



BACKGROUND PAPER 14 (PHASE I)

The Burden of Maintenance: Roads in Sub-Saharan Africa

COUNTRY ANNEX

*Ken Gwilliam, Vivien Foster, Rodrigo Archondo-Callao,
Cecilia Briceño-Garmendia, Alberto Nogales,
and Kavita Sethi*

JUNE 2008

Africa's Infrastructure | A Time for Transformation

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1818 H Street, NW
Washington, DC 20433 USA
Telephone: 202-473-1000
Internet: www.worldbank.org
E-mail: feedback@worldbank.org

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The World Bank
1818 H Street, NW
Washington, DC 20433 USA

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About AICD



This study is a product of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. AICD will provide a baseline against which future improvements in infrastructure services can be measured, making it possible to monitor the results achieved from donor support. It should also provide a better empirical foundation for prioritizing investments and designing policy reforms in Africa's infrastructure sectors.



AICD is based on an unprecedented effort to collect detailed economic and technical data on African infrastructure. The project has produced a series of reports (such as this one) on public expenditure, spending needs, and sector performance in each of the main infrastructure sectors—energy, information and communication technologies, irrigation, transport, and water and sanitation. *Africa's Infrastructure—A Time for Transformation*, published by the World Bank in November 2009, synthesizes the most significant findings of those reports.



AICD was commissioned by the Infrastructure Consortium for Africa after the 2005 G-8 summit at Gleneagles, which recognized the importance of scaling up donor finance for infrastructure in support of Africa's development.



The first phase of AICD focused on 24 countries that together account for 85 percent of the gross domestic product, population, and infrastructure aid flows of Sub-Saharan Africa. The countries are: Benin, Burkina Faso, Cape Verde, Cameroon, Chad, Côte d'Ivoire, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage is expanding to include as many other African countries as possible.



Consistent with the genesis of the project, the main focus is on the 48 countries south of the Sahara that face the most severe infrastructure challenges. Some components of the study also cover North African countries so as to provide a broader point of reference. Unless otherwise stated,



therefore, the term “Africa” will be used throughout this report as a shorthand for “Sub-Saharan Africa.”



The World Bank is implementing AICD with the guidance of a steering committee that represents the African Union, the New Partnership for Africa’s Development (NEPAD), Africa’s regional economic communities, the African Development Bank, the Development Bank of Southern Africa, and major infrastructure donors.



Financing for AICD is provided by a multidonor trust fund to which the main contributors are the U.K.’s Department for International Development, the Public Private Infrastructure Advisory Facility, Agence Française de Développement, the European Commission, and Germany’s KfW Entwicklungsbank. The Sub-Saharan Africa Transport Policy Program and the Water and Sanitation Program provided technical support on data collection and analysis pertaining to their respective sectors. A group of distinguished peer reviewers from policy-making and academic circles in Africa and beyond reviewed all of the major outputs of the study to ensure the technical quality of the work.



The data underlying AICD’s reports, as well as the reports themselves, are available to the public through an interactive Web site, www.infrastructureafrica.org, that allows users to download customized data reports and perform various simulations. Inquiries concerning the availability of data sets should be directed to the editors at the World Bank in Washington, DC.



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ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Benin

Basic country data								
Total population (millions)	8.693	Land area (sq km)		110,620		AICD study average		
Rural population (millions)	5.172	Motorized vehicle fleet (units)		100,000		Income group	Sub-region	
Urban population (millions)	3.521	GDP current prices (US\$ billions)		4.775		Low income	Western Africa	
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	2,386	2,348	3,597	1,821	6,510	8,332		
Percentage of classified network (%)	29%	28%	43%	22%	78%			
Unclassified network length [km]						7,368		
Total network length [km]						15,700		
% of classified network that is primary network						29%	19%	22%
% of classified network that is paved						22%	20%	23%
Network length density								
Classified network density per area (km per 1,000 sq km)						75	93	84
Classified network density per population (km per 1,000 people)						1.0	1.8	2.3
Classified network density per vehicle (per 1,000 vehicles)						83	141	86
Total network density per area (km per 1,000 sq km)						142	133	105
Total network density per population (km per 1,000 people)						1.8	2.4	3.1
Total network density per vehicle (per 1,000 vehicles)						157	191	115
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	33%	7%	23%	33%	18%	21%	32%	36%
% of classified network length in fair condition	25%	74%	43%	17%	55%	46%	30%	34%
% of classified network length in poor condition	43%	18%	34%	50%	27%	32%	38%	30%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	1,618	77	10	2,035	57	489	236	305
AADT in primary network (vehicles per day)						1,618	934	1,133
AADT in paved network (vehicles per day)						2,035	1,054	1,146
AADT in paved primary network (vehicles per day)						2,035	1,289	1,498
AADT in unpaved tertiary network (vehicles per day)						10	23	23
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	1,409	66	13	1,353	135	1,488		
Vehicle utilization as % of classified network utilization	95%	4%	1%	91%	9%			
Unclassified network annual vehicle utilization (million veh/km)						13		
Total network annual vehicle utilization (million veh/km)						1,501		
Primary network utilization as % of classified network utilization						95%	74%	79%
Paved network utilization as % of classified network utilization						91%	78%	86%
Unclassified network utilization as % of total network utilization						0.9%	0.5%	0.3%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							7,097		
Annual freight utilization of classified network (million tons per km)							2,876		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							2%	1%	1%
% paved roads in primary network with AADT of 300 or less							10%	24%	20%
% unpaved roads in primary network with AADT of 300 or more							34%	14%	13%
% paved roads in secondary network with AADT of 300 or less								37%	26%
% unpaved roads in secondary network with AADT of 300 or more							2%	4%	4%
% unpaved roads in tertiary network with AADT of 300 or less							95%	85%	82%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	539	84	85	519	189	708			
Road asset value as % of classified network	76%	12%	12%	73%	27%				
Asset value of primary paved network as % of classified network						73%	51%	57%	
Asset value of tertiary unpaved network as % of classified network						12%	16%	15%	
Classified net asset value as % of maximum asset value						80%	83%	83%	
Asset value of classified road network as % of GDP (%)						15%	25%	20%	
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	90%	7%	3%						
% of preservation requirements for primary network						90%	56%	43%	
Total road network preservation for a 20-year period (\$ millions)						619			
Average annual road network preservation (\$ millions)						31			
Average annual network preservation (years 1–5)(\$ millions)						63			
Average annual network preservation (years 6–20)(\$ millions)						20			
% required on road rehabilitation as % of preservation						63%	41%	43%	
% required on periodic maintenance as % of preservation						17%	33%	35%	
% Required on recurrent maintenance as % of preservation						20%	26%	66%	
Annual Network preservation requirements as % of GDP						0.6%	0.9%	0.7%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Burkina Faso

Basic country data								
Total population (millions)	1.758	Land area (sq km)			566,730		AICD study average	
Rural population (millions)	0.735	Motorized vehicle fleet (units)			130,000		Income group	Sub-region
Urban population (millions)	1.022	GDP current prices (US\$ billions)			10.328		Low income	Western Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	6,705	3,526	4,971	2,670	12,532	15,202		
Percentage of classified network (%)	44%	23%	33%	18%	82%			
Unclassified network length [km]						7,108		
Total network length [km]						22,310		
% of classified network that is primary network						44%	19%	22%
% of classified network that is paved						18%	20%	23%
Network length density								
Classified network density per area (km per 1,000 sq km)						27	93	84
Classified network density per population (km per 1,000 people)						8.6	1.8	2.3
Classified network density per vehicle (per 1,000 vehicles)						117	141	86
Total network density per area (km per 1,000 sq km)						39	133	105
Total network density per population (km per 1,000 people)						12.7	2.4	3.1
Total network density per vehicle (per 1,000 vehicles)						172	191	115
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	75%	72%	63%	67%	71%	70%	32%	36%
% of classified network length in fair condition	21%	11%	28%	30%	19%	21%	30%	34%
% of classified network length in poor condition	4%	17%	9%	4%	10%	9%	38%	30%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	339	47	29	722	52	170	236	305
AADT in primary network (vehicles per day)						339	934	1,133
AADT in paved network (vehicles per day)						722	1,054	1,146
AADT in paved primary network (vehicles per day)						726	1,289	1,498
AADT in unpaved tertiary network (vehicles per day)						28	23	23
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	831	60	52	704	239	943		
Vehicle utilization as % of classified network utilization	88%	6%	6%	75%	25%			
Unclassified network annual vehicle utilization (million veh/km)						13		
Total network annual vehicle utilization (million veh/km)						956		
Primary network utilization as % of classified network utilization						88%	74%	79%
Paved network utilization as % of classified network utilization						75%	78%	86%
Unclassified network utilization as % of total network utilization						1.3%	0.5%	0.3%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							4,342		
Annual freight utilization of classified network (million tons per km)							1,707		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							0%	1%	1%
% paved roads in primary network with AADT of 300 or less							26%	24%	20%
% unpaved roads in primary network with AADT of 300 or more							1%	14%	13%
% paved roads in secondary network with AADT of 300 or less							45%	37%	26%
% unpaved roads in secondary network with AADT of 300 or more							1%	4%	4%
% unpaved roads in tertiary network with AADT of 300 or less							74%	85%	82%
Network asset value	Pri- mary	Sec- ondary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	1,206	188	168	976	585	1,561			
Road asset value as % of classified network	77%	12%	11%	63%	37%				
Asset value of primary paved network as % of classified network						62%	51%	57%	
Asset value of tertiary unpaved network as % of classified network						11%	16%	15%	
Classified net asset value as % of maximum asset value						92%	83%	83%	
Asset value of classified road network as % of GDP (%)						15%	25%	20%	
Network preservation requirements	Pri- mary	Sec- ondary	Ter- tiary						
Distribution of preservation requirements by network type (%)	80%	14%	5%						
% of preservation requirements for primary network						80%	56%	43%	
Total road network preservation for a 20-year period (\$ millions)						1,066			
Average annual road network preservation (\$ millions)						53			
Average annual network preservation (years 1–5)(\$ millions)						64			
Average annual network preservation (years 6–20)(\$ millions)						50			
% required on road rehabilitation as % of preservation						6%	41%	43%	
% required on periodic maintenance as % of preservation						66%	33%	35%	
% Required on recurrent maintenance as % of preservation						28%	26%	66%	
Annual Network preservation requirements as % of GDP						0.5%	0.9%	0.7%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Cameroon

Basic country data								
Total population (millions)	16.683	Land area (sq km)		465,400		AICD study average		
Rural population (millions)	7.431	Motorized vehicle fleet (units)		260,000		Income group	Sub-region	
Urban population (millions)	9.252	GDP current prices (US\$ billions)		18.323		Lower middle income	Central Africa	
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	5,838	5,169	12,573	4,540	19,041	23,581		
Percentage of classified network (%)	25%	22%	53%	19%	81%			
Unclassified network length [km]						9,802		
Total network length [km]						33,383		
% of classified network that is primary network						25%	16%	25%
% of classified network that is paved						19%	17%	15%
Network length density								
Classified network density per area (km per 1,000 sq km)						51	93	87
Classified network density per population (km per 1,000 people)						1.4	8.8	1.6
Classified network density per vehicle (per 1,000 vehicles)						91	154	241
Total network density per area (km per 1,000 sq km)						72	115	222
Total network density per population (km per 1,000 people)						2.0	12.0	2.3
Total network density per vehicle (per 1,000 vehicles)						128	206	332
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	42%	39%	32%	37%	36%	36%	33%	28%
% of classified network length in fair condition	26%	28%	26%	16%	29%	27%	29%	24%
% of classified network length in poor condition	32%	34%	41%	48%	35%	37%	37%	48%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	879	239	30	1,099	92	286	341	191
AADT in primary network (vehicles per day)						879	1,186	629
AADT in paved network (vehicles per day)						1,099	1,474	828
AADT in paved primary network (vehicles per day)						1,387	1,660	923
AADT in unpaved tertiary network (vehicles per day)						23	36	11
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	1,872	451	140	1,821	643	2,463		
Vehicle utilization as % of classified network utilization	76%	18%	6%	74%	26%			
Unclassified network annual vehicle utilization (million veh/km)						18		
Total network annual vehicle utilization (million veh/km)						2,481		
Primary network utilization as % of classified network utilization						76%	70%	79%
Paved network utilization as % of classified network utilization						74%	77%	65%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Unclassified network utilization as % of total network utilization						0.7%	0.8%	1.3%
Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)						11,556		
Annual freight utilization of classified network (million tons per km)						4,615		
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more						0%	4%	0%
% paved roads in primary network with AADT of 300 or less						16%	29%	24%
% unpaved roads in primary network with AADT of 300 or more						36%	18%	18%
% paved roads in secondary network with AADT of 300 or less						49%	50%	24%
% unpaved roads in secondary network with AADT of 300 or more						18%	13%	9%
% unpaved roads in tertiary network with AADT of 300 or less						94%	80%	98%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	902	382	380	1,127	537	1,664		
Road asset value as % of classified network	54%	23%	23%	68%	32%			
Asset value of primary paved network as % of classified network						48%	48%	52%
Asset value of tertiary unpaved network as % of classified network						17%	17%	18%
Classified net asset value as % of maximum asset value						75%	80%	83%
Asset value of classified road network as % of GDP (%)						9%	30%	15%
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary					
Distribution of preservation requirements by network type (%)	67%	23%	10%					
% of preservation requirements for primary network						67%	55%	49%
Total road network preservation for a 20-year period (\$ millions)						1,347		
Average annual road network preservation (\$ millions)						67		
Average annual network preservation (years 1–5)(\$ millions)						145		
Average annual network preservation (years 6–20)(\$ millions)						41		
% required on road rehabilitation as % of preservation						62%	46%	49%
% required on periodic maintenance as % of preservation						16%	29%	22%
% Required on recurrent maintenance as % of preservation						22%	25%	71%
Annual Network preservation requirements as % of GDP						0.4%	1.2%	0.5%
Sources:								
AICD RONE Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Chad

Basic country data								
Total population (millions)	9.987	Land area (sq km)		1,259,200		AICD study average		
Rural population (millions)	7.414	Motorized vehicle fleet (units)		50,000		Income group	Sub-region	
Urban population (millions)	2.573	GDP current prices (US\$ billions)		6.541		Low income	Central Africa	
	CLASSIFIED ROAD NETWORK							
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	7,064	5,891	15,283	986	27,252	28,238		
Percentage of classified network (%)	25%	21%	54%	3%	97%			
Unclassified network length [km]						5,162		
Total network length [km]						33,400		
% of classified network that is primary network						25%	19%	25%
% of classified network that is paved						3%	20%	15%
Network length density								
Classified network density per area (km per 1,000 sq km)						22	93	87
Classified network density per population (km per 1,000 people)						2.8	1.8	1.6
Classified network density per vehicle (per 1,000 vehicles)						565	141	241
Total network density per area (km per 1,000 sq km)						27	133	222
Total network density per population (km per 1,000 people)						3.3	2.4	2.3
Total network density per vehicle (per 1,000 vehicles)						668	191	332
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	35%	28%	39%	81%	34%	36%	32%	28%
% of classified network length in fair condition	43%	27%	20%	7%	28%	27%	30%	24%
% of classified network length in poor condition	22%	44%	40%	13%	38%	37%	38%	48%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	143	32	5	519	28	45	236	191
AADT in primary network (vehicles per day)						143	934	629
AADT in paved network (vehicles per day)						519	1,054	828
AADT in paved primary network (vehicles per day)						515	1,289	923
AADT in unpaved tertiary network (vehicles per day)						5	23	11
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	369	69	28	187	278	465		
Vehicle utilization as % of classified network utilization	79%	15%	6%	40%	60%			
Unclassified network annual vehicle utilization (million veh/km)						9		
Total network annual vehicle utilization (million veh/km)						474		
Primary network utilization as % of classified network utilization						79%	74%	79%
Paved network utilization as % of classified network utilization						40%	78%	65%
Unclassified network utilization as % of total network utilization						2.0%	0.5%	1.3%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							2,094		
Annual freight utilization of classified network (million tons per km)							814		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							0%	1%	0%
% paved roads in primary network with AADT of 300 or less							25%	24%	24%
% unpaved roads in primary network with AADT of 300 or more							0%	14%	18%
% paved roads in secondary network with AADT of 300 or less							0%	37%	24%
% unpaved roads in secondary network with AADT of 300 or more							1%	4%	9%
% unpaved roads in tertiary network with AADT of 300 or less							100%	85%	98%
Network asset value	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	590	224	354	343	826	1,168			
Road asset value as % of classified network	51%	19%	30%	29%	71%				
Asset value of primary paved network as % of classified network						27%	51%	52%	
Asset value of tertiary unpaved network as % of classified network						30%	16%	18%	
Classified net asset value as % of maximum asset value						85%	83%	83%	
Asset value of classified road network as % of GDP (%)						18%	25%	15%	
Network preservation requirements	Pri- mary	Secon- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	65%	23%	11%						
% of preservation requirements for primary network						65%	56%	49%	
Total road network preservation for a 20-year period (\$ millions)						683			
Average annual road network preservation (\$ millions)						34			
Average annual network preservation (years 1–5)(\$ millions)						53			
Average annual network preservation (years 6–20)(\$ millions)						28			
% required on road rehabilitation as % of preservation						33%	41%	49%	
% required on periodic maintenance as % of preservation						31%	33%	22%	
% Required on recurrent maintenance as % of preservation						36%	26%	71%	
Annual Network preservation requirements as % of GDP						0.5%	0.9%	0.5%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Côte d'Ivoire

Basic country data								
Total population (millions)	18.468	Land area (sq km)			318,000		AICD study average	
Rural population (millions)	10.076	Motorized vehicle fleet (units)			352,117		Income group	Sub-region
Urban population (millions)	8.392	GDP current prices (US\$ billions)			17.484		Low income	Western Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	5,752	7,539	12,267	5,689	19,869	25,558		
Percentage of classified network (%)	23%	29%	48%	22%	78%			
Unclassified network length [km]						516		
Total network length [km]						26,074		
% of classified network that is primary network						23%	19%	22%
% of classified network that is paved						22%	20%	23%
Network length density								
Classified network density per area (km per 1,000 sq km)						80	93	84
Classified network density per population (km per 1,000 people)						1.4	1.8	2.3
Classified network density per vehicle (per 1,000 vehicles)						73	141	86
Total network density per area (km per 1,000 sq km)						82	133	105
Total network density per population (km per 1,000 people)						1.4	2.4	3.1
Total network density per vehicle (per 1,000 vehicles)						74	191	115
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	16%	4%	29%	17%	19%	18%	32%	36%
% of classified network length in fair condition	63%	91%	30%	63%	54%	56%	30%	34%
% of classified network length in poor condition	21%	5%	41%	20%	28%	26%	38%	30%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	682	212	16	843	47	224	236	305
AADT in primary network (vehicles per day)						682	934	1,133
AADT in paved network (vehicles per day)						843	1,054	1,146
AADT in paved primary network (vehicles per day)						951	1,289	1,498
AADT in unpaved tertiary network (vehicles per day)						14	23	23
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	1,433	585	72	1,751	338	2,089		
Vehicle utilization as % of classified network utilization	69%	28%	3%	84%	16%			
Unclassified network annual vehicle utilization (million veh/km)						1		
Total network annual vehicle utilization (million veh/km)						2,090		
Primary network utilization as % of classified network utilization						69%	74%	79%
Paved network utilization as % of classified network utilization						84%	78%	86%
Unclassified network utilization as % of total network utilization						0.0%	0.5%	0.3%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							9,727		
Annual freight utilization of classified network (million tons per km)							3,859		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							0%	1%	1%
% paved roads in primary network with AADT of 300 or less							24%	24%	20%
% unpaved roads in primary network with AADT of 300 or more							3%	14%	13%
% paved roads in secondary network with AADT of 300 or less							30%	37%	26%
% unpaved roads in secondary network with AADT of 300 or more							7%	4%	4%
% unpaved roads in tertiary network with AADT of 300 or less							93%	85%	82%
Network asset value	Pri- mary	Sec- ondary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	1,292	743	299	1,757	577	2,334			
Road asset value as % of classified network	55%	32%	13%	75%	25%				
Asset value of primary paved network as % of classified network						53%	51%	57%	
Asset value of tertiary unpaved network as % of classified network						12%	16%	15%	
Classified net asset value as % of maximum asset value						84%	83%	83%	
Asset value of classified road network as % of GDP (%)						13%	25%	20%	
Network preservation requirements	Pri- mary	Sec- ondary	Ter- tiary						
Distribution of preservation requirements by network type (%)	67%	29%	4%						
% of preservation requirements for primary network						67%	56%	43%	
Total road network preservation for a 20-year period (\$ millions)						1,651			
Average annual road network preservation (\$ millions)						83			
Average annual network preservation (years 1–5)(\$ millions)						132			
Average annual network preservation (years 6–20)(\$ millions)						66			
% required on road rehabilitation as % of preservation						42%	41%	43%	
% required on periodic maintenance as % of preservation						36%	33%	35%	
% Required on recurrent maintenance as % of preservation						22%	26%	66%	
Annual Network preservation requirements as % of GDP						0.5%	0.9%	0.7%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Ethiopia

Basic country data								
Total population (millions)	72.712	Land area (sq km)		1,000,000		AICD study average		
Rural population (millions)	60.874	Motorized vehicle fleet (units)		142,708		Income group	Sub-region	
Urban population (millions)	11.837	GDP current prices (US\$ billions)		13.315		Low income	Eastern Africa	
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	4,953	4,768	10,906	4,698	15,928	20,627		
Percentage of classified network (%)	24%	23%	53%	23%	77%			
Unclassified network length [km]						25,081		
Total network length [km]						45,708		
% of classified network that is primary network						24%	19%	14%
% of classified network that is paved						23%	20%	12%
Network length density								
Classified network density per area (km per 1,000 sq km)						21	93	134
Classified network density per population (km per 1,000 people)						0.3	1.8	1.4
Classified network density per vehicle (per 1,000 vehicles)						145	141	165
Total network density per area (km per 1,000 sq km)						46	133	151
Total network density per population (km per 1,000 people)						0.6	2.4	1.6
Total network density per vehicle (per 1,000 vehicles)						320	191	221
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	61%	28%	32%	66%	30%	38%	32%	31%
% of classified network length in fair condition	25%	38%	25%	22%	30%	28%	30%	27%
% of classified network length in poor condition	15%	34%	43%	12%	40%	34%	38%	42%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	474	142	85	499	101	192	236	185
AADT in primary network (vehicles per day)						474	934	859
AADT in paved network (vehicles per day)						499	1,054	1,367
AADT in paved primary network (vehicles per day)						522	1,289	1,539
AADT in unpaved tertiary network (vehicles per day)						82	23	27
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	857	246	340	856	587	1,443		
Vehicle utilization as % of classified network utilization	59%	17%	24%	59%	41%			
Unclassified network annual vehicle utilization (million veh/km)						45		
Total network annual vehicle utilization (million veh/km)						1,488		
Primary network utilization as % of classified network utilization						59%	74%	67%
Paved network utilization as % of classified network utilization						59%	78%	67%
Unclassified network utilization as % of total network utilization						3.0%	0.5%	0.6%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)							6,612	
Annual freight utilization of classified network (million tons per km)							2,592	
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more							0%	1% 1%
% paved roads in primary network with AADT of 300 or less							32%	24% 20%
% unpaved roads in primary network with AADT of 300 or more							40%	14% 24%
% paved roads in secondary network with AADT of 300 or less							0%	37% 21%
% unpaved roads in secondary network with AADT of 300 or more							6%	4% 5%
% unpaved roads in tertiary network with AADT of 300 or less							74%	85% 91%
Network asset value	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	1,558	315	420	1,669	625	2,293		
Road asset value as % of classified network	68%	14%	18%	73%	27%			
Asset value of primary paved network as % of classified network						66%	51%	41%
Asset value of tertiary unpaved network as % of classified network						16%	16%	20%
Classified net asset value as % of maximum asset value						85%	83%	82%
Asset value of classified road network as % of GDP (%)						17%	25%	22%
Network preservation requirements	Pri- mary	Secon- dary	Ter- tiary					
Distribution of preservation requirements by network type (%)	54%	23%	23%					
% of preservation requirements for primary network						54%	56%	30%
Total road network preservation for a 20-year period (\$ millions)						1,742		
Average annual road network preservation (\$ millions)						87		
Average annual network preservation (years 1–5)(\$ millions)						124		
Average annual network preservation (years 6–20)(\$ millions)						75		
% required on road rehabilitation as % of preservation						19%	41%	30%
% required on periodic maintenance as % of preservation						58%	33%	42%
% Required on recurrent maintenance as % of preservation						23%	26%	41%
Annual Network preservation requirements as % of GDP						0.7%	0.9%	1.0%
Sources:								
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Ghana

Basic country data								
Total population (millions)	22.533	Land area (sq km)		227,540		AICD study average		
Rural population (millions)	11.595	Motorized vehicle fleet (units)		653,309		Income group		Sub-region
Urban population (millions)	10.937	GDP current prices (US\$ billions)		12.906		Low income		Western Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	3,564	7,613	29,086	6,616	33,647	40,263		
Percentage of classified network (%)	9%	19%	72%	16%	84%			
Unclassified network length [km]						2,360		
Total network length [km]						42,623		
% of classified network that is primary network						9%	19%	22%
% of classified network that is paved						16%	20%	23%
Network length density								
Classified network density per area (km per 1,000 sq km)						177	93	84
Classified network density per population (km per 1,000 people)						1.8	1.8	2.3
Classified network density per vehicle (per 1,000 vehicles)						62	141	86
Total network density per area (km per 1,000 sq km)						187	133	105
Total network density per population (km per 1,000 people)						1.9	2.4	3.1
Total network density per vehicle (per 1,000 vehicles)						65	191	115
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	45%	41%	51%	66%	45%	49%	32%	36%
% of classified network length in fair condition	37%	29%	36%	29%	36%	35%	30%	34%
% of classified network length in poor condition	18%	30%	13%	5%	19%	17%	38%	30%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	1,855	262	50	1,314	40	250	236	305
AADT in primary network (vehicles per day)						1,855	934	1,133
AADT in paved network (vehicles per day)						1,314	1,054	1,146
AADT in paved primary network (vehicles per day)						2,936	1,289	1,498
AADT in unpaved tertiary network (vehicles per day)						28	23	23
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	2,413	729	527	3,172	497	3,669		
Vehicle utilization as % of classified network utilization	66%	20%	14%	86%	14%			
Unclassified network annual vehicle utilization (million veh/km)						4		
Total network annual vehicle utilization (million veh/km)						3,673		
Primary network utilization as % of classified network utilization						66%	74%	79%
Paved network utilization as % of classified network utilization						86%	78%	86%
Unclassified network utilization as % of total network utilization						0.1%	0.5%	0.3%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							17,274		
Annual freight utilization of classified network (million tons per km)							6,938		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							2%	1%	1%
% paved roads in primary network with AADT of 300 or less							13%	24%	20%
% unpaved roads in primary network with AADT of 300 or more							0%	14%	13%
% paved roads in secondary network with AADT of 300 or less							26%	37%	26%
% unpaved roads in secondary network with AADT of 300 or more							0%	4%	4%
% unpaved roads in tertiary network with AADT of 300 or less							72%	85%	82%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	852	1,327	1,368	2,168	1,379	3,547			
Road asset value as % of classified network	24%	37%	39%	61%	39%				
Asset value of primary paved network as % of classified network						22%	51%	57%	
Asset value of tertiary unpaved network as % of classified network						30%	16%	15%	
Classified net asset value as % of maximum asset value						91%	83%	83%	
Asset value of classified road network as % of GDP (%)						27%	25%	20%	
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	27%	44%	30%						
% of preservation requirements for primary network						27%	56%	43%	
Total road network preservation for a 20-year period (\$ millions)						2,266			
Average annual road network preservation (\$ millions)						113			
Average annual network preservation (years 1–5)(\$ millions)						132			
Average annual network preservation (years 6–20)(\$ millions)						107			
% required on road rehabilitation as % of preservation						33%	41%	43%	
% required on periodic maintenance as % of preservation						43%	33%	35%	
% Required on recurrent maintenance as % of preservation						24%	26%	66%	
Annual Network preservation requirements as % of GDP						0.9%	0.9%	0.7%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Kenya

Basic country data								
Total population (millions)	35.143	Land area (sq km)		569,140		AICD study average		
Rural population (millions)	27.763	Motorized vehicle fleet (units)		330,089		Income group		Sub-region
Urban population (millions)	7.380	GDP current prices (US\$ billions)		21.186		Low income		Eastern Africa
	CLASSIFIED ROAD NETWORK							
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	5,532	16,809	34,609	7,982	48,968	56,951		
Percentage of classified network (%)	10%	30%	61%	14%	86%			
Unclassified network length [km]						6,314		
Total network length [km]						63,265		
% of classified network that is primary network						10%	19%	14%
% of classified network that is paved						14%	20%	12%
Network length density								
Classified network density per area (km per 1,000 sq km)						100	93	134
Classified network density per population (km per 1,000 people)						1.6	1.8	1.4
Classified network density per vehicle (per 1,000 vehicles)						173	141	165
Total network density per area (km per 1,000 sq km)						111	133	151
Total network density per population (km per 1,000 people)						1.8	2.4	1.6
Total network density per vehicle (per 1,000 vehicles)						192	191	221
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	51%	51%	49%	47%	50%	50%	32%	31%
% of classified network length in fair condition	31%	23%	11%	37%	13%	16%	30%	27%
% of classified network length in poor condition	18%	26%	40%	17%	37%	34%	38%	42%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	1,156	207	24	1,108	38	188	236	185
AADT in primary network (vehicles per day)						1,156	934	859
AADT in paved network (vehicles per day)						1,108	1,054	1,367
AADT in paved primary network (vehicles per day)						1,661	1,289	1,539
AADT in unpaved tertiary network (vehicles per day)						20	23	27
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	2,335	1,269	298	3,229	672	3,901		
Vehicle utilization as % of classified network utilization	60%	33%	8%	83%	17%			
Unclassified network annual vehicle utilization (million veh/km)						11		
Total network annual vehicle utilization (million veh/km)						3,913		
Primary network utilization as % of classified network utilization						60%	74%	67%
Paved network utilization as % of classified network utilization						83%	78%	67%
Unclassified network utilization as % of total network utilization						0.3%	0.5%	0.6%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							18,269		
Annual freight utilization of classified network (million tons per km)							7,306		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							0%	1%	1%
% paved roads in primary network with AADT of 300 or less							26%	24%	20%
% unpaved roads in primary network with AADT of 300 or more							3%	14%	24%
% paved roads in secondary network with AADT of 300 or less							37%	37%	21%
% unpaved roads in secondary network with AADT of 300 or more							4%	4%	5%
% unpaved roads in tertiary network with AADT of 300 or less							89%	85%	91%
Network asset value	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	1,374	1,780	1,153	2,562	1,745	4,307			
Road asset value as % of classified network	32%	41%	27%	59%	41%				
Asset value of primary paved network as % of classified network						30%	51%	41%	
Asset value of tertiary unpaved network as % of classified network						23%	16%	20%	
Classified net asset value as % of maximum asset value						87%	83%	82%	
Asset value of classified road network as % of GDP (%)						20%	25%	22%	
Network preservation requirements	Pri- mary	Secon- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	33%	50%	17%						
% of preservation requirements for primary network						33%	56%	30%	
Total road network preservation for a 20-year period (\$ millions)						2,934			
Average annual road network preservation (\$ millions)						147			
Average annual network preservation (years 1–5)(\$ millions)						202			
Average annual network preservation (years 6–20)(\$ millions)						128			
% required on road rehabilitation as % of preservation						35%	41%	30%	
% required on periodic maintenance as % of preservation						39%	33%	42%	
% Required on recurrent maintenance as % of preservation						26%	26%	41%	
Annual Network preservation requirements as % of GDP						0.7%	0.9%	1.0%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Lesotho

Basic country data								
Total population (millions)	1.789	Land area (sq km)		30,350		AICD study average		
Rural population (millions)	1.449	Motorized vehicle fleet (units)		45,000		Income group	Sub-region	
Urban population (millions)	0.340	GDP current prices (US\$ billions)		1.476		Lower middle income	Southern Africa	
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Primary	Secondary	Tertiary	Paved	Un-paved	Classified		
Classified network length [km]	1,483	1,521	2,295	1,041	4,258	5,299		
Percentage of classified network (%)	28%	29%	43%	20%	80%			
Unclassified network length [km]						641		
Total network length [km]						5,940		
% of classified network that is primary network						28%	16%	17%
% of classified network that is paved						20%	17%	24%
Network length density								
Classified network density per area (km per 1,000 sq km)						175	93	92
Classified network density per population (km per 1,000 people)						3.0	8.8	4.9
Classified network density per vehicle (per 1,000 vehicles)						118	154	128
Total network density per area (km per 1,000 sq km)						196	115	128
Total network density per population (km per 1,000 people)						3.3	12.0	7.1
Total network density per vehicle (per 1,000 vehicles)						132	206	178
Network condition	Primary	Secondary	Tertiary	Paved	Un-paved	Classified		
% of classified network length in good condition	19%	25%	31%	23%	27%	26%	33%	31%
% of classified network length in fair condition	39%	32%	24%	42%	28%	30%	29%	29%
% of classified network length in poor condition	42%	43%	45%	35%	46%	43%	37%	39%
Network traffic	Primary	Secondary	Tertiary	Paved	Un-paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	1,350	497	59	2,175	148	546	341	379
AADT in primary network (vehicles per day)						1,350	1,186	1,664
AADT in paved network (vehicles per day)						2,175	1,474	1,323
AADT in paved primary network (vehicles per day)						2,232	1,660	1,855
AADT in unpaved tertiary network (vehicles per day)						59	36	29
Motorized vehicle network utilization	Primary	Secondary	Tertiary	Paved	Un-paved	Classified		
Classified network annual vehicle utilization (million veh/km)	731	276	50	827	230	1,057		
Vehicle utilization as % of classified network utilization	69%	26%	5%	78%	22%			
Unclassified network annual vehicle utilization (million veh/km)						1		
Total network annual vehicle utilization (million veh/km)						1,058		
Primary network utilization as % of classified network utilization						69%	70%	73%
Paved network utilization as % of classified network utilization						78%	77%	86%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Unclassified network utilization as % of total network utilization						0.1%	0.8%	0.4%
Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)						5,072		
Annual freight utilization of classified network (million tons per km)						2,068		
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more						10%	4%	5%
% paved roads in primary network with AADT of 300 or less						44%	29%	31%
% unpaved roads in primary network with AADT of 300 or more						18%	18%	6%
% paved roads in secondary network with AADT of 300 or less						27%	50%	72%
% unpaved roads in secondary network with AADT of 300 or more						18%	13%	4%
% unpaved roads in tertiary network with AADT of 300 or less						65%	80%	80%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	269	118	62	295	154	449		
Road asset value as % of classified network	60%	26%	14%	66%	34%			
Asset value of primary paved network as % of classified network						54%	48%	51%
Asset value of tertiary unpaved network as % of classified network						14%	17%	14%
Classified net asset value as % of maximum asset value						75%	80%	83%
Asset value of classified road network as % of GDP (%)						30%	30%	35%
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary					
Distribution of preservation requirements by network type (%)	58%	34%	8%					
% of preservation requirements for primary network						58%	55%	45%
Total road network preservation for a 20-year period (\$ millions)						475		
Average annual road network preservation (\$ millions)						24		
Average annual network preservation (years 1–5)(\$ millions)						42		
Average annual network preservation (years 6–20)(\$ millions)						18		
% required on road rehabilitation as % of preservation						41%	46%	45%
% required on periodic maintenance as % of preservation						37%	29%	29%
% Required on recurrent maintenance as % of preservation						22%	25%	47%
Annual Network preservation requirements as % of GDP						1.6%	1.2%	1.3%
Sources:								
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Madagascar

Basic country data								
Total population (millions)	19.087	Land area (sq km)		581,540		AICD study average		
Rural population (millions)	13.918	Motorized vehicle fleet (units)		150,000		Income group		Sub-region
Urban population (millions)	5.169	GDP current prices (US\$ billions)		5.499		Low income		Southern Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Primary	Secondary	Tertiary	Paved	Unpaved	Classified		
Classified network length [km]	2,991	6,608	16,042	5,045	20,596	25,641		
Percentage of classified network (%)	12%	26%	63%	20%	80%			
Unclassified network length [km]						3,952		
Total network length [km]						29,593		
% of classified network that is primary network						12%	19%	17%
% of classified network that is paved						20%	20%	24%
Network length density								
Classified network density per area (km per 1,000 sq km)						44	93	92
Classified network density per population (km per 1,000 people)						1.3	1.8	4.9
Classified network density per vehicle (per 1,000 vehicles)						171	141	128
Total network density per area (km per 1,000 sq km)						51	133	128
Total network density per population (km per 1,000 people)						1.6	2.4	7.1
Total network density per vehicle (per 1,000 vehicles)						197	191	178
Network condition	Primary	Secondary	Tertiary	Paved	Unpaved	Classified		
% of classified network length in good condition	64%	25%	10%	52%	12%	20%	32%	31%
% of classified network length in fair condition	22%	31%	5%	23%	12%	14%	30%	29%
% of classified network length in poor condition	14%	44%	85%	25%	77%	66%	38%	39%
Network traffic	Primary	Secondary	Tertiary	Paved	Unpaved	Classified		
Average Annual daily traffic (AADT), vehicles per day	854	276	12	827	19	178	236	379
AADT in primary network (vehicles per day)						854	934	1,664
AADT in paved network (vehicles per day)						827	1,054	1,323
AADT in paved primary network (vehicles per day)						992	1,289	1,855
AADT in unpaved tertiary network (vehicles per day)						8	23	29
Motorized vehicle network utilization	Primary	Secondary	Tertiary	Paved	Unpaved	Classified		
Classified network annual vehicle utilization (million veh/km)	932	666	68	1,523	143	1,666		
Vehicle utilization as % of classified network utilization	56%	40%	4%	91%	9%			
Unclassified network annual vehicle utilization (million veh/km)						7		
Total network annual vehicle utilization (million veh/km)						1,673		
Primary network utilization as % of classified network utilization						56%	74%	73%
Paved network utilization as % of classified network utilization						91%	78%	86%
Unclassified network utilization as % of total network utilization						0.4%	0.5%	0.4%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)							7,874	
Annual freight utilization of classified network (million tons per km)							3,173	
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more							1%	1% 5%
% paved roads in primary network with AADT of 300 or less							37%	24% 31%
% unpaved roads in primary network with AADT of 300 or more							0%	14% 6%
% paved roads in secondary network with AADT of 300 or less							60%	37% 72%
% unpaved roads in secondary network with AADT of 300 or more							0%	4% 4%
% unpaved roads in tertiary network with AADT of 300 or less							97%	85% 80%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	886	792	339	1,535	482	2,017		
Road asset value as % of classified network	44%	39%	17%	76%	24%			
Asset value of primary paved network as % of classified network						43%	51%	51%
Asset value of tertiary unpaved network as % of classified network						14%	16%	14%
Classified net asset value as % of maximum asset value						80%	83%	83%
Asset value of classified road network as % of GDP (%)						37%	25%	35%
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary					
Distribution of preservation requirements by network type (%)	34%	51%	15%					
% of preservation requirements for primary network						34%	56%	45%
Total road network preservation for a 20-year period (\$ millions)						1,443		
Average annual road network preservation (\$ millions)						72		
Average annual network preservation (years 1–5)(\$ millions)						128		
Average annual network preservation (years 6–20)(\$ millions)						54		
% required on road rehabilitation as % of preservation						52%	41%	45%
% required on periodic maintenance as % of preservation						24%	33%	29%
% Required on recurrent maintenance as % of preservation						25%	26%	47%
Annual Network preservation requirements as % of GDP						1.3%	0.9%	1.3%
Sources:								
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Malawi

Basic country data								
Total population (millions)	13.163	Land area (sq km)		94,080		AICD study average		
Rural population (millions)	10.838	Motorized vehicle fleet (units)		130,000		Income group		Sub-region
Urban population (millions)	2.325	GDP current prices (US\$ billions)		2.232		Low income		Southern Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	3,444	6,692	3,147	3,004	10,278	13,283		
Percentage of classified network (%)	26%	50%	24%	23%	77%			
Unclassified network length [km]						2,208		
Total network length [km]						15,491		
% of classified network that is primary network						26%	19%	17%
% of classified network that is paved						23%	20%	24%
Network length density								
Classified network density per area (km per 1,000 sq km)						141	93	92
Classified network density per population (km per 1,000 people)						1.0	1.8	4.9
Classified network density per vehicle (per 1,000 vehicles)						102	141	128
Total network density per area (km per 1,000 sq km)						165	133	128
Total network density per population (km per 1,000 people)						1.2	2.4	7.1
Total network density per vehicle (per 1,000 vehicles)						119	191	178
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition						41%	32%	31%
% of classified network length in fair condition						48%	30%	29%
% of classified network length in poor condition						12%	38%	39%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day						170	236	379
AADT in primary network (vehicles per day)						519	934	1,664
AADT in paved network (vehicles per day)						601	1,054	1,323
AADT in paved primary network (vehicles per day)						678	1,289	1,855
AADT in unpaved tertiary network (vehicles per day)						20	23	29
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)						826		
Vehicle utilization as % of classified network utilization								
Unclassified network annual vehicle utilization (million veh/km)						4		
Total network annual vehicle utilization (million veh/km)						830		
Primary network utilization as % of classified network utilization						79%	74%	73%
Paved network utilization as % of classified network utilization						80%	78%	86%
Unclassified network utilization as % of total network utilization						0.5%	0.5%	0.4%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							3,805		
Annual freight utilization of classified network (million tons per km)							1,497		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							0%	1%	5%
% paved roads in primary network with AADT of 300 or less							22%	24%	31%
% unpaved roads in primary network with AADT of 300 or more							13%	14%	6%
% paved roads in secondary network with AADT of 300 or less							87%	37%	72%
% unpaved roads in secondary network with AADT of 300 or more							0%	4%	4%
% unpaved roads in tertiary network with AADT of 300 or less							81%	85%	80%
Network asset value	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	862	464	103	961	467	1,428			
Road asset value as % of classified network	60%	32%	7%	67%	33%				
Asset value of primary paved network as % of classified network						57%	51%	51%	
Asset value of tertiary unpaved network as % of classified network						6%	16%	14%	
Classified net asset value as % of maximum asset value						90%	83%	83%	
Asset value of classified road network as % of GDP (%)						64%	25%	35%	
Network preservation requirements	Pri- mary	Secon- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	55%	40%	4%						
% of preservation requirements for primary network						55%	56%	45%	
Total road network preservation for a 20-year period (\$ millions)						929			
Average annual road network preservation (\$ millions)						46			
Average annual network preservation (years 1–5)(\$ millions)						54			
Average annual network preservation (years 6–20)(\$ millions)						44			
% required on road rehabilitation as % of preservation						34%	41%	45%	
% required on periodic maintenance as % of preservation						32%	33%	29%	
% Required on recurrent maintenance as % of preservation						34%	26%	47%	
Annual Network preservation requirements as % of GDP						2.1%	0.9%	1.3%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Mozambique

Basic country data								
Total population (millions)	20.144	Land area (sq km)		784,090		AICD study average		
Rural population (millions)	13.037	Motorized vehicle fleet (units)		187,660		Income group		Sub-region
Urban population (millions)	7.107	GDP current prices (US\$ billions)		7.608		Low income		Southern Africa
	CLASSIFIED ROAD NETWORK							
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	4,909	4,900	19,430	5,710	23,528	29,238		
Percentage of classified network (%)	17%	17%	66%	20%	80%			
Unclassified network length [km]						18,312		
Total network length [km]						47,550		
% of classified network that is primary network						17%	19%	17%
% of classified network that is paved						20%	20%	24%
Network length density								
Classified network density per area (km per 1,000 sq km)						37	93	92
Classified network density per population (km per 1,000 people)						1.5	1.8	4.9
Classified network density per vehicle (per 1,000 vehicles)						156	141	128
Total network density per area (km per 1,000 sq km)						61	133	128
Total network density per population (km per 1,000 people)						2.4	2.4	7.1
Total network density per vehicle (per 1,000 vehicles)						253	191	178
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	58%	26%	19%	51%	21%	27%	32%	31%
% of classified network length in fair condition	30%	52%	31%	33%	35%	34%	30%	29%
% of classified network length in poor condition	12%	21%	50%	16%	44%	39%	38%	39%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	905	147	58	888	52	215	236	379
AADT in primary network (vehicles per day)						905	934	1,664
AADT in paved network (vehicles per day)						888	1,054	1,323
AADT in paved primary network (vehicles per day)						1,003	1,289	1,855
AADT in unpaved tertiary network (vehicles per day)						47	23	29
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	1,622	263	410	1,851	444	2,295		
Vehicle utilization as % of classified network utilization	71%	11%	18%	81%	19%			
Unclassified network annual vehicle utilization (million veh/km)						33		
Total network annual vehicle utilization (million veh/km)						2,328		
Primary network utilization as % of classified network utilization						71%	74%	73%
Paved network utilization as % of classified network utilization						81%	78%	86%
Unclassified network utilization as % of total network utilization						1.4%	0.5%	0.4%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							10,674		
Annual freight utilization of classified network (million tons per km)							4,236		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							0%	1%	5%
% paved roads in primary network with AADT of 300 or less							34%	24%	31%
% unpaved roads in primary network with AADT of 300 or more							7%	14%	6%
% paved roads in secondary network with AADT of 300 or less							72%	37%	72%
% unpaved roads in secondary network with AADT of 300 or more							2%	4%	4%
% unpaved roads in tertiary network with AADT of 300 or less							53%	85%	80%
Network asset value	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	1,501	474	635	1,845	766	2,610			
Road asset value as % of classified network	58%	18%	24%	71%	29%				
Asset value of primary paved network as % of classified network						56%	51%	51%	
Asset value of tertiary unpaved network as % of classified network						21%	16%	14%	
Classified net asset value as % of maximum asset value						86%	83%	83%	
Asset value of classified road network as % of GDP (%)						34%	25%	35%	
Network preservation requirements	Pri- mary	Secon- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	53%	22%	25%						
% of preservation requirements for primary network						53%	56%	45%	
Total road network preservation for a 20-year period (\$ millions)						1,743			
Average annual road network preservation (\$ millions)						87			
Average annual network preservation (years 1–5)(\$ millions)						126			
Average annual network preservation (years 6–20)(\$ millions)						74			
% required on road rehabilitation as % of preservation						44%	41%	45%	
% required on periodic maintenance as % of preservation						32%	33%	29%	
% Required on recurrent maintenance as % of preservation						24%	26%	47%	
Annual Network preservation requirements as % of GDP						1.1%	0.9%	1.3%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Namibia

Basic country data								
Total population (millions)	2.051	Land area (sq km)			823,290		AICD study average	
Rural population (millions)	1.319	Motorized vehicle fleet (units)			177,220		Income group	Sub-region
Urban population (millions)	0.732	GDP current prices (US\$ billions)			6.372		Lower middle income	Southern Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	4,297	12,065	28,732	6,031	39,062	45,094		
Percentage of classified network (%)	10%	27%	64%	13%	87%			
Unclassified network length [km]						18,067		
Total network length [km]						63,161		
% of classified network that is primary network						10%	16%	17%
% of classified network that is paved						13%	17%	24%
Network length density								
Classified network density per area (km per 1,000 sq km)						55	93	92
Classified network density per population (km per 1,000 people)						22.0	8.8	4.9
Classified network density per vehicle (per 1,000 vehicles)						254	154	128
Total network density per area (km per 1,000 sq km)						77	115	128
Total network density per population (km per 1,000 people)						30.8	12.0	7.1
Total network density per vehicle (per 1,000 vehicles)						356	206	178
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	56%	44%	33%	57%	35%	38%	33%	31%
% of classified network length in fair condition	36%	42%	25%	36%	30%	30%	29%	29%
% of classified network length in poor condition	8%	14%	43%	7%	35%	32%	37%	39%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	1,329	173	28	1,147	43	191	341	379
AADT in primary network (vehicles per day)						1,329	1,186	1,664
AADT in paved network (vehicles per day)						1,147	1,474	1,323
AADT in paved primary network (vehicles per day)						1,362	1,660	1,855
AADT in unpaved tertiary network (vehicles per day)						27	36	29
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	2,084	762	298	2,525	620	3,145		
Vehicle utilization as % of classified network utilization	66%	24%	9%	80%	20%			
Unclassified network annual vehicle utilization (million veh/km)						33		
Total network annual vehicle utilization (million veh/km)						3,177		
Primary network utilization as % of classified network utilization						66%	70%	73%
Paved network utilization as % of classified network utilization						80%	77%	86%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Unclassified network utilization as % of total network utilization						1.0%	0.8%	0.4%
Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)						14,807		
Annual freight utilization of classified network (million tons per km)						5,949		
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more						2%	4%	5%
% paved roads in primary network with AADT of 300 or less						27%	29%	31%
% unpaved roads in primary network with AADT of 300 or more						0%	18%	6%
% paved roads in secondary network with AADT of 300 or less						73%	50%	72%
% unpaved roads in secondary network with AADT of 300 or more						1%	13%	4%
% unpaved roads in tertiary network with AADT of 300 or less						82%	80%	80%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	1,424	1,102	764	2,020	1,271	3,291		
Road asset value as % of classified network	43%	33%	23%	61%	39%			
Asset value of primary paved network as % of classified network						43%	48%	51%
Asset value of tertiary unpaved network as % of classified network						22%	17%	14%
Classified net asset value as % of maximum asset value						88%	80%	83%
Asset value of classified road network as % of GDP (%)						52%	30%	35%
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary					
Distribution of preservation requirements by network type (%)	40%	45%	15%					
% of preservation requirements for primary network						40%	55%	45%
Total road network preservation for a 20-year period (\$ millions)						1,988		
Average annual road network preservation (\$ millions)						99		
Average annual network preservation (years 1–5)(\$ millions)						122		
Average annual network preservation (years 6–20)(\$ millions)						92		
% required on road rehabilitation as % of preservation						34%	46%	45%
% required on periodic maintenance as % of preservation						35%	29%	29%
% Required on recurrent maintenance as % of preservation						30%	25%	47%
Annual Network preservation requirements as % of GDP						1.6%	1.2%	1.3%
Sources:								
AICD RONE Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Niger

Basic country data								
Total population (millions)	14.417	Land area (sq km)		1,266,700		AICD study average		
Rural population (millions)	11.966	Motorized vehicle fleet (units)		80,000		Income group		Sub-region
Urban population (millions)	2.451	GDP current prices (US\$ billions)		3.544		Low income		Western Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	4,011	2,044	7,371	3,649	9,777	13,427		
Percentage of classified network (%)	30%	15%	55%	27%	73%			
Unclassified network length [km]						3,518		
Total network length [km]						16,945		
% of classified network that is primary network						30%	19%	22%
% of classified network that is paved						27%	20%	23%
Network length density								
Classified network density per area (km per 1,000 sq km)						11	93	84
Classified network density per population (km per 1,000 people)						0.9	1.8	2.3
Classified network density per vehicle (per 1,000 vehicles)						168	141	86
Total network density per area (km per 1,000 sq km)						13	133	105
Total network density per population (km per 1,000 people)						1.2	2.4	3.1
Total network density per vehicle (per 1,000 vehicles)						212	191	115
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	47%	33%	31%	49%	32%	36%	32%	36%
% of classified network length in fair condition	42%	33%	24%	40%	27%	31%	30%	34%
% of classified network length in poor condition	12%	34%	45%	11%	42%	33%	38%	30%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	359	59	31	387	38	133	236	305
AADT in primary network (vehicles per day)						359	934	1,133
AADT in paved network (vehicles per day)						387	1,054	1,146
AADT in paved primary network (vehicles per day)						382	1,289	1,498
AADT in unpaved tertiary network (vehicles per day)						28	23	23
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	526	44	82	516	136	652		
Vehicle utilization as % of classified network utilization	81%	7%	13%	79%	21%			
Unclassified network annual vehicle utilization (million veh/km)						6		
Total network annual vehicle utilization (million veh/km)						658		
Primary network utilization as % of classified network utilization						81%	74%	79%
Paved network utilization as % of classified network utilization						79%	78%	86%
Unclassified network utilization as % of total network utilization						1.0%	0.5%	0.3%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)							2,977	
Annual freight utilization of classified network (million tons per km)							1,162	
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more							0%	1% 1%
% paved roads in primary network with AADT of 300 or less							53%	24% 20%
% unpaved roads in primary network with AADT of 300 or more							24%	14% 13%
% paved roads in secondary network with AADT of 300 or less							0%	37% 26%
% unpaved roads in secondary network with AADT of 300 or more							0%	4% 4%
% unpaved roads in tertiary network with AADT of 300 or less							73%	85% 82%
Network asset value	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	1,182	116	205	1,193	310	1,503		
Road asset value as % of classified network	79%	8%	14%	79%	21%			
Asset value of primary paved network as % of classified network						77%	51%	57%
Asset value of tertiary unpaved network as % of classified network						13%	16%	15%
Classified net asset value as % of maximum asset value						88%	83%	83%
Asset value of classified road network as % of GDP (%)						42%	25%	20%
Network preservation requirements	Pri- mary	Secon- dary	Ter- tiary					
Distribution of preservation requirements by network type (%)	75%	13%	12%					
% of preservation requirements for primary network						75%	56%	43%
Total road network preservation for a 20-year period (\$ millions)						956		
Average annual road network preservation (\$ millions)						48		
Average annual network preservation (years 1–5)(\$ millions)						62		
Average annual network preservation (years 6–20)(\$ millions)						43		
% required on road rehabilitation as % of preservation						47%	41%	43%
% required on periodic maintenance as % of preservation						27%	33%	35%
% Required on recurrent maintenance as % of preservation						26%	26%	66%
Annual Network preservation requirements as % of GDP						1.3%	0.9%	0.7%
Sources:								
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Nigeria

Basic country data								
Total population (millions)	144.749	Land area (sq km)		910,770		AICD study average		
Rural population (millions)	73.822	Motorized vehicle fleet (units)		3,500,000		Income group	Sub-region	
Urban population (millions)	70.927	GDP current prices (US\$ billions)		114.686		Low income	Western Africa	
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Sec- ondary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	28,614	21,293	72,800	38,798	83,909	122,707		
Percentage of classified network (%)	23%	17%	59%	32%	68%			
Unclassified network length [km]						35,900		
Total network length [km]						158,607		
% of classified network that is primary network						23%	19%	22%
% of classified network that is paved						32%	20%	23%
Network length density								
Classified network density per area (km per 1,000 sq km)						135	93	84
Classified network density per population (km per 1,000 people)						0.8	1.8	2.3
Classified network density per vehicle (per 1,000 vehicles)						35	141	86
Total network density per area (km per 1,000 sq km)						174	133	105
Total network density per population (km per 1,000 people)						1.1	2.4	3.1
Total network density per vehicle (per 1,000 vehicles)						45	191	115
Network condition	Pri- mary	Sec- ondary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition						38%	32%	36%
% of classified network length in fair condition						37%	30%	34%
% of classified network length in poor condition						24%	38%	30%
Network traffic	Pri- mary	Sec- ondary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day						597	236	305
AADT in primary network (vehicles per day)						1,990	934	1,133
AADT in paved network (vehicles per day)						1,772	1,054	1,146
AADT in paved primary network (vehicles per day)						2,277	1,289	1,498
AADT in unpaved tertiary network (vehicles per day)						20	23	23
Motorized vehicle network utilization	Pri- mary	Sec- ondary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)						26,759		
Vehicle utilization as % of classified network utilization								
Unclassified network annual vehicle utilization (million veh/km)						65		
Total network annual vehicle utilization (million veh/km)						26,824		
Primary network utilization as % of classified network utilization						78%	74%	79%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Paved network utilization as % of classified network utilization	94%						78%	86%
Unclassified network utilization as % of total network utilization	0.2%						0.5%	0.3%
Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)	127,536							
Annual freight utilization of classified network (million tons per km)	51,674							
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more	3%						1%	1%
% paved roads in primary network with AADT of 300 or less	5%						24%	20%
% unpaved roads in primary network with AADT of 300 or more	27%						14%	13%
% paved roads in secondary network with AADT of 300 or less	23%						37%	26%
% unpaved roads in secondary network with AADT of 300 or more	20%						4%	4%
% unpaved roads in tertiary network with AADT of 300 or less	90%						85%	82%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	8,460	3,901	1,876	12,013	2,223	14,236		
Road asset value as % of classified network	59%	27%	13%	84%	16%			
Asset value of primary paved network as % of classified network	58%						51%	57%
Asset value of tertiary unpaved network as % of classified network	12%						16%	15%
Classified net asset value as % of maximum asset value	79%						83%	83%
Asset value of classified road network as % of GDP (%)	12%						25%	20%
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary					
Distribution of preservation requirements by network type (%)	59%	37%	4%					
% of preservation requirements for primary network	59%						56%	43%
Total road network preservation for a 20-year period (\$ millions)	11,234							
Average annual road network preservation (\$ millions)	562							
Average annual network preservation (years 1–5)(\$ millions)	1,077							
Average annual network preservation (years 6–20)(\$ millions)	390							
% required on road rehabilitation as % of preservation	43%						41%	43%
% required on periodic maintenance as % of preservation	38%						33%	35%
% Required on recurrent maintenance as % of preservation	19%						26%	66%
Annual Network preservation requirements as % of GDP	0.5%						0.9%	0.7%
Sources:								
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Rwanda

Basic country data								
Total population (millions)	9.244	Land area (sq km)		24,670		AICD study average		
Rural population (millions)	7.375	Motorized vehicle fleet (units)		70,000		Income group	Sub-region	
Urban population (millions)	1.869	GDP current prices (US\$ billions)		2.494		Low income	Central Africa	
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- - dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	1,060	1,776	1,790	1,060	3,566	4,625		
Percentage of classified network (%)	23%	38%	39%	23%	77%			
Unclassified network length [km]						9,383		
Total network length [km]						14,008		
% of classified network that is primary network						23%	19%	25%
% of classified network that is paved						23%	20%	15%
Network length density								
Classified network density per area (km per 1,000 sq km)						187	93	87
Classified network density per population (km per 1,000 people)						0.5	1.8	1.6
Classified network density per vehicle (per 1,000 vehicles)						66	141	241
Total network density per area (km per 1,000 sq km)						568	133	222
Total network density per population (km per 1,000 people)						1.5	2.4	2.3
Total network density per vehicle (per 1,000 vehicles)						200	191	332
Network condition	Pri- mary	Secon- - dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	41%	7%	0%	41%	3%	12%	32%	28%
% of classified network length in fair condition	48%	21%	0%	48%	10%	19%	30%	24%
% of classified network length in poor condition	11%	73%	100%	11%	86%	69%	38%	48%
Network traffic	Pri- mary	Secon- - dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	867	106	5	867	55	241	236	191
AADT in primary network (vehicles per day)						867	934	629
AADT in paved network (vehicles per day)						867	1,054	828
AADT in paved primary network (vehicles per day)						867	1,289	923
AADT in unpaved tertiary network (vehicles per day)						5	23	11
Motorized vehicle network utilization	Pri- mary	Secon- - dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	335	68	3	335	72	407		
Vehicle utilization as % of classified network utilization	82%	17%	1%	82%	18%			
Unclassified network annual vehicle utilization (million veh/km)						17		
Total network annual vehicle utilization (million veh/km)						424		

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Primary network utilization as % of classified network utilization						82%	74%	79%
Paved network utilization as % of classified network utilization						82%	78%	65%
Unclassified network utilization as % of total network utilization						4.0%	0.5%	1.3%
Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)						1,893		
Annual freight utilization of classified network (million tons per km)						750		
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more						0%	1%	0%
% paved roads in primary network with AADT of 300 or less						31%	24%	24%
% unpaved roads in primary network with AADT of 300 or more							14%	18%
% paved roads in secondary network with AADT of 300 or less							37%	24%
% unpaved roads in secondary network with AADT of 300 or more						6%	4%	9%
% unpaved roads in tertiary network with AADT of 300 or less						100%	85%	98%
Network asset value	Pri- mary	Secon- - dary	Ter- - tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	355	50	36	355	86	441		
Road asset value as % of classified network	80%	11%	8%	80%	20%			
Asset value of primary paved network as % of classified network						80%	51%	52%
Asset value of tertiary unpaved network as % of classified network						8%	16%	18%
Classified net asset value as % of maximum asset value						88%	83%	83%
Asset value of classified road network as % of GDP (%)						18%	25%	15%
Network preservation requirements	Pri- mary	Secon- - dary	Ter- - tiary					
Distribution of preservation requirements by network type (%)	81%	18%	1%					
% of preservation requirements for primary network						81%	56%	49%
Total road network preservation for a 20-year period (\$ millions)						256		
Average annual road network preservation (\$ millions)						13		
Average annual network preservation (years 1–5)(\$ millions)						17		
Average annual network preservation (years 6–20)(\$ millions)						11		
% required on road rehabilitation as % of preservation						52%	41%	49%
% required on periodic maintenance as % of preservation						19%	33%	22%
% Required on recurrent maintenance as % of preservation						29%	26%	71%
Annual Network preservation requirements as % of GDP						0.5%	0.9%	0.5%
Sources:								
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Senegal

Basic country data								
Total population (millions)	11.928	Land area (sq km)		192,530		AICD study average		
Rural population (millions)	6.935	Motorized vehicle fleet (units)		234,029		Income group		Sub-region
Urban population (millions)	4.993	GDP current prices (US\$ billions)		8.936		Low income		Western Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	2,920	1,860	10,891	4,080	11,591	15,671		
Percentage of classified network (%)	19%	12%	69%	26%	74%			
Unclassified network length [km]						2,392		
Total network length [km]						18,063		
% of classified network that is primary network						19%	19%	22%
% of classified network that is paved						26%	20%	23%
Network length density								
Classified network density per area (km per 1,000 sq km)						81	93	84
Classified network density per population (km per 1,000 people)						1.3	1.8	2.3
Classified network density per vehicle (per 1,000 vehicles)						67	141	86
Total network density per area (km per 1,000 sq km)						94	133	105
Total network density per population (km per 1,000 people)						1.5	2.4	3.1
Total network density per vehicle (per 1,000 vehicles)						77	191	115
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	33%	26%	21%	34%	21%	24%	32%	36%
% of classified network length in fair condition	12%	26%	18%	18%	17%	18%	30%	34%
% of classified network length in poor condition	55%	48%	61%	48%	62%	58%	38%	30%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	1,089	360	37	945	35	272	236	305
AADT in primary network (vehicles per day)						1,089	934	1,133
AADT in paved network (vehicles per day)						945	1,054	1,146
AADT in paved primary network (vehicles per day)						1,177	1,289	1,498
AADT in unpaved tertiary network (vehicles per day)						34	23	23
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	1,161	245	149	1,407	147	1,554		
Vehicle utilization as % of classified network utilization	75%	16%	10%	91%	9%			
Unclassified network annual vehicle utilization (million veh/km)						4		
Total network annual vehicle utilization (million veh/km)						1,559		
Primary network utilization as % of classified network utilization						75%	74%	79%
Paved network utilization as % of classified network utilization						91%	78%	86%
Unclassified network utilization as % of total network utilization						0.3%	0.5%	0.3%

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Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							7,284		
Annual freight utilization of classified network (million tons per km)							2,907		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							0%	1%	1%
% paved roads in primary network with AADT of 300 or less							9%	24%	20%
% unpaved roads in primary network with AADT of 300 or more							0%	14%	13%
% paved roads in secondary network with AADT of 300 or less							34%	37%	26%
% unpaved roads in secondary network with AADT of 300 or more							0%	4%	4%
% unpaved roads in tertiary network with AADT of 300 or less							77%	85%	82%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	669	345	245	1,027	232	1,259			
Road asset value as % of classified network	53%	27%	19%	82%	18%				
Asset value of primary paved network as % of classified network						53%	51%	57%	
Asset value of tertiary unpaved network as % of classified network						17%	16%	15%	
Classified net asset value as % of maximum asset value						71%	83%	83%	
Asset value of classified road network as % of GDP (%)						14%	25%	20%	
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	63%	26%	11%						
% of preservation requirements for primary network						63%	56%	43%	
Total road network preservation for a 20-year period (\$ millions)						1,157			
Average annual road network preservation (\$ millions)						58			
Average annual network preservation (years 1–5)(\$ millions)						133			
Average annual network preservation (years 6–20)(\$ millions)						33			
% required on road rehabilitation as % of preservation						68%	41%	43%	
% required on periodic maintenance as % of preservation						14%	33%	35%	
% Required on recurrent maintenance as % of preservation						19%	26%	66%	
Annual Network preservation requirements as % of GDP						0.6%	0.9%	0.7%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

South Africa

Basic country data								
Total population (millions)	47.391	Land area (sq km)		1,214,470		AICD study average		
Rural population (millions)	19.061	Motorized vehicle fleet (units)		6,549,901		Income group	Sub-region	
Urban population (millions)	28.330	GDP current prices (US\$ billions)		254.992		Upper middle income	Southern Africa	
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	38,066	38,222	125,975	74,567	127,697	202,263		
Percentage of classified network (%)	19%	19%	62%	37%	63%			
Unclassified network length [km]						161,868		
Total network length [km]						364,131		
% of classified network that is primary network						19%	19%	17%
% of classified network that is paved						37%	37%	24%
Network length density								
Classified network density per area (km per 1,000 sq km)						167	167	92
Classified network density per population (km per 1,000 people)						4.3	4.3	4.9
Classified network density per vehicle (per 1,000 vehicles)						31	31	128
Total network density per area (km per 1,000 sq km)						300	300	128
Total network density per population (km per 1,000 people)						7.7	7.7	7.1
Total network density per vehicle (per 1,000 vehicles)						56	56	178
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition						42%	42%	31%
% of classified network length in fair condition						23%	23%	29%
% of classified network length in poor condition						35%	35%	39%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	5,469	117	24	2,883	5	1,066	1,066	379
AADT in primary network (vehicles per day)						5,469	5,469	1,664
AADT in paved network (vehicles per day)						2,883	2,883	1,323
AADT in paved primary network (vehicles per day)						5,497	5,497	1,855
AADT in unpaved tertiary network (vehicles per day)						5	5	29
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	75,988	1,628	1,082	78,466	233	78,699		
Vehicle utilization as % of classified network utilization								
Unclassified network annual vehicle utilization (million veh/km)						291		
Total network annual vehicle utilization (million veh/km)						78,990		

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Primary network utilization as % of classified network utilization	97%						97%	73%
Paved network utilization as % of classified network utilization	100%						100%	86%
Unclassified network utilization as % of total network utilization	0.4%						0.4%	0.4%
Passenger and freight network utilization								
Annual passenger utilization of classified network (million pass. per km)	383,141							
Annual freight utilization of classified network (million tons per km)	158,175							
Network selected standards								
% paved roads in primary network with AADT of 10,000 or more	20%						20%	5%
% paved roads in primary network with AADT of 300 or less	11%						11%	31%
% unpaved roads in primary network with AADT of 300 or more	0%						0%	6%
% paved roads in secondary network with AADT of 300 or less	100%						100%	72%
% unpaved roads in secondary network with AADT of 300 or more	0%						0%	4%
% unpaved roads in tertiary network with AADT of 300 or less	100%						100%	80%
Network asset value	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Current road asset value (\$ millions)	14,219	7,240	4,994	23,390	3,063	26,453		
Road asset value as % of classified network	54%	27%	19%	88%	12%			
Asset value of primary paved network as % of classified network	54%						54%	51%
Asset value of tertiary unpaved network as % of classified network	10%						10%	14%
Classified net asset value as % of maximum asset value	88%						88%	83%
Asset value of classified road network as % of GDP (%)	10%						10%	35%
Network preservation requirements	Pri- mary	Secon- dary	Ter- tiary					
Distribution of preservation requirements by network type (%)	42%	40%	18%					
% of preservation requirements for primary network	42%						42%	45%
Total road network preservation for a 20-year period (\$ millions)	14,347							
Average annual road network preservation (\$ millions)	717							
Average annual network preservation (years 1–5)(\$ millions)	1,136							
Average annual network preservation (years 6–20)(\$ millions)	578							
% required on road rehabilitation as % of preservation	50%						50%	45%
% required on periodic maintenance as % of preservation	25%						25%	29%
% Required on recurrent maintenance as % of preservation	25%						25%	47%
Annual Network preservation requirements as % of GDP	0.3%						0.3%	1.3%
Sources:								
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).								
Population, GDP, and land area (year 2006) from World Development Indicators 2007.								
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.								

Tanzania

Basic country data								
Total population (millions)	39.477	Land area (sq km)		883,590		AICD study average		
Rural population (millions)	29.750	Motorized vehicle fleet (units)		548,326		Income group		Sub-region
Urban population (millions)	9.727	GDP current prices (US\$ billions)		12.784		Low income		Eastern Africa
	CLASSIFIED ROAD NETWORK							
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	7,010	21,720	20,000	4,330	44,400	48,730		
Percentage of classified network (%)	14%	45%	41%	9%	91%			
Unclassified network length [km]						5,727		
Total network length [km]						54,457		
% of classified network that is primary network						14%	19%	14%
% of classified network that is paved						9%	20%	12%
Network length density								
Classified network density per area (km per 1,000 sq km)						55	93	134
Classified network density per population (km per 1,000 people)						1.2	1.8	1.4
Classified network density per vehicle (per 1,000 vehicles)						89	141	165
Total network density per area (km per 1,000 sq km)						62	133	151
Total network density per population (km per 1,000 people)						1.4	2.4	1.6
Total network density per vehicle (per 1,000 vehicles)						99	191	221
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	59%	30%	31%	70%	31%	34%	32%	31%
% of classified network length in fair condition	32%	51%	24%	25%	38%	37%	30%	27%
% of classified network length in poor condition	9%	20%	45%	5%	31%	29%	38%	42%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	1,057	217	5	1,797	100	251	236	185
AADT in primary network (vehicles per day)						1,057	934	859
AADT in paved network (vehicles per day)						1,797	1,054	1,367
AADT in paved primary network (vehicles per day)						1,909	1,289	1,539
AADT in unpaved tertiary network (vehicles per day)						5	23	27
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	2,703	1,718	37	2,840	1,618	4,458		
Vehicle utilization as % of classified network utilization	61%	39%	1%	64%	36%			
Unclassified network annual vehicle utilization (million veh/km)						10		
Total network annual vehicle utilization (million veh/km)						4,468		
Primary network utilization as % of classified network utilization						61%	74%	67%
Paved network utilization as % of classified network utilization						64%	78%	67%
Unclassified network utilization as % of total network utilization						0.2%	0.5%	0.6%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							21,005		
Annual freight utilization of classified network (million tons per km)							8,427		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							2%	1%	1%
% paved roads in primary network with AADT of 300 or less							10%	24%	20%
% unpaved roads in primary network with AADT of 300 or more							27%	14%	24%
% paved roads in secondary network with AADT of 300 or less							25%	37%	21%
% unpaved roads in secondary network with AADT of 300 or more							10%	4%	5%
% unpaved roads in tertiary network with AADT of 300 or less							100%	85%	91%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	1,380	1,417	454	1,503	1,748	3,251			
Road asset value as % of classified network	42%	44%	14%	46%	54%				
Asset value of primary paved network as % of classified network						36%	51%	41%	
Asset value of tertiary unpaved network as % of classified network						14%	16%	20%	
Classified net asset value as % of maximum asset value						87%	83%	82%	
Asset value of classified road network as % of GDP (%)						25%	25%	22%	
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	36%	60%	4%						
% of preservation requirements for primary network						36%	56%	30%	
Total road network preservation for a 20-year period (\$ millions)						2,613			
Average annual road network preservation (\$ millions)						131			
Average annual network preservation (years 1–5)(\$ millions)						148			
Average annual network preservation (years 6–20)(\$ millions)						125			
% required on road rehabilitation as % of preservation						24%	41%	30%	
% required on periodic maintenance as % of preservation						42%	33%	42%	
% Required on recurrent maintenance as % of preservation						33%	26%	41%	
Annual Network preservation requirements as % of GDP						1.0%	0.9%	1.0%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Uganda

Basic country data								
Total population (millions)	29.874	Land area (sq km)		197,100		AICD study average		
Rural population (millions)	26.068	Motorized vehicle fleet (units)		278,595		Income group		Sub-region
Urban population (millions)	3.806	GDP current prices (US\$ billions)		9.322		Low income		Eastern Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	9,171	26,751	35,000	2,331	68,591	70,922		
Percentage of classified network (%)	13%	38%	49%	3%	97%			
Unclassified network length [km]						5,000		
Total network length [km]						75,922		
% of classified network that is primary network						13%	19%	14%
% of classified network that is paved						3%	20%	12%
Network length density								
Classified network density per area (km per 1,000 sq km)						360	93	134
Classified network density per population (km per 1,000 people)						2.4	1.8	1.4
Classified network density per vehicle (per 1,000 vehicles)						255	141	165
Total network density per area (km per 1,000 sq km)						385	133	151
Total network density per population (km per 1,000 people)						2.5	2.4	1.6
Total network density per vehicle (per 1,000 vehicles)						273	191	221
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	14%	0%	0%	18%	1%	2%	32%	31%
% of classified network length in fair condition	73%	11%	29%	73%	26%	27%	30%	27%
% of classified network length in poor condition	13%	89%	71%	9%	73%	71%	38%	42%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	747	35	2	2,063	44	111	236	185
AADT in primary network (vehicles per day)						747	934	859
AADT in paved network (vehicles per day)						2,063	1,054	1,367
AADT in paved primary network (vehicles per day)						2,063	1,289	1,539
AADT in unpaved tertiary network (vehicles per day)						2	23	27
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	2,501	340	26	1,756	1,111	2,867		
Vehicle utilization as % of classified network utilization	87%	12%	1%	61%	39%			
Unclassified network annual vehicle utilization (million veh/km)						9		
Total network annual vehicle utilization (million veh/km)						2,876		
Primary network utilization as % of classified network utilization						87%	74%	67%
Paved network utilization as % of classified network utilization						61%	78%	67%
Unclassified network utilization as % of total network utilization						0.3%	0.5%	0.6%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							13,474		
Annual freight utilization of classified network (million tons per km)							5,410		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							4%	1%	1%
% paved roads in primary network with AADT of 300 or less							12%	24%	20%
% unpaved roads in primary network with AADT of 300 or more							26%	14%	24%
% paved roads in secondary network with AADT of 300 or less								37%	21%
% unpaved roads in secondary network with AADT of 300 or more							0%	4%	5%
% unpaved roads in tertiary network with AADT of 300 or less							100%	85%	91%
Network asset value	Pri- mary	Secun- dary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	1,113	726	668	758	1,749	2,507			
Road asset value as % of classified network	44%	29%	27%	30%	70%				
Asset value of primary paved network as % of classified network						30%	51%	41%	
Asset value of tertiary unpaved network as % of classified network						27%	16%	20%	
Classified net asset value as % of maximum asset value						70%	83%	82%	
Asset value of classified road network as % of GDP (%)						27%	25%	22%	
Network preservation requirements	Pri- mary	Secun- dary	Ter- tiary						
Distribution of preservation requirements by network type (%)	41%	48%	11%						
% of preservation requirements for primary network						41%	56%	30%	
Total road network preservation for a 20-year period (\$ millions)						2,769			
Average annual road network preservation (\$ millions)						138			
Average annual network preservation (years 1–5)(\$ millions)						257			
Average annual network preservation (years 6–20)(\$ millions)						99			
% required on road rehabilitation as % of preservation						42%	41%	30%	
% required on periodic maintenance as % of preservation						30%	33%	42%	
% Required on recurrent maintenance as % of preservation						28%	26%	41%	
Annual Network preservation requirements as % of GDP						1.5%	0.9%	1.0%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Zambia

Basic country data								
Total population (millions)	11.862	Land area (sq km)		743,390		AICD study average		
Rural population (millions)	7.694	Motorized vehicle fleet (units)		283,237		Income group		Sub-region
Urban population (millions)	4.168	GDP current prices (US\$ billions)		10.907		Low income		Southern Africa
CLASSIFIED ROAD NETWORK								
	By network type			By surface class		Total		
Network length	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network length [km]	3,290	3,763	11,232	6,459	11,826	18,285		
Percentage of classified network (%)	18%	21%	61%	35%	65%			
Unclassified network length [km]						18,958		
Total network length [km]						37,243		
% of classified network that is primary network						18%	19%	17%
% of classified network that is paved						35%	20%	24%
Network length density								
Classified network density per area (km per 1,000 sq km)						25	93	92
Classified network density per population (km per 1,000 people)						1.5	1.8	4.9
Classified network density per vehicle (per 1,000 vehicles)						65	141	128
Total network density per area (km per 1,000 sq km)						50	133	128
Total network density per population (km per 1,000 people)						3.1	2.4	7.1
Total network density per vehicle (per 1,000 vehicles)						131	191	178
Network condition	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
% of classified network length in good condition	55%	31%	16%	47%	14%	26%	32%	31%
% of classified network length in fair condition	16%	21%	30%	14%	32%	26%	30%	29%
% of classified network length in poor condition	29%	48%	54%	38%	54%	48%	38%	39%
Network traffic	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Average Annual daily traffic (AADT), vehicles per day	1,224	180	52	737	45	289	236	379
AADT in primary network (vehicles per day)						1,224	934	1,664
AADT in paved network (vehicles per day)						737	1,054	1,323
AADT in paved primary network (vehicles per day)						1,224	1,289	1,855
AADT in unpaved tertiary network (vehicles per day)						38	23	29
Motorized vehicle network utilization	Pri- mary	Secon- dary	Ter- tiary	Paved	Un- paved	Classified		
Classified network annual vehicle utilization (million veh/km)	1,469	247	215	1,737	195	1,932		
Vehicle utilization as % of classified network utilization	76%	13%	11%	90%	10%			
Unclassified network annual vehicle utilization (million veh/km)						34		
Total network annual vehicle utilization (million veh/km)						1,966		
Primary network utilization as % of classified network utilization						76%	74%	73%
Paved network utilization as % of classified network utilization						90%	78%	86%
Unclassified network utilization as % of total network utilization						1.7%	0.5%	0.4%

ROADS IN SUB-SAHARAN AFRICA: COUNTRY ANNEX

Passenger and freight network utilization									
Annual passenger utilization of classified network (million pass. per km)							9,128		
Annual freight utilization of classified network (million tons per km)							3,676		
Network selected standards									
% paved roads in primary network with AADT of 10,000 or more							2%	1%	5%
% paved roads in primary network with AADT of 300 or less							41%	24%	31%
% unpaved roads in primary network with AADT of 300 or more								14%	6%
% paved roads in secondary network with AADT of 300 or less							86%	37%	72%
% unpaved roads in secondary network with AADT of 300 or more							6%	4%	4%
% unpaved roads in tertiary network with AADT of 300 or less							80%	85%	80%
Network asset value	Pri- mary	Seco- ndary	Ter- tiary	Paved	Un- paved	Classified			
Current road asset value (\$ millions)	996	597	447	1,732	309	2,041			
Road asset value as % of classified network	49%	29%	22%	85%	15%				
Asset value of primary paved network as % of classified network						49%	51%	51%	
Asset value of tertiary unpaved network as % of classified network						12%	16%	14%	
Classified net asset value as % of maximum asset value						77%	83%	83%	
Asset value of classified road network as % of GDP (%)						19%	25%	35%	
Network preservation requirements	Pri- mary	Seco- ndary	Ter- tiary						
Distribution of preservation requirements by network type (%)	45%	37%	18%						
% of preservation requirements for primary network						45%	56%	45%	
Total road network preservation for a 20-year period (\$ millions)						1,686			
Average annual road network preservation (\$ millions)						84			
Average annual network preservation (years 1–5)(\$ millions)						170			
Average annual network preservation (years 6–20)(\$ millions)						56			
% required on road rehabilitation as % of preservation						60%	41%	45%	
% required on periodic maintenance as % of preservation						20%	33%	29%	
% Required on recurrent maintenance as % of preservation						20%	26%	47%	
Annual Network preservation requirements as % of GDP						0.8%	0.9%	1.3%	
Sources:									
AICD RNET Outputs from Alberto Nogales, July 2008. Based on AICD Study inputs on road length, type, condition, traffic, and road works costs (year 2007).									
Population, GDP, and land area (year 2006) from World Development Indicators 2007.									
Estimates of vehicle fleet and unclassified network length by A. Nogales based on various sources.									

Road sector institutional data and road fund good practice design criteria

Country	Established road sector institutions				Fuel levy applicability			Points-based road fund good practice design criteria								Road fund resources allocation %				
	Road Fund and Road Agency	Road Fund Only	Road Agency Only	No Road Fund and No Road Agency	High Fuel Levy	Low Fuel Levy	No Fuel Levy	Clear Legal Basis	Separation of Functions	Road User Charges	Direct Transfer	User Representation on Board	Revenue Allocation Rules	Independent Auditing	Total Score	Main Roads	Rural Roads	Urban Roads	Overhead	Other
Benin	x	✓	x	x	✓	x	x	0	0	1	0	0	1	1	3	96.4	1.3	0.3	2	0
Burkina Faso	x	✓	x	x	x	x	✓	0	0	0	0	0	0	0	0	..	..	..	..	..
Cameroon	x	✓	x	x	x	✓	x	1	0	1	1	0	1	1	5	65	12	10	3.5	9.5
Cape Verde	..	..	..	..	..	..	..	0	1	0	0	0	0	0	1	..	..	..	..	..
Chad	x	✓	x	x	✓	x	x	1	0	1	1	1	1	1	6	82	0	15	3	0
Cote d'Ivoire	✓	x	x	x	✓	x	x	0	1	1	0	0	1	1	4	90	0	10	0	0
Ethiopia	✓	x	x	x	x	✓	x	1	1	1	1	0	1	1	6	65	25	10	0	0
Ghana	✓	x	x	x	✓	x	x	0	1	1	1	1	1	1	6	37	30	25	1.5	6.5
Kenya	x	✓	x	x	x	✓	x	1	1	1	1	1	1	1	7	57	28	10	3	2
Lesotho	x	✓	x	x	✓	x	x	1	0	1	1	0	0	1	4	..	..	..	..	..
Madagascar	x	✓	x	x	✓	x	x	1	1	1	1	0	1	1	6	72	14	12	2	0
Malawi	x	✓	x	x	✓	x	x	1	1	1	1	0	1	1	6	45	25	10	5	15
Mozambique	x	✓	x	x	x	✓	x	0	1	1	0	1	1	1	5	35	25	10	1	29
Namibia	✓	x	x	x	x	✓	x	1	1	1	1	1	1	1	7	55	33	4.5	1.5	6
Niger	x	✓	x	x	✓	x	x	1	0	1	0	1	1	1	5	64		12	4.7	19.3
Nigeria	x	x	x	✓	x	x	✓	..	..	..	..	..	..	..	..	..	..	..	..	..
Rwanda	x	✓	x	x	✓	x	x	1	0	1	1	1	1	1	6	26	10	61	3	0
Senegal	x	x	✓	x	x	x	✓	0	1	0	0	0	0	0	1	..	..	..	..	..
South Africa	x	x	✓	x	x	x	✓	0	1	0	0	0	0	0	1	..	..	..	..	..
Tanzania	✓	x	x	x	x	✓	x	1	1	1	1	1	1	1	7	70	30	0	0	0
Uganda	x	✓	x	x	x	x	✓	..	..	..	..	..	..	..	..	..	..	..	..	..
Zambia	x	✓	x	x	✓	x	x	1	1	1	0	0	1	1	5	50	25	25	0	0
..	Data not available or not applicable																			