

11-B 定期点検

定期点検は、橋梁の保全を図るために定期的実施するものであり、橋面上からの点検だけでなく、橋梁の下などからも点検する。点検回数は 1回／5年
点検項目は、次のとおりとする。

(1) 橋面の状況

舗装の摩擦、路面のひび割れの有無

(2) 地覆高欄の状況

破損、変形の有無

(3) 床版の状況

床版コンクリートのひび割れの有無

(4) 伸縮装置の状況

溶接個所の破損、変形、ひび割れの有無、アンカーの状態

(5) 支承部の状況

土砂、ゴミの堆積、部材の腐蝕、変形、支承下のコンクリートのひび割れ、ボルトのゆるみ、アンカーの抜けの有無

(6) 主桁、横桁、対傾構、横構

1) 変形の有無－曲がり、ねじれ

2) 塗装の状況－変色、退色、フクレ、剥離、サビ等の有無

(7) 現場継手

ハイテンボルトの抜け落ち、ボルトのゆるみ、サビ等の有無

(8) 下部構造の状況

下部構造の沈下、傾斜、基礎の洗堀、河床の変動

11-C 異常時点検

通常点検及び定期点検で発見された重大な変形、破損にたいして行う他にサイクロン、集中豪雨などによる洪水時、あるいは地震時に行うものとする。

点検項目は、11-Bに準じて行うが、次の項目に重点をおいて行う。

(1) 洪水時

基礎工の洗堀による沈下および傾斜、河床の変動

(2) 地震時

基礎工の地震による沈下および傾斜、上部構造のうち、下部構造との接点である支承部の入念な点検を行う。

11-D 点検の記録

定期点検、異常時点検の結果、判明した事柄や処理事項は記録すること。

第12章



社会経済分析

- 12-A 現カフエ道路橋の
社会経済的側面
- 12-B プロジェクトの
経済分析

現カフエ道路橋の社会経済的側面

(1) 道路ネットワークにおけるカフエ道路橋の地位

カフエ道路橋は、ルサカ市の南約56kmの地点に位置している。カフエ道路橋を通過する道路は、ルサカ市とザンビアの南部州を結ぶ幹線道路となっておりと同時にこの幹線は南部のアフリカ諸国とも結節している。

この幹線道路は、カフエ道路橋の南約1.8kmの地点（以下、カフエ交差点と呼ぶ）で2方向に分岐している。一方は、リビングストーンを經由してジンバブエ、ボツワナの国々と結び、他方は、チルンド経由でジンバブエと結んでいる。

カフエ交差点からリビングストーンに向かう道路はT1道路と呼ばれ、この交差点でT2道路と連結している。T2道路はチルンドからルサカ、カピリムポシを経てトゥンドユマへ至る。

道路名称“T”は主要幹線道路“Inter-Territorial Road”のことを指し、ルサカ市を中心とするザンビア国内の主要都市を結んでいると同時に近隣諸国との国際道路網を形成している。

(2) 対外通商におけるカフエ道路橋の役割

表12-1は、1986-1988年の3年間のザンビアの輸出入量の交通ルート別および交通手段別の推移を示したものである。

表12-2は、上記の表12-1でのデータを基に、輸出入量の3年間平均を要約して示したものである。

表 12-1 輸出入物輸送量

(1) Year of 1986, 1987 and 1988 (Unit: ton)

Route/Mode of Transport	(a) Export			(b) Import		
	1986 (%)	1987 (%)	1988 (%)	1986 (%)	1987 (%)	1988 (%)
(1) By Road						
1) Tanzania Border	6,755	31,813	7,409	49,528	37,514	18,943
2) Malawi Border	461,835	24,412	138,130	1,764	88,339	1,247
3) Zimbabwe Border	53,731	70,407	77,881	107,714	172,014	111,776
4) Botswana Border	5,519	5,674	37,326	3,363	3,851	4,994
5) Zaire Border	21,071	70,167	19,112	923	1,922	3,116
Total by Road	548,911	202,473	279,858	163,292	303,660	140,076
(2) By Rail						
1) Tanzania Border	357,562	649,474	334,033	102,581	216,299	212,336
2) Zaire Border	5,450	15,058	12,648	1,764	0	0
3) Zimbabwe Border	25,439	56,367	45,576	200,019	120,163	174,568
Total by Rail	388,451	720,899	392,257	302,648	336,462	386,904
(3) Air	3,331	2,867	7,110	11,441	18,447	55,308
(4) Pipe Line	0	0	0	506,778	655,842	962,665
(5) Others	4,132	95,307	66,793	77	47	141
Grand Total	944,825	1,021,546	746,018	984,236	1,314,438	1,525,094

Data Source : Central Statistical Office, Zambia

表 12-2 輸出入物輸送量

Route/Method of Transport	(a) Export			(b) Import			(c) Export & Import			
	Average	(%)	(%)	Average	(%)	(%)	Average	(%)	(%)	
(1) By Road										
1) Tanzania Border	15,326	4.5%	1.7%	35,328	17.5%	2.8%	50,654	9.3%	2.3%	3.4%
2) Malawi Border	208,126	60.5%	23.0%	30,457	15.1%	2.4%	238,583	43.7%	11.0%	16.2%
3) Zimbabwe Border	67,340	19.6%	7.4%	130,501	64.5%	10.2%	197,841	36.2%	9.1%	13.5%
4) Botswana Border	16,173	4.7%	1.8%	4,069	2.0%	0.3%	20,242	3.7%	0.9%	1.4%
5) Zaire Border	36,783	10.7%	4.1%	1,987	0.9%	0.2%	38,770	7.1%	1.8%	2.6%
Total by Road	343,748	100%	38.0%	202,342	100%	15.9%	546,090	100%	25.1%	37.1%
(2) By Rail										
1) Tanzania Border	447,023	89.3%	49.4%	177,072	51.8%	13.9%	624,095	74.1%	28.6%	42.4%
2) Zaire Border	11,052	2.2%	1.2%	16	0.0%	0.0%	11,068	1.3%	0.5%	0.8%
3) Zimbabwe Border	42,461	8.5%	4.8%	164,917	48.2%	12.9%	207,378	24.6%	9.6%	14.1%
Total by Rail	500,536	100%	55.4%	342,005	100%	26.8%	842,541	100%	38.7%	57.3%
(3) Air	4,436		0.5%	21,732		1.7%	26,168		1.2%	1.8%
(4) Pipe Line	0		0.0%	708,428		55.6%	708,428		32.5%	-
(5) Others	55,410		6.1%	89		0.0%	55,499		2.5%	3.8%
Grand Total	904,130		100%	1,274,596		100%	2,178,726		100%	100%

Date Source : Central Statistical Office, Zambia

(a) 概要

表12-2によると、以下のことが概略的に観察される。

- 鉄道輸送が、特に輸出において重要な交通手段となっている。鉄道モードのうちタンザニア国境ルートが高いシェアを占めているが、これは特にコッパーベルト地帯から輸出される粗銅のタンザニア国のダルレサラム港への輸送を示している。
- パイプラインは原油の輸入において重要な役割を果たしている。
- 道路モードでの輸送のシェアは全モードのなかでは25%、およびパイプラインを除く全モードのなかでは37%を示している。

(b) カフェ道路橋の役割

道路モードのなかでは、ジンバブエ国境ルートおよびボツワナ国境ルートがカフェ道路橋に関連するものである。

ジンバブエおよびボツワナ国境ルートの合計シェアは、全モードのなかでは10%、およびパイプラインを除く全モードのなかでは15%を示す。さらに道路モードのみの中では40%のシェアを示す。

上記の観察によると、カフェ道路橋はザンビアの対外通商において相当重要な役割を担っていることがわかる。

(3) 将来道路ネットワーク計画におけるカフェ道路橋の位置

図12-1は、東・南部アフリカ特惠貿易地域 (PTA) が構想する将来道路マスタープランを示す。

PTA は、域内における経済活動全般についての協力・開発を促進する協力機構で、1984年に設立された。本部はルサカにあり、主要加盟国はザンビア、タンザニア、ジンバブエ、ボツワナ、マラウイ、エチオピア、ケニア等である。

図12-1によると、東アフリカ縦貫ハイウェイの計画ルートはカフェ道路橋を通過するように構想されている。

(4) カフェ道路橋の重要性

前述の(1)～(3)での観察によると、カフェ道路橋は国内および国際交通上重要な役割を果たしている。

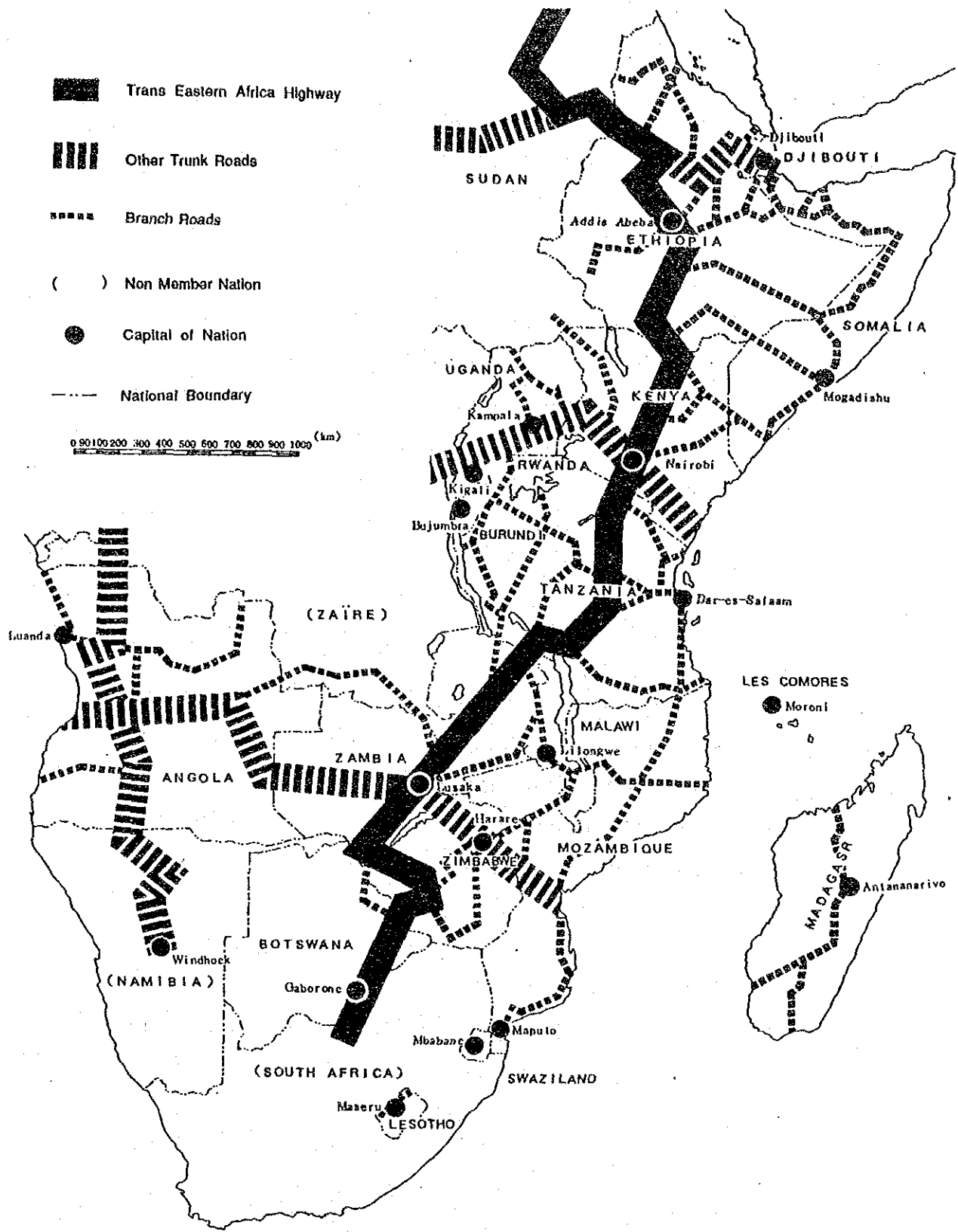


図 12-1 道路マスタープラン

Source : PTA Documents

(1) 概説

(a) 経済分析における基本的前提

橋梁の技術的調査の結果によれば、現カフェ道路橋が使用不可能の状態になる時期を明示することは困難である。

しかしながら、現橋の供用年数が長く、また下部構造の安全性について疑問なしとは断言できないため、予知せざる要因によって現橋が使用不可能になる可能性は高いと言える。

本経済分析においては、橋梁が使用不可能状態に陥る可能性があるとして想定した。

(b) カフェ橋関連の車両交通についての想定

前述の12-Aで観察したように、現カフェ道路橋は、国内および国際交通上、重要な役割を果たしている。

従って、もしカフェ道路橋が近い将来、構造上の理由から使用不可能状態になった場合は、ザンビアにおける道路交通体系に多大な影響を与えると予見できる。

橋梁が使用不可能状態になった場合、カフェ道路橋を利用していた車両交通は、他のルート（例えば対外通商の場合はタンザニア国境ルートへの転換）あるいは他の交通手段への転換が起こりうる。

そのような場合には、平常状態においてカフェ道路橋を利用していた車両交通の一定部分は、代替ルートすなわち迂回ルートに転換するものと想定した。

(c) 迂回ルートについての想定

迂回ルートに関しては、実際上の道路走行可能性、道路の改善、フェリー施設の改善等、幾つか対応策を講じなければならない要件がある。

しかしながら、本経済分析においては上記の諸要件にもかかわらず迂回ルートは利用可能と想定し、また講ずべき対応策に関しても、これをコスト要素としては考慮しないものと仮定した。

(d) 本経済分析の狙い

橋梁の使用不可能状態および迂回路についての概念は、上記のような想定に基づいているため、本調査における経済分析は、プロジェクトのフィージビリティを測定するというよりはむしろ現カフエ道路橋が使用不可能になった場合の影響度の大きさを検証するのが狙いとなる。

(e) 分析のための前提条件

i) プロジェクトライフ

プロジェクトライフは、20年間と設定した。

ii) 建設スケジュール

年次別の建設スケジュールは、建設工期が1991年～1993年、そして使用開始は1994年と設定した。

iii) 為替レート

為替レートは次のように設定した。

US\$ 1 = 40 Kwacha = 150円

(1円 = 0.267 Kwacha)

(2) 経済便益の推定

(a) プロジェクトの経済便益

本プロジェクトでの経済便益は、主として次のように列挙される。

- 橋梁の使用不可能状態の危険性の除去（橋梁の使用不可能状態の場合の迂回ルートへの交通転換による車両走行費用の増大を便益と見る）
- 橋梁の幅の改善に伴い、橋梁の両端アプローチ部における車両の交差のための待時間の短縮
- 同様に橋梁の幅員の改善に伴い、車両運転の安全性、ドライバーの快適性の増大、および事故可能性の減少
- 橋梁建設工事期間中における労働力雇用の創出

施工計画によると、雇用が期待される労働者の数は、合計で約30人/月と見込まれる。

本経済分析においては、橋梁使用不可能状態の危険性の除去を、定量化しうる便益として取扱う。

すなわち、平常な場合と比較して、迂回ルート利用の場合の車両の走行費用の増加を便益として設定した。

橋梁使用不可能状態の危険性の除去の効果は、車両走行費用の節減として具体化するものとした。

(b) 車両走行費用の節減

便益は、“With the Project”の場合と“Without the Project”の場合の車両走行費用の差として示される。ここで、“With the Project”はカフェ道路橋を再建するものであり、“Without the Project”はそのような建設を実施しないものである。

便益は次に示される式によって求められる。

$$B = TRV \times DIS \times UPVOC$$

ここで

- B : 車両走行費用節減便益
- TRV : 方向別予測交通量
- DIS : 迂回ルートと現カフェ橋ルートの方向別距離差
- UPVOC : 車両走行費用の単価

(c) 方向別交通量

表12-3は、交通需要予測の結果（第3章参照）に基づき、カフェ道路橋を通過する将来交通量を方向別に示したものである。表12-3に示す方向のうち、1)～4)の方向について本分析の対象とした。

表 12-3 方向別交通量

(Unit: Number of vehilce/day)

Direction \ year	1989	1992	2000
1) Lusaka - Southern Province	688	778	1,295
2) Kafue - Southern Province	219	249	400
3) Lusaka - Zimbabwe	39	44	176
4) Copperbelt - Southern Province	35	36	52
5) Others	130	112	203
Total	1,111	1,219	2,126

Note: "Others" includes traffic volumes related to other directions than 1) to 4) above.

これらの交通量のうち、50%の量が迂回ルートへ転換するものと想定した。

(d) 迂回ルートとカフエ橋ルートの距離差

i) 迂回ルートの設定

本分析では、カフエ橋に関する迂回ルートとしては次の2つの代替ルートすなわちイテジ・テジ・ルートとチアワ渡河ルートを仮定した。従って、経済分析の計算はこれら2つのケースに対して行われる。

ii) 距離差

上記の設定に拠って、迂回ルートとカフエ橋ルートとの距離差が推定された。(表12-4参照)

表 12-4 方向別距離差

(Unit: Km)

Direction	Via Detour Route	Via Kafue Bridge	Difference of Distance
(a) Itezhi Tezhi Route			
1) Lusaka - Southern Province (Lusaka - Choma)	574	283	291
2) Kafue - Southern Province (Kafue - Choma)	618	239	379
3) Lusaka - Zimbabwe (Lusaka - Chrindu)	755	135	620
4) Copperbelt - Southern Prov. (Lusaka - Choma)	574	283	291
(b) Chiawa Pontoon Route			
1) Lusaka - Southern Province (Lusaka - Kafue junction)	225	55	170
2) Kafue - Southern Province (Kafue - Kafue junction)	269	11	258
3) Lusaka - Zimbabwe (Lusaka - Chrindu)	146	134	12
4) Copperbelt - Southern Prov. (Lusaka - Kafue junction)	225	55	170

Note: Name of place in () indicates a point to measure distance.

(e) 車両走行費用の単価

表12-5は、車種別に車両走行費用の単価を示したものである。車両走行費用算出のための基礎データは、現地でのカーディラーや運送業者へのインタビューによって得た。

表 12-5 車両運行費単価

(Unit: Kwacha per 1,000 Km)

Passenger Car	7,107
Truck/Lorry	15,280

Note: Refer to Appendix 12-1.

表12-6は、交通需要予測の結果に基づき、年次別の車種別シェアを示したものである。

表 12-6 車両型式別占有率

Vehicle Type \ year	1989	1992	2000
Passenger Car	66.0%	67.6%	65.2%
Truck/Lorry	34.0%	32.4%	34.8%
Total	100.0%	100.0%	100.0%

車種別のシェアに基づき、車両走行費用の平均単価が推定される。
(表12-7参照)

表 12-7 車両運行費平均単価

(Unit: Kwacha per 1,000 Km)

\ year	1989	1992	2000
Average Unit Price of Vehicle Operating Cost	9,887	9,755	9,951

(f) 推定便益

上記(b) から(e) での諸前提条件に拠って、年次別の車両走行費用節減便益は次のように推定される。

(単位：百万 Kwacha)

	1992年	2000年
—イテジ・テジ・ルートの場合	638	1,185
—チアワ渡河ルートの場合	361	606

1992年と2000年の中間年の値は、直線補間によって求め、また2001年以降の値は、2000年の値と同一とした。

(3) 経済コスト

(a) 建設コスト

本分析において建設コストは約20億円、すなわち約 5億 3千 4百万 Kwachaと設定した。

この建設コストは大部分が外貨ポーションから成り、またこの外貨部分については輸入関税は既に除外されていると考えられるので、この市場価格ベースでの建設コストを経済コストと見做した。

建設コストの年次別配賦は、1991年は30%、1992年は40%、そして1993年は30%と設定した。

本分析において新設される橋梁の耐用年数は、50年と設定した。他方、プロジェクトライフは20年としたが、これは経済分析上の計算対象年数であり、橋梁はこの年数以上の寿命をもつ。従って、プロジェクトライフの最終年において減価償却の未償却分をマイナスの投資コストとして計上した。

(b) 維持コスト

本分析においては、橋梁の年々の維持コストを建設コストの1%相当額と設定した。

(4) 経済内部収益率 (EIRR)

(a) EIRR

経済内部収益率 (EIRR) は、次の式を満たす値である。

$$\sum_{t=0}^n \frac{B_t - C_t}{(1+r)^t} = 0$$

ここで

B_t : t 年における便益

C_t : t 年におけるコスト (建設コスト及び維持コスト)

t : 年次

n : 計算期間

r : EIRR の値

推定された便益および設定のコストに基づいて、EIRR は次のように求められた。(表12-8参照)

—イテジ・テジ・ルートの場合	80.1%
—チアワ渡河ルートの場合	51.9%

(b) 評価

EIRRの値は上記の結果のように求められたが、前述したように橋梁の使用不可能状態および迂回ルートのご概念は、一定の想定に依拠しているものである。

従って、このEIRRの値の評価としては、もし現在のカフエ道路橋が使用不可能状態になった場合の物流および国民経済に対して与える影響度が著しく大きいことを示していると解すべきである。

橋梁の使用不可能状態に陥る危険性を除去するためには、橋梁を再建する必要性は高いと言える。

表 12-8 經濟分析

(a) Case of Itezhi Tezhi Route

(Unit: million Kwacha)

Year	Benefit	Costruct. Cost	Maint. Cost	Net Cash Flow	EIRR
					80.11%
1991		160		-160	
1992		214		-214	
1993		160		-160	
1994	775		5	770	
1995	843		5	838	
1996	912		5	907	
1997	980		5	975	
1998	1048		5	1043	
1999	1117		5	1112	
2000	1185		5	1180	
2001	1185		5	1180	
2002	1185		5	1180	
2003	1185		5	1180	
2004	1185		5	1180	
2005	1185		5	1180	
2006	1185		5	1180	
2007	1185		5	1180	
2008	1185		5	1180	
2009	1185		5	1180	
2010	1185		5	1180	
2011	1185		5	1180	
2012	1185		5	1180	
2013	1185	-314	5	1494	

(b) Case of Chiawa Pontoon Route

(Unit: million Kwacha)

Year	Benefit	Costruct. Cost	Maint. Cost	Net Cash Flow	EIRR
					51.90%
1991		160		-160	
1992		214		-214	
1993		160		-160	
1994	392		5	387	
1995	422		5	417	
1996	453		5	448	
1997	484		5	479	
1998	514		5	509	
1999	545		5	540	
2000	606		5	601	
2001	606		5	601	
2002	606		5	601	
2003	606		5	601	
2004	606		5	601	
2005	606		5	601	
2006	606		5	601	
2007	606		5	601	
2008	606		5	601	
2009	606		5	601	
2010	606		5	601	
2011	606		5	601	
2012	606		5	601	
2013	606	-314	5	915	

第13章



プロジェクト評価 及び結言

- 13-A 評価手法
- 13-B カフェ道路橋改築
に関する考察
- 13-C 新橋計画の特徴
- 13-D 経済評価
- 13-E 結論

13-A. 評価手法

予備調査における一般的なアプローチは、プロジェクト実施の影響を見積もること、およびそれら进行评估することである。しかし、プロジェクトを評価するための伝統的なアプローチは、確定出来、しかも量的に金額で表示できる影響範囲に限定している。

ほとんどの道路プロジェクトでは、道路の利用者の直接でしかも量的な便益の項目、すなわち道路建設の直接の目的がそこにある運用コストの節減と時間節減便益のみで評価している。そしてプロジェクト評価は、費用便益分析、内部経済収益率からなる経済分析によってなされる。

しかし、カフエ川橋梁のような南部で唯一の国際幹線道路の一環である橋の架けかえの場合、もしそれが使用不能となると、その直接の利用者へのインパクトもさることながら社会、経済、国防上などへの影響はきわめて大きく、しかもそれを金額で表すことは、繁雑で困難である。もちろん、このプロジェクトの対象であるT2ルートでは、カフエ橋が使用不能となったときの利用者への直接の影響はその迂回路線が未整備で距離が長いこと非常に大きくなる。

又、それは量的に把握することは可能である。

このプロジェクトでは、金額で、量的に把握できるプロジェクトの便益として、迂回することによる運転コストの増分を利益とみて、評価の一指標として用いる。

13-B. カフエ道路橋改築に関する考察

カフエ川道路橋は当初建設されて以来約80年が経過しており、一般の耐用年数は越えている。しかし、上部構造の各構造部材はかなり健全である。ただし一部の部材が破損もしくは逸失しており、これらは補修される必要がある。現橋の幅員は6.1メートルである。しかも車道端と橋の構造部材との間の余裕が小さい。このため、大型の車両の橋上での相互通行は困難であり、交通安全上の見地から見ても好ましくない。この道路では、全交通量のなかで大型車の混入率が高く、将来ともこの傾向はしつづくものと推定される。この観点からも幅員は不足している。

橋を中心にしてその上下流の川底が、かなりの範囲にわたり橋梁建設後洗掘されている。このため、橋を支えている橋脚基礎の支持層への根入がほとんどなく、橋脚は自立が困難で、いつ倒れても不思議でない状況にあると推定される。

この橋脚の補強工事は、水深が 8 - 10 メートルあり、しかも川底は支持力の全くない泥の下に堅い岩盤が露出している。この条件のもとでの補強工事は難しく、工事費は新設より高くなる可能性がある。

さらに、両橋台は川を中心方向に変形しており、橋桁が支持梁の役割を果たしている。このため、橋桁に設計荷重以外の付加荷重がかかっている。

本橋の南側の道路はすでに改良が終わっており、また北側はルサカまで改良が実施されることが決まっている。したがって、もし橋の架けかえが行われない場合、橋がボトルネックになる。

これらのことを総合勘案し、エンジニアリングの見地からカフェ川橋梁は可能な限り早急に架けかえられるのが望ましい。

13-C. 新橋計画の特徴

新橋は現橋の位置に架設し、平面線形は、以下の理由から現在の線形を変えない。

- 現線形がよくできており、架橋位置をかえることは、むしろ線形を悪くすることになる。
- 橋の南側のアプローチ区間は高い盛土で距離が長い。盛土区間のほとんどは建設以来すでに40年経過し、安定している。
- 現橋の撤去を含めても、建設コストは、現線形を活かす方が有利である。
- 電話線の移設、土地の補償などの間接費用が不用である。

橋梁形式およびその規模は以下のものが推薦される。

橋梁形式	上路式鋼連続鈹桁橋
橋長	162 m
幅員	車道 7.3 m 歩道 2 x 1 m
スパン割	37.6 m + 43 m + 43 m + 37.6 m

橋長は現橋より22メートル長い。同様に河川幅も約20メートル広がり、河川としても好ましい方向である。

カフェ地域の環境、気候条件は、耐候性鋼材の使用を推薦できる。耐候性鋼材の使用は鋼橋の維持費の大半をなすペイントの必要をなくすることが出来、維持管理費を大幅に削減する。

13-D. 経済評価

カフエ川道路橋が使用不能になると、その影響はきわめて大きく、そのリスクは架けかえに伴う建設コストをはるかに凌駕する。

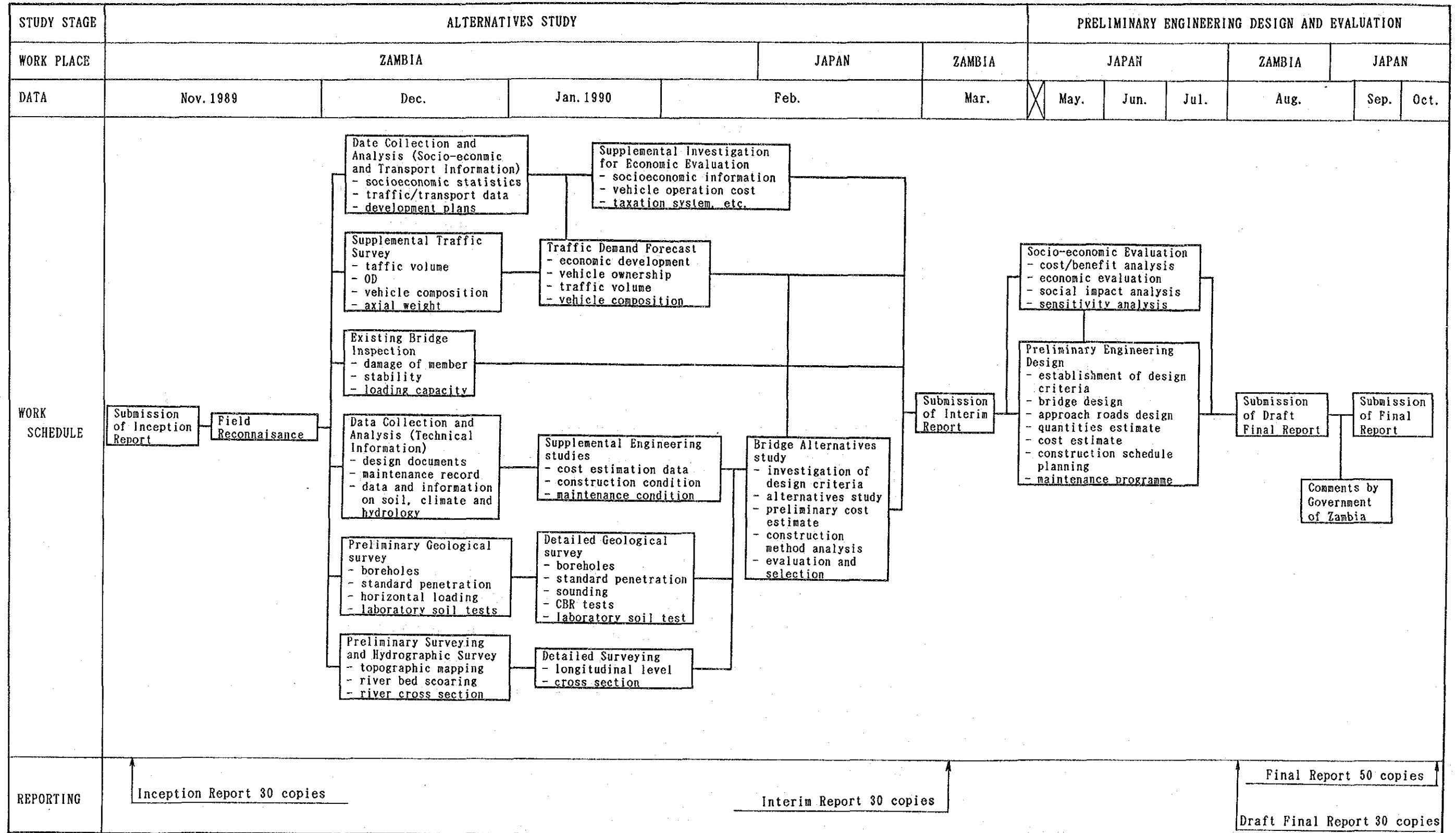
13-E. 結論

以上の討論の結果を踏まえ、工学的見地からも、経済的観点からも、カフエ川道路橋は可及的すみやかに架けかえがなされるべきである。橋梁形式の選択に当たっては、内陸国であるザンビア国の特性をいかせるものを選ぶべきである。

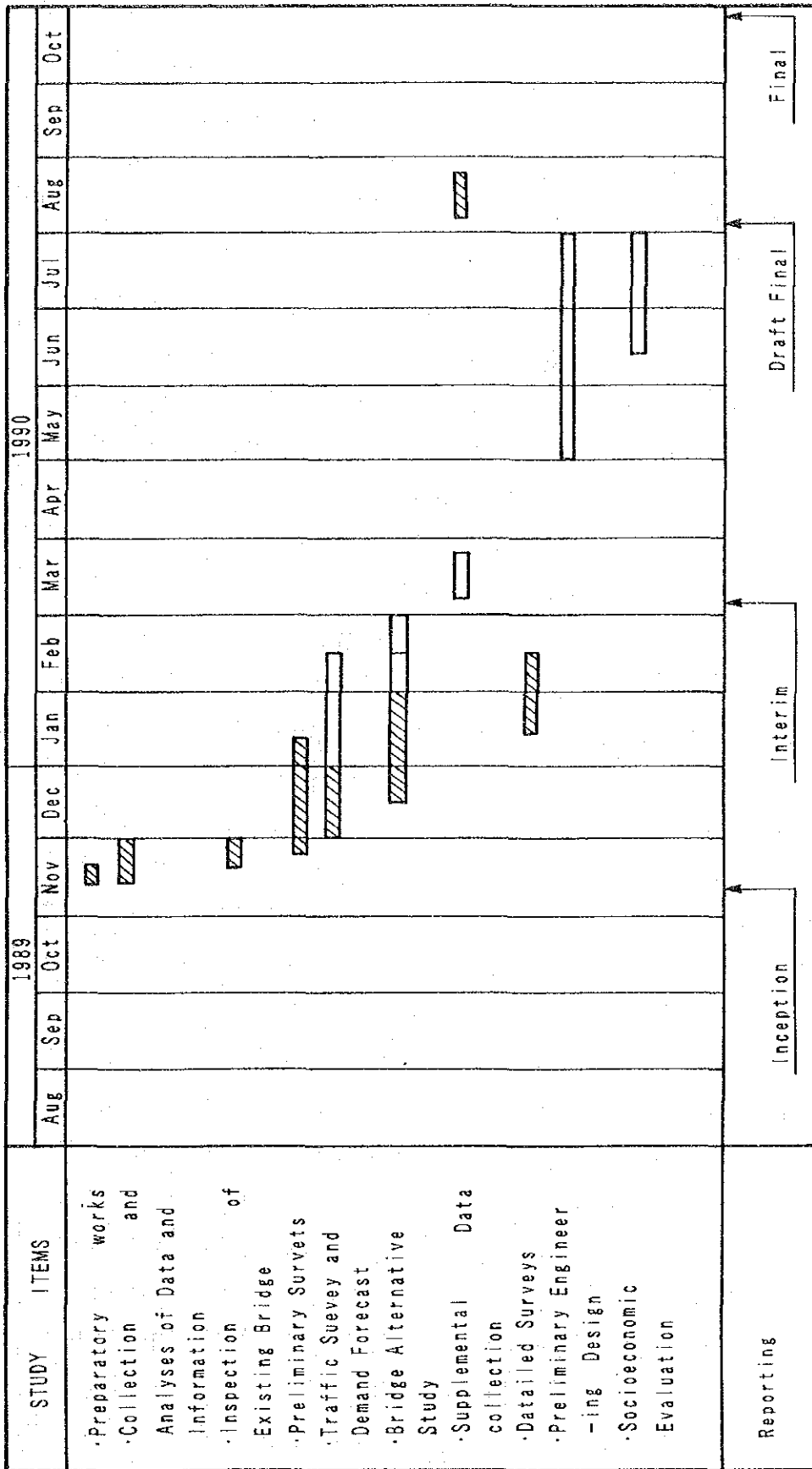
付属資料




付属資料 1-1 調査実施工程



付属資料 1-2 調査スケジュール



Field work  Home work 

カフエ橋における日変動

(From Lusaka) 11/Dec/89

Time	P.Car (%)	Truck (%)	Trail (%)	Bus (%)	Total (%)
7 7-8	8 2.4	2 2.0	4 3.8	0 0.0	14 2.6
8 8-9	10 3.1	7 7.0	6 5.7	1 11.1	24 4.4
9 9-10	12 3.7	3 3.0	4 3.8	0 0.0	19 3.5
10 10-11	25 7.6	6 6.0	10 9.5	0 0.0	41 7.6
11 11-12	19 5.8	7 7.0	10 9.5	0 0.0	36 6.7
12 12-13	20 6.1	10 10.0	6 5.7	0 0.0	36 6.7
13 13-14	22 6.7	9 9.0	6 5.7	1 11.1	38 7.0
14 14-15	25 7.6	7 7.0	8 7.6	1 11.1	41 7.6
15 15-16	29 8.9	9 9.0	7 6.7	0 0.0	45 8.3
16 16-17	36 11.0	9 9.0	9 8.6	0 0.0	54 10.0
17 17-18	36 11.0	11 11.0	2 1.9	0 0.0	49 9.1
18 18-19	26 8.0	6 6.0	9 8.6	1 11.1	42 7.8
19 19-20	15 4.6	2 2.0	8 7.6	0 0.0	25 4.6
20 20-21	4 1.2	0 0.0	1 1.0	1 11.1	6 1.1
21 21-22	7 2.1	0 0.0	3 2.9	0 0.0	10 1.8
22 22-23	3 0.9	0 0.0	1 1.0	0 0.0	4 0.7
23 23-24	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
24 24-01	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
1 1-2	1 0.3	1 1.0	0 0.0	0 0.0	2 0.4
2 2-3	1 0.3	0 0.0	0 0.0	0 0.0	1 0.2
3 3-4	1 0.3	0 0.0	1 1.0	1 11.1	3 0.6
4 4-5	2 0.6	0 0.0	0 0.0	2 22.2	4 0.7
5 5-6	9 2.8	3 3.0	2 1.9	1 11.1	15 2.8
6 6-7	16 4.9	8 8.0	8 7.6	0 0.0	32 5.9
Total	327 100	100 100	105 100	9 100	541 100

(Source) Study Team

- (Remark) 1.P.Car = Passenger Car + Van
 2.Truck = 2Axle Truck + Others
 3.Trail = Trailer + 3Axles Truck

Daily Variation at Kafue Road Bridge (To Lusaka)

11/Dec/89

Time	P.Car (%)	Truck (%)	Trail (%)	Bus (%)	Total (%)
7 7-8	18 4.9	0 0.0	5 5.3	1 12.5	24 4.2
8 8-9	19 5.2	7 6.6	12 12.8	0 0.0	38 6.6
9 9-10	28 7.6	9 8.5	2 2.1	1 12.5	40 7.0
10 10-11	29 7.9	5 4.7	10 10.6	0 0.0	44 7.7
11 11-12	29 7.9	6 5.7	3 3.2	0 0.0	38 6.6
12 12-13	16 4.4	6 5.7	8 8.5	2 25.0	32 5.6
13 13-14	19 5.2	9 8.5	3 3.2	1 12.5	32 5.6
14 14-15	28 7.6	10 9.4	7 7.4	0 0.0	45 7.8
15 15-16	34 9.3	6 5.7	8 8.5	1 12.5	49 8.5
16 16-17	29 7.9	7 6.6	3 3.2	0 0.0	39 6.8
17 17-18	19 5.2	9 8.5	5 5.3	0 0.0	33 5.7
18 18-19	23 6.3	4 3.8	4 4.3	1 12.5	32 5.6
19 19-20	22 6.0	4 3.8	4 4.3	0 0.0	30 5.2
20 20-21	14 3.8	5 4.7	3 3.2	0 0.0	22 3.8
21 21-22	7 1.9	0 0.0	5 5.3	0 0.0	12 2.1
22 22-23	6 1.6	0 0.0	2 2.1	0 0.0	8 1.4
23 23-24	4 1.1	1 0.9	1 1.1	0 0.0	6 1.0
24 24-01	2 0.5	0 0.0	0 0.0	0 0.0	2 0.3
1 1-2	0 0.0	0 0.0	2 2.1	0 0.0	2 0.3
2 2-3	0 0.0	2 1.9	0 0.0	0 0.0	2 0.3
3 3-4	1 0.3	2 1.9	0 0.0	0 0.0	3 0.5
4 4-5	1 0.3	3 2.8	2 2.1	0 0.0	6 1.0
5 5-6	2 0.5	1 0.9	4 4.3	1 12.5	8 1.4
6 6-7	17 4.6	10 9.4	1 1.1	0 0.0	28 4.9
Total	367 100	106 100	94 100	8 100	575 100

(Source) Study Team

- (Remark) 1.P.Car = Passenger Car + Van
 2.Truck = 2Axle Truck + Others
 3.Trail = Trailer + 3Axles Truck

付属資料 3-2(1/3)

交通量調査結果

Station; Kafue Bridge
Direction; From Lusaka to Livingstone

Date; 11/Dec/89

Time	P.Car	Van	2Axle	3Axle	Trail	Bus(R)	Bus(S)	Others	1+2	3+4+5	6+7	8	Total	%
	1	2	3	4	5	6	7	8						
6-7														
7-8	2	6	1	2	2	0	0	1	8	5	0	1	14	2.6
8-9	3	7	6	0	6	1	0	1	10	12	1	1	24	4.4
9-10	4	8	3	0	4	0	0	0	12	7	0	0	19	3.5
10-11	15	10	4	1	9	0	0	2	25	14	0	2	41	7.6
11-12	8	11	2	1	9	0	0	5	19	12	0	5	36	6.7
12-13	7	13	9	1	5	0	0	1	20	15	0	1	36	6.7
13-14	7	15	8	0	6	1	0	1	22	14	1	1	38	7.0
14-15	13	12	7	0	8	1	0	0	25	15	1	0	41	7.6
15-16	12	17	9	0	7	0	0	0	29	16	0	0	45	8.3
16-17	9	27	9	0	9	0	0	0	36	18	0	0	54	10.0
17-18	8	28	10	0	2	0	0	1	36	12	0	1	49	9.1
18-19	5	21	5	1	8	1	0	1	28	14	1	1	42	7.8
19-20	6	9	2	0	8	0	0	0	15	10	0	0	25	4.6
20-21	0	4	0	0	1	1	0	0	4	1	1	0	6	1.1
21-22	2	5	0	0	3	0	0	0	7	3	0	0	10	1.8
22-23	1	2	0	0	1	0	0	0	3	1	0	0	4	0.7
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
24-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
1-2	0	1	1	0	0	0	0	0	1	1	0	0	2	0.4
2-3	0	1	0	0	0	0	0	0	1	0	0	0	1	0.2
3-4	0	1	0	0	1	1	0	0	1	1	1	0	3	0.6
4-5	0	2	0	0	0	2	0	0	2	0	2	0	4	0.7
5-6	2	7	3	1	1	1	0	0	9	5	1	0	15	2.8
6-7	7	9	7	0	8	0	0	1	16	15	0	1	32	5.9
Total	111	216	86	7	98	9	0	14	327	191	9	14	541	100.0
(%)														

Result of Traffic Counting

Station; Kafue Bridge
Direction; To Lusaka from Livingstone

Date; 11/Dec/89

Time	P.Car	Van	2Axle	3Axle	Trail	Bus(R)	Bus(S)	Others	1+2	3+4+5	6+7	8	Total	%
	1	2	3	4	5	6	7	8						
6-7														
7-8	6	12	0	3	2	1	0	0	18	5	1	0	24	4.2
8-9	10	9	7	0	12	0	0	0	19	19	0	0	38	6.6
9-10	8	20	8	0	2	1	0	1	28	10	1	1	40	7.0
10-11	9	20	4	0	10	0	0	1	29	14	0	1	44	7.7
11-12	4	25	4	0	3	0	0	2	29	7	0	2	38	6.6
12-13	8	8	5	0	8	2	0	1	16	13	2	1	32	5.6
13-14	8	11	9	0	3	1	0	0	19	12	1	0	32	5.6
14-15	14	14	9	1	6	0	0	1	28	16	0	1	45	7.8
15-16	15	19	5	0	8	1	0	1	34	13	1	1	49	8.5
16-17	14	15	7	0	3	0	0	0	29	10	0	0	39	6.8
17-18	8	11	8	1	4	0	0	1	19	13	0	1	33	5.7
18-19	12	11	3	0	4	0	1	1	23	7	1	1	32	5.6
19-20	5	17	3	0	4	0	0	1	22	7	0	1	30	5.2
20-21	7	7	4	0	3	0	0	1	14	7	0	1	22	3.8
21-22	1	6	0	0	5	0	0	0	7	5	0	0	12	2.1
22-23	2	4	0	0	2	0	0	0	6	2	0	0	8	1.4
23-24	1	3	1	0	1	0	0	0	4	2	0	0	6	1.0
24-1	2	0	0	0	0	0	0	0	2	0	0	0	2	0.3
1-2	0	0	0	0	2	0	0	0	0	2	0	0	2	0.3
2-3	0	0	1	0	0	0	0	1	0	1	0	1	2	0.3
3-4	0	1	2	0	0	0	0	0	1	2	0	0	3	0.5
4-5	0	1	3	0	2	0	0	0	1	5	0	0	6	1.0
5-6	0	2	1	0	4	1	0	0	2	5	1	0	8	1.4
6-7	6	11	10	0	1	0	0	0	17	11	0	0	28	4.9
Total	140	227	94	5	89	7	1	12	367	188	8	12	575	100.0
(%)														

付属資料 3-2(2/3)

Result of Traffic Counting

Station; Great North Road (T4)

Date; 12/Dec/89

DIRECTION: FROM LUSAKA TO COPPERBELT

Time	P.Car	Van	2Axle	3Axle	Trail	Bus(R)	Bus(S)	Others	1+2	3+4+5	6+7	8	Total	%
	1	2	3	4	5	6	7	8						
6-7	7	14	16	0	6	3	0	3	21	22	3	3	49	8.8
7-8	9	9	6	0	2	4	0	2	18	8	4	2	32	3.6
8-9	9	14	12	0	4	7	4	1	23	18	11	1	51	5.8
9-10	6	26	8	0	3	2	1	4	32	11	3	4	50	5.6
10-11	20	23	13	1	9	1	2	5	43	23	3	5	74	8.4
11-12	17	30	17	0	6	4	2	2	47	23	6	2	78	8.8
12-13	21	30	15	2	1	4	1	8	51	18	5	8	82	9.3
13-14	15	27	11	0	5	1	0	14	42	16	1	14	73	8.2
14-15	15	27	16	0	5	5	0	9	42	21	5	3	71	8.0
15-16	20	32	20	0	5	3	0	6	52	25	3	6	86	9.7
16-17	16	42	12	1	9	3	0	8	58	22	3	8	91	10.3
17-18	21	36	14	0	13	2	0	10	57	27	2	10	96	10.8
18-19	5	12	5	0	7	0	0	1	17	12	0	1	30	3.4
19-20	3	5	2	0	1	0	0	3	8	3	0	3	14	1.6
20-21	1	0	5	0	2	0	0	1	1	7	0	1	9	1.0
21-22													0	0.0
22-23									0	0	0	0	0	0.0
23-24									0	0	0	0	0	0.0
24-1														
1-2														
2-3														
3-4														
4-5														
5-6														
6-7														
Total	185	327	172	4	78	39	10	71	512	254	49	71	886	100
(%)														

Result of Traffic Counting

Station; Great North Road (T4)

Date; 12/Dec/89

Direction; To Lusaka From Copperbelt

Time	P.Car	Van	2Axle	3Axle	Trail	Bus(R)	Bus(S)	Others	1+2	3+4+5	6+7	8	Total
	1	2	3	4	5	6	7	8					
6-7	2	4	12	0	7	0	0	7	6	19	0	7	32
7-8	12	9	7	0	3	1	0	5	21	10	1	5	37
8-9	21	29	12	0	4	2	0	8	50	16	2	8	76
9-10	20	23	13	0	1	2	0	5	43	14	2	5	64
10-11	12	26	11	0	4	3	0	2	38	15	3	2	58
11-12	7	24	11	0	7	1	0	5	31	18	1	5	55
12-13	12	19	10	0	2	7	0	2	31	12	7	2	52
13-14	12	19	12	0	3	6	0	2	31	15	6	2	54
14-15	15	15	11	0	1	5	0	2	30	12	5	2	49
15-16	18	22	12	0	2	0	0	1	40	14	0	1	55
16-17	21	22	19	0	6	0	0	5	43	25	0	5	73
17-18	21	22	17	0	4	5	1	3	43	21	6	3	73
18-19	10	17	8	0	0	2	1	1	27	8	3	1	39
19-20	10	27	6	0	1	0	2	1	37	7	2	1	47
20-21	6	7	0	0	2	0	0	1	13	2	0	1	16
21-22													
Total	199	285	161	0	47	34	4	50	484	208	38	50	780

付屬資料 3-2(3/3)

Result of Traffic Counting

Station; Kafue Road Brdge

Date; 14/Dec/89

DIRECTION: FROM LUSAKA TO LIVINGSTONE

Cloudy/Rain

Time	P.Car	Van	2Axle	3Axle	Trail	Bus(R)	Bus(S)	Others	1+2	3+4+5	6+7	8	Total	%
	1	2	3	4	5	6	7	8						
6-7	1.0	4.0	0.0	0.0	10.0	1.0	0.0	0.0	5.0	10.0	1.0	0.0	16.0	2.8
7-8	2.0	6.0	7.0	0.0	5.0	1.0	0.0	0.0	8.0	12.0	1.0	0.0	21.0	3.7
8-9	5.0	12.0	5.0	0.0	2.0	2.0	0.0	1.0	18.0	7.0	2.0	1.0	28.0	4.9
9-10	9.0	18.0	4.0	0.0	3.0	0.0	2.0	1.0	27.0	7.0	2.0	1.0	37.0	6.5
10-11	12.0	15.0	5.0	1.0	3.0	1.0	0.0	4.0	27.0	10.0	1.0	4.0	42.0	7.4
11-12	6.0	16.0	8.0	0.0	8.0	1.0	0.0	3.0	22.0	16.0	1.0	3.0	42.0	7.4
12-13	9.0	21.0	5.0	0.0	11.0	0.0	0.0	3.0	30.0	16.0	0.0	3.0	49.0	8.6
13-14	8.0	8.0	9.0	1.0	7.0	0.0	0.0	0.0	16.0	17.0	0.0	0.0	33.0	5.8
14-15	5.0	11.0	7.0	1.0	6.0	0.0	0.0	2.0	16.0	14.0	0.0	2.0	32.0	5.6
15-16	9.0	15.0	11.0	0.0	8.0	0.0	0.0	0.0	24.0	19.0	0.0	0.0	43.0	7.5
16-17	11.0	21.0	15.0	0.0	6.0	0.0	0.0	4.0	32.0	21.0	0.0	4.0	57.0	10.0
17-18	7.0	29.0	10.0	0.0	4.0	0.0	1.0	2.0	36.0	14.0	1.0	2.0	53.0	9.3
18-19	10.0	26.0	3.0	0.0	8.0	0.0	0.0	0.0	36.0	11.0	0.0	0.0	47.0	8.2
19-20	0.0	6.0	2.0	0.0	0.0	1.0	0.0	1.0	6.0	2.0	1.0	1.0	10.0	1.8
20-21	1.0	4.0	2.0	0.0	3.0	0.0	0.0	0.0	5.0	5.0	0.0	0.0	10.0	1.8
21-22	0.0	1.0	1.0	0.0	3.0	0.0	0.0	0.0	1.0	4.0	0.0	0.0	5.0	0.9
22-23	1.0	2.0	4.0	0.0	1.0	0.0	0.0	0.0	3.0	5.0	0.0	0.0	8.0	1.4
23-24	1.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	1.0	0.0	0.0	3.0	0.5
24-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1-2	1.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	3.0	2.0	0.0	0.0	5.0	0.9
2-3	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.4
3-4	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.4
4-5	6.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0	10.0	1.0	0.0	0.0	11.0	1.9
5-6	2.0	7.0	3.0	0.0	1.0	0.0	0.0	2.0	9.0	4.0	0.0	2.0	15.0	2.6
6-7									0.0	0.0	0.0	0.0	0.0	0.0
Total	107.0	229.0	104.0	3.0	93.0	9.0	3.0	23.0	336.0	200.0	12.0	23.0	571.0	100.0
(%)														

Result of Traffic Counting

Station; Kafue Road Brdge

Date; 14/Dec/89

DIRECTION: TO LUSAKA FROM LIVINGSTONE

Cloudy/Rain

Time	P.Car	Van	2Axle	3Axle	Trail	Bus(R)	Bus(S)	Others	1+2	3+4+5	6+7	8	Total	%
	1	2	3	4	5	6	7	8						
6-7	3.0	14.0	4.0	1.0	5.0	0.0	0.0	1.0	17.0	10.0	0.0	1.0	28.0	5.0
7-8	6.0	22.0	7.0	1.0	8.0	1.0	0.0	0.0	28.0	16.0	1.0	0.0	45.0	8.1
8-9	8.0	19.0	9.0	0.0	7.0	0.0	0.0	2.0	27.0	16.0	0.0	2.0	45.0	8.1
9-10	9.0	16.0	7.0	0.0	3.0	0.0	0.0	3.0	25.0	10.0	0.0	3.0	38.0	6.8
10-11	4.0	17.0	8.0	0.0	2.0	0.0	0.0	3.0	21.0	10.0	0.0	3.0	34.0	6.1
11-12	3.0	17.0	6.0	1.0	4.0	1.0	1.0	5.0	20.0	11.0	2.0	5.0	38.0	6.8
12-13	9.0	11.0	5.0	0.0	3.0	1.0	0.0	2.0	20.0	8.0	1.0	2.0	31.0	5.6
13-14	8.0	12.0	4.0	0.0	20.0	2.0	0.0	1.0	20.0	24.0	2.0	1.0	47.0	8.4
14-15	8.0	7.0	6.0	0.0	9.0	1.0	1.0	1.0	15.0	15.0	2.0	1.0	33.0	5.9
15-16	9.0	11.0	3.0	1.0	9.0	0.0	0.0	1.0	20.0	13.0	0.0	1.0	34.0	6.1
16-17	1.0	12.0	4.0	0.0	9.0	3.0	0.0	1.0	13.0	13.0	3.0	1.0	30.0	5.4
17-18	13.0	19.0	4.0	0.0	5.0	1.0	0.0	1.0	32.0	9.0	1.0	1.0	43.0	7.7
18-19	10.0	15.0	2.0	0.0	8.0	3.0	0.0	1.0	25.0	10.0	3.0	1.0	39.0	7.0
19-20	7.0	10.0	3.0	0.0	3.0	0.0	0.0	0.0	17.0	6.0	0.0	0.0	23.0	4.1
20-21	1.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.9
21-22	2.0	5.0	0.0	0.0	3.0	0.0	0.0	0.0	7.0	3.0	0.0	0.0	10.0	1.8
22-23	4.0	1.0	1.0	0.0	1.0	0.0	0.0	0.0	5.0	2.0	0.0	0.0	7.0	1.3
23-24	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.2
24-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1-2	1.0	1.0	1.0	0.0	2.0	0.0	0.0	0.0	2.0	3.0	0.0	0.0	5.0	0.9
2-3	0.0	1.0	0.0	0.0	3.0	0.0	0.0	0.0	1.0	3.0	0.0	0.0	4.0	0.7
3-4	1.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	4.0	0.7
4-5	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.4
5-6	0.0	4.0	2.0	0.0	5.0	0.0	0.0	0.0	4.0	7.0	0.0	0.0	11.0	2.0
6-7														
Total	107.0	219.0	79.0	4.0	111.0	13.0	2.0	22.0	326.0	194.0	15.0	22.0	557.0	100.0
(%)														

Origin	Vehicle Type				
	Total	Cars	Truck	Bus	No. Answer
1. Lusaka City Urban Area	295 (100.0%)	182 (61.7%)	113 (38.3%)	0 (.0%)	0 (.0%)
2. Kafue Area	92 (100.0%)	68 (73.9%)	24 (26.1%)	0 (.0%)	0 (.0%)
3. Chilanga	3 (100.0%)	1 (33.3%)	2 (66.7%)	0 (.0%)	0 (.0%)
4. Lusaka West	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
5. Lusaka East	4 (100.0%)	2 (50.0%)	2 (50.0%)	0 (.0%)	0 (.0%)
6. Southern Province	390 (100.0%)	274 (70.3%)	111 (28.5%)	5 (1.3%)	0 (.0%)
7. Eastern Province	2 (100.0%)	1 (50.0%)	1 (50.0%)	0 (.0%)	0 (.0%)
8. Mumbwa Area	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
9. Kapiri Area	7 (100.0%)	4 (57.1%)	3 (42.9%)	0 (.0%)	0 (.0%)
10. Serenje Area	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
11. Copperbelt Province	15 (100.0%)	7 (46.7%)	7 (46.7%)	1 (6.7%)	0 (.0%)
12. Northwestern province	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
13. Western Province	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
14. Northern province	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
15. Lusula	3 (100.0%)	3 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
16. Botswana	5 (100.0%)	4 (80.0%)	1 (20.0%)	0 (.0%)	0 (.0%)
17. Zimbabwe	29 (100.0%)	12 (41.4%)	15 (51.7%)	2 (6.9%)	0 (.0%)
18. Kenya Tanzania	2 (100.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	0 (.0%)
19. Malawi	4 (100.0%)	1 (25.0%)	3 (75.0%)	0 (.0%)	0 (.0%)
20. Mozambique	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
21. Zaire	7 (100.0%)	1 (14.3%)	6 (85.7%)	0 (.0%)	0 (.0%)
22. Angola	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
23. Republic of South Africa	6 (100.0%)	4 (66.7%)	2 (33.3%)	0 (.0%)	0 (.0%)
24. Namibia	3 (100.0%)	0 (.0%)	3 (100.0%)	0 (.0%)	0 (.0%)
25. Swaziland	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
26. Total	876 (100.0%)	573 (65.4%)	295 (33.7%)	8 (.9%)	0 (.0%)

Destination	Vehicle Type				
	Total	Cars	Truck	Bus	No. Answer
1. Lusaka City Urban Area	311 (100.0%)	220 (70.7%)	89 (28.6%)	2 (.6%)	0 (.0%)
2. Kafue Area	80 (100.0%)	57 (71.3%)	21 (26.3%)	2 (2.5%)	0 (.0%)
3. Chilanga	6 (100.0%)	5 (83.3%)	1 (16.7%)	0 (.0%)	0 (.0%)
4. Lusaka West	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
5. Lusaka East	3 (100.0%)	1 (33.3%)	2 (66.7%)	0 (.0%)	0 (.0%)
6. Southern Province	379 (100.0%)	257 (67.8%)	121 (31.9%)	1 (.3%)	0 (.0%)
7. Eastern Province	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
8. Mumbwa Area	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
9. Kapiri Area	5 (100.0%)	2 (40.0%)	2 (40.0%)	1 (20.0%)	0 (.0%)
10. Serenje Area	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
11. Copperbelt Province	15 (100.0%)	8 (53.3%)	6 (40.0%)	1 (6.7%)	0 (.0%)
12. Northwestern province	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
13. Western Province	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
14. Northern province	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
15. Lusula	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
16. Botswana	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
17. Zimbabwe	39 (100.0%)	11 (28.2%)	27 (71.1%)	0 (.0%)	0 (.0%)
18. Kenya Tanzania	2 (100.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	0 (.0%)
19. Malawi	11 (100.0%)	8 (72.7%)	2 (18.2%)	1 (9.1%)	0 (.0%)
20. Mozambique	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
21. Zaire	12 (100.0%)	0 (.0%)	12 (100.0%)	0 (.0%)	0 (.0%)
22. Angola	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
23. Republic of South Africa	8 (100.0%)	2 (25.0%)	6 (75.0%)	0 (.0%)	0 (.0%)
24. Namibia	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
25. Swaziland	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
26. Total	876 (100.0%)	573 (65.4%)	295 (33.7%)	8 (.9%)	0 (.0%)

付屬資料 3-3(2/6)

Origin	Loaded Materials							
	Total	1. Empty	2. Agricultural	3. Mineral goods	4. Chemical production	5. Industrial products	6. Miscellaneous	7. 無回答
1. Lusaka City Urban Area	295 (100.0%)	248 (84.1%)	10 (3.4%)	3 (1.0%)	5 (1.7%)	23 (7.6%)	6 (2.0%)	0 (.0%)
2. Kafue Area	92 (100.0%)	84 (91.3%)	2 (2.3%)	1 (1.1%)	0 (.0%)	5 (5.4%)	0 (.0%)	0 (.0%)
3. Chilanga	3 (100.0%)	1 (33.3%)	2 (66.7%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
4. Lusaka West	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
5. Lusaka East	4 (100.0%)	1 (25.0%)	0 (.0%)	0 (.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)	0 (.0%)
6. Southern Province	390 (100.0%)	302 (77.4%)	16 (4.1%)	51 (13.1%)	2 (.5%)	16 (4.1%)	3 (.8%)	0 (.0%)
7. Eastern Province	2 (100.0%)	1 (50.0%)	1 (50.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
8. Namwa Area	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
9. Kapiri Area	7 (100.0%)	6 (85.7%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (14.3%)	0 (.0%)	0 (.0%)
10. Serenje Area	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
11. Copperbelt Province	15 (100.0%)	8 (53.3%)	1 (6.7%)	0 (.0%)	2 (13.3%)	2 (13.3%)	2 (13.3%)	0 (.0%)
12. Northwestern province	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
13. Western Province	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
14. Northern province	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
15. Luapula	3 (100.0%)	2 (66.7%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (33.3%)	0 (.0%)
16. Botswana	5 (100.0%)	3 (60.0%)	0 (.0%)	0 (.0%)	0 (.0%)	2 (40.0%)	0 (.0%)	0 (.0%)
17. Zimbabwe	29 (100.0%)	12 (41.4%)	3 (10.3%)	3 (10.3%)	3 (10.3%)	8 (27.6%)	0 (.0%)	0 (.0%)
18. Kenya Tanzania	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
19. Malawi	4 (100.0%)	1 (25.0%)	2 (50.0%)	1 (25.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
20. Mozambique	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
21. Zaire	7 (100.0%)	5 (71.4%)	0 (.0%)	2 (28.6%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
22. Angola	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
23. Republic of South Africa	6 (100.0%)	3 (50.0%)	0 (.0%)	0 (.0%)	0 (.0%)	3 (50.0%)	0 (.0%)	0 (.0%)
24. Namibia	3 (100.0%)	0 (.0%)	0 (.0%)	3 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
25. Swaziland	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
26. Total	876 (100.0%)	688 (78.5%)	37 (4.2%)	64 (7.3%)	13 (1.5%)	61 (7.0%)	13 (1.5%)	0 (.0%)

付属資料 3-3(3/6)

Destination	Loaded Materials							
	Total	1. Empty	2. Agricultural	3. Mineral goods	4. Chemical production	5. Industrial products	6. Miscellaneous	7. 無回答
1. Lusaka City Urban Area	311 (100.0%)	238 (76.5%)	16 (5.1%)	42 (13.5%)	0 (.0%)	13 (4.2%)	2 (.6%)	0 (.0%)
2. Kafue Area	80 (100.0%)	65 (81.3%)	1 (1.3%)	9 (11.3%)	1 (1.3%)	4 (5.0%)	0 (.0%)	0 (.0%)
3. Chilanga	6 (100.0%)	4 (66.7%)	0 (.0%)	1 (16.7%)	0 (.0%)	0 (.0%)	1 (16.7%)	0 (.0%)
4. Lusaka West	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
5. Lusaka East	3 (100.0%)	3 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
6. Southern Province	379 (100.0%)	322 (85.0%)	10 (2.6%)	2 (.5%)	7 (1.8%)	31 (8.2%)	7 (1.8%)	0 (.0%)
7. Eastern Province	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
8. Humwa Area	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
9. Kapiri Area	5 (100.0%)	2 (40.0%)	1 (20.0%)	1 (20.0%)	0 (.0%)	1 (20.0%)	0 (.0%)	0 (.0%)
10. Serejeje Area	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
11. Copperbelt Province	15 (100.0%)	9 (60.0%)	2 (13.3%)	0 (.0%)	2 (13.3%)	2 (13.3%)	0 (.0%)	0 (.0%)
12. Northwestern province	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
13. Western Province	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
14. Northern province	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	0 (.0%)
15. Luapula	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
16. Botswana	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
17. Zimbabwe	38 (100.0%)	27 (71.1%)	6 (15.8%)	3 (7.9%)	0 (.0%)	0 (.0%)	2 (5.3%)	0 (.0%)
18. Kenya Tanzania	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	0 (.0%)
19. Malawi	11 (100.0%)	5 (45.5%)	0 (.0%)	2 (18.2%)	3 (27.3%)	1 (9.1%)	0 (.0%)	0 (.0%)
20. Mozambique	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
21. Zaire	12 (100.0%)	1 (8.3%)	1 (8.3%)	3 (25.0%)	0 (.0%)	7 (58.3%)	0 (.0%)	0 (.0%)
22. Angola	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
23. Republic of South Africa	8 (100.0%)	7 (87.5%)	0 (.0%)	1 (12.5%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
24. Namibia	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
25. Swaziland	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
26. Total	876 (100.0%)	688 (78.5%)	37 (4.2%)	64 (7.3%)	13 (1.5%)	61 (7.0%)	13 (1.5%)	0 (.0%)

付属資料 3-3(4/6)

Fig. 2 Classification of Vehicle

Origin of Trips	Vehicle Type					Vehicle Type				
	Total	1 乗用	2 貨物	3 バス	4 無回答	Total	1 乗用	2 貨物	3 バス	4 無回答
1. Lusaka City Urban Area	295 (100.0%)	182 (61.7%)	113 (38.3%)	0 (.0%)	0 (.0%)	311 (100.0%)	220 (70.7%)	89 (28.6%)	2 (.6%)	0 (.0%)
2. Kafue Area	92 (100.0%)	68 (73.9%)	24 (26.1%)	0 (.0%)	0 (.0%)	80 (100.0%)	57 (71.3%)	21 (26.3%)	2 (2.5%)	0 (.0%)
3. Chilanga	3 (100.0%)	1 (33.3%)	2 (66.7%)	0 (.0%)	0 (.0%)	6 (100.0%)	5 (83.3%)	1 (16.7%)	0 (.0%)	0 (.0%)
4. Lusaka West	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
5. Lusaka East	4 (100.0%)	2 (50.0%)	2 (50.0%)	0 (.0%)	0 (.0%)	3 (100.0%)	1 (33.3%)	2 (66.7%)	0 (.0%)	0 (.0%)
6. Southern Province	390 (100.0%)	274 (70.3%)	111 (28.5%)	5 (1.3%)	0 (.0%)	379 (100.0%)	257 (67.8%)	121 (31.9%)	1 (.3%)	0 (.0%)
7. Eastern Province	2 (100.0%)	1 (50.0%)	1 (50.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
8. Mkwinda Area	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)
9. Kapiri Area	7 (100.0%)	4 (57.1%)	3 (42.9%)	0 (.0%)	0 (.0%)	5 (100.0%)	2 (40.0%)	2 (40.0%)	1 (20.0%)	0 (.0%)
10. Serenje Area	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
11. Copperbelt Province	15 (100.0%)	7 (46.7%)	7 (46.7%)	1 (6.7%)	0 (.0%)	15 (100.0%)	8 (53.3%)	6 (40.0%)	1 (6.7%)	0 (.0%)
12. Northwestern province	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
13. Western Province	1 (100.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
14. Northern province	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
15. Luapula	3 (100.0%)	3 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
16. Botswana	5 (100.0%)	4 (80.0%)	1 (20.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
17. Zimbabwe	29 (100.0%)	12 (41.4%)	15 (51.7%)	2 (6.9%)	0 (.0%)	38 (100.0%)	11 (28.9%)	27 (71.1%)	0 (.0%)	0 (.0%)
18. Kenya Tanzania	2 (100.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	0 (.0%)
19. Malawi	4 (100.0%)	1 (25.0%)	3 (75.0%)	0 (.0%)	0 (.0%)	11 (100.0%)	8 (72.7%)	2 (18.2%)	1 (9.1%)	0 (.0%)
20. Mozambique	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
21. Zaire	7 (100.0%)	1 (14.3%)	6 (85.7%)	0 (.0%)	0 (.0%)	12 (100.0%)	0 (.0%)	12 (100.0%)	0 (.0%)	0 (.0%)
22. Angola	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
23. Republic of South Africa	6 (100.0%)	4 (66.7%)	2 (33.3%)	0 (.0%)	0 (.0%)	8 (100.0%)	2 (25.0%)	6 (75.0%)	0 (.0%)	0 (.0%)
24. Namibia	3 (100.0%)	0 (.0%)	3 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
25. Swaziland	2 (100.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
26. Total	876 (100.0%)	573 (65.4%)	295 (33.7%)	8 (.9%)	0 (.0%)	876 (100.0%)	573 (65.4%)	295 (33.7%)	8 (.9%)	0 (.0%)

付屬資料 3-3(5/6)

Origin of Trips	Trip Purpose									
	Total	1. To work	2. Business	3. To home	4. Shopping	5. Entertainment	6. To school	7. Social Visit	8. Others	9. 無回答
1. Lusaka City Urban Area	295 (100.0%)	17 (5.8%)	172 (58.3%)	2 (.7%)	9 (3.1%)	70 (23.7%)	0 (.0%)	13 (4.4%)	10 (3.4%)	2 (.7%)
2. Kafue Area	92 (100.0%)	3 (3.3%)	53 (57.6%)	4 (4.3%)	4 (4.3%)	16 (17.4%)	0 (.0%)	3 (3.3%)	7 (7.6%)	2 (2.2%)
3. Chilanga	3 (100.0%)	0 (.0%)	3 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
4. Lusaka West	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
5. Lusaka East	4 (100.0%)	0 (.0%)	2 (50.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	2 (50.0%)	0 (.0%)	0 (.0%)
6. Southern Province	350 (100.0%)	33 (8.5%)	230 (59.0%)	16 (4.1%)	3 (.8%)	76 (19.5%)	2 (.5%)	26 (6.7%)	4 (1.0%)	0 (.0%)
7. Eastern Province	2 (100.0%)	0 (.0%)	1 (50.0%)	0 (.0%)	1 (50.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
8. Namwa Area	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	2 (100.0%)	0 (.0%)
9. Kapiri Area	7 (100.0%)	0 (.0%)	5 (71.4%)	0 (.0%)	0 (.0%)	1 (14.3%)	0 (.0%)	1 (14.3%)	0 (.0%)	0 (.0%)
10. Serenje Area	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
11. Copperbelt Province	15 (100.0%)	0 (.0%)	8 (53.3%)	0 (.0%)	1 (6.7%)	4 (26.7%)	0 (.0%)	1 (6.7%)	1 (6.7%)	0 (.0%)
12. Northwestern province	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
13. Western Province	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)
14. Northern province	2 (100.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
15. Luapula	3 (100.0%)	0 (.0%)	2 (66.7%)	0 (.0%)	0 (.0%)	1 (33.3%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
16. Botswana	5 (100.0%)	0 (.0%)	2 (40.0%)	0 (.0%)	0 (.0%)	2 (40.0%)	0 (.0%)	1 (20.0%)	0 (.0%)	0 (.0%)
17. Zimbabwe	29 (100.0%)	0 (.0%)	18 (62.1%)	0 (.0%)	0 (.0%)	3 (10.3%)	0 (.0%)	7 (24.1%)	0 (.0%)	1 (3.4%)
18. Kenya Tanzania	2 (100.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
19. Malawi	4 (100.0%)	0 (.0%)	4 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
20. Mozambique	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
21. Zaire	7 (100.0%)	0 (.0%)	6 (85.7%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (14.3%)	0 (.0%)	0 (.0%)
22. Angola	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
23. Republic of South Africa	6 (100.0%)	0 (.0%)	4 (66.7%)	0 (.0%)	0 (.0%)	1 (16.7%)	0 (.0%)	1 (16.7%)	0 (.0%)	0 (.0%)
24. Namibia	3 (100.0%)	0 (.0%)	3 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
25. Swaziland	2 (100.0%)	0 (.0%)	1 (50.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (50.0%)	0 (.0%)	0 (.0%)
26. Total	876 (100.0%)	53 (6.1%)	519 (59.2%)	22 (2.5%)	19 (2.2%)	174 (19.9%)	2 (.2%)	58 (6.6%)	24 (2.7%)	5 (.6%)

付屬資料 3-3 (6/6)

Destination of Trips	Trip Purpose									
	Total	1. To work	2. Business	3. To home	4. Shopping	5. Entertainment	6. To school	7. Social Visit	8. Others	9. 無回答
1. Lusaka City Urban Area	311 (100.0%)	23 (7.4%)	187 (60.1%)	9 (2.9%)	2 (.6%)	62 (19.9%)	1 (.3%)	24 (7.7%)	3 (1.0%)	0 (.0%)
2. Kafue Area	80 (100.0%)	10 (12.5%)	40 (50.0%)	7 (8.8%)	1 (1.3%)	16 (20.0%)	1 (1.3%)	4 (5.0%)	1 (1.3%)	0 (.0%)
3. Chilanga	6 (100.0%)	1 (16.7%)	3 (50.0%)	0 (.0%)	1 (16.7%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (16.7%)	0 (.0%)
4. Lusaka West	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
5. Lusaka East	3 (100.0%)	0 (.0%)	2 (66.7%)	0 (.0%)	0 (.0%)	1 (33.3%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
6. Southern Province	379 (100.0%)	19 (5.0%)	215 (56.7%)	6 (1.6%)	11 (2.9%)	90 (23.7%)	0 (.0%)	16 (4.2%)	18 (4.7%)	4 (1.1%)
7. Eastern Province	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
8. Mumbwa Area	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
9. Kapiri Area	5 (100.0%)	0 (.0%)	3 (60.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	2 (40.0%)	0 (.0%)	0 (.0%)
10. Serenje Area	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
11. Copperbelt Province	15 (100.0%)	0 (.0%)	10 (66.7%)	0 (.0%)	0 (.0%)	1 (6.7%)	0 (.0%)	4 (26.7%)	0 (.0%)	0 (.0%)
12. Northwestern province	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
13. Western Province	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
14. Northern province	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
15. Luapula	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
16. Botswana	1 (100.0%)	0 (.0%)	1 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
17. Zimbabwe	38 (100.0%)	0 (.0%)	29 (76.3%)	0 (.0%)	4 (10.5%)	1 (2.6%)	0 (.0%)	4 (10.5%)	0 (.0%)	0 (.0%)
18. Kenya Tanzania	2 (100.0%)	0 (.0%)	2 (100.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
19. Malawi	11 (100.0%)	0 (.0%)	6 (54.5%)	0 (.0%)	0 (.0%)	1 (9.1%)	0 (.0%)	3 (27.3%)	0 (.0%)	1 (9.1%)
20. Mozambique	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
21. Zaire	12 (100.0%)	0 (.0%)	11 (91.7%)	0 (.0%)	0 (.0%)	1 (8.3%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
22. Angola	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
23. Republic of South Africa	8 (100.0%)	0 (.0%)	6 (75.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	1 (12.5%)	1 (12.5%)	0 (.0%)
24. Namibia	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
25. Swaziland	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)
26. Total	876 (100.0%)	53 (6.1%)	519 (59.2%)	22 (2.5%)	19 (2.2%)	174 (19.9%)	2 (.2%)	58 (6.6%)	24 (2.7%)	5 (.6%)

TRAFFIC SURVEY
INSTRUCTION MANUAL

DECEMBER, 1989

JICA STUDY TEAM

FOR

KAFUE ROAD BRIDGE RECONSTRUCTION PROJECT

PART(1)

1. Introduction

In response to the request made by the Government of Zambia for the Kafue Road Bridge Construction Project, the Government of Japan has sent a team to carry out the feasibility study on it.

The Government of Zambia will have been finished the fourth five years development plan (1985-89) in this year. The New Fifth 5-years Plan (1990-94) will start the next year which has to develop efficiently the agricultural and non-mining industries.

In the field of "Transportation", it can be said following two viewpoints.

- (1) The development of appropriate agricultural structure depend upon the well balanced infrastructure development, especially road network structure.
- (2) Zambia, due to an inland country, the sections of international roads in outside countries has always some potentiality of anxiety for national-security. From this point of view, road sections in Zambia should be well developed improved as well.

Kafue Road Bridge is one of strategically important points for Zambia from above mentioned viewpoints. This study should analyze that Kafue Road Bridge is necessary to reconstruct new bridge instead of present bridge from engineering point of view and its economic feasibility.

This traffic survey will provide data/information to the study team to enable decision making on future implementation of the proposed project. That is, the obtained data/information of traffic characteristics by the traffic survey will be utilized to forecast the future traffic volume and to study an economic feasibility. Those data can be utilized also by Zambian Government on the other purposes such as formulating a plan of road improvement/construction etc.

2. Purpose of this traffic survey

In order to analyze the feasibility of Kafue Road Bridge Construction Project, it is necessary to ascertain the origin and destination of vehicle trip and the details of the characteristics of vehicle movements at this bridge.

The obtained data/information about vehicle movements will be examined to analyze the existing road network and to make up a plan to meet the traffic demand in future. With the results of this survey, the traffic volume, nature and characteristics of existing vehicle trips can be determined. Hence, results of the survey offer useful data not only for this bridge construction planning but also for the comprehensive regional planning.

3. Outline of the Survey

3.1 Content of the survey

This survey consists of two parts;

- (a) Interviewing
- (b) Traffic counting

In the interviewing survey, vehicles passing through the survey station will be interviewed during each hour from 6:00 am. to 6:00 pm.. In traffic counting, all the vehicles passing through the station during the 24 hours period beginning at 6:00 am. will counted on an hourly basis according to the vehicle type.

3.2 Survey Station

Survey stations are selected as follows;

- (1) O-D Survey ----- Kafue Road Bridge (11/Dec.)
- (2) Traffic count --
 - a) Kafue Road Bridge (11/Dec.)
 - b) Fringe of Lusaka urban area on T4 near air port, point No.Z0105 by Road Department Survey (12/Dec.)
 - c) Fringe of Lusaka urban area on T2

near Motomoto, point No.ZT28 by
Road Department Survey (12/Dec.)

3.3 Interviewing

(a) Questionnaire for interviewing are as follows;

1. Origin of the trip
2. Destination of the trip
3. Purpose of the trip
4. Number of passengers
(in case of a passenger car/van)
5. Kinds of loaded goods
6. Tonnage of loaded goods
(in case of a truck/lorry)

(b) Procedure

In the interviewing survey, all of the vehicles passing through the survey stations will be interviewed during the survey period.

The average interviewing time is expected to be less than 3 minutes.

This O-D survey is conducted for 12 hours beginning at 6:00 a.m.

The personnel involved for each station is as follows;

Director of the traffic survey
Counterpart from Road Department
Supervisor
Group leader of interviewers
Interviewers
Counters
Personnel for urgent communication
Policemen
Defence officer if necessary

The number of personnels is shown in Table 3.1.
Also the organization chart is shown in Figure 3.1.

Policemen are assigned to stop and guide the vehicle. The supervisor and policemen should watch that the survey is carried out smoothly and safety.

Supervisor and two group leaders (at both direction of traffic flow) should be engaged to watch the progress of the survey.

Interviewers should take care of traffic accidents and troubles due to the survey is carried out along the roadside at the survey station.

3.4 Notice of interviewing

It must be emphasised here that the co-operation of the public is entirely voluntary. If any driver refuses to answer the questions, he/she will be allowed to leave the group of interviewing vehicles as far as he can avoid any traffic accidents.

Interviewers should mention that the following vehicles should be excluded for interview.

- 1) Ambulances
- 2) Fire engines
- 3) Post office vans
- 4) Police cars
- 5) Security vehicles
- 6) Armed service vehicles
- 7) Buses on regular route
- 8) VIP cars with/without an escorts of policement
- 9) Forklift and road construction vehicles
- 10) Ox-carts
- 11) Motor cycles

It should be mentioned the governmental car/truck should be interviewed except above mentioned vehicle types.

3.5 Traffic Counting

(a) Purpose of traffic Counting

When it will have heavy rain or traffic delay will be induced by the O-D survey, the survey should be stopped until such condition is cleared. The hourly result of such condition has not gained complete data. In such case, it should be estimated the whole-hourly-data using by the result of traffic counting. Therefore, the traffic counting survey has an important purpose to get the total volume of each hour and whole day in order to enlarge the results of sampling data to exact each one hour vehicle volume.

(b) Classification of vehicle type

Vehicle type is classified in this study as follows;

- 1) Passenger car
- 2) Van, Pick-up, Landrover, Landcrusor and Caravan
- 3) Lorry/Truck: two axles
- 4) Lorry/Truck: three axles and more
- 5) Lorry/Truck: draw-bar-trailer
- 6) Bus: regular route bus
- 7) Bus: sight-seeing bus or private-use bus
- 8) Others: army-vehicles, construction-vehilce, police car, emergency-vehilce etc.

(c) Procedure

Group of two or three persons, stationed by the road-side will perform assigned functions. They count the traffic volume by means of a counting sheet. Supervisor should check their records/informations collected.

The function of the counting person are only counting an information on the number of vehicles passing by, the type of vehilces and direction which is heading for. In every hour, the total number of vehicles by type is recorded in a given form. The location of these groups will be at the back of the line of interviewers for the O-D survey. The counting will commence from 6:00 am. to 6:00 pm.

4. Explanation of questionnaires

4.1 Procedure of interviewing

The interview should commence with an introductory greeting:

"Good Morning/Afternoon Sir/Madam. We are carrying out a traffic survey, would you please answer some questions about the usage of your vehicle."

(a) Origin of the trip

Ask the driver the origin of this trip i.e. the place he/she started this journey. Record the name of province, city or village or major facilities.

Ex. Where do you come from of this trip?

(b) Destination of the trip

Ask the driver where he/she will close his/her journey. Record the name of province, city and village.

Ex. Where do you want to go?

(c) Purpose of the trip

Ask the driver the purpose of this trip and mark the corresponding number according to the categories lists in the questionnaire sheet.

(d) Number of passengers (in case of passenger car/van)

Ask the driver the number of passenger of who boarded his/her vehicle for this trip, put the figure to the column. If she/he is not sure of the exact numbers, ask him/her to give the approximate number. In the case where there is no other passenger, put "0"(zero) into the corresponding column (i.e. to exclude driver himself/herself).

6. Definition of Trip

6.1 Origin and Destination of trip are most important questions in this questionnaire.

Simply saying, origin of trip means the starting place to drive of this trip. That is, Origin means the last place where the driver starts to move the vehicle up to this station. Destination means the ending place where the driver will stop the moving passing through the survey station.

Origin and Destination should be recorded clearly the name of place. (1) Name of Province, city or village
If it will be difficult, following names can be recorded instead of place. (2) The major facilities such as:

- Air port
- Governmental facilities
- Big factory
- National park
- Lake or river or bridge etc.

PART(2)

1. Manners as an interviewer

This survey is most important part in the traffic planning. Results of the survey are fully depend on the individual interviewer's effort. We have many excellent methods to analyze and a superior computing machine to calculate. But, if the data taken from the survey have not been complete, we can not get the right result from the analysis.

Therefore, the interviewer should always have the intention to trace actual activities. For that reasons mentioned above:

- (a) It is necessary to understand the content of the survey in detail. When someone asks a question, the interviewer should always be able to answer it.
- (b) The interviewer should carry out the survey according to the instruction. Do not modify or interpret the terms based upon your own judgement or assumption.

- (c) Observe the rules and schedule strictly. For example, interviewer must gather punctually at the meeting place on the specified time/data.
- (d) During the actual survey, interviewer should take care of diction and manner.
- (e) During the actual survey, interviewer must follow the direction of the policemen.
- (f) Interviewer should ask the advice of the supervisors whenever the unknown or unexpected matter will happen.

2. Attention

2.1 Check

Every interviewer should check their own marked questionnaire sheet in the rest of interviewing. In the checking, every interviewer should examine the next point.

- (1) The station No., sheet No., time of the interviewing
- (2) Name of interviewer and supervisor
- (3) Is there any blank in the answering column?
Especially Origin and Destination.
- (4) Is there no mistake in the making in every column?

Every interviewer should make these checking as early as possible and while your memories are still clear.

2.2 Attention

It must be emphasized here again that the co-operation of the public is entirely voluntary. If any driver refuse to answer the questions, it will be allowed to leave the group of interviewing vehicles as far as he can avoid any accidents.

3. Appendix

3.1 Type of Vehicles

Interviewers should identify the kind of vehicles as follows:

- (1) Passenger car
Private saloon owned by private owner
Saloon owned by company or governmental bodies.
- (2) Van, Pickup, Landrover and Landcrusor
Usual van with utilities for persons and goods
Small size truck and Jeep, Landrover, Landcrusor
- (3) Lorry; two axles
Truck with front and rear wheel
- (4) Lorry: three axles and more
Truck with front wheel and more than two rear wheels
- (5) Lorry; draw-bar-trailer
Driver and engine (that is tractor) are separated with trailer by bar.
- (6) Bus; Regular route bus
Usual public bus which operated on regular routes
- (7) Bus; Sight-seeing bus and private bus
Sight-seeing bus which operated unregularly
Private owned bus which transport own shop or companies including rental car
- (8) Others
Army vehicles, Ambulance, Fire engine, Police car, Petro tank, Construction vehicle, Refrigerator, etc.

3.2 Trip Purpose

- (1) To work (going to work)
Going to work-place of driver
Sending other person to his work place
- (2) Business (business engagement)
Selling insurance, transporting goods to customer.
Delivering materials, going to meeting or other business
- (3) To home
Going back home from work, shopping, etc.
- (4) Shopping (to go shopping/marketing)
going to market, shops and other shopping places for the purpose of buying fish, vegetables, clothes and etc.
- (5) Entertainment (For foods/entertainment)
- (6) To School
Studying, or sending children to school.
- (7) Social visit
Social gathering, visiting relatives, going to air port and other private purpose.

TRAFFIC COUNTING SHEET

JICA STUDY TEAM
Date 11 DEC, 1989

Station No.	Direction		Name of surveyor														Sheet No.			
	from	to	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
6 - 7																				
7 - 8																				
8 - 9																				
10 - 11																				
11 - 12																				
12 - 13																				
13 - 14																				
14 - 15																				
15 - 16																				
16 - 17																				
17 - 18																				
Sub total																				
Total																				

ROADSIDE OD SURVEY QUESTIONNAIRE

DATE

1989

STATION NO.	TIME: TO	DIRECTION		NAME OF INTERVIEWER	NAME OF SUPERVISOR	SHEET NO:	
		FROM	TO				
No.	TYPE OF CAR	Origin	Destination	Loaded Goods	Loaded Tonnage	ONLY FOR PASSENGER CAR PURPOSE	
1.	1. Passenger car 2. Van, Landcruiser; 3. Lorry; 2 axles 4. Lorry; 3 axles 5. Lorry; trailer and tractor 6. Bus; Regular 7. Bus; Sightseeing 8. Others () ()	1. Lusaka city 2. Kafue city 3. Livingston 4. Copperbelt 5. Zimbabwe () ()	1. Lusaka city 2. Kafue city 3. Livingston 4. Copperbelt 5. Zimbabwe	Loaded Goods 1. 2. 3.	Loaded Tonnage: 1. ton 2. ton 3. ton	1. to work 2. Business 3. Shopping 4. Entertainment 5. To home 6. To school 7. Social visit 8. Other	DRIVER + () PERSON
2.	1. 2. 3. 4. 5. 6. 7. ()			1. 2. 3.	1. ton 2. ton 3. ton	1 3 5 7 2 4 6 8	DRIVER + () PERSON
3.	1. 2. 3. 4. 5. 6. 7. ()			1. 2. 3.	1. ton 2. ton 3. ton	1 3 5 7 2 4 6 8	DRIVER + () PERSON
4.	1. 2. 3. 4. 5. 6. 7. ()			1. 2. 3.	1. ton 2. ton 3. ton	1 3 5 7 2 4 6 8	DRIVER + () PERSON
5.	1. 2. 3. 4. 5. 6. 7. ()			1. 2. 3.	1. ton 2. ton 3. ton	1 3 5 7 2 4 6 8	DRIVER + () PERSON

VEHICLE TYPE

- 1. Passenger car
- 2. Van, Pickup, Landcruiser, Landrover
- 3. Lorry; 2 axles
- 4. Lorry; 3 axles
- 5. Lorry; trailer and tractor
- 6. Bus; Regular route bus
- 7. Bus; Sightseeing bus
- 8. Others

Vehicle Type	5	10	15	20	Total
()					
()					
()					
()					

JICA STUDY TEAM
THE FEASIBILITY STUDY ON Kafue Road Bridge PROJECT

TRAFFIC VOLUME SURVEY

Sheet No. _____	DIRECTION	FROM	LUSAKA
STATION No. _____		TO	
SURVEYOR NAME _____	TIME FROM _____	TO _____	AM PM
CHECKED BY _____	DATE	11	DEC. 1989

Vehicle Type	5	10	15	20	Total
()					
()					
()					
()					

HOUR AND CLASS TRAFFIC COUNT

Province _____

Point No. _____

Exact Location _____

Day _____

Date _____

Sheet No. _____

Hour	LIGHT VEHICLES					HEAVY VEHICLES					OTHER					
	CARS				M/C	LORRIES		BUSES		Graders, etc.						
	(Cars, Vanettes, Landrovers etc. including those with trailers and caravans)				(Motor-cycles & Scooters)	Two-axled	3 or more axles	With trailer (any number of axles)	(Excluding Kombs and Minibuses)							
Night																
E.g.																
1800 to 1900	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
1900 to 2000	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
2000 to 2100	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
2100 to 2200	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
2200 to 2300	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
2300 to 2400	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
0000 to 0100	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
0100 to 0200	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
0200 to 0300	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
0300 to 0400	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
0400 to 0500	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
0500 to 0600	1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96	2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 77 82 87 92 97	3 8 13 18 23 28 33 38 43 48 53 58 63 68 73 78 83 88 93 98	4 9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94 99	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1 6 11 16	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	1 6 11 16 21 26 31 36	2 7 12 17 22 27 32 37	3 8 13 18 23 28 33 38	4 9 14 19 24 29 34 39	5 10 15 20 25 30 35 40	
Totals																

Special Classes or Heavy Tolls (Leave blank unless specially instructed)

TOTAL LIGHT VEHICLES

TOTAL HEAVY VEHICLES

TOTAL ALL VEHICLES

PROVINCE..... CLASSIFIED TRAFFIC COUNT RDHQ/72/2

VEHICLE TYPE	DATE												TOTAL				
	DAY NIGHT	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600		1700	1800		
PASSENGER CAR																	
SMALL VAN / PICK UP																	
LARGE VAN / LANDROVER / CARAVAN																	
LORRY, TWO AXLED																	
LORRY, THREE AXLED																	
LORRY-DRAW BAR TRAILER																	
HORSE • SEMI TRAILER																	
HORSE/LORRY-TWO TRAILERS																	
BUS																	
GRADER, TRACTOR, ETC.																	

付属資料 3-5(1/4) 将来 O - D 表

Table 3.5-A Future O-D Table (Passenger Cars, 1992)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(1)	0	0	5	0	1	240	0	0	0	0	0	0	0	0	0
(2)	0	0	0	0	0	95	0	0	0	0	0	0	0	0	0
(3)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
(4)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
(5)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(6)	303	92	1	1	0	0	0	1	1	0	12	0	0	0	0
(7)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(8)	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
(9)	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
(10)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(11)	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0
(12)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(13)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
(14)	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
(15)	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
(16)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(17)	9	0	0	0	0	0	0	0	7	0	2	0	0	0	0
(18)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(19)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(20)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(21)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(22)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(23)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(25)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
TOTAL	317	92	7	1	1	361	0	1	8	0	15	0	0	0	0

	16	17	18	19	20	21	22	23	24	25	TOTAL
(1)	0	7	0	0	0	0	0	1	0	0	254
(2)	0	0	0	0	0	0	0	0	0	0	95
(3)	0	0	0	0	0	0	0	0	0	0	1
(4)	0	0	0	0	0	0	0	0	0	0	1
(5)	0	1	0	0	0	0	0	0	0	0	2
(6)	0	0	0	0	0	0	0	0	0	0	411
(7)	0	1	0	0	0	0	0	0	0	0	1
(8)	0	0	0	0	0	0	0	0	0	0	2
(9)	0	0	0	0	0	0	0	0	0	0	5
(10)	0	0	0	0	0	0	0	0	0	0	0
(11)	0	2	0	0	0	0	0	1	0	0	14
(12)	0	0	0	0	0	0	0	0	0	0	1
(13)	0	0	0	0	0	0	0	0	0	0	1
(14)	0	0	0	0	0	0	0	0	0	0	2
(15)	0	0	0	0	0	0	0	0	0	0	4
(16)	0	0	0	2	0	0	0	0	0	0	4
(17)	0	0	0	8	0	0	0	0	0	0	26
(18)	0	0	0	0	0	0	0	0	0	0	0
(19)	0	1	0	0	0	0	0	0	0	0	1
(20)	0	0	0	0	0	0	0	0	0	0	0
(21)	0	1	0	0	0	0	0	0	0	0	1
(22)	0	0	0	0	0	0	0	0	0	0	0
(23)	0	0	0	4	0	0	0	0	0	0	5
(24)	0	0	0	0	0	0	0	0	0	0	0
(25)	0	0	0	1	0	0	0	0	0	0	2
TOTAL	0	13	0	15	0	0	0	2	0	0	833

付属資料 3-5 (2/4)

Table 3.5-B Future O-D Table (Truck/Lorry 1992)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(1)	0	0	0	0	4	124	0	0	0	0	0	0	1	0	0
(2)	1	0	0	0	0	32	0	0	0	0	0	0	0	0	0
(3)	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(4)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(5)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(6)	111	30	1	0	0	0	0	0	3	0	5	0	0	1	1
(7)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(8)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(9)	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
(10)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(11)	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0
(12)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(13)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(14)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(15)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(16)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(17)	6	0	0	0	0	0	0	0	0	0	3	0	0	0	0
(18)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(19)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(20)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(21)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(22)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(23)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(25)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	124	30	1	0	4	167	0	0	3	0	8	0	1	1	1

	16	17	18	19	20	21	22	23	24	25	TOTAL
(1)	1	22	0	0	0	0	0	7	0	0	159
(2)	0	0	0	0	0	0	0	0	0	0	33
(3)	0	0	0	0	0	0	0	0	0	0	4
(4)	0	0	0	0	0	0	0	0	0	0	0
(5)	0	0	0	1	0	1	0	0	0	0	2
(6)	0	0	0	0	0	1	0	0	0	0	153
(7)	0	1	0	0	0	0	0	0	0	0	1
(8)	0	0	0	0	0	0	0	0	0	0	0
(9)	0	1	0	0	0	0	0	0	0	0	4
(10)	0	0	0	0	0	0	0	0	0	0	0
(11)	0	1	0	0	0	0	0	0	0	0	9
(12)	0	0	0	0	0	0	0	0	0	0	0
(13)	0	0	0	0	0	0	0	0	0	0	0
(14)	0	0	0	0	0	0	0	0	0	0	0
(15)	0	0	0	0	0	0	0	0	0	0	0
(16)	0	0	0	0	0	0	0	0	0	0	1
(17)	0	0	3	1	0	8	0	0	0	0	21
(18)	0	3	0	0	0	0	0	0	0	0	3
(19)	0	3	0	0	0	0	0	1	0	0	4
(20)	0	0	0	0	0	0	0	0	0	0	0
(21)	0	6	0	0	0	0	0	1	0	0	7
(22)	0	0	0	0	0	0	0	0	0	0	0
(23)	0	0	0	0	0	1	0	0	0	0	2
(24)	0	0	0	0	0	4	0	0	0	0	4
(25)	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	37	3	2	0	15	0	9	0	0	407

付屬資料 3-5(3/4)

Table 3.5-C Future O-D Table (Passenger Cars 2000)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(1)	0	0	13	0	2	403	0	0	0	0	0	0	0	0	0
(2)	0	0	0	0	0	161	0	0	0	0	0	0	0	0	0
(3)	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
(4)	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
(5)	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(6)	509	157	0	2	0	0	0	2	1	0	18	0	0	0	0
(7)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(8)	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
(9)	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0
(10)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(11)	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0
(12)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(13)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
(14)	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
(15)	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0
(16)	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(17)	19	0	0	0	0	0	0	0	10	0	4	0	0	0	0
(18)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(19)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(20)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(21)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(22)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(23)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(25)	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
TOTAL	542	157	15	2	2	604	0	2	11	0	24	0	0	0	0

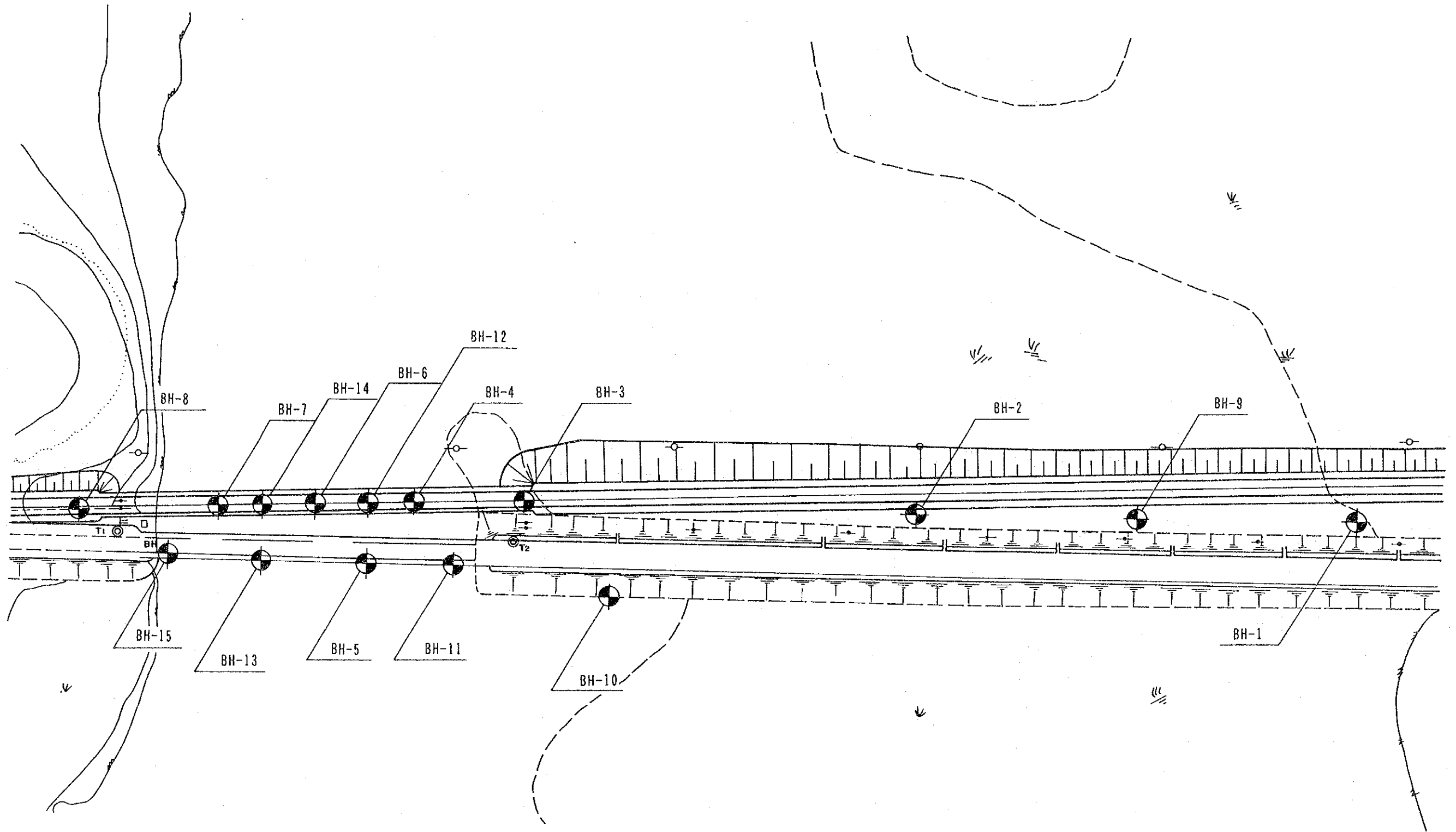
	16	17	18	19	20	21	22	23	24	25	TOTAL
(1)	0	13	0	0	0	0	0	2	0	0	433
(2)	0	0	0	0	0	0	0	0	0	0	161
(3)	0	0	0	0	0	0	0	0	0	0	2
(4)	0	0	0	0	0	0	0	0	0	0	2
(5)	0	0	0	0	0	0	0	0	0	0	4
(6)	0	0	0	0	0	0	0	0	0	0	689
(7)	0	2	0	0	0	0	0	0	0	0	2
(8)	0	0	0	0	0	0	0	0	0	0	3
(9)	0	0	0	0	0	0	0	0	0	0	8
(10)	0	0	0	0	0	0	0	0	0	0	0
(11)	0	4	0	0	0	0	0	2	0	0	23
(12)	0	0	0	0	0	0	0	0	0	0	2
(13)	0	0	0	0	0	0	0	0	0	0	1
(14)	0	0	0	0	0	0	0	0	0	0	3
(15)	0	0	0	0	0	0	0	0	0	0	6
(16)	0	0	0	4	0	0	0	0	0	0	10
(17)	0	0	0	11	0	0	0	0	0	0	44
(18)	0	0	0	0	0	0	0	0	0	0	0
(19)	0	2	0	0	0	0	0	0	0	0	2
(20)	0	0	0	0	0	0	0	0	0	0	0
(21)	0	2	0	0	0	0	0	0	0	0	2
(22)	0	0	0	0	0	0	0	0	0	0	0
(23)	0	0	0	6	0	0	0	0	0	0	8
(24)	0	0	0	0	0	0	0	0	0	0	0
(25)	0	0	0	2	0	0	0	0	0	0	4
TOTAL	0	23	0	23	0	0	0	4	0	0	1409

付属資料 3-5(4/4)

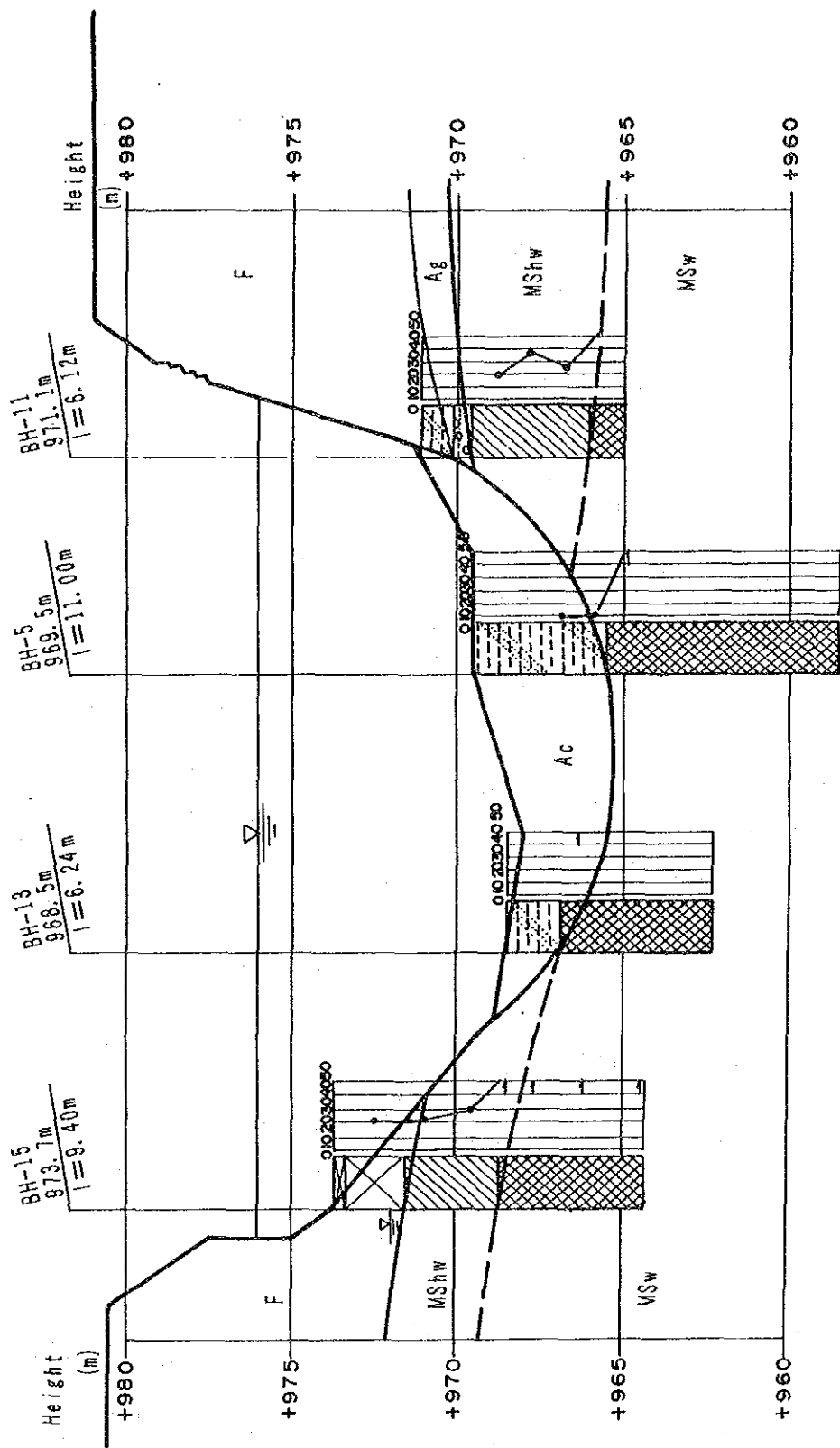
Table 3.5-D Future O-D Table (Truck/Lorry 2000)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(1)	0	0	0	0	17	254	0	0	0	0	0	0	5	0	0
(2)	146	0	0	0	0	2	0	0	0	0	0	0	0	0	0
(3)	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(4)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(5)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(6)	129	80	3	0	0	0	0	0	6	0	3	0	0	1	1
(7)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(8)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(9)	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
(10)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(11)	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0
(12)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(13)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(14)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(15)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(16)	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(17)	42	0	0	0	0	0	0	0	0	0	13	0	0	0	0
(18)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(19)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(20)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(21)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(22)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(23)	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(25)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	341	80	3	0	17	274	0	0	6	0	16	0	5	1	1

	16	17	18	19	20	21	22	23	24	25	TOTAL
(1)	3	102	0	0	0	0	0	25	0	0	406
(2)	0	0	0	0	0	0	0	0	0	0	148
(3)	0	0	0	0	0	0	0	0	0	0	15
(4)	0	0	0	0	0	0	0	0	0	0	0
(5)	0	0	0	3	0	7	0	0	0	0	10
(6)	0	0	0	0	0	0	0	0	0	0	223
(7)	0	1	0	0	0	0	0	0	0	0	1
(8)	0	0	0	0	0	0	0	0	0	0	0
(9)	0	3	0	0	0	0	0	0	0	0	7
(10)	0	0	0	0	0	0	0	0	0	0	0
(11)	0	4	0	0	0	0	0	0	0	0	18
(12)	0	0	0	0	0	0	0	0	0	0	0
(13)	0	0	0	0	0	0	0	0	0	0	0
(14)	0	0	0	0	0	0	0	0	0	0	0
(15)	0	0	0	0	0	0	0	0	0	0	0
(16)	0	0	0	0	0	0	0	0	0	0	3
(17)	0	0	5	0	0	6	0	0	0	0	66
(18)	0	5	0	0	0	0	0	0	0	0	5
(19)	0	5	0	0	0	0	0	1	0	0	6
(20)	0	0	0	0	0	0	0	0	0	0	0
(21)	0	8	0	0	0	0	0	1	0	0	9
(22)	0	0	0	0	0	0	0	0	0	0	0
(23)	0	0	0	0	0	1	0	0	0	0	7
(24)	0	0	0	0	0	9	0	0	0	0	9
(25)	0	0	0	0	0	0	0	0	0	0	0
TOTAL	3	128	5	3	0	23	0	27	0	0	933



付属資料 4-1 ボーリング位置図

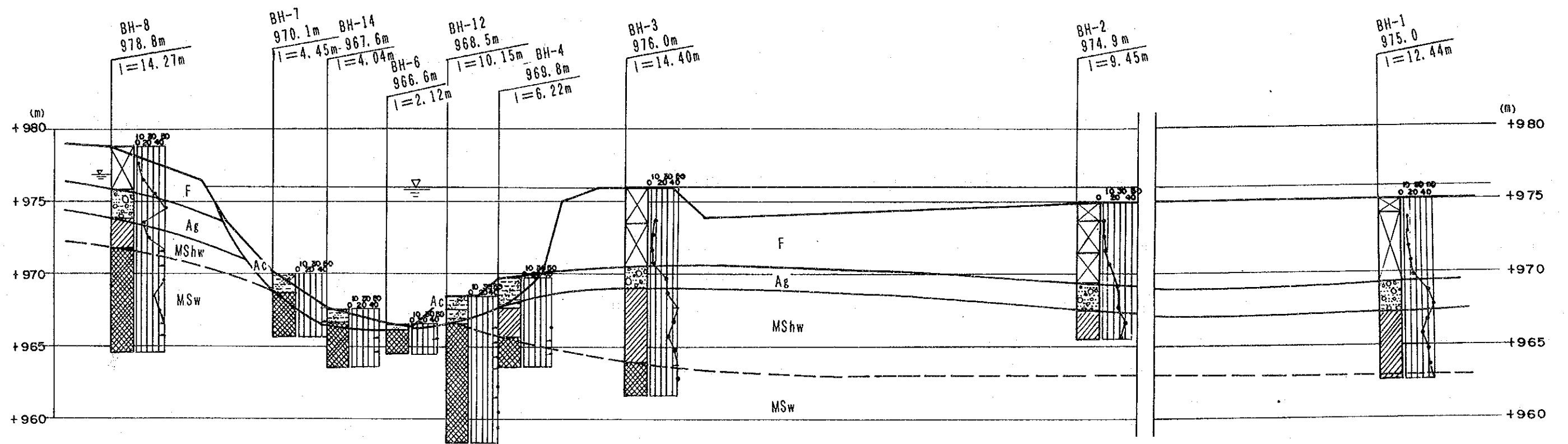


Legend

- F : Fill
- Ac : Alluvial Clay
- Ag : Alluvial Gravel
- MSHw : Heavily Weathered Mudstone to Sandstone
- MSw : Weathered Mudstone to Sandstone

付属資料 4-2

現線形上柱伏図



付属資料 4-3
新線形上柱伏図

Legend
 F : Fill
 Ac : Alluvial Clay
 Ag : Alluvial Gravel
 MShw: Heavily Weathered Mudstone to Sandstone
 MSw : Weathered Mudstone to Sandstone

Scale V=1:200
 H=1:1000

FIG DRILLING LOG

Project No. OS01-10 Project The Kofu Road Bridge Reconstruction Type of Drilling Percussion
 Hole Number BH-1 Elevation 975.0 m. Date 2nd - 6th Feb. 1990
 Water Table m Driller Wade Adams

Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test					
									Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 10cm			N - Value	
												10	20	30	40	50
	975.0	0.00														
1	974.0	1.00	1.00	X	Fill	Dark grey	Very soft	Mixed with floating mud with high water content.	1.15	P-1	4	1	1	2		
2				X	Fill	Dark grey	Medium to stiff	Low water content with less plasticity. Occasionally with white streaks	2.15 2.45	P-2	6	1	2	3		
3				X	Fill				3.15 3.45	P-3	7	2	2	3		
4				X	Fill				4.15 4.45	P-4	9	2	3	4		
5				X	Fill				5.15 5.45	P-5	14	3	4	7		
6	969.3	5.70	4.70	●	Sand and Gravel	Yellowish grey	Dense to very dense	Sand is coarse Gravel is subangular to rounded (dia. 10-50mm).	6.15 6.45	P-6	39	8	13	18		
7				●					7.15 7.37	P-7	50/22/20	20	10/2			
8	967.2	7.80	2.10	/	Mudstone / Sandstone I	Light grey to reddish purple		Heavily weathered. Low water content. With light grey streaks.	8.15 8.45	P-8	38	8	14	16		
9				/					9.15 9.45	P-9	29	7	9	13		
10				/					10.15 10.45	P-10	38	9	14	15		
11				/					11.15 11.45	P-11	42	9	12	21		
12	963.0	12.00	4.20	/	Mudstone / Sandstone II	Reddish purple		Moderately weathered	12.15 12.44	P-12	50/29/17	17	16/9			
13	962.58	12.44	0.44	/												
14								-END OF DRILLING-								
15																
16																
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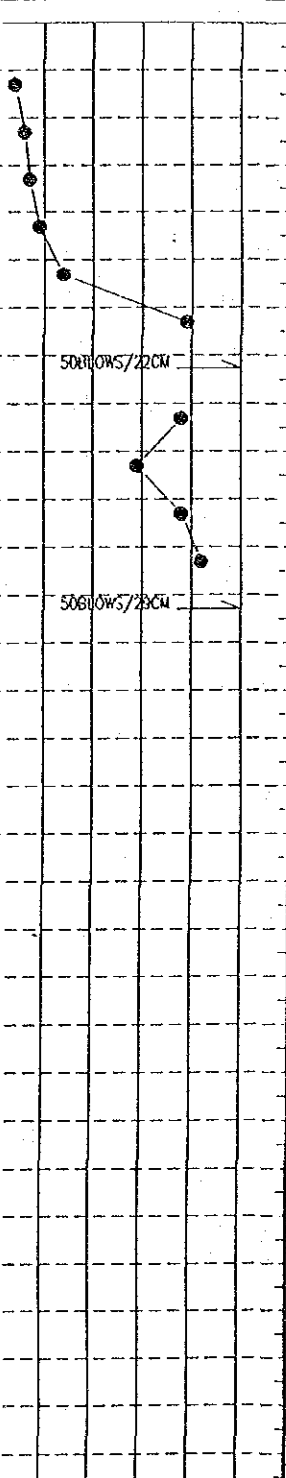


FIG DRILLING LOG

Project No. OS01-10 Project The Kalue Road Bridge Reconstruction Type of Drilling Percussion
 Hole Number BH-2 Elevation 974.90 m Date 24th Jan. - 31st Feb. 1990
 Water Table m Driller Wade Adams

Remarks
 P : Standard Penetration Test

Scale in M	Elevation in M	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test						
									Depth in m.	Sample No.	N - Value Blow/30cm	Blows Per Each 10cm			N - Value		
									10 cm	10 cm	10 cm	10	20	30	40	50	
	974.90	0.00															
1	973.60	1.30	1.30	X	Fil	Dark grey		Fine sandy silt with vegetation	1.15	P-1	4	2	1	1			
2				X	Fil	Dark grey	Very loose to loose	Poorly graded fine to medium grained sand	2.15 2.45	P-2	3	1	1	1			
3				X	Fil				3.15 3.45	P-3	5	1	1	3			
4	971.40	3.50	2.20	X	Fil	Dark grey	Stiff	Sandy clay with white streaks.	4.15 4.45	P-4	11	1	2	8			
5				X	Fil												
6	969.40	5.50	2.60	•••	Sand and gravel	Yellowish grey	Very loose	Gravel is quartz and subrounded (dia 5 - 50mm)	5.65 5.95	P-5	24	5	10	9			
7				•••	Sand and gravel	Yellowish grey	Very loose										
8	967.50	7.40	1.90	•••	Sand and gravel	Yellowish grey	Very loose		7.15 7.45	P-6	27	8	9	10			
9				•••	Sand and gravel	Yellowish grey	Very loose		8.15 8.45	P-7	38	13	11	14			
10	965.45	9.45	2.05	/ / /	Mudstone / Sandstone 1	Reddish purple		Heavily weathered and changed to clay.	9.15 9.45	P-8	31	8	9	14			
11								- END OF DRILLING -									
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
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25																	
26																	
27																	
28																	
29																	
30																	
31																	

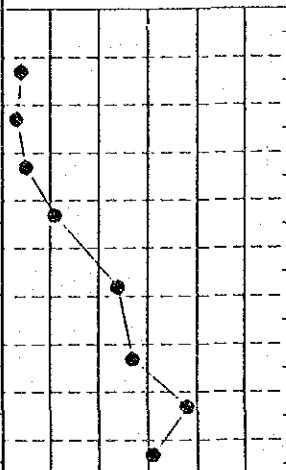


FIG DRILLING LOG

Project No. OS01-10 Project The Kolve Road Bridge Reconstruction Type of Drilling Percussion
 Hole Number BH-3 Elevation 976.00 m Date 31st Jan. - 4th Feb. 1990
 Water Table m Driller Wade Adams

Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test								
									Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 10cm			N - Value				
											10 cm	10 cm	10 cm	10	20	30	40	50	
	976.00	0.00			Fill	Dark grey	Loose	Very gravelly at upper 1m (dia. 2 - 50mm).											
1																			
2																			
3	973.50	2.50	2.50		Fill	Dark grey	Soft	Fine sandy clay with high water content.	2.15 2.45	P-1	6	2	2	2					
4									3.15 3.45	P-2	3	1	1	1					
5									4.15 4.45	P-3	3	1	1	1					
6	970.50	5.50	3.00						5.15 5.45	P-4	4	1	1	2					
7	969.00	7.00	1.50		Sand and gravel	Dark grey	Medium	Sand is fine to coarse with some silt. Gravel is siliceo (dia. 5 - 50mm).	6.15 6.45	P-5	28	5	9	14					
8					Mudstone / Sandstone I	Reddish purple		Heavily weathered and changed to stiff clay with low water content. Partially with white streaks.	7.15 7.45	P-6	30	6	8	16					
9									8.15 8.44	P-7	40/29	17	17	16/9					50 BLOWS/25CM
10									9.15 9.45	P-8	41	11	14	16					
11									10.15 10.45	P-9	32	7	9	15					
12	964.00	12.00	5.00						11.15 11.45	P-10	44	13	15	16					
13					Mudstone / Sandstone II	Reddish purple to light brown		Moderately weathered. Becomes lighter grey with depth.	12.15 12.40	P-11	50/25	17	23	10/5					50 BLOWS/25CM
14	962.00	14.00	2.00						13.15 13.45	P-12	50	14	17	19					50 BLOWS/30CM
15								-END OF DRILLING-	14.15	P-13	50/25	18	20	12/5					50 BLOWS/25CM
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
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FIG DRILLING LOG

Project No. OS01-10 Project The Kafue Road Bridge Reconstruction Type of Drilling Rotary
 Hole Number BH-4 Elevation 969.8 m Date 2nd Feb. 1990
 Water Table - m Driller Zimtranki

Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test									
									Depth in m	Sample No.	N - Value Blows/30cm	Blows Per Each 10cm								
												10 cm	20 cm	30 cm	40 cm	50 cm				
	969.80	0.00																		
1				x x x x x	Clay silt	Dark grey	(Very soft)	floating mud with some vegetation												
2	967.70	2.10	2.10																	
3				/ / / / /	Mudstone / Sandstone I	reddish purple		Heavily weathered and changed to clay.	3.25											
4	965.70	4.10	2.00						3.55	P-1	49	12	17	20						
5				Mudstone / Sandstone II	Reddish purple		Mod-rately weathered. With white streaks. ROD = 0%	4.25											
6									4.46	P-2	50	22	27	1/1						50 BLOWS/10CM
7	963.58	6.22	2.12						5.25	P-3	50/16	16	34	5						50 BLOWS/10CM
8									5.41											
9									6.10	P-4	50/12	50	12							50 BLOWS/10CM
10									6.22											
11								-END OF DRILLING-												
12																				
13																				
14																				
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FIG DRILLING LOG

Project No. OS01-10 Project The Kalve Road Bridge Reconstruction Type of Drilling Rotary
 Hole Number BH-6 Elevation 966.6 m Date 1st Feb. 1990
 Water Table m Driller Zimfranki

Remarks
 P : Standard Penetration Test

Scale in F	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test								
									Depth in m.	Sample No.	N-Value Blows/30cm	Blows Per Each 10cm			N - Value				
												10 cm	10 cm	10 cm	10	20	30	40	50
	966.60	0.00																	
	966.10	0.50	0.50	*	Sandy silt	Dark grey	Very soft	Flooding mud											
1				x	Mudstone			Moderately weathered	1.00	P-1	50	50							50 BLOWS/50CM
2	964.48	2.12	1.62	x	Sandstone II			Slightly tuffaceous. RQD = 20-90%	1.10										
								-END OF DRILLING-	2.00	P-2	50/12	50/12							50 BLOWS/12CM
									2.12										
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
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31																			

FIG DRILLING LOG

Project No. OS01-10 Project The Kofue Road Bridge Reconstruction Type of Drilling Rotary
 Hole Number BH-7 Elevation 970.1 m Date 31st Jan. 1990
 Water Table - m Driller Zimronki

Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test										
									Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 10cm			N - Value						
	970.10	0.00																			
1	968.70	1.40	1.40	x x x x x x x x x x	Sandy silt	Dark grey	Very soft	Floating mud with high water content. Sand is fine to coarse.													
2				x x x x x x x x x x	Mudstone / Sandstone II	Light grey		Tuffaceous, argillaceous and fine grained sandstone is predominant. Occasionally with some thin blockish matter. RQD = 20-90%.	2.40	P-1	50/15	50/15									
3									2.55												
4									3.40	P-2	50/9	50/9									
5	965.65	4.45	3.05						3.49												
5								-END OF DRILLING-	4.40	P-3	50/15	50/15									
5									4.55												
6																					
7																					
8																					
9																					
10																					
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FIG DRILLING LOG

Project No. 0501-10 Project The Kalue Road Bridge Reconstruction Type of Drilling Percussion
 Hole Number BH-8 Elevation 978.8 m Date 6th - 18th Feb. 1990
 Water Table -2.0 m Driller Wade Adams

Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test									
									Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 10cm			N - Value					
												10 cm	10 cm	10 cm	10	20	30	40	50	
	978.80	0.00																		
1				X	Fil	Brown to brownish grey	Medium to stiff	Silty clay with fine gravel (dia. <5mm). With slight odor of organic soil.	1.15	P-1	6	1	1	4						
2				X					1.45											
3	975.80	3.00	3.00	X					2.15	P-2	11	3	4	4						
4				X	Sand and gravel	Brownish grey	Dense to very dense	Sand is fine to coarse grained. Gravel is subangular (dia. 2 - 20mm).	2.45											
5				X					3.15	P-3	30	3	8	19						
6	973.80	5.00	2.00	X					3.45											
7				X	Mudstone / Sandstone I	Light brown to light grey		Heavily weathered and changed to clay	4.15	P-4	50	15	21	14						
8	971.80	7.00	2.00	X					4.45											
9				X	Mudstone / Sandstone II	Light grey to bluish grey to reddish purple		Tuffaceous, argillaceous and fine grained sandstone is predominant.	5.15	P-5	11	3	3	5						
10				X					5.45											
11				X					6.15	P-6	20	4	6	10						
12				X					6.45											
13				X					7.15	P-7	50/18	19	31/6							
14				X					7.33											
15				X					8.15	P-8	40/25	24	19	7/5						
16				X					8.40											
17				X					9.15	P-9	47	11	15	21						
18				X					9.45											
19				X					10.15	P-10	31	8	10	13						
20				X					10.45											
21				X					11.15	P-11	42	9	15	18						
22				X					11.45											
23				X					12.15	P-12	50/15	31	19/6							
24				X					12.30											
25				X					13.00	P-13	50/19	23	27/4							
26				X					13.19											
27	964.53	14.27	7.27	X					14.15	P-14	50/12	39	11/2							
28				X					14.27											
29				X																
30				X																
31				X																

FIG DRILLING LOG

Project No. OS01-10 Project The Kafue Road Bridge Reconstruction Type of Drilling Percussion
 Hole Number BH-9 Elevation 975.0 m Date 15th - 20th Feb. 1990
 Water Table - m Driller Wade Adams

Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test								
									Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 10cm			N - Value				
									10	20	30	40	50						
	975.0	0.00			Fill	Dark grey	Medium to very stiff	Silty Clay with low water content and low plasticity.											
1									1.15	P-1	5	1	1	3					
2									1.45	P-2	6	1	2	3					
3									2.15	P-3	7	2	2	3					
4									3.15	P-4	15	4	5	6					
5									3.45	P-5	23	6	8	9					
6	969.0	6.00	6.00		Mudstone / Sandstone I	Brownish grey to reddish brown		Heavily weathered and changed to soil	4.15	P-6	36	5	13	18					
7									6.15	P-7	34	9	11	14					
8									6.45	P-8	35	11	11	13					
9									7.15	P-9	42	11	12	19					
10	965.0	10.00	4.00		Mudstone / Sandstone II	Reddish brown		With light grey streaks. Low water content. R00=5-10%	8.15	P-10	50/22	20	27	3/2					50BLOWS/22CM
11									10.15	P-11	50/24	21	21	8/4					50BLOWS/24CM
12									11.15	P-12	50/18	29	21/8						50BLOWS/18CM
13									12.15	P-13	50/23	21	23	6/3					50BLOWS/23CM
14	960.67	14.33	4.33						13.15	P-14	50/18	24	26/8						50BLOWS/18CM
15								-END OF DRILLING-	13.38										
16									14.15										
17									14.33										
18																			
19																			
20																			
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FIG DRILLING LOG

Project No. 0501-10 Project The kalua Road Bridge Reconstruction Type of Drilling Rotary
 Hole Number BH-10 Elevation 976.0 m Date 28 Feb. - 2nd May, 1990
 Water Table - m Driller Zimlenki

Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test						
									Depth in m	Sample No.	N - Value Blows/30cm	Blows Per Each 10cm			N - Value		
									10 cm	20 cm	30 cm	10	20	30	40	50	
	976.00	0.00															
1								Silly sand with rounded gravel (dia 10-40mm)									
2																	
3																	
4																	
5																	
6	970.50	5.50	5.50						5.15 5.45	P-1	40	11	18	11			
7	969.50	6.50	1.00		Gravel	Brownish grey	Medium to dense	Poorly graded, subrounded and hard gravel									
8	968.50	7.50	1.00		Mudstone / sandstone I	Reddish purple		Tulaceous and argillaceous mudstone is predominant	7.50 7.70	P-2	50/20	40/10	5		50BLOWS/20CM		
9	967.35	8.65	1.15		Mudstone / Sandstone II	Reddish purple		Moderately weathered mudstone RQD=0-10%	8.50 8.65	P-3	50/15	50/15	15		50BLOWS/10CM		
10								-END OF DRILLING-									
11																	
12																	
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29																	
30																	
31																	

FIG DRILLING LOG

Project No. OS01-10 Project The Kofue Road Bridge Reconstruction Type of Drilling Rotary
 Hole Number BH-12 Elevation 968.5 m Date 12th to 14th Feb. 1990
 Water Table - m Driller Zumfranki

Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remark	Sampling		Standard Penetration Test									
									Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 10cm			N - Value					
												10 cm	10 cm	10 cm	10	20	30	40	50	
	968.50	0.00																		
1	967.60	0.90	0.90	x x x x	Sandy silt	Dark grey	(Very soft)	Floating mud												
2	966.60	1.90	1.00	Silty sand	Dark grey	(Very loose)	Sand is fine grained												
3				x x x x	Mudstone Sandstone #	Light grey to reddish purple		Moderately weathered and changed to soils ROD = 0%	2.05	P-1	50/22	15	15	20/7						50 BLOWS/37CM
4				x x x x					3.33	P-2	50/26	17	18	15/6						50 BLOWS/28CM
5				x x x x					4.30	P-3	50/25	18	18	14/3						50 BLOWS/26CM
6				x x x x					5.19	P-4	50/24	21	29/14							50 BLOWS/20CM
7				x x x x					6.05	P-5	50	14	25	11						50 BLOWS/30CM
8				x x x x					6.35											
9				x x x x					6.90	P-6	50/24	24	26/11							50 BLOWS/26CM
10				x x x x					7.90	P-7	50/30	24	26/15							50 BLOWS/30CM
11	958.35	10.15	8.25	x x x x					8.20	P-8	50/25	25	25							50 BLOWS/26CM
12								-END OF DRILLING-	8.90	P-9	50/25	35	15							50 BLOWS/26CM
13									10.15											
14																				
15																				
16																				
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FIG DRILLING LOG

Project No. OS01-10 Project The Kalue Road Bridge Reconstruction Type of Drilling Rotary
 Hole Number BH-13 Elevation 968.5 m Date 7th - 8th Feb. 1990
 Water Table _____ m Driller Zimfranki

Remarks
 P : Standard Penetration Test
 C : Coring

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test & Core Recovery (CR)													
									Depth in m	Sample No.	N - Value Blows/30cm	Blows Per Each 10cm			N - Value									
												10 cm	10 cm	10 cm	10	20	30	40	50					
	968.50	0.00			Sandy silt	Dark grey	(Very soft)	Floating mud with some vegetation																
1																								
2	966.90	1.60	1.60	x x x x	Mudstone / Sandstone II	Light brown		Moderately weathered with some bluish matter. ROQ = 20-35%	2.10	P-1	50/1	50/1												
3				x x x x					2.22															
4				x x x x					2.50	C-1														
5				x x x x					4.00	C-2														
6				x x x x					5.50	C-3														
7	962.26	6.24	4.64	x x x x				-END OF DRILLING-	6.00	P-2	50/15	50/15												
									6.10															
									6.24															
8																								
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FIG DRILLING LOG

Project No. OS01-10 Project The Kofue Road Bridge Reconstruction Type of Drilling Rotary
 Hole Number BH-14 Elevation 967.6 m Date 11th - 12th Feb. 1990
 Water Table m Driller Zimronki

Remarks
 P : Standard Penetration Test

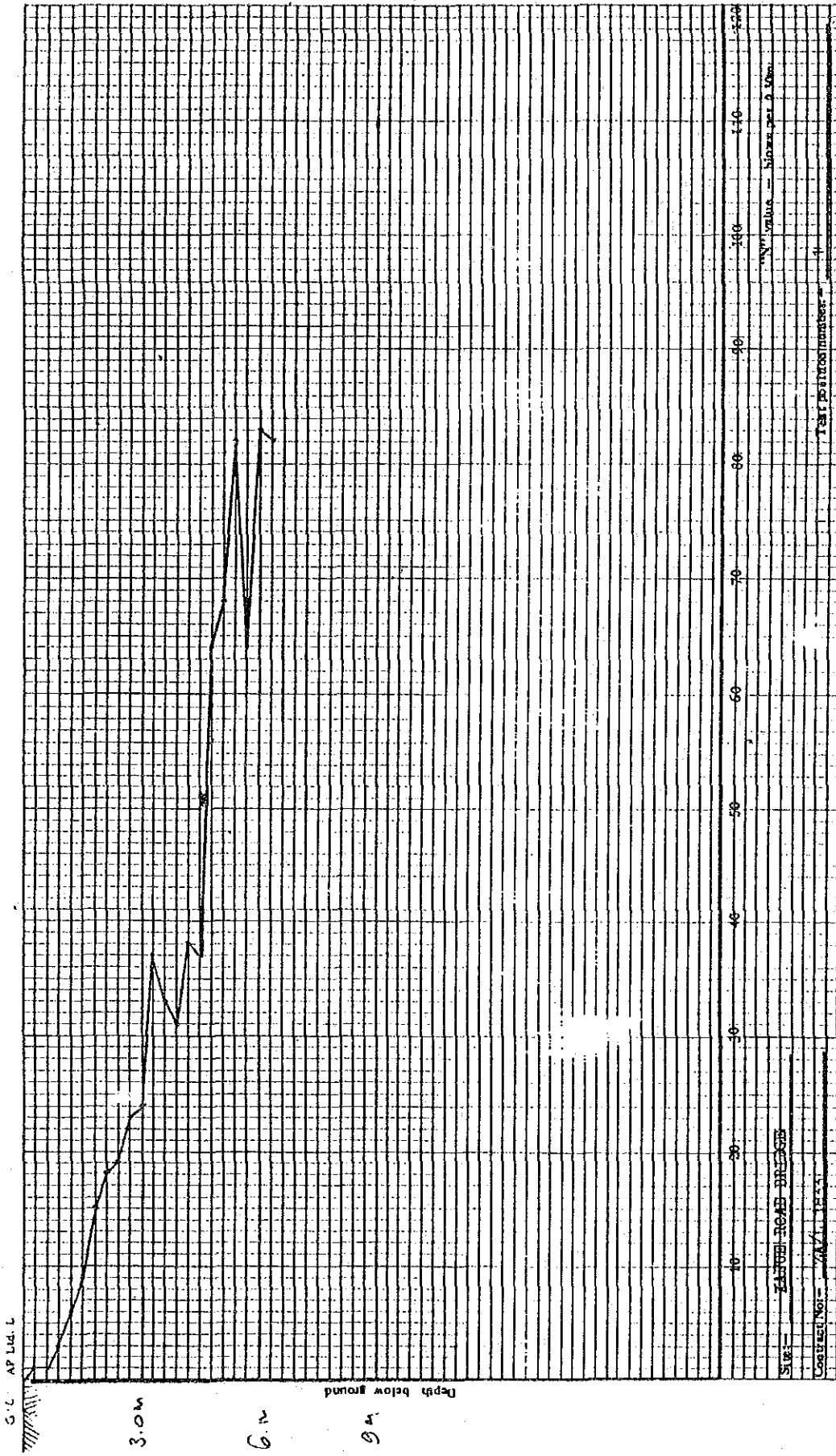
Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test									
									Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 10cm			N - Value					
												10 cm	10 cm	10 cm	10	20	30	40	50	
	967.60	0.00																		
1	966.70	0.90	0.90	x x x	Sandy silt	Dark grey	(Very soft)	flooding mud												
	966.30	1.30	0.40	x x x	Sand and gravel with clay	Light grey		Gravel is rounded (dia. 3mm)	1.90	P-1	50	50								
2				x x x	Mudstone / Sandstone II			toilaceous, argillaceous and fine grained sandstone. ROD = 10-25%	2.90	P-2	50/15	50/15								
3				x x x					3.05											
4	963.56	4.04	2.74	x x x				-END OF DRILLING-	3.90	P-3	50/13	50/13								
4									4.03											
5																				
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FIG DRILLING LOG

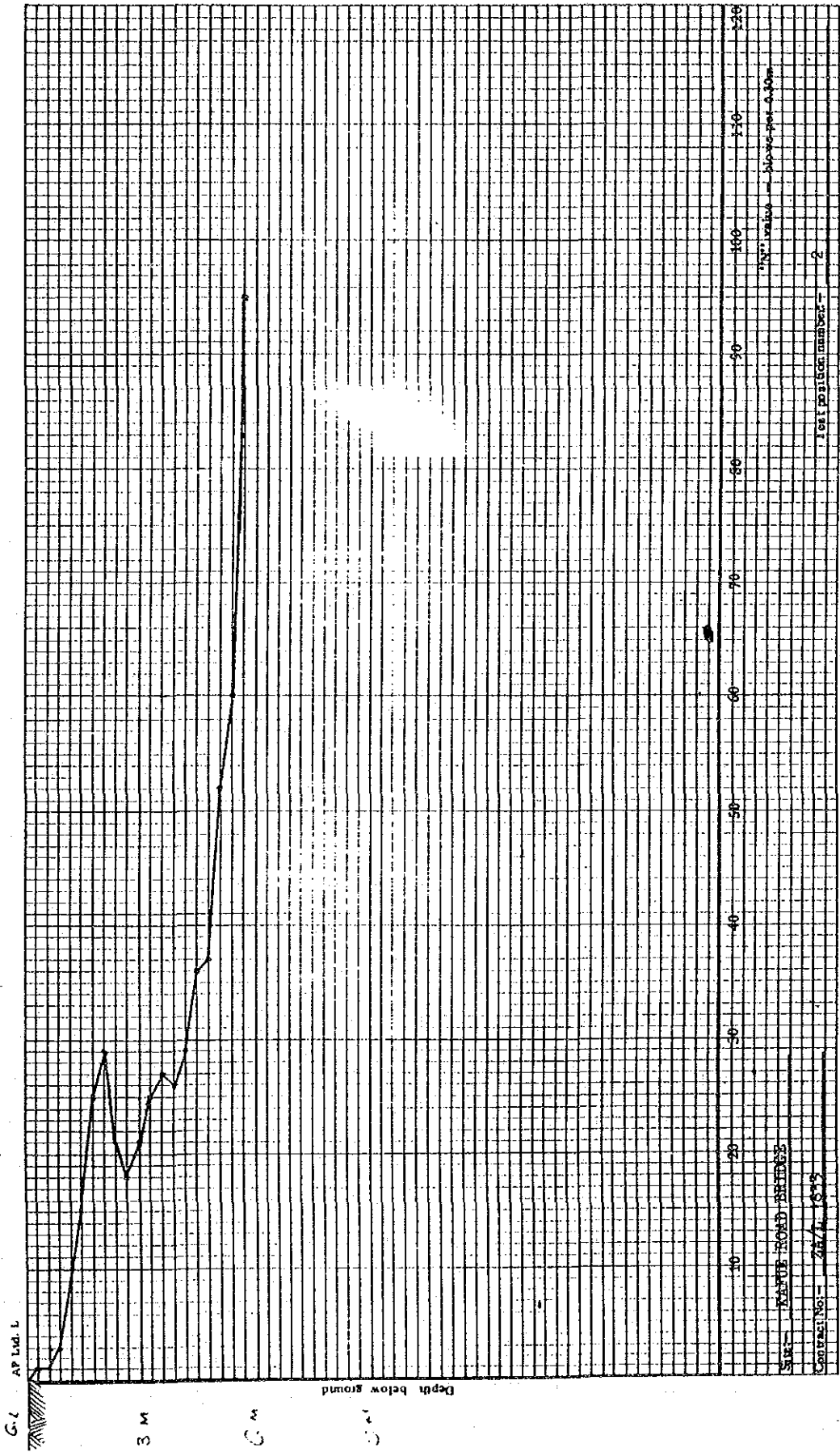
Project No. OS01-10 Project The Kahle Road Bridge Reconstruction Type of Drilling Rotary
 Hole Number BH-15 Elevation 973.7 m. Date 9th - 10th Feb. 1990
 Water Table m. Driller Zimfranki

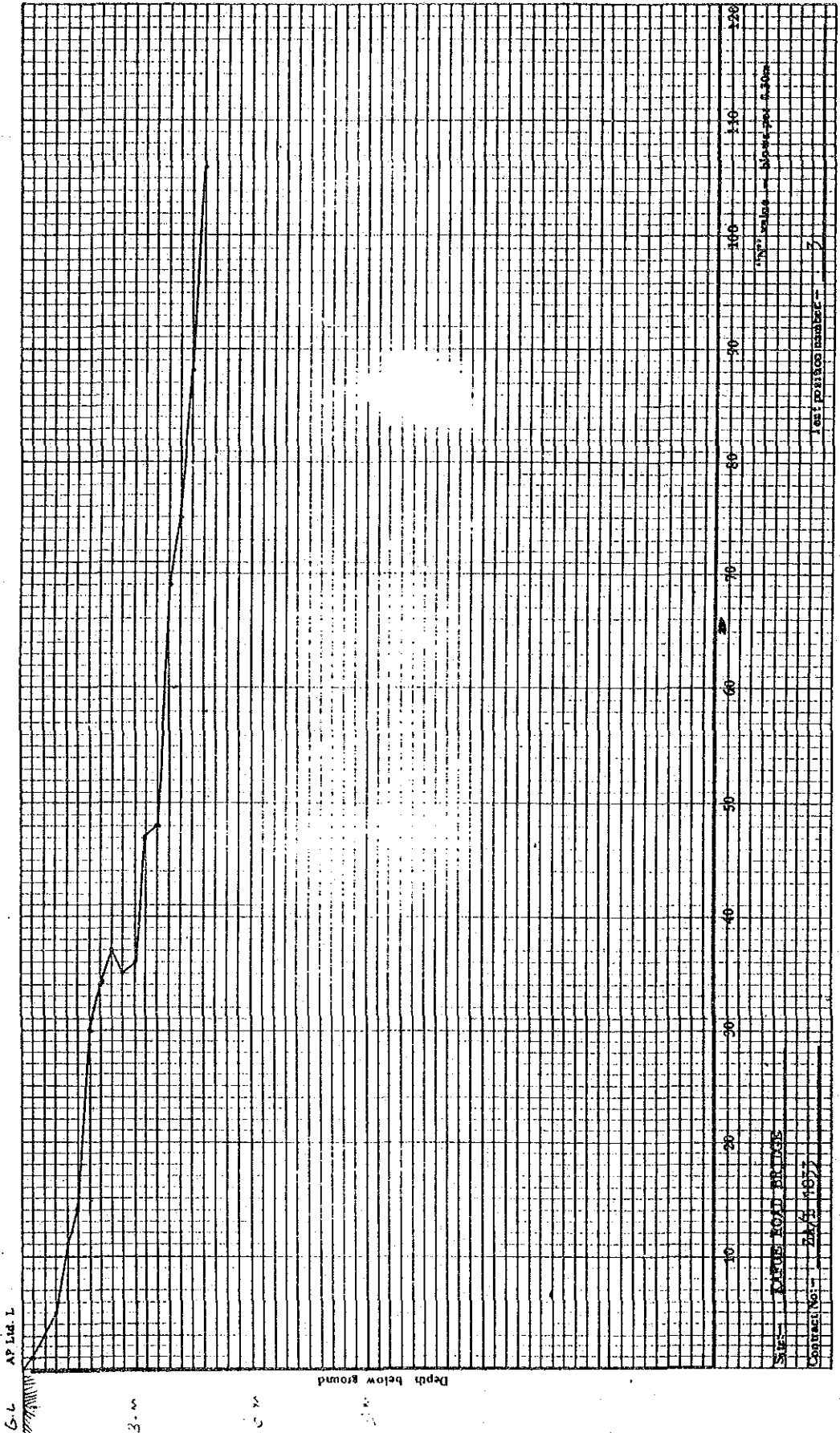
Remarks
 P : Standard Penetration Test

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling		Standard Penetration Test								
									Depth in m	Sample No.	N - Value Blows/30cm	Blows Per Each 10cm			N - Value				
											10 cm	10 cm	10 cm	10	20	30	40	50	
	973.70	0.00																	
	973.30	0.40	0.40	X	Fill	Dark grey	(Very soft)	Sandy clay											
1				X	Fill	Yellowish grey	Medium	Boulders (dia 100mm) and rounded gravel (dia. 10 - 46mm) with coarse sand	1.15	P-1	19	6	6	7					
2	971.50	2.20	1.80	/	Mudstone / Sandstone I	Light brown		Heavily weathered and changed to clay	1.45										
3				/	Mudstone / Sandstone I	Light brown		Heavily weathered and changed to clay	2.65	P-2	20	6	7	7					
4				/	Mudstone / Sandstone I	Light brown		Heavily weathered and changed to clay	2.95										
5	968.70	5.00	2.80	/	Mudstone / Sandstone II	Light grey to pale yellow.		hufaceous, argillaceous and fine grained sandstone. Partly changed to clay. R.O.D = 5-15%	3.95	P-3	27	6	6	15					
6				/	Mudstone / Sandstone II	Light grey to pale yellow.		hufaceous, argillaceous and fine grained sandstone. Partly changed to clay. R.O.D = 5-15%	4.25										
7				/	Mudstone / Sandstone II	Light grey to pale yellow.		hufaceous, argillaceous and fine grained sandstone. Partly changed to clay. R.O.D = 5-15%	5.15	P-4	50/18	18	32	6					50 BLOW/30CM
8				/	Mudstone / Sandstone II	Light grey to pale yellow.		hufaceous, argillaceous and fine grained sandstone. Partly changed to clay. R.O.D = 5-15%	5.31										
9				/	Mudstone / Sandstone II	Light grey to pale yellow.		hufaceous, argillaceous and fine grained sandstone. Partly changed to clay. R.O.D = 5-15%	6.00	P-5	50/12	50	12						50 BLOW/30CM
10	964.30	9.40	4.40	/	Mudstone / Sandstone II	Light grey to pale yellow.		hufaceous, argillaceous and fine grained sandstone. Partly changed to clay. R.O.D = 5-15%	6.12										
11								- END OF DRILLING -	7.50	P-6	50	50							50 BLOW/30CM
12								- END OF DRILLING -	7.60										
13								- END OF DRILLING -	9.15	P-7	50/25	20	20	10					50 BLOW/30CM
14								- END OF DRILLING -	9.40										
15								- END OF DRILLING -											
16								- END OF DRILLING -											
17								- END OF DRILLING -											
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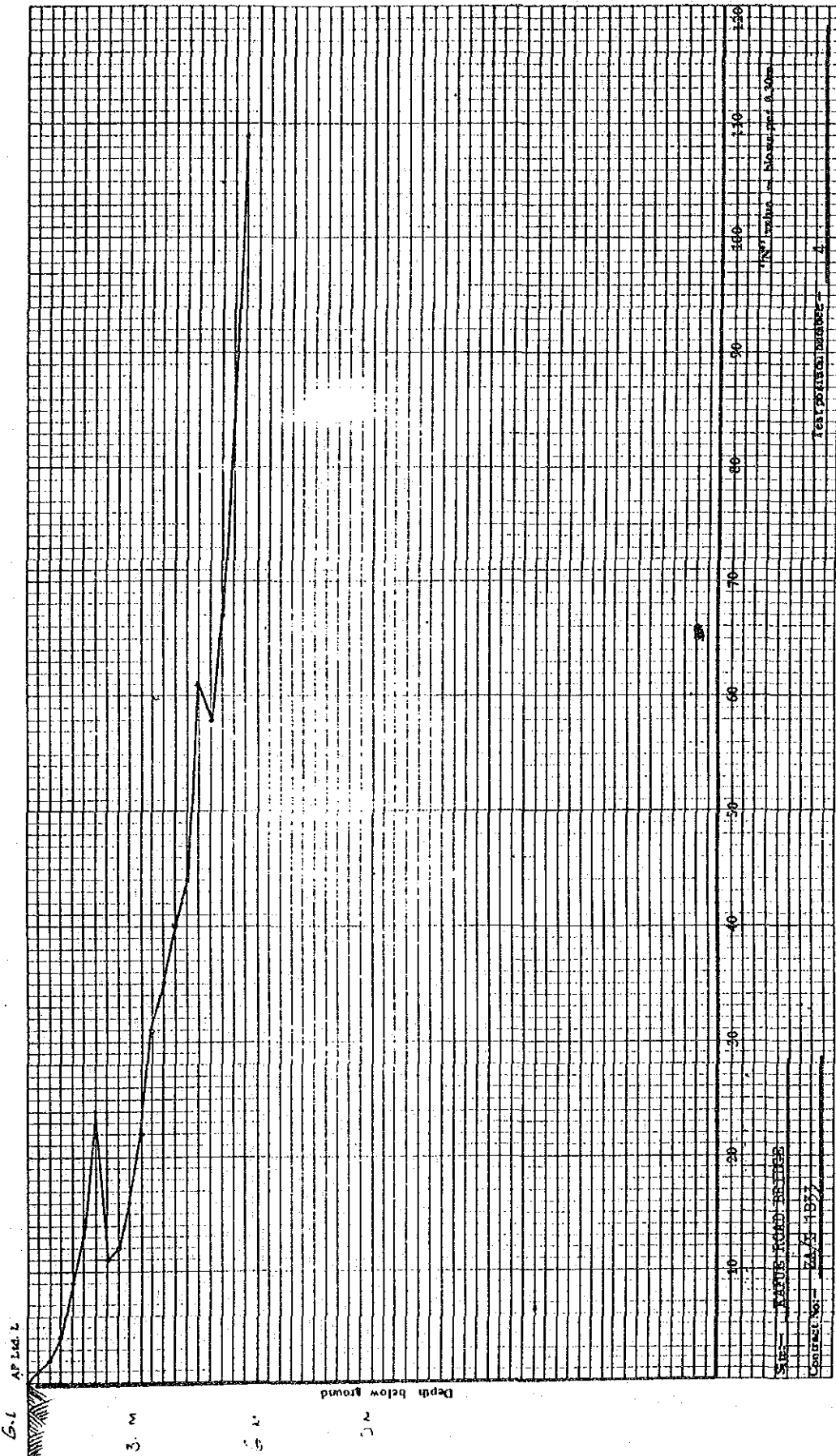
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 Contract No. - ZK/5-1677

Test Position Number - 7

Date 2ND MARCH 1990

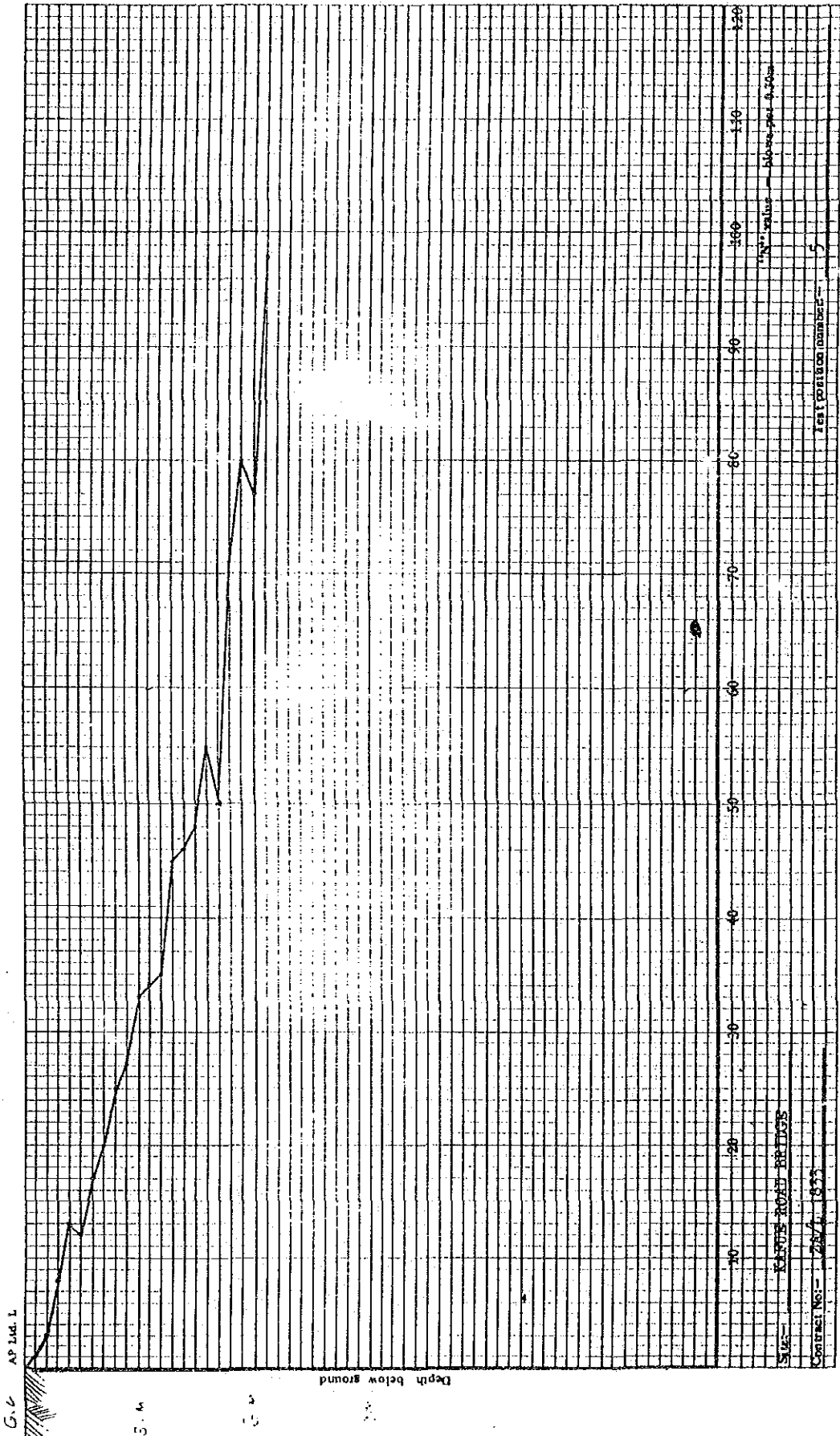
PENETROMETER TEST REPORT

WADE ADAMS PILING AND FOUNDATIONS LTD.



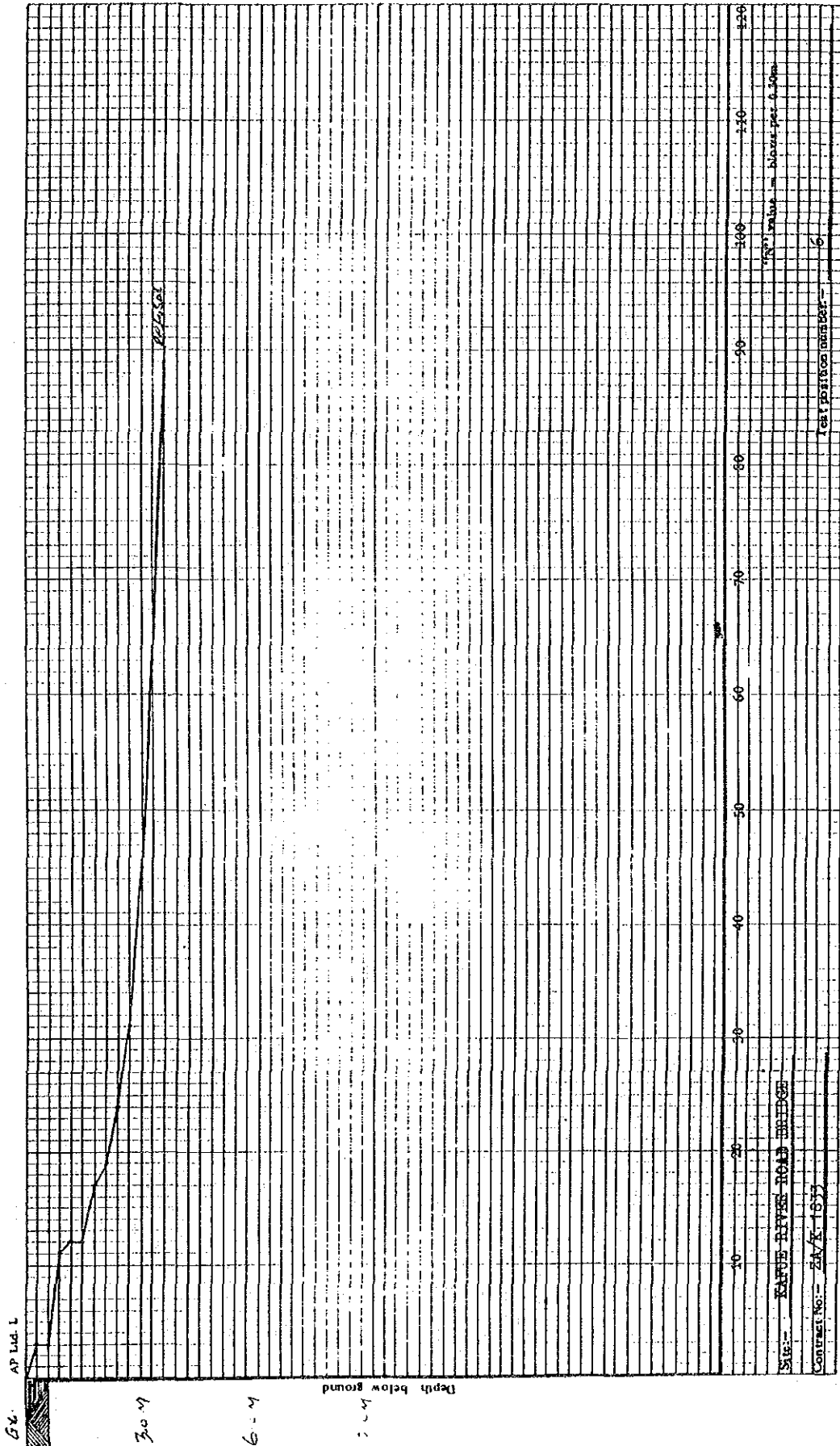
WADE ADAMS PILING AND FOUNDATIONS LTD. Date 2ND MARCH 1990

PENETROMETER TEST REPORT



WADE ADAMS PILING AND FOUNDATIONS LTD. PENETROMETER TEST REPORT Date 2ND MARCE 1990

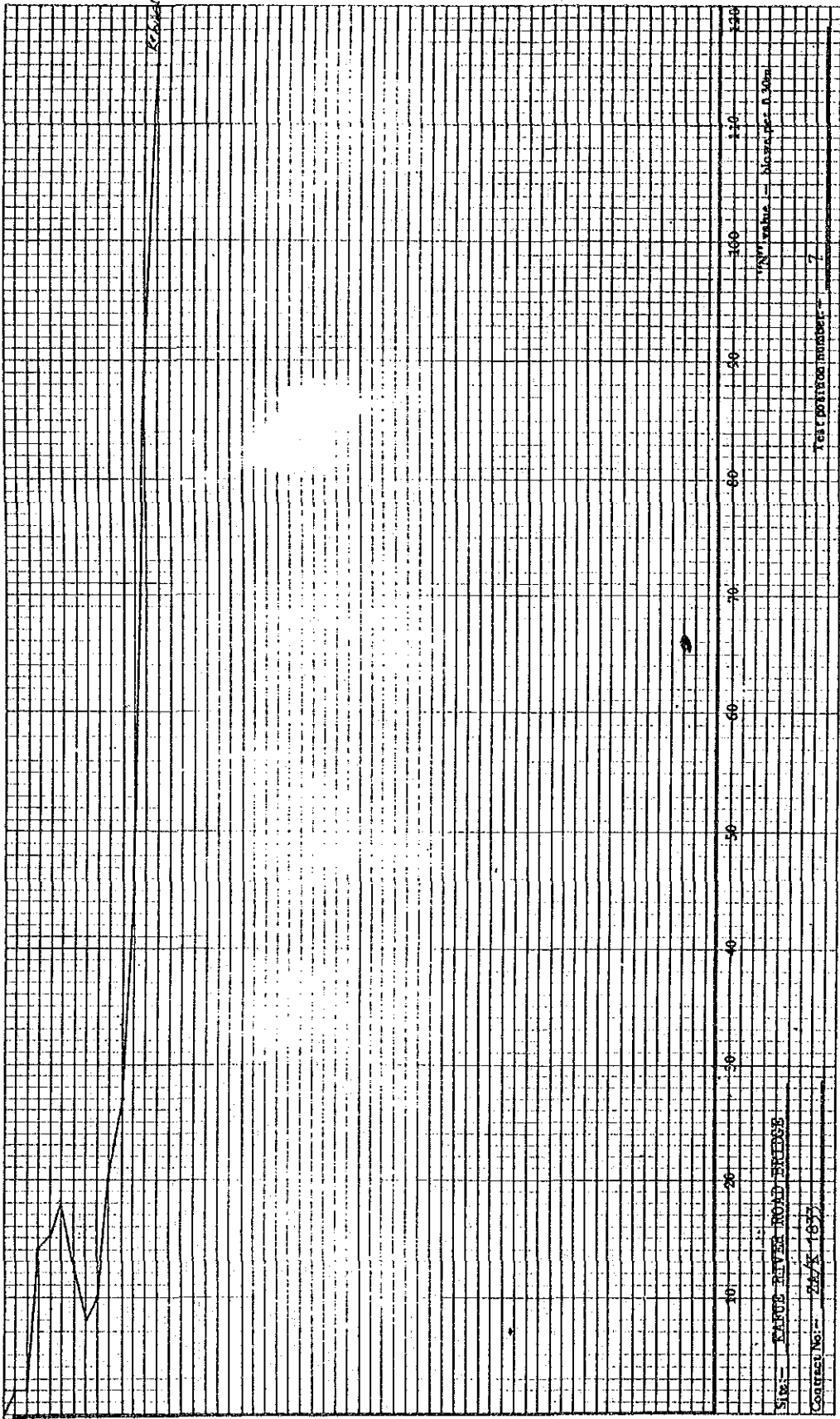
Contract No. - 28/1/893
 SUE - KAYDE ROU - BRIDGES
 100 = 1000
 RESISTANCE (Kilograms/cm²)



WADE ADAMS PILING AND FOUNDATIONS LTD. PENETROMETER TEST REPORT Date 2ND FEBRUARY 1990

G.L.

AP Lvl. 1



3.0M

6.0M

Depth below ground

0.5M

10 20 30 40 50 60 70 80 90 100 110 120 130

Contract No. — 227/X-1873

Site — STANTON RIVER ROAD BRIDGE

Test Point No. — 7

Notes —

WADE ADAMS PILING AND FOUNDATIONS LTD. Date 2ND MARCH 1990

PENETROMETER TEST REPORT

G-2. AP Ltd. L.

5.0M



Site - KALBE ROAD BRIDGE

Contract No. - 204/K-1877

Approximate blow count 0.30m

Test position number - B

WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 3RD MARCH 1990