. The loss in revenue should be compensated by City Government. These lost revenues correspond to 10% - 20% of the total income. Also it is now a serious issue that about 10% of passengers do not pay their fare, which should be reduced by strict actions of dirvers. Appendix 22.1 discusses the forecast revenues and costs with thosed measures.

They need US\$23.3 million for the renewal of buses during 4 years from 1999 to 2002 in order to sustain the service level of public transportation as mentioned in Chapter 9. It corresponds US\$6 million per annum.

It is usual to receive government assistance for public transport organization in other countries, however current expenditure of the city is TG28 billion (US\$36 million: 1997) only. It is difficult to increase the subsidy from the city. Also it is necessary that the bus companies should prepare US\$ 6 million per annum by themselves.

Income \$8.4 million, '98 \$0.7	10-20%	10% for
subsidy for	compensation for	non qualified
seludents	aged etc.	free pass.

Expenditure \$11 milllion, '98	\$6.mil for the use of renewal
	per annum

If subsidy from the city is not expectable, some measures to fill in the renewal fund are required. They were described in Chapter 9 and again repeated as follows:

- 1. Re-organization between companies and within each company.
- 2. Raising of fare from 100Tg to 150Tg in 2000, and 150Tg to 200 Tg in 2006. Reduction of the scope of people applicable to free bus service should be necessary. Actions by conductors to delete the nonqualified passengers should be enforced by legislative authorization as discussed in Chapter 9. These actions would increase the revenues during the years up to 2010, and can accumulate the funds for vehicle renewal. (see again Appendix 22.1)
- Introduction of new ticket system for allowing free transfer among routes and, unlimited use of multi-ride ticket within a stipulated time.
- 4 Sale of the existing and new bus routes to private sectors should be considered, if the revenue shortages continue. This would require a number of preparatory arrangements, the scale of four bus corporations should be reduced; legal arrangements to privatization are necessary. (Staff of bus companies shall receive some advantages in bidding for obtaining the route operation), regulation and control of the operation by TCD should be prepared and so on.
- 5. Government and city office should take measures to increase the efficiency of bus operation. (e.g. bus exclusive lane, improvement of bus stop, re-arrangement of bus routes, etc.)

22.2 Premises for Implementation

22.2.1 Financial backup by self effort

Total amount of three projects to be implemented is US\$ 25.0 million, or about US\$ 6 million per annum for 4 years mentioned in 22.1.1. While the maintenance cost is US\$ 10 million per annum as mentioned in 21.1.2. 30% of the budget of UB city (US\$11 million) is not only enough for new development but also for maintenance. Income from the entrance fare to the city area by the new roads fund comes to only Tg 110 million (US\$0.13 million).

Mongolian government is requested to establish the system in early chance to procure the necessary budget for the development of roads with effort themselves. The principle here is that the road development costs should be paid by road users. For example, registered vehicles in UB city are now at 36,000. Funds can be raised from several kind of sources such as fuel tax, registration fee and sales tax (for purchasing of vehicles), etc.

The research for increase of the tax revenue is now under implementation by the JICA assistance. Revolutionary changes in tax system and organization is required in Mongolia based on the principle that the cost should be borne by the beneficiaries. As an example, following methods could be proposed:

	Consumption	Fuel tax increase from 33Tg/L to 100TG/L	Annual increasing cost ratio for the vehicles (US\$10,000)
Fuel Tax	30,000veh x4,000 lit = 120 million Litter	120 x 77/840tg = US\$11 million	11 %
		Reg. Fee increase from Tg 30,000 to 100,000	
Registrati on Fee		30,000 x 70,000/840= US\$ 2.5 million	2.5 %
		Total tax increase US\$13.5 million	13.5 %

Forecast of revenue and expenditures by the above assumptions are in Appendix 22.2. The influence for the social prices will occur due to the increased cost of vehicles of 13 %. However, this type of macro economic analysis was not conducted in this study.

22.2.2 Maintenance system

New road construction is the investment for the future. Their maintenance and repair should be conducted to sustain the investment of the past and the present at adequate conditions. The Ulaanbaatar city's budget for road maintenance is formed from the allocations made by the Road Department, which is decided by Government under the approval of Parliament. But that is not enough for maintenance of the city roads. On the other hand, there is a shortage of pavement repair equipment as well as of materials procured from abroad. Under such a situation,

roads, structures, etc. are now rapidly deteriorating, not gradual process as in the past. The road maintenance and management could not be observed during the study period, while cracks, pot-holes have appeared on the surface. The life expectancy of road pavement, structures, etc. is obviously shortened due to unfavorable conditions. Weather conditions and poor administration would affect unfavorably.

The urgent repair works and periodical maintenance works should be conducted to save high costs in future.

22.2.3 Recognition of Quality Control of Project

There is an example of bad quality control in UB. The officially admitted durability of repair of potholes is only one year. And the same places are repaired every year.

There is a system of one-year guarantee for the road works, but this is not adhered strictly. The staff of the government and the company had come from the same government organization under the socialist system. They are too good friends to point out the defaults of the works. Review of contract documents for clear definition of the guarantee system and of organization responsible for the guarantee system in necessary strict execution of the contracts should be ensured. Otherwise the desirable quality control could not be achieved.

22.2.4 Strengthening of Organization for Management and Supervision

Current city organization for road maintenance does not function due to the lack of budget as mentioned in Chapter 21. The new efficient and reasonable organization should be re-established to meet with the above new large works. It should be avoided that the budget of a state organization is just the same to the total salary of the officers engaged.

22.2.5 Contractors and their Equipment

There are five registered contractors in UB city and they have about 120 pieces of construction equipment. However, most of them are old and not useful as mentioned in 21.2.6 of Chapter 21.

Policy for upgrading the contractors to the international level shall be adopted. At the same time competitions among national or foreign contractors should be introduced through fair bidding to ensure the above 5 contractors are not exclusive contractors for the city projects.

22.2.6 Road Inventory Data

Roads and streets have no kilometer posts. The inventory sheets of roads and bridges in UB City are not edited satisfactorily. The records for overlay, presence of improvement and date of the works are not clear. Bridges and structures on the roads in UB City have no as-built drawings and construction records. A development of database of inventory data in UB City is strongly recommended for ensuring proper maintenance work.

22.2.7 Improvement of the Organization of Bus Companies and Bus Fare

It is essential for the public transportation organization to get the official financial assistance. However it is absolutely difficult now for the UB city government. It is expected to solve the situation for the time being by raising the fare step by step, improvement of their organization and sell out of the right of some bus routes to the outside.

22.2.8 Advisers to TCD

The transport situation of the city is changing as the city develops in various aspects, to which TCD should respond in planning, regulation and implementation. Problems are –1 demand from New Central Market, -2 participation and competition of private buses (an issue of privatization), -3 periodic revision of route and trips, -4 restructure financial positions and so on.

It is recommended to have urgently one or two advising experts of survey and planning for 2 years in Network Planning Division in TCD of Ulaanbaatar City in order to strengthen capabilities of the staff. The employment fund may be requested to the technical assistance program of ADB, World Bank, or JICA

22.3 Proposals

22.3.1 Establishment of Long Term Policy and Regulations

In the planning and implementation cycle of projects for the development of transport sector, a conceptual long term plan is determined at first. This long term plan should not be changed easily. It should be followed by the present and every succeeding cabinets for a long-term period as the base of national policy. New governor or mayor should not revise the basic plan for the implementation of his political idea. During the years of implementation, a need may arise to revise the conceptual long term plan because of changes in development forecast. The revision should be decided after careful re-study of the basic plan and the spirit of the original plan should be respected as much as possible.

Right of way should be ensured within long years period under the city master plan law and land acquisition law. The land for the future road network should not be allowed for any new construction or improvement of building even if it is standing now.

22.3.2 Establishment of Regulation for the Use of the Empty Private Lands

The drainage system in UUB has many problems as mentioned in 4.4 of Chapter 4. It is difficult to design an appropriate drainage system with enough capacity for floods caused by the rain water flowing from the upper side of the city. Financially it is not reasonable to construct a huge drainage system to meet with all occasions. However, we may recommend to utilize empty

land as the emergency pond. Now there are still many empty lands inside of the city area. Some of them are kept for future construction of buildings. These open lands should be excavated as a pond until their actual development. Tax for land should be exempted during the utilization of land as an emergency pond. This idea should be backed up by the new regulations.

22.3.3 Decision of Priority of Projects

We should recognize that all selected projects above are studied in the scope of infrastructure development of UB road network. Mongolian government is expected to decide the priority of projects among all Mongolian projects irrespective of whether they will develop the project by their own budget or by the assistance of foreign organizations. It is expected relevant authorities may discuss, decide and move for realization of the selected ones at an earlier occasion.

Table 23.1.1 List of Members Concerned

JICA Headquarters, Advisory Committee and Study Team

IICA Headquaters

1) Takao KAIBARA : Director, First Development Study Division, Social Development

Study Department

2) Eri HONDA : Deputy Director, First Development Study Division, Social

Development Study Department

3) Mutsumi NARAWA : Staff, First Development Study Division, Social Development Study

Department

JICA Advisory Committee

1) Katustuyoshi NISHIKAWA

: Chairman, Deputy Director, Kagoshima National Highway Work Office,

Kyushyu Regional Construction Bureau, Ministry of Construction

2) Kusumu NAGAE : Assistant Manager, Maintenance Division 2, Engineering Department,

Tokyo Second Operation Bureau, Japan Highway Public

Corporation

3) Eiichiro MITAKE : Deputy Director, 1st Division, Operations Department 2,

The Overseas Economic Cooperation Fund

JICA Study Team

1) Koki KANEDA : Team Leader / Road Planner

2) Kanao ITOH : Regional Planner

3) Teruhiko HORIE : Public Transportation Planner

4) Yoshiki TAKAI : Road & Structural Engineer

5) Hajime KINUGAWA : Pavement Specialist

6) Ravinder KATIYAR : Traffic Demand / Economic Analysis

7) Yukio URANO : Traffic Survey Specialist

8) Akira ISHIDO : Road Administration Specialist

9) Fumiaki SHINO : Environmental specialist

10) Yukio KOUSAKA : Construction Planner / Cost Estimator

11) Morichika TAKAHASHI : Topographic Geographical Surveyor

Steering Committee and Counter Parts

Steering Committee

1) Mr. Ts. Damiran : Chairman, State Secretary, Ministry of Infrastructure Development

2) Mr. Ts. Oyunbileg : Secretary, Officer, Strategic Planning and Overall Policy Department,

MID

3) Mr. R. Bud : Director, Information, Control, Analysis and Evaluation Department,

MIL

4) Mr. B. Batjav : Director, Policy Implementation and Coordination Department, MID

5) Mr. Ts. Sukhbaatar : Deputy Director, Policy Implementation and Coordination Department,

MID

6) Mr. B. Byambajav : Officer, Government of Mongolia

7) Mr. B. Manduul : Officer, Policy Implementation and Coordination Department, MID

8) Mr. E. Gombojav : General Manager, UB City

9) Mr. Ch. Bat : Director, Strategic Policy and Planning Department, UB City

10) Mr. L. Nyamsuren : Chief Architect, UB City

11) Mr. Ch. Gankhuu : City Chief Engineer and Director of Building and Capital Investment

Department

12) Mr. N. Nyamdavaa : Director, Public Transport Department

13) Mr. L. Battsooj : Officer, Strategic Policy and Planning Department, UB City

14) Mr. S. Ochirbat : General Director, Road Department (Government Agency)

15) Mr. L. Dashdorj : Director, Budget Policy Department, Ministry of Finances

16) Mr. L. Davaadorj : Deputy Director, Foreign Trade and Cooperation Department, Ministry

of External Relations

17) Mrs. Dolgormaa : Officer, Cooperation Division, Ministry of Nature and Environment

18) Mr. S. Pioner : Deputy Chief, Traffic Police Department

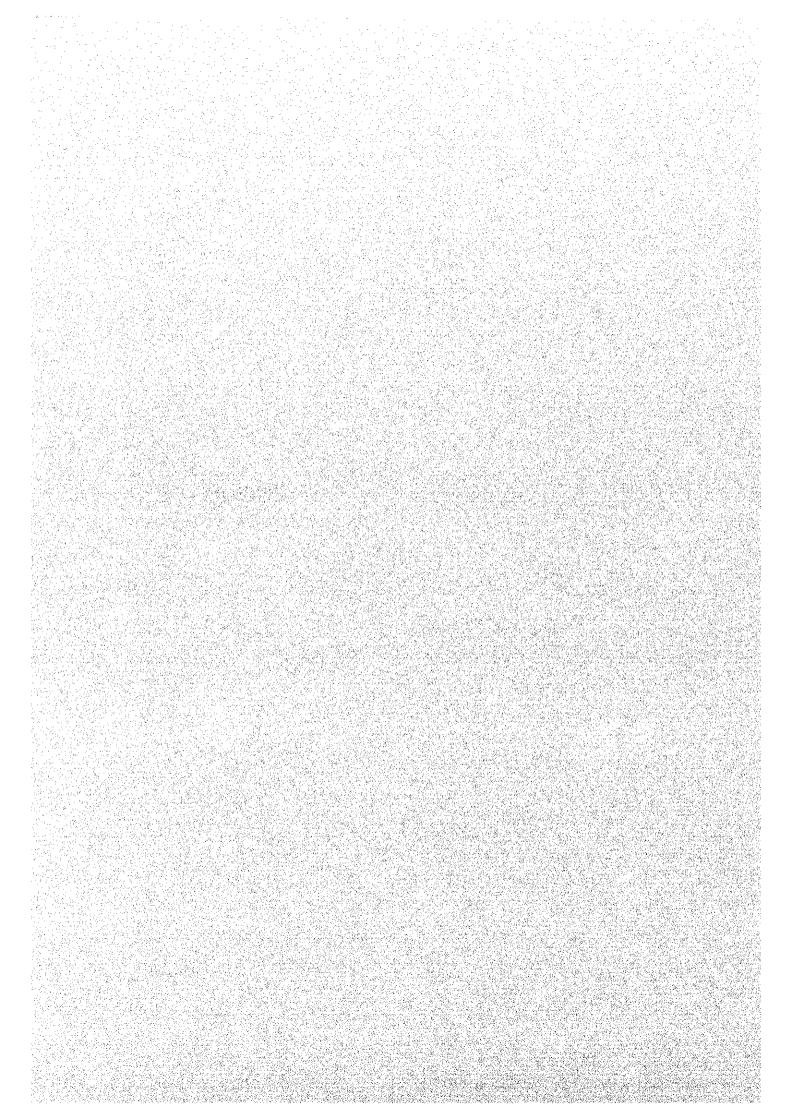
19) Ms. Sarandulam : Project Coordinator, Road Department (Government Agency)

Counterparts

1) Mr. L. Battsooj : Officer, Strategic Policy and Planning Department, UB City

2) Ms. Sarandulam : Project Coordinator, Road Department (Government Agency)

APPENDIX



Appendix Survey Sheet 4.1.1 Road Inventory Sheet (Sheet No. 1)

(Sheet No.1—	
Road Inventory Sheet	
-	

			Peint	4	3	2	-	23	Barrorl	Book	parially	many damage	nou
Inventor Date Surveyor Name		12	Tenrain	OIO	other urban	Flat	Mountain	34	Stope	non	pood	7	тату дападе
		12	Improved/not	Good	not good	bad	Not yet	35	Retnirenc wall	non	power		माराग्य वेष्टमाश्रद
Start Name		<u>«</u>	Pavement Type	Concrete	-	urface treatment	Gravel	36	Drainage	pood	parcelly	many damage	הסת
-		<u>o</u>	Thick of pave	Enough	Modium	Poor	Bad	37	Culvert	non	book	partally t	many damage
V J . P. Chana.		2	Flat/Roughtess	_	Medium/Rongh	Poor	Bad	38	Manhole	nor	pout	partrally	many damage
		ŧ	Sacks	Г	10% or more	30% or more	50% or more	ŝ	Road Sign	poor	yttechad	ĸ	non
		E	Wheelter L'Du	57	10mm or more 10mm or more	JOHN OF MOTE	SOmm or more	Q.	Terffic Non	pood	partial	meny, damage	E GE
			THE STATE OF THE S						10.00		no months	de la company	
		7	Sales Sales	Ę,	Ţ		Some of Heat			3	207.002	1	1001
Design Traffic Volume		24	Damage of BC	You	A few	1 point/10m2	mamy	42	Facility/showing	2000	partially	mam, camage	Hou
Dear Load		56	General Point	Good		Bad	Dangerous	43	Trec	Sood	partially	many, damake	נפנ
mortiagnities by the 10 of the 10 of the shall be included by resulting from	ceted by examination	31	Shoulder	2m or more	Im or more	im or less	None	44	Ulumination	5000	partially	many damage	ניסונ
strivensisy transfer (vol. 17,2 t. 27, 20, 26 and 20 size, or technical/views) evaluation referres simplemental evaluation list.	on list.	E	Sidewalk	5m or more	3m or more	lm or more	1m or less		Dangerous Place	non	afew	meny	nigent
The marks of < > specified JICA's items.				-		•			i				
- Callery of the Call						-			L				
							-						
		-											
Length of Survey Ares													
No. of Survey Area					-			-	1				
Traffic Lane Number													
View Traffic Volume													
Immused of the													
		-											
Jype of pavenerit													
Thickness of Pavement							1						Ī
nog		_											
Flatness/Ronolmess													
												_	
Wheelmack/Rut		-											
		_											
26 Thickness of Dasecourse									-				
23.7 Damage at hegoenings							_	,	_				
Submant CDV													
General Visual Degree			1						-				
Structural Number							-						
Charidar Width	_							-					
Stockwark within													
		-					1		+				
	_								***************************************				
Description 15 (all)			_	-			-						
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Entition for Security						_		7.				_	
Dumination				_	_	_			_				

Appendix Survey Sheet 4.1.2 Bridge Inventory Sheet (Sheet No. 2)

2. Bridge Inventory Sheet (Sheet No.2 -

*NAME OF BRIDGE		CLASS OF ROAD	D CROSSING NA	"CLASS OF ROAD "CROSSING. NAME OF RIVER OR ROAD	OAD		DATE OF INVENTORY	TORY	*INVENTORY BY	, ,		
*Km post			Construction By				Date of Construction		Maintenance by			
Type of Bndge	*Superstnicture				Design Loading	Sur			Load linutation	No	Yes	
	*Substructure	*Abutment			Dosign Standard		BS AASHTO.	RUSSIA OTHERS	ERS	^		
		"Pier			"Skew of Bridge		Square	Skew	Curve (deg.Row	· · ·		
Length of Bridge		E .	m Span	m.	"Condition of Crossing		•Road		т Сватисе т	Skew deg.		
"Width of Bridge	Overall	E .	m "Carriageway n	n Pedestrianway m	•	•	*River	Width of River	Depth	Free Board	Design Quantity	
Affixed Articles	Kind	Number	, ,				•	e		E		m3/sec
Traffic Volume		(year)	Ratio of Heavy Velúcie (year)		Others							
Final Record of Repair	Pavement	Deck Slab	Main Beam	Painting	Expansion Joint		Beering	Drainage	Realing	Curb	Affixed Articles	
	Others				Substructure			1				
Component		* Conditions	Conditions Of Damage		"Rating	* Component	nt	*Conditions of Damage	of Damage			Rating
Pavement	Good, Wave, Rut	Good, Wave, Rut, Crack, Pothole, Others	Ythers			Abutment	Good	Good , Crack , Spall , Deformation , Rebar-exposed , Broken , Settlement , Scouring , Others	rmation , Rebar-exp	osed, Broken, Settle	ment, Scouring,	
Lisce Ourb	Good , Scale , Crac	Good, Scale, Crack, Spall, Rebar-exposed, Others	posed, Others				Good.	Good , Crack , Spall , Deformation , Rebar-exposed , Broken , Settlement , Scouring , Others	mation, Rebar-exp	osed , Broken , Settle	ment, Scouring,	
	Good , Scale , Crac	Good , Scale , Crack , Spall , Rebar-exposed , Others	posed, Others			-qng	Good	Good , Crack , Spall , Deformation , Rebar-exposed , Broken , Settlement , Scouring , Others	mation, Rebar-exp	osed , Broken , Settle	ment, Scouring,	
Deck slab	Good . Honeycomb	эв , Crack , Deformation	Good , Honeycombs , Crack , Deformation , Rebar-exposed , Other	, Other		Pier (Type	Good ,	Good , Crack , Spall , Deformation , Robar-exposed , Broken , Settlement , Scourng , Others	rmstion, Rebar-exp	osed , Broken , Settle	ment, Scouring,	
Main Beam	Good . Honeycomb	s, Crack, Deformat	Good , Honeycombs , Crack , Deformation , Rebar-exposed , Other	, Other		*Road/Traffic sign		Good, Partial, Many damaged, None	ged, None			
Super Gross Beam	Good , Crack , Defi	Good , Crack , Deformation , Rebar-exposed ,	posed, Others		<u> </u>	*Continent						
Painting	Condition					-OVERALL 1. No damage of	OVERALL EVALUATION RATING No damage detected on the basis of the	•OVERALL EVALUATION RATING No damage detected on the basis of the inspection results.	žin		onter jenij	
Exp. Joint	Good, Abnormal S.	ound, Deformation,	Good , Abnormal Sound , Deformation , Gap , Broken , Others	E		2. Damage has	been detected and a ificant damage and a	Damage has been detected and a follow-up survey is required. There is significant damage and a detailed survey needs to be earned out to establish	equired. Is to be carried out to	o establish		
Shoe	Good, Abnormal S.	ound . Deformation ,	Good , Aknormal Sound , Deformation , Gap , Broken , Others	c			whether repair work is to be carried out or not. There is significant damage and urgent repair is	whether repair work is to be carned out or not. There is samificant damage and urgent repair is required or the bridge has to be	ed or the bridge has	<u>2</u>	į	
7	Good , Clogged Len	Good, Clogged Lenkage, Broken, Others	£13			closed to trai	closed to traffic or restriction on web or to be re-constructed new bridge)	closed to traffic or restriction on vehicle weight to be imposed, (or to be re-constructed new bridge)	mposed,		-	
* <plan profile=""></plan>								- <section></section>				
Note: The marks of " specified JICA's ritemss	specified JICA's items:	υř								, i -		
		:							* -			

Appendix Survey Sheet 4.1.3 Intersection Inventory Sheet (Sheet No. 3)

*Date of Inventory		*Inventory By	A Y	*Date of Inventory		*inventory by	
	*Street Name	*Street No.		*Location	*Street Name	*Street No.	
with the Change (Dlan & Section)				*Existing Shape (Plan & Section)	oo)		
State State of the second			1.				
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				-			
					-		
		-					
*Current Condition	Traffic Flow			*Current Condition	Traffic Flow	-	
					Sional		
	Signal	•					
	Traffic Sign				Traffic Sign		
	Pavement				Pavement		
					Others		
	Others						
*Comment				*Conunent			
						-	
Evaluation				Evaluation			
							

Table- Evaluation Rank for Existing Roads

FOUR INC. JOS					
	Categiory	Average Po	oint Weight F	Average Point Weight Factor Evaluated Point	nt Remak
Transfer malt. 15th.	21 Flamess/Roughness	mess	2.3 0.35		0.8
I rallication	29 Visual Degree		2.8 0.15	0	+
	22 Cracks		2.6 0.25	0	7
Life of Pavement	23 Wheel Track/Rut	tut	3.2 0.1	0	3
	27 Damage of Basecourse	scourse	2.4 0.15	0.	4
	Total	-		2.	6
	Evaluation Ra	mk 4~3.5. G∞	d 3.5-2.5:	Evaluation Rank 4-3.5; Good 3.5-2.5; Fzir 2.5-1.5; Poor 1.5-1.0; Bad	1.5~1.0. Bad

Table- Evaluation Rank for Existing Roads

Product 140.7						
	Categrory	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak	
T-offent lin	21 Flatness/Roughness	2.7	56.0	6.0		
Transcaonis	29 Visual Degree	٤	0.15	0.5		
	22 Cracks	3.2	0.25	8.0		
Life of Pavement	23 Wheel Track/Rut	ξ 3	0.1	0.3		
	27 Damage of Basecourse	3.2	0.15	5.0		
	Total			3		
	Property and the second			1 2 2 2 2		

Table- Evaluation Rank for Existing Roads

Route No.4					
	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
F - 2 (5) and 1 (1)	21 Flamess/Roughness	77	9.35	1.4	
Latincaciiii	29 Visual Degree	r.	0.15	0.5	
	22 Cracks	3.	0.25	8.0	
Life of Pavement	23 Wheel Track/Rut	3	0.1	6.0	
	27 Damage of Basecourse	6	0.15	5.0	
	Total			3.5	
	Evaluation Rank	4~3 5 Good	3 See Fair	4-3 5: Good 3 5-2 5: Fair 2.5-1 5: Poor 1.5-1.0: Bad	1.5~1.0° Bad

Table- Evaluation Rank for Existing Roads

Route No 3			1		
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
Too Of contactor	21 Flatness/Roughness	7	0.35	t'1	•
I ratificability	29 Visual Degree	77	0.15	9.0	
	22 Cracks	3.	0.25	8.0	
Life of Pavement	23 Wheel Track/Rut	2,5	0.3	0.3	
	27 Damage of Basecourse	f*:	0.15	5.0	
	Total			9.6	
	Evaluation Rank	4~3 5 Good	3 5-2 5 Fair	4-3 5. Good [3.5-2.5. Fair [2.5-1.5. Poor [1.5-1.0. Bad]	5~1 O. Bad

Table- Evaluation Rank for Existing Roads

	1000	table Chairman Chair to Chair Modes	515	STORY.	
Route No. 1-1)		-
	Categiony	Average Point	Weight Factor	Average Point Weight Factor/Evaluated Point R	Remak
Traff call lin	21 Flatness/Roughness	4	0.35	7.1	
tioner actions	29 Visual Degree	4	0.15	9:0	
	22 Cracks	3	0.25	80	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
	27 Damage of Basecourse	3.2	0.15	0.5	
	Total			3.6	
	Evaluation Rank	4~3.5. Good	3.5~2.5 Fair	4~3.5. Good 3.5~2.5. Fair 2.5~1 5. Poor 1.5~1 0. Bad	I O. Bad

Table- Evaluation Rank for Existing Roads

Route No.1-2 Category Average Point Weight Factor Evaluated Point Remain			CHARLES OF THE PARTY OF THE PAR		3	
Categrory 21 Platness Roughness 29 Visual Degree 22 Cnecks 23 Wheel TrackRui 27 Danage of Bascours Total Evaluation Rank	Route No. 1-2			•	٠	
21 Platness/Roughness 29 Visual Degree 22 Cracks 23 Wheel Track/Rui 27 Danuage of Basecours/ Total Evaluation Rank		Categrory	Average Point	Weight Factor	Evaluated Point	Remak
29 Visual Degree 22 Cracks 23 Wheel Track/Rui 27 Danage of Basecours Total Evaluation Rank		21 Flatness/Roughness	3	0.35	-	
22 Cracks 23 Wheel Track/Rui 27 Danage of Basccours Total Evaluation Rank	i ramagnusi i	29 Visual Degree	2.5	0.15	10	
23 Wheel Track/Rui 27 Damage of Basecours Total Evaluation Rank		22 Cracks		0.25	8.0	
27 Danuage of Basecourse 2 5 0.15 0.4 Total 2.9 2.9 2.9 Evaluation Rank 4-3.5: Good 3.5-2.5: Fair 2.5-1.5: Poor 1.5-1 0 Bad	Life of Pavement		3	0.1	0.3	
Total 2.9 Evaluation Rank 4-3.5: Good 3.5-2.5: Fair 2.5-1.5: Poor 1.5-1 @ Bad	L	27 Daniage of Basecourse	2.5	0.15	70	
		Total			2.9	
			4-3 5: Good	3.5-2.5; Fair	2.5-1.5; Poor 1	3-10 Bad

Table- Evaluation Rank for Existing Roads

Route No.103 Category Average Point Weight Factor Evaluated Point Remaix Tofficability 21 Flatness/Roughness 3.6 0.35 1.3 1.5		0.00	Charles Simple Control of the Contro			
Categior 21 Flatness/Roughness 29 Visual Degree 22 Cracks 23 Wheel Track/Rut 27 Damage of Bascourse Total	Route No. 103) *.		
21 Flatness/Roughness 29 Visual Dugree 22 Cracks 23 Wheel Track/Rut 27 Damage of Bascourse Total		Categion	Average Point	Weight Factor		emak
29 Visual Degree 22 Cracks 23 Wheel Track/Rut 27 Damage of Bascourse Total Evaluation Rank	Tenffcashilder	21 Flatness/Roughness	3.6	0.35	2.1	
22 Cracks 23 Wheel Track/Rut 27 Damage of Bascourse Total Evaluation Rank	STITION TO STITION IN	29 Visual Degree	4	0.15	90	
23 Wheel Track/Rut 27 Damage of Basecourse Total Evaluation Rank		22 Cracks	36	0.25	50	
27 Damage of Bascoursc 3.8 0.15 0.6 Total 27 Evaluation Rank 4-3.5; Good 1.5-2.5; Pair 2.5-1.5; Pror 1.5-1 till Bad	Life of Pavement		3,4	 o	0.3	
aluation Rank		27 Damage of Basecourse	3.8	0.15	9.0	
		Total			4.5	
			4~3.5. Good	3 5-2.5. Fair	2.5-1.5. Poor 1.5-1	() Bad

Table- Evaluation Rank for Existing Roads

Koufe No 82, 84, 85	85				
	Calegiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
Tenffenbilin	21 Flainess/Roughness	2.7	0.35	0.9	
Hairicachini	29 Visual Degree	2.5	0.15	7.0	
	22 Cracks	2.7	0.25	0 7	
Life of Pavement	23 Wheel Track/Rut	2.5	0.1	0.3	
	27 Damage of Basecourse	2.7	0.15	7:0	
	Total			2.7	
-	Evaluation Rank. 4-3.5; Good [3.5-2.5; Fair [2.5-1.5; Poor [1.5-1.0; Bad	4~3.5: Good	3.5-2.5: Fair	2.5~1.5: Poor 1	5-10 Bad

Table- Evaluation Rank for Existing Roads

		-		- C	,
	Categiory	Average Point	Weignt Factor	Average Point weignt Factor Evaluated Found	истак
T. 100	21 Flatness/Roughness	2	0.35	0.7	
1 rameaounty	29 Visual Degree	2	0.15	0.3	
	22 Cracks	3	0.25	0.8	
Life of Pavement	23 Wheel Track/Rut	2.3	1.0	0.2	
	27 Damage of Basecourse	2	\$1'0	0.3	
	Total			2.3	
	Evaluation Rank	4~3.5. Good	3.5-2.5: Fair	4-3.5; Good 3.5-2.5; Fair 2.5-1.5; Poor 1.5-1.0; Bad	.5-1.0: Bad

Table- Evaluation Rank for Existing Roads

	200		0	2	
Route No.121					
	Categiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
Tonfforbilin	21 Flatness/Roughness	7	0.35	0.7	
i rauncaounty	29 Visual Degree	2.3	0.15	0.3	
	22 Cracks	2	0.21	0.5	
Life of Pavement	23 Wheel Track/Rut	2.3	0.1	0.2	
	27 Damage of Basecourse	1.3	0.15	0.2	
	Fotal			1.9	
	Kvaluation Bank 4-3 5. Good 3 5-2 5. Fair 3 5-1 5. Door 5-1 0. Bad	2~3 S. Good	15-25 Fair	13 5~1 5 Pror 1 5.	~! 0: Bad

Table- Evaluation Rank for Existing Roads

	Koute No.a.y							
		Cate	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak	
	Teneffershiller	71	Flatness/Roughness	3.8	\$6.0	1.3		
	11auricacium	29	29 Visual Degree	7	51.0	9'0		
		77	22 Cracks	3.5	6.25	6'0		
	Life of Pavement		23 Wheel Track/Rut	3	1.0	6.0		
_		27	27 Damage of Basocourse	3.8	51.0	9'0		
		To	Total			1.8		
•			Evaluation Rank		3.5-2.5; Fair	3.5-2.5; Fair 2.5-1.5: Poor 1.5-1.0: Bad	1.5~1.0. Bad	

Table - Evaluation Rank for Existing Roads

	Categiony.	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Rcmak	•
Tookilis	21 Flatness/Roughness	7	. 0.35	1.4		
i Idamadaniy	29 Visual Degree	**	0.15	9.0		
	22 Cracks	7	0.25			
Life of Pavement	23 Wheel Track/Rut	٤	1.0	6.0		
	27 Damage of Basecourse	†	51'0	910		
	Total			3.9		
	Evaluation Rank	4~3.5. Good	3.5~2.5. Fair	4-3.5; Good 3.5-2.5; Fair 2.5-1.5; Poor 3.5-1.0; Bad	15-10 Bad	

Table- Evaluation Rank for Existing Roads

Koute No. 30					
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
1	21 Flatness/Roughness	4	0.35	4.1	
VIII (CED) I I E	29 Visual Degree	4	0.15	9.0	
	22 Cracks	3	0.25	0.8	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
•	27 Damage of Basecourse	4	0.15	9.0	
	Total			3.7	
	Evaluation Rank	4~3.5: Good	3.5-2.5: Fair	4-3.5; Good 3.5-2.5; Fair 2.5-1 5; Poor 1.5-1 0; Bad	1.5~1.0: Bad

Table- Evaluation Rank for Existing Roads

Route No. 37,95					
	Categiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
1	21 Flatness/Roughness	7	0.35	1.4	
Гапісаршіў	29 Visual Degree	7	0.15	9.0	İ
	22 Cracks	4	0.25		
Life of Pavement	23 Wheel Track/Rut	3.7	0.1	5.0	
	27 Damage of Basecourse	†	0.15	9.0	
	Total			4	
	Evaluation Rank	4~3.5: Good	3.5~2.5: Fair	14~3.5; Good 3.5-2.5; Fair 2.5-1.5; Poor 1.5-1.0; Bad	5-1.0: Bac

Table- Evaluation Rank for Existing Roads

				•		
Route No. 11						
	S	Categtory	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
1	7	Flatness/Roughness	*	0.35	1.1	
1 ramedonos	53	29 Visual Degree	7	0.15	9.0	
	22	22 Cracks	+	0.25	1	
Life of Pavement		23 Wheel Track/Rut	2	0.1.	0.2	
	27	27 Damage of Basecourse	4	0.15	9.0	
•	ដ	Totai			3.8	
-		Evaluation Rank	4~3.5: Good	3.5~2.5; Fair	4~3.5: Good 3.5~2.5: Fair 2.5~1.5: Poor 125~1.0: Bad	15~1 0. Bad

Table- Evaluation Rank for Existing Roads

Koute No. 12					
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
T. (F. 1):-	21 Flatness/Roughness	3	0.35	1	
rameaonny	29 Visual Degree	**	0.15	90	
	22 Cracks	3.5	0.25	6:0	
Life of Pavement	23 Wheel Track/Rut	2.5	0.1	6.0	
	27 Damage of Basecourse	2.8	0.15	9:0 .	
	Total			3.4	
	English Dans () 6 9 6 20 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1. 2. C. C. C.	26.26.50	3 6. 1 5. Dece 11	6.10.000

	Roads
	Existing
,	ō
	Rate
	Evaluation
	Table-

rough 140.77						
	Categiony	tory	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
Tollin	211	1 Flatness/Roughness	+	0.35	1.4	
1 authority	29	29 Visual Degree	4	0.15	9.0	
	22 (22 Cracks	7	0.25	1	
Life of Pavement		23 Whoel Track/Rut	4	1.0	0.4	
	27 1	27 Damage of Basecourse	7	6,15	9.0	
	Total	ai			4	
	-	Byshington Bank 4.2 5. Good 13 6.2 5: Fair 12 6.1 5: Pror 11 5.1 0: Bad	4m2 5. Good	1 5.23 4. Fair	2 5-1 5 Poor 1	5~1 0' Rad

Table- Evaluation Rank for Existing Roads

	lane.	EVALUATION NAME TO EXISTING NORTH	A IOI EAISINIS	NOSE	
Route No. 18					
	Categiory	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
Tonffortith	21 Flatness/Roughness	ţ	0.35	1.4	
Hattledoilly	29 Visual Degree	7	0.15	9.0	
	22 Cracks	3	0.25	0.8	
Life of Pavement	23 Wheel Track/Run	2	0.1	0.2	
	27 Damage of Basecourse	*	0.15	9'0	
	Total			3.6	
	Evaluation Rank 4-3.5: Good 3.5-2.5: Fair 2.5-1.5: Poor 1.5-1.0: Bad	4~3.5: Good	3 5~2.5. Fair	2.5~1.5: Poor	1.5-1.0: Bad

Table- Evaluation Rank for Existing Roads

	labic- r	1 abic- Evaluation Kank for Existing Koads	ik tor existing	Koads		
Route No. 13		٠				
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak	
Tenffenhilin	21 Flatness/Roughness	7	0.35	1.4		
TALIFORNII.	29 Visual Degree	4	0.15	9.0		٠
	22 Cracks	7	0.25	8.0		
Life of Pavement	23 Wheel Track/Rut	£	0.1	0.2		
	27 Damage of Basecourse	न	0.15	9.0		
	Total		**	3.6		
	Evaluation Rank	4-3.5: Good	3.5-2.5: Fair	4-3.5; Good [3,5-2,5; Fair [2,5-1,5; Poor [1,5-1,0; Bad	1.5-1.0; Bad	

Table. Evaluation Rank for Existing Roads

	lable-	Table- Evaluation Rank for Existing Roads	or existing	Roads	
Route No. 19			,		
	Categion	Average Point W	cight Factor	Average Point Weight Factor Evaluated Point	Remak
Total	21 Flatness/Roughness	3	0.35	I	
VIII CALLES	29 Visual Degrec	7	0.15	9.0	
	22 Cracks	m	0.25	8.0	
Life of Pavement	23 Wheel Track/Rut	ř.	0.1	0.3	
	27 Damage of Basecourse	-	0.15	9.0	
į	Total			3.3	
	Evaluation Rank	4~3.5; Good [3.5~2.5; Fair [2.5~1.5; Poor [1.5~1.0; Bad	~2.5: Fair	2.5~1.5: Poor	1.5~1.0; Bad

Table- Evaluation Rank for Existing Roads

Route No. 14					-
	Categiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
1	21 Flatness/Roughness	3	0.35		
Tratticability	29 Visual Degree	3	0.15	0.5	
	22 Cracks	3	0.25	0.8	
Life of Pavement	Life of Pavement 23 Wheel Track/Rut	3.3	0.1	0.3	
	27 Damage of Basecourse	9	0.15	. 0.5	
	Total			3.1	
	Evaluation Rank	4-3 S Good	3.5~2.5: Fair	4-3 S. Good 3.5-2.5; Fair 12.5-1.5; Poor 1.5-1.0; Bad	1.5-1.0. Bad

Table- Evaluation Rank for Existing Roads

Koute No.15			117 L. D	1	Domei
	Calegiory	Average Point	weignt radior	Average Point weignt Factor evaluation Foliag	VC:164
# 10 H	21 Flatness/Roughness	4	0.35	1.4	
LATICADINI	29 Visual Degree	2.5	0.15	0.4	
	22 Cracks	3	0.25	0.8	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
••••	27 Damage of Basecourse	3	0.15	0.5	
	Total			3.4	
	Evaluation Rank	4-3.5. Good	3.5~2.5: Fair	4-3.5; Good [3.5-2.5; Fair]2.5-1.5; Poor [1.5-1.0; Bad	5~1.0: Bad

Table- Evaluation Rank for Existing Roads

Route No. 16					
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
T Office half in	21 Flatness/Roughness	4	0.35	1.4	
i rampenomini	29 Visual Degree	2.5	0.15	0.4	
	22 Cracks	3	0.25	0.8	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
	27 Damage of Basecourse	3	0.15	50	
	Total			3.4	
	Evaluation Rank [4-3.5; Good [3.5-2.5; Fair [2.5-1.5; Poor]1,5-1.0; Bad	4~3.5: Good	3.5-2.5: Fair	2 5-1.5. Poor 1	5-1.0: Bad

Table- Evaluation Rank for Existing Roads

Koure No.44					
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
T-Offerhille.	21 Flatness/Roughness	3	0.35	1	
. HEAGICAUTILY	29 Visual Degree	थ	51.0	9.0	
	22 Cracks	3.5	57.0	6'0	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
	27 Damage of Basecourse	۲	\$1.0	9'0	
	Total			3.4	
	Evaluation Rank	4-3.5: Good	3.5-2.5. Fair	4-3.5. Good 3.5-2.5. Fair 2.5-1.5: Poor 1.5-1.0. Bad	1.5-1.0: Bad

Table Evaluation Rank for Existing Roads

TOTAL TOTAL					
	Catcgiory	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
	21 Flatness/Roughness	4	0.35	1.4	
Trathcability	29 Visual Degree	۴	0.15	0.5	
	22 Cracks	2	0.25	0.5	
Life of Pavement	23 Wheel TrackoRut	3	0.1	0.3	
	27 Damage of Bascourse	3	\$1.0	0.5	
	Total			3.2	
	Evaluation Rank 4-3.5; Good 3.5-2.5; Fair 2.5-1.5; Poor 1.5-1.0; Bad	4~3.5: Good	3.5~2.5; Fair	2.5~1.5: Poor	1.5~1.0; Bad

Table- Evaluation Rank for Existing Roads

Koute No.0							
	Ö	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak	
	21	21 Flatness/Roughness	†	0.35	1.4		
i rameability	29	29 Visual Degree	ŧ	0.15	9.0		٠,
	22	22 Cracks	3.8	0,25	I		
Life of Pavenient		23 Wheel Track/Rut	3	1.0	0.3		
	27	27 Damage of Bascoourse	8'€	0.15	9.0		
	Total	[a]			3.9		
		Evaluation Rank	4~3.5: Good	3.5-2.5: Fair	4-3.5: Good 3.5-2.5: Fair 2.5-1.5: Poor 1.5-1.0: Bad	1.5~1.0: Bad	
	٠.				7.8		

Table- Evaluation Rank for Existing Roads

			•		
Route No 26					
	Categiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
1	21 Flatness/Roughness	3	0.35	1	
i ratificacium	29 Visual Degree	7	0.15	0.6	
	22 Cracks	3.5	0.25	6.0	
Life of Pavement	23 Wheel Track/Rut	3.5	0.1	0.4	
	27 Damage of Basecourse	3.5	0.15	0.5	
	Total .			3.4	
	Evaluation Rank	4~3.5: Good	3.5~2.5: Fair	4~3.5: Good 3.5~2.5: Fair 2.5~1.5: Poor 1.5~1.0: Bad	1.5~1.0: Bad

Table- Evaluation Rank for Existing Roads

Koule No 2.3					
	Categiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
	21 Flainess/Roughness	3	55.0	1	
(imponite)	29 Visual Degree	**	51.0	0.6	
	22 Cracks	r:	0.25	0.8	
Life of Payentem	23 Wheel Track/Rut	ť:	0.1	0.3	
	27 Damage of Basecourse	4	\$1.0	90	
	To(a)			3.3	
	Evaluation Rank	4-3 5 Good	3.5~2.5: Fair	4-15 Good 3 5-2 5 Fair 2 5-1 5 Poor 1.5-10 Bad	1.5~1 0 Bad

Table- Evaluation Rank for Existing Roads

Route No. 64					ł
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Kemak
	21 Flatness/Roughness	4	0.35	4.1	
Trafficability	29 Visual Degree	4	0.15	9.0	
	22 Cracks	4	0.25		
Life of Pavement	23	3.3	0.1	0.3	
	27 Damage of Basecourse	-	0.15	0.0	
	Total			3.9	
	Evaluation Rank	4-3.5: Good	3.5-2.5. Fair	4-3.5; Good 3.5-2.5; Fair, 2.5-1.5; Poor 11.5-1.0; Bad	1.5~1.0. Bad

Table- Evaluation Rank for Existing Roads

Konic No oz					
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
	21 Flatness/Roughness	4	0.35	+1	
Trafficability	29 Visual Degree	*†	0.15	9.0	
	22 Cracks	4	0.25	-	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
	27 Damage of Basecourse	**	0.15	9.0	
	Total			3.9	
	Evaluation Rank	4~3.5: Good	3.5-2.5. Fair	4-3.5; Good 3,5-2.5; Fair 2.5-1.5; Poor 1.5-1.0; Bad	5-1 (): Bad

Table- Evaluation Rank for Existing Roads

Konie No 7/					
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
	21 Flatness/Roughness	6 .	0.35	-	
i ratheabhle	29 Visual Degree	+	0.15	9.0	
	22 Cracks	4	0.25	-	
Life of Pavement	23 Whoel Track/Rut	7	0.1	4.0	
•	27 Damage of Bascourse	+	0.15	90	
	Total			3.6	
	Evaluation Rank 4-3.5: Good [3.5-2.5: Fair [2.5-1.5: Poor [1.5-1.0: Bad]	4-3.5: Good	3.5-2.5. Fair	2.5~1.5. Poor 1.5	5-1.0 Bad
				4	

Table- Evaluation Rank for Existing Roads

Route No.63					
	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
i.	21 Flatness/Roughness	535	0.35	0.4	
1 raincaoilly	29 Visual Degree	1.5	0.15	0.2	
	22 Cracks	5.1	0,25	1.0	
Life of Pavement	23 Wheel Track/Rut	2	0.1	0.2	
	27 Damage of Basecourse	S. I Surse	0.15	0.2	
	Total			7.7	
		The contract of the contract o			

Roads	
Existing	
Rank for Existing	
Evaluation	
Fable-	

Trafficability 21 Figuress Roughness Average Point Weight Factor Evaluated Point Remains Average Point Weight Factor Evaluated Point Remains Average Point Weight Factor Evaluated Point Remains Average Point Weight Factor Average Point Weight Pactor Average Point Weight Pactor Average Point Weight Point Average Point Weight Pactor Average Point Point Average Point Weight Pactor Average Point Point Average Point Point Point Average Point Poin	route 140,01					
21 Flatness/Roughness 22 Visual Degree 22 Cracks 23 Wheel Track/Rut 23 Wheel Track/Rut 77 Damage of Basecours Total Evaluation Rank		Calegiory	Average Point	Weight Factor	Evaluated Point	
29 Visual Degree 22 Cracks 23 Wheel Track/Rut 27 Damage of Basecours Total	T. office thille.	21 Flatness/Roughness	3	0.35		
22 Cracks 23 Wheel Track/Rut 27 Damage of Basecours Total Evaluation Rank	ranneanty .	29 Visual Degree	3	0.15	0.5	
23 Wheel TrackRut 27 Damage of Basecours Total Evaluation Rank		22 Cracks	3.5	0.25	0.0	
27 Damage of Basecourse 3 0.15 0.5 Total 3.2 3.2 Evaluation Rank 4-3.5; Good 3.5-2.5; Fair 2.5-1.5; Poor 1.5-1.0; Bad	Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
aluation Rank	·	27 Damage of Basecourse	3	0.15	0.5	
Evaluation Rank 4-3.5; Good [3.5-2.5; Fair [2,5-1.5; Poor [1.5-1.0; Bad]					3.2	
		Evaluation Rank	4~3.5: Good	3.5~2.5: Fair	2,5~1.5: Poor	1.5-1.0: Bad

Table- Evaluation Rank for Existing Roads

	-21087	a one - controll I with the Events		1	
Route No.41					
	Categiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
T. a. 67. a. b. 11. a.	21 Flatness/Roughness	3	0.35	1	
t rauncacinity	29 Visual Degree	3	0.15	0.5	
	22 Cracks	3	0.25	0.8	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
	27 Damage of Basecourse	2.4	0.15	0.4	
	Total			3	
	Evaluation Rank	4~3.5. Good	3.5~2.5: Fair	14-3 5 Good 3 5-2 5 Fair 2.5-1.5 Poor 11.5-1.0 Bad	1.5-1.0 Bad

Table- Evaluation Rank for Existing Roads

		Charles of the second second				
Route No.86,115						
	Categiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Rcmak	
Transferent Line	21 Flatness/Roughness	2.8	0.35	I		
i ratificaciitis	29 Visual Degree	2.9	0.15	0.5		
	22 Cracks	3	0.25	0.8		
Life of Pavement	Life of Pavement 23 Wheel Track/Rut	3	0.1	6.0		
	27 Damage of Basecourse	3	51.0	0.4		
	Total			3		
	Evaluation Rank	4~3.5: Good	3.5~2.5: Fair	14~3.5; Good 3.5~2.5; Fair 2.5~1.5; Poor 1.5~1.0; Bad	I.5-1.0: Bad	

Table. Evaluation Bank for Existing Road

Route No.7		rector of the rest of the rector of the rect	• · · · · · · · · · · · · · · · · · · ·		
	Categrory	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
Toneffanchilier	21 Flatness/Roughness	4	0.35	1.4	
TABLICACILLY	29 Visual Degree	7	0.15	9'0	
	22 Cracks	3	0.25	0.8	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
	27 Damage of Basecourse	+	0.15	9.0	
	Totai			3.7	
	Evaluation Rank	1-3 5 Good	3 5-2 5 Fair	hed 11 1-2 1 and 5 1-2 6 1167 5 6-5 5 how 2 5 5-6	Sel O Bad

Table- Evaluation Rank for Existing Roads

Route	Route No. 88,89						
		Cate	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Ястзк
		21	Fiatness/Roughness	3.3	0.35	1.2	
<u> </u>	ranicability	29	29 Visual Degree	3.4	0.15	0.5	
		22	22 Cracks	3	0.25	0.8	
Life of	Life of Pavement	l	23 Wheel Track/Rut	2.9	0.1	0.3	
		27	27 Damage of Basecourse	2.9	\$1.0	4.0	
_		To	Total			3.2	
			Evaluation Rank	4~3.5; Good	3.5~2.5. Fair	4~3.5: Good 3.5~2.5: Fair 2.5~1.5: Poor 1.5~1.0: Bad	1.5-1.0; Ba

Table- Evaluation Rank for Existing Roads

Route No.114

Trafficability 21 Ft.					
L	21 Flatness/Roughness		0.35		
	29 Visual Degree		0.15		
22 Cr	22 Cracks		0.25		
Life of Pavement 23 W	23 Wheel Track/Rut		0.1		
27 D	27 Damage of Basecourse		0.15		
Total					
<u>ସ</u>	Evaluation Rank 4-3.5: Good 3.5-2.5: Fair 2.5-1.5: Poor 1.5-1.0: Bad	4~3.5: Good	3.5-2.5; Fair	2.5~1.5: Poor	1.5~1.0; Bad

Table- Evaluation Rank for Existing Roads

Route No.51

		Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
	T (C. c.b.)	21 Flatness/Roughness	3	0.35	1	
_	ramosome	29 Visual Degree	2	0.15	6.0	
		22 Cracks	3	0.25	80	
_	Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
_		27 Damage of Basecourse	3	0.15	0.5	
		Total			5.9	
		Evaluation Rank [4-3.5: Good [3.5-2.5: Fair [2.5-1.5: Poor] 1,5-1.0: Bad	4-3.5: Good	3.5~2.5: Fair	2.5~1.5: Poor	3-1.0; Bad

Table- Evaluation Rank for Existing Roads

	1400te No. 1 12.52					
		Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point Re	Remak
٠,	Transfer askilling	21 Flatness/Roughness	1.5	0.35	0.5	
	ranicaoliny	29 Visual Degree	2.5	0.15	† '0	
		22 Cracks	3	0.25	0.8	
	Life of Pavenient		2	0.1	0.2	
		27 Damage of Basecourse	3	0.15	0.5	
		Total			2.4]	
7		Evaluation Rank	4~3 5 Good	3.5-2.5 Fair	4~3 \$ Good 3.5-2 5 Fair 2.5-1 5 Poor 1.5-1 0: Bad	1.0: Bad

Table- Evaluation Rank for Existing Roads

Route No. 113, 112					
	Categiory	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point Remak	Remak
Г	21 Flatness/Roughness		0.35		-
ramicaomic	29 Visual Degree		0.15		
	22 Cracks		0.25		
Life of Pavement	Life of Pavement 23 Wheel Track/Rut		0.1		
	27 Damage of Basecourse		0.15		
	Total				
	Fyshation Rank	4-3 5. Good	3 5-2 5 Fair	4-3 5 Good 35-25 Fair 25-15 Poor 15-10 Bad	1.5-1.0. Bad

Table- Evaluation Rank for Existing Roads

-					
ute No.6,47		-			
	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
8	21 Flatness/Roughness	3	0.35	1	
rameaonny	29 Visual Degree	2.9	51.0	7 .0	
	22 Cracks	3	0.25	8.0	
e of Pavement	23 Wheel Track/Rut	3.1	0.1	6.0	
	27 Damage of Basecourse	. 3.1	0.15	0.5	
	Total			3	
	West water Park 12.3 5. Good 3.5.2 5. Eate 2.5.1 5. Pror 1.5.1 0. Bad	12.3 5. Cond	2 5-2 6. Fair	2 5~1 5. Page 1	3-10 Bad

able- Evaluation Rank for Existing Roads

		ומחום.	L'ALLACION L'ABIN 101 L'ALLACING L'ARACT	Simple of the	2000	
Route No. 53						
	Sate	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
The Office At No.	21	Flatness/Roughness	3	0.35]	
rameanne)	29	Visual Degree	2	0.15	0.3	
	22	22 Cracks	3.4	0.25	. 6.0	
Life of Pavement		23 Wheel Track/Rut	81.0	0.1	0.2	
	27	27 Damage of Basecourse	† E	0.15	0.5	
	ř	lotal			2.9	
		Evaluation Rank 4-3.5: Good 3.5-2.5; Fair 2.5-1.5; Poor 1.5-1.0: Bad	4-3.5. Good	3.5-2.5. Fair	2.5~1.5. Poor 1	5-1.0: Bad

Table- Evaluation Rank for Existing Roads

	Sate	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
T. 8	7	1 Flatness/Roughness	2.3	0.35	8.0	
ranicaonny	29	29 Visual Degree	c	0.15	6.0	
	72	22 Cracks	3	0.25	0.8	
Life of Pavement	33	23 Whoel Track/Rut	2	0.1	0.2	
•	27	27 Damage of Basecourse	3	0.15	0.51	
	۲	Tota!	-		2.8	

Table- Evaluation Rank for Existing Roads

Average Point Weight Factor Evaluated Point 3 0.35 1.1 3.6 0.15 0.5 3.6 0.25 0.9 1.1 3.6 0.15 0.0 1.1 3.6 0.15 0.0 1.1 3.6 0.15 0.0 1.1 3.6 0.15 0.0 1.1 3.6 0.15 0.0 1.1 3.6 0.15 0.0 1.2-1.5: Poor 1.3	Route No.58					1
21 Flatness/Roughness 29 Visual Degree 22 Cracks 23 Wheel Track/Rut 27 Damage of Bascourse Total Evaluation Rank		Category	Average Point	Weight Factor	Evaluated Point	Remak
29 Visual Degree 22 Cracks 23 Wheel Track/Rut 27 Damage of Bascourse Total Evaluation Rank		21 Flatness/Roughness	3	0.35	1.1	
22 Cracks 23 Wheel Track/Rut 27 Damage of Bascourse Total Evaluation Rank	Trafficability	29 Visual Degree	3	0.15	0.5	
23 Wheel Track/Rut 27 Damage of Bascourse Total Evaluation Rank		22 Cracks	3.6	0.25	0.9	
27 Damage of Bascourse Total Evaluation Rank	Tife of Pavement	1	3.6	0.1	0.5	
Total 3.6 Good 3.5-2.5; Fair 2.5-1.5; Poor 1.5-1.0:		1	3.9	0.15	9.0	
aluation Rank		Total			3.6	
		aluation Rank	4~3.5: Good	3.5~2.5: Fair	2.5-1.5: Poor	1.5~1.0: Bad

Table- Evaluation Rank for Existing Roads

T	7	-η		\neg		ſ	멎
Kemak							1.5-1.0 Ba
Average Point Weight Factor Evaluated Foling	.0.4	2.0	0.3	0.2	0.2	1.3	2.5~1.5: Poor
Weight Factor	0.35	0.15	0.25	1.0	0.15		3.5~2.5: Fair
Average Point	I	1	1	2	1		4~3.5: Good
Categrory	21 Flatness/Roughness	29 Visual Degree	22 Cracks	r	1	Total	Evaluation Rank 4~3.5; Good [3.5~2.5; Fair [2.5~1.5; Poor 1.5~1.0; Bad
		Trafficability		Life of Pavement			

Table- Evaluation Rank for Existing Roads

Route No. 110						
	Sale	Categron	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Reniak
i i	21	21 Flatness/Roughness		0.35		
1 rameaonny	29	29 Visual Degree		0.15		
	22	22 Cracks		0.25		
Life of Pavement		23 Wheel Track/Rut		0.1		
	27	27 Damage of Basecourse		0.15		
	£	Fotal				
		Evaluation Rank 4-3 5. Good 3.5-2 5. Fair 2.5-1.5: Poor 145-1.0. Bad	43.5. Good	3.5~2 5: Fair	2.5-1.5: Poor	1.5-1.0; Bad

Table- Evaluation Rank for Existing Roads

Route No 111					
	Categiony	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Rentak
F	21 Flamess/Roughness		0.35		
ranicadini	29 Visual Degree		0.15		
	22 Cracks		0.25		
Life of Pavement	23 Wheel Track/Rut		0.1		
	27 Damage of Basecourse		0.15		
	Total				
	Evaluation Rank 4-3 5 Good 3 5-2 5 Fair 3 5-1 5 Door 3 5-1 0 Bad	W	185 .> C-> 5	1 5-1 5 Poor	1.5~1 0. Bac

Table- Evaluation Rank for Existing Roads

	-Side I	1 abic- Evaluation Kank for Existing Roads	r Existing Roads	
Route No.76				
	Categiory	Average Point Weight Factor Evaluated Point	ight Factor Evaluate	d Point Remak
Tenthorhilin	21 Flatness/Roughness	3	0.35	
11 de la contra del la contra de la contra de la contra del la contra del la contra de la contra de la contra del la contra del la contra de la contra del la co	29 Visual Degree	3	0.15	0.5
	22 Cracks	3.8	0.25	-
Life of Pavement	Life of Pavement 23 Wheel Track/Rut	3	0.1	0.3
	27 Damage of Basecourse	3	0.15	0.5
	Total			3.3
	Freheation Dont.	4.3 C. Cond 2 C. 3 C. Dail 2 C. Dan 1 C. 1 C. D. D. J.	2 6. Ent. 1 6. 1 6.	Dans 1 6 1 0. 7

Table- Evaluation Rank for Existing Roads

AUGUST 140 E						
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Rcmak	
Tentforhilin	21 Flatness/Roughness	3	0.35	-		
(represented	29 Visual Degree	3	0.15	6.0		
	22 Cracks	4	0.25			
Life of Pavement	23 Wheel Track/Rut	3.3	0.1	0.3		
	27 Damage of Basecourse	4	0.15	9.0		
	Total			3,4		
	Fyaliation Rank	1-7 6 Cond	2 4.2 5 Enir	1-3 5. Good 12 4-2 5. Enir 12 5-1 5. Door 1 5-1 1): Dod	5.10 Dad	

Table- Evaluation Rank for Existing Roads

Route No. 104, 105	ا ي					:	
	Cate	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak	_
Trafficability	2.1	1 Flatness/Roughness	3.6	0.35	1.3		
	29	29 Visual Degree	3.4	0.15	6.0		
	22	22 Cracks	3.6	0.25	6.0		
Life of Pavement		23 Wheel Track/Rut	3.3	0.1	6.0		
	27	27 Damage of Basecourse	3.7	0.15	9.0		
	To	Total			3.6		
	-	Evaluation Rank	4~3.5: Good 3.5~2.5: Fair 2.5~1.5: Poor 1.5~1.0: Bad	3.5~2.5: Fair	2.5-1.5: Poor	1.5~1.0: Bad	

Table. Evaluation Rank for Existing Roads

	Danie Ma Co	, and the control of	device Evaluation ratio for existing roads	ior existing	Koads	
	Podde 140.10					
		Categiony	Average Point Weight Factor Evaluated Point	Weight Factor	Evaluated Point	Remak
	Trafficability.	21 Flatness/Roughness	3	0.35	-	
	· idinadilii	29 Visual Degree	3.3	0.15	0.5	
		22 Cracks	7	0.25	-	
	Life of Pavement	23 Whoel Track/Rut	Ε.	0.1	0.3	
		27 Damage of Basecourse	2.3	0.15	0.3	
. –		Total			3.1	
	-	Evaluation Rank	4~3 S. Good 3.5~2.5; Fair 2.5~1.5; Poor 1.5~1.0; Bad	5-2.5 Fair	25~15 Poor	15~1 0 Bad

Table- Evaluation Rank for Existing Roads

Koule No.45					
	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
	21 Flatness/Roughness	3	0.35	1	
rameability	29 Visual Degree	‡	0.15	0.6	
	22 Cracks	4	0.25	1	
Life of Pavement	Life of Pavement 23 Wheel Track/Rut	3.7	0.1	0.4	
	27 Damage of Basecourse	4	0.15	9.0	
	Total			3.6	•
	Evaluation Rank	4-3 5 Good	3 5~2 5. Pair	4-3 5 Good 135-25 Fair 125-15 Poor 15-10 Bad	5-1 O. Bac

Table- Evaluation Rank for Existing Roads

	****	Change Company of the	0	
Route No.39				
	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point Remak
Traction	21 Flamess/Roughness	1	0.35	5'0
California	29 Visual Degree	† "[0.15	0.2
	22 Cracks	1.2	0.25	0.5
Life of Pavement	23 Wheel Track/Rut	1.2	0.1	0.2
	27 Damage of Basecourse	1.1	0.15	0.2
	Total			1.5
	Evaluation Rank	4~3.5; Good	3.5~2.5: Fair	4-3.5; Good [3.5-2.5; Fair 2.5-1.5; Poor [1.5-1.0; Bad

Table- Evaluation Rank for Existing Roads

	-20081	Calcallation for the constant of the calcal	50000	2000	
Route No. 71.72			ı		
	Categron	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point Re	Remak
T. and Combiling	21 Flatness/Roughness	2.5	0.35	6.0	
Lamoranius	29 Visual Degree	2.5	0.15	†°0	
	22 Cracks	2.8	0.25	0.7	
Life of Pavement	23 Wheel Track/Rut	2.5	0.1	0.3	
	27 Damage of Basecourse	7	51.0	0.3	
	Total			2.6	
	Evaluation Rank	4~3.5: Good	3.5-2.5: Fair	4-3.5: Good 3.5-2.5: Fair 2.5-1.5: Poor 1.5-1.0: Bad	O: Bac
				ż	

Table- Evaluation Rank for Existing Roads

10.00					
	Categion:	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
Tentifonkilik	21 Flainess/Roughness	3	0.35		
i ameanni	29 Visual Degree	2.7	0.15	+ :0	
	22 Cracks	3.7	0.25	6.0	
Life of Pavement	23 Wheel Track/Rut	2.7	0.1	0.3	
-	27 Damage of Basecourse	3.3	0.15	0.5	
	Total			3.1	
	Evaluation Rank	4-3 5 Good	3 5~2 5 Fair	14-3 5 Good 35-25 Fair 125-15 Pror 15-10 Rad	5-10 Rad

Table- Evaluation Rank for Existing Roads

Koure No.00					
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
	21 Flatness/Roughness	3	0.35	1	
Trafficability	29 Visual Degree	6	0.15	0.5	
	22 Cracks	4	0.25	1	
Life of Pavement	ľ	0	0.1	0.3	
		-	0.15	0.2	
	Total			3	
	Evaluation Rank	4~3.5: Good	3.5-2.5. Fair	4-3.5: Good 3.5-2.5: Fair 2.5-1.5: Poor 1.5-1.0: Bad	1.5~1.0; Bad

Table- Evaluation Rank for Existing Roads

toute No. 34, 70							
	[]	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak	
H	21	21 Flatness/Roughness	3	0.35	as-4		
i ratificationity	25	29 Visual Degree	3	0.15	0.5		
	22	Cracks	3	0.25	0.8		
ife of Pavement	i	23 Wheel Track/Rut	3	0.1	0.3		
	27	27 Damage of Basecourse	. 2.5	0.15	4.0		
	۳	Total			3		
		Westnation Rank	1~1 5. Good	2 5-7 5 Pair	12-1 5. Good 12 5-2 5. Pair 2 5-1 5. Poor 1 5-1 0. Bad	1.5~1 0: 3ad	

Table- Evaluation Rank for Existing Roads

Route No. 117					
	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
+ (6 - b)	21 Flatness/Roughness	1	0.35	0.4	
Lameagnity	29 Visual Degree	2	0.15	0.3	
	22 Cracks	3	0.25	0.8	
Life of Pavement	23 Wheel Track/Rut	3	0.1	0.3	
	27 Damage of Basecourse	2	0.15	0.3	
	Total			2.1	
	Evaluation Rank	1~3 S. Good	3.5~2.5: Fair	4-3 S. Good 3.5-2.5; Fair 2.5-1.5; Poor 1.5-1.0; Bad	1.5~1.0: Bad

Table- Evaluation Rank for Existing Roads

Route No 116					
	Categion	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point Remak	Remak
1	21 Flatness/Roughness		0.35		_
raincaoiltí	29 Visual Degree		0.15		
	22 Cracks		0.25		
Life of Pavernent	Life of Pavement 23 Wheel Track/Rut		0.1		
	27 Damage of Basecourse		0.15		
	Total				
	Revaluation Rank 14-3 5 Good 1 5-7 5 Fair 9 5-1 5 Poor 1 5-1 0 Bad	2~3 5. Good	15-75 Fair	25-15. Poor	1.5~1 0. Bad

Table- Evaluation Rank for Existing Roads

Koule No. 101.20				ı
	Category	Average Point W	Average Point Weight Factor Evaluated Point	oing Kemak
	,	ľ	0.35	*
	21 Flatness/Roughness	*	2.7	1
Trafficability	20 Vicual Degree	7	0.15	0.6
	22	,	30.0	80
	22 Cracks	ر د	0.23	25
I if a of December	1	~	10	0.3
Trace of Leavenier	į			
	27 Damage of Basecourse	···	0.15	0.0
				3,6
	Total			
	Evaluation Rank	4-3.5: God 3:	4-3.5. Good 3.5-2.5: Fair 12.5-1.5: Poor 11.5-1.0: Bad	or 11.5~1.0; Bac

Table- Evaluation Rank for Existing Roads

Cates (19 29 22 22 23 27 70 70 70 70 70 70 70 70 70 70 70 70 70	Route No.65					
12 22 22 23		Category	Average Point	Weight Factor	Evaluated Point	Remak
<u> </u>		21 Flamesc/Romehness	9	0.35	1	
2225	Trafficability	29 Visual Degree	2	0.15	0.3	
12 2 23		22 Cracks	3	0.25	0.8	
12 2	1 ife of Paterment		2	0.1	0.2	
Total			2.3	0.15	0.3	
		Total			2.6	
Evaluation Rank 4-3.5; Good [3.5-2.5; Fair [2.5-1.5] Foot [1.5-1.0; Each		Evaluation Rank	4~3.5: Good	3.5-2.5; Fair	2,5-1.5: Poor 1.	S-1.0 Ba

Table- Evaluation Rank for Existing Roads

Route No 118				
	Categion	Average Point Weight	Average Point Weight Factor Evaluated Point Remak	Remak
	21 Flatness/Roughness	0.35	5	
Trafficability	29 Visual Degree	\$1.0	5	
	22 Cracks	0.25	5	
Life of Pavement	1	0		
		0.15	\$	
	Total			
	Evaluation Rank	4~3.5: Good . 3.5~2.5:	Evaluation Rank 4-3.5; Good 3.5-2.5; Fair 2.5-1.5; Poor 1,5-1.0; Bad	-1.0: Bad

· Table- Evaluation Rank for Existing Roads

	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
21 Flatness/Roughness	3	0.35		
29 Visual Degree	3.3	0.15	0.5	
22 Cracks	3	0.25	0.8	
23 Wheel Track/Rut	2.3	0.1	0.2	
27 Damage of Basecourse	3.7	0.15	0.0	
			3.1	
Evaluation Rank	4-3.5. Good	3 5~2.5: Fair	2.5~1.5: Poor 1	5-1 0 Bad
~ 100 G	Sunc	Sunc	Sunc	Dursc 3.7 0.15 4-3.5. Good 35-2.5: Fair 2.5-1.5: Poo

Table- Evaluation Rank for Existing Roads

	13000	EVALUATION NAME TO DATE UND ROADS	K 101 CAISUIN	Roads	
Route No. 119			•		
	Category	Average Point	Weight Factor	Average Point Weight Factor Evaluated Point	Remak
Traffenskilin.	21 Flatness/Roughness		0.35		
1 direction 5	29 Visual Degree		0.15		
	22 Cracks		0,25		
Life of Pavement	Life of Pavement 23 Wheel Track/Rut		0.1		
	27 Damage of Bascooursc		0.15	-	
	Total				
	Evaluation Rank 4-3.5. Good 3.5-2.5. Fair 2.5-1.5. Poor 1.5-1.0. Bad	4-3.5: Good	3.5~2.5. Fair	2.5~1.5; Poor	1.5-1.0: Bad

Table- Evaluation Rank for Existing Roads

	Remak							Y 10 Bad
	Average Point Weight Factor Evaluated Point	7.1	9.0	-	0.4	0.5	3.9	4-3.5 Good [3.5-2.5; Fair [2.5-1 5' Poor [1.5-1.0; Bad
	Weight Factor	0.35	0.15	0.25	1.0	0.15		3 5-2.5: Fair
	Average Point	t	+	†	۲	3		4~3.5 Good
	Categron.	21 Elatness/Roughness	29 Visual Degree	22 Crucks	23 Wheel Track/Rut	27 Dumage of Basecourse	Total	Evaluation Rank
Route No. 33		T-reff. and 1134.	T TAULT TO THE		Life of Pavemen			

Table- Evaluation Rank for Existing Roads

Trafficability 21 Elatiness Roughness 3 0.35 1.1 Remark	route ivo.tvo					1	
2) Elatness/Roughness 29 Visual Degree 22 Cracks 23 Wheel Track/Rut 27 Damage of Basecourse Toul		Categron	Average Point 1	Weight Factor	Evaluated Point	Remak	
29 Visual Degree 22 Cracks 23 Wheel Track/Rut 27 Damage of Basecourse Toul	T (F).	21 Elatness/Roughness	Į.	0.35] T 1		
22 Cracks 23 Wheel Track/Rut 27 Damage of Basecourse Toul Evaluation Rank) rathereness	29 Visual Degree	3	0.15	0.5		
23 Wheel Track/Rut 27 Damage of Basecourse Total Evaluation Rank		22 Cracks	εε	0.25	8.0		
27 Damage of Basecourse 3 0.15 0.5 Total Total 8.3	Life of Pavement	23 Wheel Track/Rut	+	0.1	+·0		
lustion Rank		27 Damage of Basecourse	ε	0.15	0.5		
		Total			3.3		
			1-7.5 Good	. 5-2.5. Fair	2.5~1.5 Poor	1.5-1:0: Bad	

Table- Evaluation Rank for Existing Roads

Category Category						
Categion: 21 Elainess Roughness 29 Visual Degree 22 Cracks 23 Wheel TrackRut 27 Danage of Basecourse Total Evaluation Rank	Koute No 59					
21 Elainess Roughness 29 Visual Degree 22 Cracks 23 Wheel Track/Rut 27 Damage of Basecourse Total Exaluation Rank		Сисевогу	Average Point	Weight Factor	Evaluated Point	
29 Visual Degree 22 (Cracks 23 Wheel Track/Rut 27 Damage of Basecourse Total Exaluation Rank	T (3)	21 Elainess/Roughness	3	6.35	1.1	
22 (Cracks 23) Wheel Track/Rut 27 Damage of Basecourse Total Exaluation Rank	THICAGINE	29 Visual Degree	2	0.15	0.3	
23 Wheel Track/Rut 27 Damage of Basecourse Total Evaluation Rank		22 Cracks	3	0.25	8.0	
27 Damage of Bascourse 3 0.15 0.5 Total 3.1 Evaluation Rank 4-3.5; Good 13.5-2.5; Fair 2.5-1.5; Poor 1.5-10; Bad	Life of Pavement		†	0.1	10	
aluation Rank		27 Damage of Basecourse	3	\$1.0	\$ 0	:
		Total			3.1	
			1-3 3 Good	3 5-2.5: Fair	2.5~1.5 Poor	1.5~1.0. Bad

List of Overall Evaluation for Bridge No. 4

														٠.			٠.			
Point (RAF)*(W/F)		1.4		6.0			0				(6.0		1.0					C(3.6)	8
Br. Weight factor	1	0.7		0.3	·	2		6.0		0.1	,	0.1		0.1		0.1	Min.point 1.5	. =-		Max.point 5.5
Br.		4 2		m			ſ	^				~							_	
Rating point	ğ	2 3	good bad	1 2 3 4	•	Ť	,	3		-		3		1		m	1.5-2.5	2.5~3.5	3.5-4.5	4.5~5.5
on Hem		The state of consecutive damage and defe 1	מו חבותים	Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	han 7 ton	High traffic volume of heavy vehicle with	er than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widturaffic capacity	Insufficient width for	traffic capacity	A Sound	B. Fairly sound	C: Unsound/ Lack of safety 3.5-4.5	D: Danger
Evaluation Item	į	Decrees of Cure	ज्यार त अपित	Degree of subst	Low traffic vol	axle load less than 7 ton	High traffic vo	axle load greater than 7 ton		Construction	record			Effective widt	of bridge		Sound	crain cyanganan ini	Tarack T	
1			Consoling			Load	200				-	Fishchon						Orchan Cro	, agurer)	

List of Overall Evaluation for Bridge No. 5

												_		— -				_	·	_		- -
Tai Sa	(RVF)*(W/F)		0.7			0.3				6.0			1	6.3	-		,	2		B(2.5)		K
	Br. Weight factor		0.7	, ; ,		0.3		5.0		6.0	ļ	0.1		0.1		1.0			Min.point 1.5			Max.point 5.5
١	. G		_	1	_	7		٦		~				7					_		,	
		1	1	- 1	βg	14					_			7								
	Rating point		1	2		2 3				~				3		-		3	2.5	3.5	4.	5.5
	Rati	1	٠ پر	4	900	=													1.5~2.5	2.5~3.5	13.5~	4.5~5.5
	on Item			Durability Degree of superstructure damage and defq 1 4		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	han 7 ton	High traffic volume of heavy vehicle with	er than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widthraffic capacity	Insufficient width for	traffic capacity	A · Sound	B. Fairly sound	C. Unsound/ Lack of safety 3.5-4.5	D: Danger
	Evaluation Item		•	Degree of Supe.		Degree of subs	Low traffic vol	avic load less than 7 ton	High traffic vo	axle load greater than 7 ton		Construction	record			Effective width	of bridge	· ·	Sound	froint)	n pount)	
-				Darability 3				7000	ž					Function					100	Overall evaluation (manage of point)	(1यग्रिका)	

List of Overall Evaluation for Bridge No. 6

		1000	Too Boars	Rating point	Br	Br. Weight factor	Point
		EV atuan	Evariation from		(R/P)	(NV/F)	(RVF)*(W/F)
-				paq pad	-		
	Parchilin	Degree of cury	Degree of smoothigher damage and defe	1 2 3 4	ĭ	0.7	0.7
	Caracia Caraci	Sec. 10 201920		good bad	120		
		t Degree of subs	Degree of substructure damage and defect	1 2 3 4	_	0.3	0.3
		I ow traffic vo	ow traffic volume of heavy vehicle with				
	1 004	layle load less than 7 ton	than 7 ton	,		0,3	
	Sympton	High traffic w	High traffic volume of heavy vehicle with		ļ		
	Capacity .	axle load greater than 7 ton	ter than 7 ton	8	6	0.3	60
			Constructed after 1977				
		Construction	Construction (use less than 19 years)	I		0.1	
		record	Constructed before 1977				,
	Finction		(use more than 19 years)	3	_	0.1	0.3
			Sufficient width for				;
		Effective widt	Effective widt traffic capacity		_	0.1	1.0
		of bridge	Insufficient width for			,	
		•	traffic capacity	3		0.1	- 1
	Overs!	Overall evaluation for brid A: Sound	A. Sound	1.5-2.5		Min.point 1.5	A(2.3)
	(Tallee	(range of point)	B. Fairly sound	2.5-3.5	~_		
	9	,	C. Unsound/ Lack of safety 3.5-4.5	3.5-4.5	—т		
			D. Danger	4.5-5.5	_	Max point 5.5	DX.

List of Overall Evaluation for Bridge No. 7

		Touthoutier Trees	i from	Rating point	ă	Br. Weight factor	Point	
		Evaluad	NOT HOME		(P.P.)	(W/F)	(RVF)*(W/F)	- 1
				good	v			
<u></u>	Hilto	Degree of supe	Durability Degree of superstructure damage and defe 1 2	1 2 3 4		0.7	0.7	
1	, and	300		good bad	٠.			
		Degree of subs	Degree of substructure damage and defect	1 2 3 4	1	0.3	0.3	~~
		Low traffic vol	Low traffic volume of heavy vehicle with					
Load	λď	axle load less than 7 ton	han 7 ton	1		0.3		7
S	Capacity	High traffic vo	High traffic volume of heavy vehicle with					
_		axle load greater than 7 ton	ter than 7 ton	3		0.3	6.0	
			Constructed after 1977					
		Construction	Construction (use less than 19 years)	7		0.1		7
		record	Constructed before 1977					
Func	Function		(use more than 19 years)	3	~	0.1	0.3	7
			Sufficient width for			,		
		Effective wide	Effective widt traffic capacity			0	0.1	٦.
		of bridge	Insufficient width for			,		
			traffic capacity		_	0.1	1	Т
Sec.	150	Overall evaluation for brid A. Sound	A. Sound	1.5~2.5		Min.point 1.5	A (2.3)	7
)	ange	(range of point)	B: Fairly sound	2.5~3.5				T
	0		C. Unsound/ Lack of safety 3.5-4.5	43.5-4.5				1
			D. Danger	4.5~5.5		Max.point 5.3	φ ₁	- 1
_			2000					

List of Overall Evaluation for Bridge No. 10

Point	(R/F)*(W/F)		1.4		9.0				6.0				0.3		0.1				B(3.3)		
Br. Weight factor	(W/F)		0.7		0.3		0.3		0.3		0.1		0.1		0.1		0.1	Min.point 1.5			Max.point 5.5
Br.	(R/P)		2		2				n		-		3		-						
ij		bad	4	bad	4																
9 0	(R/P)		3		3		_		m		1		3		_			_	2		Ĺ
Rating point	٦	poog	1 2	pood	1 2													1.5~2.5	2.5~3.5	5.4	45-55
-	\dashv	80	J.	8	Į,	년		县				-	-			_		=	2	43	4
Evaluation Item			Durability Degree of superstructure damage and defe 1		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	than 7 ton	High traffic volume of heavy vehicle with	axle load greater than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective wide traffic capacity	Insufficient width for	traffic capacity	A: Sound	B: Fairly sound	C: Unsound/ Lack of safety 3.5-4.5	D: Danger
Evalua			Degree of sur		Degree of sub	Low traffic ve	axle load less than 7 ton	High traffic v	axle load grea		Construction	record			Effective widt	of bridge		Overall evaluation for brid A: Sound	point)	-	
			Durability				Load	Capacity				-	Function					Overall eval	(range of point)		;

List of Overall Evaluation for Bridge No. 11

	Evalua	Evaluation Item	Rating point	Ä	Br. Weight factor	Point	
			(RVP)	(R/P)	(W/F)	(R/F)*(W/F)	
			ped bad	p			
Durability	Degree of sup	Durability Degree of superstructure damage and defe 1 2	1 2 3 4	2	0.7	1.4	٠
			preq poof	p		-	
	Degree of sub	Degree of substructure damage and defect	1 2 3 4	2	0.3	9.0	
	Low traffic vo	Low traffic volume of heavy vehicle with					
Load	axle load less than 7 ton	than 7 ton	1	1	0.3	0,3	
Capacity	High traffic w	High traffic volume of heavy vehicle with					
	axle load grea	axle load greater than 7 ton	3		0.3		
		Constructed after 1977					
	Construction	Construction (use less than 19 years)	1		0.1		
	record	Constructed before 1977					
Function		(use more than 19 years)	3	3,	0.1	0.3	
		Sufficient width for					
	Effective widt	Effective widt traffic capacity	1	1	0.1	0.1	
	of bridge	Insufficient width for					
		traffic capacity	3		0.1		
Overall eval	Overall evaluation for brid A: Sound	A: Sound	1.5~2.5		Min.point 1.5		
(range of point)	[point]	B: Fairly sound	2,5~3.5			B(2.7)	
		C. Unsound/Lack of safety 3:5-4.5	3.5-4.5				
		D; Danger	4.5~5.5		Max.point 5.3		

List of Overall Evaluation for Bridge No. 12

		Evalua	Evaluation Item	Rating point	_	Br. Weight factor	Point
				(RVP)	<u>B</u>	(W/F)	(RVF)*(W/F)
				good pag	paq		
	Durability	Degree of sup	Durability Degree of superstructure damage and defe 1	1 2 3 4	1	0.7	0.7
				good bad	2		
		Degree of sub	Degree of substructure damage and defect	2 3	4	0.3	0.3
L .		Low traffic vo	Low traffic volume of heavy vehicle with		_		
	Load	axle load less than 7 ton	than 7 ton	1	_	0.3	
	Capacity	High traffic ve	High traffic volume of heavy vehicle with			•	
		axle load grea	axle load greater than 7 ton	m	3	0.3	6.0
L			Constructed after 1977		_		
		Construction	Construction (use less than 19 years)	1		0.1	
		record	Constructed before 1977				
	Function		(use more than 19 years)	3	3	0.1	0.3
			Sufficient width for				
		Effective wide	Effective wide traffic capacity	-	1	0.1	0.1
		of bridge	Insufficient width for				
			traffic capacity	6		0.1	
<u>u</u>	Yerall eval	Overall evaluation for brid A: Sound	A: Sound	5.5-2.1		Min.point 1.5	A(2.3)
	(range of point)	f point)	B: Fairly sound	2,5-3.5			
			C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5		·	
j			D: Danger	4.5-5.5		Max.point 5.5	

		Evaluat	Evaluation Item	Rating point	Ä	Rating point Br. Weight factor	Point	
				(R/P)	(R/P)	(W/F)	(R/F)*(W/F)	-
				ped boog	P			
	Durability	Degree of sup-	Durability Degree of superstructure damage and defe 1 2	1 2 3 4	2	0.7	1.4	
				good bad	ď			
	-	Degree of sub-	Degree of substructure damage and defect	1 2 3 4	-	0.3	0.3	
		Low traffic vo	Low traffic volume of heavy vehicle with					
-	Load	axle load less than 7 ton	than 7 ton	1		0.3		
	Capacity	м э джи ц він	High traffic volume of heavy vehicle with					
	-	axle load greater than 7 ton	ter than 7 ton	6	m	0.3	6.0	
			Constructed after 1977					
		Construction	Construction (use less than 19 years)	1	-	0.1		
		record	Constructed before 1977					
	Function		(use more than 19 years)	3	Ľ	0.1	0.3	
_			Sufficient width for					
_		Effective wide	Effective wide traffic capacity			0.1		
		of bridge	Insufficient width for					
	:		traffic capacity	e	2	0.1	0.3	
	Overall eval	Overall evaluation for brid A: Sound	A: Sound	1.5-2.5		Min.point 1.5		
	(range of point)	(point)	B: Fairly sound	2.5-3.5		-	B(3.2)	
			C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5				
_			D: Danger	4.5~5.5		Max.point 5.5		

List of Overall Evaluation for Bridge No. 14

(R.P) (W.F) (R.L.) 1			in Team	Pating mint	à	Br Weight factor	Point	
(RVP) (WF) (WF) (WF) (WF) (WF) (WF) (WF) (WF		Evaluac	ion nem					
1 bad 1 0.7 1 bad 1 0.3 1 3 4 1 0.3 1 0.3 3 0.1 1 0.1 1 0.1 3 0.1 3 0.1 3 0.1 4.5 Max.point 5.5		-		١	\$	1	(R/F)*(W/F)	
2 3 4 1 0.7 1 bad 2 3 4 1 0.3 1 0.3 3 0.3 1 0.1 1 0.1 2 5 Min.point 1.5 4.5 Max.point 5.5								
1 bad 1 0.3 1 0.3 3 0.1 1 0.1 3 0.1 3 0.1 3 0.1 3 0.1 3 0.1 4.5 Max.point 5.5	ability	Degree of sup	erstructure damage and defe	2 3	-	0.7	0.7	:
avy vehicle with 1 0 3 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0				-				
any vehicle with 1 0.3 any vehicle with 3 0.3 on and the 1977 1 0.1 de before 1977 3 3 0.1 than 19 years) 3 0.1 than 19 years) 3 0.1 acity 15-2.5 ound 25-3.5 Min. point 1.5 ound 15-2.5 Max. point 5.5		Degree of subs	structure damage and defect	1 2 3	1	0.3	0.3	
any vehicle with 3 0.3 on date 1977 1 0.1 da before 1977 3 3 0.1 width for 1 0.0 tt width for 3 3 0.1 width for 3 3 0.1 width for 1.5-2.5 ound 2.5-3.5 Max point 1.5 Max point 5.5	ľ	Low traffic vo	lume of heavy vehicle with					
any vehicle with 3 3 0.3 on d after 1977 1 0.1 an 19 years) 1 0.1 d before 1977 3 3 0.1 width for 1 0.1 t width for 3 3 0.1 acity 1.5-2.5 with for 2.5-3.5 Min, point 1.5 dound 2.5-3.5 Max point 5.5	pao	axle load less	than 7 ton	. 1		0.3		
Ad after 1977 and 19 years) A before 1977 A before 1977 A than 19 years) Width for a activ a width for a city	pacity	High traffic vo	olume of heavy vehicle with				٠	
d after 1977 1 0.11 an 19 years) 1 0.11 than 19 years) 3 3 0.1 width for 1 0.1 activ 1 1.5-2.5 wind Lack of safety 3.5-4.5 Min. point 1.5		axle load grea	ter than 7 ton	3	3	0.3	6.0	
than 19 years) the before 1977 than 19 years) soity than 15 on 1 soity 15-2.5 with point 1.5 cound 25-3.5 with point 5-3 than point 5-3 soity 45-5.5 Max point 5-5 than 15-3 soity soity 15-3.5 soity 16-3.5 soity 16-3.5 soity 17-3.5 soity 18-3.5 so			Constructed after 1977				:	
than 19 years) 3 3 0.1 than 19 years) 3 0.1 width for 1 0.1 acity 3 0.1 acity 15-2.5 tound 2.5-3.5 tound 2.5-3.5 dV Lack of safety 5.5-4.5 than point 5.5 th		Construction	(use less than 19 years)	1		0.1		
than 19 years) 3 3 0.1 width for 1 0.1 tt width for 3 0.1 acity 3 0.1 acity 1.5-2.5 found 2.5-3.5 found 2.5-3.5 Afax point 5.5 Afax point 5.5		record	Constructed before 1977					
width for 1 0.1 acity 3 0.1 acity 1.5-2.5 found 2.5-3.5 Alm point 1.5 Alm point 5.5	nction		(use more than 19 years)	3	m	0.1	0.3	
acity 1 0.1 acity 3 3 0.1 acity 1.5–2.5 Min.point 1.5 ound 2.5–3.5 Max.point 5.5 (4.5–5.5 Max.point 5.5	٠.		Sufficient width for					
acity 3 3 0.1 acity 1.5-2.5 Min.point 1.5 cond 2.5-3.5 Max.point 5.5 d. Lack of safety 3.5-4.5 Max.point 5.5		Effective widt	traffic capacity	1		0.1		
acity 3 3 0.1 1.5-2.5 Min.point 1.5 cond 2.5-3.5 Max.point 5.5 id/Lack of safety 5.5-4.5 Max.point 5.5		of bridge	Insufficient width for					
ound 2.5~3.5 Min.point 1.5 ound 2.5~4.5 Max.point 5.5 (4.5~5 (4.5~5 (4.5	4.	· •	traffic capacity	3	æ	0.1	0.3	:
ound 2.5~3.5 td Lack of safety 3.5~4.5 (4.5~5.5 Max.point 5.5	ral! eva	luation for brid	A: Sound	1.5-2.5		Min.point 1.5		
C: Unsound/ Lack of safety 3.5-4.5 D: Danger (4.5-5.5	range	f point)	B: Fairly sound	2,5~3.5			B(2.5)	
	•		C: Unsound/ Lack of safety	3.5-4.5				
			D: Danger	4.5~5.5	- :	Max point 5.5		

List of Overall Evaluation for Bridge No. 15

														:				~		_,	
Point	(RVF)*(W/F)		1.4		9.0				0.9				0.3				0.3			C(3.5)	
ž	(W/F)	•	0.7		0.3		0.3		0.3		0.1		0.1		0.1		0.1	Min.point 1.5			Max.point 5.5
ā	<u> </u>		2	-	2				3				٣				m				
Rating point	(R/P)	good bad	1 2 3 4	good bad	1 2 3 4	-	1		3		1		3		1		3	1.5~2.5	2.5~3.5	3.5-4.5	4.5~5.5
Evaluation Item			Durability Degree of superstructure damage and defe 1 2 3		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	than 7 ton	High traffic volume of heavy vehicle with	axle load greater than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widt traffic capacity	Insufficient width for	traffic capacity	A: Sound	B: Fairly sound	C: Unsound/ Lack of safety 3.5-4.5	D. Danger
Evaluat	i		Degree of sup		Degree of subs	Low traffic vo	axle load less than 7 ton	High traffic vo	axle load grea		Construction	record			Effective widt	of bridge		Overall evaluation for brid A: Sound	f point)		
			Durability				Load	Capacity	,			•	Function					Overall eva	(range of point)		

	Evaluat	Evaluation Item	Rating point	P.	Š	
	į		(R/P)	2	(¥/E)	(R/F)*(W/F)
			good bad		•	
Durability	Degree of sup	Durability Degree of superstructure damage and defe 1 2	1 2 3 4	-	0.7	0.7
,			good bad	-		
	Degree of subs	Degree of substructure damage and defect	1 2 3 4	-	0.3	0.3
	Low traffic vo	Low traffic volume of heavy vehicle with				•
Load	axle load less than 7 ton	than 7 ton	1		0.3	
Capacity	High traffic vo	High traffic volume of heavy vehicle with				
	axie toad grea	axie load greater than 7 ton	3	~	0.3	6.0
		Constructed after 1977				
	Construction	Construction (use less than 19 years)	1	-	0.1	0.1
	record	Constructed before 1977				
Function		(use more than 19 years)	3		0.1	
		Sufficient width for				
	Effective wide	Effective wide traffic capacity	-1	-	0.1	0.1
	of bridge	Insufficient width for				
		traffic capacity	3		0.1	
Overall eva	Overall evaluation for brid A: Sound	A: Sound	1.5~2.5		Min.point 1.5	A(2.1)
(range of point)	f point)	B: Fairly sound	2.5-3.5			
,	•	C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5			
		D: Danger	4.5~5.5		Max.point 5.5	

	Evaluat	Evaluation Item	Rating point	Ä	Br. Weight factor	Point
			(RVP)	R.	(W/F)	(R/F)*(W/F)
			good bad	72.		
Durability	Degree of supe	Durability Degree of superstructure damage and defe 1 2	1 2 3 4	2	0.7	1.4
,			good bad	ַם,		
	Degree of subs	Degree of substructure damage and defect	1 2 3 4	2	0.3	9.0
	Low traffic vol	Low traffic volume of heavy vehicle with				
Z Z	axle load less than 7 ton	than 7 ton	1		0.3	
بعنؤ	High traffic vo	High traffic volume of heavy vehicle with				
	axle load greater than 7 ton	ter than 7 ton	m	3	0.3	6.0
		Constructed after 1977				
,	Construction	Construction (use less than 19 years)	1		0.1	
	record	Constructed before 1977				
Function		(use more than 19 years)	3	~	0.1	0.3
		Sufficient width for				
	Effective widt	Effective widthraffic capacity	1		0.1	0.1
	of bridge	Insufficient width for				
		traffic capacity	3		0.1	
Overall eva	Overall evaluation for brid A: Sound	A: Sound	1.5~2.5		Min.point 1.5	
(range of point)	f point)	B: Fairly sound	2,5~3.5			B(3.3)
		C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5			
		D: Danger	4.5~5.5		Max.point 5.5	

List of Overall Evaluation for Bridge No. 18

Point	(RVF)*(W/F)		2.1		0.3		0.3						0.3		0.1				B(3.1)		
Weight factor	(W/F)		0.7		0.3		0.3		0.3		0.1		0.1		0.1		0.1	Min.point 1.5			Max.point 5.5
Br.	(RVP)		٣	_			-						m						•		
Rating point		good bad	1 2 3 4	peq pood	1 2 3 4		1		m		1		3		1		3	1.5-2.5	2.5~3.5	3.5~4.5	4,5~5.5
Evaluation Item			Durability Degree of superstructure damage and defe 1		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	than 7 ton	High traffic volume of heavy vehicle with	ter than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widthraffic capacity	Insufficient width for	traffic capacity		punos	C: Unsound/ Lack of safety 3.5-4.5	D: Danger
Evaluat			Degree of sup		Degree of subs	Low traffic vo	axle load less than 7 ton	High traffic vo	axle load greater than 7 ton		Construction	record			Effective width	of bridge		Overall evaluation for brid A: Sound	f point)		
			Durability				Load	Capacity					Function				÷	Overali eval	(range of point)		

List of Overall Evaluation for Bridge No. 19

		· -T		 [_1	_	1				· -	_	
Point (R/F)*(W/F)		0.7		9.6		0.3				0.1				1.0			A(1.8)			
Br. Weight factor (R/P) (W/F)		0.7		0.3		0.3		0.3		0.1		0.1		0.1		0.1	Min.point 1.5			Max.point 5.5
Br. (R/P)	-թ_	_	₽.	2		_													_	_
Rating point (R/P)		1 2 3 4	good bad	1 2 3 4		1		8		1		3		1		3	1.5~2.5	2,5~3.5	3.5-4.5	4.5-5.5
Evaluation Item		Durability Degree of superstructure damage and defe 1 2		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	than 7 ton	High traffic volume of heavy vehicle with	axle load greater than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widt traffic capacity	Insufficient width for	traffic capacity	A: Sound	puno	C; Unsound/ Lack of safety 3.5-4.5	D. Danger
Evaluat		Degree of sup		Degree of sub-	Low traffic vo	axic load less than 7 ton	High traffic w	axle load grea		Construction	record			Effective widt	of bridge		Overall evaluation for brid A: Sound	(point)		
		Durability		•		Load						Function					Overall eval	(range of point)		

List of Overall Evaluation for Bridge No. 20

		Evaluat	Evaluation Item	Rating point	B.	Br. Weight factor	Point
				(RVP)	(RVP)	(W/Æ)	(RVF)*(W/F)
				good bad	-		
	Durability	Degree of sup	Durability Degree of superstructure damage and defi	1 2 3 4	2	0.7	1,4
: :				good bad	q		
		Degree of sub-	Degree of substructure damage and defect	1 2 3 4	2	0.3	9.0
		Low traffic vo	Low traffic volume of heavy vehicle with			•	
	Load	axle load less than 7 ton	than 7 ton	1	1	0.3	0.3
	Capacity	High traffic vo	High traffic volume of heavy vehicle with			•	
		axle load greater than 7 ton	ter than 7 ton	3		0.3	
			Constructed after 1977			ustam.	
		Construction	Construction (use less than 19 years)	. 1		0.1	0.1
		record	Constructed before 1977			Canhur	
	Function		(use more than 19 years)	3		0.1	
			Sufficient width for				
		Effective widt	Effective widt traffic capacity	1	-	0.1	0.1
		of bridge	Insufficient width for				
			traffic capacity	3		0.1	
	Overall eva	Overall evaluation for brid A: Sound	A: Sound	1.5~2.5		Min.point 1.5	
	(range of point)	f point)	B: Fairly sound	2.5~3.5			B(2.5)
			C; Unsound/ Lack of safety 3.5-4.5	3.5-4.5			
			D: Danger	4.5-5.5		Max point 5.5	

List of Overall Evaluation for Bridge No. 21

L		Evaluat	Evaluation Item	Rating point	Zi.	$\overline{}$	18	Br. Weight factor	Point
				(RAP)	2	(RAP)	_	(W/F)	(RVF)*(WVF)
٠				good		bad	L.,		
-	Durability	Degree of supe	Durability Degree of superstructure damage and defe	1 2	3	4		0.7	0.7
	•			200g	֓֞֞֞֟֟֜֟֡֡֡֡֡	bad	_		
		Degree of subs	Degree of substructure damage and defect	1 2	3	4	3-	0.3	6.0
_		Low traffic vo	Low traffic volume of heavy vehicle with			_			
	Load	axle load less than 7 ton	than 7 ton			_	_	0.3	0.3
_	Capacity	High traffic vo	High traffic volume of heavy vehicle with						
_		axle load greater than 7 ton	er than 7 ton	m		_		0.3	
_			Constructed after 1977			_			
		Construction	Construction (use less than 19 years)	_		_		0.1	
		record	Constructed before 1977						
	Function		(use more than 19 years)	3			-	0.1	0.3
			Sufficient width for						
		Effective widt	Effective wide traffic capacity	1				0.1	0.1
	-	of bridge	Insufficient width for						
			traffic capacity	3			_	0.1	
	Overall eva	Overall evaluation for brid A. Sound	A. Sound	1.5~2.5			풀,	Min.point 1.5	A(2.3)
	(range of point)	f point)	B: Fairly sound	2.5-3.5					
			C: Unsound/ Lack of safety	3.5-4.5					
			D: Danger 4.5-5.5	4.5~5.5			Ž	Max.point 5.5	

List of Overall Evaluation for Bridge No. 22

٠.					•						<u>.</u>									•	
Point	(R/F)*(W/F)		0.7		9.0				6.0				0.3	,	0.1				B(2.6)		
Br. Weight factor	(W/F)		0.7		0.3		0.3		0.3		0.1		0.1		0.1		0.1	Min.point 1.5			Max.point 5.5
Ä	(RAP)		1		7				~				~		_	_				:	_
Rating point		good bad	1 2 3 4	good bad	1 2 3 4		-		3		1		3		1		3	1.5-2,5	2,5~3.5	3,5-4,5	4,5~5.5
on Itom			Durability Degree of superstructure damage and defe		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	than 7 ton	High traffic volume of heavy vehicle with	ter than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widt traffic capacity	Insufficient width for	traffic capacity	A. Sound	R. Fairly sound	C. Unsound/ Lack of safety 3.5-4.5	D. Danger
Evaluation Item	Evaluat		Degree of sure	300000000000000000000000000000000000000	Degree of subs	Low traffic vo	axle foad less than 7 ton		axle load greater than 7 ton		Construction	record			Effective widt	of bridge)	Owers I evaluation for heigh Sound	(range of point)	, man	
			Divershilfty				Load	Capacity				÷	Function		· .			Jenes II	(range)	9	

List of Overall Evaluation for Bridge No. 23

						1	٠
	Evaluati	Evaluation Item	Rating point	ä	Br. Weight factor		
			(RVP)	(RVP)	(W/F)	(R/F)*(W/F)	
			paq pad	-		.=-	
shility	Degree of sure	Durability Degree of superstructure damage and defe	1 2 3 4	2	0.7	1.4	
aoung	200		good bad	21			
	Degree of subs	Degree of substructure damage and defect	1 2 3 4	1	6,3	0.3	·
	Low traffic vo	Low traffic volume of heavy vehicle with					
. peor	axle load less than 7 ton	than 7 ton	1		0.3		
	High traffic vo	High traffic volume of heavy vehicle with					
	axle load greater than 7 ton	ter than 7 ton	3	3	0.3	6.0	
		Constructed after 1977					
	Construction	Construction (use less than 19 years)	1		0.1		
	record	Constructed before 1977				,	
Function		(use more than 19 years)	3	3	0.1	0.3	
		Sufficient width for					
	Effective widt	Effective widthraffic capacity	1	-	0.1	0.1	
	of bridge	Insufficient width for					
)	traffic capacity	3		0,1		
in les	Overall evaluation for brid A: Sound	A: Sound	1.5~2.5		Min.point 1.5		
range	(range of point)	B: Fairfy sound	2.5~3.5			B(3.0)	
		C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5				
		D: Danger	4.5~5.5		Max.point 5.5	1 0	
				l			

						l
	Frainst	Evaluation Item	Rating point	т М	Br. Weight factor	
				(RVP)	(W/F)	(R/F)*(W/F)
			paq pad			
Dumbility	Degree of girk	Degree of superstructure damage and defe	1 2 3 4	1	0.7	0.7
 - manual	200		peq poos	1		
	Degree of sub	Degree of substructure damage and defect 1	1 2 3 4		0.3	0.3
	Low traffic vo	Low traffic volume of heavy vehicle with			•	
Load	axle load less than 7 ton	than 7 ton	1		0.3	
Capacity	High traffic vo	High traffic volume of heavy vehicle with				
	axle load erea	axle load greater than 7 ton	Э	3	0.3	0.9
		Constructed after 1977				
	Construction	Construction (use less than 19 years)	1		0.1	
	record	Constructed before 1977				,
Function		(use more than 19 years)	3	3	0.1	0.3
		Sufficient width for				
	Effective widt	Effective widthraffic capacity	ш		0.1	
	of bridge	Insufficient width for				
	l	traffic capacity	m	3	0.1	0.3
over Hermon	Overall evaluation for brid A: Sound	A: Sound	1.5~2.5		Min.point 1.5	
(range)	(range of point)	B; Fairly sound	2.5~3.5	·		B(2.5)
-		C: Unsound/ Lack of safety 3.5-4.5	93.5-4.5			
		D: Danger	4.5~5.5		Max.point 5.5	16
				l		

List of Overall Evaluation for Bridge No. 27

	Erminstion Item	on Item	Rating point	Br.	Br. Weight facton	Point
			(R/P)	(RAP)	(W/F)	(RVF)*(W/F)
			prod podg	ğ		
Durahility	Degree of supe	Durability Degree of superstructure damage and defe 1 2	1 2 3 4	2	0.7	1,4
			good bad	7 2.		
	Degree of subs	Degree of substructure damage and defect	1 2 3 4	7	0.3	9.0
	Low traffic vol	Low traffic volume of heavy vehicle with				
Load	axie load less than 7 ton	than 7 ton	1		0.3	
Capacity	High traffic vo	High traffic volume of heavy vehicle with				
1	axle load greater than 7 ton	ter than 7 ton	3	°	0.3	0.0
		Constructed after 1977				
	Construction	Construction (use less than 19 years)	1		1.0	0.1
	record	Constructed before 1977				
Function		(use more than 19 years)	3		0.1	
		Sufficient width for				,
	Effective wide	Effective widt traffic capacity	1		0.1	0.1
	of bridge	Insufficient width for				
		traffic capacity	3		0.1	
Overall eva	Overall evaluation for brid A: Sound .	A: Sound .	1.5~2.5		Min.point 1.5	
(range of point)	of point)	B: Fairly sound	2.5~3.5	γ		B(3.1)
		C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5			
		D: Danger	4.5~5.5		Max.point 5.5	125

List of Overall Evaluation for Bridge No. 28

Point	(R.F)*(W/F)		1.4		0.3	•			0.9		0.1						0.3		B(3.0)		
Br. Weight factor	(W/F)		0.7		0.3		0.3		0.3		0.1		0.1		0.1		0.1	Min.point 1.5			Max.point 5.5
គ	E.	_	2		-				3		I						3				
ij		bad	3 4	paq	3 4						-										
Rating point	(R/P)		2		2 3		-		m		_		3		1		3	2	2	5	٠,
R		poog	-	pood	1													1.5-2.5	2.5-3.5	3.5	4.5-5.5
Evaluation Item			Durability Degree of superstructure damage and defe		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	than 7 ton	High traffic volume of heavy vehicle with	axle load greater than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective wide traffic capacity	Insufficient width for	traffic capacity	A: Sound	B: Fairly sound	C: Unsound/ Lack of safety 3.5-4.5	D: Danger
Evaluat	!		Degree of sup		Degree of sub.	Low traffic ve	axle load less than 7 ton	High traffic ve	axle load grea		Construction	record			Effective wide	of bridge		Overall evaluation for brid A: Sound	(point)		
			Durability				Load	Capacity			-		Function					Overall eval	(range of point)		- :

List of Overall Evaluation for Bridge No. 29

							•														-
	Foint (R/F)*(W/F)		1.4		0.3				0.9		0.1			,		٠	0,3		B(3.0)		
	Br. Weight factor	1	0.7		0.3		0.3		0.3		0.1		0.1		0.1		0.1	Min.point 1.5			Max.point 5.5
	Br.	-	2	q	. 1				3		1						3				
,	Rating point	good bad	1 2 3 4	good bad	1 2 3 4		1		3		1		3		1		3	1.5-2.5	2.5~3.5	3.5-4.5	4.5~5.5
	Evaluation Item		Durability Degree of superstructure damage and defe 1		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	han 7 ton	High traffic volume of heavy vehicle with	er than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective wide traffic capacity	Insufficient width for	traffic capacity	A: Sound	B: Fairly sound	C. Unsound/ Lack of safety 3.5-4.5	D: Danger
-	Evaluat		Degree of sup		Degree of subs	Low traffic vo	axle load less than 7 ton	High traffic vo	axie load greater than 7 ton		Construction	record			Effective wide	of bridge		Overall evaluation for brid A: Sound	point)		
			Durability				Program	Capacity []	•				Function			:		Overall evalu	(range of point)		

List of Overall Evaluation for Bridge No. 32

	Evalua	Evaluation Item	Rating poir	t Br.	Rating point Br Weight factor	Point
			(RVP)	(R/P)	(W/F)	(RUF)*(W/F)
			good	paq		
Durability	Degree of sup	Durability Degree of superstructure damage and defe 1 2	1 2 3 4	1	0.7	7.0
•				paq		
	Degree of sub	Degree of substructure damage and defect	1 2 3	4	0.3	0.3
	Low traffic vo	Low traffic volume of heavy vehicle with	·			
Load	axle load less than 7 ton	than 7 ton	м	-	0.3	0.3
Capacity	High traffic w	High traffic volume of heavy vehicle with				
	axle load grea	axle load greater than 7 ton	т	•	0.3	
		Constructed after 1977				
	Construction	Construction (use less than 19 years)			0.1	0.1
	record	Constructed before 1977				
 Function		(use more than 19 years)	3		0.1	
		Sufficient width for				
	Effective widt	Effective wide traffic capacity	r-d	1	0.1	0.1
	of bridge	Insufficient width for				
		traffic capacity	٣	_	0.1	
Overall eva	Overall evaluation for brid A: Sound	A: Sound	1.5-2.5	_	Min.point 1.5	A(1.5)
(range of point)	f point)	puno	2.5-3.5			
		C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5			
:		D: Danger	4.5~5.5		Max.point 5.5	, .

	Evaluat	Evaluation Item	Rating point	Ä	Rating point Br. Weight factor	Point
•			(RVP)	(RVP)	(W/E)	(RVF)*(W/F)
			q poas	paq		
Durabi	lity Degree of sup	Durability Degree of superstructure damage and defe 1 2	3	4 2	0.7	1.4
				paq		
١	Degree of sub-	Degree of substructure damage and defect	1 2 3	·-	0.3	0.3
	Low traffic vo	Low traffic volume of heavy vehicle with				
Load	axie load less than 7 ton	than 7 ton	1	-	0.3	0.3
Capacity		High traffic volume of heavy vehicle with				
,		axle load greater than 7 ton	m		0.3	
		Constructed after 1977				
	Construction	Construction (use less than 19 years)		1	0.1	0.1
	procer	Constructed before 1977				
Function	100	(use more than 19 years)	٣		0.1	
		Sufficient width for				
	Effective wid	Effective wide traffic capacity		1	0.1	0.1
	of bridge	Insufficient width for		_		
		traffic capacity	m		0.1	
Overall	Overall evaluation for brid A: Sound	A: Sound	1.5~2.5		Min.point 1.5	A (2.2)
. (ran	(range of point)	B: Fairly sound	2.5~3.5			
		C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5			
	-	D. Danger	4.5~5.5		Max.point 5.5	

List of Overall Evaluation for Bridge No. 35

			:																			_
Point		(K/F)*(W/F)	,	1.4		0.3	•			6.0			. (6.0	,	0.1			_	B(3.0)		D
D. Waisht factor	אכולייו שרים	(W/E)		0.7		0.3		0.3		0.3	,	0.1		0.0		0.1		0.1	Min.point 1.5			Max point 5.5
Ġ	ă	2	_	7	-					~				~		_				_,		_
	Kating point	(RVP)	peq poor	1 2 3 4	good bad	1 2 3 4		7		3		1		3		1		3	1.5~2.5	2.5-3.5	3.5-4.5	4.5-5.5
	Evaluation Item			Districture damage and defe 1		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	than 7 ton	High traffic volume of heavy vehicle with	ter than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widt traffic capacity	Insufficient width for	traffic capacity	A. Sound	B. Fairly sound	C. Unsound/ Lack of safety 3.5-4.5	D: Danger
	Evaluati			Degree of Supe		Degree of subs	Low traffic vo	axle load less than 7 ton	High traffic vo	axle load greater than 7 ton		Construction	record			Effective widt	of bridge)	Overall evaluation for brid A. Sound	f point)		
					-			peo	Capacity				:	Function				1	Overall eva	(range of noint)		

List of Overall Evaluation for Bridge No. 36

								·						_		r		-т	<u>-</u> -	· T	1	- <u>-</u> 1
		(N/F)*(W/F)		1.4		0,3				6.9		0.1				0.1				B(2.8)		8
	≱	(W/F)		0.7	-	0.3		0.3		0.3		0.1		0.1		0.1	,	0.1	Min.point 1.5			Max.point 5.5
	Ä	2		2		1				3		~										
)	H	(RAP)	paq pood	1 2 3 4	paq pad	1 2 3 4		-		3		Ţ		3		1		3	1.5~2.5	2.5~3.5	3.5~4.5	4.5~5.5
	on Item			Descriptive Degree of superstructure damage and defe 1		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	han 7 ton	High traffic volume of heavy vehicle with	ler than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widetraffic capacity	Insufficient width for	traffic capacity	A; Sound	B: Fairly sound	C: Unsound/ Lack of safety 3.5-4.5	D. Danger
10 10 10 10 10 10 10 10 10 10 10 10 10 1	Evaluation Item			Degree of Sinc	3.00	Degree of subs	Low traffic vol	axie load less than 7 ton	High traffic vo	axle load greater than 7 ton		Construction	record			Effective wide	of bridge	,	Overall evaluation for brid A; Sound	f noint)	ì	
				Damphility	Carrow Carrow			Load	Ć.	•				Function					Overall eva	(range of noint)	-0	

					6	11. at 6. des	Doing	
•		Emphrati	Evoluation Item	Rating point BT. Weight Lactor	ŭ	weign tacou		
		Ly and a	TOTAL TIONS	(RAP)	(R/P)	(W/F)	(R/F)*(W/F)	
				good bad				
	Percebility	Degree of supe	Describing Degree of superstoucture damage and defe	1 2 3 4	1	0.7	0.7	
	Company of the Compan	3		paq pad	1			
		Degree of subs	Degree of substructure damage and defect	1 2 3 4	Э	0.3	6.0	
		Low traffic vo	low traffic volume of heavy vehicle with	•				
	Load	exterload less than 7 ton	than 7 ton			0.3		
	Canacity	High traffic vo	High traffic volume of heavy vehicle with					~-
	}	axle load greater than 7 ton	ter than 7 ton	3	~	0.3	6.0	
			Constructed after 1977					
		Construction	Construction (use less than 19 years)	1		0.1		-
		record	Constructed before 1977					
	Function		(use more than 19 years)	3	٣	0.1	0.3	
			Sufficient width for			,		
		Effective widt	Effective widt traffic capacity	1		0.1	Y -5	_
		of bridge	Insufficient width for			,		
			traffic capacity	3	_	0.1		т
	Sept 1	Owen !! Ampliation for hijd A: Sound	A: Sound	1.5-2.5		Min.point 1.5		_
	(Tange of noint)	froint	B: Fairly sound	2.5-3.5			B(2.9)	
			C. Unsound/ Lack of safety 3.5-4.5	3.5-4.5				_
			D. Danger	14.55.5		Max.point 5.5	200	
	_		J. J. L. J. J. L. J. J. L. J. J. L. J. L. J. J. L. J. J. L. J. J. J. L. J. J. J. L. J.					

List of Overall Evaluation for Bridge No. 39

					Winds Company	Doint
	Feeligh	Evaluation Item	Rating point Br. Weight Lactors	ä	WCEPH LAGOR	
			(RVP)	(RVP)	(W/F)	(RVE)*(W/E)
			peq poor	P		
Dwahility	Degree of supe	Degree of superstructure damage and defe	1 2 3 4	2	0.7	*-
			good bad	ŋ.		
	Degree of sub	Degree of substructure damage and defect	1 2 3 4	2	0.3	90
	Low traffic vo	Low traffic volume of heavy vehicle with				,
Load	axle load less than 7 ton	than 7 ton	1		0.3	0.3
Capacity	High traffic vo	High traffic volume of heavy vehicle with				
,	axie load grea	axie load greater than 7 ton	3		0.3	
		Constructed after 1977				
_	Construction	Construction (use less than 19 years)	1		0.1	0.1
	record	Constructed before 1977				
Function		(use more than 19 years)	Э		0.1	
		Sufficient width for				
	Effective widt	Effective widetraffic capacity	1	_	0.1	0.1
	of bridge	Insufficient width for				
		traffic capacity	3		0.1	
Overall ex	Overall evaluation for brid A: Sound	A: Sound	1.5~2.5		Min.point 1.5	-1
(range)	(range of point)	B. Fairly sound	2.5-3.5			B(2.5)
9	ì	C: Unsound/ Lack of safety 3.5-4.5	3.5-4.5			
		D. Danger	4.5~5.5		Max point 5.5	5

List of Overall Evaluation for Bridge No. 40

(RAF)*(W/F)

Rating point Br. Weight factor (R/P) (R/P) (W/F)

List of Overall Evaluation for Bridge No. 48

Evaluation Item

6.0

0.7

tood bad

Durability Degree of superstructure damage and defe

Degree of substructure damage and defect

Low traffic volume of heavy vehicle with axic load less than 7 ton. High traffic volume of heavy vehicle with

Load

axle load greater than 7 ton

Construction

record

Function

6.0

0.3

0.3

0.7

0.1

0.1

0.1

Constructed after 1977 (use less than 19 years) Constructed before 1977 (use more than 19 years)

Sufficient width for traffic capacity Insufficient width for

> Effective widt of bridge

raffic capacity

Overall evaluation for brid A: Sound

(range of point)

Min.point 1.5

											,										
Point	(R/F)*(W/F)		1.4	•	6.0		0.3				0.1				0.1				B(2.8)		
Br. Weight factor	(W/E)		0.7		0.3	•	0.3		0.3		0.1		0.1		0.1		0.1	Min.point 1.5			Max point 5.5
Br.	(R/P)		2				-				-				-						
Rating point	(R/P)	peq pood	1 2 3 4	peq pood	1 2 3 4		1		. 3		1						3	1,5-2.5	2.5-3.5	3.5-4.5	4.5-5.5
Evaluation Item			Durability Degree of superstructure damage and defe 1		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	han 7 ton	High traffic volume of heavy vehicle with	er than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective widthraffic capacity	Insufficient width for	traffic capacity	A: Sound	puno	C: Unsound/ Lack of safety 3.5-4.5	D: Danger
Evaluat			Degree of supe		Degree of subs	Low traffic vo	axle load less than 7 ton	High traffic vo	axle load greater than 7 ton		Construction	record			Effective widt	of bridge		Overall evaluation for boid A: Sound	Doint)		
			Durability				8	5-					Function					Overall eval	(range of point)	3	

List of Overall Evaluation for Bridge No. 45

•											-										
Point	(RVF)*(W/F)		1.4	•	0.3		0.3						0.3		0.1			A (2.4)			
Š	(W/E)		0.7		0.3		0.3		0.3		0.1		0.1	٠	0,1		0.1	Min.point 1.5			Max.point 5.5
Br	3	70	2	P	-		-						3		I						
Rating point	(R/P)	good bad	1 2 3 4	good bad	1 2 3 4		1		3		1		3		1		3	1.5~2.5	2.5~3.5	3.5-4.5	4,5~5.5
Evaluation Item			Phirability Degree of superstructure damage and defe 1 2		Degree of substructure damage and defect	Low traffic volume of heavy vehicle with	than 7 ton	High traffic volume of heavy vehicle with	ter than 7 ton	Constructed after 1977	Construction (use less than 19 years)	Constructed before 1977	(use more than 19 years)	Sufficient width for	Effective wide traffic capacity	Insufficient width for	traffic capacity	A: Sound	B: Fairly sound	C. Unsound/ Lack of safety 3.5-4.5	D. Danger
Evaluati			Degree of supo		Degree of subs	Low traffic vo	Load axle load less than 7 ton	High traffic vo	axle load greater than 7 ton		Construction	record			Effective wide	of bridge		Overall evaluation for brid A: Sound	f point)		:
			Durabilin				Load	Capacity				. 5	Function					Overall eval	(range of point)	,	

List of Overall Evaluation for Bridge No. 50

C: Unsound/Lack of safety 3.

	Evaluati	Evaluation Item	Rating point	Br.	Ϋ́c	
			(RVP)	(RAP)	(W/F)	(RAF)*(WAF)
			peq poof	Ġ.		
Durability	Degree of supe	Durability Degree of superstructure damage and defe 1 2	1 2 3 4	4	0.7	2.8
•			good bad	Į.		
	Degree of subs	Degree of substructure damage and defect	1 2 3 4	*	0.3	1.2
	Low traffic vol	Low traffic volume of heavy vehicle with				
Load	axle load less than 7 ton	han 7 ton	1		0.3	
Capacity	High traffic vo	High traffic volume of heavy vehicle with				
	axle load greater than 7 ton	er than 7 top	3	3	0.3	6.0
		Constructed after 1977				
	Construction	Construction (use less than 19 years)			0.1	0.1
	record	Constructed before 1977				
Function		(use more than 19 years)	3		0.1	
		Sufficient width for				
	Effective widt	Effective widt traffic capacity	1		0.1	
	of bridge	Insufficient width for				
		traffic capacity	£	3	0.1	0.3
Overall eva	Overall evaluation for brid A: Sound	A: Sound	1.5-2.5		Min.point 1.5	
(range of point)	of point)	B: Fairly sound	2.5~3.5			
		C: Unsound/ Lack of safery 3.5-4.5	3.5~4.5			
		D: Danger	4.5~5.5		Max.point 5.5	D(5.3)