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PUBLIC AND PRIVATE SECTOR APPROACHES TO  
MANAGEMENT OF UNPAVED ROADS.

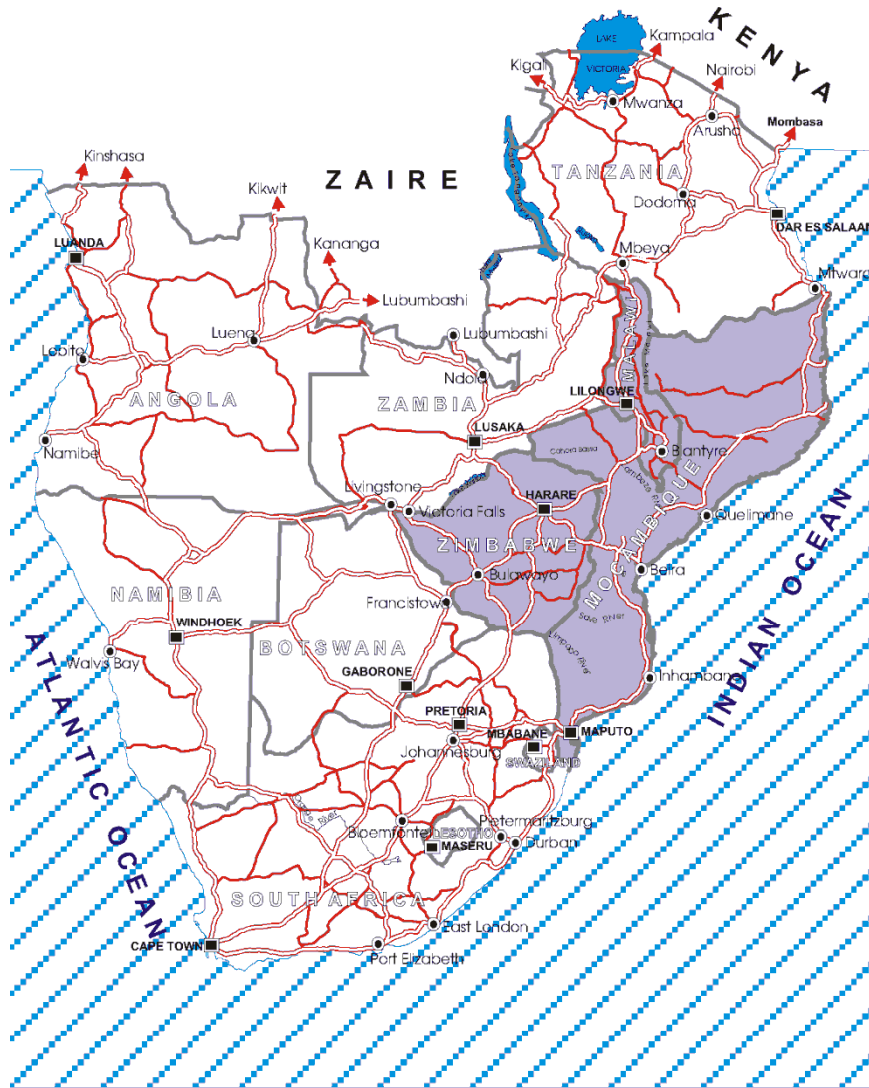
IRF/TARA/gKTP Road Convention ARUSHA,  
TANZANIA

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25<sup>th</sup> – 28<sup>th</sup> November 2009

Kingstone S. Gongera

# Southern Africa



The presentation describes and compares the Public and Private sector approaches to tractor-based routine maintenance management in Zimbabwe and Mozambique

# Population / Gross Domestic Product/ Agriculture Contribution

<b>Country</b>	<b>Land Area (km<sup>2</sup>)</b>	<b>Population</b>	<b>GDP (Billion US\$)</b>	<b>Agriculture Contribution to GDP</b>
Zimbabwe	399 757	12.2 million	554	16%
Mozambique	801 590	21 million	7559	23%
Malawi	94 079	14.3 million	1051	37%

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# The Planning Process

- ❑ Simplified benefit assessment;
- ❑ Determination of Simplified Cost Assessment;
- ❑ Conducting a Benefit Cost Analysis.



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# Planning Rationale

- Provide roads fit for local motorised transport;
  - Ensure equitable access to social facilities;
  - Provide all-weather access.
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# Approach through Force Account

- Setting up of Road Engineering Division
    - Creating and operating a Road Planning Division;
    - Carrying out a Road Inventory;
    - Organising & developing personnel in RED;
    - Develop a Road Maintenance System;
    - Develop a human resources development system within RED.
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# Area Based Maintenance System

Choosing appropriate, affordable technology

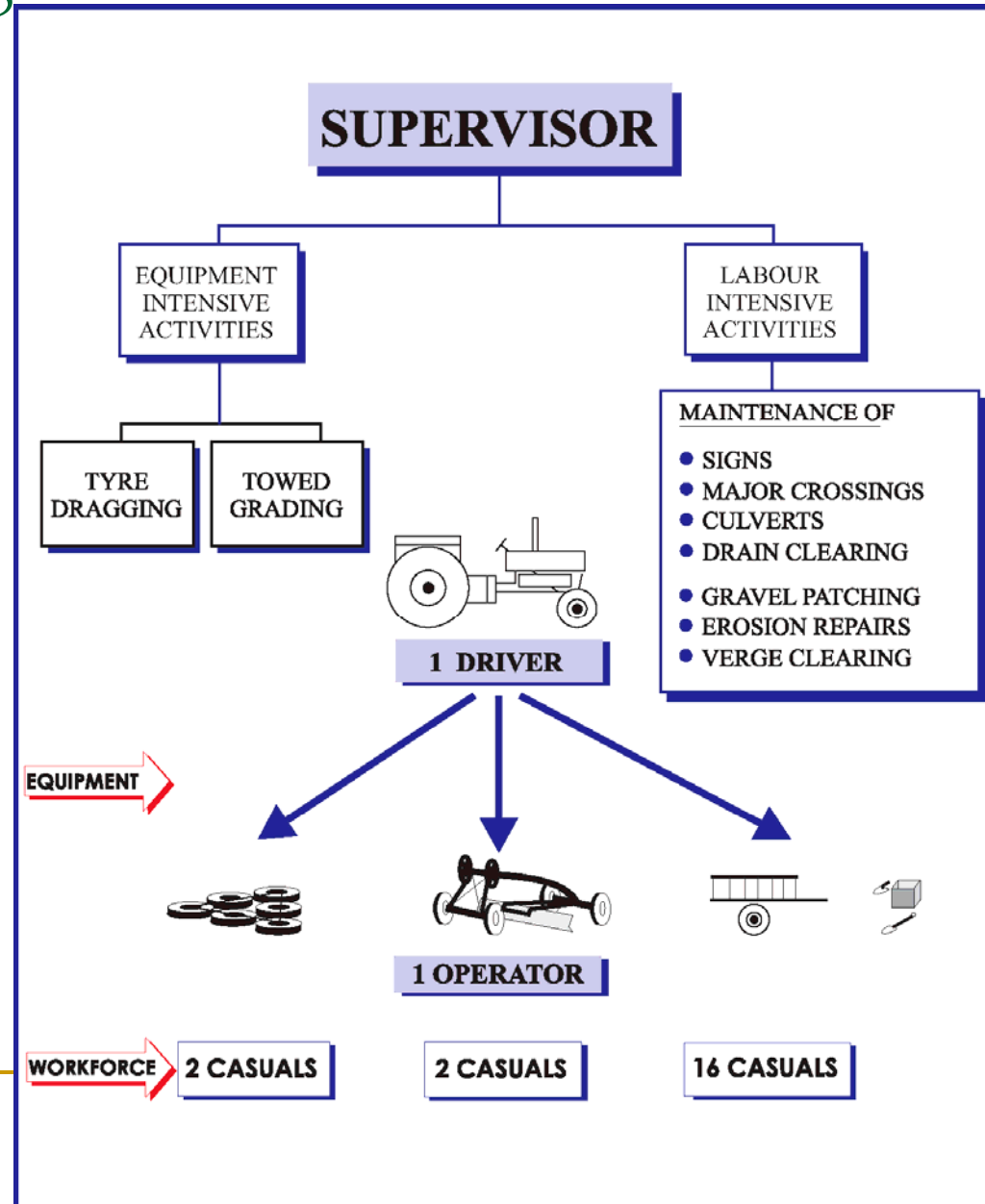
- ❑ Output per hour is the same;
- ❑ Motorised grader requires more specialised maintenance and repair;
- ❑ Higher fuel consumption.



# Maintenance Base Camp



# Organogram



# Towed Grader

- ❑ Wet season;
- ❑ Output 10 km per day;
- ❑ Tractors charge - \$30.00 per hour;
- ❑ Reshape road and improve riding surface.



# Tyre Drag

- ❑ Dry season operation;
- ❑ Output 30km per day;
- ❑ Tractor drawn - \$30.00 per hour;
- ❑ Smoothens corrugations.



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# Tractor and Trailer

- ❑ Wet and Dry seasons
- ❑ Used to deploy labour along the road;
- ❑ Opening mitre drains;
- ❑ Cutting grass round blind curves;
- ❑ Filing potholes;
- ❑ Repair road furniture;
- ❑ Patch gravelling.



# Bikita District Work Programme

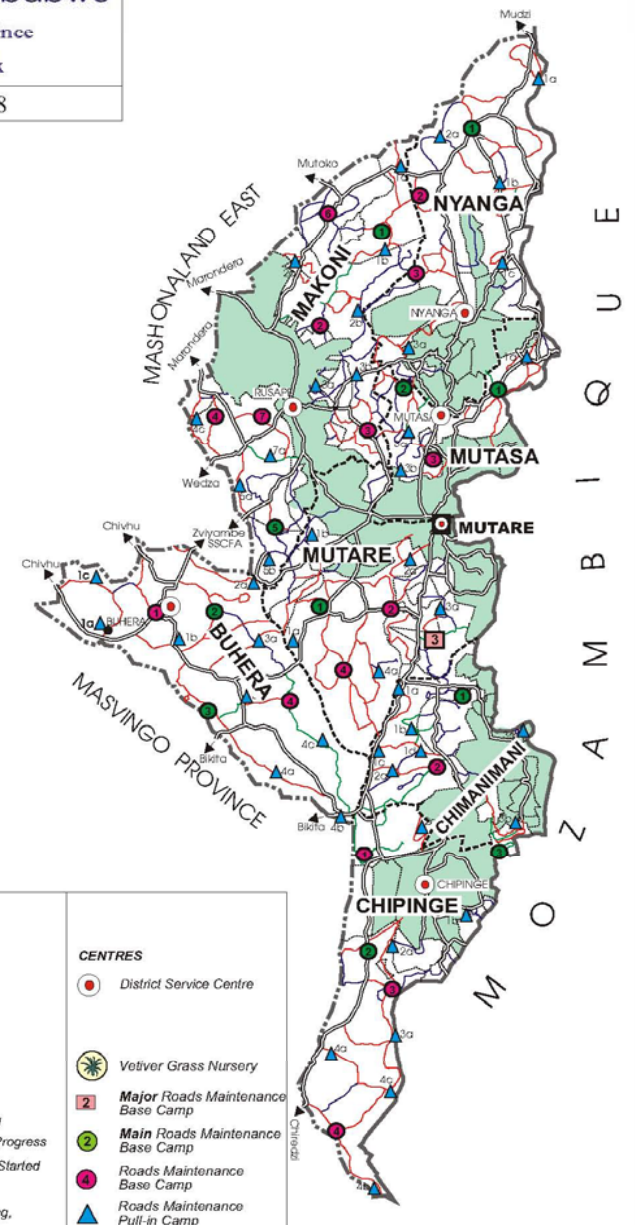
## Bikita District, Unit 1 - Towed Grading Work Programme (Example)

District Development Fund  
Roads Engineering Division

WORK PROGRAMME - WET SEASON											
(Equipment and Labour Activities)											
Province:	Masvingo			District:	Bikita		Unit:		1 (Chirorwe)		
	Activity	DAY 1		DAY 2		DAY 3		DAY 4		DAY 5	
Week 1	Equipment	C102	10	C102	10	C102	10	C102	10	C201	10
	Labour	4		2		5		7		9	
Week 2	Equipment	C201	7	C313	10	C313	4 to pull-in camp	C103	10	C103	7
	Labour	11		12		14		15		17	
Week 3	Equipment	C116	6	C101	8	C101	7	C101	3	Labour	
	Labour	22		18		19		20		21	
Week 4	Equipment	Labour		Labour		Labour		Labour		Labour	
	Labour	1		3		6		8		10	
Week 5	Equipment	C102	10	C102	10	C102	10	C102	10	C201	10
	Labour	4		2		5		7		9	
Week 6	Equipment	C201	7	C313	10	C313	4 to pull-in camp	C103	10	C103	7
	Labour	11		12		13		15		16	

# Map of Manicaland

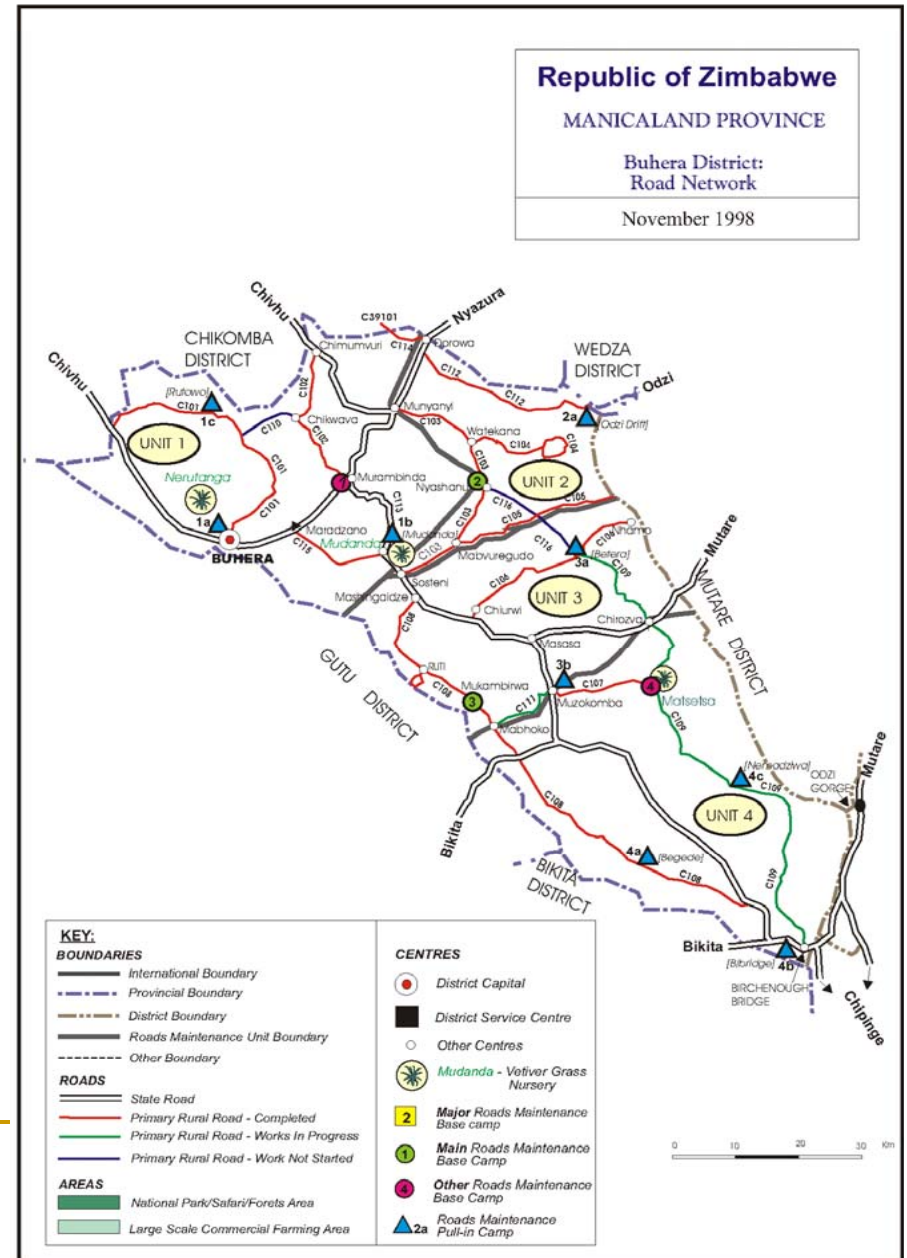
Republic of Zimbabwe  
 Manicaland Province  
 Road Network  
 November 1998



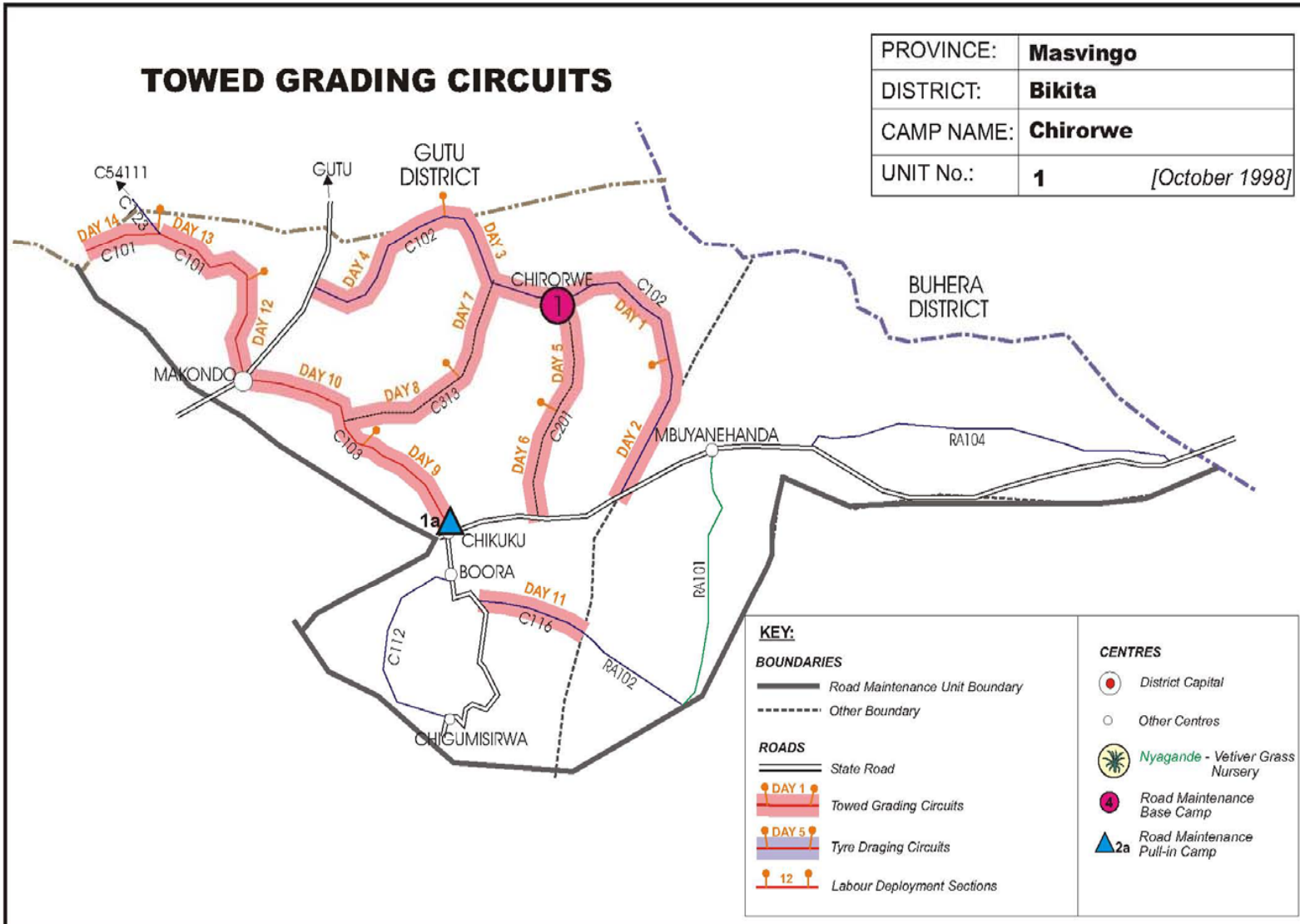
KEY:	
<b>BOUNDARIES</b>	
	International Boundary
	Provincial Boundary
	District Boundary
	Other Boundary
<b>ROADS</b>	
	State Road
	Primary Rural Road - Completed
	Primary Rural Road - Works in Progress
	Primary Rural Road - Work Not Started
<b>AREAS</b>	
	Large Scale Commercial Farming, Safari and Forest Areas
<b>CENTRES</b>	
	District Service Centre
	Vetiver Grass Nursery
	Major Roads Maintenance Base Camp
	Main Roads Maintenance Base Camp
	Roads Maintenance Base Camp
	Roads Maintenance Pull-in Camp

# Map of Buhera District

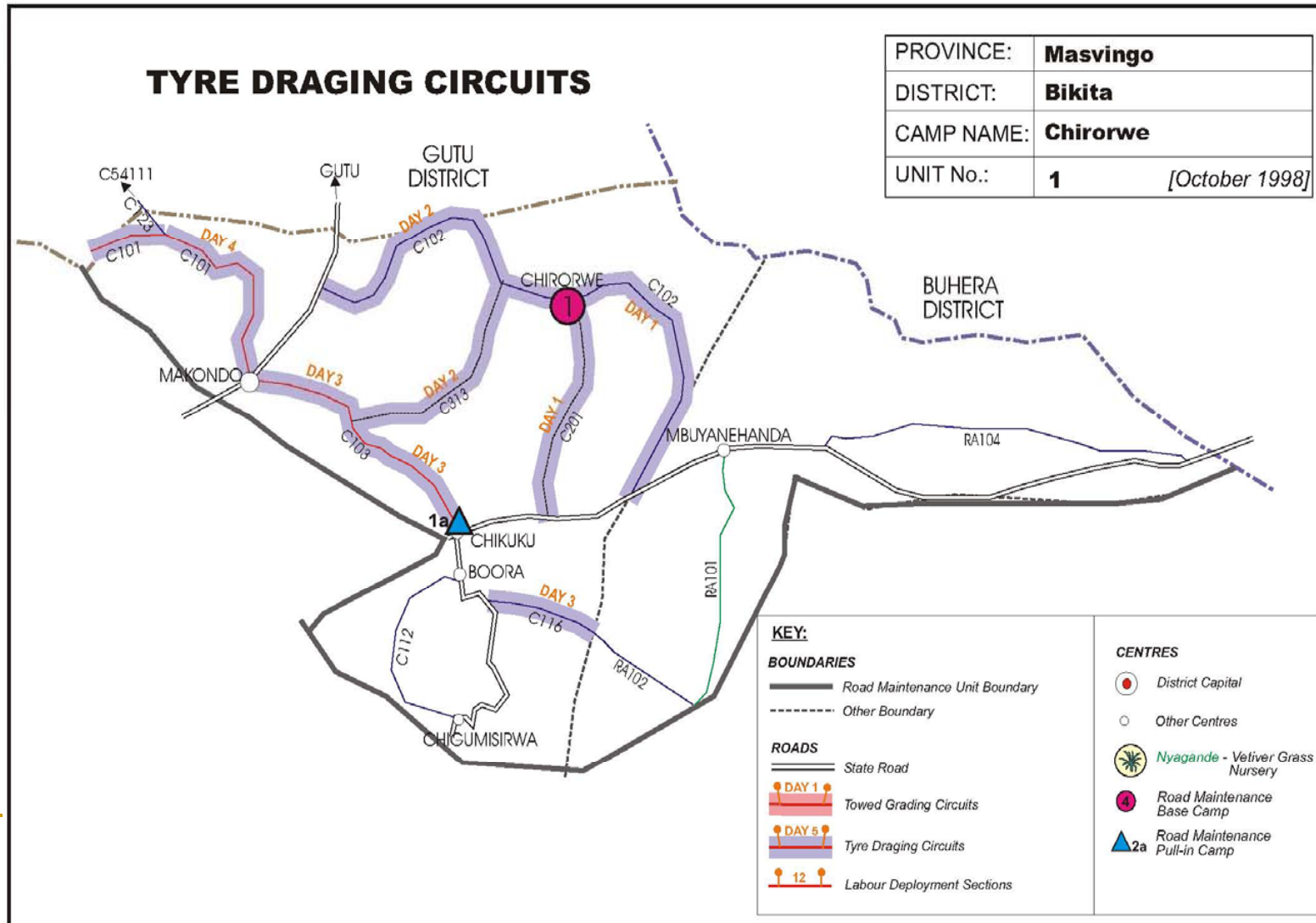
- Each camp 150 – 200km
- 194 camps in Zimbabwe – 25 000km under maintenance



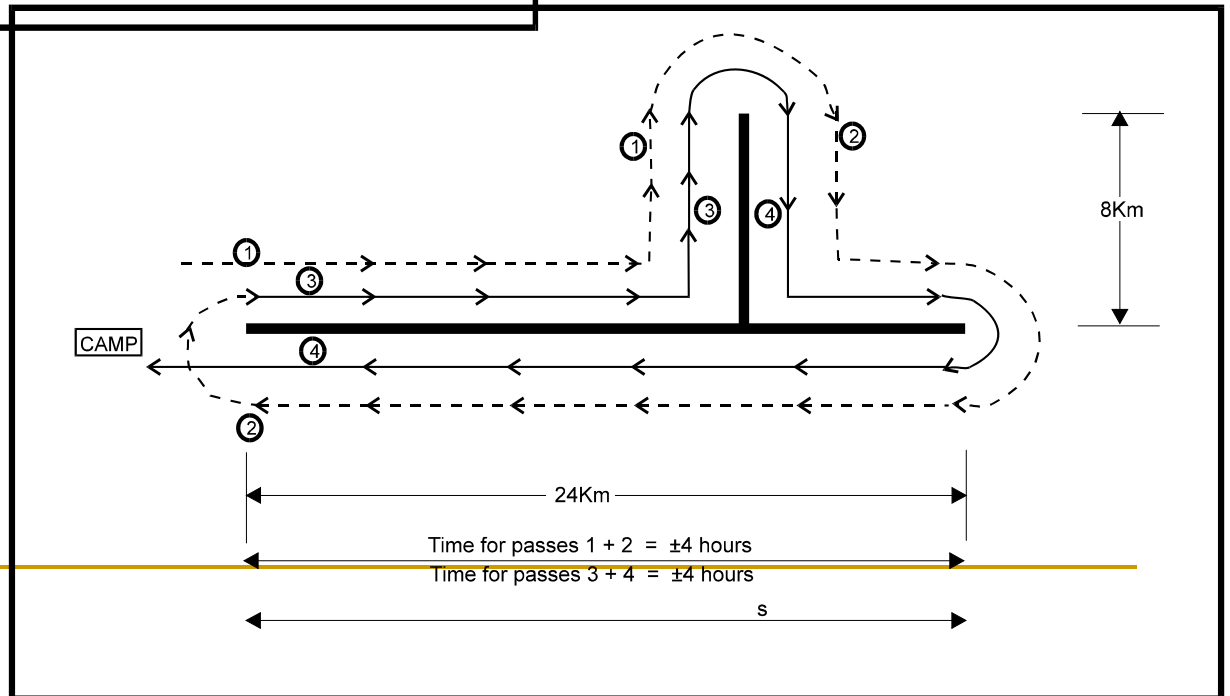
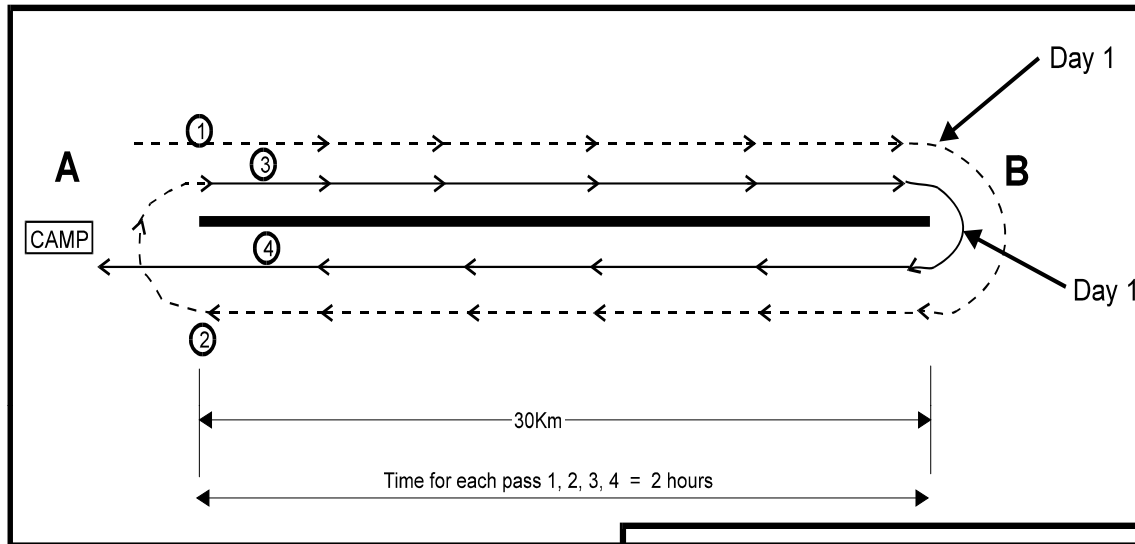
# Influence Area of Maintenance Unit – Towed Grading Circuits



# Influence Area of Maintenance Unit – Tyre Dragging Circuits



# Grading Sequence



# Cleaning Culverts



# Labour Activities



# Annual Operations Calendar

Activities	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Verge Clearing					█				█			
Erosion and Drains						█					█	
Culvert clearing and repair						█			█			
Sign Maintenance											█	
Patch gravelling			█				█			█		
Major structures maintenance						█			█			
Manpower			6	6	4	26	28	6	18	28	14	8

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## Advantages of Area Based Maintenance

Adopted in both public and private systems

- Staff live close to work place;
  - Improved efficiency of equipment – tractor does grading, dragging and deployment of labour;
  - Planning work for smaller units easier;
  - Supply of fuel and repair costs reduced;
  - Improved monitoring of smaller areas.
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## Concept for Labour Intensive Work

- More efficient use of labour;
  - Tractor is used to ferry labour to work;
  - Sections pre-determined by supervisor;
  - Areas close to camp can be worked by labour on foot – no need for deployment.
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# Maintenance Costs for Small Contractors

## CALCULATED ROUTINE ROAD MAINTENANCE COST

MOZAMBIQUE / OCTOBER 2005

### MAINTENANCE EQUIPMENT

**TRACTORS** Cost/hr = usd 15.90

Costs per km per year for tractor to carry out following activities

See Tractor Inputs for  
input estimates

	Hrs/km per year	Cst/hr (USD)	Cst/km/yr (USD)
Towed Grading	1.9	15.90	30.52
Tyre Dragging	5.1	15.90	81.39
Transport	2.0	15.90	31.05
Total Time	9.0		142.96
Add 50 % experience factor (see notes)			
<b>TOTAL TRACTOR COSTS</b>	<b>13.5</b>		<b>214.44</b> USD/km

### PICKUP

	km	mths	total/yr		
Supervision	1200	x 12	= 14400		
Transport			= 14400 Km/yr	x 0.542	USD/km
<b>TOTAL PICKUP</b>				<b>Cst/km/yr</b>	<b>52.02</b> USD/km

### TOWED EQUIPMENT

	Lgth (km)	Rate	mnth	Total Cost	Cst/km/yr
Towed Grader	150	517	12	6205.5	41.37
Trailer	150	150	12	1804	12.02
Water bowser	150	137	12	1647	10.98
Tire drags	150	13.4	12	161	1.07
<b>TOTAL EQUIPMENT</b>					<b>65.45</b> USD/km

### LABOUR

Labour Wages	600 USD/year/man	x	0.17 = (NOTE A)	100.00
protective clothes, tools, benefits	250 USD/year/man	x	0.17 = (NOTE A)	41.67
<b>TOTAL LABOUR COSTS</b>				<b>141.7</b> USD/km

### CORE STAFF

Core Staff (Supervisor, Clerk, Tractor Driver & Tow Grader Op) 108.00 USD/km

### OTHER

Stationary	3.00 USD/km
Maintenance of camps	5.00 USD/km
<b>TOTAL OPERATIONAL COST PER KM PER YEAR</b>	<b>589.57</b> USD/km

### ADD IN OVERHEADS, PROFIT AND TAXES:

	Amount	Running Total	
Overheads	20%	118	707.57 USD/km
Profit	20%	142	849.17 USD/km
IVA	17%	144	993.53 USD/km

**TOTAL COST USD 993.53 USD/km**

<b>NOTES:</b>	All costs in USD UNLESS OTHERWISE STATED
	Based on 150 km road under maintenance
	Average Number of Labourers 25 Annual Wage each = USD 600
Note A:-	factor calculated by [ 'x' by 25 persons /' 150 km] to give annual cost/km
	Experience Factor: Tractor hours calculated on ideal setup - 50% allowance made to allow for inexperience of contractors.

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# Public or Private Sector Approach?

The Private sector approach seems more expensive (>+20%)

Key Issues for consideration:

- Greater efficiency of private sector? QA arrangements?
- More intimate knowledge & commitment by the public sector?
- Full accounting of costs in the Public sector (including finance and depreciation)?
- Duplication of effort/expertise in private sector supervision, measurement and implementation;
- Government can access finance far cheaper and more easily than the private sector;
- System robustness to recover from system/finance failure?

More detailed benefit-cost comparisons required!

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