

ESTABLISHMENT AND OPERATION OF A TECHNOLOGY TRANSFER CENTRE – ZIMBABWEAN EXPERIENCE

by

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ABSTRACT

The idea to establish a technology transfer centre in Zimbabwe was first mooted during a visit to Harare by Federal Highway officials Steve Gaj and Alfred Logie in January, 1999. During that visit the Department of Roads Directorate and the FHWA officials discussed how such a facility could become a training centre for Zimbabwean road engineers, particularly rural district engineers who have little or no access to innovative highway and transportation practices.

In February 1999, a decision was made by the directorate to have the T² Centre fall under the Research Branch of the Department of Roads. This decision was conveyed to the FHWA and they concurred. This culminated in a visit to U.S.A. by two officers from the Department of Roads at the invitation of the FHWA to attend the 1999 Local Technical Assistant Program Annual Conference in Roanoke, Virginia. This visit became an eye opener to the concept of a T² Centre.

In Zimbabwe the Department of Roads which was previously a Ministry on its own called the Ministry of Roads and Road Traffic was the custodian of all the information pertaining to planning, designing, construction and maintenance of all roads be it primary, secondary or tertiary roads. This left a big gap between the Ministry of Roads and Road Traffic and other road authorities because the Ministry of Roads catered for State roads only. When the Ministry of Roads became a Department of Roads this did not help in closing the information or technology gap between the other road authorities like the district councils, rural councils or urban councils. The Department of Roads had a solid infrastructure with experienced engineers and technicians with nothing to compare about in the other road authorities. In fact according to the Road Act they were not road authorities. The T² Centres in the various States of the U.S. take up this Challenge to close up the technology gap between States. Now in Zimbabwe's situation it is a question of closing the gap between the Department of Roads under the Ministry of Transport and Communication with the other road authorities within the country before we close the technology or information gap between Zimbabwe and its SADC countries.

In establishing our T² Centre we are very fortunate in that the Ministry of Transport and Communication and the Directorate of the Department of Roads is very supportive. The FHWA is our "spin" Doctor for the establishment of Zimbabwe T² Centre. FHWA has donated equipment that includes computers to start up the Centre to the tune of over US\$ 10 000.00. In addition we have received volumes of Manuals AASHTO and FHWA publications. The Centre

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has managed to establish a penetrative mailing list within Zimbabwe and has published 2 mock newsletters which the stakeholders are finding them interesting.

The Zimbabwe T² Centre is currently organising a workshop to be held in mid-October 2000 on the use of Tars and Tar/PVC premix and spray and chip technology as a substitute to 150/200 penetration grade bitumen. The Department of Roads previously carried out extensive research on the use of these locally produced tars and even carried out successful field trials. It is the intention of this workshop to pass on this technology to Rural District Councils and Urban Councils and local contractors who have never used this product for road surfacing and pothole patching.

1. INTRODUCTION

Transport is indispensable to economic and social development in any country be it a developed or developing country like Zimbabwe. Road transport is the dominant means of transport in Zimbabwe. In fact 80% by volume of trade is transported by road. The paradox of it is that more than 70% of our regional trunk roads and primary roads were built in the 1960's and early 70's and most of them have exceeded the 20 year design life.

Lack of financial resources to reconstruct or rehabilitate the ageing road network and the unavailability of good quality gravel is compounding the problem. Faced with such a dilemma the Technology Transfer Centre Concept could not have come at a more opportune time to the Zimbabwe Government. Having released the magnitude of this problem the Government through the Ministry of Transport and Communications readily embraced the Road Sector Reform and Development Programme which seeks to address issues pertaining to road legislation, road classification, road administration and road funding.

The Zimbabwe Government in a signatory to the SADC Protocol on Transport, Communication and Meteorology which commits it to making new arrangements for the management and financing of roads as part of a harmonised regional approach to road infrastructure management. It is our hope that our Technology Transfer Centre will systematically and effectively facilitate the acquisition and dissemination of technology, practice and policy knowledge and know-how that is relevant to the Zimbabwe road transportation environment. The Zimbabwe Technology Transfer Centre was officially launched on the 4th February, 2000 by the Secretary for Transport and Energy. The Centre was established with assistance from Federal Highway Administration who provided basic equipment, technical assistance and financing of foreign travels.

2. GENERAL OVERVIEW OF THE SITUATION IN ZIMBABWE

2.1 Geographical Location, Physical Features and Climatic Conditions

Zimbabwe is situated between 15°35' and 22°30' latitude south of the equator and between 25° and 33° east of the Greenwich Meridian. It is situated in south Central Africa between the Limpopo river in the south the Zambezi river in the north. Zimbabwe is bounded by Zambia to the north and north-west, by South Africa to the south, by Mozambique to the east and north-east and by Botswana to the south-west. Zimbabwe lies wholly to the north of the Tropic of Capricorn. It is part of the great plateau which is a major feature of the geography of the southern African region. [Refer to Figure 1 at the appendix for the map of Southern Africa].

The area of Zimbabwe is 390 245 sq. km, about the size of California. Most of the country lies between 600 m and 2000 m above sea level.

The outstanding feature is the central plateau, known as the highveld, which is about 650 km long by 80 km wide. On either side of this the middleveld which is between 600 m and 1 200 m above sea-level. Deep river valleys have split the middleveld into great blocks of fine plateau country. The lowveld below 600 m comprises a narrow strip in the Zambezi Valley and a broader tract between the Limpopo and Save rivers. The lowest point in the country is the confluence of the Save and Runde rivers, which is about 162 m above sea level.

The climate of Zimbabwe is relatively uniform apart from a narrow tract in the eastern Districts and a similar area around Masvingo town in south eastern Zimbabwe. The main rainy season falls between the months of December and March except in the eastern Districts where it might rain throughout the year. During the dry months intense evaporation and desiccation occurs

On the Central Plateau the mean annual rainfall varies from 600- 1 000 mm with a corresponding mean annual temperature range of 6-31°C. In the hotter, lower altitude areas of the Save-Limpopo Basin the mean annual rainfall may be as low as 200 mm or as high as 600 mm with temperature range of 10-30°C. The Zambezi Valley experiences a mean annual rainfall of around 500 mm and a temperature range of 14-34°C. Along the western border the mean annual rainfall is between 500-800 mm with temperature range of 8-32°C, whilst low temperatures, 6-24°C accompany a mean annual rainfall of 900 to 2 000 mm in the Eastern Highlands. See Figure 2.

2.1.1 Geology

Approximately 60% of Zimbabwe is composed of Granite rocks which takes the form of large batholiths around which are draped the schistose, metamorphosed volcanic and Sediments of the Green schist belt (or commonly termed Gold Belts). The Granites are intruded by much younger Dolerite dykes. The north of the country is bounded by Highly Micaceous Gneisses and sediments of Karoo System, which include Tillites, Sandstones and Mudstones. South of Kariba Dam these sediments include Coal Measures. The south of the country is bounded by Gneisses, Karoo Basalts and Sediments and Younger Sandstones of the Cretaceous Period.

The west is bounded by Granite and Kalahari Sands. To the north-west of Hwange and at the Victoria Falls are outcrops of Karoo Basalts. The country is divided by a north north-east trending, 500 km long dyke, called the Great Dyke, which is composed of differentiated layers of Gabbro in which are found Chromite Seams. See Figure 2.

2.1.2 Pedology

Approximately 80% of soils in Zimbabwe are residual bearing a close relationship to the underlying rocks. These soils are mainly Granitic in character. The west of the country is largely covered by transported, Aeolian Kalahari Sands whilst in river valleys and at the top of mountain slopes Alluvium and Colluvium are developed respectively. Demographic Characters. According to the last population census, 1992 Zimbabwe had a population of 10.4 million giving a population density of approximately 16 per square kilometer. With annual growth rate of 3.14 per cent. Zimbabwe's population was estimated at 13.079 million by the end of 1999. The next population census is in year 2002. 75% of Zimbabwe's population lives in the rural areas and only 25% lives in cities and towns.

2.2 Political and Administrative Structures

The legislature of Zimbabwe consists of the President and a Unicameral or a "Single Chamber" Parliament. The President is the Head of State, Head of Government and Commander-in-Chief of the Defence Forces and elected by voters registered on the common roll and holds office for a period of six years after which he/she may be elected for further periods of office. Parliament consists of 150 members. One hundred and twenty members are elected by voters registered on the common roll constituencies, eight are Provincial Governors who are ex-officio Members of Parliament, ten are traditional Chiefs and 12 are appointed by the President. The 8 governors are the political and administrative figures per province.

3. ROAD TRANSPORTATION

3.1 Road Network

The road inventory shows that Zimbabwe has a total network of 81 816 km of which 18 047 km are sealed, 32 487 km gravel and 31 281 km are earth road. See table below.

Table 1: Classified Network Rural System

ROAD CLASS	TOTAL LENGTH (km)	AS A % OF CLASSIFIED NETWORK
Regional	3,068.3	4.2%
Primary	1,506.1	2.1%
Secondary	15,884.4	22.0%
Tertiary Feeder	19,031.7	26.3%
Tertiary Access	32,792.1	45.4%
Total Classified	72,282.5	100.0%

Table 2: Classified Network Urban System

ROAD CLASS	TOTAL LENGTH (km)	AS A % OF CLASSIFIED NETWORK	
Arterial	618.7	7.7%	7.7%
CBD	229.2	2.9%	17.7%
Collector	1 188.3	14.8%	
Local	5 967.7	74.6%	74.6%
Total Classified	8 003.8	100.0%	

Total Classified Urban Public Network of Zimbabwe is 8 010.5 km.

The Tables give a breakdown of the classified network for the rural and Urban Systems respectively.

Table 3: Summary Distribution of Road Network by Type of Authority

ROAD AUTHORITY	WMSH	WMKS	WMGS	NM	TOTAL SEALED	GR	ER	UN-SEALED	AUTHORITIES NETWO
DoR Network	2728.76	-23 263.00	5095.63	1216.64	9041.03	8297.04	877.10	9174.14	18215.20
UCs Network	1050.20	242.60	3403.60	1828.80	6525.20	927.10	522.10	1449.28	7974.50
RDCs Network	64.30	2.20	569.50	1844.80	24 80.90	23263.00	29882.50	53145.55	55626.40
Zimbabwe's Road Net	3843.30	244.80	9068.80	4890.30	18047.10	32487.20	31281.80	63769.00	81816.10

Acronyms

WMSH - Wide Mat Surfaced Shoulders

WMKS - Wide Mat Kerbed Shoulders

WMGS - Wide Mat Gravel Shoulders

NM - Narrow Mat

GR - Gravel Road

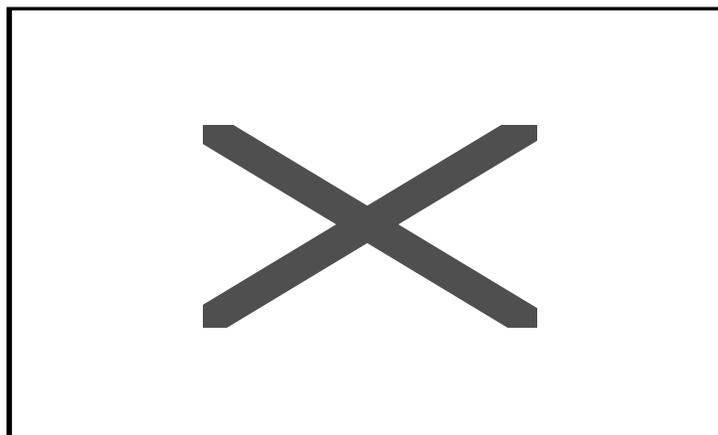
ER - Earth Road

DoR - Department of Roads

UCs - Urban Councils

RDCs - Rural District Councils

Figure 3



- 1 Department of Roads
- 2 Urban Councils
- 3 Rural District Councils

ZIMBABWE ROAD NETWORK

Department of Roads Total	=	18 215 km
Rural District Councils Total	=	55 626 km
Urban Councils Total	=	7 974 km
Other (National Parks & Private)	=	18 000 km
Total Network	=	100 000 km

The Rural District Councils have the biggest share of the network i.e. 68% while Department of Roads has 22% and Urban Councils has about 15%. However, the Department of Roads is responsible for all the Regional, Primary and Secondary Roads.

3.2 Road Sector Reform Programme

In August, 1996 the government of Zimbabwe signed the SADC Protocol on Transport, Communications and Meteorology. This Protocol committed Zimbabwe into a new approach in the management and financing of roads as part of a harmonized regional perception to road infrastructure provision and management. This prompted the setting up of a Road Sector Reform and Development Programme (RSRDP) which looked into:

- (i) Policy on the road sector
- (ii) The associated road sector legislation
- (iii) Classification of the whole road network
- (iv) Division of responsibility for the road network
- (v) Efficiency and accountability in the administration and management of the road network.

A Road Sector Reform Steering Committee (RSRSC) was set up by the Ministry of Transport to carry out the work for the RSRDP. Membership of this RSRDC was drawn from both the public and private sectors. The ultimate goal of the RSRDP is that all road users in Zimbabwe enjoy the benefits of an appropriately designed, maintained and managed road network supporting a sustainable economic growth for the country.

Between 1998 and 1999 the committee worked hard and managed to accomplish the following:

- a) Re-writing the Roads act for Zimbabwe
- b) Reclassification of Zimbabwe's road network
- c) Setting up a Road Fund for Zimbabwe.

The Committee has come up with a Road Sub-Sector Policy Green Paper. The Green Paper will go through further public consultation before its adoption as a Government White Paper on road sector policy.

At the beginning of 1999 a donor-funded consultancy was commissioned to review the Road

Investment Appraisal Methods and the Preparation of a Five-Year Road Investment Programme. The initial phase of the RSRDP is the Road Maintenance and Reform Project (RMRP).

The major components of the RMRP are:

- . Routine and Periodic Maintenance
- . Backlog Maintenance
- . Institutional reforms and Human Resources Development
- . Rehabilitation.

Another key component of the RSRDP is the establishment of the Zimbabwe National Road Administration (ZiNaRA) to manage the road funds and the maintenance of roads in Zimbabwe. The institutional reforms are expected to cover the establishment of State Highways Authority (SHA) which will commercialise and enhance the management of the main road network. Local Authorities i.e. RDCs and UCs will embark on capacity building/development to improve on the efficiency and accountability of management of their road networks. See Figure – ZiNaRA Structure.

4. ZIMBABWE TECHNOLOGY TRANSFER CENTRE

The Zimbabwe Technology Transfer Centre was officially launched on the 4th February, 2000 by the Secretary of Transport & Energy. However, the idea of establishing a Technology Transfer Centre in Zimbabwe was first mooted in January, 1999 when Federal Highway Officials came to Harare and deliberated on this concept with Ministry of Transport Officials. The Zimbabwe Technology Transfer Centre was established with assistance from the U.S. federal Highway Administration and the Department of Roads which falls under the Ministry of Transport and Communications who between themselves provided basic equipment, technical assistance, initial seed money and financing for foreign travel.

4.1 Objectives

The primary objective of the Centre is to systematically and actively facilitate the acquisition and dissemination of appropriate technology, practice and policy knowledge and know-how that is relevant to the Zimbabwe road transportation environment.

4.1.1 Main driving forces to embrace the concept were:

- i) Need to share information between the Department of Roads, the Rural District Councils and Urban Councils to ensure uniform standards and procedure.
- ii) Need to share information and know-how between consultants and contractors in the transport industry and government institutions like local authorities and the Department of Roads.
- iii) Enhancement of the Capacity Building Programme in the Rural District and Urban Councils.
- iv) Need to acquire and share technology to rehabilitate and reconstruct the country's aged road network some of which is over 35 years.
- v) Sharing experiences with well established organizations like Transport Research Institutes and Universities.
- vi) Need to apply new technology in the road and bridge design, construction and maintenance.
- vii) Need to curb the ever increasing road carnage on our roads with a total number of registered vehicles of 915 039 in 1999. Refer to Table 3.

Table 4: TOTAL CASUALTIES ACCORDING TO TYPE OF ROAD USER 1994-1999

TYPE OF ROAD USER	1994		1995		1996		1997		1998		1999
	Killed	Injured	Killed								
Passengers	435	7 076	399	6 520	372	7 352	400	6 751	792	10 756	542
Pedestrians	441	3 851	431	4 197	427	4 651	472	5 135	668	6 332	617
Drivers	295	3 187	220	3 450	317	4 048	341	4 037	543	6 272	568
Pedal Cyclists	82	1 540	85	1 638	67	1 462	85	1 540	123	2 053	117
Motor Cyclists	21	486	12	528	13	522	9	443	26	571	14
TOTAL	1 274	16 140	1 147	16 333	1 196	18 035	1 307	17 906	2 152	25 984	1 858

Figure 4

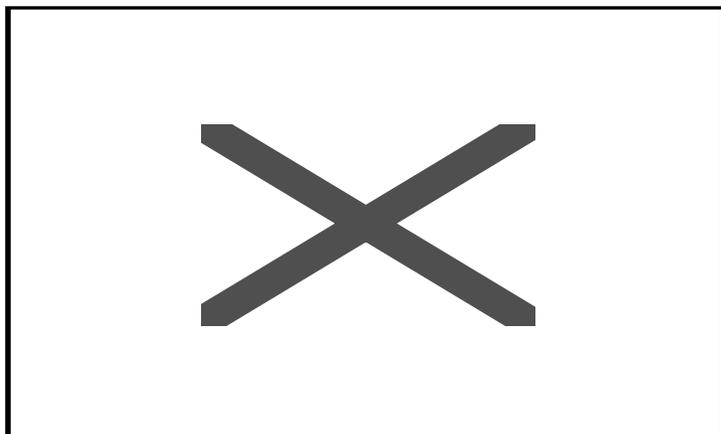
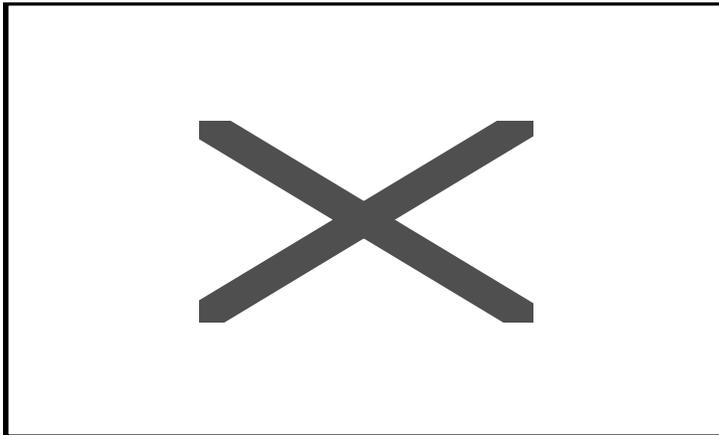


Figure 5



That there is no benefit to be derived from duplicating research efforts or to re-invent the wheel.

It was in recognition of these challenges that a Centre offering local road agencies improved access to highway and road technology would go a long way in alleviating some of the problems.

4.2 Mission

To serve as a focal point for active dissemination of information and technology in order to improve the quality of our road network.

4.3 Programme of the Centre

Steps towards Establishment

i) The first step taken was to compile a list of all the players in the transport industry starting with local authorities, academic institutions, professional organizations, consultants, contractors and international players which formed the basis of our mailing list.

ii) Sent out invitation for inaugural meeting for February the 4th 2000 and list of people who attended appears as an Appendix.

iii) The next step was for the T² Centre Committee to identify Advisory Board Members from key organizations and institutions and did identify 12, informed them asked them if they accepted the invitations to be Board members. Only six accepted to be members.

In December, 2000 4 Board members turned up for a meeting with FHWA officials who helped to enlighten the members on the role of the Advisory Board.

iv) The year 2000 we did not have an operational budget allocation from the Department of Roads hence it was not easy to implement our action plan.

4.4 Management and administration of T² Centre

The Centre is managed under the following structure.

i) Management Committee of 5 members. All the 5 members are from the Department of Roads.

This Management Committee has the following responsibilities:

- a) Comes up with the annual work plan and budget for the T² Centre.
- b) Steer up activities to be carried out by the Centre.
- c) Reviewing progress of the Centre.

ii) Manager: He is the head of the Centre answerable to the Management Committee and the Director of Roads and chair the Centre's meetings.

iii) Supporting staff – there is a Centre Secretary in the structure who is still to be appointed but in the meantime the Centre's Librarian is standing in place.

4.5 Main Task and Activities of the Centre

The main thrust of the Centre will be:

- i) Education and training.
- ii) Improvement in transmission of information.

4.5.1 Activities of the Centre

The programme activities of the Centre closely follow those of the LTAP Centres along which the Centre is modelled.

- i) Needs assessment exercise. It is imperative to know what the stakeholders expect from the Centre so as to maximize the utilization of the Centre.
- ii) Compile and maintain a mailing list. The Centre maintains a mailing list of all local government road authorities, contractors, consultant firms in the transport industry, professional organizations, academic institutions and regional and international transportation organizations.
- iii) Publishing a quarterly newsletter

The Centre publishes a quarterly newsletter which amongst other items includes a list of transportation related materials like reports, studies, training kits etc, that will be available at the Centre, announcements on courses to be conducted, seminars, meetings and conferences to come and any other issues pertaining to Technology Transfer.

- iv) Provide material and information.

The Centre distributes materials to users upon request but so far it is the Department of Roads users and the University of Zimbabwe students who regularly request for information.

- v) Provide an Information Service

The Centre provides advice, guidance and referrals. The Research Division of the Department of Roads has over the years carried out research on local materials and has kept a lot of information which can now be accessed through the Centre.

- vi) Conduct and arrange Seminars and Training Sessions

This is a very important task for the Centre because this is one proven way of dissemination of information and technology directly to the clientele.

4.6 Funding

The Zimbabwe T² Centre is funded:

- i) Government of Zimbabwe through the Department of Roads in the Ministry of Transport and Communications.
- ii) The U.S. Federal Highway Administration
- iii) Centre's generated funds (future plans).

Although the Government through the Department of Roads is doing its best to fund our programme its resources are also limited, so there is every need to devise methods for self-sustainability.

4.7 Operations and Accomplishment of the Centre to date

4.7.1 Exchange visits between US FHWA and Zimbabwe T² Centre Ministry of Transport Officials.

- i) Two T² Centre Committee members attended the 1999 Annual LTAP Conference in Virginia, U.S.A. courtesy of the FHWA.
- ii) Two high ranking Officials in the Ministry of Transport and Energy visited the U.S.A. in April, 2000 to learn more about the institutional and organizational functions and technology transfer process.
- iii) In June, 2000 a T² Centre Committee member who is also our librarian visited U.S.A. where he was exposed to various library software at the University of California and at the Transport Research Board. Also attended the Special Library Association U.S.A. Conference.
- iv) In December, 2000 the Centre librarian attended a Library Software Training course at KwaZulu Natal Provincial Department of Transportation, South Africa. All the 4 trips (i-iv) above were sponsored by the US FHWA.
- v) Officials from the FHWA visited Zimbabwe T² Centre several times in 2000 to assist in the

establishment of the Centre and to evaluate progress.

vi) The Centre organized a one-day workshop on the Use of Thermoplastic Road Marking Materials.

vii) The Centre organised a workshop on Road Maintenance in Urban Areas in November, 2000 where several Urban Councils were represented. A paper was presented on “The Zimbabwe Technology Transfer Centre: An Insight into its Composition and Operations”.

viii) Two trial newsletters were issued in the year 2000. There is no Editorial Board in place, the Management Committee is acting as the Editorial Board.

ix) Staffing of the Centre:

The Ministry of Transport and Communications Department of Roads has seconded 5 committee members to form the nucleus of the Centre. Two are civil engineers, two are researchers and one is a librarian. All the five work on part-time basis. A secretary is being sought to man the Centre.

5. Self Appraisal and Evaluation

In a bid to continuously improve the level of our service we propose to introduce objective mechanisms for measuring progress, performance and plan for improvement.

The following activities have been proposed for the evaluation program:

1. Distribute and review course evaluation forms.
2. Convene Advisory Board meetings.
3. Review Advisory Board comments and recommendations.
4. Conduct staff meetings to evaluate program performance and coordinate program operations.
5. Conduct a countrywide needs assessment. The results of the assessment will be incorporated into the current program.

6. CONCLUSION

From the innumerable transportation deficiencies Zimbabwe has as a country, the importance and role

the Zimbabwe Technology Transfer Centre is going to play cannot be over-emphasized. Technology

Transfer Centres have been proved to be effective vehicles for exchange of information, it is therefore our last hope to attain technological equilibrium.

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