












6.4 Topographic Survey Result







Table Temporary Bench Marks





Bridge Number	Point	Final Values		
		Southing	Easting	Elevation
		(m)	(m)	(m)
1	BM1-1	8,208,758.250	301,082.901	339.201
	BM1-2	8,209,126.562	300,938.452	334.040
2	BM2-1	8,236,756.509	300,105.666	420.082
	BM2-2	8,237,012.705	299,978.863	414.842
3	BM3-1	8,251,683.435	299,634.002	504.018
	BM3-2	8,251,809.000	299,346.000	501.000
4	BM4-1	8,252,657.551	297,149.195	511.805
	BM4-2	8,252,811.000	296,949.000	514.000
5	BM5-1	8,265,496.305	295,224.299	574.552
	BM5-2	8,265,740.722	295,194.509	571.881
6	BM6-1	8,289,150.067	279,229.966	626.136
	BM6-2	8,289,276.091	279,021.555	628.969
7	BM7-1	8,295,394.802	272,253.853	704.055
	BM7-2	8,295,543.336	272,054.566	708.072
8	BM8-1	8,308,059.837	259,725.954	724.576
	BM8-2	8,308,301.000	259,794.000	726.000
9	BM9-1	8,308,596.521	259,898.673	716.590
	BM9-2	8,308,915.000	259,969.000	715.000
10	BM10-1	8,319,906.166	246,787.736	608.379
	BM10-2	8,320,009.000	246,588.000	606.000
11	BM11-1	8,322,235.518	242,704.340	585.424
	BM11-2	8,322,428.000	242,459.000	587.000
12	BM12-1	8,327,597.387	244,506.824	582.342
	BM12-2	8,327,817.000	244,625.000	586.000
13	BM13-1	8,359,344.746	235,112.189	566.854
	BM13-2	8,359,761.000	235,133.000	567.000



CONTROL POINT DESCRIPTION			POINT No. BM.1-1		
			DATE 27/04/2011		
PROJECT	BRIDGE 1		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.1-1	8208758.250	301082.901			339.201
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
LOCATION					
					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	161-17-26		2.906		sign pole
RP-2	339-23-15		192.694		bridge
RP-3	340-54-21		192.820		bridge





CONTROL POINT DESCRIPTION				POINT No. BM.1-2	
				DATE 27/04/2011	
PROJECT	BRIDGE 1		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.1-2	8209126.562	300938.452			334.040
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
<u>LOCATION</u>					
<u>RP1</u>		<u>RP2</u>		<u>RP3</u>	
					
<u>GENERAL INFORMATION</u>					
	AZ		DISTANCE		DESC
RP-1	341-28-47		137.072		sign pole
RP-2	154-48-54		111.045		bridge
RP-3	157-28-12		110.827		bridge

CONTROL POINT DESCRIPTION			POINT No. BM.2-1		
			DATE 27/04/2011		
PROJECT	BRIDGE 2		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.2-1	8236756.509	300105.666			420.082
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ	DISTANCE		DESC	
RP-1	340-50-58	116.444		guard rail	
RP-2	341-44-48	142.131		bridge	
RP-3	343-43-28	141.009		bridge	







CONTROL POINT DESCRIPTION			POINT No. BM.2-2		
			DATE 27/04/2011		
PROJECT	BRIDGE 2		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.2-2	8237012.705	299978.863			414.842
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	151-59-43		54.861		guard rail
RP-2	153-26-21		79.194		bridge
RP-3	157-01-29		79.549		bridge



CONTROL POINT DESCRIPTION				POINT No. BM.3-1	
				DATE 25/04/2011	
PROJECT	BRIDGE 3		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.3-1	8251683.435	299634.002			504.018
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
<u>LOCATION</u>					
<u>RP1</u>			<u>RP2</u>		<u>RP3</u>
					
<u>GENERAL INFORMATION</u>					
	AZ		DISTANCE		DESC
RP-1	118-42-56		3.563		sign Pole
RP-2	292-44-18		158.354		bridge
RP-3	294-31-36		158.586		bridge





CONTROL POINT DESCRIPTION			POINT No. BM.3-2		
			DATE 25/04/2011		
PROJECT	BRIDGE 3		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.3-2	8251809.000	299346.000			501.000
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
 					
RP1			RP2		
			RP3		
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	37-14-29		15.268		tree
RP-2	112-49-22		131.189		bridge
RP-3	114-59-55		131.456		bridge





CONTROL POINT DESCRIPTION			POINT No. BM.4-1		
			DATE 23/04/2011		
PROJECT	BRIDGE 4		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.4-1	8252657.551	297149.195			511.805
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
LOCATION					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ	DISTANCE		DESC	
RP-1	128-11-02	11.966		sign Pole	
RP-2	307-18-13	96.163		bridge	
RP-3	311-22-30	96.584		bridge	







CONTROL POINT DESCRIPTION				POINT No. BM.4-2	
				DATE 23/04/2011	
PROJECT	BRIDGE 4		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.4-2	8252811.000	296949.000			514.000
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
<u>LOCATION</u>					
					
<u>RP1</u>			<u>RP2</u>		<u>RP3</u>
					
<u>GENERAL INFORMATION</u>					
	AZ		DISTANCE		DESC
RP-1	299-01-46		19.610		sign Pole
RP-2	119-36-24		107.243		bridge
RP-3	123-17-19		107.627		bridge

CONTROL POINT DESCRIPTION			POINT No. BM.5-1		
			DATE 23/04/2011		
PROJECT	BRIDGE 5		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.5-1	8265496.305	295224.299			574.552
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
LOCATION					
 					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	338-16-10		4.951		sign Pole
RP-2	344-17-01		124.253		bridge
RP-3	346-32-25		123.704		bridge







CONTROL POINT DESCRIPTION			POINT No. BM.5-2		
			DATE 23/04/2011		
PROJECT	BRIDGE 5		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.5-2	8265740.722	295194.509			571.881
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
		RP1		RP2	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	203-03-51		5.376		sign Pole
RP-2	181-04-07		102.940		bridge
RP-3	183-46-51		103.880		bridge

CONTROL POINT DESCRIPTION			POINT No. BM.6-1		
			DATE 4/5/2011		
PROJECT	BRIDGE 6		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.6-1	8289150.067	279229.966			626.136
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
LOCATION					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	295-15-55		116.602		tank
RP-2	299-13-40		118.840		bridge
RP-3	301-36-11		118.969		bridge





CONTROL POINT DESCRIPTION			POINT No. BM.6-2		
			DATE 4/5/2011		
PROJECT	BRIDGE 6		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.6-2	8289276.091	279021.555			628.969
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
<u>LOCATION</u>					
<u>RP1</u>			<u>RP2</u>		
					
			<u>RP3</u>		
					
<u>GENERAL INFORMATION</u>					
	AZ	DISTANCE		DESC	
RP-1	107-43-20	3.610		control point	
RP-2	124-30-52	94.120		bridge	
RP-3	121-31-33	93.669		bridge	







CONTROL POINT DESCRIPTION				POINT No. BM.7-1	
				DATE 4/5/2011	
PROJECT	BRIDGE 7		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.7-1	8295394.802	272253.8528			704.0552
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
 					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	273-20-15		2.096		control point
RP-2	111-36-20		16.477		tree
RP-3	94-26-03		61.501		tree

CONTROL POINT DESCRIPTION			POINT No. BM.7-2		
			DATE 4/5/2011		
PROJECT	BRIDGE 7		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.7-2	8295543.336	272054.5663			708.0721
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	101-24-39		19.015		tree
RP-2	117-26-42		52.354		tree
RP-3	120-17-55		62.126		tree


CONTROL POINT DESCRIPTION			POINT No. BM.8-1		
			DATE 5/24/2011		
PROJECT	BRIDGE 8		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.8-1	8308059.837	259725.954			724.576
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
LOCATION					
 					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	250-59-58		2.979		tree
RP-2	16-48-29		155.627		bridge
RP-3	18-38-17		155.809		bridge




CONTROL POINT DESCRIPTION			POINT No. BM.8-2		
			DATE 5/24/2011		
PROJECT	BRIDGE 8		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.8-2	8308301	259794			726
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
 					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	315-42-38		19.955		house
RP-2	190-10-47		80.118		bridge
RP-3	193-44-18		79.809		bridge

CONTROL POINT DESCRIPTION			POINT No. BM.9-1		
			DATE 5/24/2011		
PROJECT	BRIDGE 9		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.9-1	8308596.521	259898.673			716.59
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
LOCATION					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	227-01-22		27.864		tree
RP-2	12-27-59		174.040		bridge
RP-3	014-06-19		173.955		bridge

CONTROL POINT DESCRIPTION			POINT No. BM.9-2		
			DATE 5/24/2011		
PROJECT	BRIDGE 9		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.9-2	8308915	259969			715
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
 					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	279-59-35		20.815		house
RP-2	190-03-28		134.074		bridge
RP-3	192-09-55		133.805		bridge

CONTROL POINT DESCRIPTION			POINT No. BM.10-1		
			DATE 5/24/2011		
PROJECT	BRIDGE 10		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.10-1	8319906.166	246787.736			608.379
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
LOCATION					
 					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	7-20-31		23.201		house
RP-2	296-21-32		118.736		bridge
RP-3	298-45-30		118.688		bridge

CONTROL POINT DESCRIPTION			POINT No. BM.10-2		
			DATE 5/24/2011		
PROJECT	BRIDGE 10		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.10-2	8320009	246588			606
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	356-23-36		3.895		tree
RP-2	114-50-54		81.674		bridge
RP-3	118-19-01		81.572		bridge

CONTROL POINT DESCRIPTION			POINT No. BM.11-1		
			DATE 23/04/2011		
PROJECT	BRIDGE 11		LOCATION	MOZAMBIUQE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.11-1	8322235.518	242704.340			585.424
<u>DESCRIPTION OF MARK</u>			<u>DIAGRAMS</u>		
BOLT ON CONCRETE					
LOCATION					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ	DISTANCE		DESC	
RP-1	328-13-23	54.644		sign Pole	
RP-2	327-35-10	63.049		bridge	
RP-3	331-14-48	64.997		bridge	

CONTROL POINT DESCRIPTION			POINT No. BM.11-2		
			DATE 23/04/2011		
PROJECT	BRIDGE 11		LOCATION	MOZAMBIQUE	
ZONE 37 PROJECTION U.T.M.			VERTICAL DATUM (M.S.L)		
SCALE FACTOR			HORIZONTAL DATUM WGS1984		
CO - ORDINATE			GEOGRAPHIC CO - ORDINATE		
POINT	SOUTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
BM.11-2	8322428.000	242459.000			587.000
DESCRIPTION OF MARK			DIAGRAMS		
BOLT ON CONCRETE					
LOCATION					
					
RP1		RP2		RP3	
					
GENERAL INFORMATION					
	AZ		DISTANCE		DESC
RP-1	275-54-50		5.241		sign Pole
RP-2	306-11-29		5.490		sign Pole
RP-3	124-54-18		15.866		sign Pole