

資料 2 主要面談者リスト

ボツワナ政府

(1) Ministry of Foreign Affairs

E.S.Mpofu	Parmanent Secretary
M.Moorad	Acting Permanent Secretary
Osear Motswagae	Deputy Director (Multilateral)
P.J.Gaumakwe	Foreign Affairs Officer
P.Buzzman	Foreign Affairs Officer

(2) Ministry of Finance and Development Planning

D.M.Gaseitsiwe	Chief Economist
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(3) Ministry of Works, Transport and Communications

Mmapula Johnson	Permanent Secretary
M.J.Moatshe	Deputy Permanent Secretary
A.Nkaro	Acting Director, Roads Department
Ethaim K, Msimeta	Chief Roads Engineer, Roads Department
Judith Nwako	Principal Road Engineer, Roads Department
M.Kono	Principal Road Engineer, Roads Department
P.G.Alpajora	Senior Bridge Engineer, Roads Department
M.Gabosekwe	Planning Officer

(4) Other Related Authorities

C.T.T.Magowe	District Commissioner, Chobe
B.P.Matenge	District Officer Department, Chobe
A.Makgonatsotlhe	Principal State Counsel, Attorney General Chambers
O.G.Morale	Officer in Charge, Customs, Kazungula
G.M.Letsatle	Senior Immigration Officer
M.T.Lekoko	Senior Immigration Officer
S.S.Samuel	Acting Officer Commanding, Police

ザンビア政府

(1) Ministry of Foreign Affairs

Inyambo Liboma	Legal Officer
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(2) Ministry of Finance and Economic Development

Stella M.Chibanda	Director, External Resource Mobilization
A.M.Musunga	Acting Director, External Resource Mobilization

G.K.Muchimba Acting Chief Economist (Bilateral)
H.S.Akapelwa Economist (Japan Desk)

(3) Ministry of Works and Supply

G.P.Nyirenda Permanent Secretary
Erasmus M.Chilundika Acting Assistant Director(planning), Roads Dept.
M.E.O. Beshir Head of Construction Management Unit, Roads Dept.
E.Mware Senior Exel Engineer, Roads Department
Albert Zulu Road Inspector, Road Department
Bupe Kaonga Assistant Director of Planning
Roads Department, Southern Province, Livingstone,
Stephen malubila Provincial Roads Engineer, Roads Department
Ntinda Leonard Senior Road Inspector
Richard Kambenja Monitoring and Planning Unit

(4) Ministry of Transport and Communications

W. S. C. Mwandila Director of Planning and Research Unit

(5) Department of Water Affairs (Headquarters)

P. Chola Deputy Director
C. Chileshe Senior Hydrologist

(6) Survey Department

Bwalya N. Chuba Head of Photogrammetry

(7) Other Relevant Authorities

Rev.P.M.Akupela Acting High Commissioner
Gaudentia Salasini Principal State Advocate, Ministry of Legal Affairs
D.H.Hakayobe Acting Permanent Secretary, Provincial Administration,
Southern Province, Livingstone

ジンバブエ政府

(1) Ministry of Transport and Energy

N.Kudenga Director of Roads
M.Ndoro Deputy Chief Engineer (Planning), Department of Roads

ナミビア政府

(1) National Planning Commission Secretariat

H.Rumpf	Parmanent Secretary
P.A.Kiiyala	Director of Development Cooperation
V.Tjikuzu	Development Cooperation Officer
J.Mbeeli	Development Cooperation Officer
O.Amuteuya	Development Cooperation Officer

(2) Ministry of Works, Transport and Communications

P.Thiemann	Acting Director, Department of Transport
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(3) Office of Surveyer General

K.Owolabi	Surveyer General
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SADC

Willem Goeiemann	Senior Economist
狩野専門家	

Others

M. Phiri	Regional Manager
	Engineering Services Cooperation Ltd.(ESCO), Livingstone, Zambia

日本側

(1) 在南アフリカ日本大使館	大塚 公使 石塚 一等書記官
(2) 在ザンビア日本大使館	遠藤 一等書記官 坂 二等書記官
(3) 在ジンバブエ日本大使館	丸山 参事官
(4) JICA 南アフリカ事務所	高橋 事務所長 中村 所員 木藤 所員
(5) JICA ボツワナ駐在員事務所	筒井 事務所長
(6) JICA ザンビア事務所	石川 事務所長 大田 次長 吉村 所員 田辺 所員
(7) JICA ジンバブエ事務所	佐藤 事務所長 門脇 所員

QUESTIONNAIRE
FOR
THE FEASIBILITY STUDY
ON
KAZUNGULA BRIDGE OVER THE ZAMBEZI RIVER
BETWEEN
THE REPUBLIC OF BOTSWANA
AND
THE REPUBLIC OF ZAMBIA
November 1999
Japan International Cooperation Agency (JICA)

This questionnaire is prepared by the Japanese Preparatory Study Team for the FEASIBILITY STUDY ON KAZUNGULA BRIDGE OVER THE ZAMBEZI RIVER so as to obtain basic data and information required for the study.

Please answer to all the questions in the questionnaire. Answers need not be too much in detail but should be brief and precise.

- Note: - Please write [Yes] in the [Availability] for the Data/Item available.
- Please write [No] in the [Availability] for the Data/Item unavailable.

1. GENERAL INFORMATION

	Data/Item	Availability	Place of Data Available	Name of Report & Files
1	Socio-economic conditions in the last 10 years	No		
2	Population by district and division	Yes		1991 Population Census
3	Agricultural, industrial and mining products by main sort and by district and division	No		
4	Foreign trade (quantity and value country by main sort	Yes	SADC/MCI	
5	Foreign trade balance	No		
6	Income distribution by district and division	No		
7	Price index	Yes	MCI	
8	Exchange rate for USS	Yes	Bank of Botswana	
9	Number of foreign tourists	Yes	MCI	
10	Number of vehicles	Yes	Dept of RTS	
2	National development plans and regional development plans by district and division			National Development Plans
	1) Economic development plans	Yes	MFDP/MLG	
	2) Transportation development Plans	No		
	3) Agricultural and Fishing development plans	Yes	M/O Agriculture	
	4) Industrial development plans including	Yes	MCI	
	1) Recent tendency of foreign investment	-	-	
	2) Free trade Zone			
	5) Progress of above mentioned plans in %	Yes	MFDP	
	6) Forecast of socio-economic indicators	Yes	DTRP	
	7) Existing land use of the site area			
3	Annual budget with breakdown for the next 10 years	No		
4	Public investment in the last 5 years by component	Yes	MCI	
5	Amount of foreign assistance	Yes	MCI/MFDP	

SADC - Southern Africa Development Community
MCI - Ministry of Commerce & Industry
RTS - Road Transport and Safety)
MFDP - Ministry of Finance & Dev. Planning

DTRP - Dept of Town & Regional Planning.
MLG - Ministry of Local Government.

II TRANSPORTATION SYSTEM

		Availability		
	Data/Item	Availability	Place of Data Available	Name of Report & Files
1	1. Transportation system	Yes	RD/BR/DWA	
	1) Network maps and capacity of transportation systems (roads, railways, inland waterway and ferry)	Yes		
	2) Present condition of each mode	Yes	RD/BR/DWA	
	1) Degree of the development	Yes	RD/BR/DWA	
	2) Traffic volume by each mode	Yes	RD/DWA	
	3) Amount of investment of each mode	Yes	DRTS/BR/DWA	
	4) Transportation cost, fares, and tariffs of each mode	Yes	DRTS/BR/DWA	
	5) Operational/managing cost of each mode	Yes	DRTS/BR/DWA	
	3) Development/improvement policies and plans for each mode	Yes	RD/DRTS/BR/DWA	
	4) Related studies and reports, if any	Yes	DRTS/BR/DWA	
2.	Transport Administration	Yes		
	1) Administrative organisation chart with jurisdictional responsibilities and brief explanation	Yes		
	1) Ministry of Works, Transport Communication (Botswana), Ministry of Works and Supply (Zambia), and related agencies.			
	2) Other indispensable organizations for this project			
3	Existing and on-going road development plans and project	Yes	RD	
	1) Design, implementation schedule and current project status	Yes	RD	
	2) National plan	Yes	RD/MFDP/MWTC	
	3) Annual plan	Yes	RD	

RD - Roads Department
 BR - Botswana Railways
 DWA - Dept of Water Affairs
 DRTS - Dept of Road Transport & Safety

MWTC - Ministry of Transport & Communications.

III. ORGANISATIONS CONCERNING THE IMPLEMENTATION OF THE STUDY

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. Agencies in charge of and / or concerned with followings:			
1) Permission to aerial photo taking	Yes	DSM	
2) Custody of topographic maps and aerial photos	Yes	DSM	
3) Area Conservation	Yes	DSM	
4) Geological data / information	Yes	GS	
Please state:			
- Name of Agencies and Departments			
- Name and position of the responsible persons in charge for the Japanese Study Team to contact			
2. Organization to supervise and steer the management of the Study	Yes	RD/MWTC	
3. Roads and railway related budget			
1) Road and Railway construction budget	Yes	RD/BR	
2) Road and Railway maintenance budget	Yes	RD/BR	
4. Road and Bridge related cost			
1) Construction cost by type of road, bridge and location	Yes	RD	
2) Maintenance cost by type of road, bridge and location	Yes	RD*	
3) Construction material cost	Yes	RD	
4) Unit costs for major work	Yes	RD	

DSM - Department of Surveys and Mapping

GS - Geological Surveys.

* Limited to roads as the bridge maintenance programme has just been introduced.

IV. Environmental issues (1)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. Legislation related to environmental policies and standards			
1) Responsible ministry or agency		MLG/NCSA	
2) Laws / guidelines	Yes	AG's Chambers	
3) Environmental quality standards including emission / effluent standards	Yes	MLG/NCSA**	
- Standard values and penalties			
- Monitoring system and its responsible agency			
4) Laws / guidelines related to environmental impact assessment (EIA)	Yes	MLG/NCSA**	
- Type / Size of activities for EIA			
- Procedure			
2. International conventions on environmental conservation			
- Affiliation to bilateral or multi-lateral conventions			
- Names of conventions and the date of affiliation, if any			
3. Present situation of the proposed projects sites			
1) Socio-economic environment			
- Plan of resettlement, if any (number of people to be resettled) (compensation)			
- Experience of resettlement in previous projects, if any			
- Main industry or source of income of residents			
- Distribution of schools, hospitals, power lines, etc (public facilities)			
- Cultural property or archaeological sites			
- History of epidemic disease			
- Solid waste collection/disposal system and waste water treatment system			

NCSA - National Conservation Strategy Agency

AGS - Attorney Generals.

** Draft Environmental Legislation awaiting approval by Parliament

IV. Environmental issues (2)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
2. Natural environment			
- Location of particular areas officially protected such as national parks and natural parks	Yes	DNWP	
- Location of environmentally vulnerable areas such as mangrove forest and wetland	Yes	M/o Agric/NCSA	
- Species of precious animals and plants in the area	Yes	M/o Agric/NCSA	
- Distribution of important historical spots, landscape and scenery			
3) Quality of Life			
- Present conditions of air quality, water quality, soil contamination, noise and vibration	Yes	MMRWA/NCSA/Agric	
- Number of pollution grievances			
- Environmental education			
4. Environmental impact assessment (EIA) of the proposed project			
1) Environmental factors / items to be expected affecting environments by the proposed project	Yes	DWA/NCSA/GS	
2) Necessity of EIA in the proposed project	Yes	DWA/NCS/GS	

DNWP - Department of Wildlife and National Parks
MMRWA - Ministry of Mineral Resources & Water Affairs

V. TECHNICAL DATA / INFORMATION (1)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. Topographic data			
1) Topographic maps - of larger scale on site, if any	Yes	DSM	
2) Availability of aerial photos - Aerial photos (1/5,000)	Yes	DSM	
3) Maps and treaties of international boundaries on site	Yes	DSM/MFA	
2. Geological data	Yes	GS	
1) Geological maps covering the study area	Yes	GS	
2) Existing report about data / information such as:	Yes	GS	
- Location of soft ground	Yes	DSM	
- Results of geological / soil investigations			
3. Geodetic data			
1) Triangulation point network	Yes	DSM	
2) Bench-mark network	Yes	DSM	
3) Points description (Control points, Bench mark)	Yes	DSM	
4) Triangulation point data list	Yes	DSM	
4. Hydrographic data			
1) Hydrogeological maps or data	Yes	DWA	
2) Amount of ground water pumped	Yes	DWA	
3) Number of wells and boreholes to be used	Yes	DWA	
4) Change of water level including ground water in recent years	Yes	DWA	

MFA - Ministry of Foreign Affairs

V. TECHNICAL DATA/INFORMATION (2)

Data/Item	Availability		Name of Report and Files
	Availability	Place of Data Available	
5. Meteorological data:-			
(1) Monthly rainfall data (daily rainfall data, if possible)	Yes	DMS	
(2) Temperature	Yes	DMS	
(3) Wind (observation data at the point of the site)	Yes	DMS	
(4) Others	Yes	DMS	
6. Natural disaster			
(i) History of natural disaster			Community Consultation
- Earthquake			
- Cyclone			
- Flood, landslide, etc;			
7. Data of existing bridge more than 100 metres in length			
- Type of length, width, spa, clearance, load limitation	Yes	Rd.	
- Construction cost, year built, etc;	Yes	Rd	
8. Specification and standard:			
(1) Geometric standard	Yes	Rd	Road design Manual
(2) Bridge standard	-	-	
(3) Pavement standard	Yes	Rd	Road design Manual
(4) Environment standard	Yes	NCSA	
(5) Maintenance manual	Yes	RD	
(6) Legal enforcement, etc;	Yes	Ags/CP/NCSA/RD***	
(7) Navigation or clearance requirements on site	Yes	MMRWA/DWA	

DMS – Department of Meteorological Services

*** The enforcement institution is related to the specific activity

VI. CONSULTANTS AND SURVEYORS

Data/Item	Availability		Name of Report and Files
<p>1. List of registered consulting firm in actual and terms of:-</p> <ul style="list-style-type: none"> - Environmental Survey - Topographic survey - Soil/Geotechnical survey - Hydrographic survey - Traffic survey - Socio-economic survey 	Yes	Rd	
<p>2. Cost of investigation and survey</p> <ul style="list-style-type: none"> - Environmental survey (water quality, noise, fauna, flora etc;) - Topographic survey, sounding survey - Boring, laboratory soil test, riverbed material survey - Hydrographic survey - Origin-destination survey - Socio-economic survey - Salary for consultants 	Yes	Rd	
<p>3. Bidding rate for:</p> <ul style="list-style-type: none"> - Environmental specialist - Surveyor - Geotechnical engineer - Hydrographic engineer - Traffic engineer - Economist, etc; 			

VII. OTHER INFORMATION

Data/Item	Availability		Name of Report and Files
	Availability	Place of Data Availability	
1. Future budgetary plan for the implementation of the project 2. Any specific restrictions related to the study 3. Availability of the government's equipment/instruments/apparatus for the study (i) Equipment/instruments/apparatus which are available for the following category with the following information:			
a) Category - Instrument for geodetic survey - Apparatus for geological/soil investigation - Apparatus for traffic survey - Computer - Services vehicle - Others			
b) Information - Name - Type (or Model/maker) - Characteristics (or capacity) - Number of units - Condition			
4. Availability of construction (soil/sand/aggregate, timber, Cement/concrete, steel/materials and products, etc.) 5. Opinions of alternative routes			

I .GENERAL INFORMATION

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. Socio-economic conditions in the last 10 years			
1) GNP (or GDP) by sector, district and division	YES	CSO, LUSAKA	
2) Population by district and division	YES	" "	
3) Agricultural, industrial and mining products by main sort and by district and division	YES	MAFF	
4) Foreign trade (quantity and value, country) by main sort	YES	CSO, LUSAKA	
5) Foreign trade balance	YES	MOFED	
6) Income distribution by district and division	YES	CSO, LUSAKA	
7) Price index	YES	CSO, LUSAKA	
8) Exchange rate for US\$	YES	BOZ	
9) Number of foreign tourists	YES	ZNTB	
10) Number of vehicles	YES	RTC	
2. National development plans and regional development plans by district and division			
1) Economic development plans	YES	MOFED	
2) Transportation development plans	YES	MOFED	
3) Agricultural and fishing development plans	YES	MAFF	
4) Industrial development plans including			
① Recent tendency of foreign investment	YES	MCTI	
② Free trade zone	YES	MCTI	
5) Progress of above mentioned plans in %	YES	MCTI	
6) Forecast of socio-economic indicators	YES	MCTI	
7) Existing land use of the site area	YES	PPU-SP	
3. Annual budget with breakdown for the next 10 years	YES	MOFED	
4. Public investment in the last 5 years by component	YES	MOFED	
5. Amount of foreign assistance	YES	MOFED-ERM	

II. TRANSPORTATION SYSTEM

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. Transportation systems			
1) Network maps and capacity of transportation systems (roads, railways, inland waterway and ferry)	YES	MCT	
2) Present condition of each mode			
① Degree of the development	YES	MCT	
② Traffic volume by each mode	YES	MCT	
③ Amount of investment of each mode	YES	MCT	
④ Transportation cost, fares, and tariffs of each mode	YES	MCT	
⑤ Operational / managing cost of each mode	YES	MCT	
3) Development / improvement policies and plans for each mode	YES	MCT	
4) Related studies and reports, if any	YES	MCT	
2. Transport administration			
1) Administrative organization chart with jurisdictional responsibilities and brief explanation	YES	MOWS (Z)	
① Ministry of Work, Transport Communication (Botswana), Ministry of Work and Supply (Zambia), and related agencies	YES	MOWS (Z)	
② Other indispensable organizations for this project	YES	NRB	
3. Existing and on-going road development plans and project			
1) Design, implementation schedule and current project status	YES	RD/NRB	
2) National plan	YES	RD/NRB	
3) Annual plan	YES	RD/NRB	

III. ORGANIZATIONS CONCERNING THE IMPLEMENTATION OF THE STUDY

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
<p>1. Agencies in charge of and / or concerned with followings :</p> <p>1) permission to aerial photo taking</p> <p>2) Custody of topographic maps and aerial photos</p> <p>3) Area conservation</p> <p>4) Geological data / information</p> <p>Please state :</p> <p>- Name of Agencies and Departments</p> <p>- Name and position of the responsible persons in charge for the Japanese Study Team to contact</p>	<p>YES</p> <p>YES</p> <p>YES</p> <p>YES</p>	<p>SURVEY DEPT.</p> <p>SURVEY DEPT.</p> <p>MO ENV.</p> <p>GEOLOGICAL SURVEY DEPT.</p> <p>① SURVEYOR GENERAL (SURVEY DEPT.)</p> <p>② TECHNICAL RECORDS OFFICER (GEOLOGICAL SURVEY)</p>	
<p>2. Organization to supervise and steer the management of the Study</p>	<p>YES</p>	<p>RD</p>	
<p>3. Roads and railway related budget</p> <p>1) Road and Railway construction budget</p> <p>2) Road and Railway maintenance budget</p>	<p>YES</p> <p>YES</p>	<p>RD / ZR / TAZARA</p> <p>RD / ZR / TAZARA</p>	<p>YELLOW BOOK FOR ROADS AS WELL AS ROADZEP DOCUMENT</p>
<p>4. Road and Bridge related cost</p> <p>1) Construction cost by type of road, bridge and location</p> <p>2) Maintenance cost by type of road, bridge and location</p> <p>3) Construction material cost</p> <p>4) Unit costs for major work</p>	<p>YES</p> <p>YES</p> <p>YES</p> <p>YES</p>	<p>RD</p> <p>RD</p> <p>RD</p> <p>RD</p>	

IV. Environmental issues (1)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. Legislation related to environmental policies and standards			
1) Responsible ministry or agency	YES	MOENR	
2) Laws/guidelines	YES	MOENR	
3) Environmental quality standards including emission/effluent standards			
- Standard values and penalties	YES	ECZ	
- Monitoring system and its responsible agency	YES	ECZ/RD	
4) Laws/guidelines related to environmental impact assessment(EIA)			
- Type/size of activities for EIA	YES	ECZ/MOENR	
- Procedure	YES	ECZ/RD	
2. International conventions on environmental conservation			
- Affiliation to bilateral or multi-lateral conventions	YES	ECZ	
- Names of conventions and the date of affiliation, if any	YES	ECZ	
3. Present situation of the proposed project sites			
1) Socio-economic environment	NO		
- Plan of resettlement, if any (number of people to be resettled) (compensation)	NO		
- Experience of resettlement in previous projects,if any	NO		
- Main industry or source of income of residents	.	PPU - L/STONE	
- Distribution of schools, hospitals, power lines, etc. (public facilities)	YES	PPU - L/STONE	
- Cultural property or archaeological sites	YES	NHCC	
- History of epidemic disease	YES	MOH	
- Solid waste collection/disposal system and waste water treatment system	YES	L/STONE COUNCIL	

IV. Environmental issues (2)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
2) Natural environment			
- Location of particular areas officially protected such as national parks and natural parks	YES	ZAWA	
- Location of environmentally vulnerable areas such as mangrove forest and wetland	YES	FD	
- Species of precious animals and plants in the area	YES	ZAWA	
- Distribution of important historical spots, landscape and scenery	YES	MHCC	
3) Quality of life			
- Present conditions of air quality, water quality, soil contamination, noise and vibration	NO		
- Number of pollution grievances	NO		
- Environmental education	NO		
4. Environmental impact assessment (EIA) of the proposed project			
1) Environmental factors / items to be expected affecting environments by the proposed project	YES	RD	
2) Necessity of EIA in the proposed project	YES	RD	

V. TECHNICAL DATA / INFORMATION (1)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. Topographic data			
1) Topographic maps			
- of larger scale on site, if any	YES	SURVEY DEPT.	
2) Availability of aerial photos			
- Aerial photos (1/5,000)	YES	SURVEY DEPT.	
3) Maps and treaties of international boundaries on site	YES	SURVEYOR GENERAL	
2. Geological data			
1) Geological maps covering the study area	YES	GEOLOGICAL SURVEY DEPT.	
2) Existing report about data / information such as :			
- Location of soft ground	NO		
- Results of geological / soil investigations	NO		
3. Geodetic data			
1) Triangulation point network	YES	SURVEY DEPT.	
2) Bench-mark network	YES	SURVEY DEPT.	
3) Points description (Control points, Bench mark)	YES	SURVEY DEPT.	
4) Triangulation point data list	YES	SURVEY DEPT.	
4. Hydrographic data			
1) Hydrogeological maps or data	YES	DOWA - LUSAKA	
2) Amount of ground water pumped	YES	DOWA - MONZE	
3) Number of wells and boreholes to be used	YES	DOWA - MONZE	
4) Change of water level including ground water in recent years	YES	DOWA - CHOMA	

V. TECHNICAL DATA / INFORMATION (2)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
5. Meteorological data			
1) Monthly rainfall data (daily rainfall data, if possible)	YES	METEOROLOGICAL DEPT.	
2) Temperature	YES	METEOROLOGICAL DEPT.	
3) Wind (observation data at the nearest point of the site)	YES	METEOROLOGICAL DEPT.	
4) Others	YES	METEOROLOGICAL DEPT.	
6. Natural disaster			
1) History of natural disaster			
- Earthquake	NO		
- Cyclone	NO		
- Flood, landslide, etc.	NO		
7. Data of existing bridge more than 100 meters in length			
- Type of length, width, span, clearance, load limitation	YES	RD	BRIDGE MANAGEMENT SYSTEM (BMS)
- Construction cost, year built, etc.	YES	RD	
8. Specification and standard			
1) Geometric standard	YES	RD	
2) Bridge standard	YES	RD	
3) Pavement standard	YES	RD	
4) Environment standard	YES	RD	
5) Maintenance manual	YES	RD	
6) Legal enforcement, etc.	YES	RD	
7) Navigation or clearance requirements on site	YES	RD	

VI. CONSULTANTS AND SURVEYORS

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. List of registered consulting firm in and actual results and terms of ;			
- Environmental survey	YES	MOENY.	
- Topographic survey	YES	RP	
- Soil / Geotechnical survey	YES	DATA RP	
- Hydrographic survey	YES	DOWA	
- Traffic survey	NO		
- Socio-economic survey	YES	CSO	
2. Cost of investigation and survey			
- Environmental survey (water quality, noise, fauna, flora, etc.)	YES	ECZ	
- Topographic survey, sounding survey	YES	SURVEY DEPT.	
- Boring. laboratory soil test, riverbed material survey	YES	WADE ADAMS / RP	
- Hydrographic survey	YES	DOWA	
- Origin-destination survey	?		
- Socio-economic survey	YES	CSO	
- Salary for consultants	YES	ACEZ	
3. Bidding rate for ;			
- Environmental specialist	YES	ACEZ	
- Surveyor	YES	ACEZ	
- Geotechnical engineer	YES	ACEZ	
- Hydrographic engineer	YES	ACEZ	
- Traffic engineer	YES	ACEZ	
- Economist, etc.	YES	ACEZ	

VI. OTHER INFORMATION(1)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
1. Future budgetary plan for the implementation of the project	NO		
2. Any specific restrictions related to the study	NO		
3. Availability of the government's equipment / instruments / apparatus for the study			
1) Equipment / instruments / apparatus which are available for the study by the following category with the following information :			
a) Category			
- Instrument for geodetic survey	YES	SURVEY DEPT.	
- Apparatus for geological / soil investigation	YES	RD/GEOLOGICAL SURVEY DEPT.	
- Apparatus for traffic survey	NO		
- Computer	NO		
- Services vehicle	NO		
- Others	YES		
b) Information			
- Name	YES	RD/GEOLOGICAL SURVEY	
- Type (or model / maker)	YES	AND SURVEY DEPT.	
- Characteristics (or capacity)	YES	" "	
- Number of units	YES	" "	
- Condition	YES	" "	
4. Availability of construction materials (soil / sand / aggregate, timber, cement/ concrete, steel/ materials & products, etc.)	NO		
5. Opinions of alternative routes	NO		

VI. OTHER INFORMATION(2)

Data / Item	Availability		Name of Report & Files
	Availability	Place of Data Available	
6. Number of accidents of Kazungla ferryboat and their damages/sacrifices including oil spill (positive impact for environment after the completion of new bridge)	YES	ESCO	
7. Organization for ferry operation	YES	ESCO/RD	
8. Number of ferryboats and their capacities, conditions	YES	ESCO/RD	
9. International boundaries at bridge site and treaty with neighbouring countries	YES	SURVEYOR GENERAL/MOFA	
10. Present border facilities and organization at the site	YES	IMMIGRATIONS/CUSTOMS DEPT.	

資料4 収集資料リスト

収集資料リスト(1)

番号	カテゴリー	資料の名称	発行年	地域	言語	形態	版型	ページ数	デジタル・コピーの別	部数	収集先名称又は発行機関	寄贈・購入の別	備考
1	地質	Log Analysis for Mining Applications	-	SOUTH AFRICA	英語	書籍	A4	156	デジタル	1	Reeves	寄贈	教科書
2	コンサル	CONSULTING GEOTECHNICAL AND CIVIL ENGINEERS	-	-	英語	冊子	A4	2	デジタル	1	GEOPRACTICA	寄贈	パンフレット
3	コンサル	GEOPRACTICA C.C. COMPANY PROFILE	1999	-	英語	冊子	A4	25	デジタル	1	GEOPRACTICA	寄贈	会社案内
4	電話帳	Yellow pages	1999	Pretoria	英語	書籍	A4	736	デジタル	1	TELECOM DIRECTORY SERVICES (PTY) LTD	寄贈	中央郵便局で無料配布
5	単価	COSTED PROPOSAL FOR GEOTECHNICAL, ENVIRONMENTAL & LAND SURVEY SERVICES, KAZUNGULA BRIDGE, BOTSWANA / ZAMBIA	1999	対象地域	英語	冊子	A4	24	デジタル	1	GEOPRACTICA	寄贈	現地再委託プロジェクト・サークル、見積
6	コンサル	Wetland CONSULTING SERVICES COMPANY PROFILE	1999	-	英語	書面	A4	17	デジタル	1	Wetland CONSULTING SERVICES	寄贈	会社案内
7	機関	SADC IN BRIEF	-	BOTSWANA	英語	冊子	A4	2	デジタル	1	SADC	寄贈	パンフレット
8	開発計画	NATIONAL DEVELOPMENT PLAN 8 1997/98-2002/03	1997	BOTSWANA	英語	書籍	A4	626	デジタル	1	Ministry of Finance and Development Planning	購入	ボツワナ国家開発計画
9	統計	STATISTICAL BULLETIN	1999	BOTSWANA	英語	書籍	A4	134	デジタル	1	CENTRAL STATISTICS OFFICE	購入	
10	環境管理	A HANDBOOK OF BASIC ECOLOGY FOR RANGE MANAGEMENT IN BOTSWANA	1978	BOTSWANA	英語	書籍	A4	117	デジタル	1	MINISTRY OF AGRICULTURE	購入	
11	野生生物保護法	WILDLIFE CONSERVATION AND NATIONAL PARKS ACT, 1992	1992	BOTSWANA	英語	冊子	B5	117	デジタル	1	REPUBLIC OF BOTSWANA	購入	ACT NO.28 OF 1992
12	廃棄物法	WASTE MANAGEMENT ACT, 1998	1998	BOTSWANA	英語	冊子	B5	47	デジタル	1	REPUBLIC OF BOTSWANA	購入	NO.15 OF 1998
13	道路運送法	ROAD TRANSPORT (PERMITS)	-	BOTSWANA	英語	冊子	B5	31	デジタル	1	REPUBLIC OF BOTSWANA	購入	CHAPTER 69:03
14	野生生物保護法	WILDLIFE CONSERVATION (CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA) (AMENDMENT) ORDER, 1999	1999	BOTSWANA	英語	冊子	B5	34	デジタル	1	REPUBLIC OF BOTSWANA	購入	
15	野生生物保護法	WILDLIFE CONSERVATION (POSSESSION AND OWNERSHIP OF ELEPHANT TUSKS OR IVORY) REGULATIONS, 1999	1999	BOTSWANA	英語	冊子	B5	5	デジタル	1	REPUBLIC OF BOTSWANA	購入	
16	水法	WATER	-	BOTSWANA	英語	冊子	B5	36	デジタル	1	REPUBLIC OF BOTSWANA	購入	CHAPTER 34:01
17	水道法	WATERWORKS	-	BOTSWANA	英語	冊子	B5	26	デジタル	1	REPUBLIC OF BOTSWANA	購入	CHAPTER 34:03
18	野生生物保護法	AQUATIC WEEDS (CONTROL)	-	BOTSWANA	英語	冊子	B5	28	デジタル	1	REPUBLIC OF BOTSWANA	購入	CHAPTER 34:04
19	森林法	FOREST	-	BOTSWANA	英語	冊子	B5	18	デジタル	1	REPUBLIC OF BOTSWANA	購入	CHAPTER 38:04
20	魚類保護法	FISH PROTECTION	-	BOTSWANA	英語	冊子	B5	3	デジタル	1	REPUBLIC OF BOTSWANA	購入	CHAPTER 38:05
21	大気汚染防止法	ATMOSPHERIC POLLUTION (PREVENTION)	-	BOTSWANA	英語	冊子	B5	13	デジタル	1	REPUBLIC OF BOTSWANA	購入	CHAPTER 65:03

収集資料リスト(2)

番号	カテゴリー	資料の名称	発行年	地域	言語	形態	版型	ページ数	判別	部数	収集先名称又は発行機関	寄贈・購入の別	備考
22	公共道路法	PUBLIC ROADS	-	BOTSWANA	英語	冊子	B5	23	判別	1	REPUBLIC OF BOTSWANA	購入	CHAPTER 69:04
23	環境	Environmental Issues in Botswana	1998	BOTSWANA	英語	書籍	A4	159	判別	1	LIGHTBOOKS	購入	
24	地理	BOTSWANA A PHYSICAL, SOCIAL AND ECONOMIC GEOGRAPHY	1998	BOTSWANA	英語	書籍	A4	316	判別	1	Longman Botswana	購入	
25	産業	BOTSWANA 19 edition a review of commerce and industry	1999	BOTSWANA	英語	書籍	A4	160	判別	1	B & T DIRECTORIES (PTY) LTD	寄贈	
26	道路橋梁	Final Report on the Study of the Kazungula Bridge and the Proposed Alternative Road Link Between Pandamatenga and Victoria Falls	1987	BOTSWANA, ZIMBABWE, ZAMBIA	英語	簡易製本	A4	220	コピー	1	SATCC	寄贈	SATCC Project No.1.8.2/1.9.4
27	道路橋梁	Study of the Zambezi River Crossing Between Victoria Falls and Katima Mulilo	1992	BOTSWANA, ZIMBABWE, ZAMBIA	英語	簡易製本	A4	75	コピー	1	SATCC	寄贈	SATCC Project No. AAA.1.06
28	地形図	KASANE 1:50,000	1980	KASANE	英語	図面	A0	1	判別	1	Department of Surveys and Lands	寄贈	SHEET 1725 C3 & PART C4
29	地形図	NGOMA BRIDGE 1:50,000	1996	NGOMA BRIDGE	英語	図面	A0	1	判別	1	Department of Surveys and Lands	寄贈	SHEET 1724 D4 & PART OF D3
30	水理地質図	HYDROGEOLOGICAL RECONNAISSANCE MAP 1:500,000	1983	Chobe District	英語	図面	A0	1	判別	1	Geological Survey Department	寄贈	SHEET 2
31	地質図	THE NATIONAL GEOLOGICAL MAP OF THE REPUBLIC OF BOTSWANA 1:1,500,000	1999	BOTSWANA	英語	図面	A0	1	判別	1	Department of Geological Survey - LOBATSE	寄贈	
32	土質図	KASANE 1:250,000	1990	KASANE	英語	図面	A0	1	判別	1	FAO/UNDP/GOVT. OF BOTSWANA	寄贈	Soil Mapping and Advisory Service Project BOT/85/011
33	土質図	SOIL MAP OF THE REPUBLIC OF BOTSWANA 1:1,000,000	1990	North Botswana	英語	図面	A0	1	判別	1	FAO/BOT/85/011	寄贈	Soil Mapping and Advisory Service Project BOT/85/011
34	土質図	EXPLANATORY NOTE ON THE SOIL MAP OF THE REPUBLIC OF BOTSWANA	1990	BOTSWANA	英語	冊子	A4	48	判別	1	FAO/BOT/85/011	寄贈	Soil Mapping and Advisory Service Project BOT/85/011
35	環境アセス	The EIA process (based on P.Wathern 1988)	1988	BOTSWANA	英語	文書	A4	1	コピー	1	NATIONAL CONSERVATION STRATEGY	寄贈	
36	環境アセス	Airport Circle to Pilane/Rasesa Road	1998	GABORONE	英語	簡易製本	A4	72	コピー	1	CCI	寄贈	環境アセスメント事例
37	コンサル	LIST OF CONSULTING FIRMS - ROAD DEPARTMENT	1999	BOTSWANA	英語	文書	A4	2	判別	1	ROADS DEPARTMENT	寄贈	
38	単価	MONTHLY RATE, TOPOGRAPHIC SURVEY etc.	1999	BOTSWANA	英語	文書	A4	4	判別	1	ROADS DEPARTMENT	寄贈	
39	地図帳	SOCIAL STUDIES ATLAS FOR ZAMBIA	1999	ZAMBIA	英語	書籍	A4	49	判別	1	LONGMAN	購入	
40	地図	LUSAKA MAP	-	LUSAKA	英語	図面	A0	1	判別	1	Directory publishers of zambia limited	購入	
41	統計	ZAMBIA IN FIGURES 1998	1999	ZAMBIA	英語	冊子	A6	24	判別	1	CENTRAL STATISTICAL OFFICE	購入	
42	統計	CONSUMER PRICE STATISTICS 1995	1996	ZAMBIA	英語	冊子	A5	27	判別	1	CENTRAL STATISTICAL OFFICE	購入	

収集資料リスト(3)

番号	カテゴリー	資料の名称	発行年	地域	言語	形態	版型	ページ数	リジナル・コピーの別	部数	収集先名称又は発行機関	寄贈・購入の別	備考
43	統計	QUARTERLY EMPLOYMENT AND EARNINGS SURVEY 1994	1995	ZAMBIA	英語	冊子	A5	10	リジナル	1	CENTRAL STATISTICAL OFFICE	購入	FOURTH QUARTER 1994
44	統計	SELECTED SOCIO-ECONOMIC INDICATORS 1998	1999	ZAMBIA	英語	冊子	A4	36	リジナル	2	CENTRAL STATISTICAL OFFICE	購入	
45	統計	EXTERNAL TRADE BULLETIN 1994	1995	ZAMBIA	英語	冊子	A4	16	リジナル	1	CENTRAL STATISTICAL OFFICE	購入	
46	統計	EMPLOYMENT TRENDS 1985 TO 1993	1994	ZAMBIA	英語	冊子	A4	24	リジナル	1	CENTRAL STATISTICAL OFFICE	購入	
47	統計	MIGRATION AND TOURISM STATISTICS 1993 REPORT	1994	ZAMBIA	英語	冊子	A4	23	リジナル	1	CENTRAL STATISTICAL OFFICE	購入	
48	統計	CONSUMER PRICE STATISTICS 1995	1996	ZAMBIA	英語	冊子	A4	1	リジナル	1	CENTRAL STATISTICAL OFFICE	購入	
49	統計	CENSUS OF POPULATION, HOUSING AND AGRICULTURE 1990	1991	南部ZAMBIA	英語	書籍	A4	159	リジナル	2	CENTRAL STATISTICAL OFFICE	購入	
50	統計	CENSUS OF POPULATION, HOUSING AND AGRICULTURE 1990 DESCRIPTIVE TABLES	1991	南部ZAMBIA	英語	書籍	A4	350	リジナル	2	CENTRAL STATISTICAL OFFICE	購入	
51	統計	LIVING CONDITIONS MONITORING SURVEY REPORT 1996	1997	ZAMBIA	英語	書籍	A4	355	リジナル	2	CENTRAL STATISTICAL OFFICE	購入	
52	統計	THE EVOLUTION OF POVERTY IN ZAMBIA 1991-1996	1997	ZAMBIA	英語	書籍	A4	161	リジナル	1	CENTRAL STATISTICAL OFFICE	購入	
53	環境アセス	ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED CONSTRUCTION OF THE SENANGA-SIRUKALI ROAD	1999	西部ZAMBIA	英語	報告書	A4	70	コピー	1	MINISTRY OF WORKS & SUPPLY	寄贈	環境アセスメント事例
54	環境アセス	ENVIRONMENTAL IMPACT ASSESSMENT STATEMENT FOR THE PROPOSED CONSTRUCTION OF THE SAMUKOTA-SITQYA ROAD	1999	西部ZAMBIA	英語	報告書	A4	65	コピー	1	MINISTRY OF WORKS & SUPPLY	寄贈	環境アセスメント事例
55	環境法	The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997	1997	ZAMBIA	英語	書面	A4	26	コピー	1	Government of Zambia	購入	
56	環境法	The Air Pollution Control (Licensing and Emission Standards) Regulations, 1996	1996	ZAMBIA	英語	書面	A4	19	コピー	1	Government of Zambia	購入	Act No.12 of 1990
57	環境法	The Pesticides and Toxic Substances Regulations, 1994	1994	ZAMBIA	英語	書面	A4	23	コピー	1	Government of Zambia	購入	Act No.12 of 1990
58	環境法	The Water Pollution Control (Effluent and Waste Water) Regulations, 1993	1993	ZAMBIA	英語	書面	A4	18	コピー	1	Government of Zambia	購入	Act No.12 of 1990
59	環境法	The Waste Management (Licensing of Transporters of Wastes and Waste Disposal Sites) Regulations, 1993	1993	ZAMBIA	英語	書面	A4	9	コピー	1	Government of Zambia	購入	Act No.12 of 1990
60	環境法	The Environmental Protection and Pollution Control Act, 1990	1990	ZAMBIA	英語	書面	A4	39	コピー	1	Government of Zambia	購入	Act No.12 of 1990
61	環境	ENVIRONMENT COUNCIL OF ZAMBIA	-	ZAMBIA	英語	冊子	A4	2	リジナル	1	ENVIRONMENT COUNCIL OF ZAMBIA	購入	パンフレット
62	環境	ENVIRO-LINE Issue No.6	1998	ZAMBIA	英語	冊子	A4	23	リジナル	1	ENVIRONMENT COUNCIL OF ZAMBIA	購入	Newsletter

収集資料リスト(4)

番号	カテゴリー	資料の名称	発行年	地域	言語	形態	版型	ページ数	オリジナル・コピーの別	部数	収集先名称又は発行機関	寄贈・購入の別	備考
63	気象データ	Livingstone月別気温、降水量及び風速データ	1999	Livingstone	英語	フロッピーディスク	4	1	オリジナル	1	Meteorological Department/ZAMBIA	購入	1988~1999年
64	水理データ	NANA'S FARM日別水位、月別流量データ、及びSENANGA日別水位データ	1999	ZANBEZI RIVER	英語	フロッピーディスク	4	1	オリジナル	1	Department of Water Affairs /ZAMBIA	購入	1990~1999年(NANA), 1959~1999年(SENANGA)
65	統計資料	Household Budget Survey 1993/94, Total Household Consumption, Employment and Income. Volume 3	1998	ZAMBIA	英語	書籍	A4	103	オリジナル	1	Central Statistical Office	寄贈	
66	統計資料	Conduirt Price Index, October 1999 Release	1999	ZAMBIA	英語	書面	A4	19	コピー	1	Central Statistical Office	寄贈	
67	統計資料	Projected Mid-Year Population by Age and Sex in Districts	-	ZAMBIA	英語	書面	A4	4	コピー	1	Central Statistical Office	寄贈	
68	統計資料	GDP by Kind of Economic Activity 1994-1998	-	ZAMBIA	英語	書面	A4	13	コピー	1	Central Statistical Office	寄贈	
69	道路行政	Road Sector Investment Programme (ROADSHIP 1997-2007)	1997	ZAMBIA	英語	書籍	A4	87	オリジナル	1	Ministry of Communications and Transport	寄贈	
70	道路行政	Road Maintenance Manual (ROADSHIP)	1998	ZAMBIA	英語	書籍	A4	70	オリジナル	1	Ministry of Communications and Transport	寄贈	
71	道路行政	Core Road Network (ROADSHIP)	1997	ZAMBIA	英語	書籍	A4	50	オリジナル	1	National Roads Board	寄贈	
72	道路行政	Tourist Roads	-	ZAMBIA	英語	書面	A4	1	コピー	1	Roads Department	寄贈	
73	道路行政	Other Information on Kazungula Pontoon Statistics	-	ZAMBIA	英語	書面	A4	1	コピー	1	Roads Department	寄贈	
74	気象データ	Rainfall Data, Livingstone Station - Airport (1998-1999)	-	ZAMBIA	英語	書面	A4	4	コピー	1	Roads Department	寄贈	
75	道路橋梁	Preliminary Design Report Section 4, Zambezi River Bridge, Volume 1 : Report	1998	Namibia	英語	報告書	A4	4	オリジナル	1	Ministry of Works, Transport & Communcion	寄贈	
76	地形図	South West Africa 1:50,000 1725CC & CD	1980	Namibia	英語	図面	A1	2	オリジナル コピー	1	General Surveyor's Office, Namibia	寄贈	

資料-2 収集資料リスト

No.	タイトル	発行年	発行元	種別	備考
1	1:250,000 地形図 (Livingstone)		Survey Department, Livingstone	オリジナル	
2	1:250,000 地形図 (Shesheke)		Survey Department, Livingstone	オリジナル	
3	Tourist Map of Livingstone and Victoria Falls		Survey Department, Livingstone	オリジナル	
4	1:50,000 地形図 (1725D4: Livingstone)		Survey Department, Lusaka	青焼	
5	1:50,000 地形図 (1725D3: Livingstone と Kazungula の間)		Survey Department, Lusaka	オリジナル	
6	1:50,000 航空写真 (Kazungula Ferry 付近)	1994.05	Survey Department, Lusaka	オリジナル	
7	日水位 (Victoria Falls-B/TREE) 、 1924/25～1999/00.04.26	2000.05	Provincial Water Engineer, Lusaka Province	オリジナル	
8	日流量年表 (Victoria Falls-B/TREE) 、 1924/25～1998/99	2000.05	Provincial Water Engineer, Lusaka Province	オリジナル	
9	日水位 (Nana's Farm) 、 1990.12.10/91～1998/99	2000.05	Provincial Water Engineer, Lusaka Province	オリジナル	1992/93 欠測月有 1993/1994 欠測
10	日流量年表 (Nana's Farm) 、 1990.12.10/91～1998/99	2000.05	Provincial Water Engineer, Lusaka Province	オリジナル	1992/93 欠測月有 1993/1994 欠測

資料5 ローカルコンサルタント リスト

(1) ボツワナ国

会社名	コンサルタント	所在地	電話	ファクス	電子メール
ACTSConsultants		P.Bag BO 89, Gaborone	353-849	303-197	
DIWI Botswana		P.O.Box 1721,Gaborone	353-360	353-360	
Geoflux	Burrow Binnie	PO Box 854 Gaborone	375-105	300-242	
Intermaping Botswana (Pty) Ltd.	DIWI	PO Box 401898 B Hurst	312-728	351-726	
CCI – Environmental Planners and Educations Consultants (PTY) Ltd.	ACE	P Bag 00488 Gaborone	307-911	357-690	
Groundwater Consulting Services	TTCS	PO Box 1520 Gaborone	301-243		

備考：道路局登録コンサルタント59社の一部

(2) ザンビア国のコンサルタントリスト

会社名	代表者	所在地	電話	ファクス	電子メール
Burrow Binnie	Russ Nekoo, Director	10th Floor Kulima Towers Katunjila Road, Lusaka P.O.Box 31923, Lusaka	224947	224941	
Interconsult Zambia Ltd.	Sven A. Svensen, Resident Manager	Zambia Office P.O. Box 34528, Lusaka	272455	274837	
Brian Colquhoun, Hugh O'Donnell and Partners	J.L. Kaluan, Senior Partner	Craig House Cha Cha Cha Road, Lusaka P.O. Box 31943, Lusaka	228459	215524	
Asco(Z) Ltd.	C.K. Patel, Director	AscoHouse, Luanshya Road, Lusaka P.O. Box 31340, Lusaka	228721	224085	

備考：社員30名以上の会社

(3) 南アフリカ共和国のコンサルタントリスト

会社名	代表者	所在地	電話	ファクス	電子メール
GEOPRACTICAC.C.	Wallis Evans, Jan Arkert	1164, Minnie Postma Street, Florida Ext II, South Africa Box227, Maraisburg 1700	(011)67 4-1325	(011)67 4-4513	wallis@geopr actica.co.za jan@geopract ica.co.za
Wetland CONSULTING SERVICES	Gary Marneweck, Piet-Louis Grundling	Building 1 Ground Floor SanwoodPark 379 Queens Crescent Lynnwood Pretoria	(012)36 1-8856	(012)36 1-9801	wetlandgm@s martnet.co.za wetlandpl@s martnet.co.za

HYDROLOGICAL SURVEY OF KAZUNGULA FERRY SITE

Introduction:

The survey to determine the topography of the river bed and the velocity of the water at various points on the Zambezi and Chobe rivers was requested for by the JICA Study Team for the Proposed Bridge Construction in Kazungula. The survey team was mobilised on 19/04/2000 and Arrived on site on 25/04/2000 to carry out a 4 day survey operation.

Equipment:

The survey equipment comprised of the following:

- 1) Twin engine 8 seater speed boat
- 2) A TC 600 Total Station
- 3) One Velocity Meter
- 4) One 15kg weight
- 5) One 50m rope

Methodology:

The survey comprised of measuring the depth of the river at approximately 25m intervals by sinking a weight tied to a graduated rope. The rope which was graduated at 1m intervals was then straightened and read off against the top of the boat. This first reading indicated the depth of the river bed from the top of the boat, which averaged 0.55m above the water level. The level of the boat was determined with respect to the temporary benchmark established on the land using the TC600 Total Station, which also determined the coordinates of the point being measured. At the same time the velocity of water was measured using a velocity meter. The velocity meter counts the number of revolutions over a preferred time after which the revolutions per second are calculated. Using a deduced formula for a particular propeller used, the velocity of the water is calculated.

Through out the velocity observations, propeller No.1 was used and the following are the formulae used for this one:

- a) For $n < 5.00$, $v = 0.0559n + 0.034$
- b) For $n > 5.00$, $v = 0.0543n + 0.042$

Where n = number of revolutions per seconds
 v = velocity of water in meters per second.

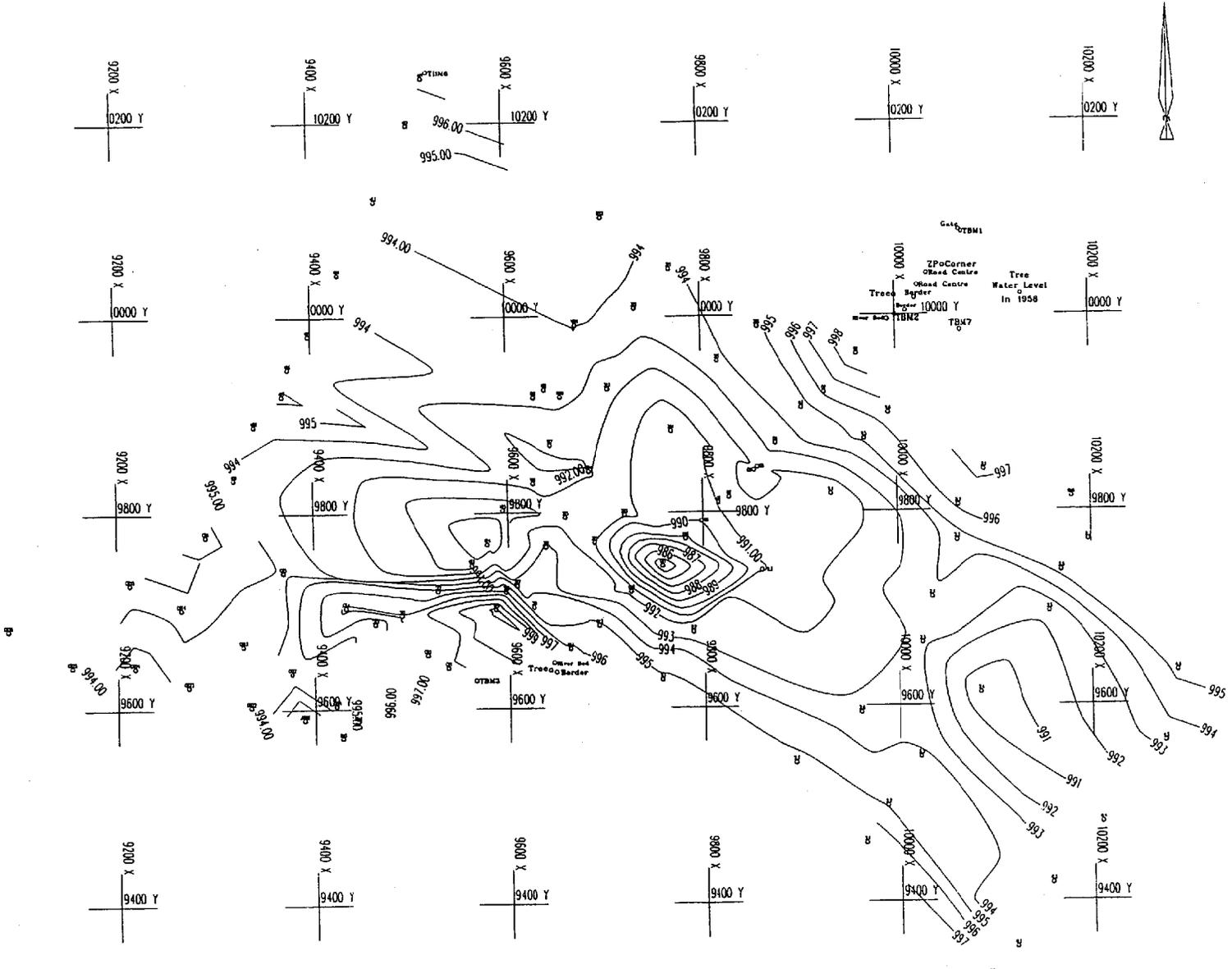
All the data was the synchronized and summarized as in the attached tables.

HYDROLOGICAL SURVEY OF KAZUNGULA FERRY SITE

Pt. No.	Eastings (m)	Northings (m)	Height (m)	Description	Rope Reading (m)	Reduced Level (m)	No.Of Revs.	Water Velocity (m/sec.)
TBM02	10000.000	10000.000	1000.000	TBM				
TBM01	10070.657	10084.661	1002.596	TBM				
1	10067.862	10086.875	1002.633	GATE				
2	10034.025	10042.128	1002.260	ROADCENT				
3	10024.055	10029.784	1001.124	ROADCENT				
4	9999.879	10019.794	1000.498	TREE				
5	10021.235	10016.859	1000.930	BORDER				
6	10011.673	10003.959	1000.431	BORDER				
7	9992.252	9995.487	999.558	RIVERBED				
LOSTN01	9960.464	9961.064	1000.089	TOP BOAT	1.20	998.889	147	0.175
LOSTN02	9926.547	9922.159	1000.077	TOP BOAT	3.95	996.127	304	0.317
LOSTN03	9903.199	9906.662	1000.063	TOP BOAT	5.50	994.563	907	0.863
LOSTN04	9875.676	9870.901	1000.058	TOP BOAT	6.65	993.408	802	0.768
LOSTN05	9857.297	9846.775	1000.089	TOP BOAT	7.90	992.189	701	0.676
LOSTN06	9853.782	9843.585	1000.102	TOP BOAT	7.65	992.452	759	0.729
LOSTN07	9828.226	9815.416	1000.089	TOP BOAT	8.40	991.689	852	0.813
LOSTN08	9816.935	9809.853	1000.099	TOP BOAT	9.00	991.099	1158	1.090
LOSTN09	9798.562	9791.056	1000.069	TOP BOAT	10.00	990.069	1019	0.964
LOSTN10	9781.852	9773.058	1000.124	TOP BOAT	11.30	988.824	217	0.238
LOSTN11	8703.522	8653.469	1000.128	TOP BOAT	16.00	984.128	701	0.676
LOSTN12	9772.009	9749.984	1000.113	TOP BOAT	8.40	991.713	289	0.304
LOSTN13	9692.984	9684.662	1000.187	TOP BOAT	5.00	995.187	421	0.423
LOSTN14	9662.817	9661.114	1000.112	TOP BOAT	4.00	996.112	162	0.189
LOSTN15	9645.904	9646.933	999.657	RIVERBED	0.00	999.657	0	0.000
LOSTN16	9642.110	9639.372	1000.598	TREE				
LOSTN17	9648.258	9637.297	1000.539	BORDER				
TBM03	9565.614	9629.115	1001.226	TBM				
CROSTN01	9536.705	9642.310	1000.094	TOP BOAT	2.40	997.694	138	0.167
CROSTN02	9515.881	9655.383	1000.137	TOP BOAT	4.00	996.137	670	0.648
CROSTN03	9462.299	9686.749	1000.126	TOP BOAT	4.90	995.226	794	0.761
CROSTN04	9432.539	9703.630	1000.214	TOP BOAT	3.00	997.214	773	0.742
CROSTN05	9368.530	9740.198	1000.314	TOP BOAT	6.60	993.714	850	0.811
CROSTN06	9289.566	9776.750	1000.410	TOP BOAT	3.80	996.61	253	0.271
L1RSTN01	9489.354	9695.797	1000.258	TOP BOAT	3.10	997.158	811	0.776
L1RSTN02	9527.168	9720.518	1000.222	TOP BOAT	4.90	995.322	753	0.723
L1RSTN03	9561.822	9746.625	1000.237	TOP BOAT	9.80	990.437	834	0.797
L1RSTN04	9578.791	9767.787	1000.254	TOP BOAT	11.15	989.104	840	0.802
L1RSTN05	9594.949	9802.611	1000.345	TOP BOAT	10.00	990.345	673	0.651
L1RSTN06	9625.862	9830.210	1000.325	TOP BOAT	8.00	992.325	742	0.714
L1RSTN07	9644.347	9869.415	1000.371	TOP BOAT	8.90	991.471	790	0.757
L1RSTN08	9627.442	9917.994	1000.364	TOP BOAT	7.00	993.364	704	0.679
L1RSTN09	9639.279	9925.895	1000.336	TOP BOAT	7.00	993.336	786	0.753
L1RSTN10	9655.444	9918.392	1000.323	TOP BOAT	6.80	993.523	710	0.685
L1RSTN11	9671.912	9990.916	1000.336	TOP BOAT	6.30	994.036	788	0.755
L1RSTN12	9700.518	10101.089	1000.373	TOP BOAT	6.00	994.373	699	0.675
TBM04	9443.529	9586.952	1000.650	TBM				
CR1STN01	9421.354	9603.184	1000.226	TOP BOAT	5.80	994.426	57	0.094
CR1STN02	9376.582	9637.347	1000.216	TOP BOAT	5.95	994.266	678	0.656
CR1STN03	9327.647	9665.387	1000.317	TOP BOAT	6.90	993.417	673	0.651
CR1STN04	9264.759	9702.502	1000.326	TOP BOAT	5.90	994.426	699	0.675
CR1STN05	9212.584	9728.523	1000.416	TOP BOAT	5.80	994.616	692	0.668
TBM05	9427.344	9570.274	1000.788	TBM				
CR2STN01	9389.088	9589.074	1000.282	TOP BOAT	2.90	997.382	559	0.548
CR2STN02	9334.604	9602.538	1000.383	TOP BOAT	6.90	993.483	704	0.679
CR2STN03	9271.370	9623.793	1000.354	TOP BOAT	7.00	993.354	746	0.717
CR2STN04	9216.775	9643.290	1000.386	TOP BOAT	8.00	992.386	793	0.760
CR2STN05	9152.706	9644.598	1000.388	TOP BOAT	6.00	994.388	607	0.591
CR2STN06	9087.272	9682.658	1000.437	TOP BOAT	6.00	994.437	361	0.369

HYDROLOGICAL SURVEY OF KAZUNGULA FERRY SITE

Pt. No.	Eastings (m)	Northings (m)	Height (m)	Description	Rope Reading (m)	Reduced Level (m)	No.Of Revs.	Water Velocity (m/sec.)
L2RSTN01	9625.994	9703.608	1000.206	TOP BOAT	6.00	994.206	505	0.499
L2RSTN02	9688.753	9769.369	1000.162	TOP BOAT	9.00	991.162	301	0.314
L2RSTN03	9719.545	9797.281	1000.187	TOP BOAT	9.00	991.187	556	0.545
L2RSTN04	9768.776	9883.902	1000.246	TOP BOAT	10.20	990.046	467	0.465
L2RSTN05	9817.115	9954.924	1000.314	TOP BOAT	6.50	993.814	549	0.539
L2RSTN06	9858.814	9989.725	1000.344	TOP BOAT	5.45	994.894	517	0.510
L3RSTN01	9769.221	10048.433	1000.288	TOP BOAT	6.45	993.838	415	0.418
L3RSTN02	9732.678	10007.975	1000.275	TOP BOAT	6.40	993.875	442	0.442
L3RSTN03	9704.213	9926.336	1000.295	TOP BOAT	7.95	992.345	438	0.438
L3RSTN04	9683.569	9842.252	1000.237	TOP BOAT	8.15	992.087	334	0.344
L3RSTN05	9659.169	9794.945	1000.238	TOP BOAT	8.80	991.438	333	0.343
L3RSTN06	9639.050	9764.919	1000.176	TOP BOAT	7.00	993.176	295	0.309
L3RSTN07	9608.654	9725.606	1000.229	TOP BOAT	6.50	993.729	535	0.526
L3RSTN08	9597.298	9719.556	1000.210	TOP BOAT	4.00	996.21	301	0.314
L3RSTN09	9586.923	9701.831	1000.217	TOP BOAT				
TBM06	9524.437	10252.380	1001.059	TBM				
L4RSTN01	9518.987	10245.634	1000.431	TOP BOAT	3.00	997.431	37	0.075
L4RSTN02	9501.854	10197.233	1000.273	TOP BOAT	5.00	995.273	254	0.272
L4RSTN03	9467.570	10118.305	1000.310	TOP BOAT	6.10	994.21	316	0.328
L4RSTN04	9428.305	10043.554	1000.304	TOP BOAT	6.80	993.504	360	0.368
L4RSTN05	9397.487	9981.446	1000.299	TOP BOAT	5.50	994.799	313	0.325
L4RSTN06	9375.842	9947.847	1000.346	TOP BOAT	5.80	994.546	370	0.377
L4RSTN07	9369.691	9920.524	1000.348	TOP BOAT	4.00	996.348	305	0.318
L4RSTN08	9340.858	9889.900	1000.340	TOP BOAT	5.85	994.49	405	0.409
L4RSTN09	9319.092	9835.643	1000.423	TOP BOAT	6.80	993.623	230	0.250
TBM07	10067.000	9983.927	1002.562	TBM				
L1LSTN01	9756.757	9628.860	1000.178	TOP BOAT	4.90	995.278	59	0.095
L1LSTN02	9788.890	9677.808	1000.210	TOP BOAT	7.00	993.21	313	0.325
L1LSTN03	9860.599	9741.051	1000.186	TOP BOAT	9.20	990.986	340	0.350
L1LSTN04	9932.164	9818.405	1000.178	TOP BOAT	9.00	991.178	334	0.344
L1LSTN05	9967.184	9874.704	1000.222	TOP BOAT	5.00	995.222	260	0.277
L1LSTN06	9991.771	9900.899	1000.241	TOP BOAT	3.80	996.441	154	0.181
TBM08	10179.882	9813.733	1001.376	TBM				
L2LSTN01	10090.127	9842.018	1000.283	TOP BOAT	3.00	997.283	226	0.247
L2LSTN02	10063.013	9805.396	1000.196	TOP BOAT	4.00	996.196	432	0.433
L2LSTN03	10061.370	9769.074	1000.186	TOP BOAT	5.70	994.486	317	0.329
L2LSTN04	10035.292	9711.468	1000.180	TOP BOAT	6.35	993.83	318	0.330
L2LSTN05	10024.575	9664.622	1000.241	TOP BOAT	7.00	993.241	370	0.377
L2LSTN06	9960.706	9593.049	1000.229	TOP BOAT	6.95	993.279	283	0.298
L2LSTN07	9893.070	9541.862	1000.281	TOP BOAT	4.96	995.321	244	0.263
L3LSTN01	9964.040	9459.590	1000.272	TOP BOAT	3.25	997.022	140	0.169
L3LSTN02	9986.078	9497.385	1000.223	TOP BOAT	5.30	994.923	330	0.341
L3LSTN03	10021.493	9546.880	1000.260	TOP BOAT	5.95	994.31	265	0.282
L3LSTN04	10084.617	9612.984	1000.232	TOP BOAT	10.00	990.232	230	0.250
L3LSTN05	10156.479	9695.827	1000.191	TOP BOAT	7.90	992.291	370	0.377
L3LSTN06	10168.914	9738.188	1000.389	TOP BOAT	5.00	995.389	280	0.295
L3LSTN07	10197.084	9769.089	1000.334	TOP BOAT	6.00	994.334	100	0.133
L4LSTN01	10090.499	9321.799	1000.355	TOP BOAT	3.15	997.205	215	0.237
L4LSTN02	10118.616	9351.838	1000.331	TOP BOAT	6.80	993.531	338	0.348
L4LSTN03	10156.637	9417.304	1000.249	TOP BOAT	6.70	993.549	310	0.323
L4LSTN04	10208.567	9479.619	1000.300	TOP BOAT	8.95	991.35	310	0.323
L4LSTN05	10273.423	9561.499	1000.258	TOP BOAT	6.80	993.458	306	0.319
L4LSTN06	10286.489	9634.125	1000.264	TOP BOAT	5.00	995.264	305	0.318
L4LSTN07	10384.936	9561.727	1000.348	TOP BOAT	6.00	994.348	240	0.259
WL1958	10130.399	10020.547	1002.837	TREE				
ZP CORNER	10050.571	10049.777	1002.086	POLICE POST				

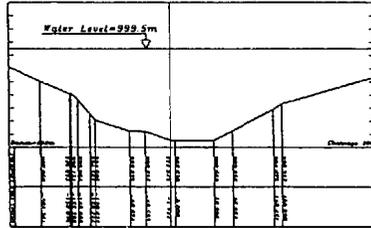



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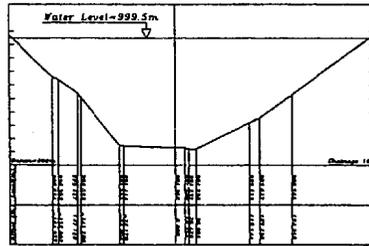
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KK	KK			MAY, 2000.
REVISION	NO.	DATE	BY	

PROJECT: HYDROLOGICAL SURVEY ON THE PROPOSED BRIDGE CONSTRUCTION PROJECT IN KAZUNGULA			
TITLE: CONTOUR MAP OF RIVER BED			
Scale	Contents	Drawing no.	Rev.

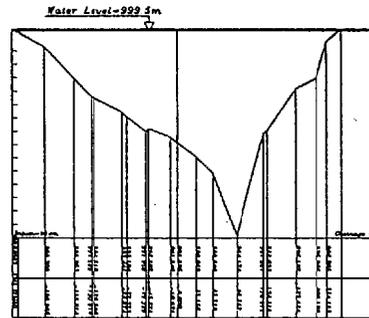
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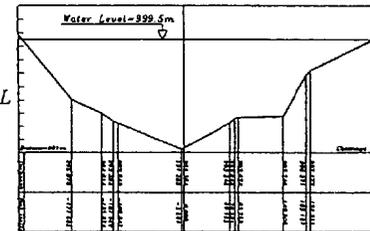
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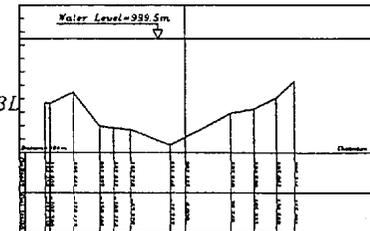
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SECTION 4L



SECTION 3L

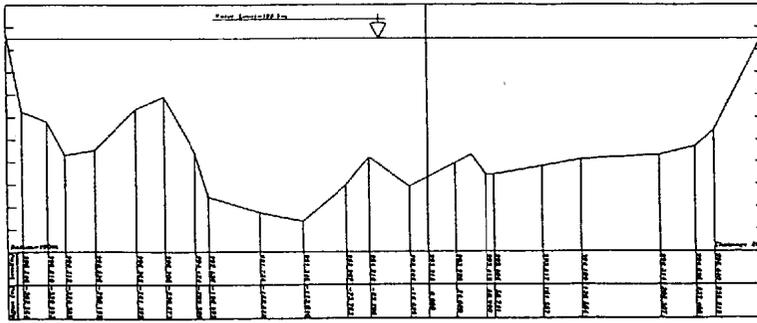


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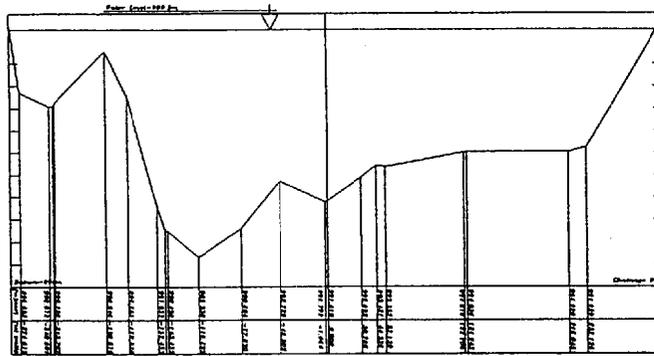
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KK	KK			MAY, 2000.
REVISION	NO.	DATE	BY	

PROJECT: HYDROLOGICAL SURVEY ON THE PROPOSED BRIDGE CONSTRUCTION PROJECT IN KAZUNGULA
 NAME: EXISTING CROSS-SECTIONS
 Scale: Y 1:100 R 1:2000
 Drawing No.
 Rev.
 Date: 28-05-2000

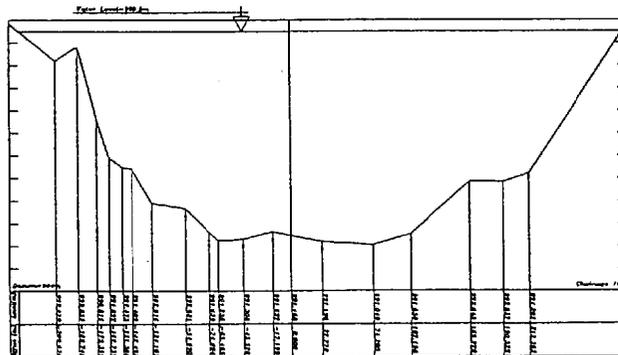
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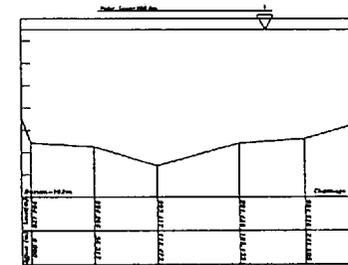
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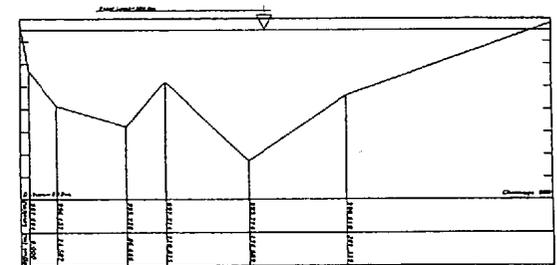
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SECTION CR1



SECTION CR00



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DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DATE
KK	KK			MAY, 2000.
REVISION	DATE	BY		

PROJECT: HYDROLOGICAL SURVEY ON THE PROPOSED BRIDGE CONSTRUCTION PROJECT IN KAZUNGULA			
TITLE: EXISTING CROSS-SECTIONS			
Scale: V 1:100 H 1:2000	Contract	Drawing No.	Rev.