

Public Enterprise Makedonijapat
The Former Yougoslav
Republic of Macedonia

FOLLOW-UP COOPERATION STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT OF ROAD
MAINTENANCE EQUIPMENT
IN
THE FORMER YUGOSLAV REPUBLIC OF
MACEDONIA

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EQUIPMENT
IN
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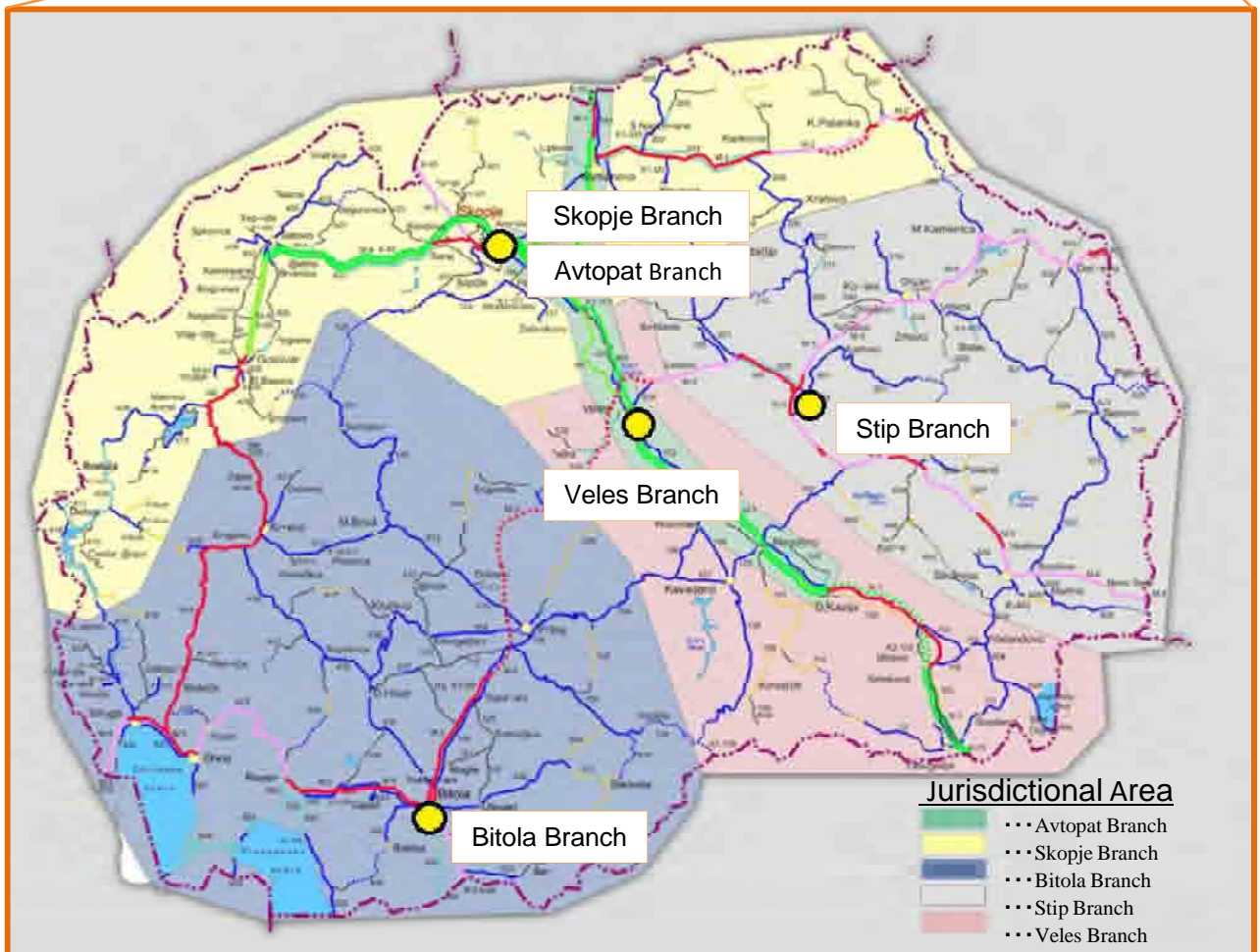
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Location Map

The Former Yugoslav Republic of Macedonia

Capital : Skopje
Population : 2.11 million (2013)
Language : Macedonian
Religion : Christianity, Islam
Area : 25,713km²
GNI per capital : 4,870 USD (2013)

Source : World Bank



Photos (1/4)



Meeting with MTC, Makedonijapat



Paving work by procured equipment



Dump truck working at site



10ton Vibration roller at site



Wheel loader at site



Motor grader at site



Inspection at Veles branch



Inspection of a dump truck

Photos (2/4)



Locally purchased alternator
(Bulldozer)



Vibration absorbing rubber of
10ton vibration roller



Wear condition of undercarriage
(Bulldozer)



Wear condition of front tire
(Asphalt finisher)



Workshop of Veles branch



Workshop of Bitola branch



Part stock at Bitola branch



Engine repair shop at Skopje city

Photos (3/4)

Asphalt plant



General view



Asphalt plant and control room



Loading onto a dump truck
under the surge bin



Cold bin



Bending spot of belt conveyor



Dryer and dryer burner



Good conditioned turbines of dryer burner



Pressure gauge at the dryer burner

Photos (4/4)



Quite few wear at the chains of hot elevator



Almost no wear in the mixer chip



Dust from the chimney due to damaged cloths of bag filter



Locally installed sounding leveler at filler silo



Inside the control room



Damaged control panel board by lightning



Messy part warehouse



Asphalt mixture test room with old apparatus

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Abbreviations

EU	European Union
EBRD	European Bank for Reconstruction and Development
GDP	Gross Domestic Product
GNI	Gross National Income
IBRD	International Bank for Reconstruction and Development
JICA	Japan International Cooperation Agency
MTC	Ministry of Transport and Communications
S/W	Scope of Work

Chapter 1 Outline of Follow-up Cooperation Study

Chapter 1 Outline of Follow-up Cooperation Study

1-1 Background and purpose of the Study

Since independence from the former Yugoslavia in 1991, the Former Yugoslav Republic of Macedonia (hereinafter referred to as "Macedonia") has advanced exchange and cooperation with EU nations in an effort to establish a market economy. Being a landlocked nation, it is important for Macedonia to secure access roads to sea ports and to construct and maintain roads for domestic and international physical distribution. Macedonia's road network, which covers a total length of 14,159 km, accounts for 93% of domestic transportation, and it is important infrastructure for facilitating international transportation in the Balkans. In particular, the road network has become increasingly important in recent years due to increasing exchange with neighboring countries such as Bulgaria, Albania, Serbia, Greece and so on.

Public Enterprise Makedonijapat (hereinafter referred to as "Makedonijapat"), under the jurisdiction of the Ministry of Transport and Communications (hereinafter referred to as "MTC"), is the sole agency responsible for conducting maintenance work on 4,427 km of trunk roads (magistral roads, class-1 regional roads, class-2 regional roads) not including municipal roads, and it directly manages road maintenance and repair works via five branches throughout the country. Road maintenance equipment is essential for conducting road maintenance work, however, the equipment owned by Makedonijapat is aged and limited in terms of varieties and quantities, and this has hindered progress of road maintenance work.

In response to such a situation, the Government of Japan implemented the Grant Aid Project for Improvement of Road Maintenance Equipment in fiscal 2000, and Makedonijapat procured 12 types and 41 units of road maintenance equipment including bulldozers, motor graders, etc. (including four maintenance workshop tool sets) and one asphalt plant in 2001~2002.

In the 13 years since the said equipment was procured, it has been widely used in maintaining trunk roads all over the country and has contributed to restoring functions of the deteriorated road network, thereby boosting the country's economic development. Meanwhile, concerning the maintenance and repair of the said equipment itself, Makedonijapat has independently procured or manufactured spare parts, however, it is unable to maintain some items of equipment because the necessary parts cannot be procured in Macedonia or Europe and Makedonijapat does not have the technical capacity to conduct the necessary work.

Under these conditions, Makedonijapat requested JICA to conduct grant aid follow-up (hereinafter referred to as "F/U") cooperation geared to procuring the parts necessary for repair of the equipment. On receiving the request, JICA decided to implement the F/U cooperation (Study) and dispatched the Study Team from October 5 to October 23, 2014 in order to survey and confirm the equipment situation, causes of trouble, the maintenance system, parts procurement situation, etc. and confirm the validity of the F/U cooperation.

1-2 Target Equipment

The road maintenance equipment procured in the Grant Aid Project for Improvement of Road Maintenance Equipment of 2000 comprised 12 types and 41 items of equipment consisting of bulldozers, motor graders, wheel loaders, crawler type hydraulic excavator, wheel type hydraulic excavator, vibration rollers (10 ton), vibration rollers (4 ton), tire rollers, asphalt finishers, asphalt distributor, dump trucks, and workshop tools, as well as one asphalt plant.

In the request for F/U cooperation, parts are requested for the asphalt plant, dump trucks, vibration rollers, tire rollers, and asphalt finishers, however, the Study here targets all the road maintenance equipment that was procured in the said Grant aid project.

Table 1-1 shows the procured equipment in the Grant Aid Project, and the branches where it has been allocated. Also, at Avtopat Branch, the Study targets parts that were procured at the same time as the equipment.

Table1-1 Location of procured road maintenance equipment

Equipment	Manufacturer	Model	Branch				Total
			Skopje	Bitola	Veles	Stip	
Bulldozer	Komatsu	D65E-12		1	1		2
Motor grader	Komatsu	GD511A-1	1	1	1	1	4
Wheel loader	Komatsu	WA320-3	1	1	1	1	4
Hydraulic excavator (Crawler)	Komatsu	PC200-6				1	1
Hydraulic excavator (Wheel)	Komatsu	PW100-3		1			1
Vibration roller (10ton)	Sakai	SW750H	1	1	1	1	4
Vibration roller (4ton)	Sakai	SW500-1E	1	1	1	1	4
Tire roller	Sakai	TS200	1	1	1	1	4
Asphalt finisher	Niigata	NFB60W-V	1	1	1	1	4
Asphalt distributor	Nissan diesel	LKC210DHHC	1				1
Dump truck	Nissan diesel	PKC212EHLB	2	2	2	2	8
Workshop tool	Maruma technica	1 Set	1	1	1	1	4
Asphalt plant	Tanaka	TAP-800LB SB-60	1				1

Chapter 2 Current Conditions of the Sector

Chapter 2 Current Conditions of the Sector

2-1 Social and Economic Conditions

Situated in the south of the Balkan Peninsula, Macedonia is a landlocked nation bordered by Bulgaria to the east, Greece to the south, Albania to the west, and Serbia to the north. It has a population of 2,100,000 (World Bank, 2012) and national land area of 25,700 square km, mostly comprising hilly and mountainous land.

Macedonia makes it a basic national policy to join the EU, and it became a candidate for EU membership in 2005. In terms of economy, it is striving to vitalize domestic industry and attract overseas investment through implementing preferential tax measures, privatization and so on.

The main industries are food processing, textile products, and chemical products. Per capita GNI is US\$4,870 and the GDP is US\$10.20 billion in 2013 (World Bank), of which primary industry accounts for 10.2%, secondary industry for 27.5%, and tertiary industry for 62.3% (CIA World Fact Book, 2013 est.). The economic growth rate was slightly negative (-0.5%) in 2012 following a decline in exports in the wake of the European debt crisis, however, it recovered to plus 2.7% in 2013 thanks to sound growth of agricultural production and exports of farm products, etc. (World Bank).

The unemployment rate is 28.6% (2013 est.) overall and 53.9% (2012) among young people (15~24 years), so job creation is a major challenge facing the country (CIA World Fact Book)

2-2 Development Plans

Government Program 2011-2015 is the main development plan in Macedonia. Within this, infrastructure development is regarded as key to economic development, economic competitiveness, and improvement of freight and passenger transportation, and infrastructure projects are proposed as a means of reducing differentials with EU standards and achieving integration.

In response to the government program, the MTC has compiled National Transport Strategy 2007-2017.

Within this, as the strategy for promoting economic development, the following are raised as priority items:

- (1) Completion of expressway corridors that will contribute to promoting international exchanges with the EU and neighboring countries

Pan-European Corridor 8 : East-west corridor running from the border with Bulgaria to the border with Albania

Pan-European Corridor 10 : North-south corridor running from the border with Serbia to the border with Greece

- (2) Development of an efficient national highway network to link with the corridors
- (3) Strengthening maintenance of prioritized magistral roads and regional roads

2-3 Road Conditions

The trunk road network of Macedonia covers a total length of approximately 4,427 km and comprises magistral roads, which connect neighboring countries and major domestic cities, and regional roads, which connect two or more regional cities. Out of approximately 1,579 km of magistral roads, highways account for approximately 294 km.

Table 2-1 shows categories of the trunk road network in Macedonia, the paving situation, and road conditions. Road conditions have mainly been adjudicated based on visual inspection of cracking, rutting and so on.

Table2-1 Trunk road network, the paved situation, and road conditions

	Length (km)	Ratio of paved roads (%)	Road condition (%) (Ratio of good and normal)
Magistral roads (include highways)	1,578.9	85	91
Regional roads 1	1,654.9	93	82
Regional roads 2	1,193.0	67	68
Total	4,426.8	82	79

Source: Makedonijapat

2-4 Assistance by Other Donors

The main donors for the road sector in Macedonia are the European Bank for Reconstruction and Development (hereinafter referred to as "EBRD") and the World Bank for Reconstruction and Development (hereinafter referred to as "IBRD"). These agencies loan funds for road construction and rehabilitation to the Public Enterprise for State Roads. Makedonijapat does not receive any loans or equipment supply, etc.

Table 2-2 shows recent assistance projects.

Table2-2 Recent assistance projects by other donors

	Donor	Project	Road Section	Period	Project cost (Mil. Euro)
Loan	European Bank for Reconstruction and Development (EBRD)	National Road program	Stip-Kochani (27km) Widening,Rehabilitation	2014~	165
			Raec-Drenovo (10km) Construction		
			Trebenista-Struga (8kn) Construction		
			Ohrid-Pestani (12km) Construction		
	World Bank for Reconstruction and Development (IBRD)	National and Regional Roads Rehabilitation Project	Bitola-Makazi (18km) Rehabilitation	2014~2019	52
			Resen-Bukovo (11km) Rehabilitation		
			Boskov bridge-Debal (8km) Rehabilitation		

Source: EBRD, IBRD

Chapter 3 Field Survey Results

Chapter 3 Field Survey Results

3-1 Outline and Activities of the Implementing Agency

3-1-1 Organization

Road administration in Macedonia is under the jurisdiction of the MTC, which oversees the Public Enterprise for State Roads and Makedonijapat. The Public Enterprise for State Roads conducts planning, fundraising, and project implementation for magistral roads and regional roads. It contracts road construction and improvement works out to private construction companies, but it consigns maintenance work to Makedonijapat. Meanwhile, local authorities are in charge of maintenance on municipal roads. Figure 3-1 shows the organization chart of the MTC.

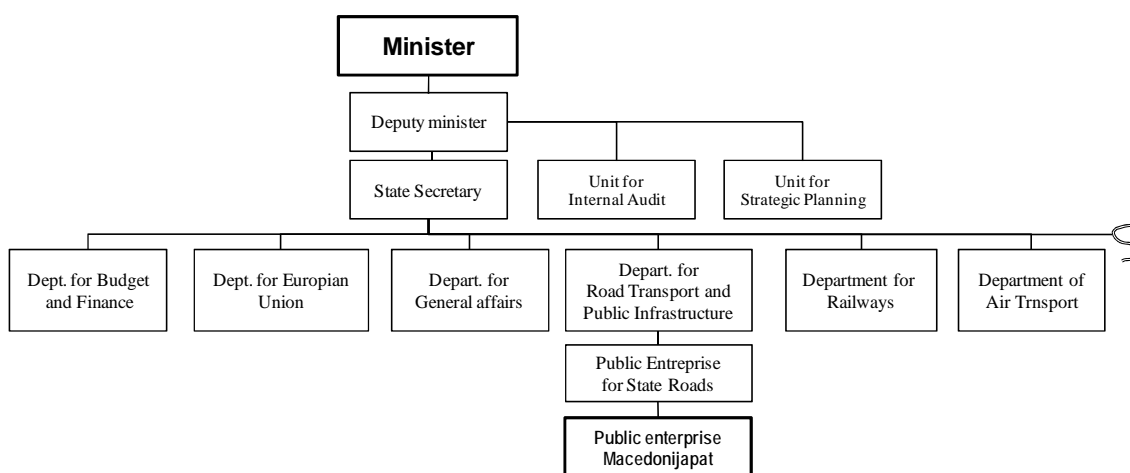


Figure3-1 Organization chart of the MTC

The implementing agency for this F/U cooperation is Makedonijapat. It has a total of 873 staffs, comprising 49 working in headquarters and 824 working on road maintenance through five branches throughout the country (Skopje, Bitola, Stip, Veles, Avtopat). Each branch conducts maintenance via a network of local offices. The numbers of local offices under each branch are 9 in Skopje, 12 in Bitola, 5 in Stip, 4 in Veles, and 1 in Avtopat. Figure 3-2 shows the organization chart of Makedonijapat.

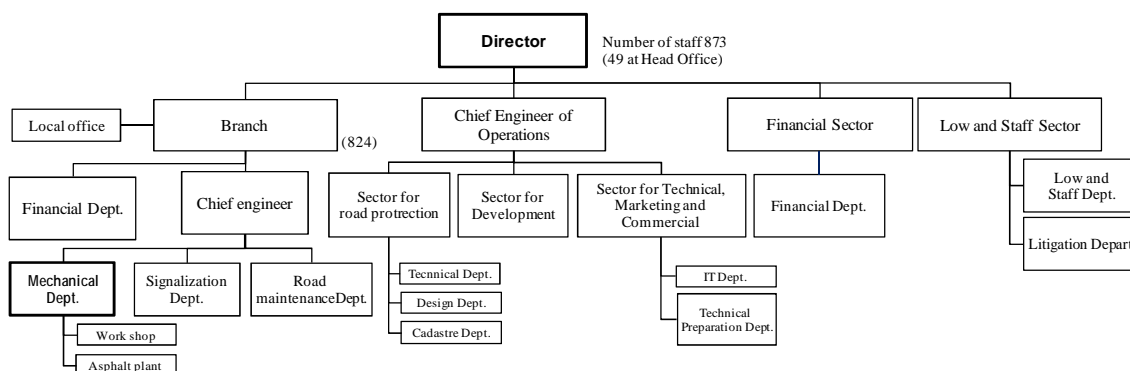


Figure3-2 Organization chart of Makedonijapat

3-1-2 Road Network

Table 3-1 shows the length of roads managed by each branch.

Table3-1 Managed road length by branch of Makedonijapat

unit : km

Road classification	Skopje	Bitola	Stip	Veles	Avtopat	Total
Magistral roads	254.8	672.0	236.4	121.8	293.9	1578.9
Class-1 Regional roads	388.0	489.0	416.2	361.7		1654.9
Class-2 Regional roads	505.9	207.5	354.6	125.0		1193.0
Total	1148.7	1368.5	1007.2	608.5	293.9	4426.8

Source: Makedonijapat

The branches of Skopje, Bitola, Stip, and Veles conduct maintenance of magistral roads and regional roads in their respective areas of jurisdiction, while the Avtopat branch is responsible for maintenance of highways all over the country. Because the highways are located within the areas of jurisdiction of the Skopje and Veles branches, the length of magistral roads managed by these two branches is relatively short. Because the area managed by the Bitola branch is large and contains a relatively large proportion of flat land, the length of magistral roads and regional roads is long. Veles branch has jurisdiction over a small area and mountainous land, so it has the shortest length of roads under its jurisdiction.

3-1-3 Budget

The budget and project plans of Makedonijapat are compiled based on the annual contracts for road maintenance that are concluded with the Public Enterprise for State Roads. Table 3-2 shows the revenues and expenditures balance for the past five years.

Table 3-2 Summary of financial status of Makedonijapat for the past 5 years

unit: Million denars

	2010	2011	2012	2013	2014 (half year)
Revenues total	947.5	801.1	881.1	828.3	394.3
Expenditures total	1,115.7	1,048.3	938.7	850.4	396.3
Personnel	521.2	523.4	435.2	310.4	153.2
Office	3.9	3.9	2.4	2.4	0.4
Material	202.4	151.8	185.6	216.8	100.6
Fuel and oil	87.9	86.4	99.4	101.6	38.7
Spare parts	21.1	20.5	17.0	16.5	6.5
Repair (outsorce)	18.8	20.8	10.9	17.8	8.7

Source: Makedonijapat

Income over the past four years (2010-2013) has been relatively stable at 864.5 million denars on average. On the other hand, expenditure was approximately 1,115 million denars, creating a deficit of almost 2 million denars, however, efforts have since been made to improve the balance each years through cutting personnel expenses, etc.

The workforce has been cut from 1,500 in 2011 to 873 at present mainly through reducing staff at headquarters and indirect departments, and personnel expenses have been reduced by approximately 40%.

Meanwhile, costs of works materials and fuel and oil, etc. necessary for operating equipment are increasing, indicating that road maintenance work is steadily being implemented.

The cost of purchasing periodic replacement parts and repair parts for equipment is approximately 18.8 million denars per year on average. Meanwhile, components for engines and hydraulic instruments, etc. that cannot be repaired inside Makedonijapat are outsourced to private repair shops, and the cost of such outsourced repairs is 17.1 million denars on average. These figures indicate that equipment maintenance work is also being implemented on a steady basis.

Before equipment was supplied under the Grant Aid Project, Makedonijapat rented equipment to make up for its shortfall, however, it currently pays no rental fees.

3-1-4 Road Maintenance Works by Makedonijapat

Road maintenance works by Makedonijapat are categorized and allocated budget in the manner shown in Table 3-3. The amount allocated has remained almost the same every year since 2010.

Table3-3 Job contents of Makedonijapat

unit : Million denars

	Contents	Budget
Periodical Maintenance	Rehabilitation of road surface (Asphalt cutting, Overlay) Measures of Landslide	170
Winter Maintenance	Clearing snow, Procurement snow melting materials(calcium chloride, sand etc.)	405
Regular Maintenance	Pothole patching, Grass cutting, Maintenance of road fence, nets and signalizations etc.	212

Source: Makedonijapat

Construction equipment and asphalt plants are mainly used in road repair works under the category of periodic maintenance. Dump trucks are used for transporting asphalt mixture, etc., and they are also used for spreading calcium chloride, sand and other snow melting agents and clearing snow with plough attachments during the winter.

On magistral roads, deterioration is progressing, however, overlay and patching, etc. are appropriately implemented to repair cracking, rutting, potholes, etc. and conditions are generally good. Moreover, during the field survey, the Study Team visited the site of repairs (asphalt cutting and overlay work by asphalt finisher, etc.) being implemented by Makedonijapat and confirmed that the work is being conducted smoothly and appropriately.

Meanwhile, the situation regarding regional roads, especially class-2 regional roads, is as shown in Table 2-1. Sections with poor surface conditions account for roughly one third of all roads and although there is urgent need to conduct maintenance and repairs, these cannot be adequately performed because priority is given to the magistral roads and class-1 regional roads.

Tables 3-4 through 3-7 show the road maintenance works record of each branch. On comparing the works record (cost base) of each branch, it was found that approximately 47% of the total cost is incurred at the Skopje branch, which manages a lot of road sections that are subject to heavy traffic load and rapidly advancing wear.



Photo3-1 Maintenance work of a magistral road (Bitola)



Photo3-2 Maintenance work of a regional road (Debar)

Table 3-4 Work record of Skopje branch (in 2013)

Section	Period	Kind of work	Work volume	Cost (MKD)
Tetovo-Gostivar	Apr-May	Asphalt cutting and laying	95,650 m ² 8.4 km	19,949,000
Mavrovi Anovi-Debar	Jun	Asphalt cutting and laying	5,876 m ² 3.80 km	8,488,000
Melnicki Most-Debar			12,532 m ² 385.00 km	
Melnicki Most- Selce			6,022 m ² 3.650 km	
Sekulica-Sopsko	Jun	Excavation and transportation	3,000 m ² 2.00 km	789,000
Rudare-Konjuh-Beljakovci-Klechovce				
Sekulica- Sopsko	July	Asphalt laying	6,760 m ² 1.69 km	11,979,000
Rudare-Konjuh-Beljakovce-Klechovce				
Kondovo-Radusha-Rasche	Aug	Asphalt laying	5,250 m ² 12.0 km	3,693,000
Rankovci- Kriva	Aug	Asphalt cutting and laying	18,804 m ² 1.50 km	8,181,000
Palanka-Deve Bair				
Straza-Kolari	Sep	Asphalt cutting and laying	13,756 m ² 5.01 km	6,169,000
Skopje-Katlanovo	Sep	Asphalt laying	4,150 m ² 0.60 km	2,994,000
Sekulica-Shopsko	Sep	Pothole patching	6,450 m ²	1,424,000
Rudare-Konjuh-Beljakovci-Klechovce				
Beljakovci-Konjuh				
Kondovo-Radusha-Rasche	Sep	Asphalt laying	2.00 km	81,228
Skopje-Katlanovo	Sep	Excavation, Asphalt laying	610 m ² 199.00 m ³	933,000
Rankovci-Kriva Palanka-Deve Bair	Oct	Asphalt cutting and laying	18,805 m ² 1.5 km	642,000
Sekulica-Shopsko Rudare-Konjuh-Beljakovci-Klechovce	Oct	Excavation, Sand spreading	6,050 m ³ 6,100 m ² 40 h 150.00 m ³	5,803,000
Kondovo-Radusha-Rasche	Oct	Asphalt laying	5,370 m ² 12.00 km	222,000
Rankovci-Kriva Palanka-Deve Bair	Nov	Asphalt cutting and laying	18,804 m ² 1.50 km	1,020,000
Mavrovi Anovi-Debar	Nov	Asphalt cutting and laying	5,876 m ²	572,000
Melnicki Most -Selce			12,532 m ²	
Total				72,940,000

Source: Makedonijapat

Table 3-5 Work record of Stip branch (in 2013)

Section	Period	Kind of work	Work volume	Cost (MKD)
Karaorman-Karbinci-Kozjak	Apr	Asphalt laying	6,024 m ² 1.6 km	5,000,000
Raborci village-Popchevo village	Apr	Asphalt laying, Installation of guard rail	14,210 m ²	10,000,000
Raborci village-Popchevo village	Oct	Asphalt laying, Installation of guard rail	7,476 m ² 0.8 km	4,000,000
A-4 Intersection (Susica village)	Oct	Asphalt laying, Installation of guard rail	4,272 m ² 0.5 km	2,812,000
A-4 Intersection (Susica village)	Nov	Asphalt laying, Installation of guard rail	4,272 m ² 0.5 km	187,000
Total				22,000,000

Source: Makedonijapat

Table 3-6 Work record of Veles branch (in 2013)

Section	Period	Kind of work	Work volume	Cost (MKD)
Veles-Izvor	Apr	Asphalt laying	5,200 m ² 2.4 km	5,008,000
Gevgelija-Bogdanci	Jul	Asphalt laying	3,300 m ² 0.6 km	3,999,000
Rabrovo-Kosturino	Aug	Asphalt laying	1,344 m ²	997,000
Kadfrifakovo	Aug	Asphalt laying, Transportation of gravel	22,038 m ²	7,044,000
Pletvar-Farish	Sep	Asphalt laying	748 m ²	731,000
Furka-Dojran	Sep	Asphalt laying	2,880 m ² 2.5 km	6,807,000
Kadfrifakovo	Sep	Asphalt laying, Transportation of gravel, Installation of signalization	28,062 m ²	3,956,000
Furka-Dojran	Oct	Asphalt laying, Pothole patching	11,339 m ² 2.5 km	10,173,000
Total				38,720,000

Source: Makedonijapat

Table 3-7 Work record of Bitola branch (in 2013)

Section	Period	Kind of work	Work volume	Cost (MKD)
Resen-Makazi	Apr	Asphalt cutting and laying	12,690 m ² 2.6 km	4,543,000
Oslomej-Tuin	May	Asphalt laying	1,000 m ²	622,000
Oslomej-Tuin	Jun	Asphalt laying	14,296 m ²	8,439,000
Pletvar-Belovodica	Sep	Asphalt laying	8,149 m ²	3,470,000
Pesochani village	Sep	Asphalt laying, Pothole patching	95 m ²	645,000
Pletvar-Belovodica	Oct	Asphalt laying	1,975 m ²	1,712,000
Resen-Makazi	Nov	Asphalt cutting and laying	1,993 m ²	1,216,000
Total				20,650,000

Source: Makedonijapat

Table 3-8 shows the production record of asphalt mixture by the asphalt plant used at Skopje branch that was procured in the Grant Aid Project. Production levels dropped in 2008 and 2009 due to the stoppage of plant operation when the control panel, etc. were damaged by lightning strike.

Table 3-8 Production record of asphalt mixture at Skopje branch

unit : Thousand ton

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Production	27.0	37.7	31.1	22.4	12.8	5.1	0.7	22.1	12.0	11.6	14.7	(15.0)	212.2

Source: Makedonijapat

For reference, Table 3-9 shows the production record in 2013 of asphalt plants at the other branches.

Table3-9 Production of asphalt mixture by the other branches (in 2013)

unit : Thousand ton

Branch	Stip	Veles	Bitola
Production	12.0	10.5	10.0

Source: Makedonijapat

3-1-5 Condition of Road Maintenance Equipment Owned by Makedonijapat

- (1) Table 3-10 shows the breakdown of road maintenance equipment owned by each branches as of October 2014. Including the equipment that was procured under the Grant Aid Project, the total number of construction equipment and dump trucks is 151 units. Since 2001, when equipment was procured under the Grant Aid Project, only six dump trucks and one backhoe loader were procured in 2005, however, much of the other equipment has been operating for 20 or 30 years and is aged.
- (2) Out of 151 units, there are 85 dump trucks (approximately 65%). These are utilized throughout the year. In winter, attachments are fitted to the trucks and they are used for clearing snow.
- (3) Out of 11 units excluding the equipment procured under the Grant Aid Project, 99 units are in operation. Inoperable equipment accounts for 10.8%, indicating that the equipment is being maintained and utilized to a certain degree.

Table3-10 Equipment list of each branch (as of Oct. 2014)

Branch	Equipment	Total	Procured by grant	Year of Procurement				Observation
				'71~'80	'81~'90	'91~'00	'01~	
Skopje	① Wheel loader	4(4)	1(1)		1	2	1	
	② Motor grader	2(2)	1(1)			1	1	
	③ Asphalt finisher	2(2)	1(1)		1		1	
	④ Roller	4(4)	3(3)			1	3	
	⑤ Dump track	29(28)	2(2)		6	18	5	Procure 3 units (2005)
	⑥ Asphalt distributor	1(1)	1(1)				1	
	⑦ Backhoe loader	1(1)	0				1	Procure 1 unit (2005)
	Total	43(42)	9(9)		8	22	13	
Veles	① Bulldozer	2(2)	1(1)	1			1	
	② Wheel loader	4(4)	1(1)	2		1	1	
	③ Motor grader	2(2)	1(1)	1			1	
	④ Asphalt finisher	2(1)	1(1)		1		1	
	⑤ Roller	6(6)	3(3)	1	2		3	
	⑥ Dump track	17(16)	2(2)	2	6	6	3	Procure 1 unit (2005)
	Total	34(31)	9(9)	7	9	7	10	
Stip	① Bulldozer	2(2)	0	2				
	② Wheel loader	5(5)	1(1)	1	2	1	1	
	③ Motor grader	2(2)	1(1)		1		1	
	④ Asphalt finisher	3(3)	1(1)	1	1		1	
	⑤ Roller	5(3)	3(2)	1	1		3	SW500 under repair
	⑥ Dump track	12(12)	2(2)		4	5	3	Procure 1 unit (2005)
	⑦ Hydraulic excavator	1(1)	1(1)				1	
	計	30(28)	9(8)	5	9	6	10	
Bitola	① Bulldozer	2(2)	1(1)			1	1	
	② Wheel loader	5(5)	1(1)	2	1	1	1	
	③ Motor grader	2(2)	1(1)	1			1	
	④ Asphalt finisher	2(2)	1(1)		1		1	
	⑤ Roller	6(5)	3(3)	2	1		3	
	⑥ Dump track	27(20)	2(2)	2	7	15	3	Procure 1 unit (2005)
	⑦ Hydraulic excavator	1(1)	1(1)				1	
	Total	45(37)	10(10)	7	10	17	11	
Total	① Bulldozer	6(6)	2(2)	3		1	2	
	② Wheel loader	18(18)	4(4)	5	4	5	4	
	③ Motor grader	8(8)	4(4)	2	1	1	4	
	④ Asphalt finisher	9(8)	4(4)	1	4		4	
	⑤ Roller	21(18)	12(11)	4	4	1	12	
	⑥ Dump track	85(76)	12(12)	4	23	44	14	
	⑦ Hydraulic excavator	2(2)	2(2)				2	
	⑧ Others	2(2)	1(1)				2	
	Total	151(138)	37(36)	19	36	52	44	

Figures in () show the number of working units

3-2 Condition of Road Maintenance Equipment Supplied in the Grant Aid Project

Table 3-11 shows the conditions of road maintenance equipment procured under the Grant Aid Project. For detailed information on each item of equipment, see Annex 6 Result of checking (Construction equipment and trucks) and Annex 7 Result of checking (Asphalt plant).

Table 3-11 Conditions of road maintenance equipment procured under the Grant Aid Project (as of Oct.2014)

	Equipment	Model	Serial No.	Branch	Service meter/Odd Meter	Machine Condition	Contents of trouble/repair
1	Bulldozer	Komatsu D65E-12	65105	Veles	—	Good	Service meter out of order
2			65104	Bitola	1564Hr	Good	
3	Motor grader	Komatsu GD511A-1	11224	Skopje	1780Hr	Good	Service meter and engine safety relay out of order
4			11222	Veles	3789Hr	Good	Dozer edge is partially chipped
5			11223	Stip	2175Hr	Good	Service meter out of order
6			11225	Bitola	537Hr	Good	Service meter out of order, Dozer edge is chipped
7	Wheel loader	Komatsu WA320-3	54150	Skopje	5824Hr	Good	
8			54151	Veles	4401Hr	Good	Cabin front glass crack
9			54152	Stip	4278Hr	Good	
10			54149	Bitola	3680Hr	Good	Oil leakage from starting motor
11	Hydraulic excavator	Komatsu PC200-6	110551	Stip	5851Hr	Working with some problem	①Chisel point worn out ②Breaker out of order
12	Hydraulic excavator	Komatsu PW100-3	3512	Bitola	1719Hr	Good	Oil leakage from valve
13	Vibration Roller (10ton)	Sakai SW750H	20209	Skopje	2666Hr	Good	Local made vibration absorbing rubber
14			20210	Veles	2622Hr	Good	Local made roller blade
15			20208	Stip	4002Hr	Working with some problem	①Air invasion to fuel line ②Pump for water sprinkler out of order
16			20211	Bitola	2880Hr	Good	Pump for water sprinkler out of order
17	Vibration Roller (4ton)	Sakai SW500	10111	Skopje	1541Hr	Good	Pump for water sprinkler out of order
18			10110	Veles	1599Hr	Good	
19			10108	Stip	1252Hr	Cannibalization	Rear Hydraulic motor out of order
20			10109	Bitola	1657Hr	Under repair	Vibratory motor out of order
21	Tire roller	Sakai TS200	23236	Skopje	2572Hr	Good	
22			23233	Veles	11661Hr	Good	
23			23234	Stip	3126Hr	Good	
24			23235	Bitola	3683Hr	Good	Diverted water sprinkler pump from 4ton roller 10109
25	Asphalt finisher	Niigata NFB60W	20138	Skopje	3198Hr	Good	①Large oil consumption ②Front tire worn out
26			20139	Veles	3415Hr	Good	①Output interface board trouble ②Front tire worn out
27			20140	Stip	3247Hr	Good	①Output interface board trouble ②Front tire worn out
28			20137	Bitola	2535Hr	Good	①Output interface board trouble ②Front tire worn out
29	Asphalt distributor	UD trucks LKC210	107	Skopje	49602km	Good	
30	Dump truck	UD trucks PKC212	346	Skopje	404590km	Working with some problem	①Fly wheel crack ②Breakdown starting relay, motor
31			348	Skopje	792868km		ECU trouble
32			347	Veles	337117km	Good	ECU trouble
33			348	Veles	221678km	Under repair	Gear pump for dumping under repair
34			349	Stip	297758km	Good	
35			345	Stip	337117km	Good	
36			351	Bitola	246244km	Working with some problem	Oil leakage from engine oil pan
37			350	Bitola	144951km		①ECU trouble ②Air stuck when gear shifting
38	Asphalt plant	Tanaka TAP-800LB	106572	Skopje	Accumulated production 210,000ton	Working	①Electronics parts damage ②Parts(roller etc.) worn out

(1) 13 years have passed since the equipment was procured under the Grant Aid Project and it has become aged, however, out of 37 items, only one 4-ton vibration roller SW500 has become unusable (2.7%), so the equipment is in good condition.

(2) Faults can sometimes be seen in the construction equipment and trucks, however, they are repaired and kept in working order. Even so, the following undesirable conditions have been confirmed in the field survey, and improvements are needed.

1) Engine oil and engine filters need to be replaced at certain operating intervals in order to prevent engine failures, etc., however, manufacturer recommendations are not followed and engine oil is very dirty. Moreover, non-genuine filters are used, even though they are compatible sizes. Also, water separators are not drained and have become noticeably dirty.

2) Oil leaks can be seen around engines, valves, etc., but this is thought to be because packing of inappropriate dimensions and materials was used for sealing when conducting repairs. It is desirable to conduct repairs using genuine parts.

3) Tires and other consumable parts for dump trucks, etc. are procured at low prices from China, etc., however, because these quickly wear out and adversely impact traction and running performance, it is desirable to use manufacturer-designated parts.

4) When cutting edges, etc. for motor graders become worn, Makedonijapat uses parts it has made from steel, however, since these are not sharp and adversely impact excavation, it is desirable to use genuine parts.



Photo3-3 Cutting edges made by Makedonijapat

(3) The asphalt plant is maintained and used in good condition without any major problems. Since the branches have used asphalt plants for a long time, they have acquired a certain degree of technical capacity for conducting repairs and operation. The Skopje branch has conducted the following kinds of repairs and reworking geared to making the asphalt plant easier to use.

1) Makedonijapat has independently repaired damage to electrical systems caused by lightning strikes. It has replaced control panel circuit boards and weighing device load cells with spare parts supplied by Japan, and it has procured equivalent parts for parts not in stock such as load cell amplifiers (transmitters) and aggregate feeder inverters.

- 2) It has additionally fitted a sounding level gauge (made in Japan) to the filler silo, thereby improving the plant so that the exact stock of filler can be monitored from the control room.
- 3) To reduce the amount of dust gathered in the hot bin and ensure the stable quality of asphalt mixture, improvements have been made allowing dust from the primary dust collector (dry type dust collector) to be weighed and utilized as filler.

3-3 Equipment Maintenance System

3-3-1 Equipment Maintenance

Equipment maintenance is basically implemented by each branch. Operators and mechanics conduct routine inspection and maintenance. The maintenance workshops do not have satisfied tools, however, they use the gantry cranes, welders, compressors, and tools procured under the Grant Aid Project to carry out maintenance and repairs.

Table 3-12 shows the staffing arrangement of each branch workshop.

Table3-12 Staffing arrangement of each branch workshop

Branch	Engineer	Mechanic	Machinist	Electrician	Welder	Total
Skopje	1	5	11	1	2	20
Veles	1	4	11	2	2	20
Stip	0	5	5	0	3	13
Bitola	0	2	12	0	2	16



Photo 3-4 Transmission installation work (Bitola)



Photo3-5 Tool box (Bitola)

In the survey, it was confirmed that the equipment procured under the Grant Aid Project is generally being operated in good condition, except for one 4-ton vibration roller that can no longer be used. According to hearings conducted with operators and mechanics, Makedonijapat conducts repairs of electric circuits and welding structures, etc. itself, and it is deemed to possess adequate technical capacity. Meanwhile, Makedonijapat consigns repairs of engines and

hydraulic equipment, etc. to external contractors, who are also deemed to possess ample technical capability. In such cases, the branches obtain approval from headquarters and select contractors via tender.

Meanwhile, maintenance records such as operation records and repair records are not managed for each item of equipment. And considering the difficulty of procuring parts and the inadequate situation regarding parts control, the periodic oil and parts replacements recommended by manufacturers are not always conducted at appropriate times. Improvements are needed in order to prevent failures in advance and extend the service life of equipment. Some examples of parts that need to be changed periodically or when wear occurs are shown below.

- Oil that requires periodic replacement
Engines, transmissions, hydraulic devices
- Filters that require periodic replacement
Engines, engine oil, fuel, air, transmissions, hydraulic devices
- Expendable parts that need to be replaced when worn
Tires, blade edges, bucket teeth, roller blades, asphalt plant conveyor belts, rollers

3-3-2 Parts Control

The Avtopat branch centrally manages the parts that were procured together with the equipment in the Grant Aid Project. However, improvements need to be made in terms of cooperation and information sharing with other branches concerning the control and distribution of these parts. For example, missed entries were seen in the cardex used for grasping parts quantities at Avtopat branch, control of storage locations wasn't functioning, and so on. Thus, parts control is not conducted at an appropriate level. In contrast, the Skopje and Bitola branches enter exact stock quantities on cardex and perform location control also.



Photo 3-6 Part stock condition (Skopje)



Photo 3-7 Part stock condition (Bitola)

3-3-3 Equipment Parts Procurement Sources

Table 3-13 shows the agents that were set when the equipment was supplied under the Grant Aid Project.

Table3-13 Agents that were set when the equipment was supplied under the Grant Aid Project

Distributor	Manufacturer	Equipment
TEHNO MAK. Export Import	Komatsu	Bulldozer, Motor grader, Wheel loader, Hydraulic excavator
RIKOMAK	Sakai	Vibration roller, Tire roller
	Niigata	Asphalt finisher
	Nissan diesel	Dump truck, Asphalt distributor
TEKNOX Machinery D.O.O	Tanaka	Asphalt plant

Genuine parts for the Komatsu construction equipment such as bulldozers, motor graders, etc. are procured from TEHNO MAK and agents in Greece and other Balkan countries. Concerning parts supply for the vibration rollers and tire rollers made by Sakai, the asphalt finishers made by Niigata, the dump trucks made by Nissan Diesel, and the asphalt plant made by Tanaka, the warranty periods (one year following supply) and compulsory parts supply periods (seven years following supply) set for the agents were applied at the beginning, however, they are no longer functioning now that the agent contracts have expired (even though the agents still exist). Moreover, because no alternative agents exist in the Balkans or anywhere else in Europe, it is difficult to procure parts. Some third party parts are procured even with inferior quality.

3-3-4 Equipment Repair Contractors

Repairs of components for engines, transmissions, hydraulic devices, electrical components, etc. that cannot be repaired in the workshops of Makedonijapat are outsourced to respective specialized contractors. These contractors conduct major overhauls, etc. and have high technical ability.

Table 3-14 shows the repair contractors and contents of consignment.

Table3-14 Repair contractors and contents of consignment

Contractor	Contents	Characteristic
Mak-Diesel	Engine overhaul, supply genuine parts	Official Distributor of Cummins (USA) and Bosch(German). Own engine pump test stand.
JANAKI	Transmission overhaul, supply parts	Supply Filter, V-belt, Piston, fuel hose etc. Transmission work is entrusted to the KINZOL
KINZOL	Sub-contractor of JANAKI	Dealer of service meter and tachograph. Repair and Maintenance of transmission
ISKRA	Repair of electrical parts, supply parts	Head office is in Slovenia, Macedonia bases. All parts are third party one.
KOZERA	Repair of hydraulic parts	Overhauling of gear pump and cylinder
MZT OPREMA ZA MASINI	Supply cutting edge	In recent years, no delivery record. Produce tooth for agricultural machinery and leaf spring of truck mainly
MZT ALATNI MASINI	Supply rollers for asphalt plant	Casting, forging, machining for steel product. Main product is brake lining for railway

3-4 Necessity/Justification of F/U Cooperation

As noted earlier, the followings are confirmed with the results of site survey conducted in Oct., 2014.

- ① Even 13 years have passed from procurement, the targeted equipment has been put into operation positively with self-help efforts of Makedonijapat.
- ② As far as spare parts, Makedonijapat is purchasing them from the local distributors of a manufacturer. On the other hand other manufacturers' parts are unavailable in Macedonia and nearby countries because of expiration of the distributor agreements.
- ③ Makedonijapat, an organization under the jurisdiction of the MTC, continues to be in charge of the maintenance works of magistral roads, regional roads and highways. However the expenses have been exceeding the contract amounts on road maintenance works resulting in constant deficits. Even personal expenses have been restrained by structural reforms on organization and staff number, parts cost was decreased by about 22% over 4 years. Moreover reservation of equipment replacement fund is difficult, for the time being it is inevitable to use the owned equipment including the procured one by the Grant Aid Project.

Considering the results of the survey, it is difficult to improve the present situation with self-help efforts because of budgetary and technical aspects. Execution of F/U cooperation will be justified because of much effective utilization of the targeted equipment can be expected.

The contents of F/U cooperation are decided based on priorities of equipment and spare parts, as shown in the Chapter 4, "Follow-up Cooperation Implementation Plan".

Chapter 4 Follow-up Cooperation Implementation Plan

Chapter 4 Follow-up Cooperation Implementation Plan

4-1 Order of Priority of Equipment and Parts for F/U Cooperation

Upon confirming the need for repairs in procured equipment owned by Makedonijapat based on the contents of the request and results of the field survey, the parts required for trouble and failure were selected. Moreover, the necessary parts were prioritized according to the following method.

(1) Step 1: Confirmation of equipment priority

The order of priority of equipment is classified into high, medium, and low based on three items including level of contribution to business efficiency in Makedonijapat. Moreover, asphalt plant is assessed according to each major unit.

Three items subject to assessment:

- ① Impact on work efficiency
Level of contribution in terms of implementing the road maintenance work of Makedonijapat
- ② Level of contribution to extending service life
The degree to which equipment life is extended due to the F/U cooperation
- ③ Difficulty of procuring alternative equipment
The level of difficulty of procuring equipment that has the same or similar functions

Upon conducting assessment based on these three items, equipment that receives a high ranking for two or more items is deemed high priority, while equipment that receives a high ranking for one item is deemed medium priority. If equipment receives a low ranking for even one item, its overall priority is also treated as low.

1) Construction equipment and trucks

High priority is generally given to equipment used in asphalt paving works such as the asphalt finishers, 10-ton vibration rollers, tire rollers, dump trucks, etc. Dump trucks have a high priority because they have high versatility, also being used for snow clearing in winter, and they also have a high performance evaluation. The medium priority rating is mainly given to equipment used in civil engineering works and incidental works, for example, the bulldozers, wheel loaders, 4-ton vibration rollers, etc. Concerning the 4-ton vibration roller, #10108, because the repair of rear-wheel hydraulic travel motor is complicated and not cost-effective, it is omitted from the F/U target equipment. Low priority is given to the workshop tools.

2) Asphalt plant

Among asphalt plant units, high priority is given to the weight unit, drier burner, and surge bin that have an impact on the quality of asphalt mixture, and the dust collector that is necessary for conducting environmental measures. Medium priority is given to the belt conveyor, stock bin, mixer, etc. that mainly comprise welded structures and can be repaired locally. No units are deemed to have low priority.

3) Comparison of asphalt plant and construction equipment and trucks

In the comparison of asphalt plants with construction equipment and trucks, Makedonijapat does not think that asphalt plants have much higher priority than construction equipment and trucks. This is based on the belief that, even when the asphalt plant is working normally, it cannot fulfill its objective unless the asphalt finisher is working. However, the plant that produces the asphalt mixture needed for road maintenance work does have higher priority as fundamental equipment.

(2) Step 2: Confirmation of the necessity of parts

Concerning the prioritized equipment, attributes were examined according to each part. Here, the order of priority of each part is classified as high, medium, or low based on rating of three indicators, i.e. degree of urgency, difficulty of procurement in the local or nearby area, and cost effectiveness.

Three items used in assessment:

- ① Degree of urgency
Degree of urgency of parts, for example, parts that have stopped functioning, parts for which urgent replacement is desired, etc.
- ② Difficulty of procurement in the local or nearby area
The level of difficulty of procuring parts in the local or nearby area
- ③ Cost effectiveness (cost performance)
Degree of effect gained from parts replacement compared to the parts cost

Upon conducting assessment based on these three items, equipment that receives a high ranking for two or more items is deemed high priority, while equipment that receives a high ranking for one item is deemed medium priority. If equipment receives a low ranking for even one item, its overall priority is also treated as low.

(3) Priority of procured parts

As is shown in Table 4-1, the parts with High priority at both Step1 for equipment and Step 2 for spare parts are categorized as total priority ranking of 1. The parts with High at Step1 and Middle at Step 2 have total priority ranking of 2.

The parts with Middle at Step1 for equipment will be divided into 2 groups, High at Step 2 are categorized as total priority ranking of 3, and Middle at Step 2 are as total priority ranking of 4.

The parts with Low at Step 2 have total priority ranking of 5.

Table4-1 Grouping by prioritization

Priority	Equipment, Unit (Step 1)	Spare parts (Step 2)
1	High	High
2	High	Middle
3	Middle	High
4	Middle	Middle
5		Low

- 1) The request of components such as asphalt finisher engines, dump truck transmissions and so on, however, since faults in these can be remedied by supplying internal parts such as piston rings, shafts, etc., the degree of priority of components is low, while that of internal parts is high.
- 2) Since consumable parts such as brake lining, etc., which is a safety-related part, are procured and fitted locally and are functioning normally without a problem, they have not been included.

Table 4-2 (Construction equipment and trucks) and Table 4-3 (Asphalt Plant) show the parts indicated the necessary parts and their level of priority based on the request and the results of the field survey.

Table4-2 Survey result of requested part condition and newly required parts (Construction equipment and truck)

No.	Equipment	Requested letter		Result of survey				Priority		Procure
		Requested part	Qty	Condition	Required part	Qty	Equip't	Part	Priority	
1	Former Nissan Diesel dump truck	Fly wheel, Transmission		• Crack at flywheel of #346	Flywheel	1	High	High	1	
				• Power shaft of #350 was damaged, but transmission itself is normal and deleted.						
		Clutch disk		• Available locally						
		Pressure plate		• Crack at pressure plate of #346	pressure plate	4		High	1	
		Throw-out bearing		• No problem and not required						
		Starting motor		• On #346 local motor was installed, but water invasion.	Starting motor	1		High	1	
		Oil filter		• Unavailable locally, so 8 pieces per unit will be procured (For 4 years when replaced every 10,000km traveling)	Oil filter	64		High	1	
		Wheel lug nut		• Lug nuts were stolen on #351, but procured locally. Deleted.						
		ECU (Engine Control Unit)	2	• Trouble on #347, #348, #350	ECU	3		High	High	1
				• Starting relay trouble on #346, and separated cranking circuit was set	Starting relay	1		Medium	2	
				• Hydraulic pump of #348 is disassembled to repair, but bushing and casing are worn out.	Hydraulic pump	1		Medium	2	
				• Oil leakage from the oil pans of #350 and #351	Oil pan	2		High	1	
					Gasket	2		High	1	
		2	Sakai Vibratory roller	Fuel filter		• Available locally				
Injection nozzle				• No problem and not required						
Head light				• No problem and not required						
				• Pumps for water sprinkler are out of order on 10ton rollers, #20208 and #20211 (Two pumps per unit)	Water pump	4	High	High	1	
				• Pump for water sprinkler is out of order on 4ton roller, #10111	Water pump	1	Medium	High	3	
				• Vibratory motors of front and rear are out of order on 4ton roller, #10109	Vibratory pump	2	Medium	Medium	4	
				• No problem and not required						
				• No problem and not required						
				• No problem and not required						
				• No problem and not required						
3	Sakai Tire roller	Fly wheel, Transmission		• No problem and not required			High			
		Clutch disk		• No problem and not required						
		Pressure plate		• No problem and not required						
		Throw-out bearing		• No problem and not required						
				• Water sprinkler pumps of front and rear on #23235 are out of order.	Water pump (front)	1		High	1	
			Water pump (rear)	1	High	1				
4	Former Niigata (current Sumitomo) Asphalt finisher	Engine assembly		• Oil consumption is large on #20138, but overheat trouble was repaired locally.	Piston ring set	4	High	High	1	
		Starting motor		• No problem and not required						
		Set of front tires		• Large worn out on 4units (2pieces per unit)	Solid tire	8		High	1	
		Alternator		• No problem and not required						
		Injection nozzle		• No problem and not required						
				• Unstable control of traveling and conveyor speed	Output interface board	4		High	1	
5	Komatsu Motor grader	No request		• Safety relay is out of order on #11224	Safety relay	1	High	Low	5	
				• Cutting edges of front dozer are worn out on #11222 and #11225.	Cutting edge	4		Low	5	
				• Locally procured cutting edge of blade is very bad on #11225.	Cutting edge	2		Low	5	
				• Scarifier teeth are not enough on #11225.	Tooth	11		Low	5	
				• Oil leakage from mating face of starter on #54149	Seal	1		High	Low	5
6	Komatsu Wheel loader	No request			O-ring	1	High	Low	5	
7	Komatsu Crawler type hydraulic excavator	No request		• Wearing of bucket pins is large, making noise on #110551.	Set of bucket pins	1	High	Low	5	
				• Wearing of side cutters is large on #110551.	Side cutter, bolts	1		Low	5	
				• Diaphragm of hydraulic breaker is out of order and chisel point is worn out.	Diaphragm	1		High	1	
					Chisel point	1		High	1	

Table4-3 Survey result of requested part condition and newly required parts (Asphalt plant)

No.	Unit name	Requested letter		Additional request		Result of survey			Priority		Procure Priority	
		Requested part	Qty	Part	Qty	Condition	Required part	Qty	Unit	Part		
1	Weighing unit	Control panel	1			Electronic parts damaged by lightning before. At present substitutes are used for operation, but these are fundamental parts requiring installation of genuine parts.	Control panel	1	High	High	1	
		Aggregate scale unit	1				Aggregate scale unit	1		Medium	2	
		Load cell (aggregate)	3				Load cell (aggregate)	1		High	1	
		Load cell (Filler)	2				Load cell (Filler)	1		High	1	
		Load cell (Asphalt)	2				Load cell (Asphalt mixture)	1		High	1	
2	Dryer	Thermocouple	3			Available locally	Thermocouple	1	Medium	Low	5	
		Wheel	4			Available locally	Wheel	4		Low	5	
				Shaft	4		Available locally	Shaft		4	Low	5
				Tapered key	4		Available locally	Tapered key		4	Low	5
		Reduction gear	2			Rotating eccentrically, needs replacement	Reduction gear	4		High	3	
3	Dryer burner	Nozzle head	2				Nozzle head	1	High	High	1	
		Nozzle orifice	2				Nozzle orifice	1		High	1	
		Copper packing A	2				Copper packing A	1		High	1	
		Copper packing B	2				Copper packing B	1		High	1	
		O-ring	2				O-ring	1		High	1	
		Gas magnet valve	1				Gas magnet valve	1		High	1	
		Control motor	1				Control motor	1		Medium	2	
		Flow meter	1			Being damaged, needs installment	Flow meter	1		Low	5	
				Screw pump	1			Screw pump		1	High	1
				Oil flow valve	1			Oil flow valve		1	High	1
		Pressure gauge	1		Damaged, substitute gauge with lower capacity is set.	Pressure gauge	2	High	1			
		Flame eye	1			Flame eye	1	High	1			
4	Cold aggregate conveyor	Carrier roller	5			Worn out, but available locally	Carrier roller	15	Medium	Low	5	
		Return roller	2			Worn out, but available locally	Return roller	2		Low	5	
5	Hot elevator							-				
6	Stock bin	Air cylinder	1				Air cylinder	1	Medium	High	3	
7	Belt conveyor	Carrier roller	66			Worn out, but available locally	Carrier roller	36	Medium	Low	5	
		Return roller	8			Worn out, but available locally	Return roller	6		Low	5	
		Snap roller	3			Worn out, but available locally	Snap roller	3		Low	5	
		Roller F200	3			Worn out, but available locally	Roller F200	1		Low	5	
		Motor pulley	1				Motor pulley	1		High	3	
8	Surge bin	Limit switch	6				Limit switch	6	High	High	1	
		Magnet valve A	1				Magnet valve A	1		High	1	
				Magnet valve B	2			Magnet valve B		2	High	1
9	Mixer					Cylinder packing	2	Medium	High	3		
10	Dust collector					Some filters are torn and the differential pressure is large because of clogging. For environment protection all filters are to be changed.	Filter cloth	240	High	High	1	
							Band	240		High	1	
							Magnet valve B	5		High	1	
							Valve (Diaphragm packing set)	10		High	1	
							Transferring blower	1		High	1	

Tables 4-4 and 4-5 show the contents of parts selected according to each level of priority.

Table4-4 Part content by priority (Construction equipment and truck)

Priority	Part content
1	<p>a) Because of troubles, provisional measures were taken but improperly. Requiring replacement with genuine parts. Ex: Electronic boards of dump trucks and asphalt finishers, water sprinkler pump for rollers</p> <p>b) Inoperative due to troubles. Requiring replacement. Hydraulic breaker of excavator (Diaphragm, chisel point)</p> <p>c) Parts worn out Front tires of asphalt finisher</p>
2	<p>a) Hydraulic pump of dump truck under repair (Uncertainty of satisfied repair work)</p> <p>b) Locally modified parts to measure the trouble such as redundant starting circuit (Starting relay and so on)</p>
3	Equipment priority is middle, but parts are in trouble such as water sprinkler pump of 4ton vibration roller
4	One unit of 4ton vibration roller will be restored, even cost performance of repairing is fair. Vibratory motor will be required.
5	Locally available parts of Komatsu and so on.

Table4-5 Part content by priority (Asphalt plant)

Priority	Part content
1	<p>a) Fundamental parts affecting total operation of asphalt plant, damaged previously, such as electronic parts of weighing unit</p> <p>b) Environmental affecting parts such as torn filters and damaged valves at dust collector unit</p>
2	Local availability is fair, and its emergency degree is medium such as scale unit and control motor.
3	Emergency degree is medium and for preparation, 3items; Reduction gear, Air cylinder and Motor pulley.
4	None
5	Locally available parts such as belts, rollers of conveyor.

The priorities assigned to each equipment and part have basically been agreed with Makedonijapat as shown in Annex 1, 2, 3, and 4 of the Technical Note.

Annex 1 Tentative Evaluation results of the Equipment to be repaired

Annex 2 Tentative Evaluation results of the spare parts required for repair and maintenance of the Equipment excluding the Asphalt Mixing Plant

Annex 3 Tentative Evaluation results of the Asphalt Mixing Plant

Annex 4 Tentative Evaluation results of the spare parts of the Asphalt Mixing Plant

4-2 Plan of Target Parts for F/U Cooperation

Leaving aside the priority level 5 parts that can be procured locally or in the nearby area, for example, parts for Komatsu products, and conveyor belts, rollers, etc. for asphalt plants, parts that have a priority ranking of 1 to 4 shall be targeted.

As is shown in Table 4-6, the supplied parts comprise 54 items, 713 units, with its value of approximately 20 million yen.

Table4-6 Spare parts list (1/2)

No.	Equipment		Parts name	Specification	Manufacturer	Q'ty	Amount(Yen)
1-1	Dump truck	UD Trucks PKC212EHLB	Flywheel	12310-Z504B	UD Trucks	1	99,900
1-2			Starting motor	23300-Z5572	UD Trucks	1	93,600
1-3			ECU	25947-Z5610	UD Trucks	3	691,200
1-4			Oil pan	11110-Z5513	UD Trucks	2	99,540
1-5			Gasket	11121-Z5506	UD Trucks	2	13,032
1-6			Fuel filter	16444-97001	UD Trucks	16	81,648
1-7			Pre fuel filter	16403-99011	UD Trucks	16	40,896
1-8			Oil filter	15201-Z9013	UD Trucks	64	357,120
1-9			Clutch cover	30210-Z5101	UD Trucks	4	231,120
1-10			Air filter outer	16546-99316	UD Trucks	16	227,520
1-11			Air filter inner	16546-99203	UD Trucks	16	102,240
1-12			Starting relay	23220-NB012	UD Trucks	1	11,790
2-1			Gear pump	S260813361	Shin Meiwa	1	187,110
3-1			Power shaft (SHIFT ROD)	8876410	Eaton	1	37,167
4-1	Vibration Roller (10ton)	Sakai SW750H	Pump (SW750H water sprinkler)	4704-78000-0	Sakai	4	509,400
4-2	Vibration Roller (4ton)	Sakai SW500-1E	Pump (SW500 water sprinkler)	4718-18000-1	Sakai	1	126,000
4-3			Motor (SW500 vibration)	4207-50000-1	Sakai	2	475,740
4-4	Tire roller	Sakai TS200	Motor (TS200 water sprinkler)	4704-77000-2	Sakai	1	444,870
4-5			Motor (TS200 water sprinkler)	4716-85000-0	Sakai	1	97,740
5-1	Asphalt finisher	Sumitomo NFB60W-V	Ring set	112121-115-0	Sumitomo	4	19,012
5-2			Output board	NH90341301	Sumitomo	4	304,438
5-3			Solid tire	N2008138U1	Sumitomo	8	4,145,234
5-4			Engine stop SOL B6C	N200020314	Sumitomo	4	363,654
5-5			Oil element	KRJ3547 (N20607304)	Sumitomo	8	95,472
6-1	Hydraulic excavator	Komatsu PC200-6	Diaphragm	762410023A	Sandvik	1	27,090
6-2			Chisel point	7627790010	Sandvik	1	87,570

Table4-6 Spare parts list (2/2)

7-1	Asphalt plant	Tanaka TAP-800LB SB-60	Control panel	81208	Tanaka	1	1,098,000
7-2			Load Cell (aggregate)	80805	Tanaka	1	250,200
7-3			Load Cell (filler)	80806	Tanaka	1	250,200
7-4			Load Cell (asphalt)	80807	Tanaka	1	250,200
7-5			Nozzle head	80303	Tanaka	1	27,000
7-6			Nozzle orifice	80304	Tanaka	1	8,550
7-7			Copper packing A	80305	Tanaka	1	900
7-8			Copper packing B	80306	Tanaka	1	900
7-9			O-ring	80307	Tanaka	1	720
7-10			Gas magnet valve	80321	Tanaka	1	5,130
7-11			Screw pump	80386	Tanaka	1	634,500
7-12			Oil flow valve	80353-80379	Tanaka	1	206,100
7-13			Pressure gauge	80392	Tanaka	2	52,200
7-14			Flame eye	80319	Tanaka	1	96,300
7-15			Limit switch ILS-550	TB6017	Tanaka	6	35,100
7-16			Magnet valve MVS-15A	TB6044	Tanaka	1	28,350
7-17			Magnet valve	OP60418	Tanaka	2	10,440
7-18			Filter cloth	BF80029	Tanaka	240	2,160,000
7-19			Band	BF80030	Tanaka	240	216,000
7-20			Magnet valve	BF80016-1	Tanaka	5	54,000
7-21			Valve (diaphragm packing set)	BF80016-2	Tanaka	10	58,500
7-22			Transferring blower	BF80023	Tanaka	1	1,053,900
7-23			Aggregate scale unit (Transmitter 4mA ~ 20mA)	80801	Tanaka	1	160,200
7-24			Control motor	80385	Tanaka	1	279,000
7-25			Reduction gear	80252	Tanaka	4	1,029,600
7-26			Air cylinder	80737	Tanaka	1	69,300
7-27			Motor pulley	BC8002	Tanaka	1	595,800
7-28			Cylinder packing set	80924	Tanaka	2	7,200
Equipment cost							17,608,393
Transportation cost etc.							2,297,881
Total							19,906,274

4-3 Repair and Procurement Plan

In the event where the F/U cooperation is implemented, the repair and procurement plan will be as follows.

- (1) The technical level of Makedonijapat has been confirmed to be at a certain level, so Makedonijapat will implement the replacement work for supplied parts.
- (2) Because parts are replacement parts for equipment procured in 2001 and 2002, genuine parts will be adopted.

- (3) The supplied parts include engine-related parts. Concerning engine exhaust gas controls in Macedonia, EURO IV is applied to dump trucks, etc., however, no controls are currently applied to construction equipment. Concerning vehicles, EURO IV will be applied to new vehicles and also engines that are replaced in vehicles currently in operation. Since the F/U cooperation here does not entail engine replacements, there will be no need to consider exhaust gas controls. Moreover, the current EU standard is EURO VI, while EURO IV was adopted in 2005.
- (4) All the parts for supply will be procured in Japan.
- (5) Concerning the transportation routes, the parts will be shipped by sea from Yokohama Port to Thessalonica Port in Greece, overland from Thessalonica Port to Skopje in Macedonia, and then to the Avtopat branch of Makedonijapat, where they will undergo customs clearance and be handed over to the Macedonian side. One 20-foot container will be enough to fit the volume of parts.
- (6) Makedonijapat will appoint a general manager at headquarters and seek to share information between headquarters and the branches and also between the branches.
- (7) Since the equipment serial number and branch are specified, Makedonijapat will promptly transport the supplied parts to each branch in charge.
- (8) The responsible person at each branch will compile a repair implementation plan and receive confirmation from the general manager. He/she will follow progress and give reports to the general manager. Following implementation of all repairs and replacement of parts, except for the periodic replacement parts such as filters, etc., the general manager will report to the local JICA office.
- (9) In implementing repair work, repair manuals and parts books will be referred to in order to secure repair quality.
- (10) Concerning tax exemption measures in Macedonia, following signing of the S/W, the F/U Project will be registered with the Government of Macedonia, and authorities in the Ministry of Finances will guarantee tax exemptions via the MTC and Secretariat for European Affairs.

4-4 Necessity of Dispatching Engineers

As was described in 3-3-1, Makedonijapat has a certain level of equipment maintenance and repair technology and its staff members are sufficiently able to replace/install parts to construction equipment, trucks, and asphalt plants. Therefore, there is no need to dispatch engineers regarding this work.

On the other hand, there is room for improvement regarding the maintenance system

equipment concerned is already coming up to 20 years old, it will eventually become necessary to replace the equipment. However, Makedonijapat has hardly conducted any equipment purchase or replace, except for the purchase of six dump trucks, etc. in 2005.

Considering that budget constraints exist, it will be essential to equalize and secure equipment replacement costs through discussions with the MTC and the Public Enterprise for State Roads, etc., which is the agency that orders maintenance work. In particular it will be necessary to prioritize the allocation of budget for replacement of paving equipment such as asphalt plants and asphalt finishers, etc. that are essential for conducting road maintenance, and dump trucks that are needed for maintaining roads in winter also.

4-6-2 Equipment Maintenance

Viewing the completion of repairs here as the beginning of the second phase of equipment operation, it is anticipated that equipment conditions can be grasped and equipment can be used more effectively and for longer through definitely implementing periodic inspections and replacements according to manufacturers' manuals, keeping operating records that show working hours, work contents, fuel and oil consumption, etc., and keeping records of maintenance and repair contents and used parts, etc.

It is desirable to move from the current corrective maintenance system of addressing problems after they occur to a preventive maintenance system that involves periodic inspections and maintenance.

The Equipment Maintenance System Diagram for Preventive Maintenance in Figure 4-1 shows the preventive maintenance implementation contents, roles of related parties, and used forms.

Work, Maintenance, Repair Control	Part Control	Format	Branch				Head Office In charge	External
			Operator	Mechanic	Parts man	In charge		
Daily Job and Inspection,		Daily job and maintenance record	○			◎		
Monthly Job record		Monthly Job record	△			○	◎	
Periodical Inspection	Prior arrangement of parts Parts receiving/shipping control	Maintenance record	○	△	x	x		
		Parts order sheet	x	x	○	x	◎	Parts supplier
		Cardex	x	x	○	x		
Repair work by Makedonijapat	Parts order Parts procurement	Maintenance record	△	○		x		
		Parts order sheet	x	x	○	x	◎	Parts supplier
		Cardex	x	x	○	x		
Repair work (Out sourcing)		Maintenance record	△	○		x	x	
		Quotation			x	○	△	Repair shop
		Repair order sheet			x	○	◎	Repair shop
Monthly maintenance record		Monthly maintenance record	x	△	△	○	◎	

○: Main recorder
△: Sub recorder
◎: Approval
x: Information sharer

Figure4-1 Equipment Maintenance System Diagram for Preventive Maintenance

Figure 4-2 and Figure 4-3 show the samples of daily job and maintenance record forms used for conducting preventive maintenance.

Daily Job and Maintenance record												
Date	yy mm dd		Branch		Charge							
Name of job			Location									
Type of Job												
Equipment			Manufacturer									
Model			Serial No.									
Service meter (starting time) _____ H			Service meter (ending time) _____ H									
Fuel replenishment _____ litter			Oil replenishment _____ litter									
Unit	Item	Check point	Result		Mark	Solution						
			Good	Poor								
Engine	Lubrication oil	Oil level, dirty, leakage										
	Cooling water	Volume of water level, clogging of fin, leakage										
	Fan belt	Tension, damage										
	Gauge	Function, damage										
	Fuel	Level, leakage										
	Air element	Clogging (Dust indicator)										
Work equipment	Hydraulic oil	Level, leakage										
	Cylinder	Leakage, damage										
	Work equipment	Function, grease feed										
	Swing device	Function										
Travel device	Undercarriage	Bolt loosening										
	Truck flame	Function, damage, deform, grease feed										
Safety device	Locking device	Function										
	Horn	Function										
	Working light	Function										
Mark	Result of inspection, those without abnormalities put "✓" in the column of the good of the inspection results, also to those with abnormalities put "✓" in the column of poor				Mark	Change	Repair	Adjust	Tight	Clean	Supply	No applicable
	X	R	A	T		C	L	—				

Figure4-2 Sample of daily report

Maintenance record (Construction equipment)

Date: _____ Branch _____
 Name _____
 Equipment kind: _____ Model: _____ Serial No. _____
 Hour meter reading: _____ H (km) _____

Unit	Trouble	Action taken
Engine		
Power train		
Steering		
Traveling		
Electrical		
Chassis		
Work equipment		
Others		

Consumed parts

Name	Number	Q'ty	Unit price	Amount
Total				

Labor, cost
 Labor required _____ Hr

Cost
 Parts _____
 Others _____
 Total _____

Figure4-3 Sample of maintenance record

Chapter 5 Anticipated Effects of Follow-up Cooperation

Chapter 5 Anticipated Effects of Follow-up Cooperation

5-1 Project Overall Goal and Project purpose

Overall Goal : Road transport functions and road reliability in Macedonia will be improved.

Project purpose: Functions of the road maintenance equipment procured under the Grant Aid Project will be restored, and the area of road repairs will increase.

5-2 Effects of F/U Cooperation

The equipment targeted in this F/U cooperation comprises the road maintenance equipment (asphalt finishers, vibration rollers, etc.) and asphalt plants that were procured in the Grant Aid Project for Improvement of Road Maintenance Equipment in 2001 and 2002. This equipment is used for implementing road maintenance in Macedonia, and contributes to restoring functions of the road network and promoting economic development.

However, 13 years have passed since the said equipment was procured and it has become aged. Moreover, because some spare parts cannot be obtained in Macedonia or nearby countries, the Macedonian side is having difficulty keeping the equipment in good condition.

The Study Team surveyed the condition of all the equipment procured in the Grant Aid Project and identified the parts that are required for equipment repair and maintenance. Under this F/U cooperation, through supplying the necessary parts except for those that can be procured in nearby countries, functions of almost all equipment will be restored. Through making effective use of this equipment, it will become possible to efficiently implement road maintenance work, so the F/U cooperation will contribute to the road maintenance policy being pursued by the Government of Macedonia. Moreover, through maintaining the Pan-European Corridors crossing the country, human and physical exchanges will be promoted in the Balkans.

5-3 Efficiency of F/U Cooperation

As a result of the cooperation, the condition of construction equipment, trucks, and asphalt plant, which were procured in the Grant Aid Project and have fulfilled their original objectives, will be improved, and the equipment will continue to be utilized for performing road maintenance all over Macedonia. The cooperation can thus be described as efficient in that past inputs will be activated.

5-4 Impact

As a result of this F/U cooperation, road maintenance equipment functions will be restored, road maintenance and repair works capability will be improved, roads will become more reliable, and this will contribute to the economic development and reduction of poverty in Macedonia. The benefitting population will be the entire 2,100,000 population of Macedonia.

5-5 Recommendations

5-5-1 Equipment Maintenance System

As a result of the field survey, it was confirmed that Makedonijapat has a certain level of equipment maintenance and repair technology. On the other hand, maintenance records such as operation records and repair records are not kept, and the periodic oil and filters replacement, etc. recommended by manufacturers are not appropriately conducted.

By keeping operating records that show working hours, work contents, fuel and oil consumption, etc., and keeping records of maintenance and repair contents and used parts, etc., equipment conditions can be grasped, preventive maintenance can be enabled, and equipment can be used more effectively and extended its life.

It is recommended that the current corrective maintenance system be changed to a preventive maintenance system.

Section 4-6-2 introduces examples of equipment maintenance system such as daily job and maintenance record forms for preventive maintenance.

5-5-2 Planned Replacement of Road Maintenance Equipment

Through implementing this F/U cooperation, the functions of the target equipment can be restored and service lives can be extended by around five years, however, since the equipment concerned is already coming up to 20 years old, it will eventually become necessary to replace the equipment. Moreover, in addition to the equipment procured in the Grant Aid Project, there are approximately 100 items of other equipment as shown in Table 3-10, however, this too is between 20~30 years old and is aged except for seven units that were purchased in 2005.

Considering that budget constraints exist, it is recommended to equalize and secure equipment replacement costs through discussions with the MTC and the Public Enterprise for State Roads. In particular it will be necessary to prioritize the allocation of budget for replacement of paving equipment such as asphalt plants and asphalt finishers, etc. that are essential for conducting road maintenance, and dump trucks that are needed for maintaining roads in winter also.

Annex

1. Member List of the Study Team
2. Study Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions (M/D)
5. Technical Note (T/N)
6. Result of checking (Construction equipment and trucks)
7. Result of checking (Asphalt plant)

Annex. 1 Member List of the Study Team

Name	Assignment	Present Post
Mr. Satoru MATSUYAMA	Team Leader	Advisor Grant Aid Project Management Division 1 Financial Cooperation Implementation Department, JICA
Mr. Keita IZUMI	Project Coordinator	Assistant Director Grant Aid Project Management Division 1 Financial Cooperation Implementation Department, JICA
Mr. Haruo FUKUCHI	Chief Consultant	INGEROSEC Corp.
Mr. Masahiro YASUE	Equipment Planner	INGEROSEC Corp.
Mr. Toshiyuki KOKUBU	Asphalt Plant Planner	INGEROSEC Corp.

Annex. 2 Study Schedule

	Date		Mr. MATSUYAMA	Mr. IZUMI	Mr. FUKUCHI	Mr. YASUE	Mr. KOKUBU
1	OCT. 4	Sat			Leave Tokyo 22:30 (TK0053)		
2	5	Sun	Leave Tokyo 11:55 (TK0051) Arrive Istanbul 18:00 Leave Istanbul 19:25 (TK1005) Arrive Skopje 19:50		Arrive Istanbul 5:00 Leave Istanbul 7:40 (TK1003) Arrive Skopje 8:10		
3	6	Mon	Courtesy visit to Min. of Transport. & Communications, and Secretariat for European Affairs. Courtesy visit and Discussion with Makedonijapat (Explanation of Inception Report and Questionnaires, and survey schedule)				
4	7	Tue	Skopje, Avtopat branches, and Asphalt Plant at Skopje Discussion, Data collection, Check the equipment (equip't)				
5	8	Wed	Veles and Stip branches to check machine conditions, repair shops, and roads under their control				
6	9	Thu	Discussion with MOTC and Makedonija PAT on M/D		Skopje branch job site (Debar), Check the equip't	Skopje branch	Check the asphalt plant
7	10	Fri	Signature of M/D Leave Skopje 20:45 (TK1006) Arrive Istanbul 23:25	Signature of M/D	Stip branch job site (Strumica), Check the equip't	Skopje branch	
8	11	Sat	Leave Istanbul 01:00 (TK0052) Arrive Tokyo 18:30	Survey of manufacturers' distributors, data analysis, and Internal meeting			
9	12	Sun	Data analysis, Internal meeting				
10	13	Mon	Skopje branch				
				Skopje branch job site (Kumanovo) Check the equip't	Skopje branch		
11	14	Tue	Discussion with Makedonijapat about asphalt plant				
12	15	Wed	Move to Bitola branch for discussion , data collection, and checking equipment conditions and road conditions under control				
			Skopje branch				
13	16	Thu	-Ditto- and return to Skopje				
			Checking Plant repair facilities				
14	17	Fri	Discussion with Makedonijapat about asphalt plant				
15	18	Sat	Data analysis and internal meeting				
			Leave Skopje 9:05 (TK1004) Arrive Istanbul 11:35 Leave Istanbul 17:10 (TK050)				
16	19	Sun	-Ditto-				
			Arrive Tokyo 10:25				
17	20	Mon	Discussion with Makedonijapat				
18	21	Tue	Discussion with Makedonijapat				
19	22	Wed	Signature of Technical Note, Visit of repair shops				
20	23	Thu	Leave Skopje 9:05 (TK1004) Arrive Istanbul 11:35 Leave Istanbul 17:10 (TK050)				
21	24	Fri	Arrive Tokyo 10:25				

Annex. 3 List of Parties Concerned in the Recipient Country

Name	Title	Organization
Orhideja Kaljosevska	Head of Sector	Secretariat for European Affairs
Sofce Kzstic	Head of Unit	Secretariat for European Affairs
Vlado Misajlovski	State Secretary	Ministry of Transport and Communication
Toni Temkov	Cabinet of Minister	Ministry of Transport and Communication
Gajur Kadriu	Director, HQ	Public Enterprise. Makedonijapat
Dijana Orovcaneć	Chief engineer for Technical and Marketing, HQ	Public Enterprise. Makedonijapat
Petko Spasevski	Head of Mechanization, HQ	Public Enterprise. Makedonijapat
Ruska Hadzimitkov	Engineer Road Protection, HQ	Public Enterprise. Makedonijapat
Zoran Trenkovski	Manager, Skopje Asphalt Plant	Public Enterprise. Makedonijapat
Nikola Jauev	Electrician, HQ	Public Enterprise. Makedonijapat
Saso Todorovsky	Mechanization manager, Skopje	Public Enterprise. Makedonijapat
Tome Janevski	General Manager, Veles branch	Public Enterprise. Makedonijapat
Miladinovei Sveti	Mechanization manager, Stip branch	Public Enterprise. Makedonijapat
Stojkovsky Saso	Warehouse Manager, Avtopat branch	Public Enterprise. Makedonijapat
Televski Saso	Mechanization manager, Bitola branch	Public Enterprise. Makedonijapat
Toru Ogura	Project Formulation Adviser	JICA Balkan Office
Jun Hirashima	Project Formulation Adviser	JICA Balkan Office
Sasho Dimitrov	Technical Coordinator in Skopje	JICA Skopje Liaison Office
Igor Kolevsky	General Manager	MAK Diesel (contractor)
Jane Nikolovski	General Manager	JANAKI (contractor)

10th October, 2014

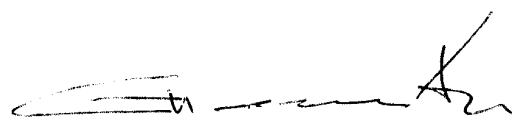
Mr. Satoru MATSUYAMA
Team Leader
Follow-up Study Team
Japan International Cooperation Agency

Dear Sir,

I have the honor to acknowledge the receipt of your letter, dated 10th October, 2014, regarding the signature of the Minutes of Discussions concerning the Follow-up Study on the Project for Improvement of Road Maintenance Equipment (hereinafter referred to as “the Study”), agreed between the Public Enterprise Makedonijapat and Japan International Cooperation Agency.

Hereby, I have confirmed that the Minutes of Discussions, which is duly described in the attachment, have been agreed between the Public Enterprise Makedonijapat and JICA.

However, I declare that the Republic of Macedonia does not accept the denomination used for my country in the abovementioned Minutes of Discussions, having in view that the constitutional name of my country is the Republic of Macedonia.



Gajur KADRIU
Director
Public Enterprise Makedonijapat
Republic of Macedonia

MINUTES OF DISCUSSIONS

ON

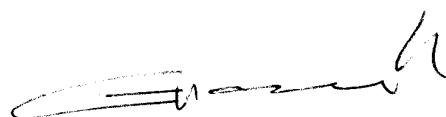
THE FOLLOW-UP STUDY

ON

THE PROJECT FOR IMPROVEMENT OF ROAD MAINTENANCE EQUIPMENT

IN

THE REPUBLIC OF MACEDONIA

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10th October, 2014

Mr. Gajur KADRIU
Director
Public Enterprise Makedonijapat
Former Yugoslav Republic of Macedonia

Dear Sir,

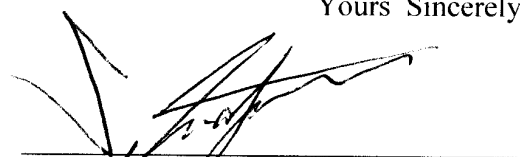
I have the honor to refer to our recent discussions regarding the Follow-up Study on the Project for Improvement of Road Maintenance Equipment (hereinafter referred to as “the Study”).

In response to the request from the Government of the Former Yugoslav Republic of Macedonia (hereinafter referred to as “Macedonia”), Japan International Cooperation Agency (hereinafter referred to as “JICA”) decided to conduct the Study. JICA sent to Macedonia the Follow-up Cooperation Study Team (hereinafter referred to as “the Team”) headed by myself and the Team is scheduled to stay in the country from 5th to 23rd October, 2014.

In the course of discussions and field surveys, I hereby have confirmed that the Minutes of Discussions, which is duly described in the attachment, have been agreed between the Public Enterprise Makedonijapat and JICA. The Team will proceed to further works and prepare the Follow-up Study Report.

I would very appreciate it if you could confirm the Minutes of Discussions on behalf of the Public Enterprise Makedonijapat.

Yours Sincerely,



Satoru MATSUYAMA

Team Leader

Follow-up Study Team

Japan International Cooperation Agency

MINUTES OF DISCUSSIONS

ON

THE FOLLOW-UP STUDY

ON

THE PROJECT FOR IMPROVEMENT OF ROAD MAINTENANCE EQUIPMENT

IN

THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

A handwritten signature in black ink, appearing to be 'J. Ar', located in the bottom right corner of the page.

ATTACHMENT**1. Outline of the Follow-up Cooperation Scheme**

The Macedonian side understood the JICA's Follow-up Cooperation Scheme explained by the Team as follows:

- 1-1. Objective of the Follow-up Cooperation Project (hereinafter referred to as "the Project") is to maintain and restore the function of equipment and facilities provided through the Project for Improvement of Road Maintenance Equipment (hereinafter referred to as "the Original Project"), which was completed in February 2002, to the originally expected levels.
- 1-2. Viability of the implementation of the Project will be determined by JICA after the Study.
- 1-3. The Study aims at, through field survey and discussions with concerned officials, examining the current situation of equipment and facilities, clarifying the request from the Macedonian side, and collecting necessary information for considering the Project implementation.

2. Sites for the Study

Sites for the Study are Avtopat Branch Office, Bitola Branch Office, Skopje Branch Office including Asphalt Plant, Stip Branch Office and Veles Branch Office, where the equipment were procured and installed by the Original Project, as shown in Annex-1.

3. Responsible and Implementing Agencies

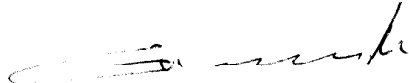
- 3-1. The responsible agency is the Ministry of Transport and Communications (MTC). The organization chart of MTC is shown in Annex-1.
- 3-2. The implementing agency is the Public Enterprise Makedonijapat. The organization chart of Public Enterprise Makedonijapat is shown in Annex-2.

4. Components of the Follow-up Cooperation Project

- 4-1. Both sides identified the equipment procured in the Original Project to be examined and considered for the components of the Project as shown in Annex-4.
- 4-2. Both sides will confirm the condition of the equipment and agree the priority order of the equipment to be restored in the Study for considering the Project components.
- 4-2. Based on the Minutes of Discussions and technical examination of the Study both in Macedonia and Japan, JICA will make final decision on the implementation of the Project. Such decision may also be subject to budgetary allocation by the Japanese side. In case the Project is determined to be undertaken, JICA will inform the Macedonian side of the final components of the Project at the same time.

5. Schedule of the Study

- 5-1. The Team will proceed to further investigations in Macedonia until 23rd October, 2014.
- 5-2. JICA will finalize and send the Final Report on the Study to the Macedonian side by the end



of January, 2015.

- 5-3. JICA will notify the Macedonian side of the result of decision and the final components of the Project through JICA Balkan office by the end of January, 2015.

6. Undertakings by the Macedonian side

When the Project is decided to be implemented, the Macedonian side shall take necessary measures for the smooth implementation of the Project as listed below.

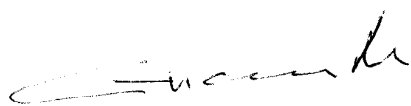
- 6-1. To secure sufficient space necessary when the Project is executed;
- 6-2. To ensure prompt customs clearance of the products and to assist internal transportation of the products in Macedonia;
- 6-3. To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in Macedonia with respect to the purchase of the products and the services be exempted;
- 6-4. To accord Japanese nationals whose services may be required in connection with the supply of products as may be necessary for their entry into Macedonia and stay therein for the performance of their work, if the services above are judged necessary after further examination;
- 6-5. To ensure that the products be installed by Public Enterprise Makedonijapat other than those installed in the Project;
- 6-6. To ensure that the products be maintained and used properly and effectively to make best use of the equipment in future, including purchase of all the necessary consumables for continuous use of the equipment;
- 6-7. To provide JICA with necessary information upon the request of JICA;
- 6-8. To bear all the expenses, other than those to be borne by the Project, necessary for the transportation and installation of the products, when necessary.

Annex-1 Site Map

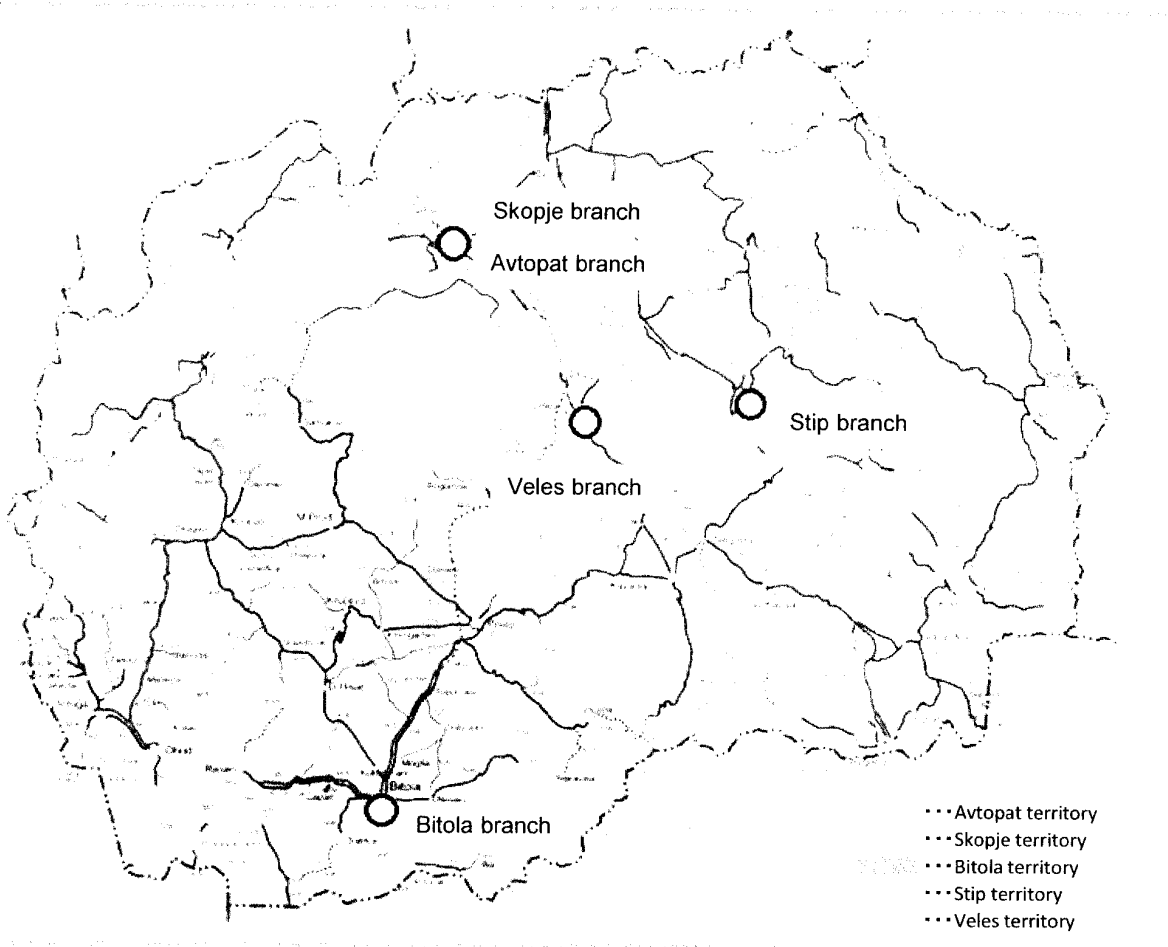
Annex-2 Organization chart of MTC

Annex-3 Organization chart of Public Enterprise Makedonijapat

Annex-4 Equipment List in the Original Project to be examined and considered for the components of the Project



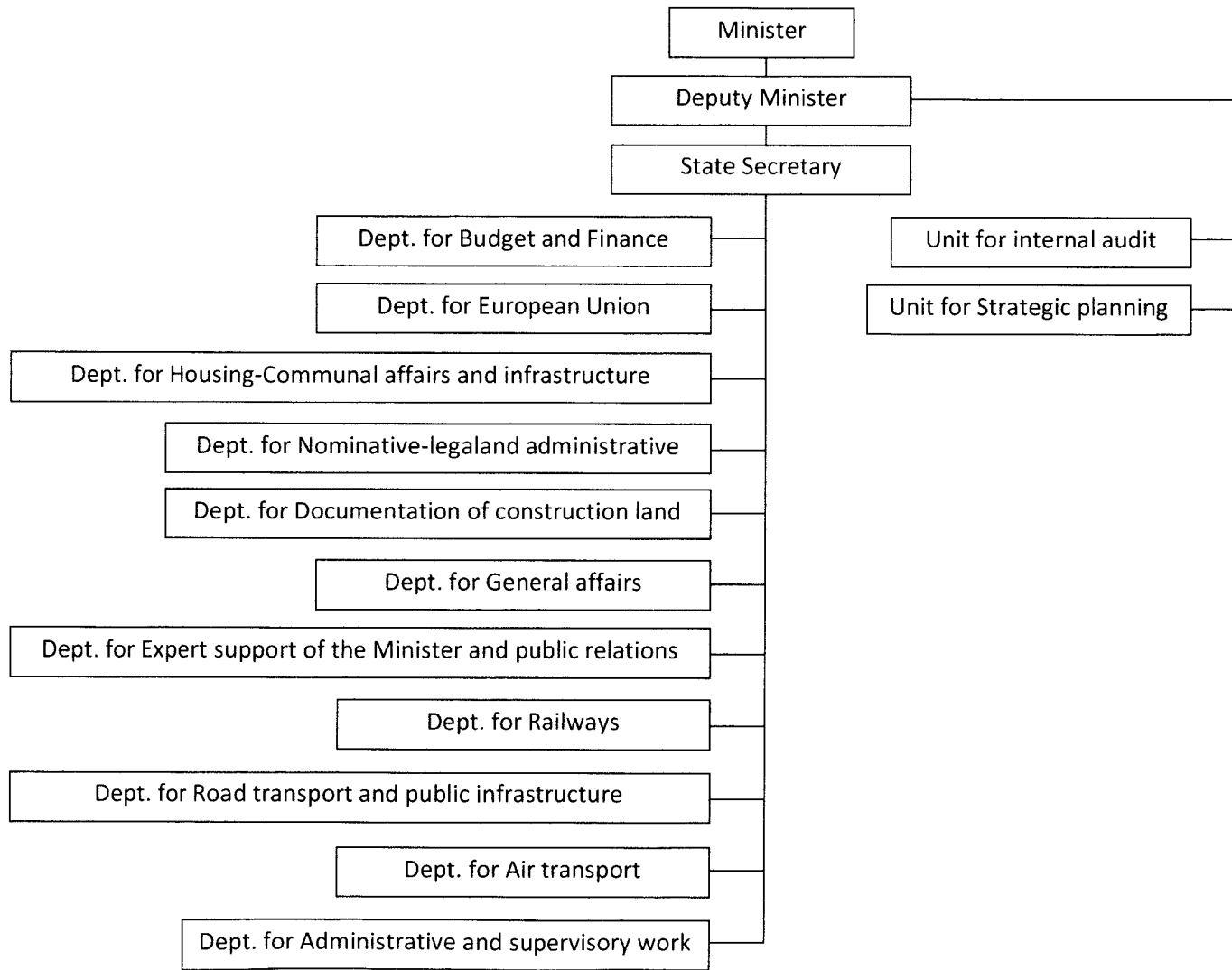
Site Map



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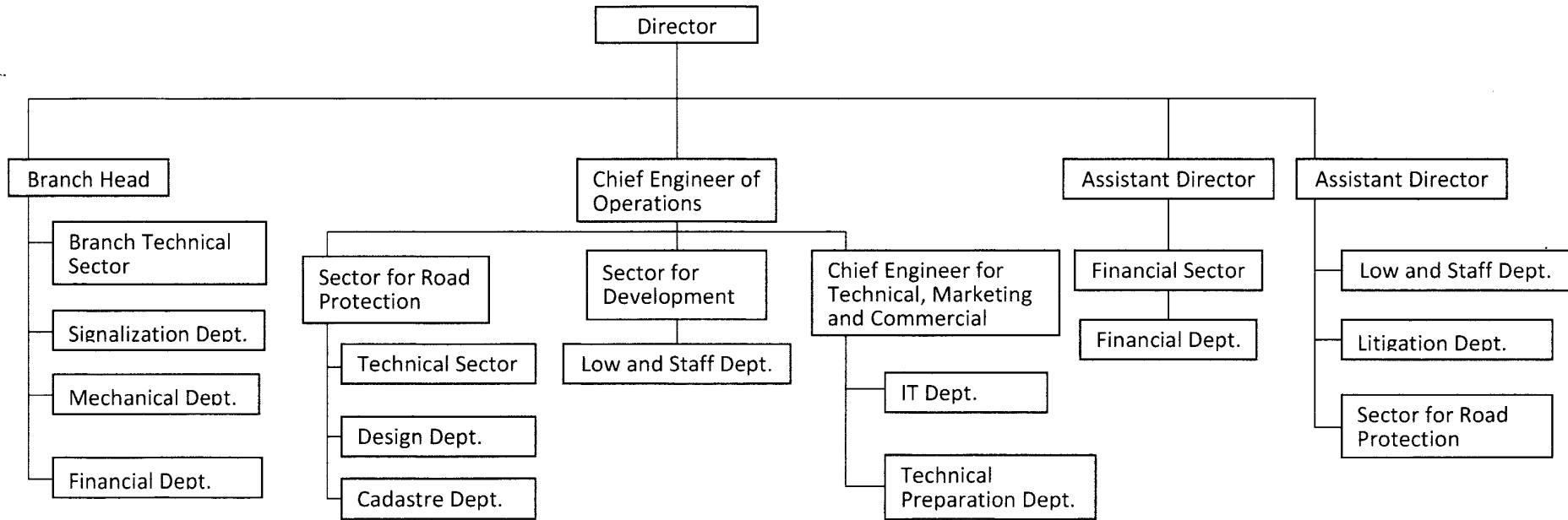
Organization Chart of MTC



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Organization Chart of Public Enterprise Makedonijapat



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Equipment List in the Original Project
to be examined and considered for the components of the Project

No.	Equipment	Model	Q'ty	Manufacturer
1	Bulldozer	D65E-12	2	Komatsu
2	Motor Grader	GD511A-1	4	Komatsu
3	Wheel Loader	WA320-3 Custom	4	Komatsu
4	Hydraulic Excavator (Crawler type)	PC200-6 Excel	1	Komatsu
5	Hydraulic Excavator (Wheel type)	PW100-3	1	Komatsu
6	Vibration Roller (10ton)	SW750H	4	Sakai
7	Vibration Roller (4ton)	SW500-1E	4	Sakai
8	Tire Roller	TS200	4	Sakai
9	Asphalt Finisher	NFB60W-V	4	Niigata
10	Asphalt Distributor	NDS-40DDT(S)/ LKC210DHHC	1	Niigata Nissan Diesel
11	Dump Truck	DR-8/ PKC212EHLB	8	Shinmeiwa Nissan Diesel
12	Workshop Tools	NT-0701 (MGC-3) etc.	4	Maruma Technica
13	Asphalt Mixing Plant	TAP-800LB +SB-60	1	Tanaka

22nd October, 2014

Mr. Haruo FUKUCHI
Consultant Team Leader
JICA Follow-up Study Team

Dear Sir,

I have the honor to acknowledge the receipt of your letter, dated 22nd October, 2014, regarding the signature of the Technical Note on the Follow-up Study on the Project for Improvement of Road Maintenance Equipment (hereinafter referred to as "the Study"), agreed between the Public Enterprise Makedonijapat and JICA Follow-up Study Team (hereinafter referred to as "the Team").

Hereby, I have confirmed that the Technical Note, which is duly described in the attachment, have been agreed between the Public Enterprise Makedonijapat and the Team.

However, I declare that the Republic of Macedonia does not accept the denomination used for my country in the abovementioned Technical Note, having in view that the constitutional name of my country is the Republic of Macedonia.



Gajur KADRIU
Director
Public Enterprise Makedonijapat
Republic of Macedonia

TECHNICAL NOTE
ON
THE FOLLOW-UP STUDY
ON
THE PROJECT FOR IMPROVEMENT OF ROAD MAINTENANCE EQUIPMENT
IN
THE REPUBLIC OF MACEDONIA



22nd October, 2014

Mr. Gajur KADRIU
Director
Public Enterprise Makedonijapat
Former Yugoslav Republic of Macedonia

Dear Sir,

I have the honor to refer to our recent discussions regarding technical items of the Follow-up Study on the Project for Improvement of Road Maintenance Equipment (hereinafter referred to as "the Study").

I hereby have confirmed that the Technical Note, which is duly described in the attachment, have been agreed between the Public Enterprise Makedonijapat and the JICA Study Team (hereinafter referred to as "the Team"). The Team will proceed to further works and prepare the Follow-up Study Report.

I would very appreciate it if you could confirm the Technical Note on behalf of the Public Enterprise Makedonijapat.

Yours Sincerely,



Mr. Haruo FUKUCHI
Consultant Team Leader
JICA Follow-up Study Team

TECHNICAL NOTE
ON
THE FOLLOW-UP STUDY
ON
THE PROJECT FOR IMPROVEMENT OF ROAD MAINTENANCE EQUIPMENT
IN
THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

Frank J.F.

ATTACHMENT**1. Prioritization Criteria for the Study**

The Macedonian side and the Team agreed the prioritization criteria for the Study as follows:

The prioritization procedure is divided into two (2) steps.

(1) The prioritization for the Equipment (Step 1)

Each equipment is ranked with marks ("High", "Middle" or "Low") according to the evaluation items as listed below:

- (a) Impact on efficiency of road maintenance works
- (b) Contribution toward its life extension of equipment
- (c) Difficulty of substitutions

(2) The prioritization for the spare parts required for repair and maintenance of the Equipment (Step 2)

Each spare part is ranked with marks ("High", "Middle" or "Low") according to the evaluation items as listed below:

- (a) Urgency
- (b) Difficulty of Local / Regional Availability
- (c) Cost Performance

2. Tentative Evaluation results of the Equipment

The tentative evaluation results of current condition and priority order of the Equipment to be repaired is shown in Annex-1.

3. Tentative Evaluation Results of the spare parts of the Equipment excluding the Asphalt Mixing Plant

The tentative evaluation results of the spare parts required for repair and maintenance of the Equipment excluding the Asphalt Mixing Plant is shown in Annex-2.

4. Tentative Evaluation Results of the Asphalt Mixing Plant

The tentative evaluation results of current condition and priority order of the component for the Asphalt Mixing Plant to be repaired is shown in Annex-3.

5. Tentative Evaluation Results of the spare parts of the Asphalt Mixing Plant

The tentative evaluation results of the spare parts required for repair and maintenance of the Asphalt Mixing Plant is shown in Annex-4.

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Annex-1 Tentative Evaluation results of the Equipment to be repaired

Annex-2 Tentative Evaluation results of the spare parts of
the Equipment excluding the Asphalt Mixing Plant

Annex-3 Tentative Evaluation results of the Asphalt Mixing Plant

Annex-4 Tentative Evaluation results of the spare parts of the Asphalt Mixing Plant

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Annex-1

Tentative Evaluation results of the Equipment to be repaired

No	Equipment (Model)	Manufacturer	Q'ty	Serial No.	Branch Name	Current Condition	Evaluation Result			Priority Rank
							Impact on Efficiency	Contribution to Life Extension	Difficulty of Substitution	
1	Bulldozer (D65E-12)	Komatsu	2	65105	Veles	Good	Middle	Middle	High	<i>Middle</i>
				65104	Bitola	Good				
2	Motor Grader (GD511A-1)	Komatsu	4	11224	Skopje	Good, with engine starting problem	High	Middle	High	<i>High</i>
				11222	Veles	Good, with parts required				
				11223	Stip	Good				
				11225	Bitola	Good, with parts required				
3	Wheel Loader (WA320-3 Custom)	Komatsu	4	54150	Skopje	Good	High	Middle	Middle	<i>Middle</i>
				54151	Veles	Good				
				54152	Stip	Good				
				54149	Bitola	Good, with parts required				
4	Hydraulic Excavator -Crawler type (PC200-6 Excel)	Komatsu	1	110551	Stip	Fair, with parts required	High	Middle	High	<i>High</i>
5	Hydraulic Excavator -Wheel type (PW100-3)	Komatsu	1	3512	Bitola	Good, with repairs required (oil leakage)	Middle	Middle	Middle	<i>Middle</i>
6	Vibration Roller -10ton (SW750H)	Sakai	4	20209	Skopje	Good	High	High	Middle	<i>High</i>
				20210	Veles	Good				
				20208	Stip	Fair, with repairs required				
				20211	Bitola	Good				
7	Vibration Roller -4ton (SW500-1E)	Sakai	4	10111	Skopje	Good	Middle	Middle	Middle	<i>Middle</i>
				10110	Veles	Good				
				10108	Stip	Out of order, both rear motors problem				
				10109	Bitola	Fair, no vibration				
8	Tire Roller (TS200)	Sakai	4	23236	Skopje	Good	High	Middle	High	<i>High</i>
				23233	Veles	Good				
				23234	Stip	Good				
				23235	Bitola	Good, with parts required				



9	Asphalt Finisher (NFB60W-V)	Niigata	4	20138	Skopje	Good, with parts required	High	High	High	<i>High</i>
				20139	Veles	Good, with some minor problem				
				20140	Stip	Good, with parts required				
				20137	Bitola	Good, with parts required				
10	Asphalt Distributor (NDS-40DDT(S)/LKC210DHHC)	Niigata Nissan Diesel	1	00107	Skopje	Good	Middle	Middle	Middle	<i>Middle</i>
11	Dump Truck (DR-8/ PKC212EHLB)	Shinmeiwa Nissan Diesel	8	001362H	Skopje	Fair, with parts required	High	High	Middle	<i>High</i>
				001368H	Skopje	Fair, with problem				
				00347	Veles	Good, with parts required				
				32014916 03	Veles	Good, but under repairing				
				00349	Stip	Good, with minor problem				
				00345	Stip	Good, with minor problem				
				00351	Bitola	Fair, with parts required				
				00350	Bitola	Fair, with parts required				
12	Workshop Tools (NT-0701) etc.	Maruma Technica	4	-	-	-	Middle	Middle	Low	<i>Low</i>
13	Asphalt Mixing Plant	Tanaka	1	-	-	-	High	High	High	<i>High</i>

Annex-2

Tentative Evaluation results of the spare parts required for repair and maintenance
of the Equipment excluding the Asphalt Mixing Plant

No	Equipment Model	Serial No.	Branch Name	Parts Name	Parts No.	Q'ty	Evaluation Result			Priority Rank
							Urgency	Difficulty of Availability	Cost Performance	
1	Bulldozer D65E-12	65105	Veles	Nil	-					
		65104	Bitola	Nil	-					
2	Motor Grader GD511A-1	11224	Skopje	Relay, E/G stop	569-06-61960	1	Middle	Low	Middle	Low
		11222	Veles	Edge	233-971-5120	2	Middle	Low	Middle	Low
		11223	Stip	Nil	-					
		11225	Bitola	Edge	232-70-12142	2	Middle	Low	High	Low
				Edge	233-971-5120	2	Middle	Low	High	Low
		Tooth	09271-00045	11	Middle	Low	Middle	Low		
3	Wheel Loader WA320-3 Custom	54150	Skopje	Nil	-					
		54151	Veles	Nil	-					
		54152	Stip	Nil	-					
		54149	Bitola	Seal	ND028901-5190	1	Middle	Low	Middle	Low
				O-ring	ND90801-20470	1	Middle	Low	Middle	Low
4	Crawler type excavator PC200-6	110551	Stip	Pins of bucket linkage	To be confirmed	4	Middle	Low	High	Low
				Side cutter	To be confirmed	2	Middle	Low	High	Low
				Diaphragm	MC7624310700	1	High	High	High	High
				Chisel point	MC7627990010	1	High	High	High	High
5	Wheel type excavator PW100-3	3512	Bitola	Nil	-					
6	10ton Vibratory roller SW750H	20209	Skopje	Nil	-					
		20210	Veles	Nil	-					
		20208	Stip	Pump	4704-77000-2	1	Middle	High	High	High
		20211	Bitola	Pump	4704-77000-2	1	Middle	High	High	High
7	4ton Vibratory roller SW500-1E	10111	Skopje	Pump	4704-77000-2	1	Middle	High	High	High
		10110	Bitola	Nil	-					
		10108	Stip	Nil	-					
		10109	Bitola	Hyd. motor etc.	To be confirmed	2	Middle	High	Middle	Middle
8	Tire roller TS200	23236	Skopje	Nil	-					
		23233	Veles	Nil	-					
		23234	Stip	Nil	-					
		23235	Bitola	Pump	4704-77000-2	1	Middle	High	High	High
9	Asphalt finisher NFB60W-V	20138	Skopje	Piston rings	Isuzu 112121-1150	1	Middle	High	High	High
		20139	Veles	Nil	-					
		20140	Stip	Nil	-					
		20137	Bitola	Nil	-					
		Common	Board	H903 41301	4	High	High	High	High	High
			Solid tire	N2008138U1	8	High	High	High	High	High
			Shut-off valve	To be confirmed	4	Middle	High	High	High	High
Hyd. oil filter	2026073U1		8	High	High	High	High	High		
10	Asphalt distributor LKC210	00107	Skopje	Nil	-					

11	Dump truck PKC212LB	001362H	Skopje	Starting relay	23220-NB006	1	Middle	Middle	Middle	<i>Middle</i>
				Flywheel	12310-Z504B	1	High	High	High	<i>High</i>
				Seal		1	Middle	Middle	High	<i>Middle</i>
				Starting motor	23300-Z5572	1	High	Middle	High	<i>High</i>
		001368H	Skopje	ECU	25947-Z5610	1	High	High	High	<i>High</i>
		00347	Veles	ECU	25947-Z5610	1	High	High	High	<i>High</i>
		320149 1603	Veles	Hyd. pump	To be confirmed		Middle	High	Middle	<i>Middle</i>
		00349	Stip	Nil	-					
		00345	Stip	Nil	-					
		00351	Bitola	Oil pan	11110-Z5513	1	High	High	High	<i>High</i>
				Gasket	11121-Z5506	1	High	High	High	<i>High</i>
		00350	Bitola	ECU	25947-Z5610	1	High	High	High	<i>High</i>
				Oil pan	11110-Z5513	1	High	High	High	<i>High</i>
				Gasket	11121-Z5506		High	High	High	<i>High</i>
				Shaft	To be confirmed		High	High	Middle	<i>High</i>
		Common		Fuel filter	16444-97001	16	High	High	High	<i>High</i>
Pre fuel filter	16403-99011			16	High	High	High	<i>High</i>		
Oil filter	15201-Z9009			64	High	High	High	<i>High</i>		
Clutch cover (clutch plate)	30210-Z5101			4	High	High	High	<i>High</i>		
Air filter outer	16546-99316			16	High	High	High	<i>High</i>		
Air filter in	16546-99203			16	High	High	High	<i>High</i>		

Annex-3

Tentative Evaluation results of the Asphalt Mixing Plant

No	Component	Current Condition	Problem	Evaluation Result			Priority Rank
				Impact on Efficiency	Contribution to Life Extension	Difficulty of Substitution	
1	Weight Unit	Fair,	① Risk of lightning damage	High	Middle	High	High
2	Dryer	Fair	① Thermocouple wear	High	Middle	Middle	Middle
			② Wheel(roller) and reduction gear wear				
3	Dryer burner	Fair	① Wear of flow meter, pump and nozzle	High	High	High	High
			② Broken pressure gauge by vibration				
			③ Risk of flame eye breakage				
4	Cold aggregate conveyor	Fair	① Risk of worn-out rollers	Middle	Middle	Middle	Middle
5	Hot elevator	Good	Nil				
6	Stock bin	Fair	① Risk of breakage of air cylinder	Middle	Middle	High	Middle
7	Belt conveyor	Fair	① Stuck rollers	Middle	Middle	Middle	Middle
			② Risk of breakage of motor pulley				
8	Surge bin	Fair	① Risk of wear of magnet valve and limit switch	High	Middle	High	High
9	Mixer	Fair	① Risk of wear of air cylinder packing	High	Middle	Middle	Middle
10	Dust collector	Fair	① Clogging of filter bag and some bags have holes	High	High	High	High
			② Risk of deterioration of valve				
			③ Risk of breakage of transferring blower				



Annex-4

Tentative Evaluation results of the spare parts of the Asphalt Mixing Plant

No	Component	Parts Name	Parts No.	Q'ty	Request	Evaluation Result			Priority Rank
						Urgency	Difficulty of Availability	Cost Performance	
1	Weight Unit	① Control panel (Base board)	81208	1	Yes	Middle	High	High	High
		① Aggregate scale unit (transmitter 4mA ~ 20mA)	80801	1	Yes	Middle	Middle	High	Middle
		① Load cell for aggregate	80805	1	Yes	Middle	High	High	High
		① Load cell for filler	80806	1	Yes	Middle	High	High	High
		① Load cell for asphalt	80807	1	Yes	Middle	High	High	High
2	Dryer	① Thermocouple	80231	1	Yes	Middle	Low	High	Low
		② Wheel	80246	4	Yes	Middle	Low	Middle	Low
		② Shaft	80247	4	No	Middle	Low	Middle	Low
		② Gib-headed taper key	80248	4	No	Middle	Low	Middle	Low
		② Reduction gear	80252	4	Yes	Middle	High	High	High
		① Nozzle head	80303	1	Yes	Middle	High	High	High
3	Dryer burner	① Nozzle orifice	80304	1	Yes	Middle	High	High	High
		① Copper Packing	80305	1	Yes	Middle	High	High	High
		① Copper Packing	80306	1	Yes	Middle	High	High	High
		① O-ring	80307	1	Yes	Middle	High	High	High
		① Gas magnet valve	80321	1	Yes	Middle	High	High	High
		① Control motor	80385	1	Yes	Middle	Middle	High	Middle
		① Flow meter	80390	1	Yes	High	Low	High	Low
		① Screw pump	80386	1	No	High	High	High	High
		① Oil flow valve	80353-80379	1	No	High	High	High	High
		② Pressure gauge	80392	2	No	High	High	High	High
		③ Flame eye	80319	1	No	Middle	High	High	High
		4	Cold aggregate conveyor	① Carrier roller	80123	15	Yes	Middle	Low
① Return roller	80124			2	Yes	Middle	Low	High	Low
5	Hot elevator	Nil	Nil						
6	Stock bin	① Air cylinder	80737	1	Yes	Middle	High	High	High
7	Belt conveyor	① Carrier roller (only roller)	BC8005	36	Yes	High	Low	High	Low
		① Return roller (only roller)	BC8006	6	Yes	High	Low	High	Low
		① Snap roller	BC8004	3	Yes	Middle	Low	High	Low
		① Roller F200	BC8025	1	Yes	Middle	Low	Middle	Low
		② Motor pulley	BC8002	1	No	Middle	High	High	High
8	Surge bin	① Limit switch 1LS-550	TB6017	6	Yes	Middle	High	High	High
		① Magnet valve MVS-15A	TB6044	1	Yes	Middle	High	High	High
		① Magnet valve	OP60418	2	No	Middle	High	High	High
9	Mixer	① Cylinder (packing set)	80924	2	No	Middle	High	High	High
10	Dust collector	① Filter cloth	BF80029	240	No	High	High	High	High
		① Band	BF80030	240	No	High	High	High	High
		② Valve (magnet valve)	BF80016	5	No	Middle	High	High	High
		② Valve (Diaphragm packing set)	BF80016	10	No	Middle	High	High	High
		③ Transferring blower	DR80023	1	No	Middle	High	High	High



Machine conditions Checked on Oct 13, 2014

Type	: Bulldozer	Manufacturer	: Komatsu
Model	: D65E-12	Serial number	: 65105
Branch	: Skopje branch		
Check point	: Beljakovci job site, 20km from Kumanovo Land clearing job		
Service meter/odd meter	:	Out of order (stopped at 937Hr)	
Overall conditions	:	Good	
1. Coolant leakage occurred one month ago. Radiator sealant (SONAX) was procured from Tovi , Skopje and put in. The operator is wondering until when this sealant works.			
2. Alternator could not charge 5 – 6 years ago and was replaced with genuine one.			
3. Service meter stopped. Mr. Nikola will fix it.			



Machine conditions Checked on Oct 09, 2014

Type	: Motor grader	Manufacturer	: Komatsu
Model	: GD511A-1	Serial number	: 11224
Branch	: Skopje branch		
Check point	: Mogorche job site near Debal Spreading roadbed material for improving the unpaved road		
Service meter/odd meter	:	Out of order (stopped at 1,780Hr 2 years ago)	
Overall conditions	:	Good	
1. Starting switch sometimes fails. Engine stop relay has a problem. At present the operator directly connects the starting motor with a wrench.			
2. In 2012 the rear tires were replaced. The shop was TDA Trade , Skopje city.			
3. Twice a year the engine oil was changed before and after the winter season.			
4. Cutting edges of front dozer were replaced with local-make ones in 2012.			



Machine conditions Checked on Oct 09, 2014

Type	: Wheel loader	Manufacturer	: Komatsu
Model	: WA320-3	Serial number	: 54150
Branch	: Skopje branch		
Check point	: Lazaropole borrowing area of roadbed material The materials were loaded onto dumpers and carried to Mogorche job site where grader and roller were working.		
Service meter/odd meter	: 5,824Hr		
Overall conditions	: Good		
1. This machine was moved from the asphalt base in Skopje on 06 of October but would be returned in the week of 13th.			
2. Fuel gauge was broken.			
3. The operator said after 2 to 3 hour working, sound comes from inside of the work equipment lever, which could not be confirmed by the checker.			
4. Hydraulic filter was replaced around 5months ago, until then noise came from the Hydraulic tank.			



Machine conditions Checked on Oct 09, 2014

Type	: 10ton Vibratory roller	Manufacturer	: Sakai H. I. (Heavy Industry)
Model	: SW750H	Serial number	: SW13-20209
Branch	: Skopje branch		
Check point	: Mongorche job site near Debal Compaction of spreaded roadbed materials		
Service meter/odd meter	: 2,666Hr		
Overall conditions	: Good		
1. Caution lamps of battery charging and oil pressure were kept on lighting.			
2. Forward side rubber isolator of right-hand rear were replaced with local make ones which were found at Veles branch in May, 2013. Rear side rubber absorbers were original ones, but without any problems.			



Machine conditions Checked on Oct 07, 2014

Type	: 4ton Vibratory roller	Manufacturer	: Sakai H. I.
Model	: SW500-1E	Serial number	: VSW18-10111
Branch	: Skopje branch		
Check point	: Skopje branch		
Service meter/odd meter	:	1,541Hr	
Overall conditions	:	Good	
1. A sprinkler pump is out of order.			



Machine conditions Checked on Oct 13, 2014

Type	: Tire roller	Manufacturer	: Sakai H. I.
Model	: TS200	Serial number	: TTS6-23236
Branch	: Skopje branch		
Check point	: Beljakovci job site, where D65E-12 #65105 of Skopje branch was also working.		
Service meter/odd meter	:	2,572Hr / 12,890m	
Overall conditions	:	Good	
1. Left-side rear tire was side-cut. An order of new tire was placed 6months ago, and arrived at Skopje in the beginning of October. That's a BKT tire from India with price of 1300-1400 Euro. That tire is to be installed after bringing back to Skopje once this job is finished.			
2. The water pump for spraying was repaired 3 years ago.			



Machine conditions Checked on Oct 13, 2014

Type	: Asphalt finisher	Manufacturer	: Niigata (Sumitomo)
Model	: NFB60W-V	Serial number	: NFB6W-20138
Branch	: Skopje branch		
Check point	: Beljakovci job site, where D65E-12 #65105 of Skopje branch was also working.		
Service meter/odd meter	:	3,198Hr	
Overall conditions	:	Good	
1. Mr. Nikola , an engineer of Makedonijapat, repaired the starting circuit around 2years ago.			
2. The shafts of sprocket driving chains were replaced, twice at left, once at right.			
3. The starting motor and the alternator were replaced at the service point in Skopje of ISKRA, a Slovenian Company .			
4. Oil consumption rate is high, 1.5liters per 50 liters of fuel. Even 2 years ago, the engine was repaired at Skopje by the mechanics of TOTI PROM – Kavadarci , the piston rings have to be changed.			



Machine conditions Checked on Oct 09, 2014

Type	: Dump truck	Manufacturer	: Nissan Diesel (UD trucks)
Model	: PKC212EHLB	Serial number	: PKC212E-00346
Branch	: Skopje branch	E/G serial number:	FE6-001362H
Check point	: Lazaropole job site (Debal) where WA320 was working Hauling roadbed materials to Mogorche		
Service meter/odd meter	:	404,590km	
Overall conditions	:	Fair	
1. One week ago the starting switch was broken, so additional circuit was set near the steering wheel to start-up.			
2. In June the starting motor was replaced by ISKRA , a Slovene company but without genuine parts. So the seal cannot be fitted completely, resulting in water invasion.			
3. According Mr. Saso, Skopje branch mechanization manager, there are cracking at the flywheel and the pressure plate with highest priority for repairing together with the starting motor as secondary priority.			



Machine conditions Checked on Oct 07, 2014

Type	: Dump truck	Manufacturer	: Nissan Diesel (UD trucks)
Model	: PKC212EHLB	Serial number	: PKC212E-00348
Branch	: Skopje branch	E/G serial number	: FE6-001368H
Check point	: Skopje branch		
Service meter/odd meter	:	792,868km	
Overall conditions	:	Fair	
1. Engine did not start when checking was done, but the next day could be started. (On 13th also did not start.)			
2. The pressure plate was worn-out.			



Machine conditions Checked on Oct 07, 2014

Type	: Asphalt distributor	Manufacturer	: Nissan Diesel (UD trucks)
Model	: LKC210D	Serial number	: LKC210D-00707
Branch	: Skopje branch	E/G serial number	: FE6-214790C
Check point	: Skopje branch		
Service meter/odd meter	:	49,602km	
Overall conditions	:	Good	



Machine conditions Checked on Oct 08, 2014

Type	: Motor grader	Manufacturer	: Komatsu
Model	: GD511A-1	Serial number	: 11222
Branch	: Veles branch		
Check point	: Veles branch		
Service meter/odd meter	:	3,789Hr	
Overall conditions	:	Good	
1. Rotation direction of front tires is incorrect, so exchange was requested.			
2. Left-side cutting edge was split partially, but still there are 5cm wear allowance at right side.			



Machine conditions Checked on Oct 08, 2014

Type	: Wheel loader	Manufacturer	: Komatsu
Model	: WA320-3	Serial number	: 54151
Branch	: Veles branch		
Check point	: Veles branch		
Service meter/odd meter	:	4,401Hr	
Overall conditions	:	Good	
1. The starting motor was replaced.			
2. The alternator was repaired partially in Veles.			
3. Water pump of the engine was replaced with imported one from Greece.			
4. The Front glass was cracked.			



Machine conditions Checked on Oct 08, 2014

Type	: 10ton Vibratory roller	Manufacturer	: Sakai H. I. (Heavy Industry)
Model	: SW750H	Serial number	: VSW13-20210
Branch	: Veles branch		
Check point	: Veles branch		
Service meter/odd meter	:	2,622Hr	
Overall conditions	:	Good	
1. Very good conditions except 16 (4 x 4) rubber isolators.			
2. Blades of rollers are self-make.			



Machine conditions Checked on Oct 08, 2014

Type	: 4ton Vibratory roller	Manufacturer	: Sakai H. I.
Model	: SW500-1E	Serial number	: VSW18-10110
Branch	: Veles branch		
Check point	: Veles branch		
Service meter/odd meter	:	1,599Hr	
Overall conditions	:	Good	



Machine conditions Checked on Oct 08, 2014

Type	: Tire roller	Manufacturer	: Sakai H. I.
Model	: TS200	Serial number	: TTS6-23233
Branch	: Veles branch		
Check point	: Veles branch		
Service meter/odd meter	:	11,661Hr	
Overall conditions	:	Good	
1. Water pump for spraying was changed.			
2. Water separator was contaminated much.			



Machine conditions Checked on Oct 08, 2014

Type	: Asphalt finisher	Manufacturer	: Niigata (Sumitomo)
Model	: NFB60W-V	Serial number	: NFB6W-20139
Branch	: Veles branch		
Check point	: Veles branch		
Service meter/odd meter	:	3,415Hr	
Overall conditions	:	Good	
1. Control of travelling speed was mal-functioning sometimes. The board of speed control is out of order. This trouble happened on the all finishers.			
2. Front tires were worn out			



Machine conditions Checked on Oct 08, 2014

Type	: Dump truck	Manufacturer	: Nissan Diesel (UD trucks)
Model	: PKC212EHLB	Serial number	: PKC212E-00347
Branch	: Veles branch	E/G serial number	: FE6-001363H
Check point	: Veles branch		
Service meter/odd meter	:	186,260km	
Overall conditions	:	Good	
1. Engine control unit was out of order.			



Machine conditions Checked on Oct 08, 2014

Type	: Dump truck	Manufacturer	: Nissan Diesel (UD trucks)
Model	: Veles branch	Serial number	: PKC212E-00348
Branch	: Veles branch	E/G serial number	: FE6-001368H
Check point	: Veles branch		
Service meter/odd meter	:	221,678km	
Overall conditions	:	Good, but under repairing	
1. Hydraulic motor was detached and sent to Skopje for repairing.			
2. Pre-fuel filter (16403—99011) has not been changed, because they did not receive them. However delivery record shows each 2 sets were delivered per unit, and 1 set is still stocked based on the part stock log.			
3. ALCO make SP-848, a locally procured fuel filter, was attached.			



Machine conditions Checked on Oct 10, 2014

Type	: Motor grader	Manufacturer	: Komatsu
Model	: GD511A-1	Serial number	: 11223
Branch	: Stip branch		
Check point	: Mokrino village, Municipality of Novo Selo (near the border with Bulgaria). Grading work at village road		
Service meter/odd meter	:	Out of order	(stopped at 2,175Hr)
Overall conditions	:	Good	
1. Worn-out tires which were attached a few years ago. Their brand is Taishan, Chinese.			
2. Cutting edges of front dozer are original ones.			
3. Cutting edges of blade are changed every year. Trakparts are importing from Greece.			



Machine conditions Checked on Oct 10, 2014

Type	: Wheel loader	Manufacturer	: Komatsu
Model	: WA320-3	Serial number	: 54152
Branch	: Stip branch		
Check point	: Delchevo office of Stip branch		
Service meter/odd meter	:	4,278Hr	
Overall conditions	:	Good	
1. This machine was moved from asphalt base.			
2. 90% of works are for gravel loading, remained 10% for road clearing after landslide.			
3. Front tires were changed with East-up, Chinese ones, on the other hand front tires have not been changed.			
4. Locally procured fuel filter is used; Luber-finer LFF4294 or Baldwin BT339.			
5. Engine oil and filter are replaced before winter.			



Machine conditions Checked on Oct 10, 2014

Type	: Hydraulic excavator	Manufacturer	: Komatsu
Model	: PC200-6	Serial number	: 110551
Branch	: Stip branch		
Check point	: Mokrino village, Municipality of Novo Selo (near the border with Bulgaria).		
Service meter/odd meter	:	5,851Hr	
Overall conditions	:	Fair	
1. Pins at bucket linkage are worn-out, making noise and difficult to fine jobs			
2. 5 years ago, the machine fell down and the top of boom were bended, so the arm is attached incorrectly.			
3. Bucket has a large crack necessary to weld and side cutters are worn-out.			
4. Left-side track frame parts are broken, so the front idler cannot be adjusted. They also repaired the same of right-side 3months ago. Metalomekanica in Skopje Repaired by 1,500Euro.			
4. Control valve of breaker JKHB1500 became out of order 1 month ago.			



Machine conditions Checked on Oct 10, 2014

Type	: 10ton Vibratory roller	Manufacturer	: Sakai H. I. (Heavy Industry)
Model	: SW750H	Serial number	: VSW13-20208
Branch	: Stip branch		
Check point	: Mokrino village, Municipality of Novo Selo (near the border with Bulgaria).		
Service meter/odd meter	:	4002Hr	
Overall conditions	:	Fair	
1. All the caution lamps keep turning on even when the engine is running.			
2. Near the cab a polyester tank is attached as a fuel tank. This is because the air enters the fuel line when the ordinal tank is used, and every 15minutes the operator must take out air from the fuel line.			
3. Sprinkler pump is out of order.			



Machine conditions Checked on Oct 08, 2014

Type	: 4ton Vibratory roller	Manufacturer	: Sakai H. I.
Model	: SW500-1E	Serial number	: VSW18-10108
Branch	: Stip branch		
Check point	: Stip branch workshop		
Service meter/odd meter	:	1,252Hr	
Overall conditions	:	Out of service	
1. This machine was stopped working for 4 – 5 years. Both rear hydraulic motors were broken. Makedonija PAT sought the motors in Greece, but failed.			
2. This machine is said to be used as cannibalization.			



Machine conditions Checked on Oct 08, 2014

Type	: Tire roller	Manufacturer	: Sakai H. I.
Model	: TS200	Serial number	: TTS6-23234
Branch	: Stip branch		
Check point	: Stip branch workshop		
Service meter/odd meter	:	3,126Hr / 11,856km	
Overall conditions	:	Good	
1. In May 2014 the filters were changed as follows;			
Fuel filter	Baldwin BF76		
E/G oil filter	Baldwin B-205		
2. Water separator was contaminated.			



Machine conditions Checked on Oct 08, 2014

Type	: Asphalt finisher	Manufacturer	: Niigata (Sumitomo)
Model	: NFB60W-V	Serial number	: NFB6W20140
Branch	: Stip branch		
Check point	: Stip branch		
Service meter/odd meter	:	3,247Hr	
Overall conditions	:	Good	
1. The machine just returned from work.			
2. The operator complained when dials of both side conveyors are set to the same position, each conveyors runs with different speed. However this difference of speed can be adjusted by setting the dials properly.			
3. The front wheels are worn-out.			



Machine conditions Checked on Oct 08, 2014

Type	: Dump truck	Manufacturer	: Nissan diesel (UD trucks)
Model	: PKC212EHLB	Serial number	: PKC212E-00349
Branch	: Stip branch	E/G serial number	: FE6-001369H
Check point	: Stip branch		
Service meter/odd meter	:	297,758km	
Overall conditions	:	Good	
1. The operator complained that the locally procured V-belt for alternator with 13mm width could not be fixed with tension because width of the original V-belt was 15mm width. We suggested the tension lever to fix properly.			
2. There was oil leakage from hydraulic hose to the dump cylinder.			



Machine conditions Checked on Oct 10, 2014

Type	: Dump truck	Manufacturer	: Nissan Diesel (UD trucks)
Model	: PKC212EHLB	Serial number	: PKC212E-00345
Branch	: Stip branch	E/G serial number	: FE6-001355H
Check point	: Stip branch Smojmirovo office (south-east of Delcevo)		
Service meter/odd meter	:	337,117km	
Overall conditions	:	Good	
1. The driver told there was no problem, but Mr. Petko explained sometimes the starting motor sometimes failed to start.			
2. Vessel was so rusty because of hot hauled asphalt with 170 degrees Celcius.			
.			



Machine conditions Checked on Oct 15, 2014

Type	: Bulldozer	Manufacturer	: Komatsu
Model	: D65E-12	Serial number	: 65104
Branch	: Bitola branch		
Check point	: Bitola branch, Asphalt base		
Service meter/odd meter	:	1,564Hr	
Overall conditions	:	Good	
1. There was water leakage from radiator, and brazing works were done at their workshop 3 to 4 years ago.			
2. One year ago a hydraulic hose was replaced.			



Machine conditions Checked on Oct 15, 2014

Type	: Motor grader	Manufacturer	: Komatsu
Model	: GD511A-1	Serial number	: 11225
Branch	: Bitola branch		
Check point	: Bitola branch, asphalt base		
Service meter/odd meter	:	Out of order (stopped at 573Hr)	
Overall conditions	:	Good	
1. Cutting edges of front dozer and blade, teeth of scarifier are not so good. Edges of blade are locally-make, edges of front dozer are split, and 2 of 9 scarifier teeth are not attached.			
2. Rear tires were changed with Mitas, Czech.			
3. 2 – 3 years ago, the center of radiator fan was broken partially, but repaired.			
4. There is no trace of engine oil and filter change.			



Machine conditions Checked on Oct 15, 2014

Type	: Wheel loader	Manufacturer	: Komatsu
Model	: WA320-3	Serial number	: 54149
Branch	: Bitola branch		
Check point	: Bitola branch, asphalt base		
Service meter/odd meter	:	3,680Hr	
Overall conditions	:	Good	
1. During warranty period, the starting motor was broken, and TEI, the distributor, Replaced. But now oil leakage has started.			
2. Bucket was modified by removing teeth and welding steel plate for better scooping at asphalt base.			
3. Tires were changed twice. At present Romanian for rear and Chinese for front,			
4. T/C oil temperature is now out of order.			



Machine conditions Checked on Oct 15, 2014

Type	: Wheel excavator	Manufacturer	: Komatsu
Model	: PW100-3	Serial number	: 3512
Branch	: Bitola branch		
Check point	: Ohrid, making drainage canal from the culvert to prevent from submergence.		
Service meter/odd meter	:	Out of service (stropped at 1,719Hr)	
Overall conditions	:	Good	
1. Tachometer was out of order.			
2. There was oil leakage from hydraulic valve. After this job, the machine would be transported to Bitola city for repairing.			
3. Even there are 19 original fuel filters at Avtopat, but local procured filter was Attached.			



Machine conditions Checked on Oct 16, 2014

Type	: 10ton Vibratory roller	Manufacturer	: Sakai H. I. (Heavy Industry)
Model	: SW750H	Serial number	: VSW13-20211
Branch	: Bitola branch		
Check point	: Outskirts of Kichevo Paving work of route A2e (13.5m width x 850m length)		
Service meter/odd meter	:	2,880Hr	
Overall conditions	:	Good	
1. A sprinkler pump is out of order.			



Machine conditions Checked on Oct 15, 2014

Type	: 4ton Vibratory roller	Manufacturer	: Sakai H. I.
Model	: SW500-1E	Serial number	: VSW18-10109
Branch	: Bitola branch		
Check point	: Bitola branch, asphalt base		
Service meter/odd meter	:	1,657Hr	
Overall conditions	:	Fair	
1. For 7 to 8 months vibration did not work on both front and rear. Mr. Nikola of Skopje, an electrical engineer came to fix but failed			



Machine conditions Checked on Oct 16, 2014

Type	: Tire roller	Manufacturer	: Sakai H.I.
Model	: TS200	Serial number	: TTS6-23235
Branch	: Bitola branch		
Check point	: Outskirts of Kichevo Paving work of route A2e (13.5m width x 850m length)		
Service meter/odd meter	:	3,683Hr	
Overall conditions	:	Good	
1. Water pump for spraying did not work 3 to 4 years ago. The pump of 4ton vibratory roller is used now.			



Machine conditions Checked on Oct 16, 2014

Type	: Asphalt finisher	Manufacturer	: Niigata (Sumitomo)
Model	: NFB60W-V	Serial number	: NFB6W20137
Branch	: Bitola branch		
Check point	: Outskirts of Kichevo Paving work of route A2e (13.5m width x 850m length)		
Service meter/odd meter	:	2,535Hr	
Overall conditions	:	Good	
1. Worn-out of front wheels. Sometimes wheels stop while travelling.			
2. Conveyers sometimes stop. Widening both side wings can restart.			
3. There are mal-functioning of T/M control valve sometimes. Opening the valve by the operator can fix and shifting gear becomes possible.			
4. Sounds came from the hydraulic pump when the engine speed ran fast.			
5. Lower electronic board in the control box was repaired by Mr. Nikola in June, 2014.			



Machine conditions Checked on Oct 16, 2014

Type	: Dump truck	Manufacturer	: Nissan Diesel (UD trucks)
Model	: PKC212EHLB	Serial number	: PKC212E-00351
Branch	: Bitola branch	E/G serial number	: FE6-001379H
Check point	: Outskirts of Kichevo Paving work of route A2e (13.5m width x 850m length)		
Service meter/odd meter	:	246,244km	
Overall conditions	:	Fair	
1. There was oil leakage from below part of the engine, the engine oil pan perhaps. Welding works had been done twice, but still oil was leaked.			
2. The genuine wheel nuts were stolen, so stud bolts and nuts were changed.			



Machine conditions Checked on Oct 15, 2014

Type	: Dump truck	Manufacturer	: Nissan Diesel (UD trucks)
Model	: PKC212EHLB	Serial number	: PKC212E-00350
Branch	: Bitola branch	E/G serial number	: FE6-001377H
Check point	: Skopje branch, Prilep office		
Service meter/odd meter	:	144,951km	
Overall conditions	:	Fair	
1. 3years ago T/M was repaired BNVAP (Kichevo) at Skopje. Because of difficulty of gear shifting.			
2. ECU(Engine Control Unit) became out of order 3 -4 years ago.			
3. Locally procured clutch disk are procured from BNVAP every year.			
4. There was fuel leakage from the tank 1 year ago, but being repaired.			
5. When shifting the gear from low speed to higher in winter, stuck at the air valve with noise makes impossible. Removing the hose can shift to higher speed.			

General view



Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Status of plant	In operation		

Units of Cold bin, Belt feeder Belt conveyor



Cold bin, Belt feeder, Belt conveyor

Carrier and return rollers of belt conveyor



Pushing roller at the bending corner and large block removing device

Scratch of belt feeder belt

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Cold bin, Belt feeder, Belt conveyor		
Status of units	In operation with minor problems at various points		

1. Cold bin: The base was distorted by contacts of the wheel loader. Warning was issued to the manager.
2. Belt feeder: There are scratches and wear at the belt, which is to be changed when necessary.
3. Belt conveyor: There are scratches and wear at the belt, which is to be changed when necessary. Out of 72 carrier rollers 13 are stuck. Immediate replacement is required. At the bending corner, the pushing roller, F200, was replaced with a local one, but is to be replaced again with a genuine roller. Screen for removing large boulders was installed, which is said to be very effective.

Units of Aggregate conveyor, Dryer



Cold aggregate conveyor, Dryer

Cold aggregate conveyor



Dryer driving parts such as rollers

Internal turbines of the Dryer.
There are quite few damages.

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Cold aggregate conveyor, Dryer		
Status of units	In operation. Few problems at present.		

- There are quite few damages at the dryer. The internal turbine is stout also.
The driving wheel has worn out slightly, but no problem at present. A spare is desirable.
A reduction gear rotates eccentrically. Further tightening is requested to the plant manager.
The thrust rollers and the ring tire are worn slightly, but no problem.
- The belt of cold aggregate conveyor was damaged and are planned to be replaced.
The chain cover is kept on having taken off. Asked the manager to attach it.

Unit of Dryer burner



Front view of Dryer burner

Dryer, Dryer burner



Vicinity of the pump

Dryer burner (view from dryer inside)

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Dryer burner		
Status of unit	In operation with problems.		

- Flow meter does not work because of being damaged.
- Two fuel pressure gauges were broken. Secondary fuel pressure gauge of 2 mPa is installed.
Both gauges are required to be replaced with normal gauges of 5 mPa.
- Fuel pump makes large noise. The inner rotor is considered to be worn out.
The fuel pump is required to be replaced.
- The quality of fuel is said to be bad.

Unit of Asphalt plant



Bucket chain of hot elevator (quite few wear)



General view of the asphalt plant



Screen of Vibrating sieve (still workable)



Inside Mixer (No wear at rotating wings and so on)

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Asphalt plant (Hot elevator, Vibrating sieve, Weighing unit, Mixer)		
Status of unit	In operation. No problem at present.		
<p>1. Less wear at all parts.</p> <p>2. Modification was done to suppress variation of dust volume at the stock bin.</p>			

Unit of Dust collector



General view of dust collector (Part1)



General view of dust collector (Part2), dust from the chimney



Inside bag filter (some torn filters)



Manometer indicating 1970Pa

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Dust collector (Dry type dust collector, Bag filter, Dust recovery system)		
Status of unit	In operation with problems		
<p>1. Filters at the bag filter are torn and some dust is emitted from the chimney. The differential pressure is around 2000Pa, slightly large because of clogging. All filters are requested to be changed.</p>			

Unit of Filler feeding



Top of filler silo, Upper part of filler elevator



General view of Filler feeding unit



Buckets of Filler elevator and upper shoot



Stepless level gauge (Sounding leveler)

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Filler feeding unit, Filler silo		
Status of unit	In operation with some minor problems		
<p>1. Filler may be leaked from mini bag at the top of filler silo. Filters may be not fixed or torn. No interference to asphalt production even checking is required.</p> <p>2. To measure the remained volume of filler silo, the leveler of empty and full position was attached position. originally. For convenience Japan-make sounding leveler was installed locally to detect the intermediate position.</p> <p>3. Filler feeding unit has no problem.</p>			

Unit of Asphalt supply system



General view of asphalt supply system



Vicinity of hot oil circulation pump



Heat piping at asphalt tank



Locally replaced gear pump at the ground

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Asphalt supply system (Asphalt tank, hot oil heater, asphalt piping)		
Status of unit	In operation with minor problems.		
<p>1. Originally required time to warm asphalt tank was for 10hours, but is now for 25hours. Carbonized material is attached to heat piping at the asphalt plant, to be taken away in winter.</p> <p>2. Noise comes from the hot oil circulation pump. Bearing is to be checked. Coupling was replaced with China-make, which is cheaper but with shorter life than Japan-make.</p> <p>3. Gear pumps on the asphalt tank and at the ground were replaced locally.</p> <p>4. Piping connecting asphalt lorry and asphalt tank was clogged, so replaced locally.</p>			

Unit of Surge bin



Spilled asphalt mixture is building up near the winch.



General view of surge bin



Asphalt mixture is just put in the bucket of Skip.



Top view of the trolley

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Surge bin (Surge bin, trolley, Skip frame, Charge gate)		
Status of unit	In operation with minor problems.		

1. Skip is operating per batch of mixer.
2. Around 150kg of asphalt mixture is attached at the bucket of skip.
3. Brake of the winch operates almost without slippage.
The wires were replaced frequently. Local wire has different specifications and shorter life.
4. Asphalt mixture is building up near the winch and to be taken away immediately.

Unit of Control room



Control room inside



Replaced base board because of being damaged



Newly replaced load cell amplifier



Newly replaced inverter

Plant name	Asphalt plant	Manufacturer	Tanaka Iron Works Co., Ltd.
Model	TAP-800, SB-60	Serial number	0106572
Production	Approximately 210,000tons (Accumulated)		
Unit name	Control room (Control panel, Switch board)		
Status of unit	In operation		

1. Many parts were struck by lightning.
The control panel, the inverter, the load cell and so on were damaged by lightning.