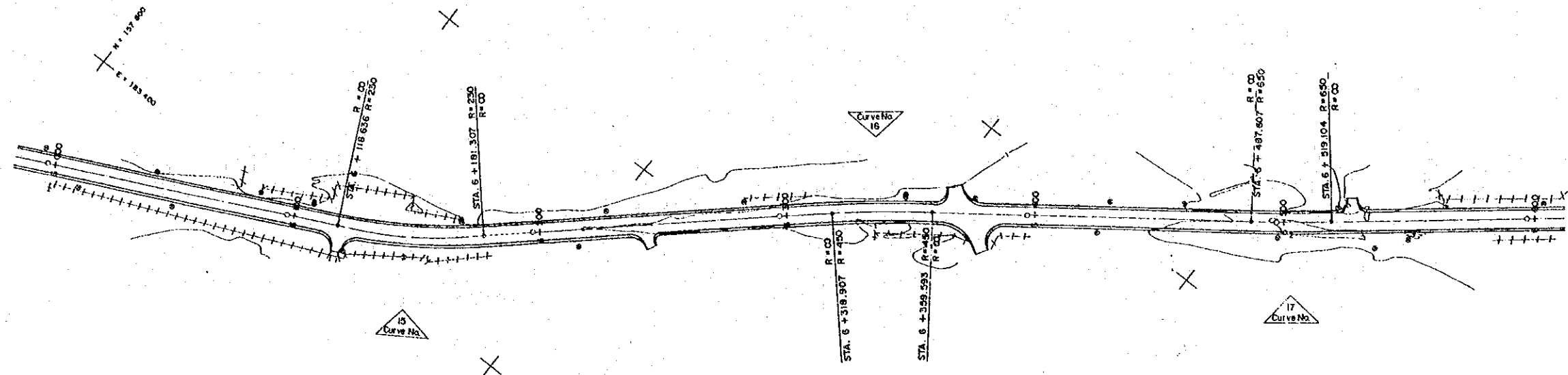
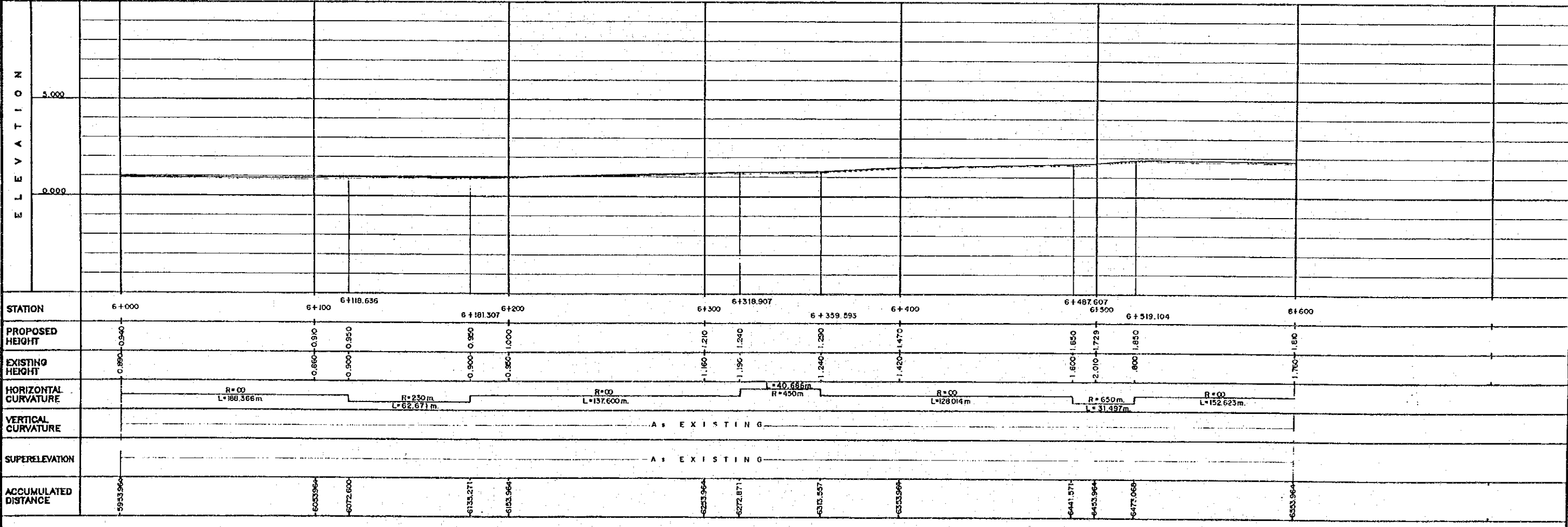


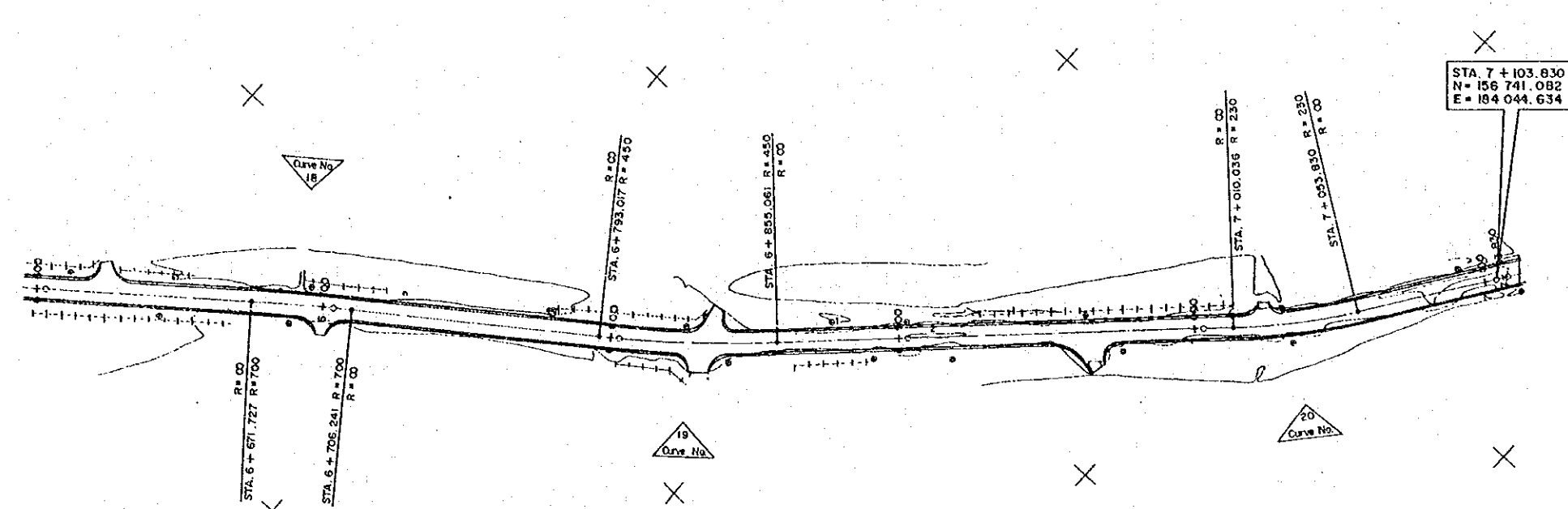
BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE		PLAN AND PROFILE SECTION 7-2(4/18) STA. 6+000 - STA. 6+800	SHEET NO. 3-34
HORI: 1:1000	VER: 1:100		



CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lo	E	g%	w	V (kph)
15	157 456.958	183 419.009	15° 56' 44" L	230.000	31.531	62.671	2.150	As Existing	-	80
16	157 313.376	183 544.946	05° 10' 49" R	450.000	20.357	40.688	0.460	As Existing	-	80
17	157 183.398	183 642.507	02° 46' 35" L	650.000	15.752	31.497	0.190	As Existing	-	80





CURVE NO.	COORDINATES		ELEMENTS OF CURVES									
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e%	κ	V(kph)		
18	157 039.642	183 759.957	02°49'30"R	700.000	17.260	34.514	0.210	AS EXISTING	-	80		
19	156 950.929	183 840.178	07°53'59"L	450.000	31.071	62.044	1.070	AS EXISTING	-	80		
20	156 782.118	183 985.517	10°54'35"L	230.000	21.964	43.794	1.050	AS EXISTING	-	80		

ELEVATION	STATION												
	6+600	6+671.727	6+700	6+706.241	6+793.017	6+800	6+855.061	6+900	7+000	7+010.036	7+053.830	7+100	7+103.830
PROPOSED HEIGHT	1.810	1.710	1.750	1.750	1.770	1.750	1.850	2.050	1.980	1.971	2.028	2.150	2.150
EXISTING HEIGHT	1.760	1.660	1.700	1.700	1.720	1.740	1.840	2.000	1.930	1.921	1.978	2.090	2.140
HORIZONTAL CURVATURE	R=∞ L=161.623 m		R=700 m L=34.614 m		R=∞ L=86.776 m		R=450 m L=62.044 m		R=∞ L=154.975 m		R=230 m L=43.794 m		R=∞ L=46.170 m
VERTICAL CURVATURE	As EXISTING												
SUPERELEVATION	As EXISTING												
ACCUMULATED DISTANCE	6533.964	6625.634	6653.964	6680.205	6746.981	6753.964	6869.025	6883.964	6993.964	6994.000	7007.794	7033.964	7037.794

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

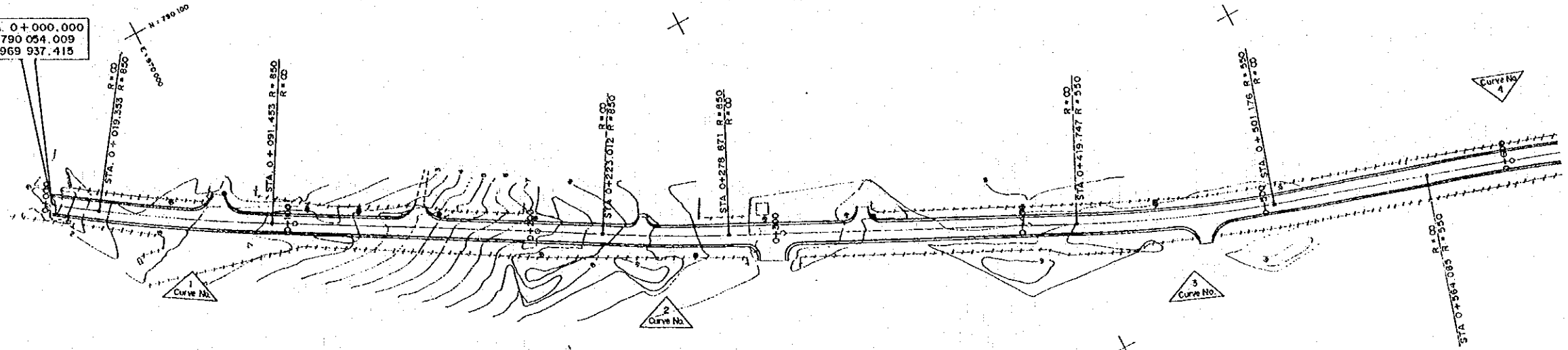
SCALE
HOR: 1:1000
VER: 1:100

PLAN AND PROFILE
SECTION 7-2(18) STA. 0+000 - STA. 0+600

SHEET NO.
3-36

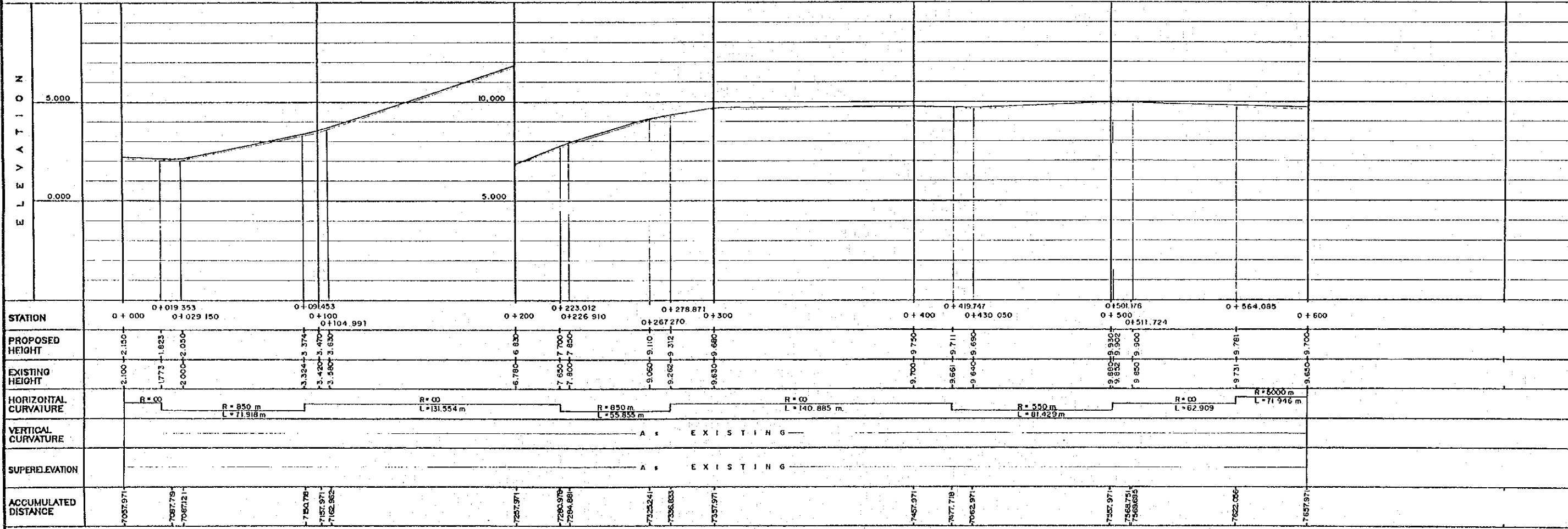


STA. 0+000.000
N = 790 054.009
E = 969 937.415



CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	RadAs	T	Lo	E	±%	W	V(kph)
1	790 022.772	969 983.198	04° 51' 56" L	850.000	36.071	72.100	0.770	As Existing	-	80
2	789 926.632	970 153.508	03° 45' 55" L	850.000	27.940	55.859	0.460	As Existing	-	80
3	789 834.529	970 345.054	08° 28' 58" L	550.000	40.789	81.429	1.510	As Existing	-	80
4	789 794.023	970 475.931	00° 49' 33" L	3000.000	36.034	72.068	0.130	As Existing	-	80

NOTE:
COORDINATES SYSTEM ON THIS ROAD SECTION 17-21
USED LOCAL SYSTEM. THIS SYSTEM HAS NO RELATIONSHIP
TO SECTION 17-11 ARE DIFFERENT COORDINATES.



STATION	0+000	0+019.353	0+029.150	0+091.453	0+100	0+104.991	0+200	0+223.012	0+226.910	0+267.270	0+300	0+400	0+419.747	0+430.050	0+500	0+511.724	0+564.085	0+600		
PROPOSED HEIGHT	2.150	1.825	2.050	3.374	3.470	3.630	6.830	7.700	7.850	9.110	9.312	9.680	9.750	9.711	9.690	9.930	9.902	9.900	9.761	9.700
EXISTING HEIGHT	2.100	1.773	2.000	3.324	3.420	3.630	6.780	7.650	7.800	9.060	9.262	9.630	9.700	9.661	9.640	9.900	9.852	9.850	9.731	9.650
HORIZONTAL CURVATURE	R=∞	R=850 m	L=71.918 m	R=∞	L=131.554 m	R=850 m	L=55.853 m	R=∞	L=140.885 m	R=350 m	L=87.429 m	R=∞	L=62.909 m	R=∞	R=5000 m	L=71.946 m				
VERTICAL CURVATURE	A = EXISTING																			
SUPERELEVATION	A = EXISTING																			
ACCUMULATED DISTANCE	7937.971	7937.79	7967.121	7937.79	7957.971	7962.962	7957.971	7980.979	7984.684	7952.241	7956.833	7957.971	7957.971	7977.719	7962.971	7957.971	7963.751	7968.695	7962.066	7957.971

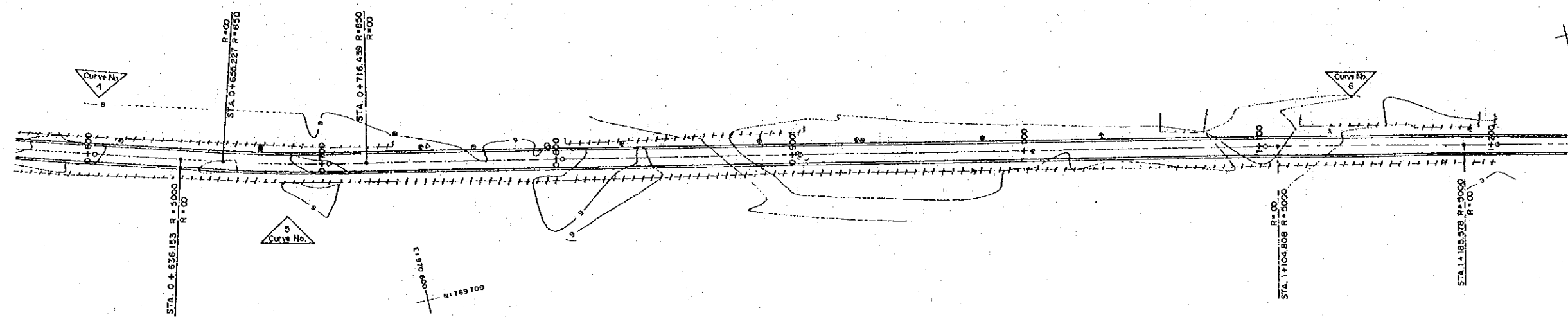
BASIC DESIGN STUDY ON THE PROJECT FOR ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE
HOR: 1:1000
VER: 1:100

PLAN AND PROFILE
SECTION 7-2(7/8) STA. 0+600 - STA. 1+200

SHEET NO.
3-37

N 783.800
000.126.13

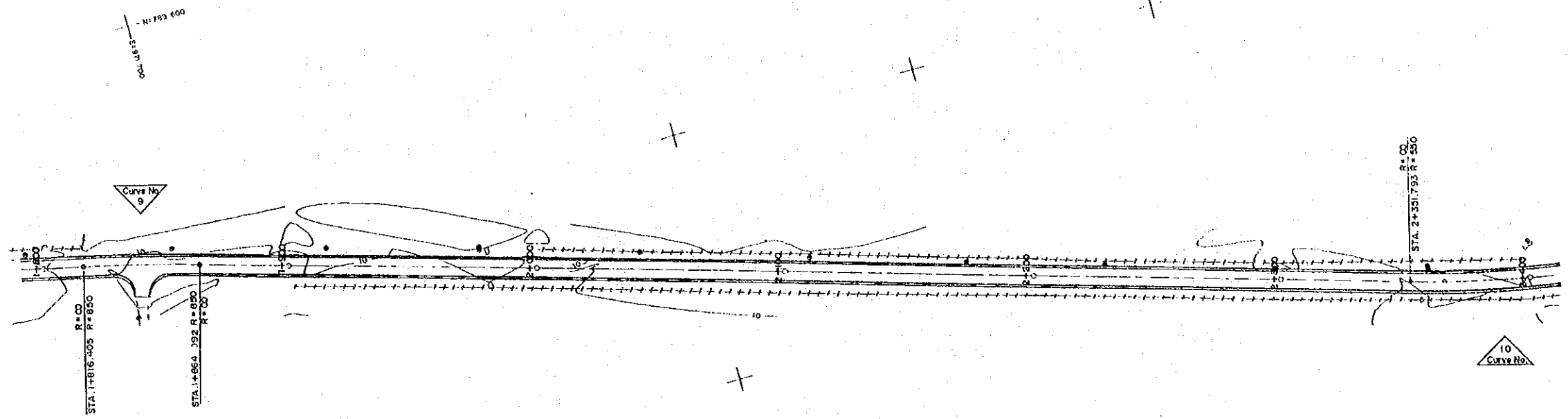


CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e %	W	V(kph)
4	789 794. 023	970 475. 931	00°48'33" L	5000.000	56 034	72.068	0.130	As Existing	-	80
5	789 769. 860	970 558. 182	04°07'34" L	850.000	30 619	61.212	0.550	As Existing	-	80
6	789 672. 430	971 007. 105	00°55'32" R	5000.000	40 388	80.770	0.180	As Existing	-	80

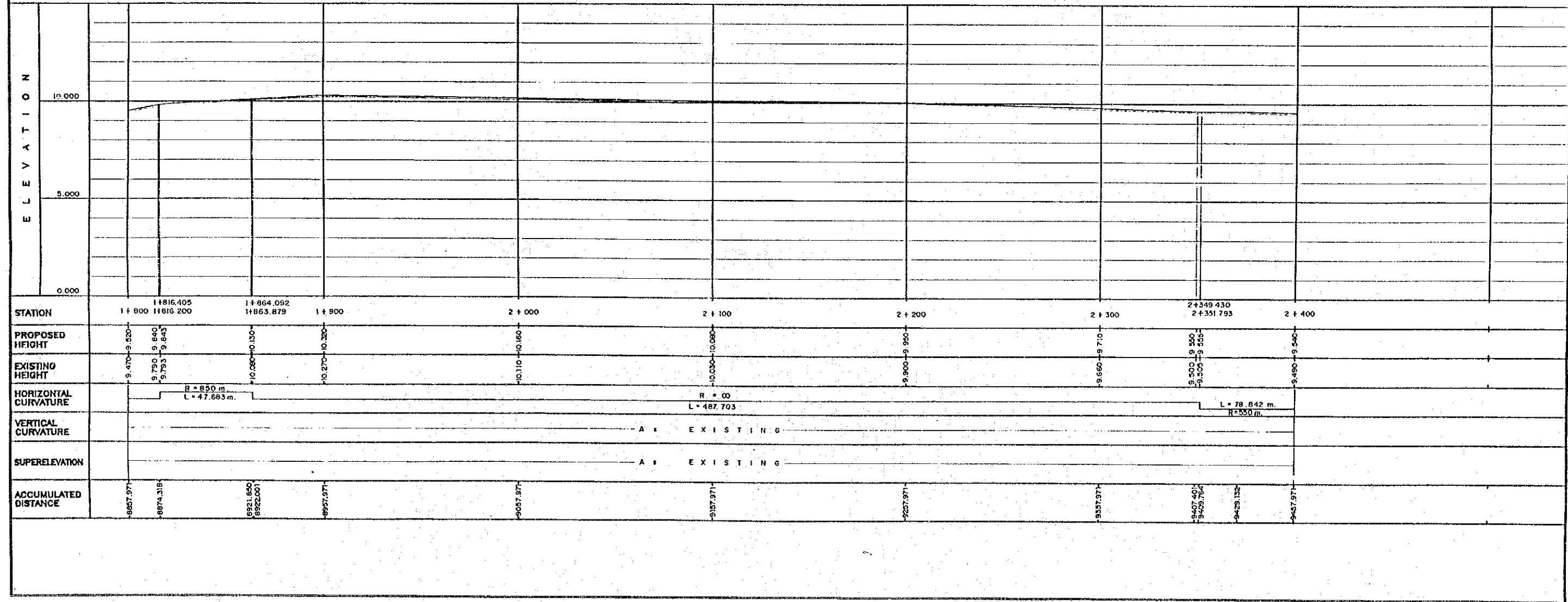
ELEVATION	STATION												
	0+600	0+636.031	0+655.277	0+662.810	0+700	0+716.439	0+724.760	0+800	0+900	1+000	1+104.808	1+185.578	1+200
10.000													
5.000													
0.000													
PROPOSED HEIGHT	9.700	9.608	9.566	9.540	9.530	9.530	9.520	9.500	9.500	9.520	9.860	9.930	9.950
EXISTING HEIGHT	9.600	9.548	9.516	9.490	9.540	9.470	9.470	9.000	9.000	8.870	8.810	8.880	8.900
HORIZONTAL CURVATURE	R = 5000m L = 71.946m		R = ∞ L = 19.124m		R = 850m L = 61.213m		R = ∞ L = 388.369			R = 5000m L = 80.770m			
VERTICAL CURVATURE	As EXISTING												
SUPERELEVATION	As EXISTING												
ACCUMULATED DISTANCE	7687.971	7694.002	7710.729	7720.78	7737.971	7772.164	7782.731	7857.971	7927.971	8007.971	8054.590	8057.971	8233.607

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE	PLAN AND PROFILE	SHEET NO.
HOR: 1:1000	SECTION 7-29/03 STA. 1+800 - STA. 2+400	3-39
VER: 1:100		



CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e %	W	V(kph)
9	789 507.526	971 662.137	03° 12' 52" R	650.000	23.850	47.667	0.330	As Existing	-	80
10	789 355.300	972 211.733	08° 12' 48" L	650.000	39.489	78.842	1.420	As Existing	-	80

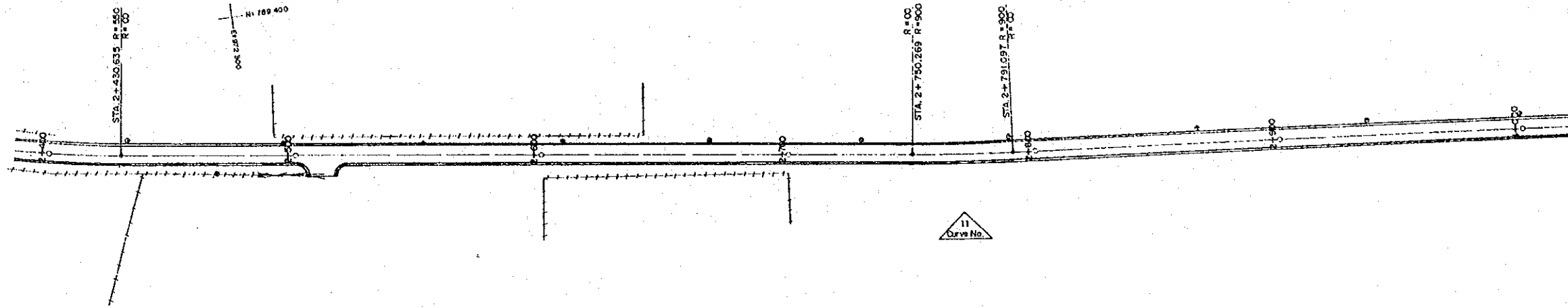


BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE
HOR: 1:1000
VER: 1:100

PLAN AND PROFILE
SECTION 7-2(K/B) STA. 2+400 - STA. 3+000

SHEET NO.
3-40



CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	a %	W	V(kph)
11	789 303 637	972 587 740	02°35'57" L	900.000	20.417	40.828	0.230	0.000	-	80

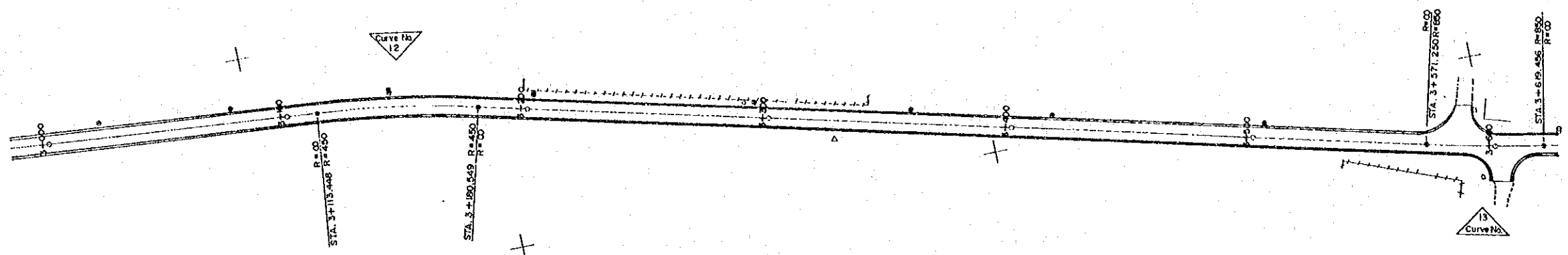
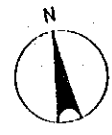
ELEVATION	STATION									
	2+400	2+430.635	2+500	2+600	2+700	2+750.269	2+790.843 2+791.097	2+900	3+000	
10.000										
5.000										
0.000										
PROPOSED HEIGHT	9.490	9.530	9.430	9.560	9.530	9.570	9.510	9.480	9.230	9.160
EXISTING HEIGHT	9.490	9.430	9.380	9.510	9.530	9.420	9.450	9.340	9.180	9.110
HORIZONTAL CURVATURE	R=550m		R=∞ L=319.634m				R=900m L=418.228m		R=∞ L=208.963m	
VERTICAL CURVATURE	AS EXISTING									
SUPERELEVATION	AS EXISTING									
ACCUMULATED DISTANCE	9457.971	9469.671	9489.565	9507.971	9527.971	9547.981	9568.813	9587.971	9607.971	9627.971

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

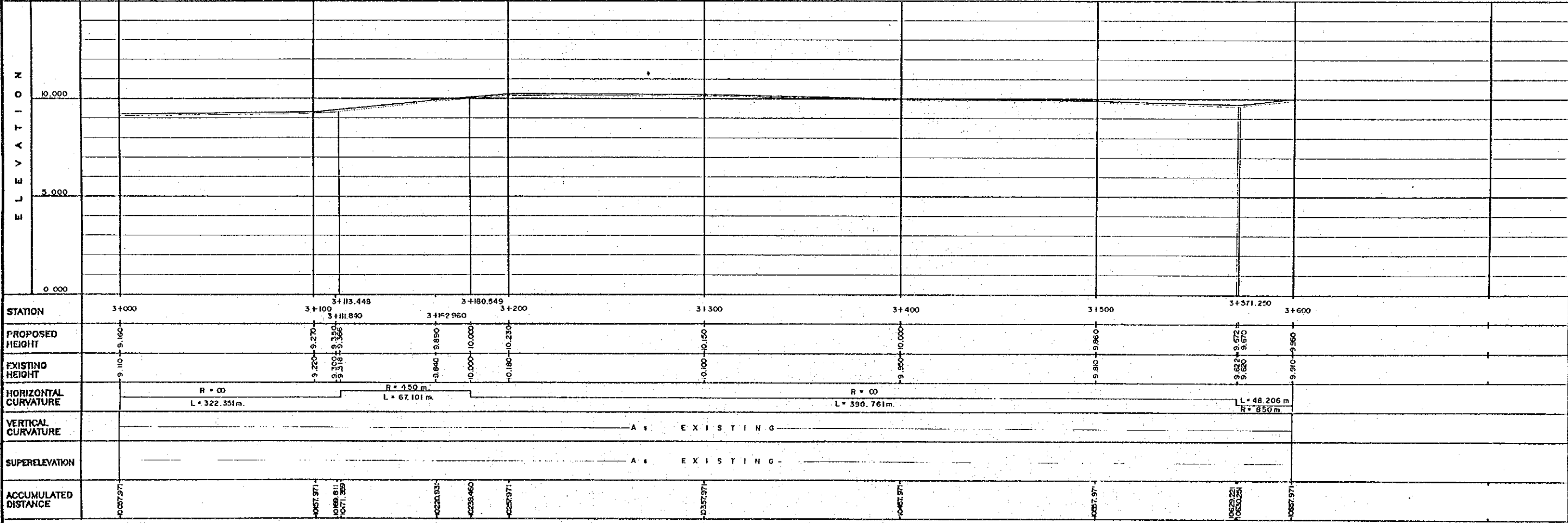
SCALE
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VER: 1:100

PLAN AND PROFILE
SECTION 7-2(II/B) STA. 3+000 - STA. 3+600

SHEET NO.
3-41



CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e %	w	V (kph)
12	789 269.367	972 962.558	08° 32' 57" R	450.000	33.613	67.101	1.250	As Existing	-	80
13	789 162.634	973 398.156	03° 14' 05" L	650.000	24.110	48.206	0.340	As Existing	-	80

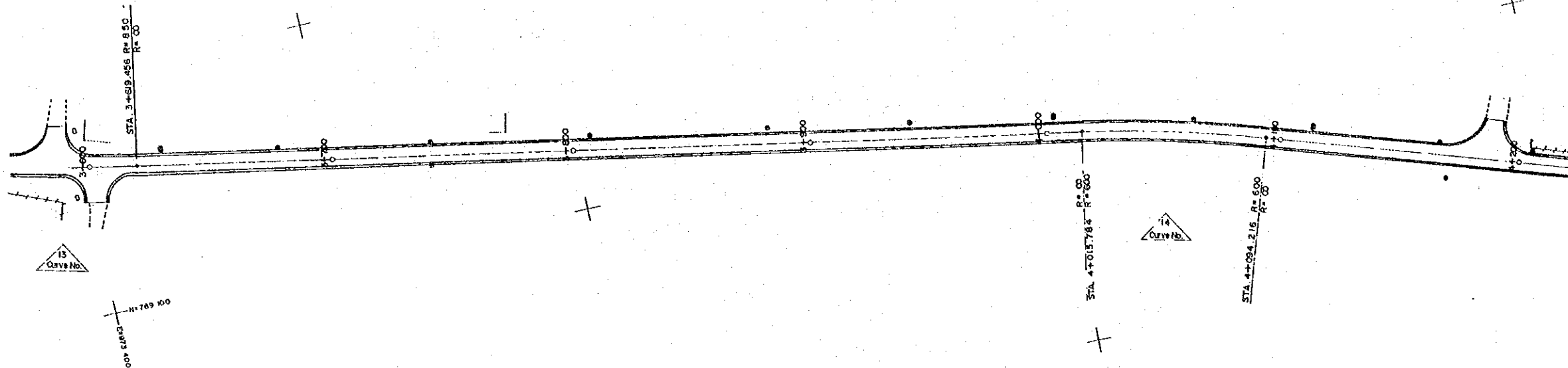
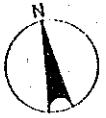


BASIC DESIGN STUDY ON THE PROJECT FOR ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

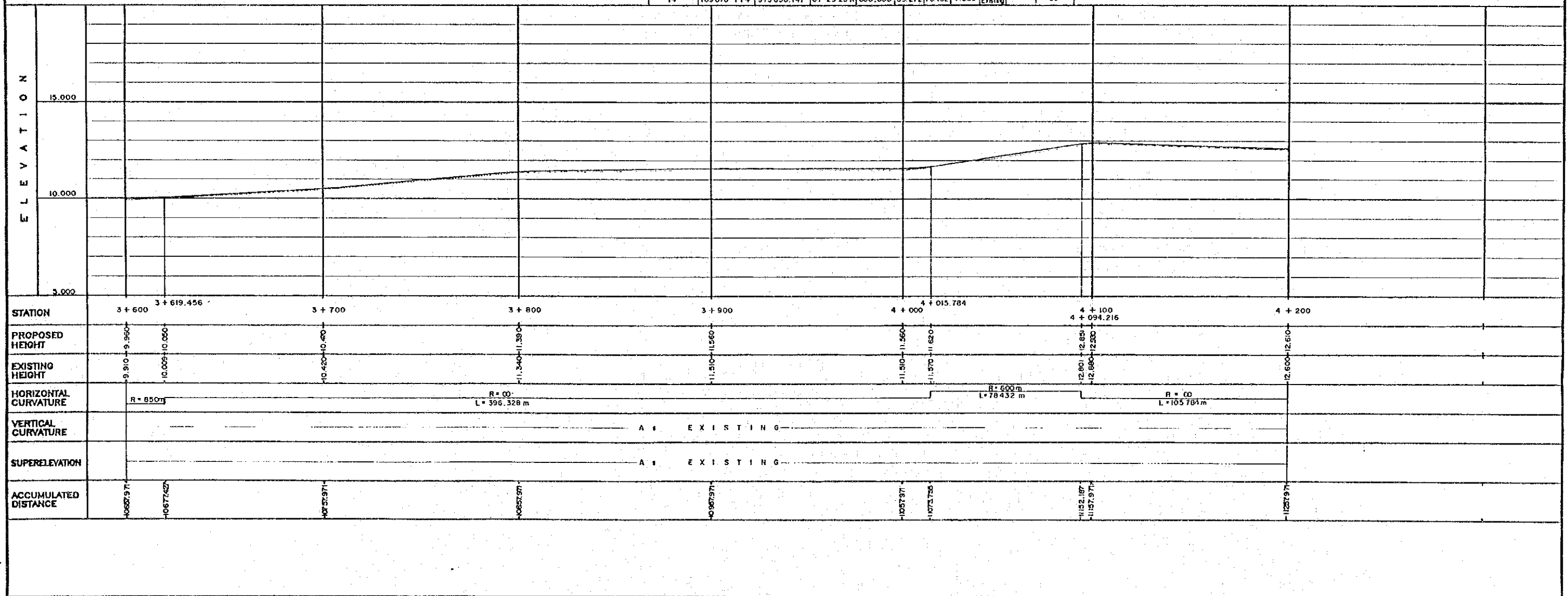
SCALE
HOR: 1:1000
VER: 1:100

PLAN AND PROFILE
SECTION 7-2(2/8) STA. 3+600 - STA. 4+200

SHEET NO.
3 - 42



CURVE NO.	COORDINATES		ELEMENTS OF CURVE							
	NORTHING	EASTING	Def. Angle	Radius	T	Lo	E	e %	w	V(kph)
13	789162.634	973598.156	03°14'58" L	850.000	24.110	48.206	0.340	Exp. (In)	-	80
14	789078.714	973850.141	07°29'23" R	600.000	39.272	78.432	1.280	Exp. (In)	-	80

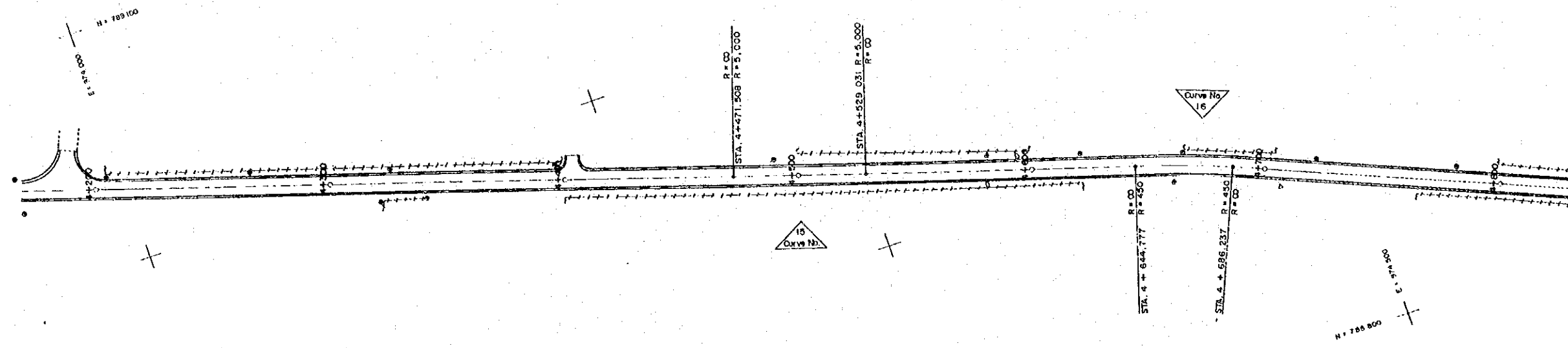


BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

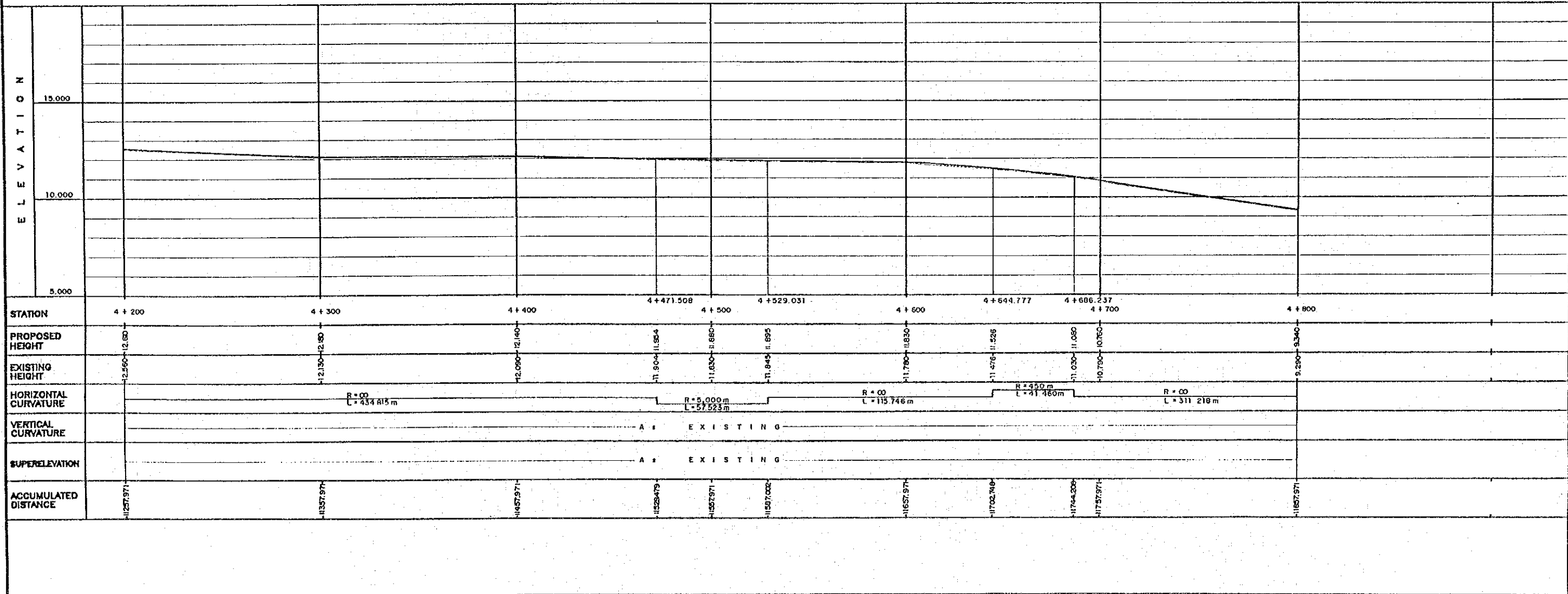
SCALE
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VER: 1:100

PLAN AND PROFILE
SECTION 7-2(13/18) STA. 4+200 - STA. 4+800

SHEET NO.
3 - 43



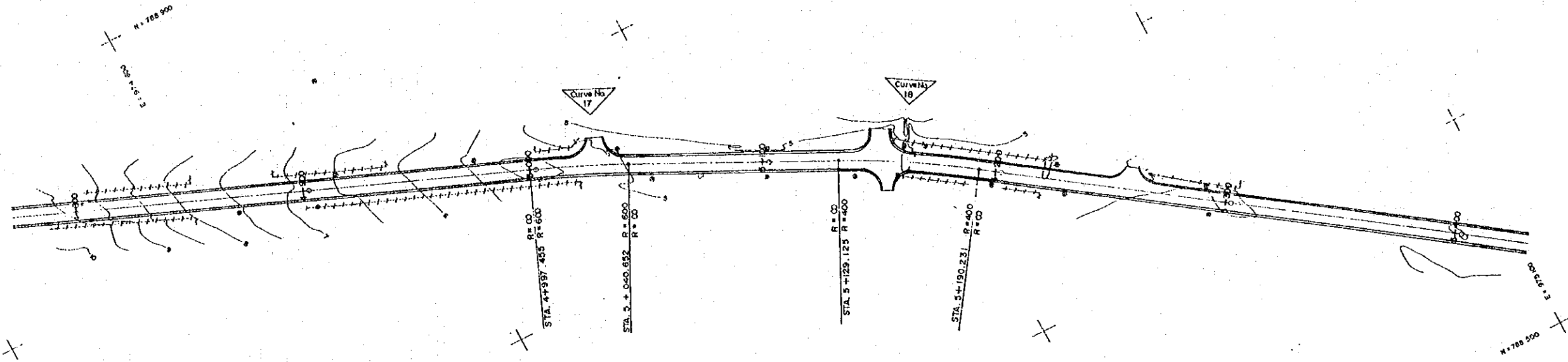
CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e %	w	V(kph)
15	788 941.041	974 273.652	00° 59' 33" L	5000.000	28.762	57.523	0.080	As Existing	-	80
16	788 891.764	974 431.387	06° 16' 44" R	450.000	20.745	41.460	0.480	Existing	-	80



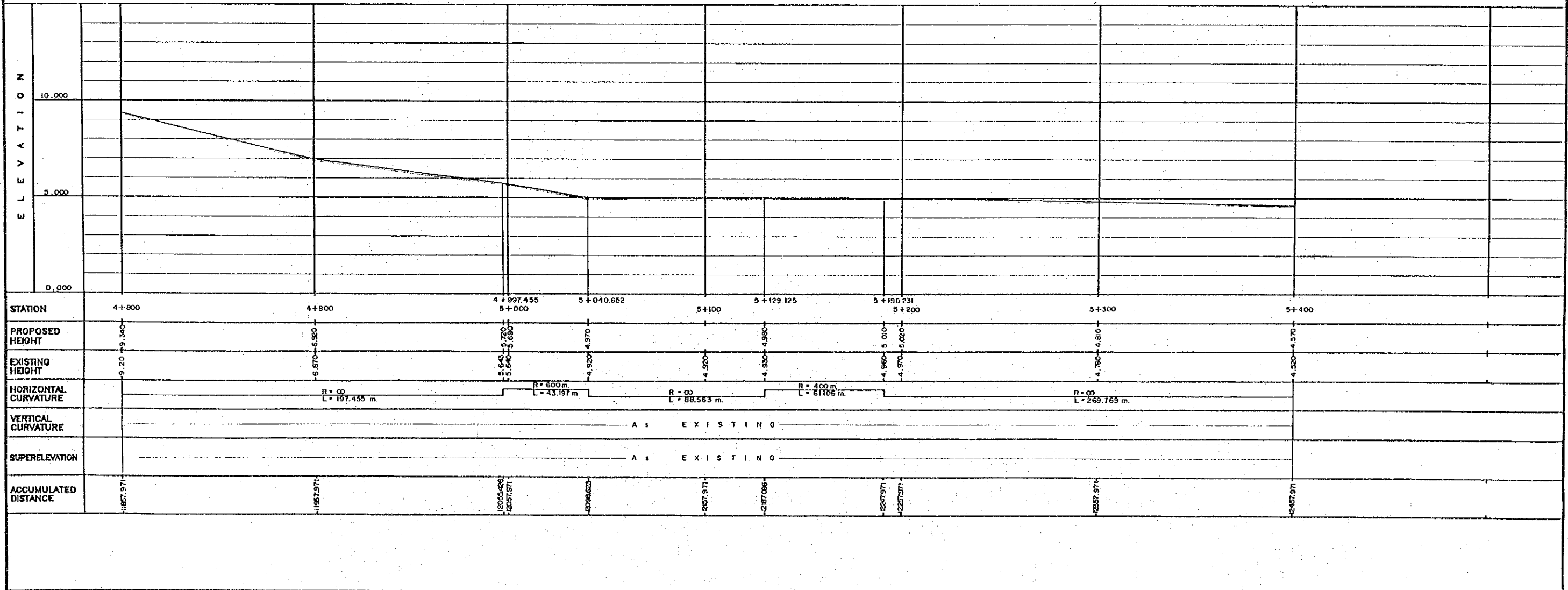
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VER: 1:100

PLAN AND PROFILE
SECTION 7-2(14/16) STA. 4+800 - STA. 5+400

SHEET NO.
3-44



CURVE NO.	COORDINATES		ELEMENTS OF CURVES									
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	a %	w	V (kph)		
17	788 756.500	974 755.895	04° 07' 30" R	600.000	21.608	43.197	0.390	Existing	-	80		
18	788 693.168	974 881.529	08° 45' 10" R	400.000	30.813	61.106	1.170	Existing	-	80		

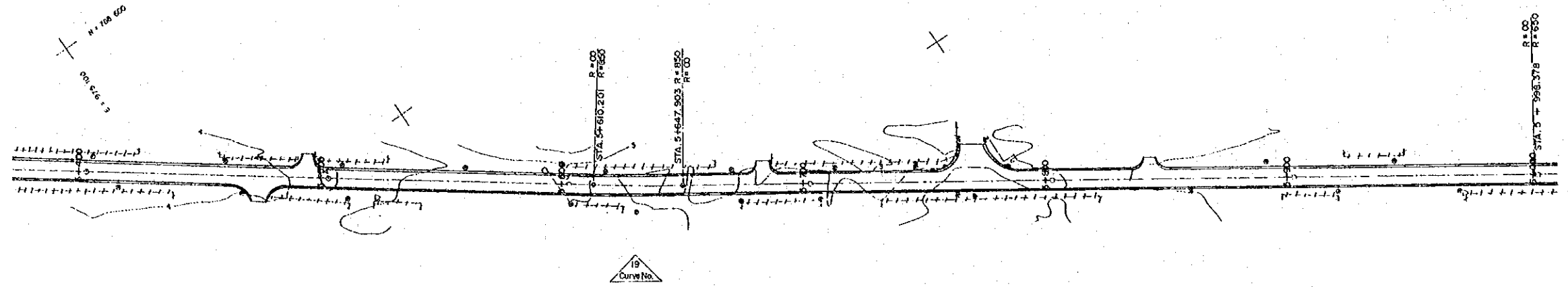


BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE
HOR: 1:1000
VER: 1:100

PLAN AND PROFILE
SECTION 7-2(15/16) STA. 5+400 - STA. 6+000

SHEET NO.
3-45



CURVE NO	COORDINATES		ELEMENTS OF CURVE								
	NORTHING	EASTING	Del Angle	Radius	T	Lc	E	e %	w	V(kph)	
19	788 420.527	975 263.679	02° 32' 29" L	850.000	18.054	37.702	0.210	Existing	-	80	

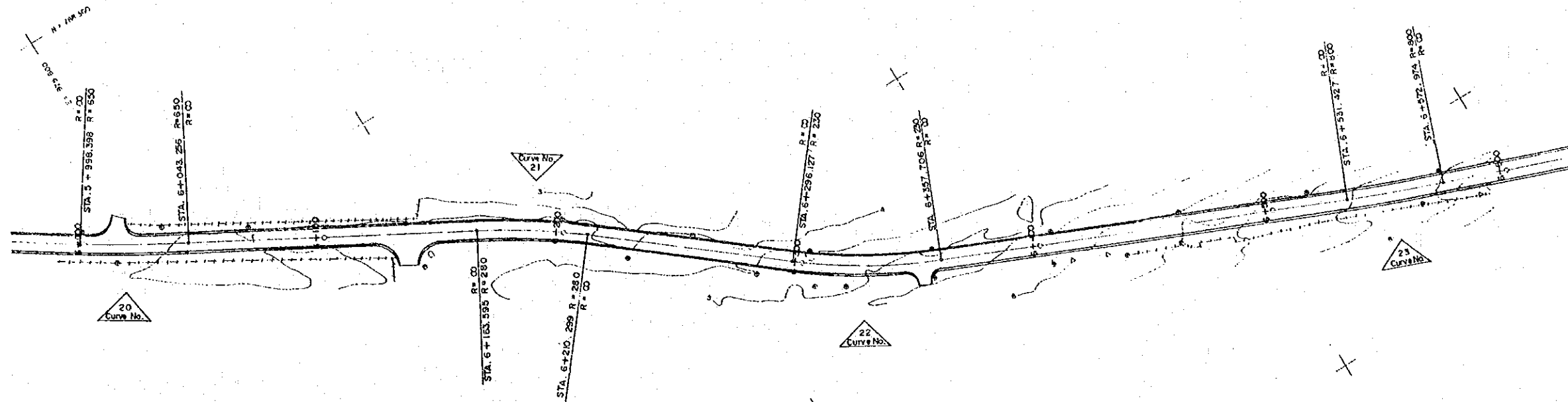
ELEVATION	STATION									
	5+400	5+500	5+600	5+610.201	5+616.520	5+647.903	5+700	5+800	5+900	6+000
PROPOSED HEIGHT	4.570	4.170	3.720	3.732	3.740	3.780	3.930	3.720	4.020	4.010
EXISTING HEIGHT	4.520	4.120	3.670	3.682	3.690	3.710	3.780	3.670	3.970	3.980
HORIZONTAL CURVATURE		R = ∞ L = 419.970		L = 37.702 m R = 850 m				R = ∞ L = 350.475		
VERTICAL CURVATURE				AS EXISTING						
SUPERELEVATION				AS EXISTING						
ACCUMULATED DISTANCE	4287.971	4287.971	4287.971	4288.172	4288.491	4288.687	4287.971	4287.971	4287.971	4287.971

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

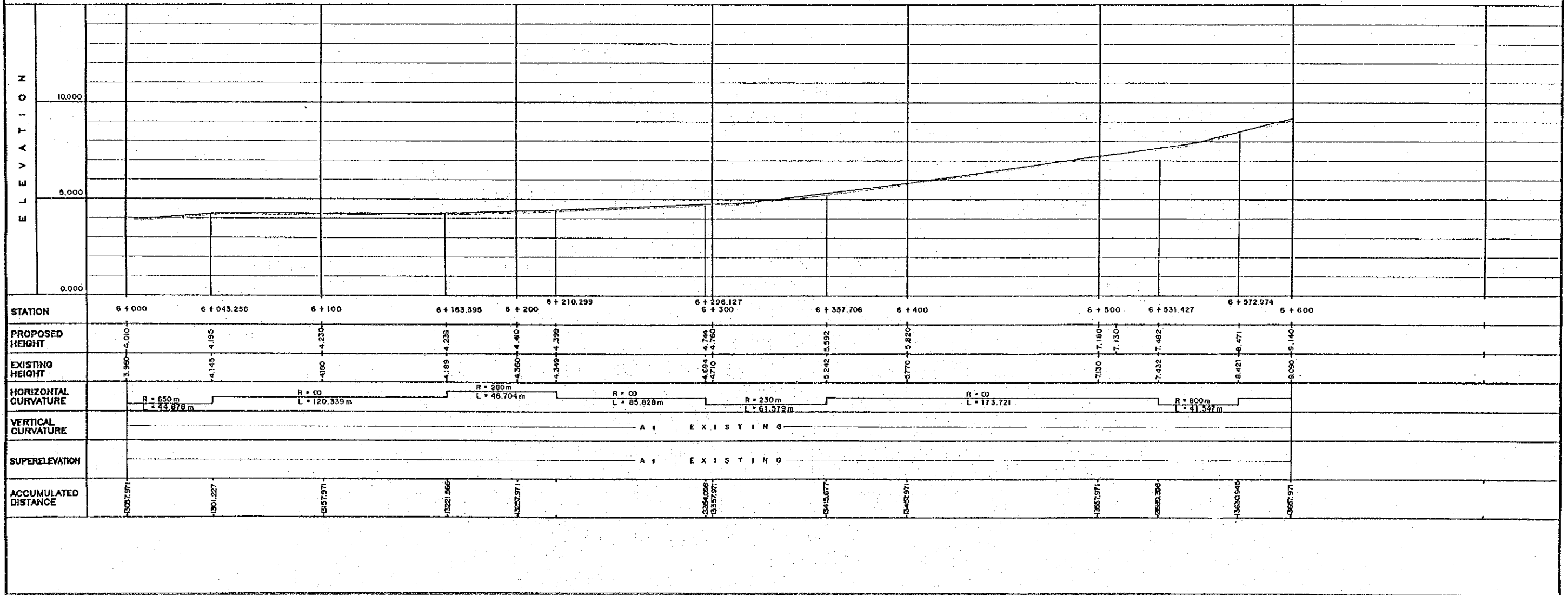
SCALE
HOR: 1:1000
VER: 1:100

PLAN AND PROFILE
SECTION 7-2(K6/18) STA. 6+000 - STA. 6+600

SHEET NO.
3-48



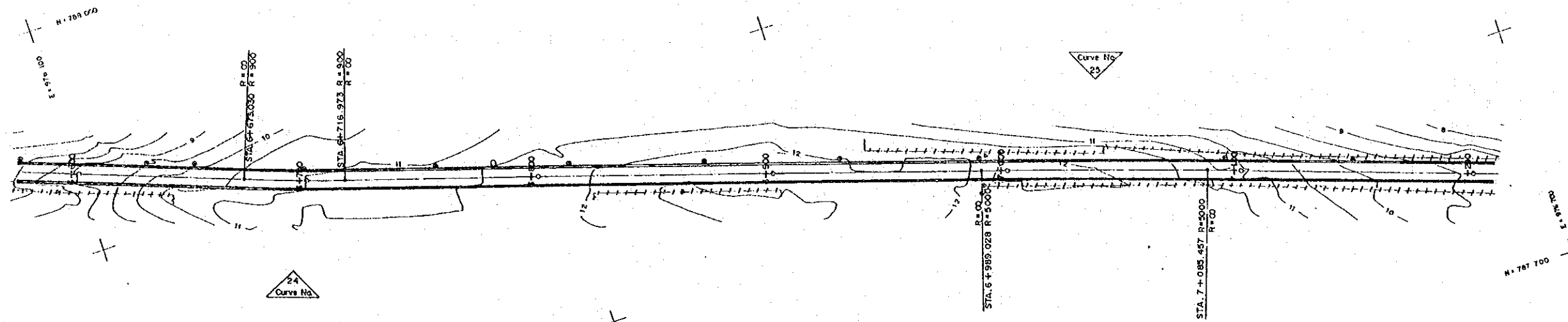
CURVE NO.	COORDINATES		ELEMENTS OF CURVES									
	NORTHING	EASTING	Def. Angle	Rad/m	T	Lc	E	•%	AS	W	V(kph)	
20	788 207 355	975 592 384	03° 57' 21" L	650.000	22.448	44.678	0.390	AS	---	---	80	
21	788 126 762	975 737 728	09° 33' 25" R	280.000	23.406	46.704	0.980	AS	---	---	80	
22	788 039 355	975 847 357	15° 20' 24" L	230.000	30.975	61.579	2.000	AS	---	---	80	
23	787 950 440	976 054 559	02° 58' 32" L	800.000	20.778	41.547	0.270	AS	---	---	80	



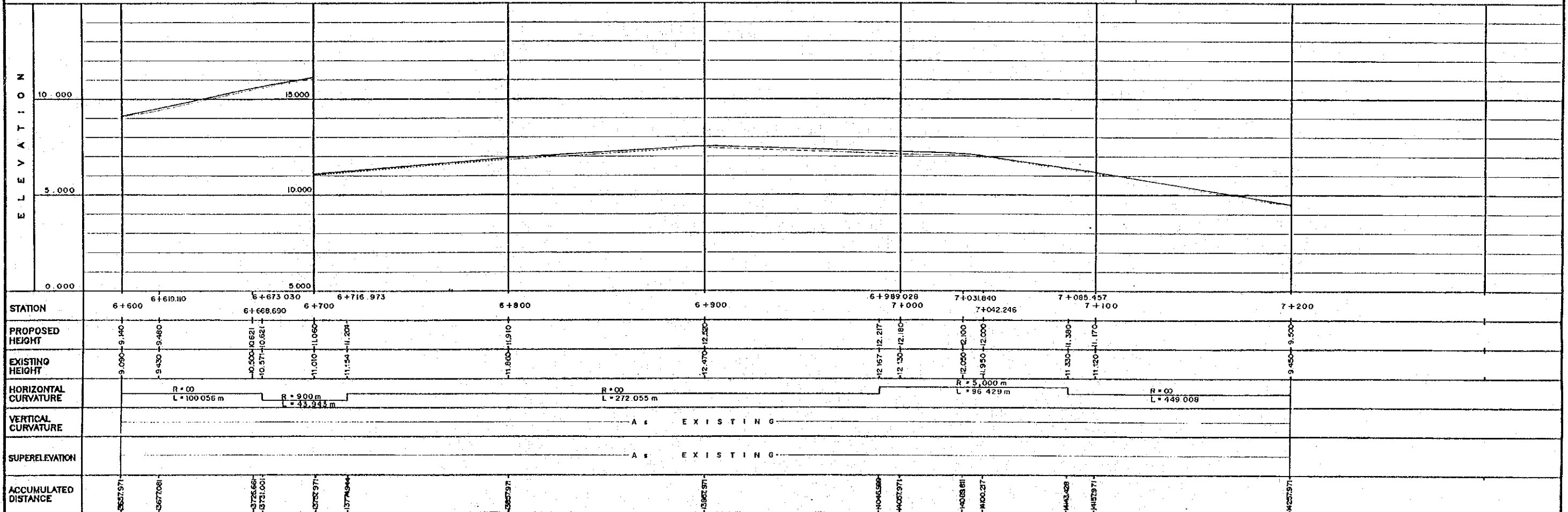
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VER: 1:100

PLAN AND PROFILE
SECTION 7-2(17/10) STA. 6+600 - STA. 7+200

SHEET NO.
3-47



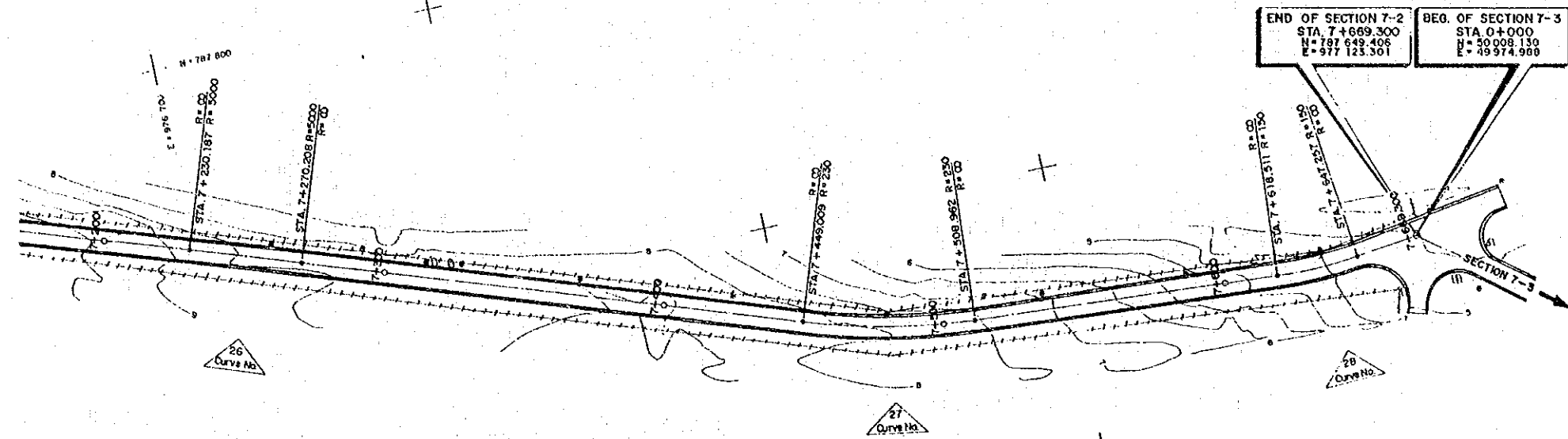
CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e %	W	V(kph)
24	787 901.012	976 188.542	02° 47' 51" L	900.000	21.976	43.943	0.270	Existing	-	80
25	787 798.369	976 515.034	01° 00' 18" R	5000.000	48.216	96.429	0.230	Existing	-	80



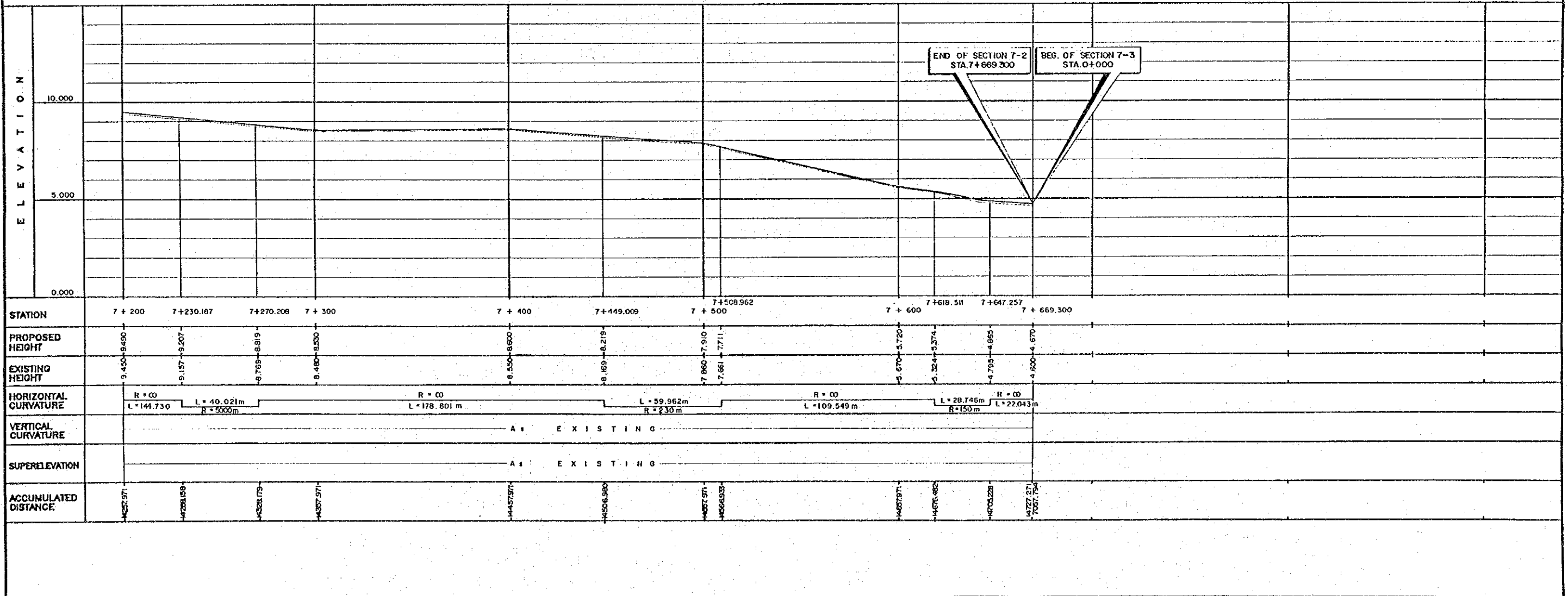
SCALE
HOR: 1:11000
VER: 1:1100

PLAN AND PROFILE
SECTION 7-2(18/18) STA. 7+200 - STA. 7+669.300

SHEET NO.
3-48



CURVE NO.	COORDINATES		ELEMENTS OF CURVE							
	NORTHING	EASTING	Def. Angle	Radius	T	Lo	E	a %	w	V(kph)
26	787 730.595	976 716.919	00°27'31" R	5000.000	20.011	40.021	0.040	Existing	-	80
27	787 655.993	976 933.383	14°56'06" L	230.000	30.147	59.953	1.970	Existing	-	80
28	787 645.026	977 087.105	10°58'49" L	150.000	14.417	28.746	0.691	Existing	-	80
29	787 649.405	977 123.301	END OF PROJECT							



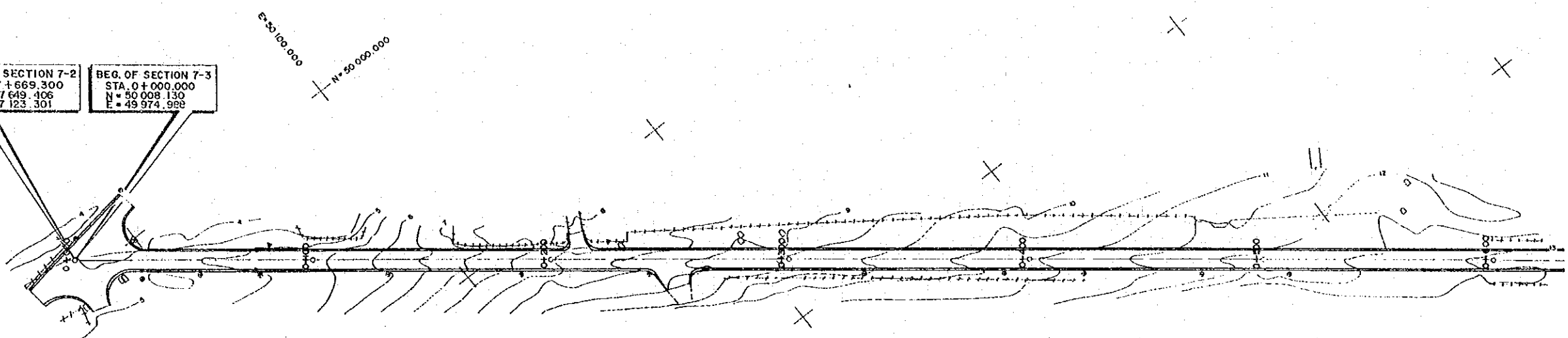
SCALE
HOR: 1:1000
VER: 1:100

PLAN AND PROFILE
SECTION 7-3(1/7)(STA.0+000 - STA.0+600)

SHEET NO.
3-49

END OF SECTION 7-2
STA. 7+669.300
N = 787 649.406
E = 977 123.301

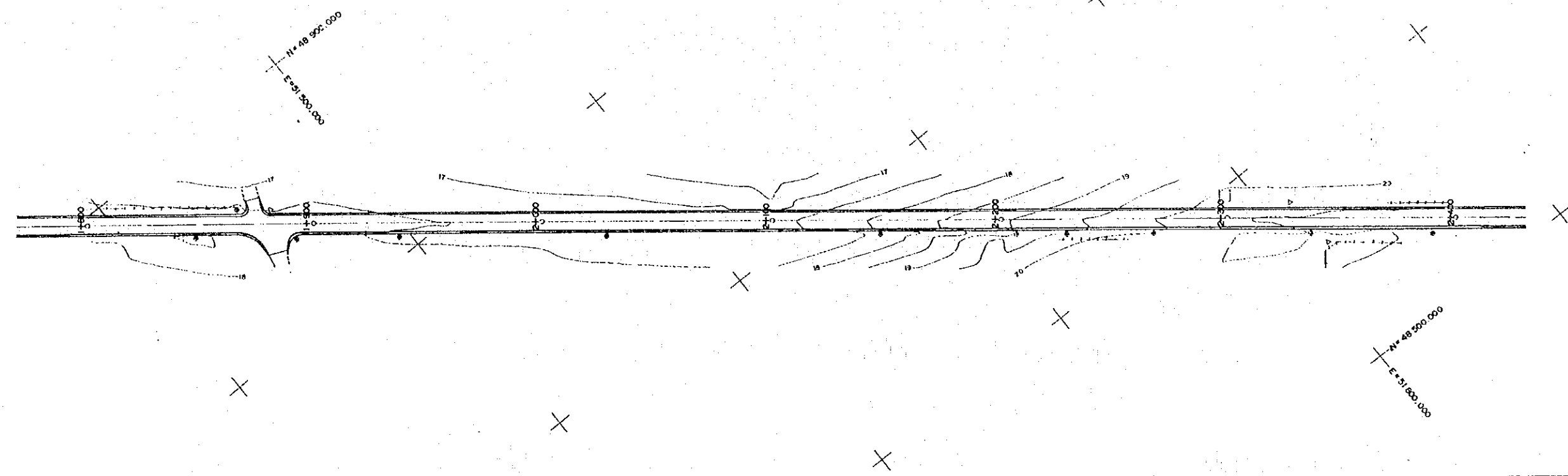
BEG. OF SECTION 7-3
STA. 0+000.000
N = 50 008.130
E = 49 974.988



NOTE
COORDINATES SYSTEM ON THIS ROAD SECTION (7-3) USED LOCAL SYSTEM. THIS SYSTEM HAS NO RELATIONSHIP TO SECTION (7-1 AND 7-2) ARE DIFFERENT COORDINATES.

ELEVATION	STATION						
	0+000	0+100	0+200	0+300	0+400	0+500	0+600
10,000							
5,000							
0,000							
PROPOSED HEIGHT	4.600	5.400	7.940	9.600	10.960	12.210	13.130
EXISTING HEIGHT	4.600	5.350	7.890	9.550	10.910	12.160	13.080
HORIZONTAL CURVATURE	Len. 3630.000						
VERTICAL CURVATURE	AS EXISTING						
SUPERELEVATION	AS EXISTING						
ACCUMULATED DISTANCE	4727.094	4827.094	4927.094	5027.094	5127.094	5227.094	5327.094

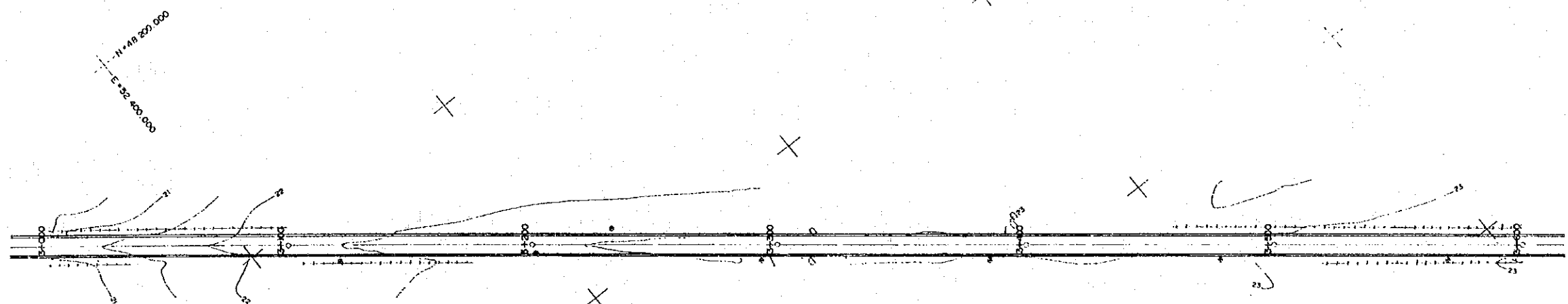
BEG. OF SECTION 7-3
STA. 0+000



E L E V A T I O N	25.000									
	20.000									
15.000										
STATION	1+800	1+900	2+000	2+100	2+200	2+300	2+400			
PROPOSED HEIGHT	17.850	17.760	17.390	17.340	18.930	20.460	20.920			
EXISTING HEIGHT	17.850	17.710	17.340	17.290	18.880	20.410	20.870			
HORIZONTAL CURVATURE				R = ∞						
VERTICAL CURVATURE				As EXISTING						
SUPERELEVATION				As EXISTING						
ACCUMULATED DISTANCE	6627094	6627094	6627094	6627094	6627094	67027094	67027094			

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE	PLAN AND PROFILE	SHEET NO.
HOR: 1:1000 VER: 1:100	SECTION 7-3(6/7) STA. 3+000 - STA. 3+600	3-54



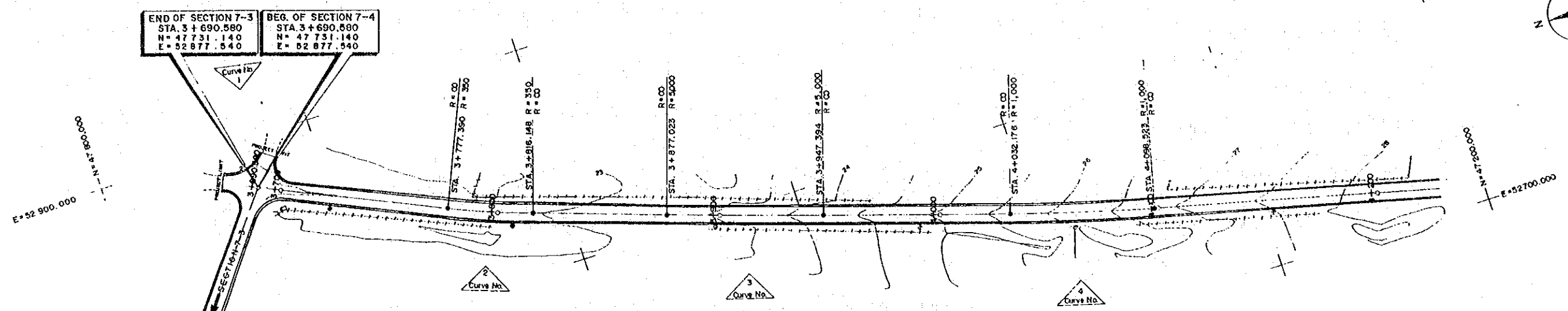
ELEVATION	25.000									
	20.000									
15.000										
STATION	3+000	3+100	3+200	3+300	3+400	3+500	3+600			
PROPOSED HEIGHT	21.250	22.400	22.380	23.250	23.180	23.280	23.500			
EXISTING HEIGHT	21.250	22.360	22.380	23.200	23.180	23.200	23.480			
HORIZONTAL CURVATURE				R = ∞						
VERTICAL CURVATURE					A: EXISTING					
SUPERELEVATION					A: EXISTING					
ACCUMULATED DISTANCE	17727.094	17827.094	17927.094	18027.094	18127.094	18227.094	18327.094			

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE
HOR: 1:1000
VER: 1:100

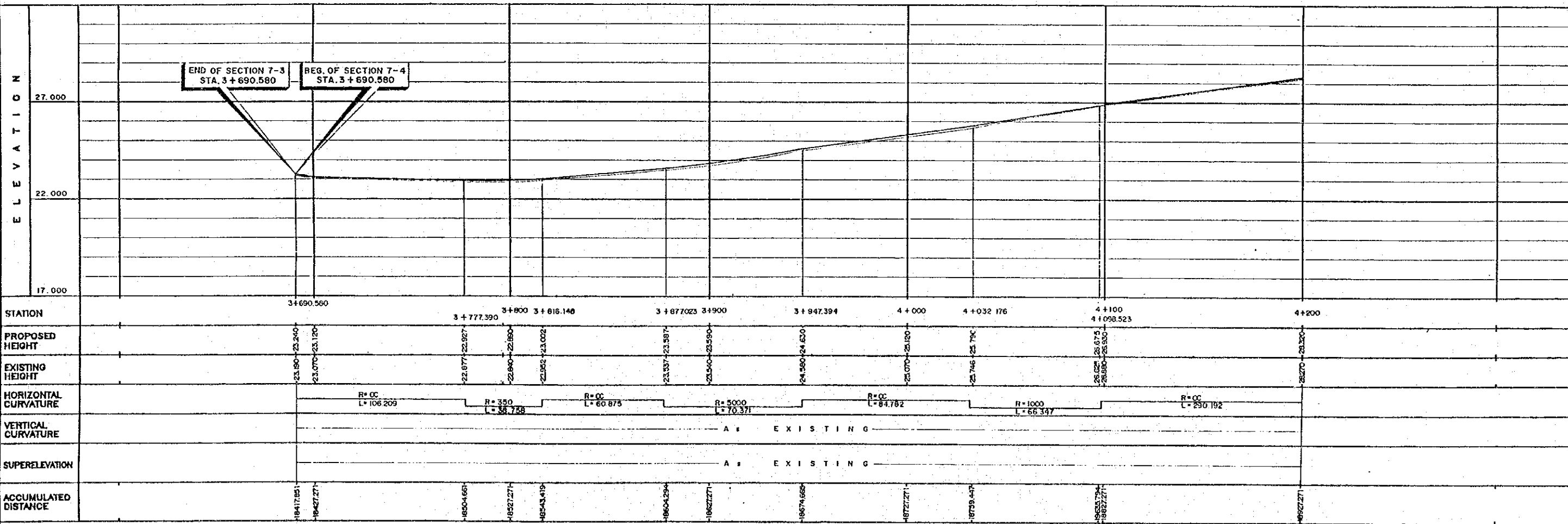
PLAN AND PROFILE
SECTION 7-4(1/5) STA. 3+690.580-STA.4+200

SHEET NO.
3-56



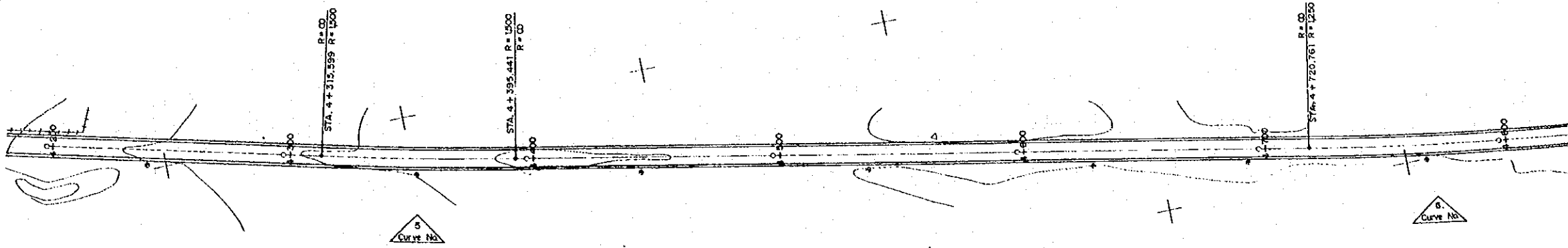
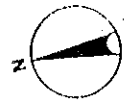
NOTE:
ROAD SECTION (7-4) USE THE SAME COORDINATES
SYSTEM OF ROAD SECTION (7-3)

CURVE NO.	COORDINATES		ELEMENTS OF CURVE									
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e %	w	V (kph)		
1	47 731 .140	52 877 .540	76°40'04" R	NO	ELEMENTS							
2	47 634 .712	52 833 .023	06°20'41" L	350.000	19.399	38.738	0.540	Existing	-	80		
3	47 525 .178	52 796 .509	00°48'24" L	∞	35.898	70.395	0.120	Existing	-	80		
4	47 379 .217	52 750 .124	03°48'05" L	1000.000	33.186	66.347	0.550	Existing	-	80		

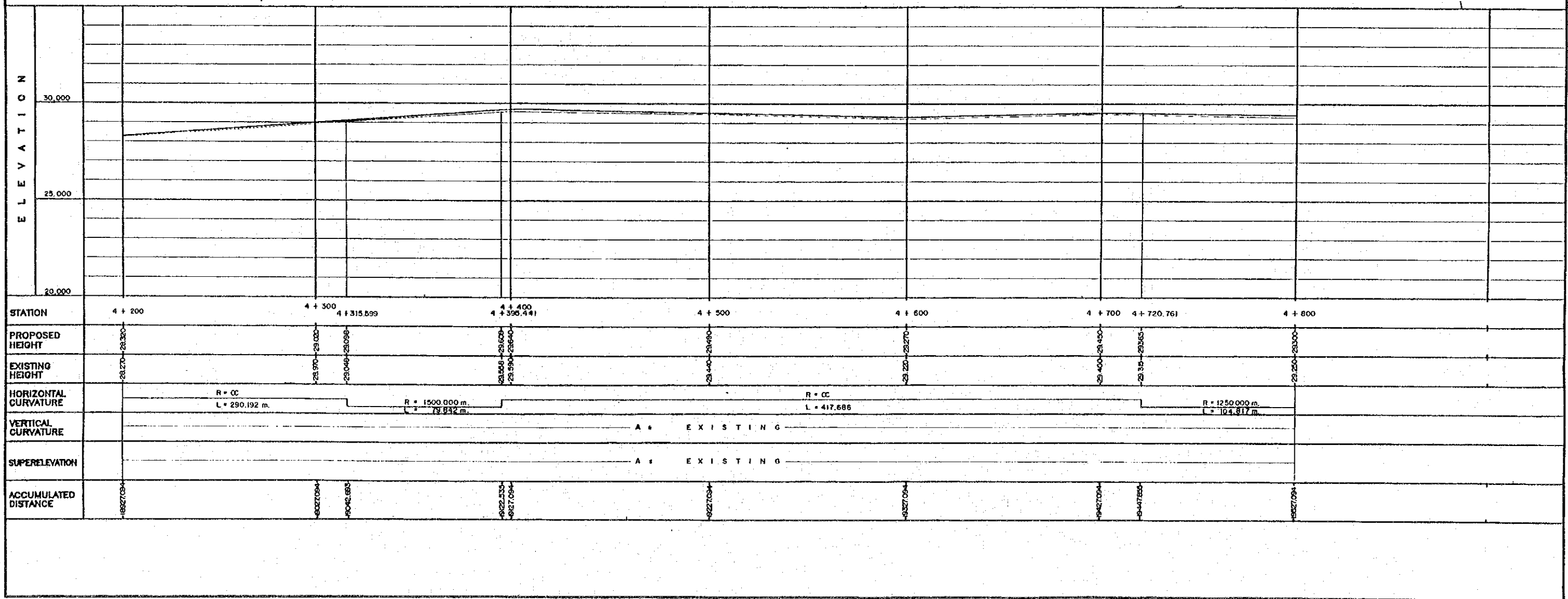


BASIC DESIGN STUDY ON THE PROJECT FOR ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE	PLAN AND PROFILE	SHEET NO.
HOR: 1:1000		
VER: 1:100		



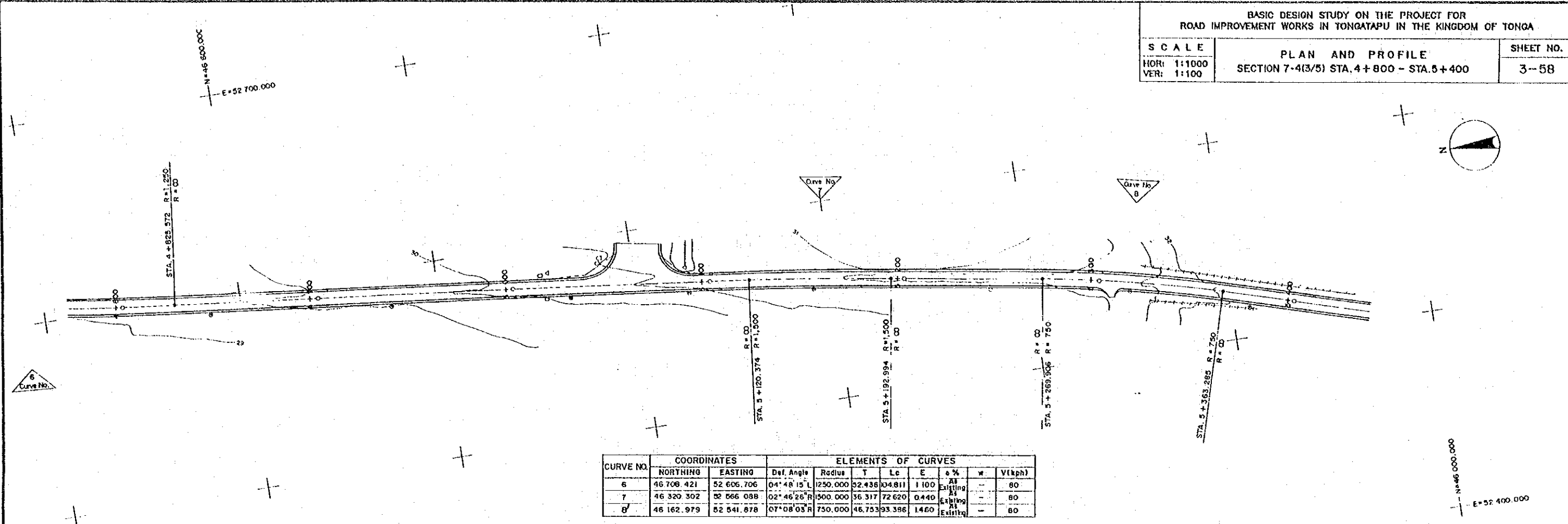
CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lo	E	e %	w	V(kph)
5	47 097.436	52 690.764	03° 02' 59" L	1500.000	39.930	79.842	0.530	Existing	-	80
6	46 708.421	52 606.706	04° 48' 15" L	1250.000	52.438	104.811	1.110	Existing	-	80



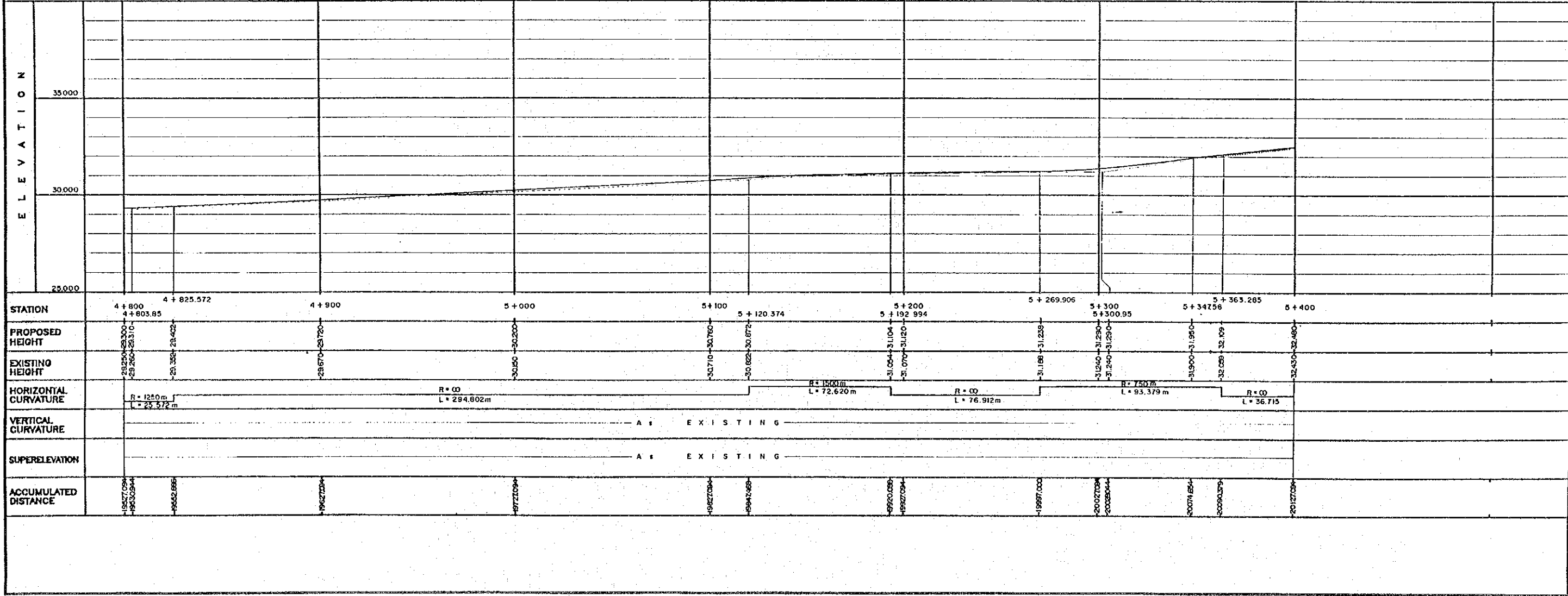
SCALE
HOR: 1:1000
VER: 1:100

PLAN AND PROFILE
SECTION 7-4(3/5) STA. 4+800 - STA. 5+400

SHEET NO.
3-58



CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e %	w	V(kph)
6	46 708.421	52 606.706	04° 48' 15" L	1250.000	52.436	104.811	1.100	2.8	---	80
7	46 320.302	52 566.088	02° 46' 26" R	500.000	36.317	72.620	0.440	Existing	---	80
8	46 162.979	52 541.878	07° 08' 03" R	750.000	46.753	93.396	1.460	Existing	---	80

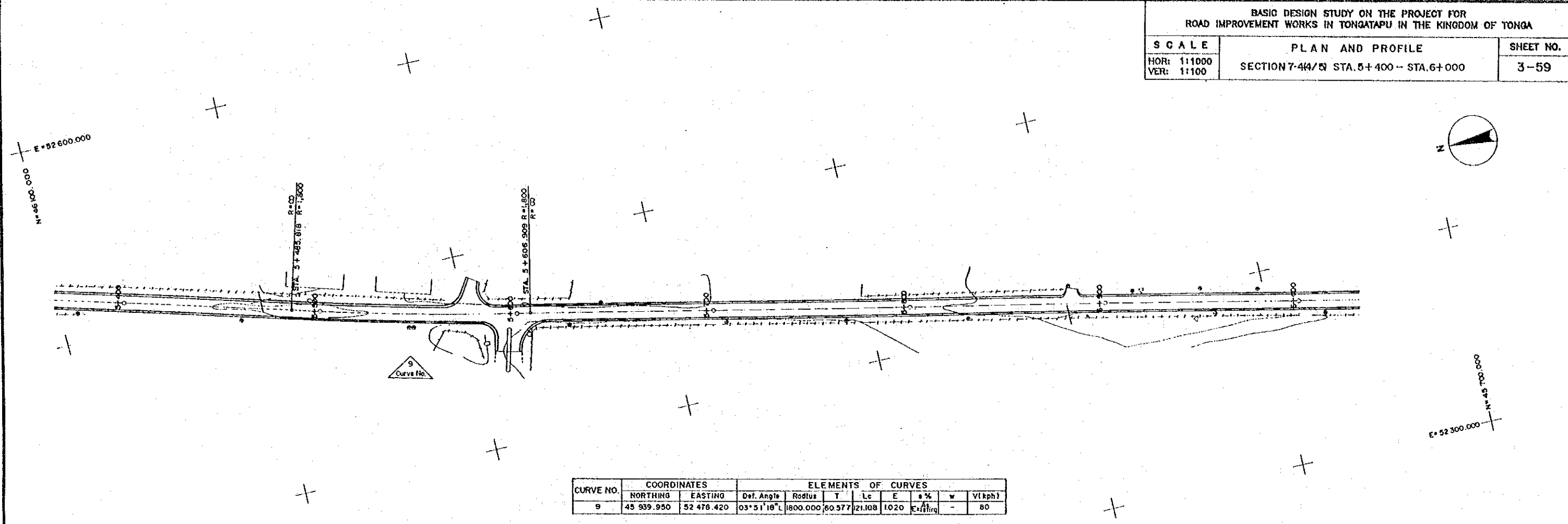


BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE
HOR: 1:1000
VER: 1:100

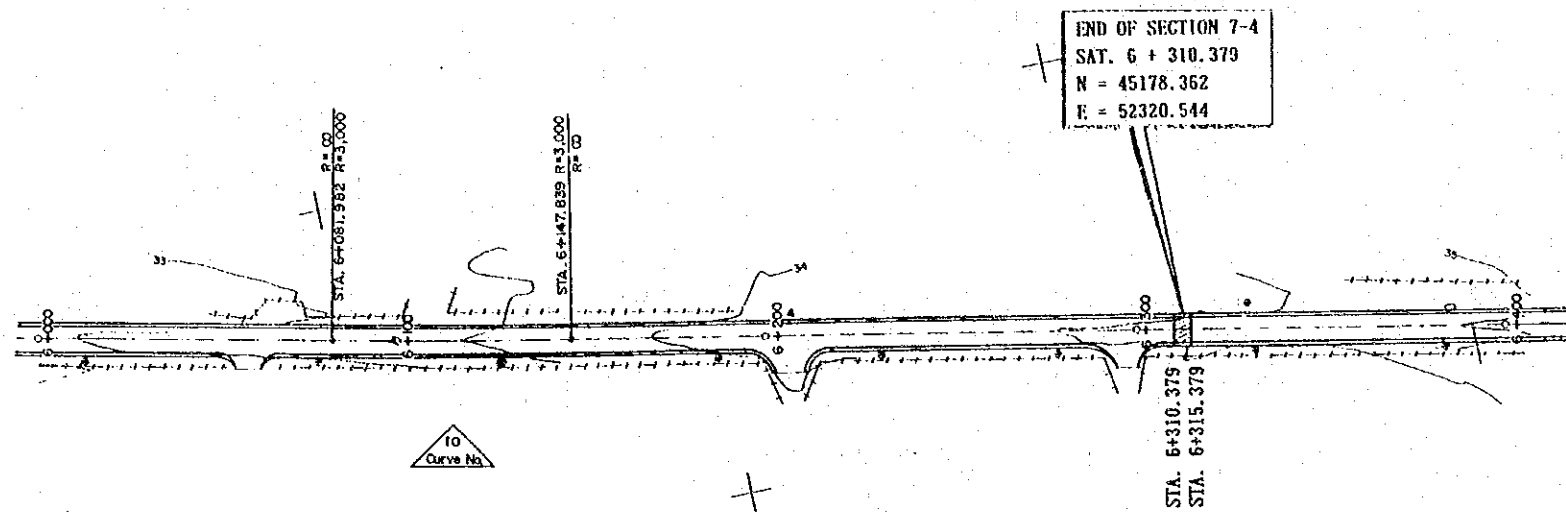
PLAN AND PROFILE
SECTION 7-44/S STA. 5+400 - STA. 6+000

SHEET NO.
3-59

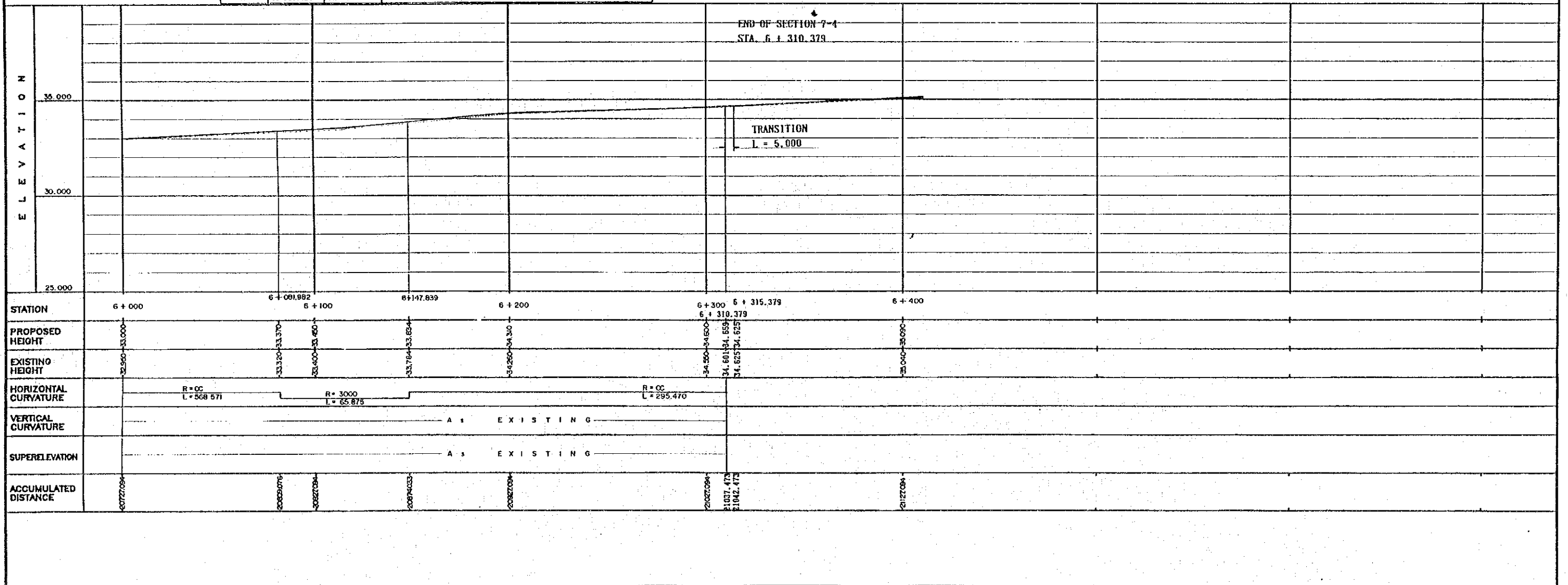


CURVE NO.	COORDINATES		ELEMENTS OF CURVES							
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	e%	w	V(kph)
9	45 939.950	52 476.420	03°51'16" L	1800.000	60.577	121.028	1020	Existing	-	80

ELEVATION	STATION										
	5+400	5+485.818 5+500	5+606.909 5+600	5+700	5+800	5+900	6+000				
PROPOSED HEIGHT	32.460	32.617	32.700	32.850	32.960	33.000	33.000				
EXISTING HEIGHT	32.400	32.567	32.720	32.810	32.840	32.890	32.960				
HORIZONTAL CURVATURE	R=OC		R = 1800.000 m. L = 121.091 m.			R=OC					
VERTICAL CURVATURE	AS EXISTING										
SUPERELEVATION	AS EXISTING										
ACCUMULATED DISTANCE	20327.094	20329.127	20337.094	20347.094	20357.094	20367.094	20377.094				



CURVE NO.	COORDINATES		ELEMENTS OF CURVE								
	NORTHING	EASTING	Def. Angle	Radius	T	Lc	E	Δ%	w	V(kph)	
10	45 370.389	52 357.070	OP 2° 28' L	3000.000	32.930	65.657	0.180	AT	-	80	
11	45 080.123	52 301.858	END OF PROJECT								



SCALE

SHEET NO.

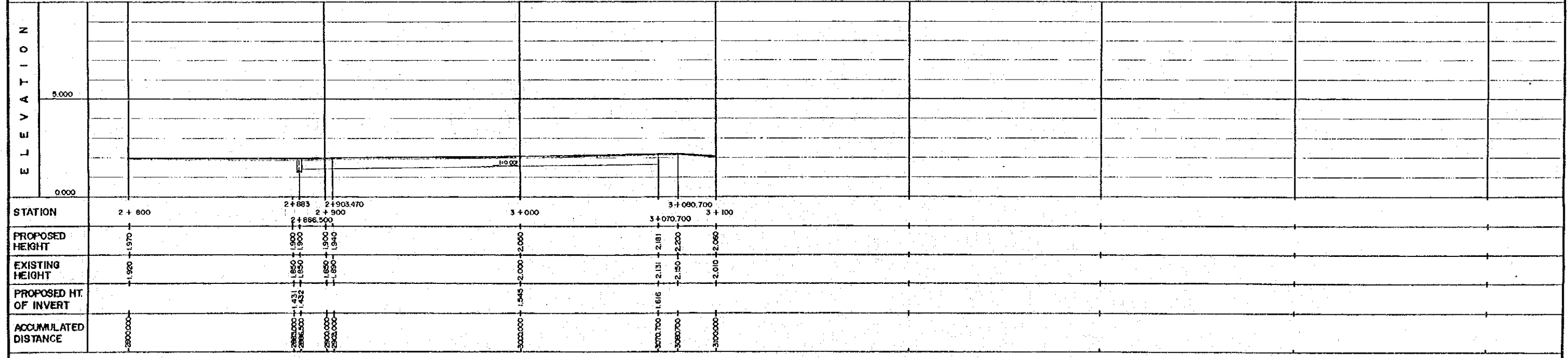
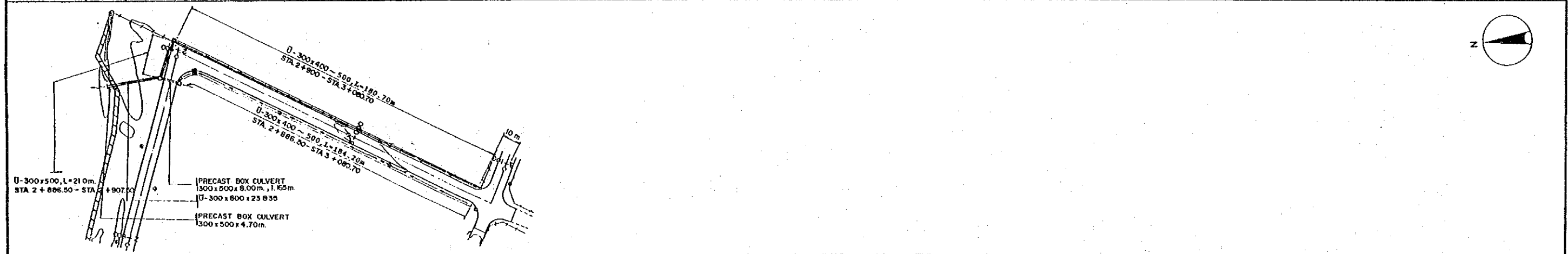
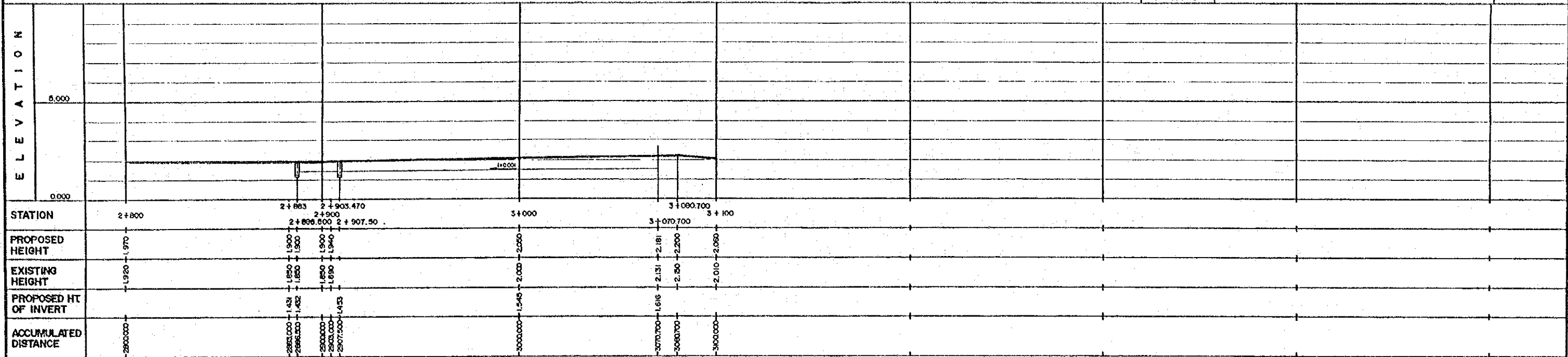
4. DRAINAGE

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE
H = 1:1000
V = 1:100

DRAINAGE PLAN AND PROFILE
SECTION I-1 (1/5) STA. 2 + 886.50 - STA. 3 + 080.70

SHEET NO.
4-1



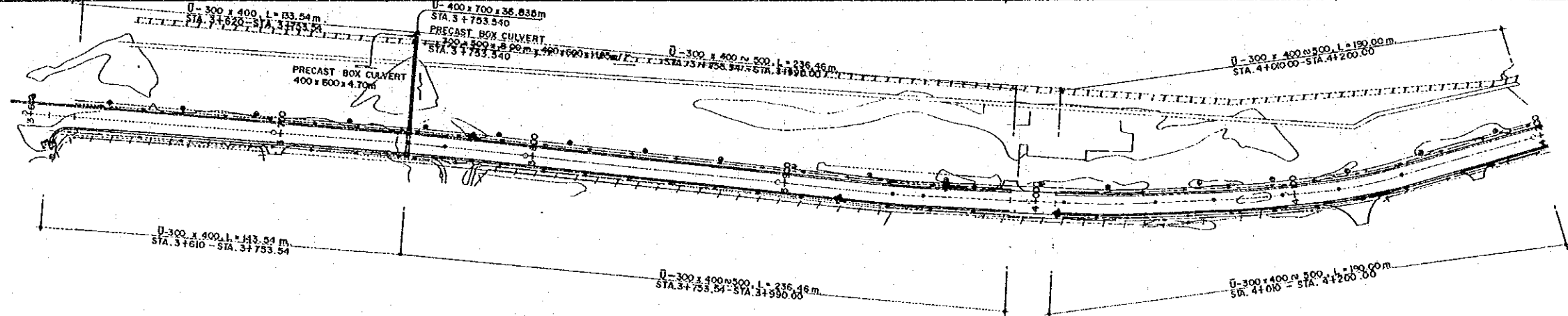
BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE
H = 1:1000
V = 1:100

DRAINAGE PLAN AND PROFILE
SECTION I-(12/5) STA. 3+610-STA. 4+200

SHEET NO.
4-2

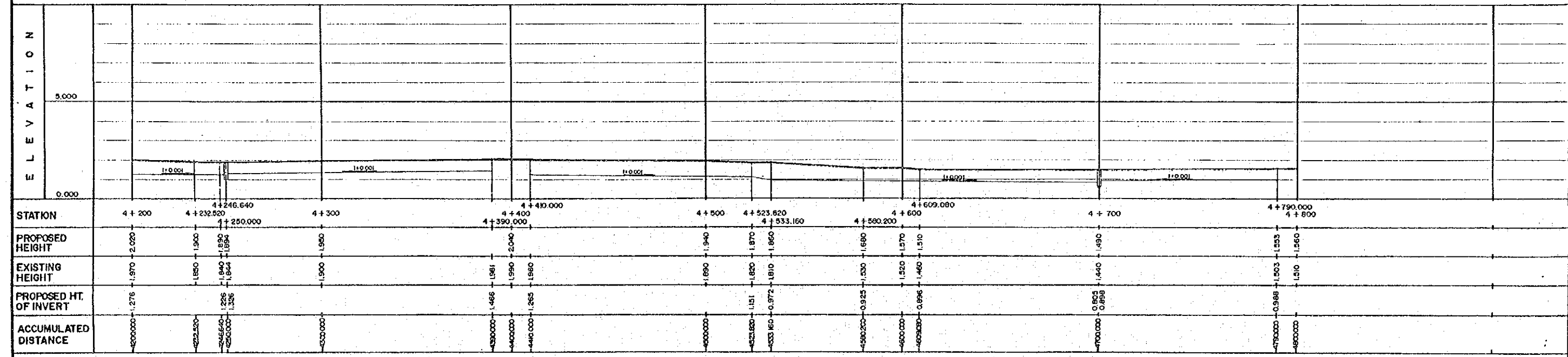
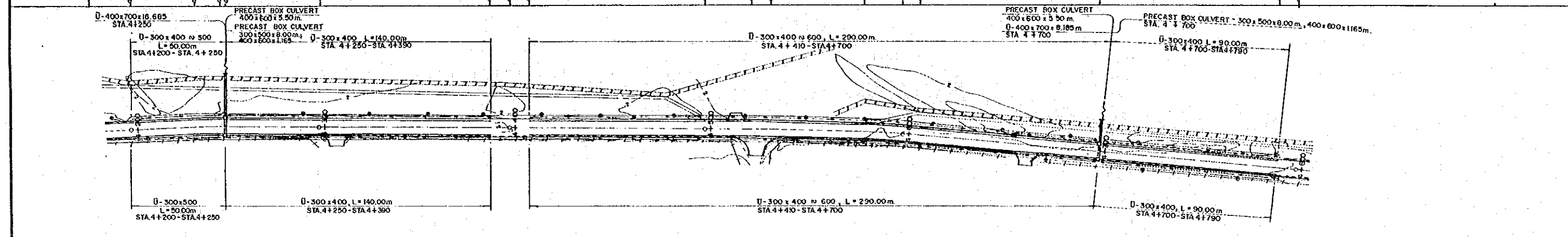
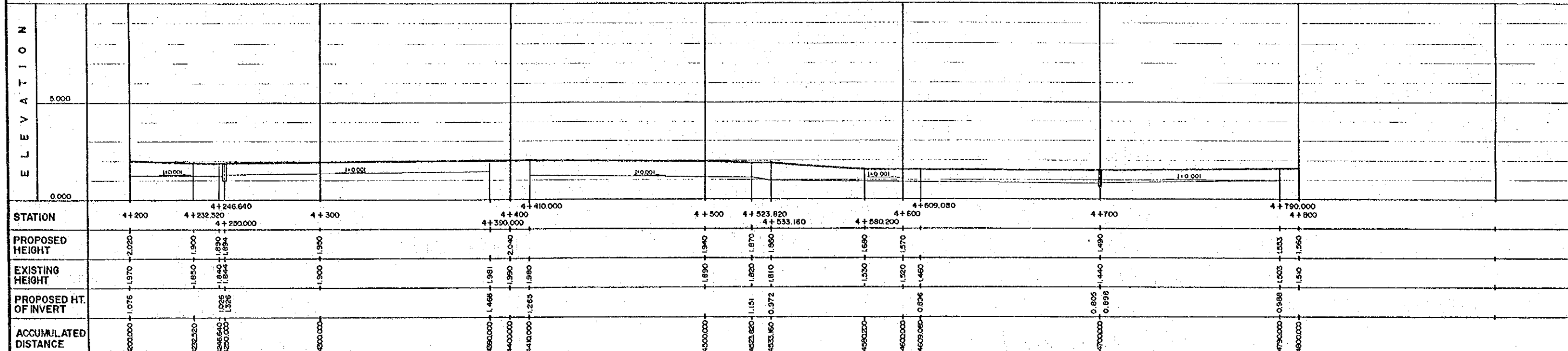
ELEVATION	0.000																	
	1:000																	
	1:000																	
	1:000																	
	1:000																	
STATION	3+600	3+620	3+700	3+753.540	3+767.944	3+800	3+900	3+946.024	3+957.848	3+990.000	4+013.518	4+049.268	4+077.338	4+098.930	4+100	4+118.040	4+146.337	4+200
PROPOSED HEIGHT	1.710	1.697	1.500	1.580	1.710	1.700	1.910	1.940	1.980	2.030	1.910	1.930	1.960	2.020	1.990	1.940	1.910	2.020
EXISTING HEIGHT	1.660	1.597	1.450	1.530	1.660	1.650	1.860	1.890	1.930	1.980	1.860	1.880	1.910	1.970	1.940	1.890	1.860	1.970
PROPOSED HT. OF INVERT		1.082	0.992	0.938	1.119	1.165	1.265	1.356	1.466	1.510	1.266	1.276	1.176	1.376	1.476	1.376	1.276	1.076
ACCUMULATED DISTANCE	3600.000	3620.000	3700.000	3753.540	3767.944	3800.000	3900.000	3946.024	3957.848	3990.000	4013.518	4049.268	4077.338	4098.930	4100.000	4118.040	4146.337	4200.000



ELEVATION	0.000																	
	1:000																	
	1:000																	
	1:000																	
	1:000																	
STATION	3+600	3+610.000	3+700	3+753.540	3+767.944	3+800	3+900	3+946.024	3+957.848	3+990.000	4+013.518	4+049.268	4+077.338	4+098.930	4+100	4+118.040	4+146.337	4+200
PROPOSED HEIGHT	1.710	1.678	1.500	1.580	1.710	1.700	1.910	1.940	1.980	2.030	1.910	1.930	1.960	2.020	1.990	1.940	1.910	2.020
EXISTING HEIGHT	1.660	1.618	1.450	1.530	1.660	1.650	1.860	1.890	1.930	1.980	1.860	1.880	1.910	1.970	1.940	1.890	1.860	1.970
PROPOSED HT. OF INVERT		1.082	0.992	0.938	1.119	1.165	1.265	1.356	1.466	1.510	1.266	1.276	1.176	1.376	1.476	1.376	1.276	1.076
ACCUMULATED DISTANCE	3600.000	3610.000	3700.000	3753.540	3767.944	3800.000	3900.000	3946.024	3957.848	3990.000	4013.518	4049.268	4077.338	4098.930	4100.000	4118.040	4146.337	4200.000

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE H = 1:1000 V = 1:100	DRAINAGE PLAN AND PROFILE SECTION I-(13/5) STA. 4+200-STA. 4+790	SHEET NO. 4-3
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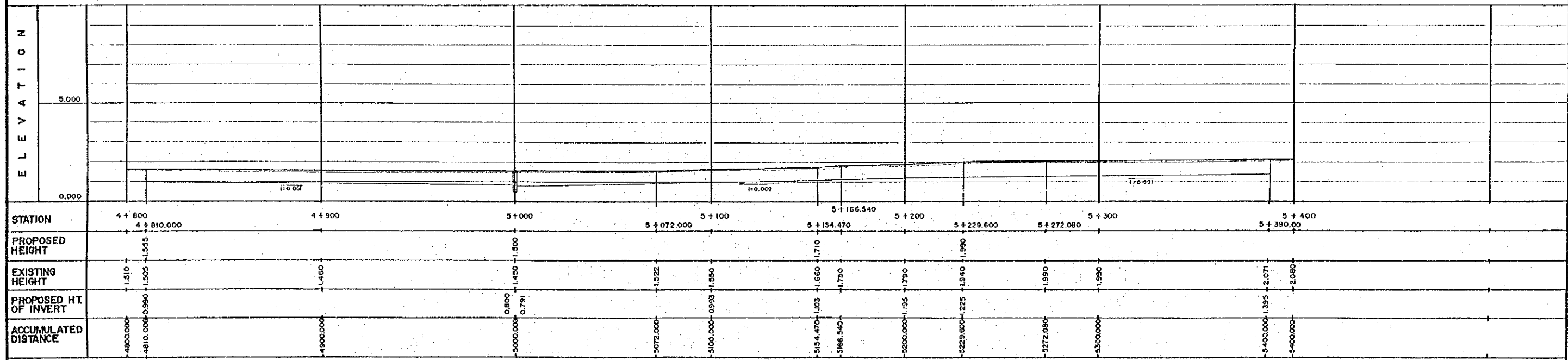
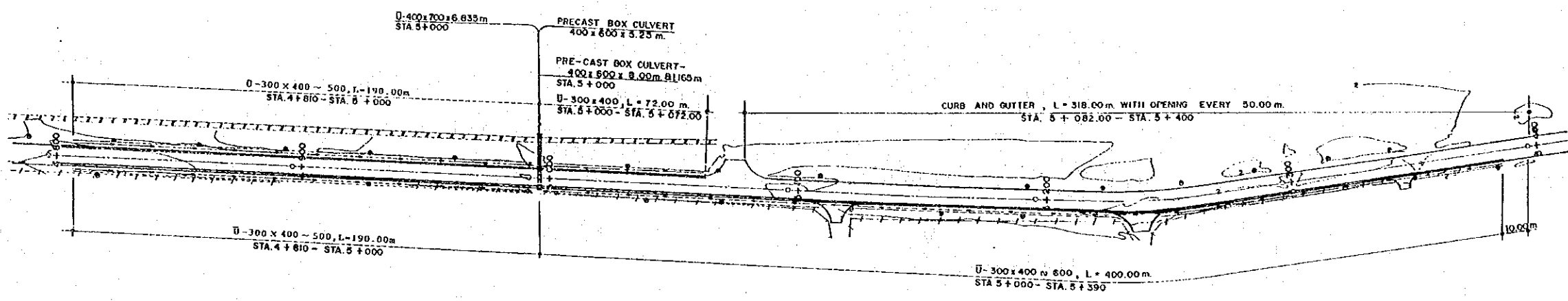
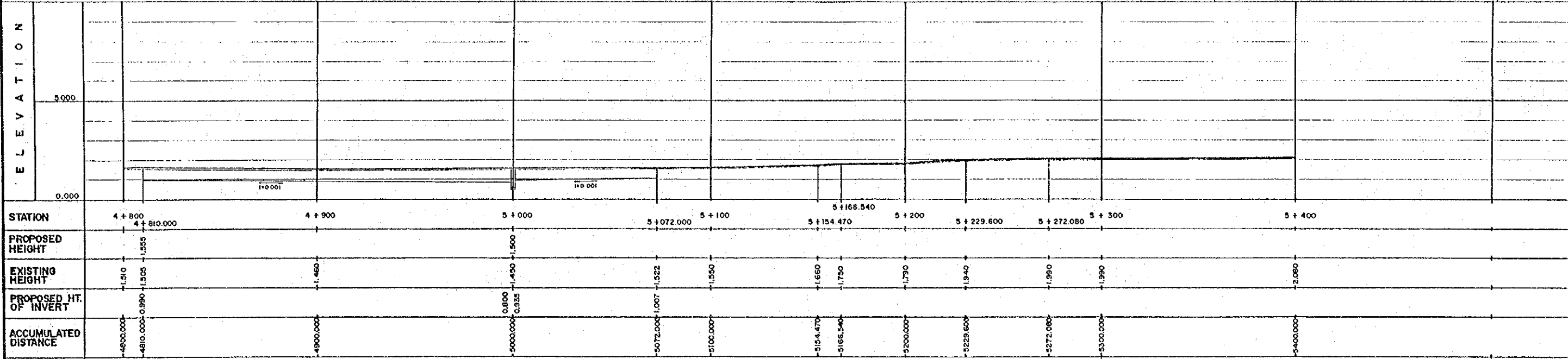
STATION	4+200	4+232.520	4+246.640 4+250.000	4+300	4+400 4+390.000	4+500	4+523.820 4+533.160	4+600 4+580.200	4+609.080	4+700	4+790.000 4+800
PROPOSED HEIGHT	2.020	1.900	1.890 1.894	1.950	2.040	1.940	1.870 1.860	1.690	1.570	1.490	1.553 1.560
EXISTING HEIGHT	1.970	1.850	1.840 1.844	1.900	1.980	1.890	1.820 1.810	1.530	1.520	1.440	1.503 1.510
PROPOSED HT. OF INVERT	1.276	1.226	1.226 1.226	1.265	1.265	1.466	1.151 1.072	0.925	0.896	0.805 0.898	0.988
ACCUMULATED DISTANCE	0.000000	0.222520	0.469160	0.700000	1.100000	1.600000	2.123820	2.724020	3.333008	4.043008	4.833008

BASIC DESIGN STUDY ON THE PROJECT FOR ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

SCALE
H = 1:1000
V = 1:100

DRAINAGE PLAN AND PROFILE
SECTION 1-(14/5) STA. 4+810 - STA. 5+400

SHEET NO.
4-4

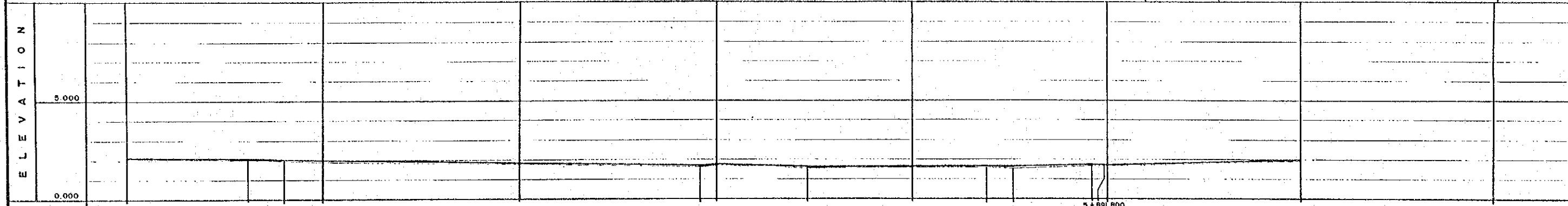


BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

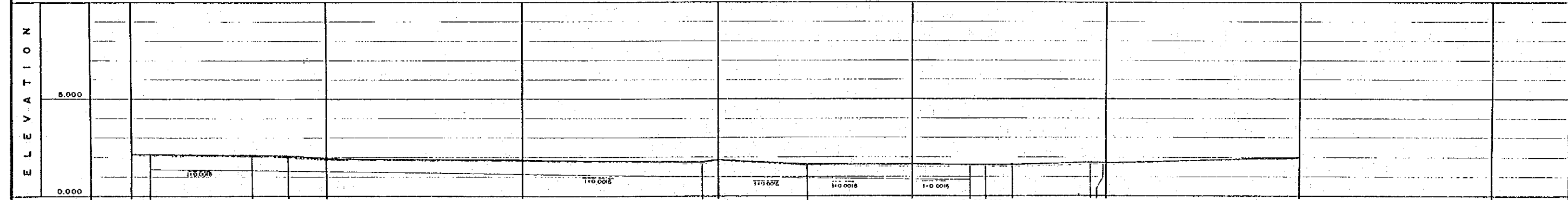
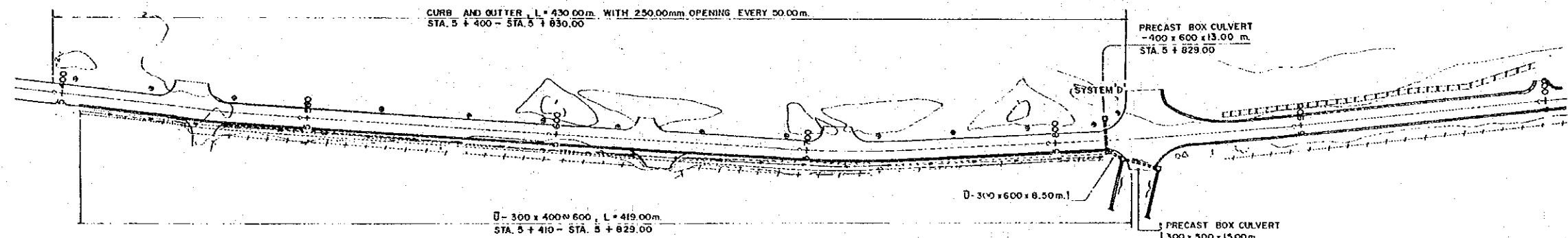
SCALE
H= 1:1000
V= 1:100

DRAINAGE PLAN AND PROFILE
SECTION I-(115/5) STA. 5+410 - STA. 5+829

SHEET NO.
4-5



STATION	5 + 400	5 + 481.660 5 + 480.170	5 + 500	5 + 600	5 + 700 5 + 692.610	5 + 745.210	5 + 800	5 + 837.270 5 + 850.680	5 + 891.800 5 + 898.730	6 + 000
PROPOSED HEIGHT	2.060 - 2.130	2.020 - 2.070	1.930 - 1.980	1.870 - 1.920	1.770 - 1.820	1.610 - 1.660	1.560 - 1.610	1.500 - 1.550	1.550 - 1.600	1.960
EXISTING HEIGHT	2.060 - 2.130	2.020 - 2.070	1.930 - 1.980	1.870 - 1.920	1.770 - 1.820	1.610 - 1.660	1.560 - 1.610	1.500 - 1.550	1.550 - 1.600	1.960
PROPOSED HT. OF INVERT										
ACCUMULATED DISTANCE	5400.000	5481.660	5490.170	5500.000	5600.000	5700.000	5745.210	5800.000	5837.270 5850.680	5900.000



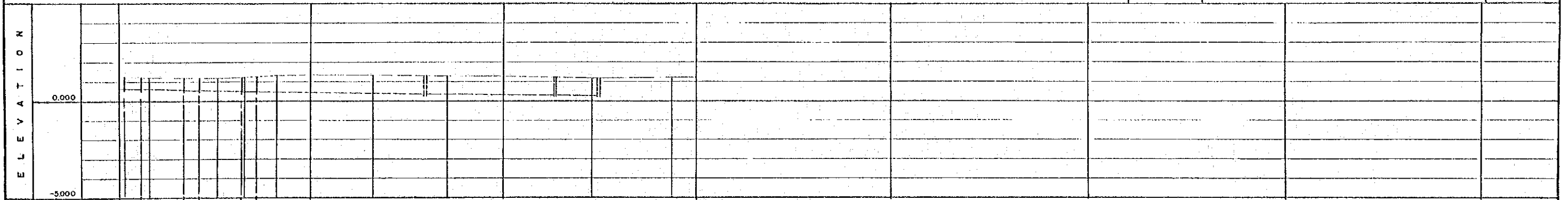
STATION	5 + 400 5 + 410.000	5 + 481.660 5 + 480.170	5 + 500	5 + 600	5 + 700 5 + 692.610	5 + 745.210	5 + 800	5 + 829.000 5 + 837.270 5 + 850.680	5 + 900 5 + 898.730	6 + 000
PROPOSED HEIGHT	2.060 - 2.130	2.020 - 2.070	1.930 - 1.980	1.870 - 1.920	1.770 - 1.820	1.610 - 1.660	1.560 - 1.610	1.500 - 1.550	1.550 - 1.600	1.960
EXISTING HEIGHT	2.060 - 2.130	2.020 - 2.070	1.930 - 1.980	1.870 - 1.920	1.770 - 1.820	1.610 - 1.660	1.560 - 1.610	1.500 - 1.550	1.550 - 1.600	1.960
PROPOSED HT. OF INVERT										
ACCUMULATED DISTANCE	5400.000	5410.000 5481.660	5490.170	5500.000	5600.000	5700.000	5745.210	5800.000	5837.270 5850.680	5900.000

BASIC DESIGN STUDY ON THE PROJECT FOR
ROAD IMPROVEMENT WORKS IN TONGATAPU IN THE KINGDOM OF TONGA

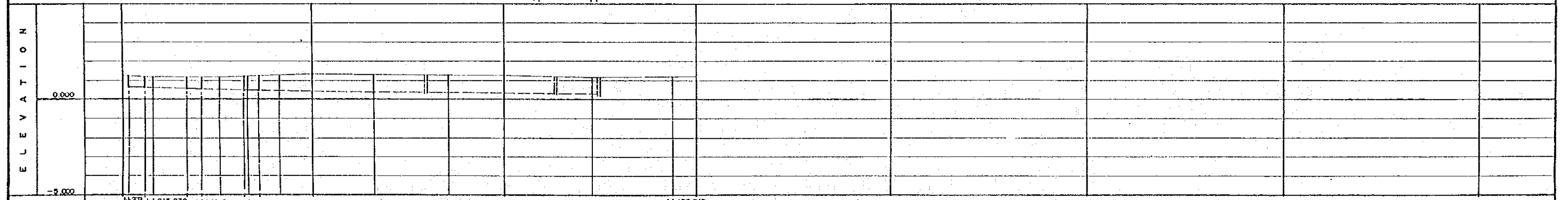
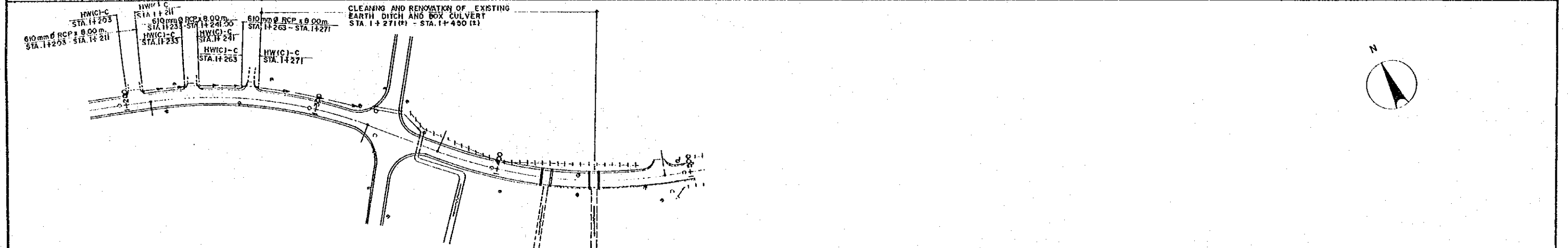
SCALE
HOR: 1:1000
VER: 1:100

DRAINAGE PLAN AND PROFILE
SECTION 1-2(1/1) STA. 1+200 - STA. 1+500

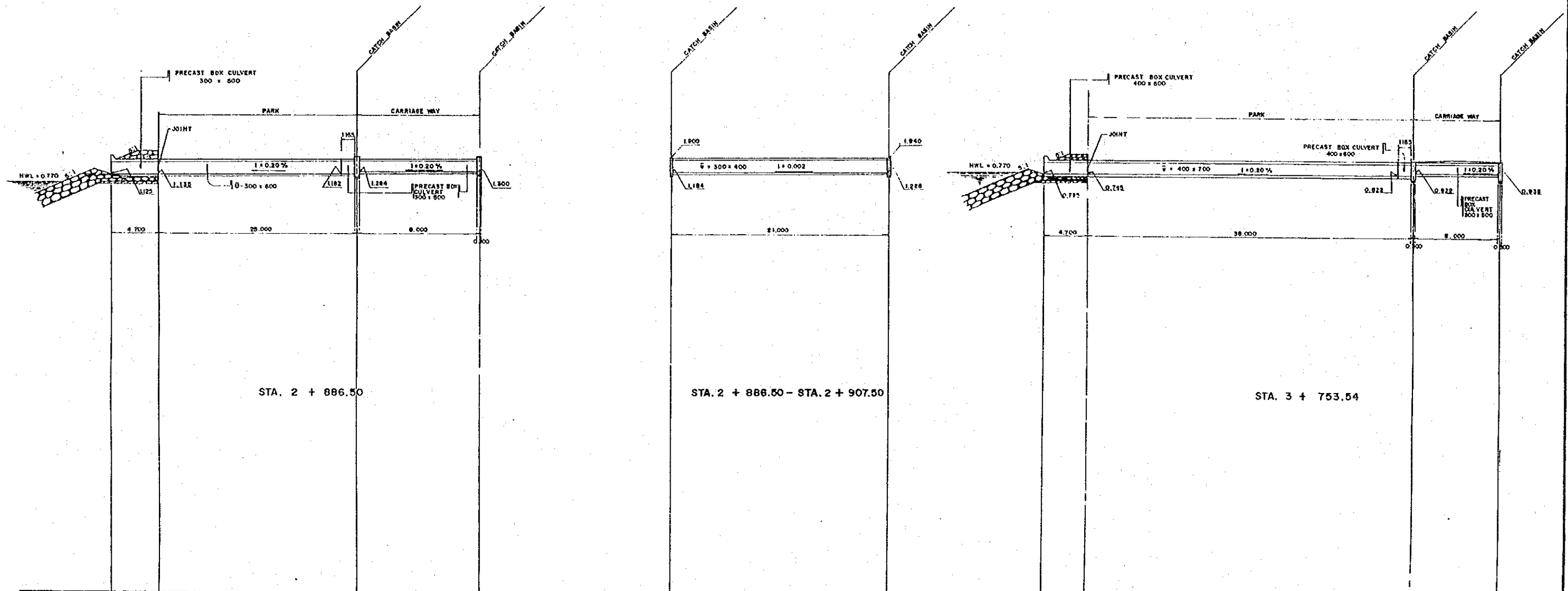
SHEET NO.
4-6



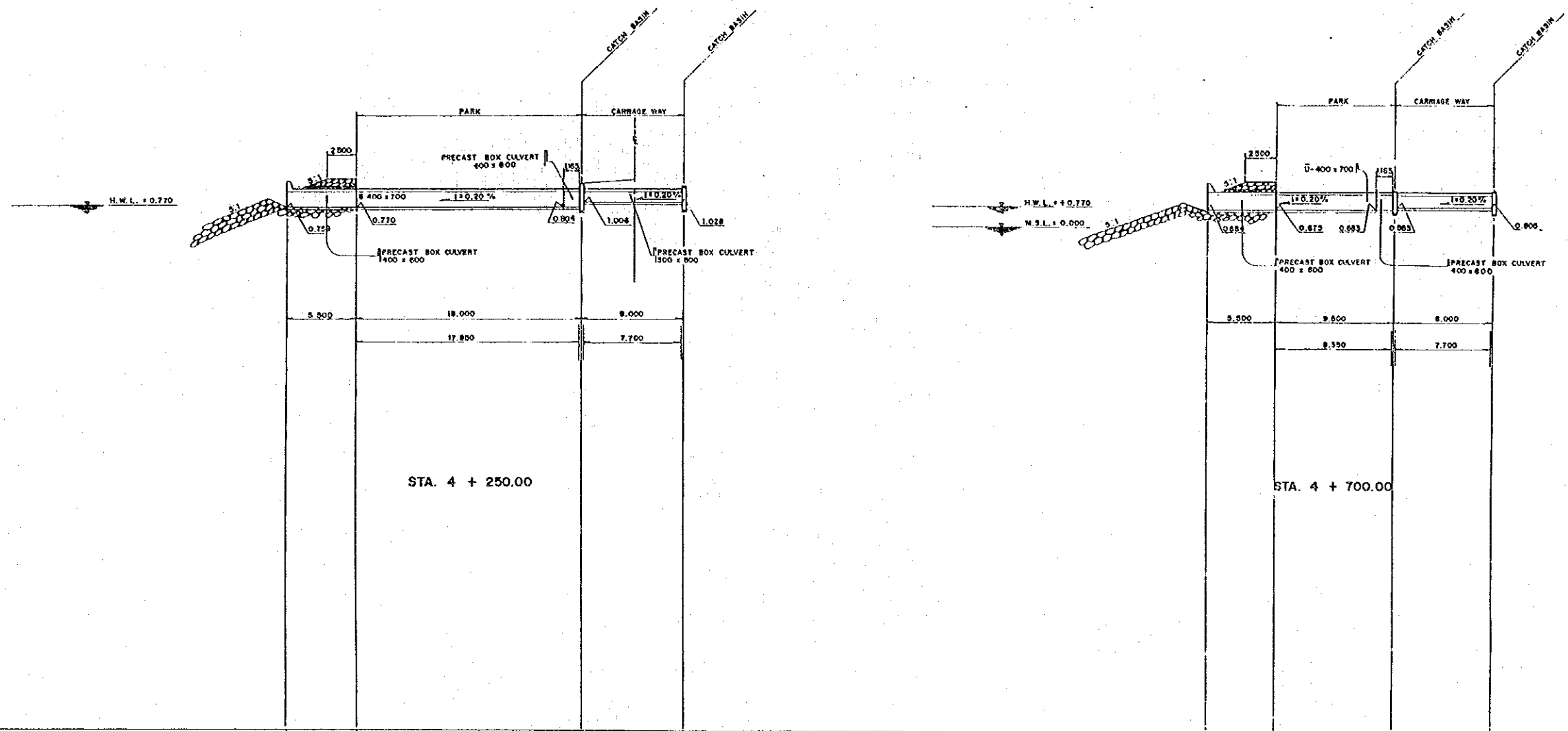
STATION	1+200	1+215.830	1+234	1+242.5	1+263	1+271	1+300	1+332.356	1+370.227	1+400	1+446.029	1+487.317	1+500
PROPOSED HEIGHT	1.310	1.276	1.200	1.280	1.350	1.360	1.436	1.432	1.420	1.320	1.332	1.340	
EXISTING HEIGHT	1.260	1.226	1.150	1.230	1.300	1.310	1.280	1.280	1.270	1.170	1.180	1.190	
PROPOSED HT. OF INVERT	0.659	0.651	0.629	0.621	0.599	0.591							
ACCUMULATED DISTANCE	200.000	215.830	234.000	242.500	263.000	271.000	300.000	332.356	370.227	400.000	446.029	487.317	500.000



STATION	1+200	1+215.830	1+234	1+242.5	1+263	1+271	1+300	1+332.356	1+370.227	1+400	1+446.029	1+487.317	1+500
PROPOSED HEIGHT	1.310	1.276	1.200	1.280	1.350	1.360	1.436	1.432	1.420	1.320	1.332	1.340	
EXISTING HEIGHT	1.260	1.226	1.150	1.230	1.300	1.310	1.280	1.280	1.270	1.170	1.180	1.190	
PROPOSED HT. OF INVERT	0.659	0.651	0.629	0.621	0.599	0.591							
ACCUMULATED DISTANCE	200.000	215.830	234.000	242.500	263.000	271.000	300.000	332.356	370.227	400.000	446.029	487.317	500.000

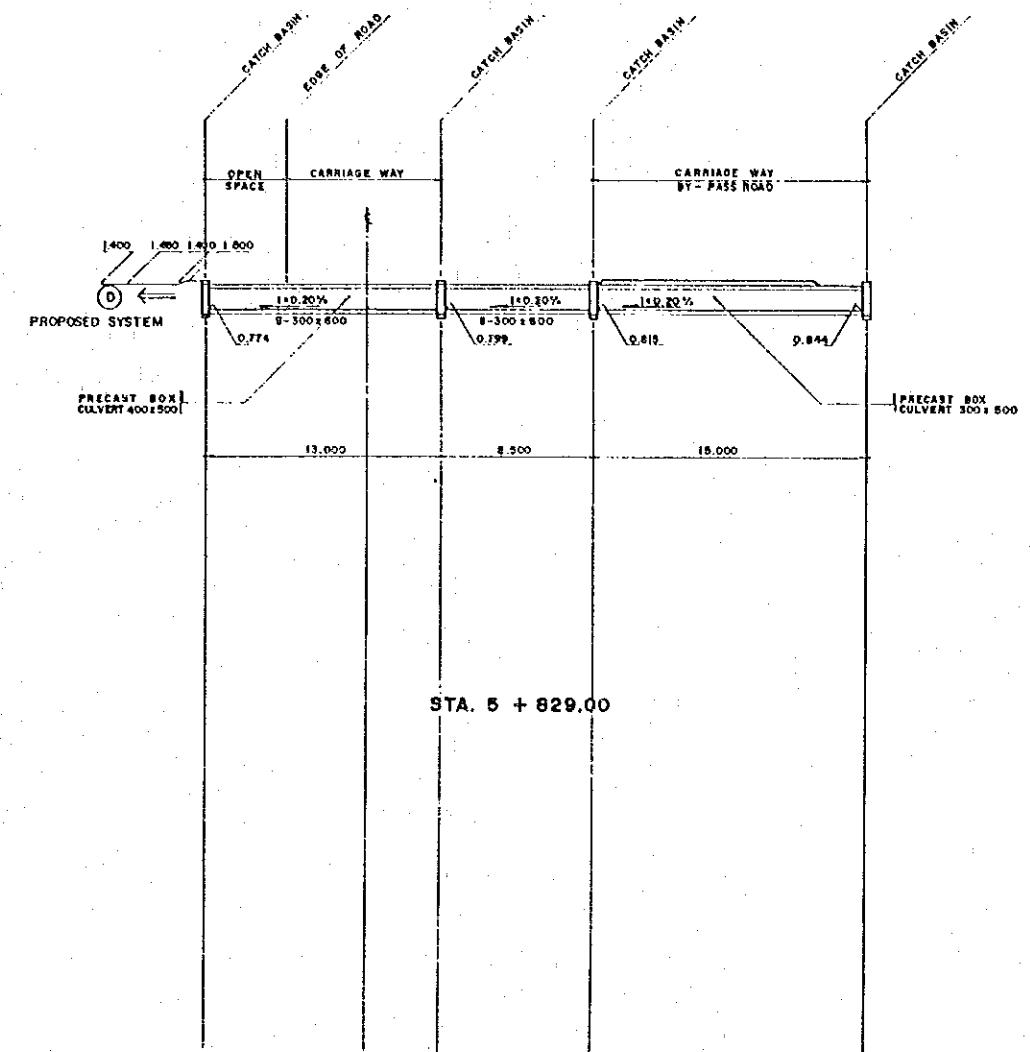
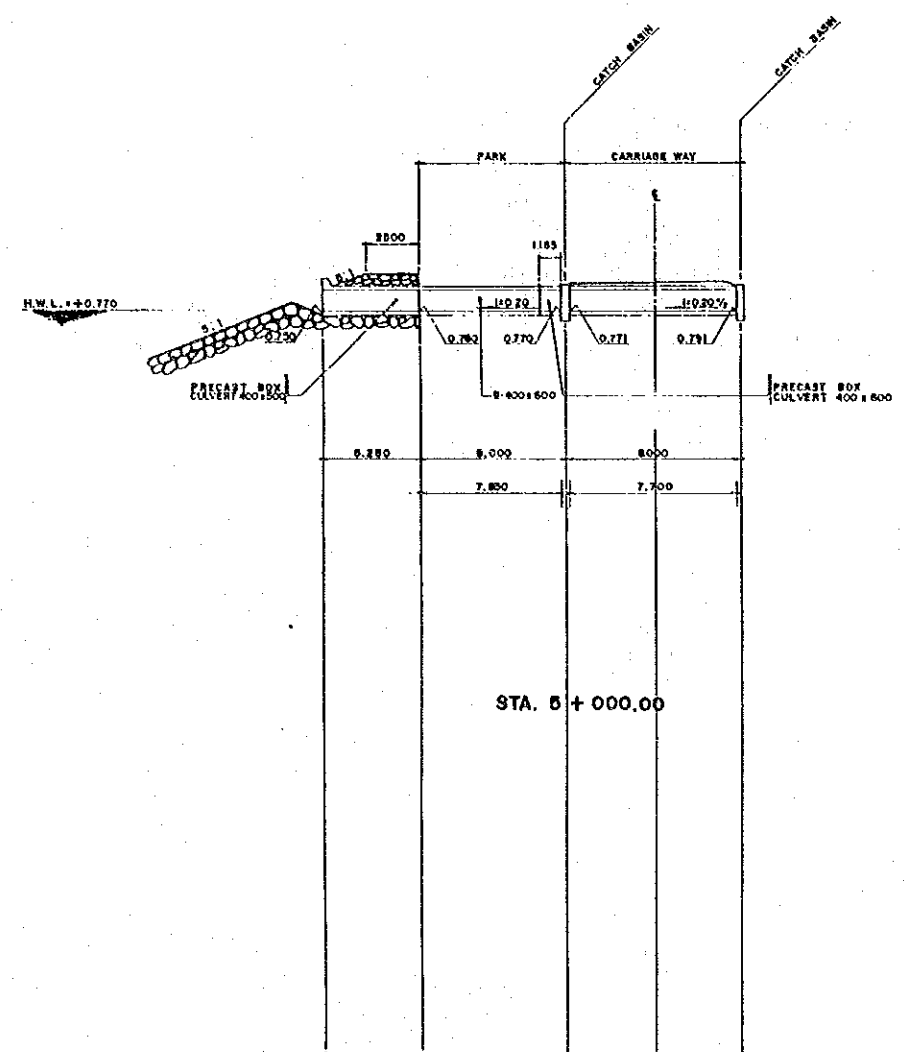


STATION	EXISTING GROUND HEIGHT	PROPOSED GROUND HEIGHT	PRECAST BOX CULVERT INVERT HEIGHT	ACTUAL PROPOSED GROUND HEIGHT
0+000	1.850	1.850	1.125	0.000
0+004.70	1.750	1.800	1.133	4.700
0+025.70	1.800	1.800	1.182	29.700
0+027.70	1.870	1.820	1.184	37.700
2+888.50	1.800	1.800	1.184	0.000
2+907.50	1.890	1.940	1.228	21.000
3+753.54	1.400	1.400	0.735	-0.000
3+804.70	1.500	1.550	0.740	4.700
3+806.70	1.810	1.900	0.822	42.700
3+808.70	1.810	1.900	0.838	50.700



STATION	EXISTING HEIGHT	PROPOSED IMPROVED HEIGHT	ACCUMULATIVE DISTANCE
0+000			0.000
0+025.00	2.000	2.000	5.500
0+050.00	2.000	2.000	17.800
0+075.00	1.900	1.900	18.000
0+100.00	2.050	2.050	23.500
0+125.00	1.800	1.800	23.500
0+150.00	1.844	1.844	31.500
0+175.00	1.900	1.900	31.500
0+200.00	1.850	1.850	31.500
0+225.00	1.700	1.700	31.500
0+250.00	1.650	1.650	31.500
0+300.00			0.000
0+325.00	1.700	1.700	5.500
0+350.00	1.750	1.750	15.000
0+375.00	1.650	1.650	15.000
0+400.00	1.440	1.440	23.000
0+425.00	1.350	1.350	23.000

SCALE	DRAINAGE CROSS-SECTION	SHEET NO.
AS SHOWN		4-9



ACCUMULATED DIST.	PROPOSED ROAD HEIGHT	PROPOSED GUTTER HEIGHT	EXISTING HEIGHT	STATION
0.000	0.750			0 + 000
5.250	0.780	1.750	1.750	0 + 000.25
15.250	0.770 0.771	1.596 1.500	1.536	0 + 003.25
21.250	0.791	1.377	1.327	0 + 008.25
0.000	0.775	1.500	1.500	0 + 000
		1.610	1.610	
15.000	0.799 0.799	1.550	1.550	0 + 003.00
21.500	0.815 0.815	1.610	1.560	0 + 008.50
36.500	0.844	1.610	1.560	0 + 035.50

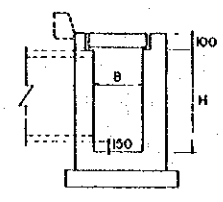
SCHEDULE OF SIDE DITCH

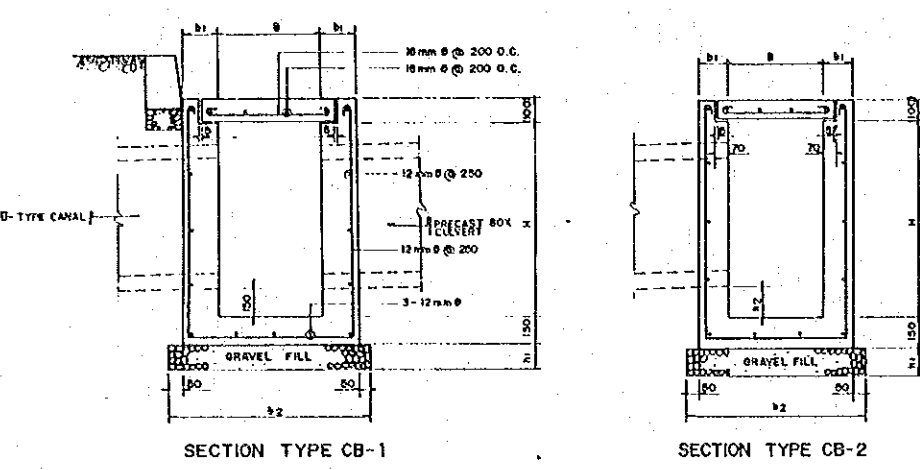
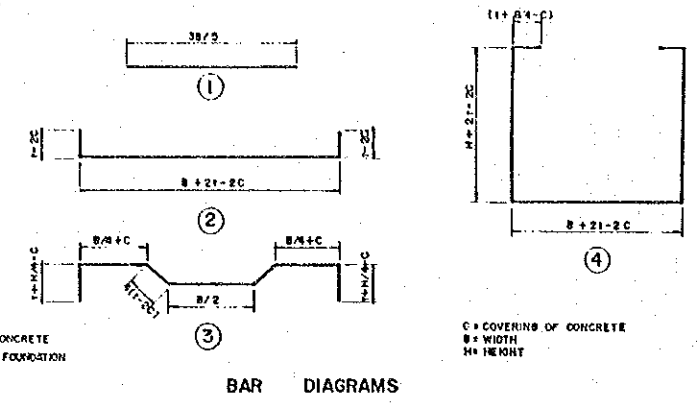
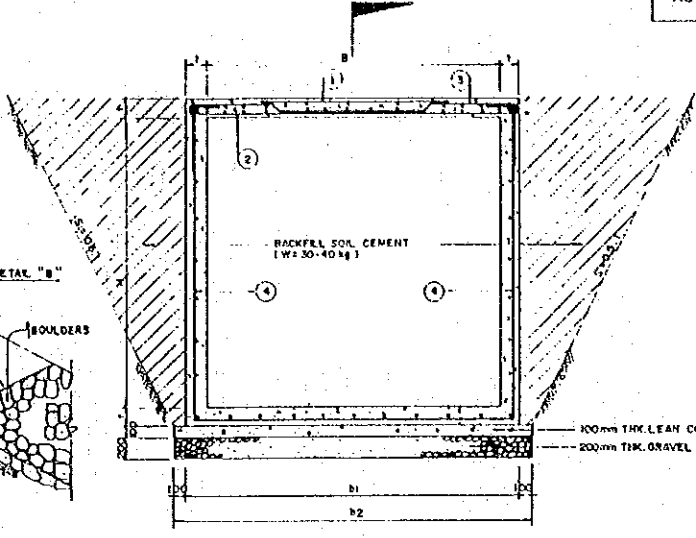
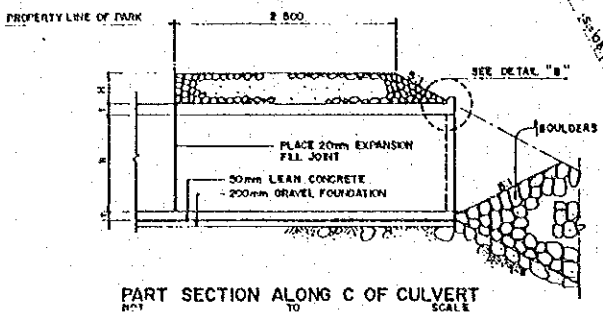
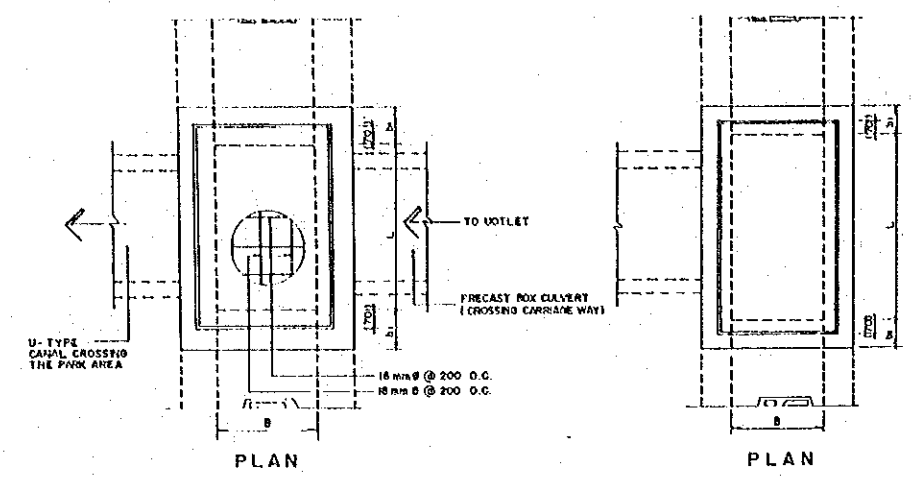
STATION FROM - TO	LOCATION		DESIGNED SECTION			LENGTH (m)		REMARKS
	LEFT	RIGHT	TYPE	WIDTH (mm)	HEIGHT (mm)	LEFT SIDE	RIGHT SIDE	
2 + 886.50 - 2 + 907.50	L		U	300	400	21.00		CONSTRUCT PRECAST BOX CULVERT @ STA. 2 + 886.50
2 + 900.00 - 3 + 070.20	L		U	300	400	180.70		
2 + 886.50 - 3 + 070.20		R	U	300	400		184.20	
3 + 620.00 - 3 + 753.54	L	R	U	300	400	133.54	133.54	
3 + 753.54 - 3 + 950.00	L	R	U	300	400 x 500	236.46	236.46	CONSTRUCT PRECAST BOX CULVERT @ STA. 3 + 753.54
4 + 010.00 - 4 + 250.00	L	R	U	300	400 x 500	240.00	240.00	
4 + 250.00 - 4 + 390.00	L	R	U	300	400	140.00	140.00	CONSTRUCT PRECAST BOX CULVERT @ STA. 4 + 250.00
4 + 410.00 - 4 + 620.00	L	R	U	300	400 x 600	210.00	210.00	
4 + 620.00 - 4 + 700.00	L	R	U	300	400 x 600	80.00	80.00	
4 + 700.00 - 4 + 790.00	L	R	U	300	400	90.00	90.00	CONSTRUCT PRECAST BOX CULVERT @ STA. 4 + 700.00
4 + 810.00 - 5 + 000.00	L	R	U	300	400	190.00	190.00	
5 + 000.00 - 5 + 072.00	L		U	300	400	72.00	72.00	
5 + 000.00 - 5 + 139.00		R	U	300	400 x 600	390.00	390.00	CONSTRUCT PRECAST BOX CULVERT @ STA. 5 + 000.00
5 + 141.00 - 5 + 182.00		R	U	300	400 x 600	419.00	419.00	
5 + 400.00 - 5 + 552.00	L	R	V	1000	500	152.00	152.00	BY-PASS ROAD

DRAINAGE SCHEDULE

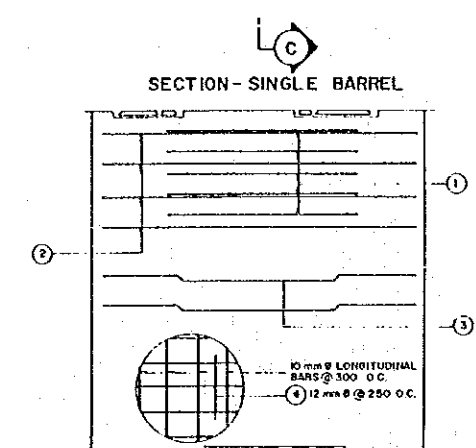
STATION	C. ELEV.	CULVERT/TYPE U CANAL CHARACTERISTICS					INLET/OUTLET STRUCTURE		REMARKS
		INV. ELEV.		SIZE			LEFT	RIGHT	
		LEFT	RIGHT	WIDTH (mm)	HEIGHT (mm)	LENGTH (mm)			
2 + 886.50	1.961	1.284	1.300	300	500	8000	CB	CB	PRECAST BOX CULVERT CROSSING THE ROAD
				300	500	1165	-	-	PRECAST BOX CULVERT ON THE SIDEWALK
		1.135	1.184	300	600	23835	-	CB	U TYPE CANAL TO BE CONSTRUCTED AT THE PARK
		1.128	1.135	300	500	4700	-	CB	PRECAST BOX CULVERT TO THE OUTLET.
3 + 753.54	1.580	0.922	0.938	300	500	8000	CB	CB	PRECAST BOX CULVERT ON THE ROAD
				400	600	1165	-	-	PRECAST BOX CULVERT ON THE SIDEWALK
		0.745	0.822	400	700	36855	-	CB	U TYPE CANAL AT THE PARK
		0.740	0.745	400	600	4700	-	-	PRECAST BOX CULVERT TO THE OUTLET
4 + 250.00	1.894	1.006	1.026	300	500	8000	CB	CB	PRECAST BOX CULVERT CROSSING THE ROAD
				400	600	1165	-	-	PRECAST BOX CULVERT ON THE SIDEWALK
		0.770	0.806	400	700	16685	-	CB	U TYPE CANAL AT THE PARK
		0.760	0.770	400	600	5500	-	-	PRECAST BOX CULVERT TO THE OUTLET
4 + 700.00	1.490	0.785	0.805	300	500	8000	CB	CB	PRECAST BOX CULVERT CROSSING THE ROAD
				400	600	1165	-	-	PRECAST BOX CULVERT ON THE SIDEWALK
		0.775	0.785	400	700	8185	-	CB	U TYPE CANAL AT THE PARK
		0.784	0.775	400	600	5500	-	-	PRECAST BOX CULVERT TO THE OUTLET
5 + 000.00	1.500	0.771	0.791	400	600	8000	CB	CB	PRECAST BOX CULVERT CROSSING THE ROAD
				400	600	1165	-	-	PRECAST BOX CULVERT ON THE ROAD
				400	700	6835	-	CB	U TYPE CANAL AT THE PARK
				400	600	5250	-	-	PRECAST BOX CULVERT TO THE OUTLET
5 + 829.00	1.600	0.815	0.844	300	500	15000	CB	CB	PRECAST BOX CULVERT CROSSING BY PASSROAD
		0.799	0.815	300	600	8500	CB	CB	U TYPE CANAL ON THE EDGE OF THE ROAD
		0.774	0.799	400	500	13000	CB	CB	PRECAST BOX CULVERT CROSSING ROAD TO OPEN SPACE CONNECT TO EXISTING DRAINAGE SYSTEM 'D'

SCHEDULE OF CATCH BASIN

STATION	TYPE	DESIGNED SECTION			TOP ELEV.	INV. ELEV.		C. FIN. ELEV.	REMARKS
		WIDTH (mm)	LENGTH (mm)	HEIGHT (mm)		LEFT	RIGHT		
2 + 886.50	CB1	B 300	L 600	H 700	1.796	1.184		1.961	
	CB1	B 300	L 600	H 850			1.300		
3 + 753.54	CB1	B 300	L 600	H 700	1.415	0.822		1.580	
	CB1	B 300	L 600	H 850			0.938		
4 + 250.00	CB1	B 300	L 600	H 1100	1.729	0.806		1.894	
	CB1	B 300	L 800	H 850			1.026		
4 + 700.00	CB1	B 300	L 600	H 700	1.325	0.785		1.490	
	CB1	B 300	L 600	H 700			0.805		
5 + 000.00	CB1	B 300	L 600	H 800	1.335	0.685		1.500	
	CB1	B 300	L 600	H 700			0.791		
5 + 829.00	CB2	B 1000	L 300	H 800	1.435	0.774		1.600	
	CB1	B 300	L 600	H 800			0.815		
	CB1	B 300	L 600	H 750			0.844		
2 + 907.50	CB1	B 300	L 600	H 650			1.226		



	(B) WIDTH	(L) LENGTH	(H) HEIGHT
CB-1/2	300	600	510
	300	600	600
	300	600	620
	300	600	640
	300	600	660
	300	600	700
	300	600	720
	300	600	740
	300	600	760
	300	600	820
	300	600	850
	300	600	900
300	600	1100	



BAR SCHEDULE										
CLEAR		t	BAR 1		BAR 2		BAR 3		BAR 4	
SPAN "B"	SPAN "H"	THICKNESS	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING
300	400	150	10	200	12	300	12	300	12	250
	500	150	10	200	12	300	12	300	12	250
	600	150	10	200	12	300	12	300	12	250
400	700	150	10	200	12	300	12	300	12	250
	600	150	10	200	12	300	12	300	12	250
	600	150	10	200	12	300	12	300	12	250

ESTIMATE OF QUANTITIES OF CATCH BASIN (PER UNIT)			
	CONCRETE (m ³)	GRAVEL FILL (m ³)	STEEL BARS (Kg)
CB-1	0.310	0.080	40.00
CB-2	0.310	0.080	40.00

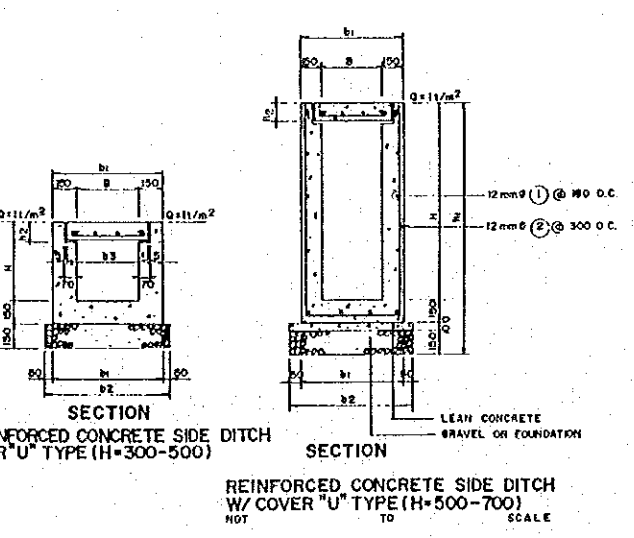
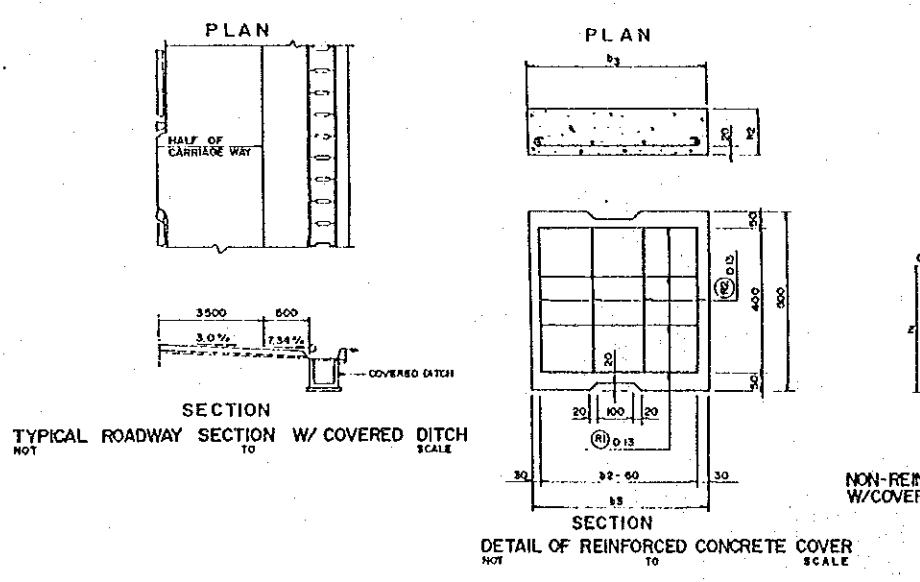
	DIMENSION			STEEL BAR				
	b3	b2	CONC.	No of BARS	LENGTH	No of BARS	LENGTH	WT. Kg
C2-B300	430	110	0.023	4	370	4	400	3.065 08
C2-B400	530	120	0.031	4	470	4	400	3.463 76
C2-B500	630	130	0.040	4	570	4	400	3.861 101

DETAIL OF CATCH BASIN NOT TO SCALE

DETAIL OF PRECAST BOX CULVERT NOT TO SCALE

ESTIMATE OF QUANTITIES OF U-TYPE STRUCTURE											
SYMBOL	DIMENSION (mm)					QUANTITY OF MATERIALS / 10 m					REMARKS
	B	H	b1	b2	h1	m ³ CONC.	FOUNDA. CONC.	LEAN CONC. (m ³)	FOUND. GRAVEL (m ³)	STEEL BARS (Kg)	
U-300 x 400	300	400	600	700	550	1.946	—	—	0.460	61.300	REINFORCED ON COVER ONLY
U-300 x 500	300	500	600	700	650	2.246	—	—	0.460	61.300	- do -
U-400 x 400	400	400	700	800	550	2.082	—	—	0.620	69.260	- do -
U-400 x 500	400	500	700	800	650	2.382	—	—	0.620	69.260	- do -
U-500 x 500	500	500	800	900	650	2.518	—	—	0.800	77.220	- do -
U-300 x 600	300	600	600	700	1000	2.538	1.05	0.70	0.583	220.220	REIN. INCLUDES STEEL BARS
U-400 x 700	400	700	700	800	1100	2.970	1.20	0.80	0.620	494.360	ON THE DITCH WALL & BASE SLAB

ESTIMATE OF QUANTITIES OF PRECAST BOX CULVERT (PER LINEAR METER)					
	THICKNESS	CONCRETE (m ³)	LEAN CONC (m ³)	FOUND. GRAVEL (m ³)	STEEL BARS (Kg)
300 x 400	150	0.300	0.080	0.16	21.80
300 x 500	150	0.330	0.080	0.16	22.20
300 x 600	150	0.360	0.080	0.16	23.00
300 x 700	150	0.390	0.080	0.16	23.80
400 x 600	150	0.390	0.090	0.18	24.50
400 x 700	150	0.420	0.090	0.18	25.00



SECTION TYPICAL ROADWAY SECTION W/ COVERED DITCH NOT TO SCALE

SECTION DETAIL OF REINFORCED CONCRETE COVER NOT TO SCALE

SECTION NON-REINFORCED CONCRETE SIDE DITCH W/COVER "U" TYPE (H=300-500)

SECTION REINFORCED CONCRETE SIDE DITCH W/ COVER "U" TYPE (H=500-700) NOT TO SCALE

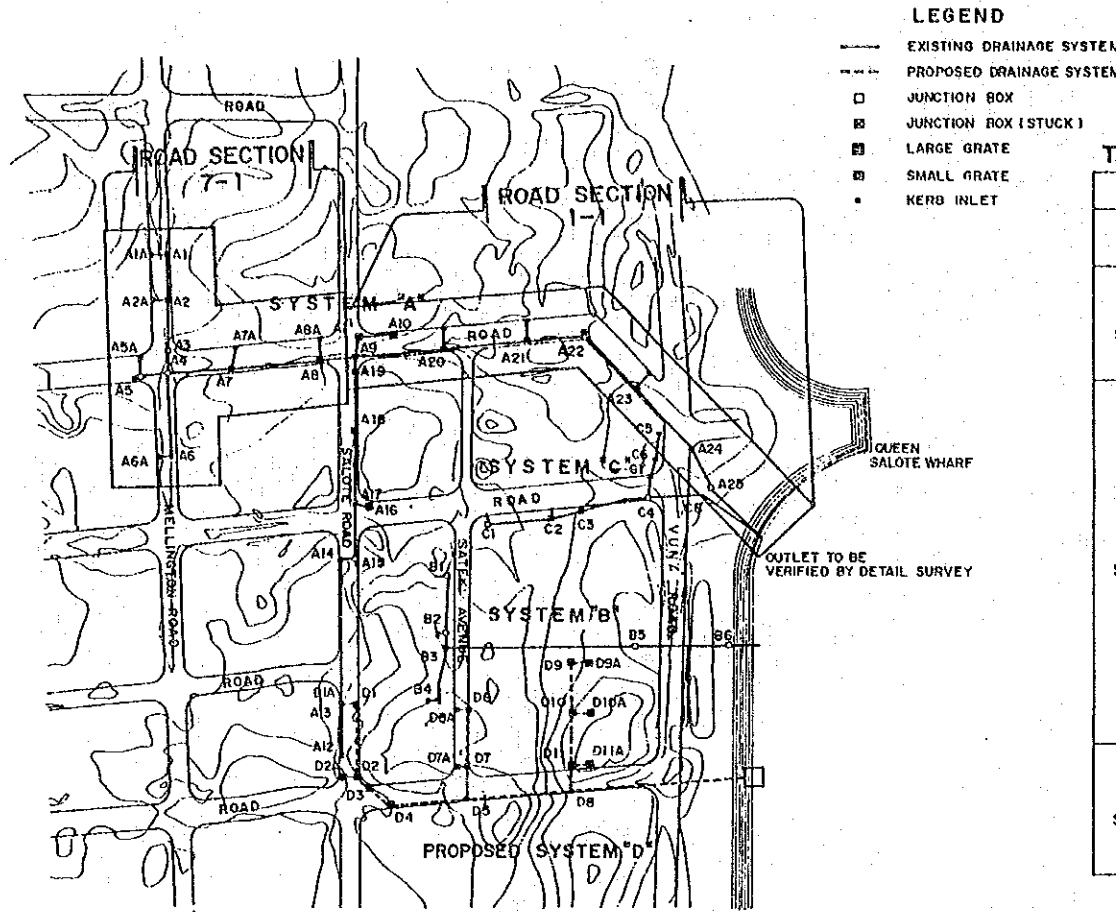
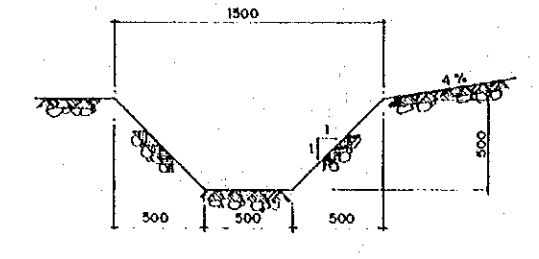
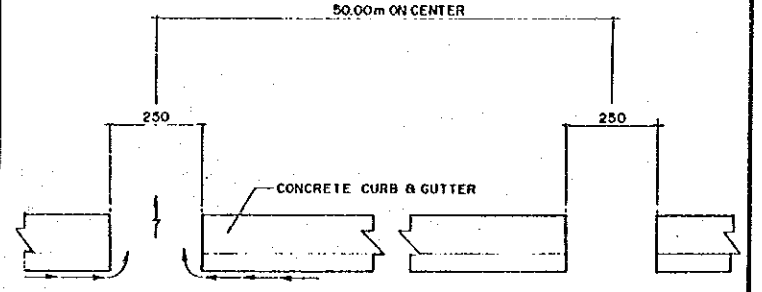


TABLE A
SCHEDULE OF DRAINAGE SYSTEM AT SECTION 7-1 & 1-1

ROAD SECTION	TYPE OF STRUCTURE	NO. OF UNIT	REMARKS
1-1 SYSTEM 'A'	CATCH INLET W/LARGE GRATE	4 EACH	TO BE CLEANED UP - LARGE GRATE ARE A-1, A-2, A-7 & A-8 - SMALL GRATE ARE A1A, A2A, A5A, A5, A6A, A6, A7A & A8A
	W/SMALL GRATE	8 EACH	
7-1 SYSTEM 'A'	LATERAL	25.00m	LATERAL STRUCTURE FROM A1 TO A2 AND THEIR CATCH INLETS TO BE CLEANED-UP. STRUCTURES FROM A1A TO A1 A2A TO A2 A2 TO A3 A3 - A4 A5A - A5 A6A - A6 A6 - A4 A5 - A4 A7A - A7 A8A - A8 A4 - A7 A7 - A8 A8 - A9 OF ROAD SECT. 1 - 1
	CROSSING PIPE	9.00m	
	CROSSING PIPE LATERAL	8.00m	
	LATERAL	30.00m	
	LATERAL	12.00m	
	CROSSING PIPE	8.00m	
	"	7.00m	
	LATERAL	45.00m	
	LATERAL	15.00m	
	CROSSING PIPE	10.00m	
1-1 SYSTEM 'A'	LATERAL STRUCTURE	15.00m	FROM A10 - A9 CROSSING STRUCTURES EACH WITH LENGTH OF 9m (±), AND CATCH INLETS. LATERAL STRUCTURES FROM A9 TO A20 TO A25 TO OUTLET
	CROSSING PIPES	27.00m	
	LATERAL STRUCTURE W/ CATCH INLET INCLUDED	260.00m	
	LATERAL	19.00m	



DETAIL OF EXISTING EARTH TO BE CLEANED UP AND RENOVATED SCALE 1:20

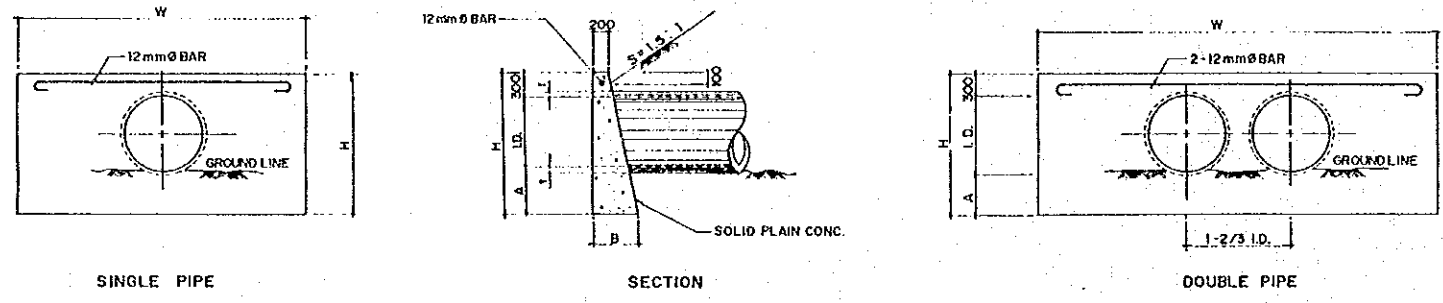


DETAIL OF CURB & GUTTER OPENING NOT TO SCALE

EXISTING AND PROPOSED DRAINAGE SYSTEM

TABLE B (SCHEDULE OF LATERAL PIPES (RCP))

STATION	TYPE OF STRUCTURE	LENGTH	REMARKS
1 + 203 - 1 + 211	610mm Ø RCP	8.00m	CONSTRUCT HEADWALLS HW(C)-A @ STA. 1 + 203 - STA. 1 + 211 FOR RENOVATION AND CLEANING UP
1 + 211 - 1 + 233	EARTH DITCH	22.00m	
1 + 233 - 1 + 241	610mm Ø RCP	8.00m	CONSTRUCT HEADWALLS HW(C)-A @ STA. 1 + 233 - STA. 1 + 241 FOR RENOVATION AND CLEANING UP
1 + 241 - 1 + 263	EARTH DITCH	22.00m	
1 + 263 - 1 + 271	610mm Ø RCP	8.00m	CONSTRUCT HEADWALLS HW(C)-A @ STA. 1 + 263 - STA. 1 + 271 STATIONS ARE TO BE VERIFIED & STRUCTURES TO BE CLEANED UP
1 + 271 - 1 + 450	EARTH DITCH/RCBC	179.00m	



STRAIGHT TYPE HEADWALL TYPE HW(C)-A NOT TO SCALE

TABLE C (ONE STRAIGHT TYPE HEADWALL) HW(C)-A

INTERNAL DIAMETER (I.D.)	MACHINE MADE MIN. THK SHELL (t)	HAND MADE MIN. THK SHELL (t)	DIMENSION (mm)				SINGLE PIPE						DOUBLE PIPE			
			A	B	H	W	CONCRETE (m³)		REINF. STEEL (Kg)	W (mm)	AREA OF WATERWAY (m²)		CONCRETE (m³)		REINF. STEEL (Kg)	
							M.M.	H.M.			M.M.	H.M.				
460	50	76	310	350	1070	1800	0.16	0.47	0.45	5	2600	0.33	0.63	0.56	7	
610	64	90	410	430	1320	2400	0.29	0.87	0.85	6	3500	0.58	1.20	1.16	9	
780	76	102	510	530	1570	3000	0.45	1.50	1.47	8	4400	0.90	2.02	1.97	11	
910	86	114	610	600	1920	3600	0.65	2.32	2.28	10	5200	1.30	3.16	3.09	13	
1220	108	-	810	810	2330	4800	1.17	4.94	-	12	6900	2.34	6.70	-	17	

