APPENDIX 6

PICTURES OF FIELD ACTIVITIES

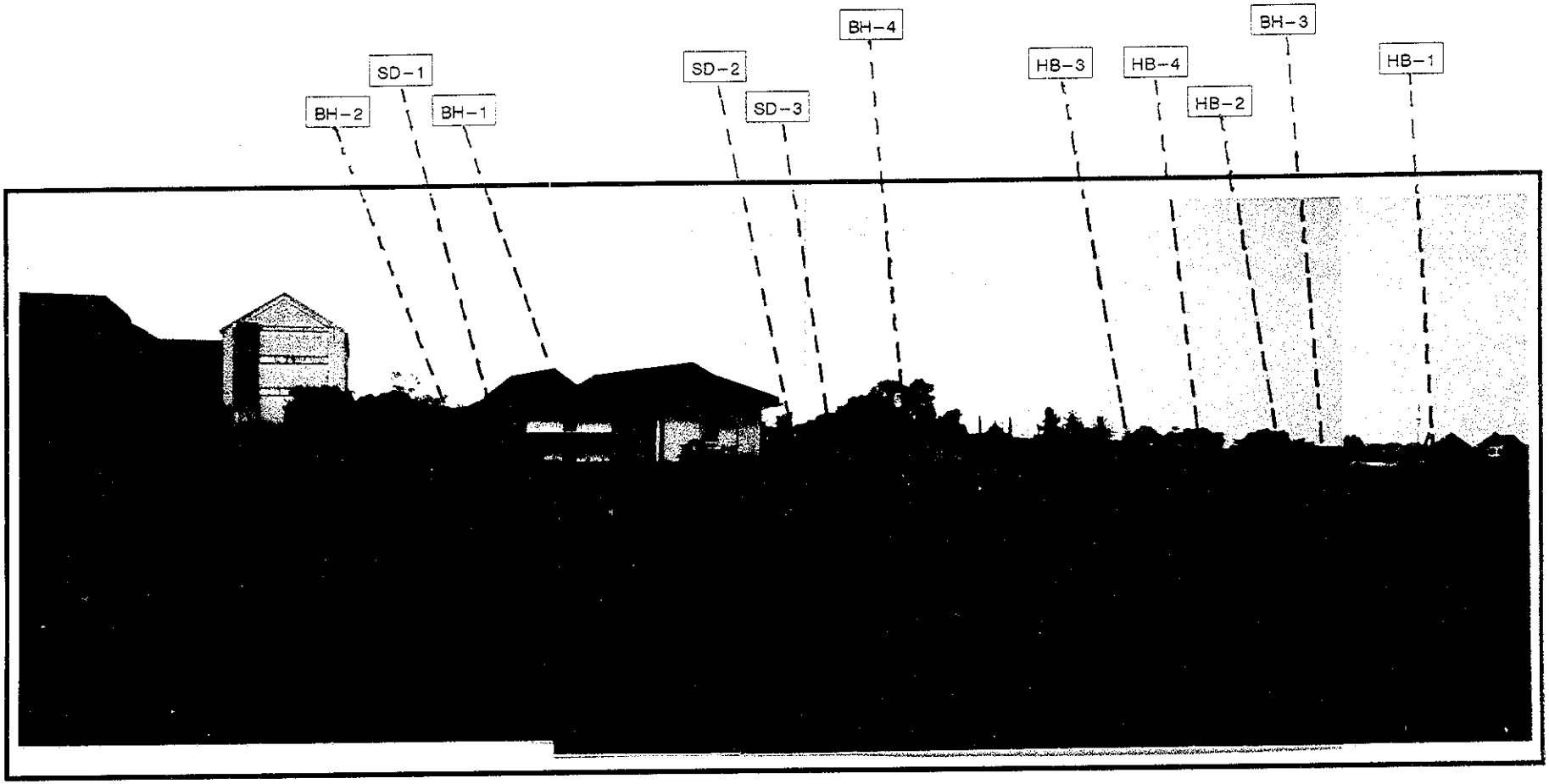


Figure 1 : Investigation Location Point : Bore Hole, Dutch Cone Panetration, and Hand Borin Ikip – Bandung



Figure 2 : Activity Machine Drilling at BH – 1 and Standard Penetration Test.



Figure 3 : Activity Machine Drilling at BH – 2 and Standard Penetration Test.

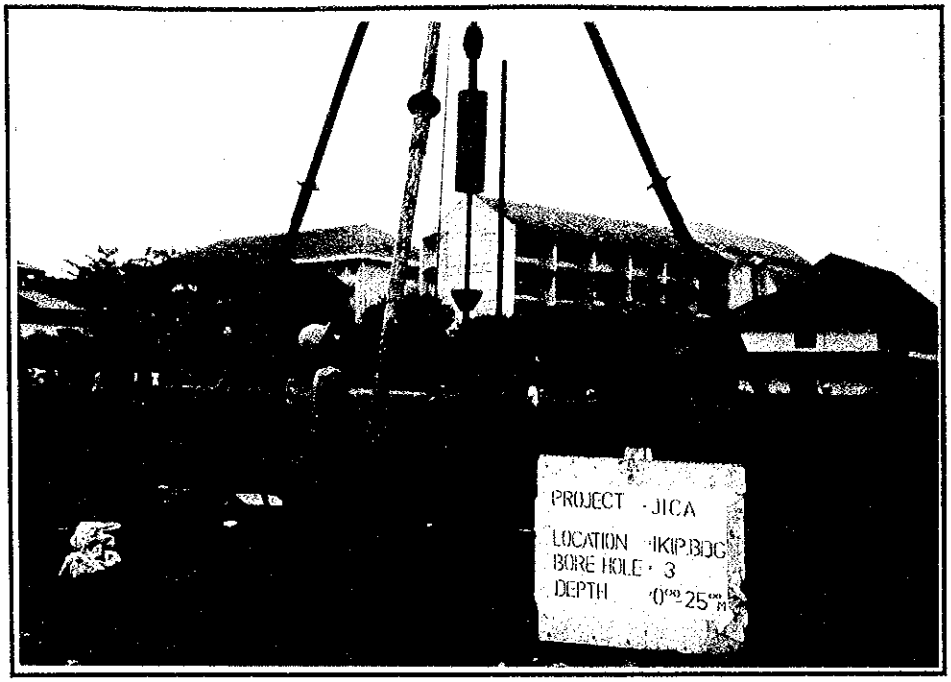


Figure 4 : Activity Machine Drilling at BH – 3 and Standard Penetration Test.



Figure 5 : Activity Machine Drilling at BH – 4 and Standard Penetration Test.

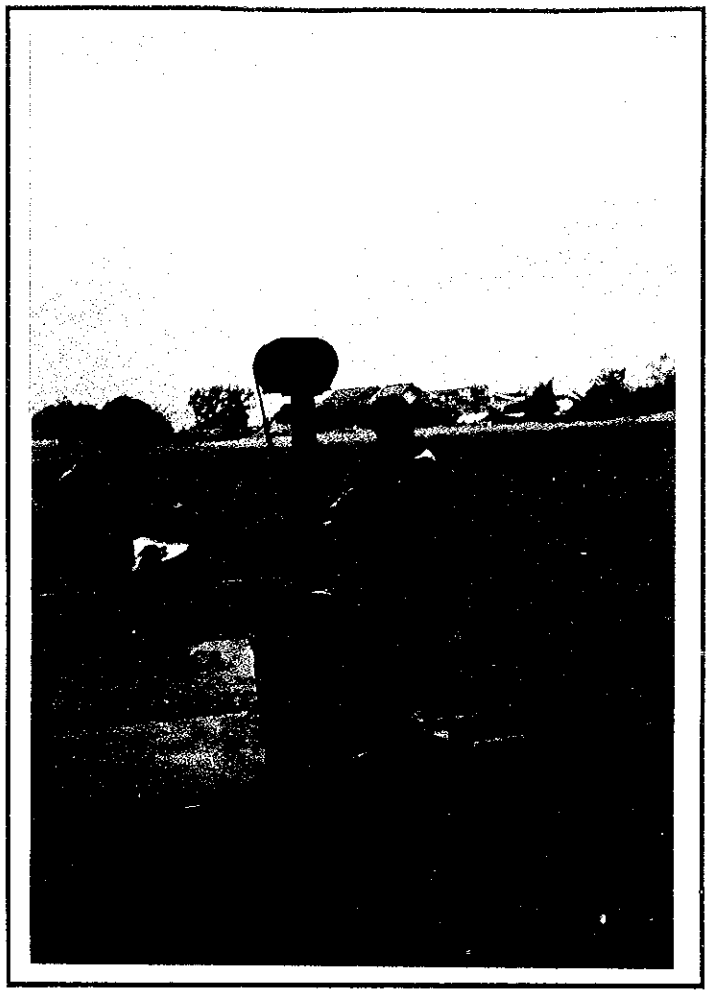


Figure 6 : Activity Ducth Cone Penetration Test SD – 1



Figure 7 : Activity Ducth Cone Penetration Test SD – 2

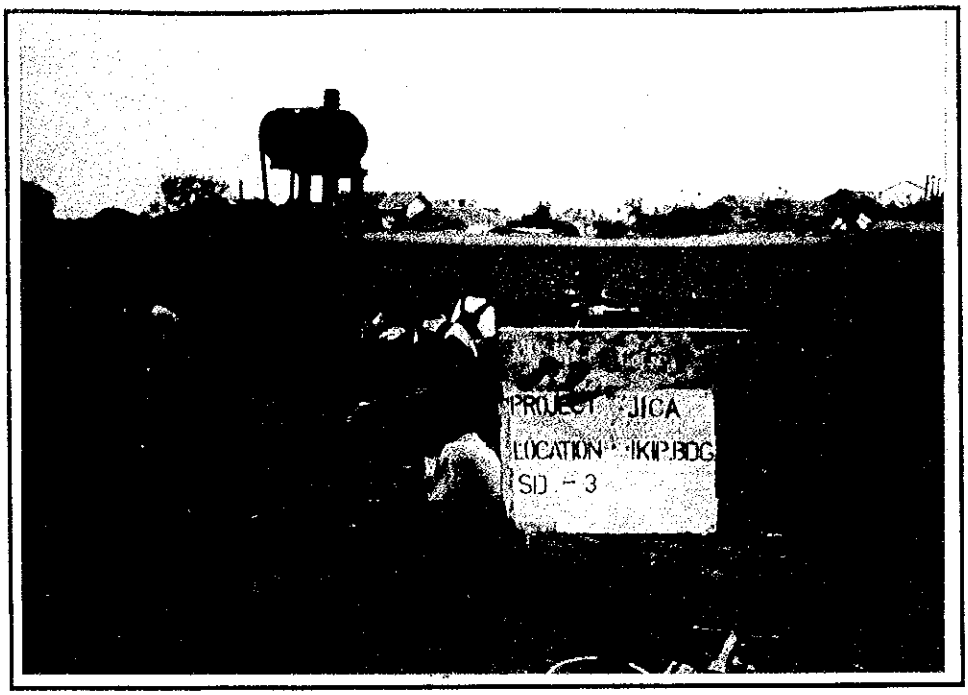


Figure 8 : Activity Ducth Cone Penetration Test SD – 3

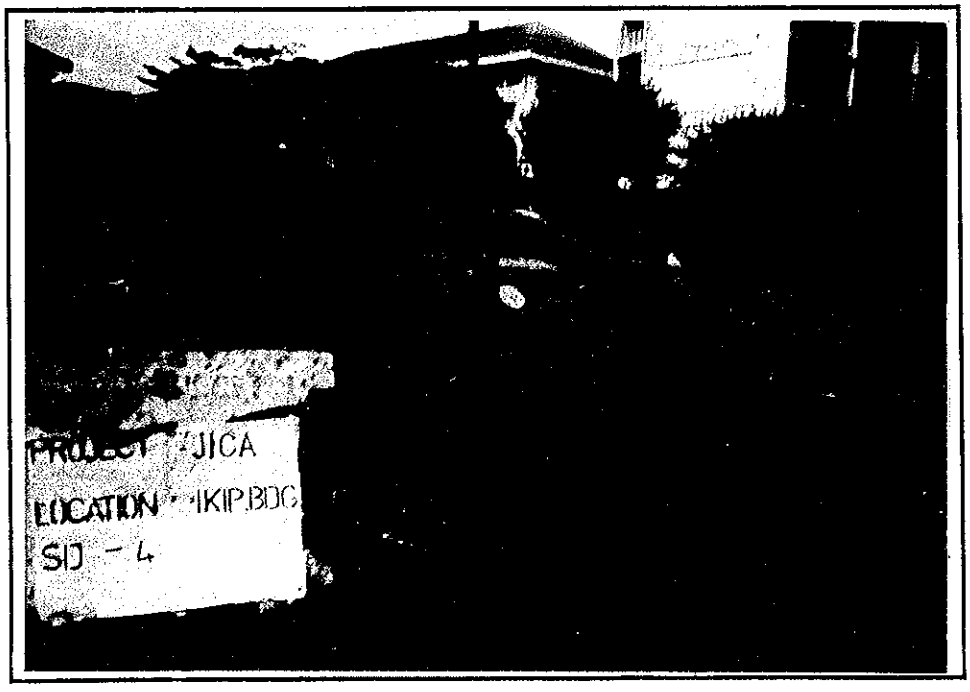


Figure 9 : Activity Ducth Cone Penetration Test SD – 4

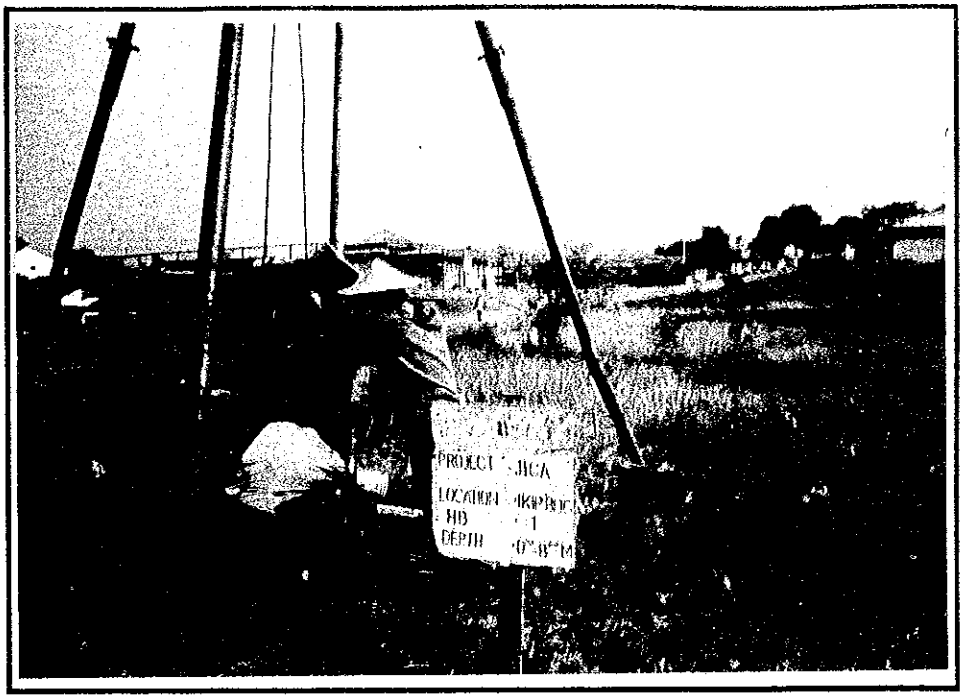


Figure 10 : Activity Machine Drilling at HB – 1

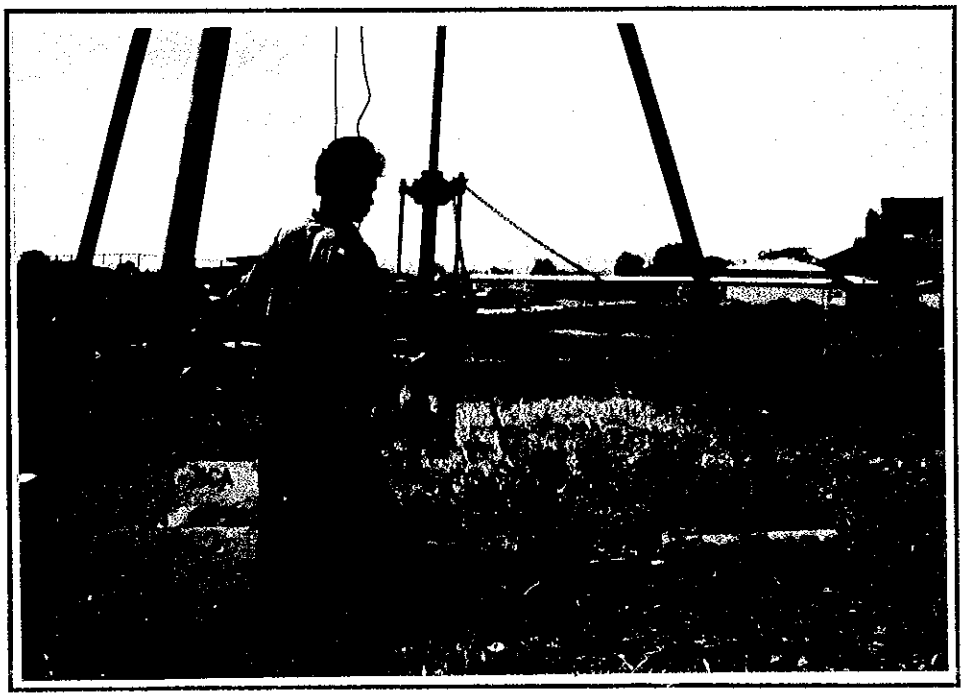


Figure 11 : Activity Machine Drilling at HB – 1



Figure 12 : Activity Machine Drilling at HB – 3

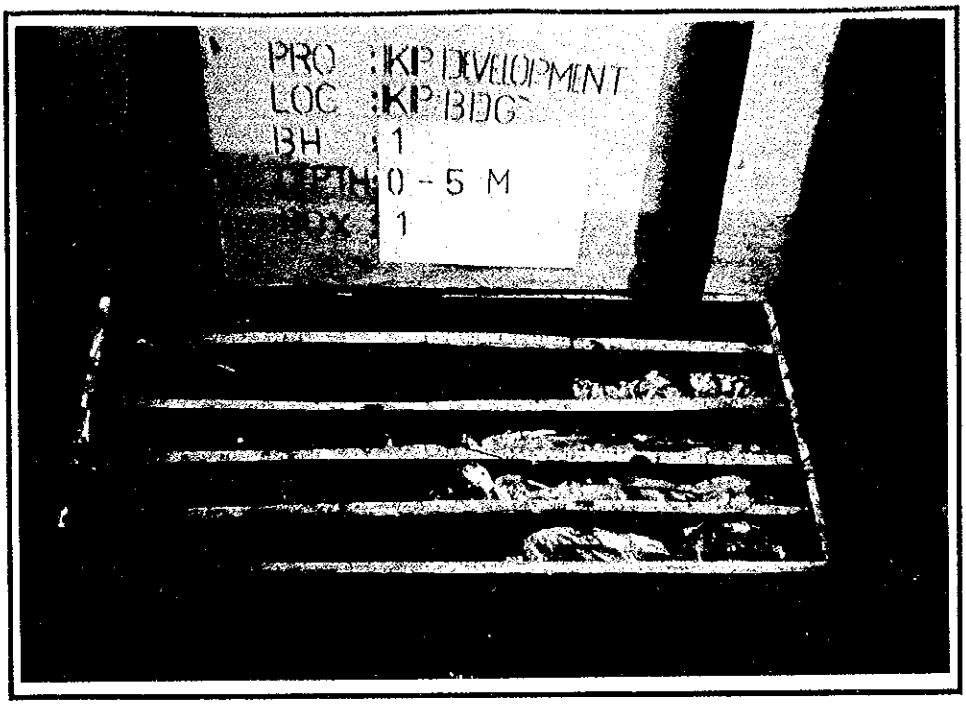


Figure 13 : Bore Hole (BH–1) Core Sample Depth : 0 – 5 m

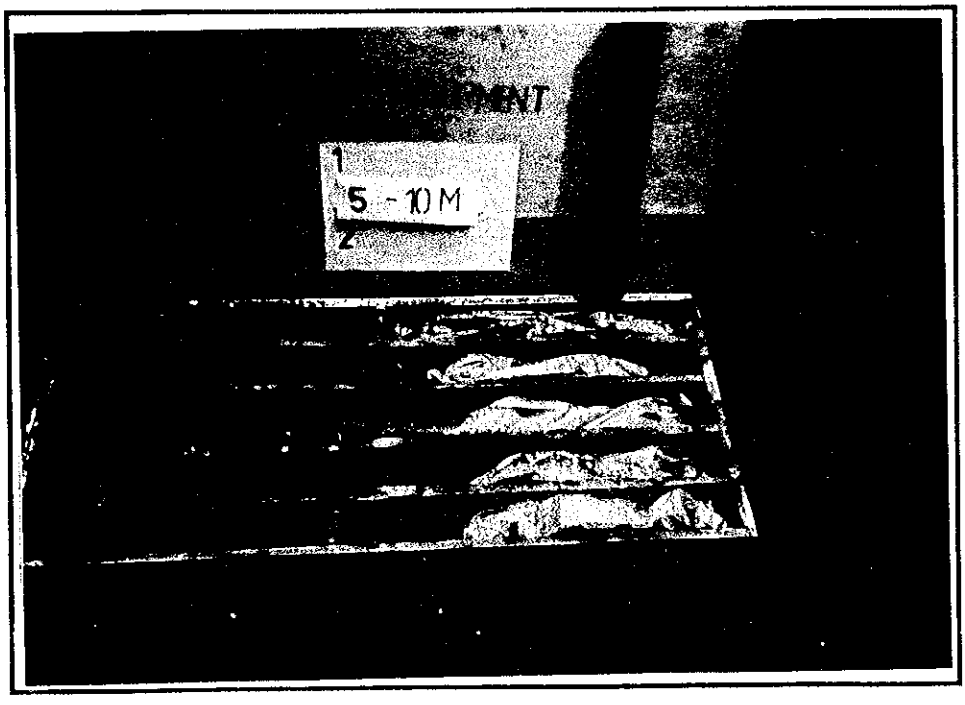


Figure 14 : Bore Hole (BH–1) Core Sample Depth : 5 – 10 r

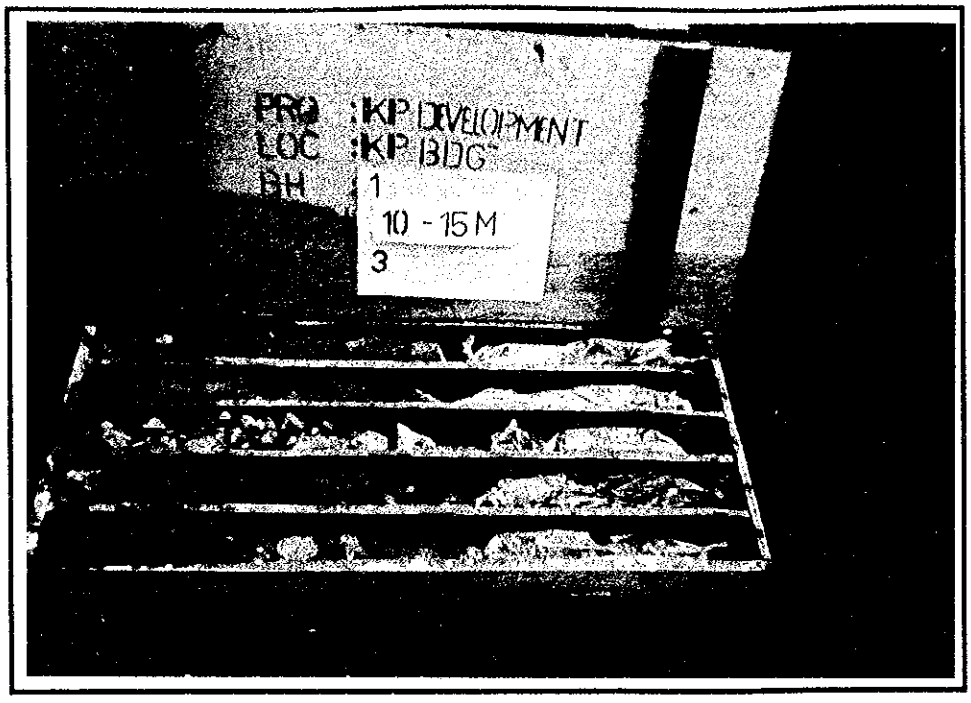


Figure 15 : Bore Hole (BH–1) Core Sample Depth : 10 – 15

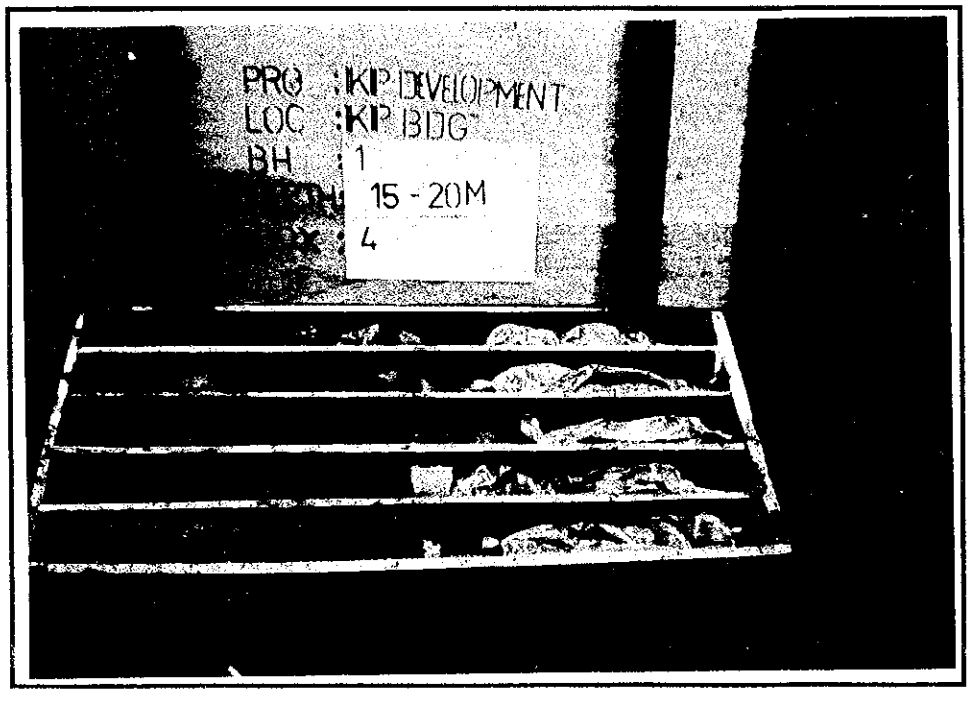


Figure 16 : Bore Hole (BH–1) Core Sample Depth : 15 – 20



Figure 17 : Bore Hole (BH–1) Core Sample Depth : 20 – 25

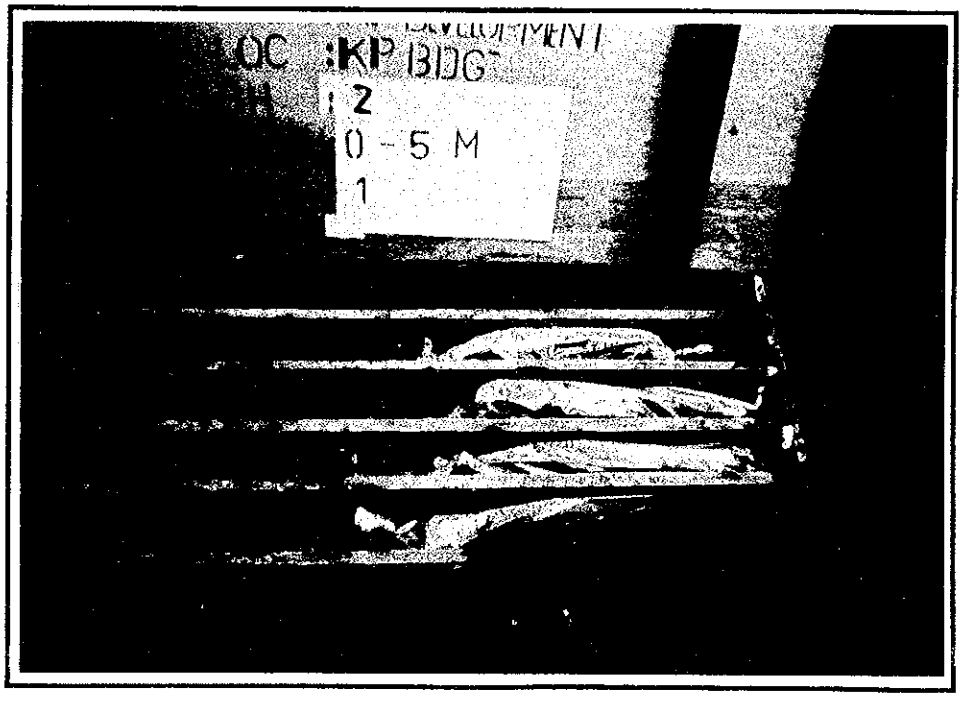


Figure 18 : Bore Hole (BH–2) Core Sample Depth : 0 – 5 m

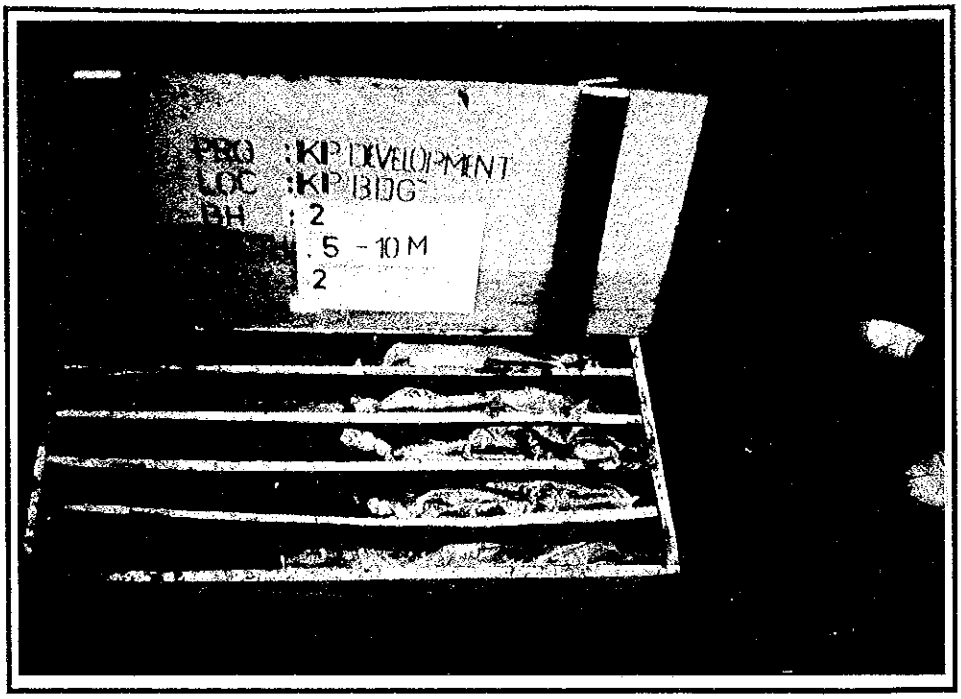


Figure 19 : Bore Hole (BH–2) Core Sample Depth : 5 – 10 r

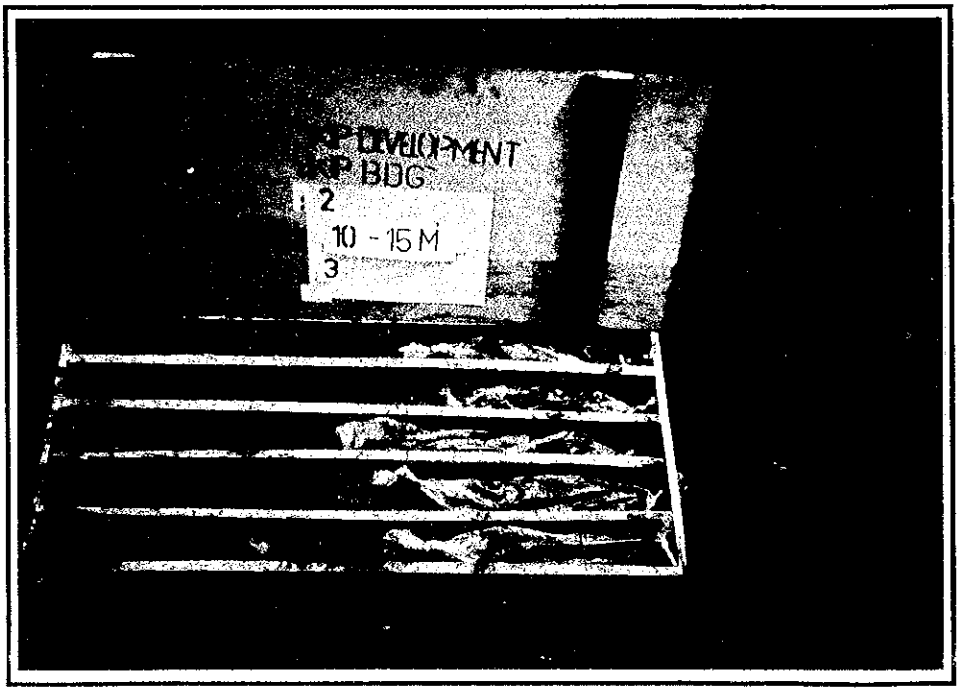


Figure 20 : Bore Hole (BH–2) Core Sample Depth : 10 – 15

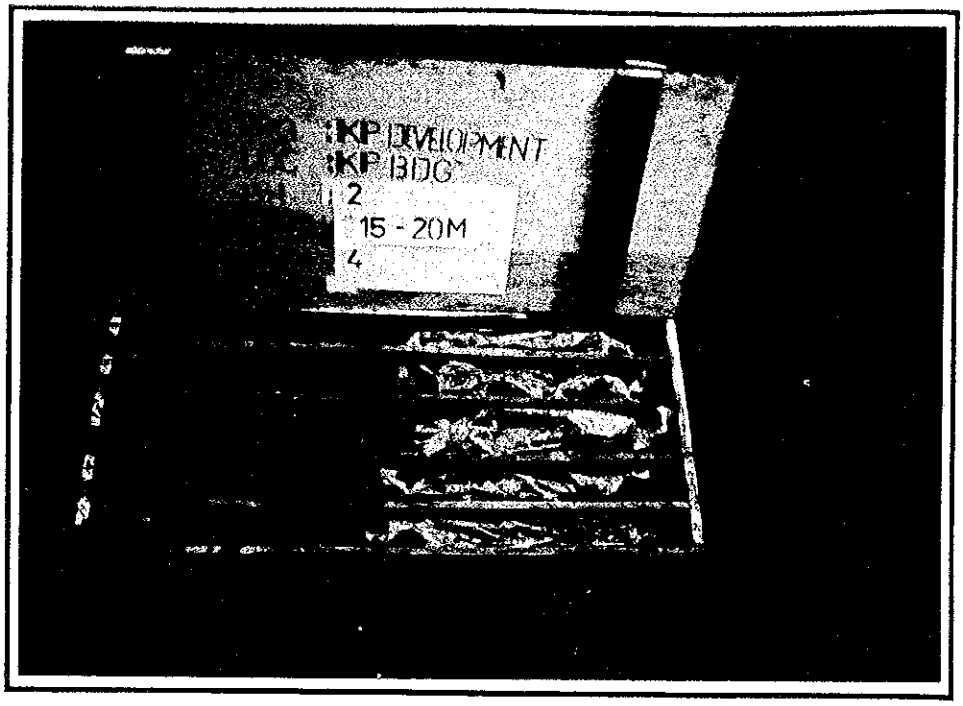


Figure 21 : Bore Hole (BH–2) Core Sample Depth : 15 – 20 m.

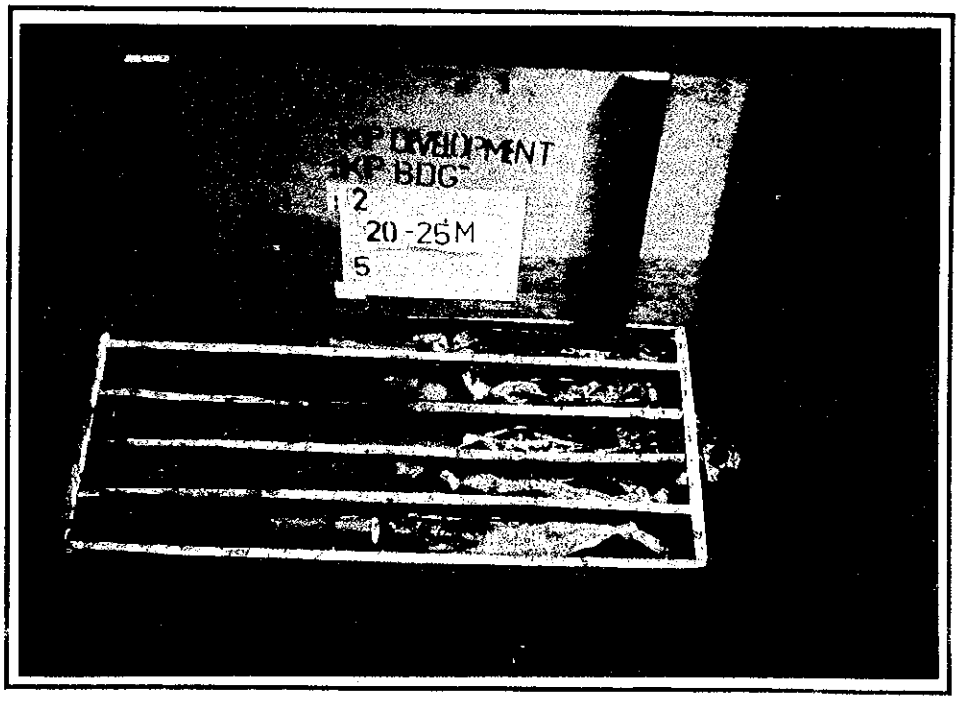


Figure 22 : Bore Hole (BH–2) Core Sample Depth : 20 – 25 m.

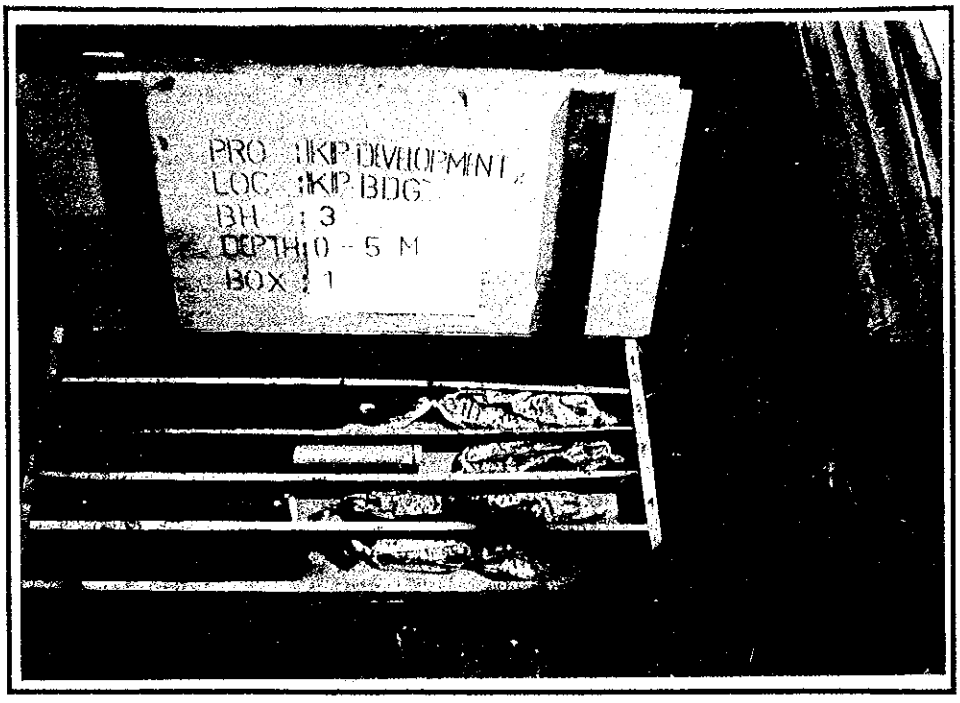


Figure 23 : Bore Hole (BH–3) Core Sample Depth : 0 – 5 m.

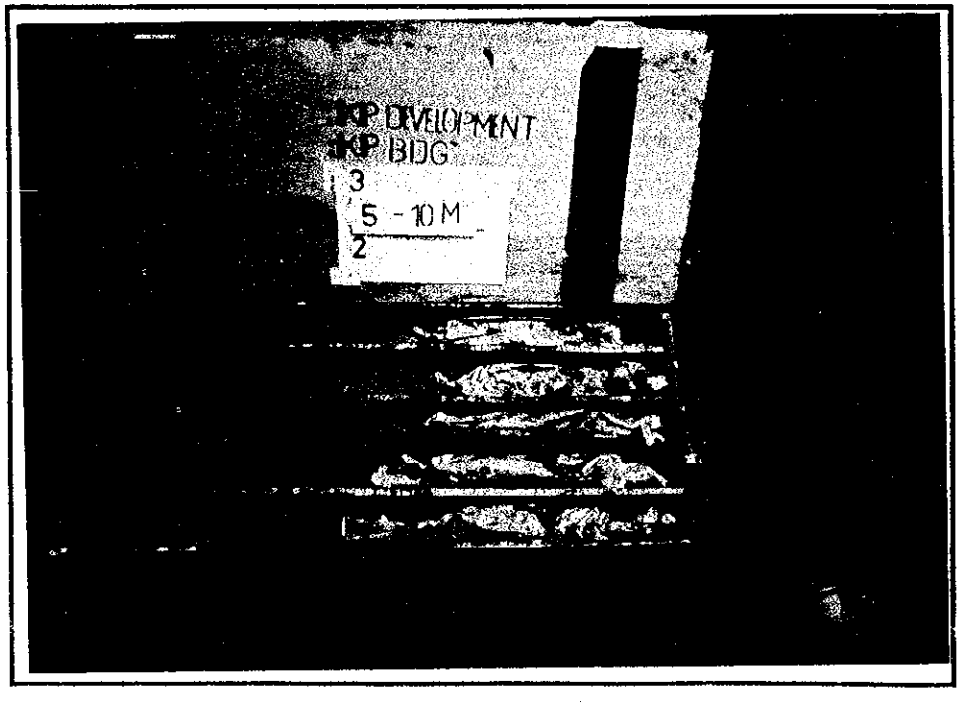


Figure 24 : Bore Hole (BH–2) Core Sample Depth : 5 – 10 m.

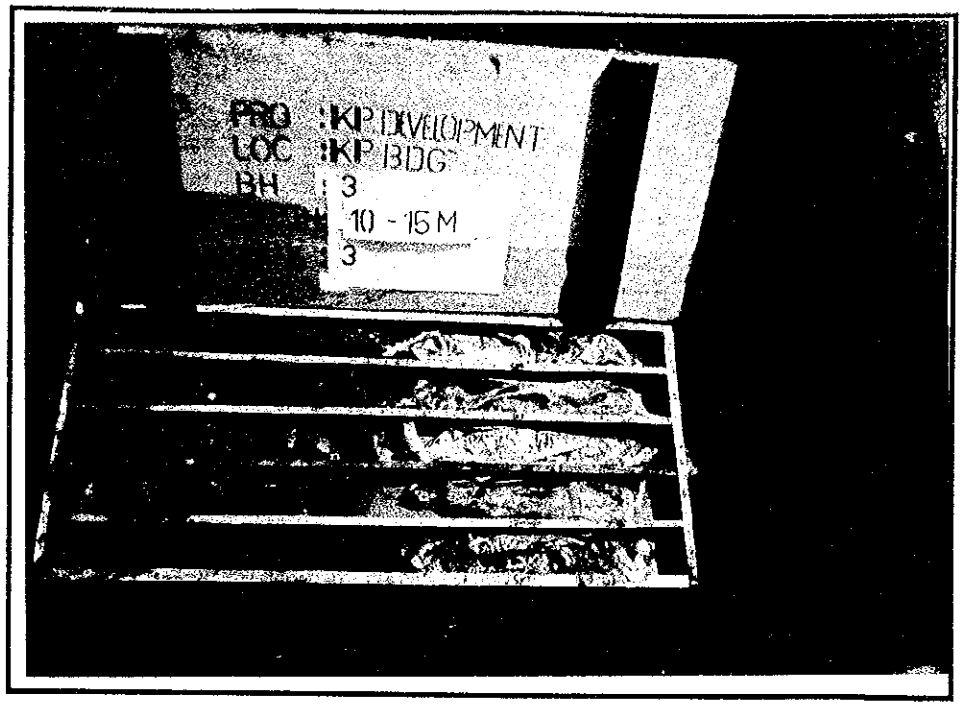


Figure 25 : Bore Hole (BH–3) Core Sample Depth : 10 – 15 m.



Figure 26 : Bore Hole (BH–3) Core Sample Depth : 15 – 20 m.

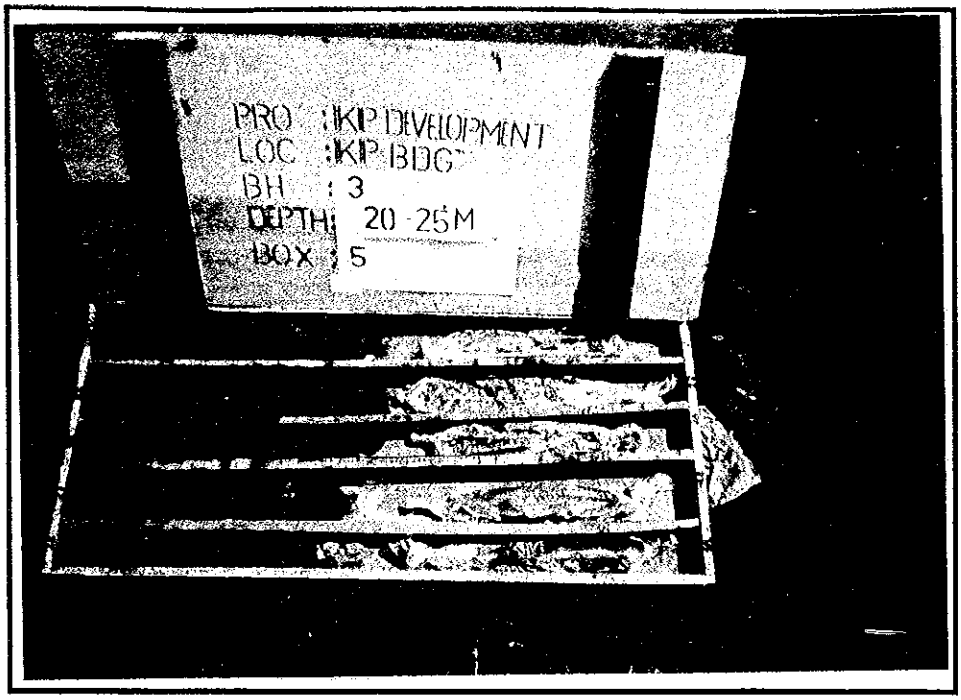


Figure 27 : Bore Hole (BH–3) Core Sample Depth : 20 – 25 m.

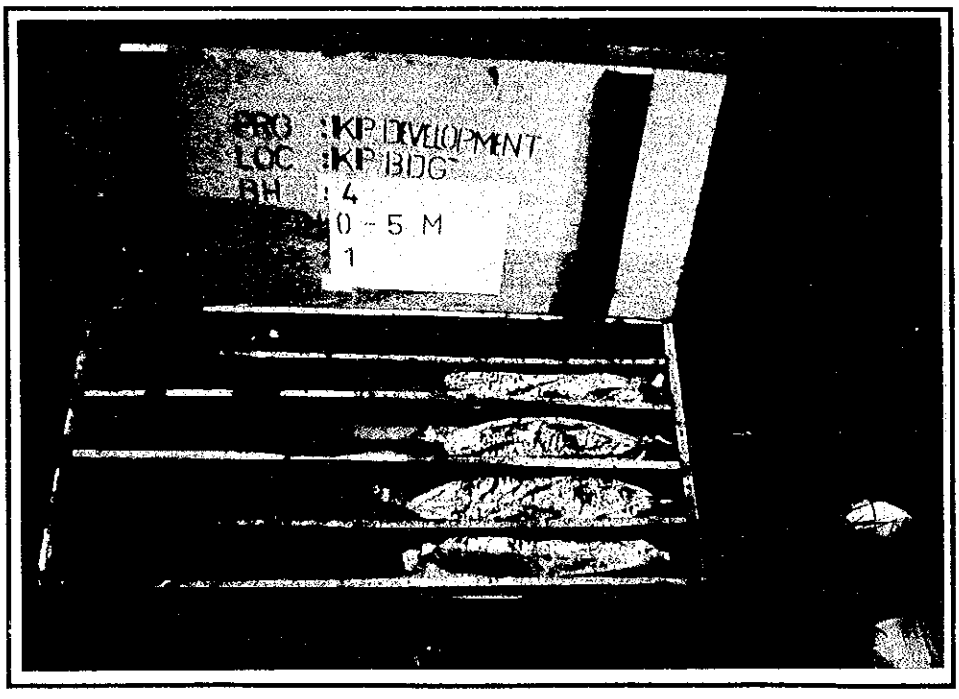


Figure 28 : Bore Hole (BH–4) Core Sample Depth : 0 – 5 m.



Figure 29 : Bore Hole (BH–4) Core Sample Depth : 5 – 10 m.

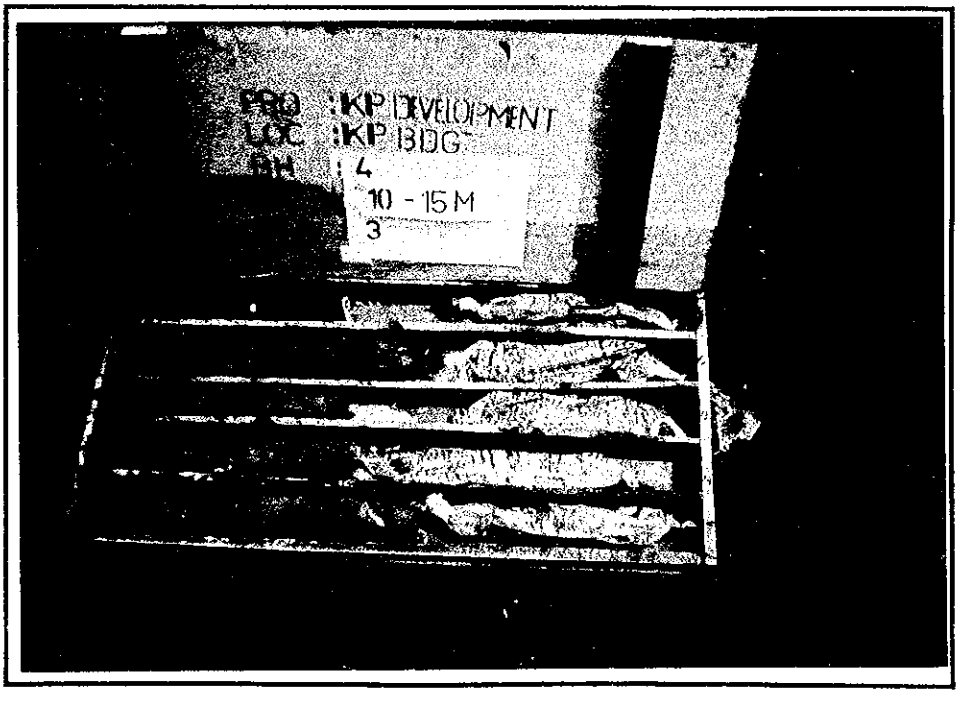


Figure 30 : Bore Hole (BH–4) Core Sample Depth : 10 – 15 m.

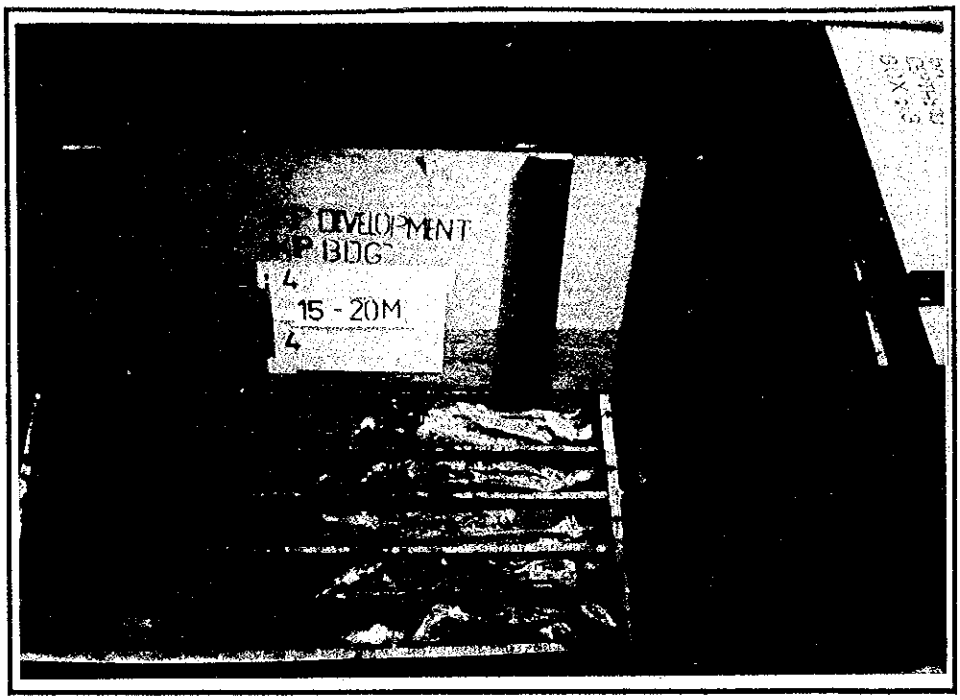


Figure 31 : Bore Hole (BH–4) Core Sample Depth : 15 – 20 m.

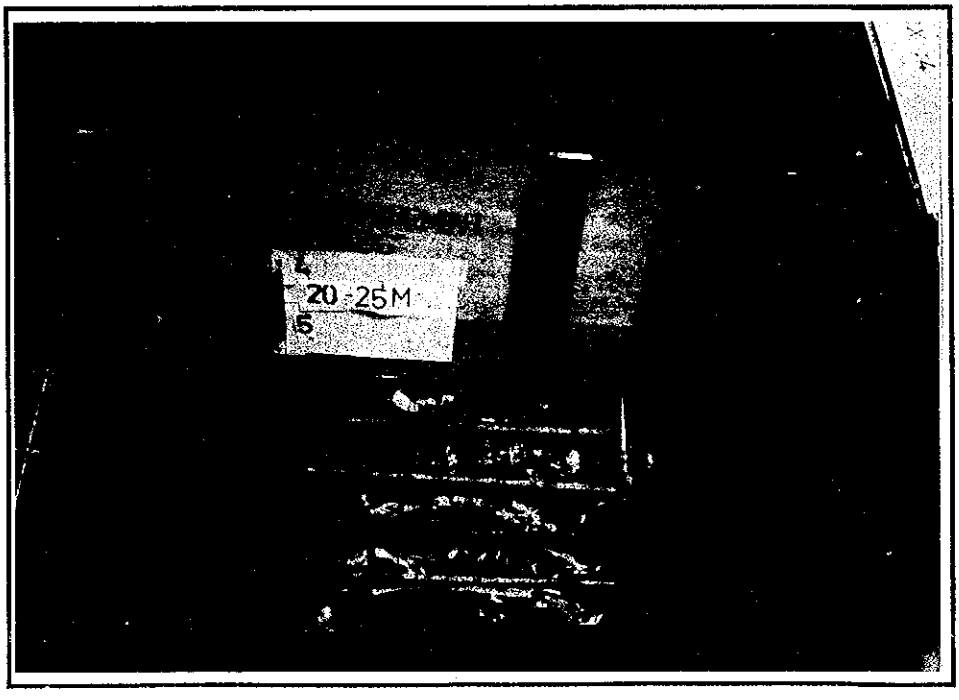


Figure 32 : Bore Hole (BH–4) Core Sample Depth : 20 – 25 m.

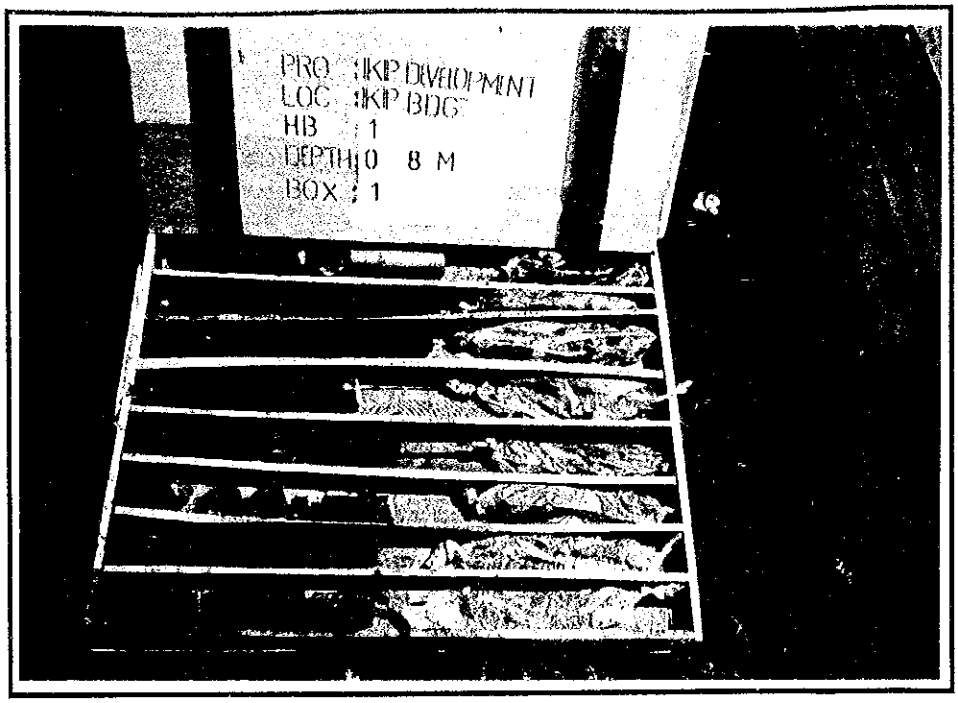


Figure 33 : Bore Hole (BH–1) Core Sample Depth : 0 – 8 m.

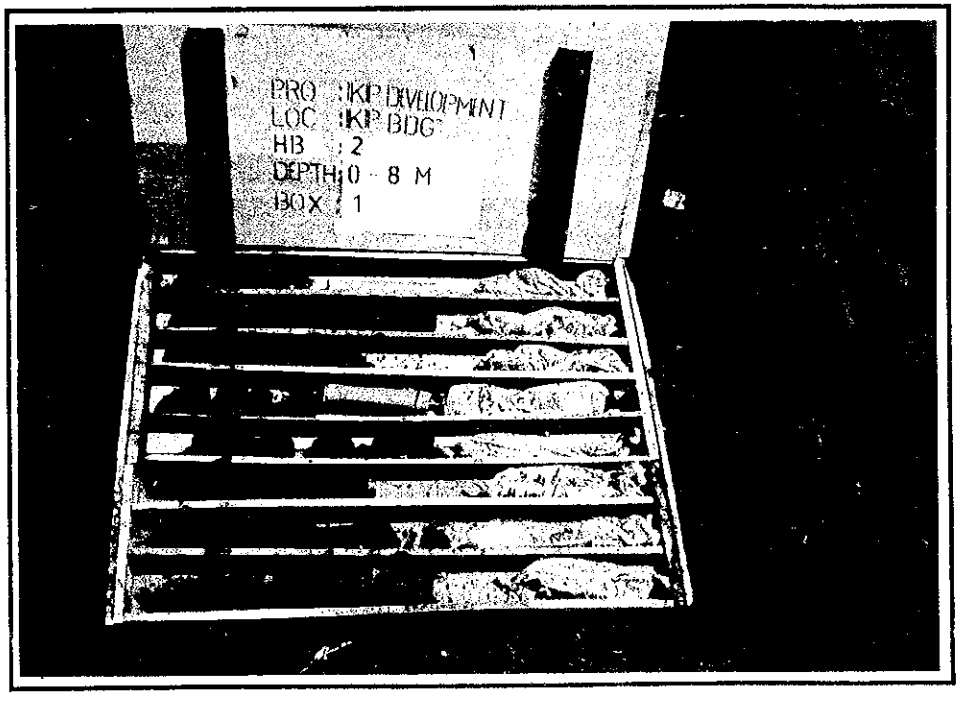


Figure 34 : Bore Hole (BH–2) Core Sample Depth : 0 – 8 m.

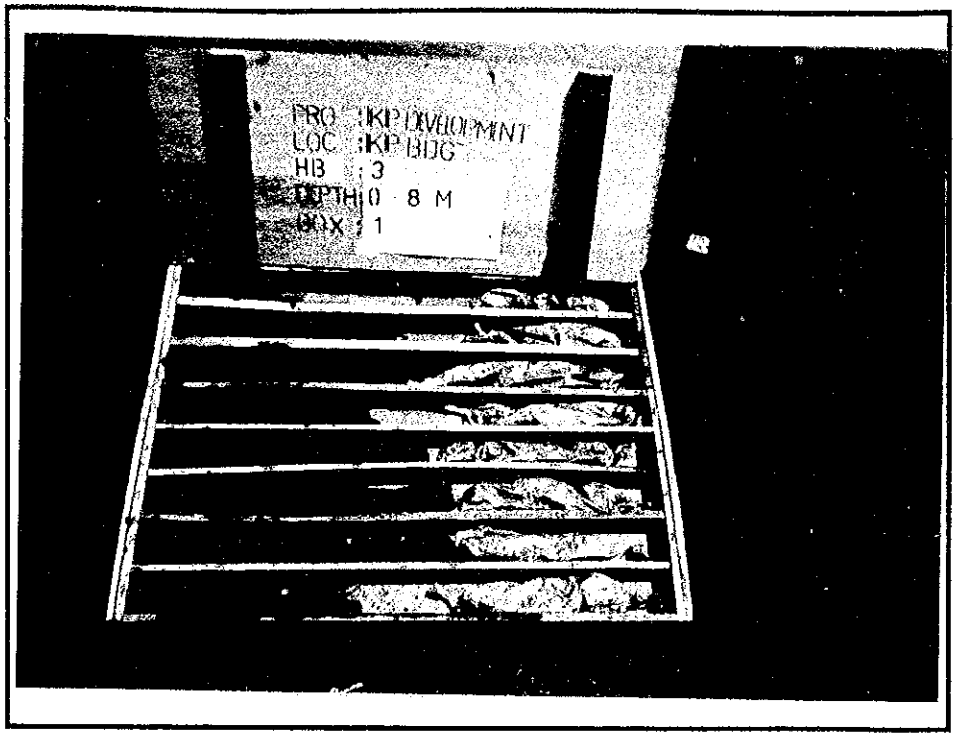


Figure 35 : Bore Hole (BH–3) Core Sample Depth : 0 – 8 m.

JAPAN INTERNATIONAL COOPERATION AGENCY
(J I C A)

TOPOGRAPHICAL SURVEY AND MAPPING
FOR
DEVELOPMENT OF SCIENCE AND
MATHEMATICS TEACHING FOR
PRIMARY AND SECONDARY EDUCATION PROJECT
IKIP - BANDUNG

FINAL REPORT

March 1999

Revision : 0

CONSULTANT :

PACIFIC CONSULTANTS INTERNATIONAL
Consulting Engineers and Architects
7-5, Sekido 1-chome, Tama-shi, Tokyo-206 JAPAN, Ph. 81-423-72-0111

SURVEY CONSULTANT :

PT BITA ENARCONENGINEERING
ENGINEERS • ARCHITECTS • CONSULTANTS
JL. PAHLAWAN NO. 74 - BANDUNG 40124; PHONE (022) 702748 (HUNTING); FAX. (022) 702749
JL. R I N I NO.61 AMPERA RAYA-RAGUNAN, JAKARTA SELATAN 12560; PHONE (021) 78833354; FAX (021) 7804137

Table of Content

1.	Introduction	1
2.	Scope of Works	1
3.	Methodology	2
	3.1. Benchmark Establishment	2
	3.2. Horizontal Control Network	3
	3.3. Vertical Control Network	4
	3.4. Detailed / Mesh Survey	4
	3.5. Stake Out of Borehole and DCPT Location	5
	3.6. Draft of Drawing / Map	6
	3.7. Digitizing	6
	3.8. Plotting	6
4.	Calculation Process	7
	4.1. Polygon	7
	4.2. Levelling	7
5.	Mapping	8
6.	Personnel and Equipment	9
	6.1. Field Works	9
	6.2. Office Works	9

APPENDICES :

Appendix 1 : Calculation of Polygon - Ring I and Ring II

Appendix 2 : Calculation of Levelling

Appendix 3 : Pictures of New Benchmarks (JICA 1, JICA 2, JICA 3)

Appendix 4 : Drawing No: 910.001 (Topographical Map and Site Lay Out)

1. INTRODUCTION

Under the aid funded by **Japan International Cooperation Agency (JICA)**, a new building units for the purpose of Development of Science and Mathematics Teaching For Primary and Secondary Education are to be constructed in the allocated lot inside IKIP compounds in Bandung, Indonesia.

Pacific Consultants International (PCI) being the consultant for this project requires existing map of the project site in order to carry out Design Engineering. The Topographical Survey and Mapping are required to produce information on the surface elevations and general features of the project site.

PT. BITA Enarcon Engineering (BITA) is retained by **PCI** to provide the service to carry out Topographical Survey and Mapping for the above purpose.

Following the Draft Report which has been reviewed by PCI, this report serves as Final Report on the above assignment and consists of methodology, calculation and relevant attachments.

2. SCOPE OF WORK

The scope of work of the Topographical mapping for this project under the contract is as follows :

Field works :

a. Benchmark establishment
b. Vertical Control Network
c. Detail Survey
d. Horizontal Control Network
e. Stake out of Bore hole and DCPT position

Office works :

a. Drafting of Drawing / Map
b. Digitizing
c. Plotting

All of the above item of works cover the area of 1.5 Ha .

3. METHODOLOGY

As describe on the scope of work, the field works of Topographical Survey and Mapping for this project, consist of **five (5)** items of work, from Bench mark establishment to Staking out of Borehole and DCPT location. While the office works includes **three (3)** items of works, from drafting of drawing / map to plotting.

The followings are methods of each task to be prepared.

3.1. Benchmark Establisment

All benchmarks were setup on the strategic location and relatively stable ground, so it can be easily used for next survey works by maintaining the coordinate and elevation value. Three Bench Marks were designated as **JICA-1** located near Post Graduate Building,**JICA-2** located near tennis court and **JICA-3** located in the north side of northern asphalt road of the project site near Art Storage Building.

The Bench Marks were constructed based on a standard specification usually used in similar condition of the soil ***(see figure. 1)***. Red paint has been applied for these Bench Marks to stand out in the open field.

The Coordinates of the new Bench Marks are as follows : **(table -1)**

BM	Northing (m)	Easting (m)	Elevation (m)
JICA-1	859.843	1223,390	94.651
JICA-2	897.394	1080.489	96.648
JICA-3	942.158	1115.939	99.027

3.2. Horizontal Control Network

To determine the horizontal position (E , N) , a polygon traversing survey has been carried out using Theodolite having accuracy for reading angle up to seconds. The distance measurement was determined using Electronic Distance Meter (EDM) with reading accuracy up to 0.001 m.

Prior to carrying out this activity, a checking survey to the existing BMs ie ; BM.01, BM.02 and BM.04 , used as reference, was done. This checking survey indicate that **BM 02** can be utilized since the condition is still stable.

Polygon Survey :

* Surveying path was prepared on a temporary working map.
* Survey starts from BM.02 and went along a planned path above to go around and come back to BM.02. (see polygon line in the map).
* Reading of the angle were carried out with double series method to ensure accurate reading.
* For distance measurement, at least three (3) times reading at each position and averaged were adopted.

Allowable Correction :

* Closure error for a round trip survey is = 10 $\sqrt{n}$ where n = number of points / angle being surveyed.
* Relative error is less than or same as 1 : 10000.

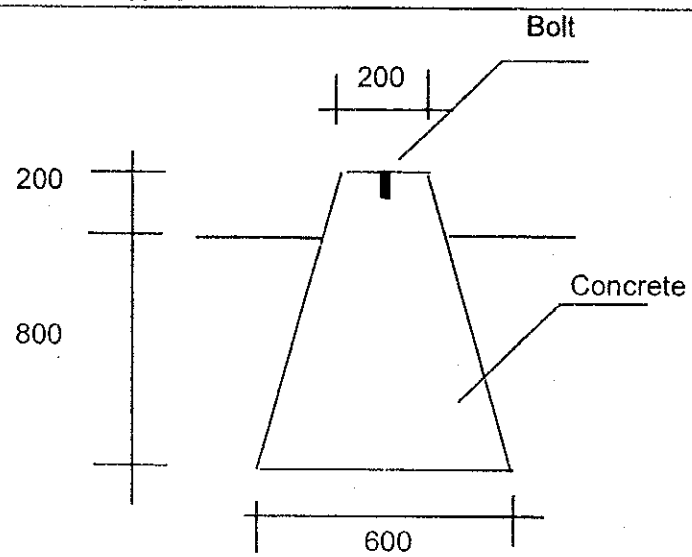


Figure 1

3.3. Vertical Control Network

Elevation of established benchmarks are determined by Levelling traversing method using Waterpass equipment based on BM 02 with Elevation of 102.477 m (local coordinates system), with the followings technical specification ;

Measurement specification

- Traversing starts from BM 02 and ends on the same point (close traverse)
- Maximum difference between each readings is 2 mm.
- The accuracy of the vertical control network is 10 mm $\sqrt{D_{km}}$, where D is total distance in kilometer.

3.4. Detail / Mesh Survey

All important feature which might be related to the development of the site in the project area (elevation, coordinates of the natural and man made feature)

are determined using mesh survey method, with the following technical specification ;

Measurement specification

* Mesh survey starts and ends on the known points (control points) using Tachimetri system.
* Measurement of the mesh survey are taken at approximate distance of 10 m plus extreme points.

3.5. Stake Out of Bore Hole and DCPT Location

The Bore Hole and DCPT points were set up prior to establishment of the new situation map, so it very much relied on the existing building as reference. Theodolite and meter band were used to do this work.

When the map was established than the points were picked and inserted in the topographical map. Result of this exercise are recorded below: **(table 2)**

Bore Hole	Easting (m)	Northing (m)	Elevation (m)
BH 1	1119.063	909.050	94.20
BH 2	1169.063	909.050	94.20
BH 3	1119.063	849.050	93.69
BH 4	1169.063	849.050	93.74
HB 1	1119.063	819.050	93.99
HB 2	1144.063	819.050	94.20
HB 3	1169.063	819.050	93.60
SD 1	1144.063	909.050	94.25
SD 2	1119.063	879.050	93.90
SD 3	1169.063	879.050	94.11
SD 4	1144.063	849.050	93.70

3.6. Draft of Drawing / Map.

The draft of drawing / map was prepared in 1 : 250 topographical map based on the survey data in the millimeter section paper, which will then be used for digitizing.

The method for the drawing of topographical map is as follows :

- Plotting all of control point by coordinate system in the specified scale
- Plotting all of detail / mesh point by polar system
- Drawing contour by interpolation method

3.7. Digitizing

Since the final product which is specified in the contract is in the digital map format, then the draft map are digitized to convert the conventional map format to the digital format.

The specification for the digitation is as follows;

- All of topographical features shall be digitized
- The group/clasification of features are stored on the different layers
- Especially for contour, index contour and other contour line are stored on the different layers.
- The digital data format is processed under AutoCad Ver. 12 format.

3.8. Plotting

To have the hard copy of the topographical map, the following specification was followed :

- The map are presented on A-0 map sheet format with 1 : 250 scale.
- Material to be used for hard copy is good quality tracing paper with black ink

4. CALCULATION PROCESS

4.1. Polygon

Polygon survey is devided into two (2) rings.

* Ring I : Checking of BM for reference.

* Ring II : Survey on the project area.

The reference BM for this survey is BM 02 (E = 1120.117; N = 1005.167 ; Elevation = 102.477).

The calculation summary for horizontal control is as follows :

Ring I : (Checking of BM)

Total traverse distance : 703,040 meters

Total turning point : 5 points

Accuracy report :

		Calculation	Allowable
Angle	:	0' 21"	22' 36"
Absis	:	0.040 m	
Ordinate	:	- 0.024 m	
Linier	:	0.064 m	
Relative	:	1 : 15,956	1 : 10,000

Ring II : (project area)

Total traverse distance : 820.293 meters

Total turning point : 11 points

Accuracy report :

		Calculation	Allowable
Angle	:	0' 17"	33' 17"
Absis	:	- 0.009 m	
Ordinate	:	0.017 m	
Linier	:	0.019 m	
Relative	:	1 : 43,143	1 : 10,000

For more details please see ***Appendix 1***

4.2. Levelling

The levelling traverse was done , using BM 02 (Elevation = 102.477 m) for reference .

The calculation summary for vertical control is as follows ;

Total traverse distance : 855.3 meters

Close error : 0,008 m < 0.00925 m (OK !)

For more details calculation please see ***Appendix 2.***

5. MAPPING

For preparing the final map, all of the reduced field datas (which is calculated and adjusted by referrence point and control points as well as control bearing) shall be plotted on the millimeter tracing paper in the specified map scale, and tracing the contour line by interpolating from the spot height.

The product of this activity is manuscript map, which is than to be used for input of digitizing.

Since the final product is digital format map, and the conventional method used for field survey, then the digital map shall be produced by transfering the manuscript map (hard copy format) to the digital format.

All details drawn on the manuscript map transfered to the digital format, and classified on several classification details which was stored on the different layers, such as :

- Ordinary contour line,
- Index contour line,
- Control points,
- Traverse line,
- Spot height,
- DCPT and Bore hole location,
- Land use.

With this different layers system, the plotting works which might be required for different purposes will be easily done.

To know about the completeness and the accuracy of the digitizing works, the digital map format were plotted on the plain paper base, so that it can be compared with the manuscript map.

6. PERSONNEL AND EQUIPMENT

6.1. Field Works

A. Personnel

Chief Surveyor/Engineer	: Sobirin, BE	
Surveyor	: Endang saeful, BE	
	M. Rais	
	Agus Indra	
Computer Operator	: Agus	

B. Equipment

E.D.M.	: Sokessa RED 2 TM 1 A	1 unit
Theodolite 2nd order	: Sokessa TM 1 A	1 unit
Theodolite 2nd order	: WILD T-2	1 unit
Theodolite Compass	: WILD T-0	1 unit
Level (Waterpass)	: Zeiss NI 2	1 unit

6.2. Office Works

A. Personnel

Engineer	: Sobirin, BE
Operator Digitation	: Agus Hermawan
	Sumarno
	Yusmanar Budiawan

B. Equipment

Computer	: PC IBM Comp	2 unit
Digitizer	: GTCO A-1	1 unit
Plotter	: Rolland Flatbed	1 unit
Printer	: Canon BJC-4100	1 unit

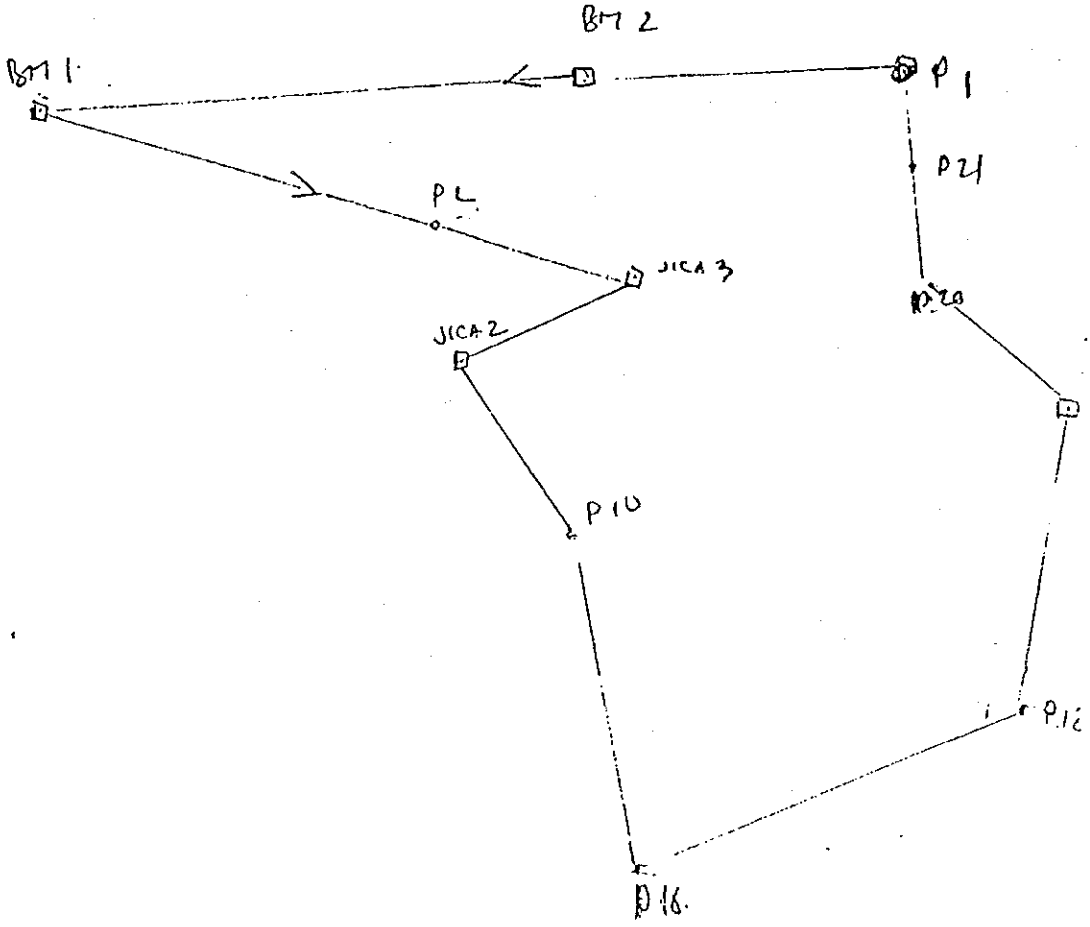
APPENDIX 1

CALCULATION OF POLYGON

RING - I and Ring - II

Skala Rencana Pengukuran

POLIGON



PENGECEKAN POSISI BM LAMA !

POLIGON

:K :

TANGGAL : 21-9-988

BI .: KAMPUS IKIP

ALAT UKUR : EUM PEN 2/41/09 TM, 1A 293

R OLEH : M-QAIS

HALAMAN :

RING 1

TITIK ARAH	BACAAN	SUDUT	JARAK		BESAR SUDUT	SUDUT V	JARAK MIRING
BM 02	B	232 59 24	120,148	B	300 32 10	88 4626	120,176
	LB	52 59 23		LB	300 32 12		
A1	LB	353 31 35	27,044	RR	300 32 11	87 3657	27,213
	B	173 31 34					
BM 01	B	113 32 12	27,074	B	169 18 10	83 3657	27,213
	LB	293 32 25		LB	169 18 06		
BM 04	LB	102 50 31	271,212	RR	169 18 08	87 3313	271,459
	B	282 50 22					
A1	B	77 40 30	271,217	B	34 36 10	92 27 11	271,416 5
	LB	257 40 21		LB	34 36 16		
A2	LB	247 16 39	264,185	RR	34 36 14	92 3026	264,418 7
	B	67 16 40					
BM 03	B	88 23 48	264,188	B	97 44 32	87 3058	264,436
	LB	268 23 53		LB	97 44 26		
BM 04	LB	06 08 19	60,487	RR	97 44 29	90 3454	60,490 39
	B	186 08 20					
A2	B	157 54 59	60,449	B	342 49 18	89 2204	60,448 5
	LB	337 54 45		LB	342 49 20		
BM 01	LB	320 44 08	120,143	RR	342 49 19,5	91 0514	120,165 4 5
	B						
	B			B			
	LB			LB			
	LB						
	B			RR			
	B			B			
	LB			LB			
	LB						
	B			RR			
	B			B			
	LB			LB			
	LB						
	B			RR			
	B			B			
	LB			LB			
	LB						
	B			RR			

SKETS :

POLIGON

PROYEK :

LOKASI : KAMPUS IKIP

DIUKUR OLEH : ENDANG S.
M ROIS

TANGGAL : 22-9-1998

ALAT UKUR : EDM, REDO 2, 21109

HALAMAN : MIA, ... 2193
SOKKIA

(Ring 2)

POSISI ALAT	TITIK ARAH	BACAAN	SUDUT H	JARAK DATAR	BESAR SUDUT H		SUDUT V	JARAK MIRING
BM 02	P1	B	260 03 56	88,022	B	177 58 37	91 15 53	88,043 3 2
		LB	80 03 42		LB	177 58 58		
	BM 01	LB	258 02 40	90.5330	RR	177 58 47,5	90 5330	120.167 5
		B	78 02 33					
BM 01	BM 02	B	232 59 24	120,113	B	37 30 49	88 08 55	120.176 7 5
		LB	52 59 23		LB	37 30 54		
	P2	LB	90 30 13	88,099	RR	37 30 51,5	83 3657	88,649 8
		B	270 30 17					
P2	BM 01	B	214 05 08	88,646	B	154 02 43	90 3947	88, 652
		LB	34 05 00		LB	154 02 50		
	BM JICA3	LB	188 07 50	43.848	RR	154 02 46,5	92 4534	43, 849
		B	08 07 51					
BM JICA 3	P2	B	231 55 24	43.840	B	299,16 41	87 14 40	43, 89 1 88
		LB	51 55 24		LB	299 16 37		
	BM JICA2	LB	351 12 01	57,100	RR	299 16 39	92 1343	57,143 2 2
		B	171 12 05					
	P3	B	180 22 14		B		92 4552	
		LB			LB			
		LB			RR			
		B						
BM JICA 2	BM JICA 3	B	32 31 46	57,087	B	136 02 16	87 38 13	57, 136 40 39
		LB	212 31 51		LB	136 02 12		
	P16	LB	348 34 05	96,508	RR	136 02 15	91 4525	96, 55 3 1
		B	168 34 02					
P16	BM JICA2	B	175 07 22	96,903	B	94 16 34	88 1008	96, 552 49 9
		LB	355 07 04		LB	94 16 30		
	P18	LB	89 23 34	76,344	RR	94 16 22	90 29 51	76, 347 46 6
		B	269 23 56					
P18	P16	B	72 48 41	76, 335	B	136 31 08	89 3608	76, 337 7
		LB	252 48 46		LB	136 31 05		
	BM JICA1	LB	29 19 51	80, 574	RR	136 31 02,5	88 3828	80, 597
		B	209 19 41					
	P17	B	32 10 18	49,370	B		89 0358	
		LB			LB			
	P19	LB		29,069	RR		87 1047	
		B	194 54 15					

SKETS :

TANGGAL : 24-9-1998

NO. PATOK	SUDUT (grad)	KOREKSI	AZIMUTH (grad)	JARAK (D)	D SIN A	KOREKSI	D COS A	KOREKSI
BM02	342° 49' 19"	-4,2"	267° 32' 27"	120,151	-120,044	0,005	-5,164	0
BM 01	300° 32' 15"	-4,2	28° 04' 19,5"	27,044	12,726	0.002	23,862	-0,001
A1	169° 16' 08"	-4,2	17° 22' 23,3"	27,312	80,982	0,011	208,839	-0,011
BM04	349° 36' 14"	-4,2	186° 58' 33,1"	264,165	-32,083	0.004	-262,28	-0.011
A2	97° 44' 29"	-4,2	104° 42' 57,9"	60,437	58,454	0,008	-15,353	-0,001
BM02								
Σ	126° 0' 21"		Σ	743,009	Σ	0,046	Σ	-0024
			Koreksi sudut	0' 21"			0,046 m	
			Koreksi ijin	22'. 36"				
							Linier = 0.064 m	
			Koreksi jarak = 1/15956					
			Koreksi ijin = 1/10000					

KOORDINAT X	KOORDINAT Y	KETINGGIAN	NO. PATOK
1120, 117	1005, 167	102, 477	BM02
1060, 061	1000, 004	100, 101	BM01
1012, 786	1023, 887	—	A1
1093, 756	1282, 717	—	BM04
1061, 670	1020, 579	—	A2
1120, 117	1005, 167	102, 477	BM02

POLIGON

PROYEK :

LOKASI : KAMPUS ITKP

DIUKUR OLEH : ENDANG S.
M ROIS

TANGGAL : 22-9-1998

ALAT UKUR : EDM, RED 2, 21109

HALAMAN : MIA, — 2193
SOKKIA

(Ring 2)

POSISI ALAT	TITIK ARAH	BACAAN	SUDUT H	JARAK DATAR	BESAR SUDUT H		SUDUT V	JARAK MIRING
BM 02	P1	B	260 03 56	88,022	B	177 58 37	91 15 53	88,043 3 2
		LB	80 03 42		LB	177 58 58		
	BM 01	LB	258 02 40	90.5330	RR	177 58 47,5	90 53 30	120.167 5
		B	78 02 33					
BM 01	BM 02	B	232 59 24	120,113	B	37 30 49	88 08 55	120.176 7 9
		LB	52 59 23		LB	37 30 54		
	P2	LB	90 30 13	88,099	RR	37 30 51,5	83 36 57	88,649 8
		B	270 30 17					
P2	BM 01	B	214 05 08	88,646	B	154 02 43	90 39 47	88, 652
		LB	34 05 00		LB	154 02 50		
	BM JICA3	LB	188 07 50	43.848	RR	154 02 46,5	92 45 34	43, 899
		B	08 07 51					
BM JICA 3	P2	B	231 55 24	43.840	B	299, 16 41	87 14 40	43, 88 1 88
		LB	51 55 24		LB	299 16 37		
	BM JICA2	LB	351 12 01	57, 100	RR	299 16 39	92 13 43	57, 143 2 2
		B	171 12 05					
	P3	B	180 22 14		B		9 24 55 2	
		LB			LB			
		LB			RR			
		B						
BM JICA 2	BM JICA 3	B	32 31 46	57,087	B	136 02 16	87 38 13	57, 136 4 0 3 9
		LB	212 31 51		LB	136 02 12		
	P16	LB	348 34 05	96, 508	RR	136 02 15	91 45 25	96, 55 3 1
		B	168 34 02					
P16	BM JICA2	B	175 07 22	96, 503	B	94 16 34	88 10 08	96, 552 49 5
		LB	355 07 04		LB	94 16 30		
	P18	LB	89 23 34	76, 344	RR	94 16 22	90 29 51	76, 347 46 6
		B	269 23 56					
P18	P16	B	72 48 41	76, 335	B	136 31 08	89 36 08	76, 337 7
		LB	252 48 46		LB	136 31 05		
	BM JICA1	LB	29 19 51	80, 574	RR	136 31 02,5	88 38 28	80, 597
		B	209 19 41					
	P17	B	32 10 18	49, 370	B		89 09 58	
		LB			LB			
	P19	LB		29, 069	RR		87 10 47	
		B	194 54 15					

SKETS :

POLIGON

TANGGAL : 22-9-1995

KAMPUS IKIP

ALAT UKUR :

ENDANG SUPUL.

HALAMAN :

M RAIS

BACAAN	SUDUT	JARAK	BESAR SUDUT		SUDUT V	JARAK MIRING
B	220 04 44	80,561	B	74.29 02	91 09 11	80,582
LB	40 09 48					
LB	114 38 46	41,922	LB	74 28 53	90 14 00	41,922
B	294 38 47		RR	74 29 005		
B	142 25 45	41,909	B	253, 35 49	89 39 12	41,910
LB	322 25 42		LB	253 35 52		
LB	216 01 34	47.520	RR	253 35 512	84 55 12	47,707
B	36 01 34					
B	93 29 35	47,572	B	174 05 17	95 07 46	47,703
LB	273 29 38		LB	174 05 16		
LB	87 34 51	79,662	RR	174 05 16,5	87 58 58	79,757
B	267 34 55					
B	67 57 35	79650	B	82 10 14	92 58 58	79,758
LB	247 57 37		LB	82 10 88		
LB	330 07 45	88.025	RR	82 10 11	90 17 07	88,026
B	150 07 49					
B			B			
LB			LB			
LB			RR			
B			B			
LB			LB			
LB			RR			
B			B			
LB			LB			
LB			RR			
B			B			
LB			LB			
LB			RR			
B			B			
LB			LB			
LB			RR			

SKETS :

DIUKUR : Endang Saepul. KSE
DIHITUNG : Endang Saepul
RING : ... 2 (DUA) ....

PERHITUNGAN POLIGON

Ring 2

PROYEK : .....
LOKASI : Kampus IKIP
TANGGAL : 24 - 9 - 1998

NO. PATOK	SUDUT (°) (~~grad~~)	KOREKSI	AZIMUTH (°) (~~grad~~)	JARAK (D) m	D SIN A	KOREKSI	D COS A	KOREKSI	KOORDINAT X	KOORDINAT Y	KETINGGIAN	NO. PATOK
BM02	177° 58' 58"								1120,117	1005,167	102,477	BM02
BM01	37° 30' 54"	+1.6	276° 32' 12,7"	120,151	-120,04	0	-5,164	0	1000,642	1000,093	100,101	BM01
P2	154° 02' 50"	1,6	125° 03' 8,25"	88,639	72,562	-0.001	-50,907	0.002	1072,642	949,093	101,116	P2
JICA3	299° 16' 41"	1,6	99° 05' 51,8"	43,848	43,296	-0.001	-6,935	0.001	1115,939	942,158	99,027	JICA3
JICA2	136° 02' 16"	1,5	218° 22' 44,3"	57,100	-35,451	-0.001	-44,762	0.002	1080,489	897,394	96,648	JICA2
P16	94° 16' 34"	1,5	174° 24' 59,9"	96,344	9,390	0.000	-96,050	0.004	1089,879	801,340	93,474	P16
P18	136° 31' 05"	1,5	88° 41' 35,4"	76,344	76,324	-0.001	9.741	0.000	1166,204	803,081	93,122	P18
JICA1	74° 29' 02"	1,6	45° 12' 42"	80,574	57,185	-0.001	56,764	0.002	1223,390	859,843	94,651	JICA1
P20	253° 35' 52"	1,6	299° 41' 45,5"	41,922	-36,416	-0.001	20,768	0.001	1186,974	880,610	94,164	P20
P21	174° 05' 17"	1,5	13° 17' 39,1"	47,520	10,927	-0.001	46,247	0.002	1197,902	926,854	98,565	P21
P1	82° 10' 14"	1,5	7° 22' 57,6"	79,662	10,236	-0.001	79,002	0.003	1208,138	1005,853	102,787	P1
BM02		1,5	269° 33' 13,2"	88,025	-88,622	-0.001	-0,686	0.000	1120,117	1005,167	102,477	BM02
Σ sudut	1619° 59' 43"	Σ 17"	Σ	820,293	Σ	-0.009	Σ	0.017				

Koreksi sudut : 17"

Koreksi ijin : 33,17" ΣΔd = 0,019 m

Koreksi jarak ijin = 1/10000 +

Koreksi jarak = 1/43143

Linier = 0,019 m

APPENDIX 2

CALCULATION OF LEVELLING

DAFTAR KODRDINAT DAN ELEVASI

LOKASI : KAMPUS IKIP BANDUNG

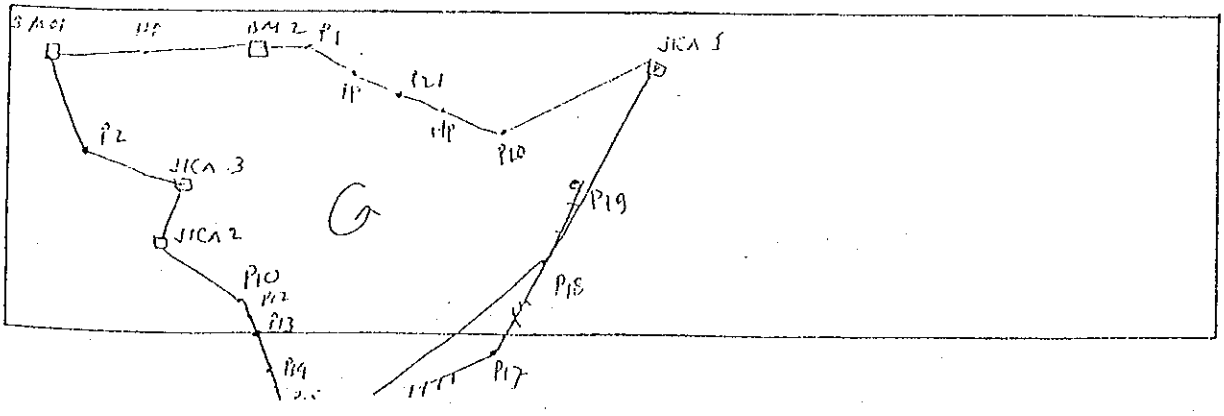
O	NAMA PATOK	KOORDINAT		ELEVASI	KETERANGAN
		X (m)	Y (m)	Z (m)	
1	BM. 2	1120, 117	1005, 167	102, 477	BM lama
2	BM - 1	1000, 642	1000, 093	100, 102	BM Lama
3	BM JICA 1	1223, 390	859, 843	94, 651	BM baru
4	BM JICA 2	1080, 489	897, 394	96, 648	BM baru
5	BM JICA 3	1115, 939	942, 158	99, 027	BM baru
6	P.1	1208, 138	1005, 853	102, 787	patok kayu
7	P.2	849, 093	949, 093	101, 116	paku di jalan
8	P.3	1115, 939	942, 158	97, 825	— " —
9	P.4	1101, 812	920, 143	97, 047	— " —
10	P.5	1100, 791	910, 210	96, 362	— " —
11	P.6	1099, 784	900, 400	95, 936	— " —
12	P.7	1098, 768	890, 491	95, 510	— " —
13	P.8	1097, 754	880, 608	95, 011	— " —
14	P.9	1096, 730	870, 632	94, 416	— " —
15	P.10	1095, 723	860, 814	93, 697	— " —
16	P.11	1094, 705	850, 891	92, 936	— " —
17	P.12	1093, 690	841, 000	92, 228	— " —
18	P.13	1092, 672	831, 078	94, 168	patok kayu
19	P.14	1091, 667	821, 280	94, 321	patok kayu
20	P.15	1090, 647	811, 345	93, 864	— " —
21	P.16	1089, 879	801, 340	93, 474	— " —
22	P.17	1120, 416	784, 631	93.653	— " —
23	P.18	1166, 204	803, 081	93, 122	— " —
24	P.19	1181, 065	828, 24	94, 248	— " —
25	P.20	1186, 974	880, 610	94, 164	— " —
26	P.21	1197, 902	926, 854	98, 565	— " —

Lokasi : KAMPUS IKIP

LEVELLING

TGL : 21-09-'48
DIUKUR : M. KAIS. CJ.
ALAT : WP. ZEIS NI 2.

TITIK ALAT	ARAH	NAMA TARGET	STAND 1 Bacaan benang ATAS	STAND 1 Bacaan benang TENGAH	STAND 1 Bacaan benang BAWAH	STAND 1 BEDA TINGGI	STAND 2 Bacaan benang ATAS	STAND 2 Bacaan benang TENGAH	STAND 2 Bacaan benang BAWAH	STAND 2 BEDA TINGGI	Rata-rata beda tinggi	Jarak (m)
1	B	BM 2	0642	0460	0297	-1.238	0597	0423	0247	-1.239	-1.238	34,5
	M	HP	1852	1698	1542		1803	1662	1498			31,0
2	B	HP	1215	1080	0945	-1.140	1159	1025	0892	-1.140	-1.140	27,0
	M	BM 1	2358	2220	2082		2305	2165	2025			27,6
3	B	BM 1	2110	1905	1702	+1.013	2145	1935	1725	+1.015	+1.014	40,8
	M	P2	1140	0892	0650		1160	0920	0680			49,0
4	B	P2	0282	0210	0138	-2,090	0318	0248	0177	-2,090	-2,090	14,4
	M	JICA 3	2455	2300	2145		2492	2338	2282			31,0
5	B	JICA 3	0127	0022	–	-2,378	0168	0065	–	-2,380	-2,379	21,0
	M	JICA 2	2582	2400	2212		2637	2445	2260			37,0
6	B	JICA 2	0145	0034	–	-2,956	0122	0012	–	-2,955	-2,956	21,8
	M	P 10	–	2990	2900		–	2967	2876			18,0
7	B	P10	0911	0877	0841	-1,466	0912	0877	0842	-1.465	-1.466	7,0
	M	P12	2407	2343	2277		2406	2342	2278			13,0
8	B	P12	2364	2337	2312	+1.940	2298	2272	2246	+1.941	+1.940	5,2
	M	P13	0421	0397	0372		0354	0331	0306			4,9
9	B	P13	1434	1348	1258	-0,695	1417	1328	1242	-0,695	-0,695	17,6
	M	P16	2125	2043	1962		2106	2023	1942			16,3
	B	P14	~~1860~~	~~1670~~	~~1482~~		1225	1175	1125	+0,153	sisalah	
	M	P15	~~22~~				1678	1632	1586	-0,304	tidak pis.	
10	B	~~P16~~	~~1860~~	~~1670~~	~~1482~~	~~+0,338~~	~~1847~~	~~1657~~	~~1467~~	+0,341		
	M	~~P18~~	~~2202~~	~~2008~~	~~1813~~		~~2182~~	~~1998~~	~~1802~~			
	B	P16	1362	1719	1562	-0,352	–	1690	–	-0,352	-0.352	30
	M	P18	2312	2071	1829		–	2042	–			48,3
					JML. =				JML. =			

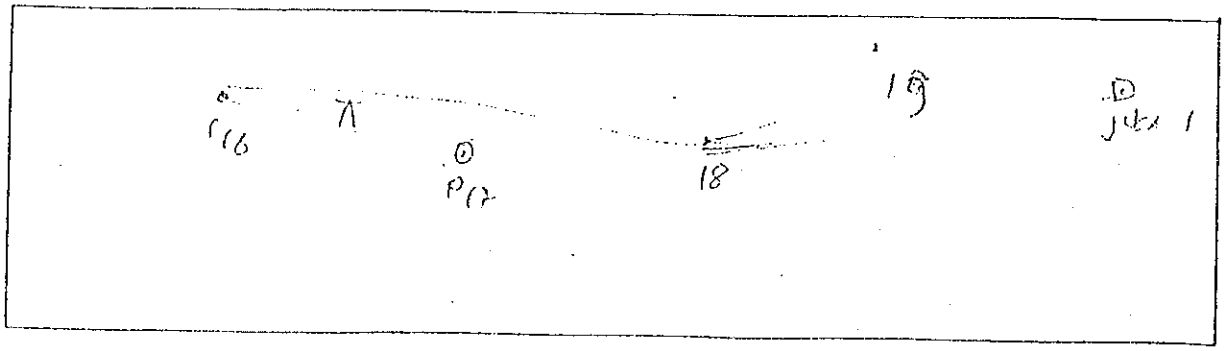


LEVELLING

Lokasi : KAMPUS IKIP

TGL : 21 - 9 - '98
DIUKUR : M. RAIS. CS.
ALAT : ZEIS, NI 2.

TITIK ALAT	ARAH	NAMA TARGET	STAND 1 Bacaan benang ATAS	TENGAH	BAWAH	BEDA TINGGI	STAND 2 Bacaan benang ATAS	TENGAH	BAWAH	BEDA TINGGI	Rata-rata beda tinggi	Jarak
11	B	P18	2992	2817	2642	+1,528 ✓	2972	2798	2622	+1,528	+1,528 ✓	35,0
	M	JICA 1	1521	1289	1057		1501	1270	1039			46,4
12	B	JICA 1	1663	1515	1366	-0,487 ✓	1710	1566	1410	-0,487	-0,487 ✓	29,7
	M	P20	2104	2002	1900		2149	2048	1947			20,4
13	B	P20	2807	2721	2607	+2,509	2780	2666	2552	+2,510	+2,509	20
	M	HP	0237	0214	0192		0180	0157	0134			4,5
14	B	HP	2945	2866	2787	+1,892	2988	2908	2828	+1,892	+1,892	15,8
	M	P21	1027	0977	0923		1069	1017	0966			10,4
15	B	P21	2942	2812	2782	+2,683	2978	2848	2718	+2,683	+2,683	16
	M	HP	0230	0129	0028		0265	0165	0064			20,2
16	B	HP	-	1326	1162	+1,539	1885	1729	1573	+1,539	+1,539	32,8
	M	P1	0386	0287	0181		0296	0190	0086			20,5
17	B	P1	1387	1170	0953	-0,310	1338	1121	0907	-0,310	-0,310	43,4
	M	BM 2	1702	1480	1254		1657	1431	1203			44,8
	B									Σ		855,3
	M											
⛪	B	P16	1847	1657	1467	+0,179 ✓					✓	
	M	P17	1592	1478	1363							
	B											
	M											
⛪	B	P18	2413	2328	2243	+1,126 ✓					✓	
	M	P19	1283	1202	1122							
	B											
	M											
					JML. =				JML =		-0,008	



LEVELLING

TITIK ALAT	ARAH	NAMA TARGET	STAND 1 Bacaan benang ATAS	TENGAH	BAWAH	STAND 1 BEDA TINGGI	STAND 2 Bacaan benang ATAS	TENGAH	BAWAH	STAND 2 BEDA TINGGI	Rata-rata beda tinggi
1	B	P12	2474	2404	2334	+2,182	2411	2339	2271	+2188	+2188
	M	P9	0290	0218	0132		0226	0151	0071		
	B	P11	-	-	-		1651	1631	1611	+0,708	thdp P12.
	M										
2	B	P9	2305	2228	2152	+1.519	2243	2165	2088	+1.521	+1.520
	M	P6	0781	0709	0637		0716	0644	0573		
	B	P8	-	-	-		1597	1569	1543	-0.426	Selisih thdp P6.
	M	P7	-	-	-		1092	1070	1048	-0,925	
3	B	P6	2157	2093	2027	+1.890	2116	2049	1982	+1.808	+1.839
	M	P3	0287	0203	0122		0243	0161	0079		
	B	P5	-	-	-		1642	1624	1607	-1.463	Selisih thdp P3.
	M	P4	-	-	-		0971	0939	0907	-0,778	
	B										
	M										
	B										
	M										
	B										
	M										
	B										
	M										
	B										
	M										
					JML. =				JML. =		

HITUNGAN SIFAT DATAR

RING

PROYEK : KAMPUS IKIP :
LOKASI :
TANGGAL : 21 - 09 - '98
DIHITUNG : M. RAIS

No. Titik	Beda Tinggi Stand I	Beda Tinggi Stand II	Beda Tinggi Rata-rata	koreksi	Elevasi	No. Titik
BM 02					102,477	BM 02
	- 1,238	- 1,239	- 1,238	+1		
HP					101,240	HP
	- 1,140	- 1,140	- 1,140	+1		
BM 01					100,101	BM 01
	+ 1,013	+ 1,015	+ 1,014	+1		
P2					101,116	P2
	- 2,090	- 2,090	- 2,090	+1		
JICA 3					99,027	JICA 3
	- 2,378	- 2,380	- 2,379	-		
JICA 2					96,648	JICA 2
	- 2,956	- 2,955	- 2,956	+1		
P10					93,697	P10
	- 1,466	- 1,465	- 1,466	+1		
P12					92,228	P12
	+ 1,940	+ 1,941	+ 1,940	-		
P13					94,168	P13
	- 0,695	- 0,695	- 0,695	+1		
P16					93,474	P16
	- 0,352	- 0,352	- 0,352	-		
P18					93,122	P18
	+ 1,528	+ 1,528	+ 1,528	+1		
JICA 1					94,651	JICA 1
	- 0,487	- 0,487	- 0,487	-		
P20					94,164	P20
	+ 2,508	+ 2,510	+ 2,509	-		
HP					96,673	HP
	+ 1,892	+ 1,892	+ 1,892	-		
P21					98,565	P21
	+ 2,683	+ 2,683	+ 2,683	-		
HP					101,248	HP
	+ 1,539	+ 1,539	+ 1,539	-		
P1					102,787	P1
	- 0,310	- 0,310	- 0,310	-		
BM 02.		Σ = - 0,008			102,477	BM 02

TOLERANSI $4/\Delta h = 10\sqrt{D\ km}$

$\Sigma D = 855,3\ m = 0,8553\ km.$

$10\sqrt{0,8553} = 9,2482\ mm.$

Koreksi = + 0,008 m ≈ 8 mm.

Koreksi < Toleransi → memenuhi

HITUNGAN SIFAT DATAR
SISLAH

PROYEK :
LOKASI :
TANGGAL :
DIHITUNG :

No. Titik	Beda Tinggi (m) Stand I	Stand II	Beda Tinggi Rata-rata	Elevasi (m)	No. Titik
P16				+93.474	P16
	+0.179	-	+0.179		
P17				+93.653	P17
P18				+93.122	P18
	+1.126	-	+1.126		
P19				+94.248	P19
P13				+94.168	P13
	+0.153	-	+0.153		
P14				+94.321	P14
P13				+94.168	P13
	-0.304	-	-0.304		
P15				+93.864	P15
(P12)				+92.228	P12
	+2.188	+2.188	+2.188		
P9				+94.416	P9
P11	-	-	+0.708	+92.936	P11
(P9)				+94.416	P9
	+1.519	+1.521	+1.520		
P6				+95.936	P6
P8	-	-	-0.926	+95.011	P8
P7	-	-	-0.925	+95.510	P7

HITUNGAN SIFAT DATAR

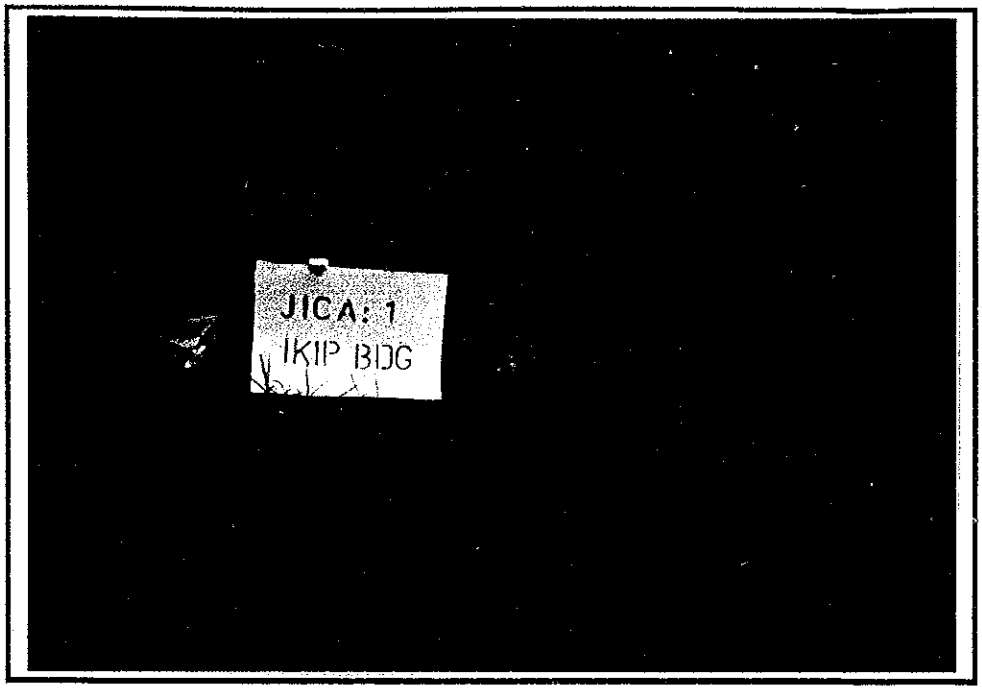
PROYEK :
LOKASI :
TANGGAL :
DIHITUNG :

No. Titik	Beda Tinggi (m)		Beda Tinggi Rata-rata	Elevasi (m)	No. Titik
	Stand I	Stand II			
P6				+95,936	P6
	+ 1,890	+ 1,890	+ 1,890		
P3				+97,825	P3
P5	-	-	- 1,463	+96,362	P5
P4	-	-	- 0,778	+97,047	P4

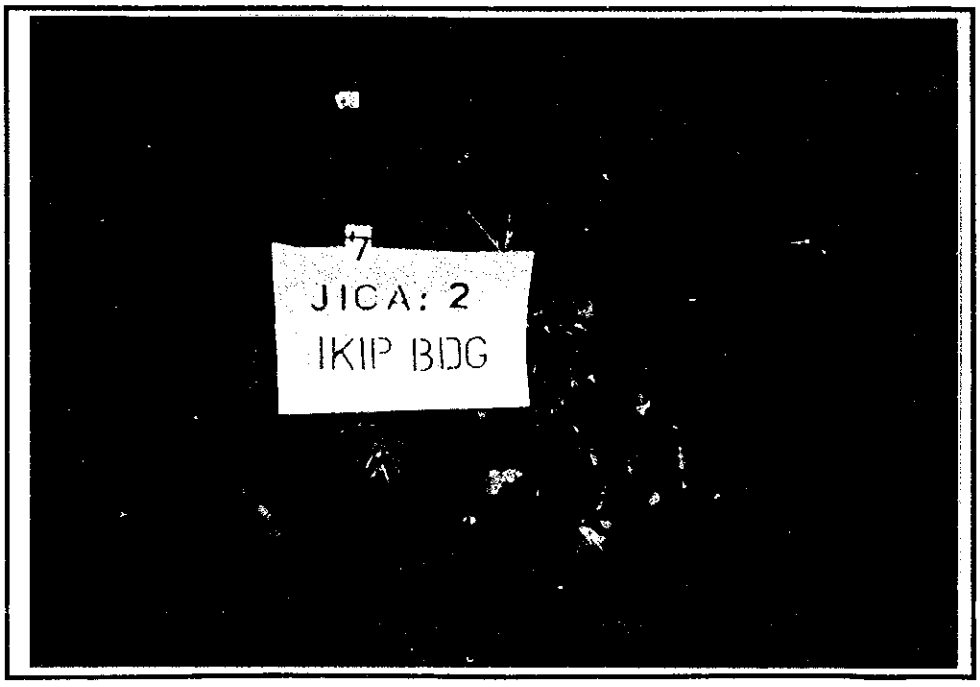
APPENDIX 3

PICTURES OF NEW BENCH MARKS

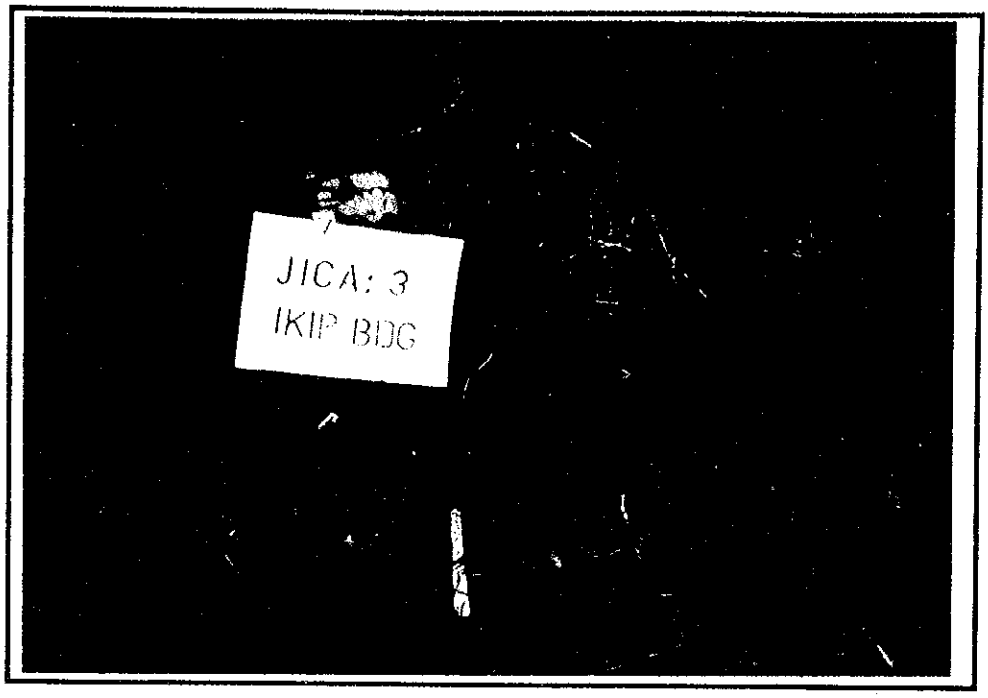
(JICA 1, JICA 2, JICA 3)



New Bench Mark JICA – 1



New Bench Mark JICA – 2



New Bench Mark JICA – 3

APPENDIX 4

Drawing No: 910.001

(Topographical Map and Site Lay Out)

910.001

N 750.000

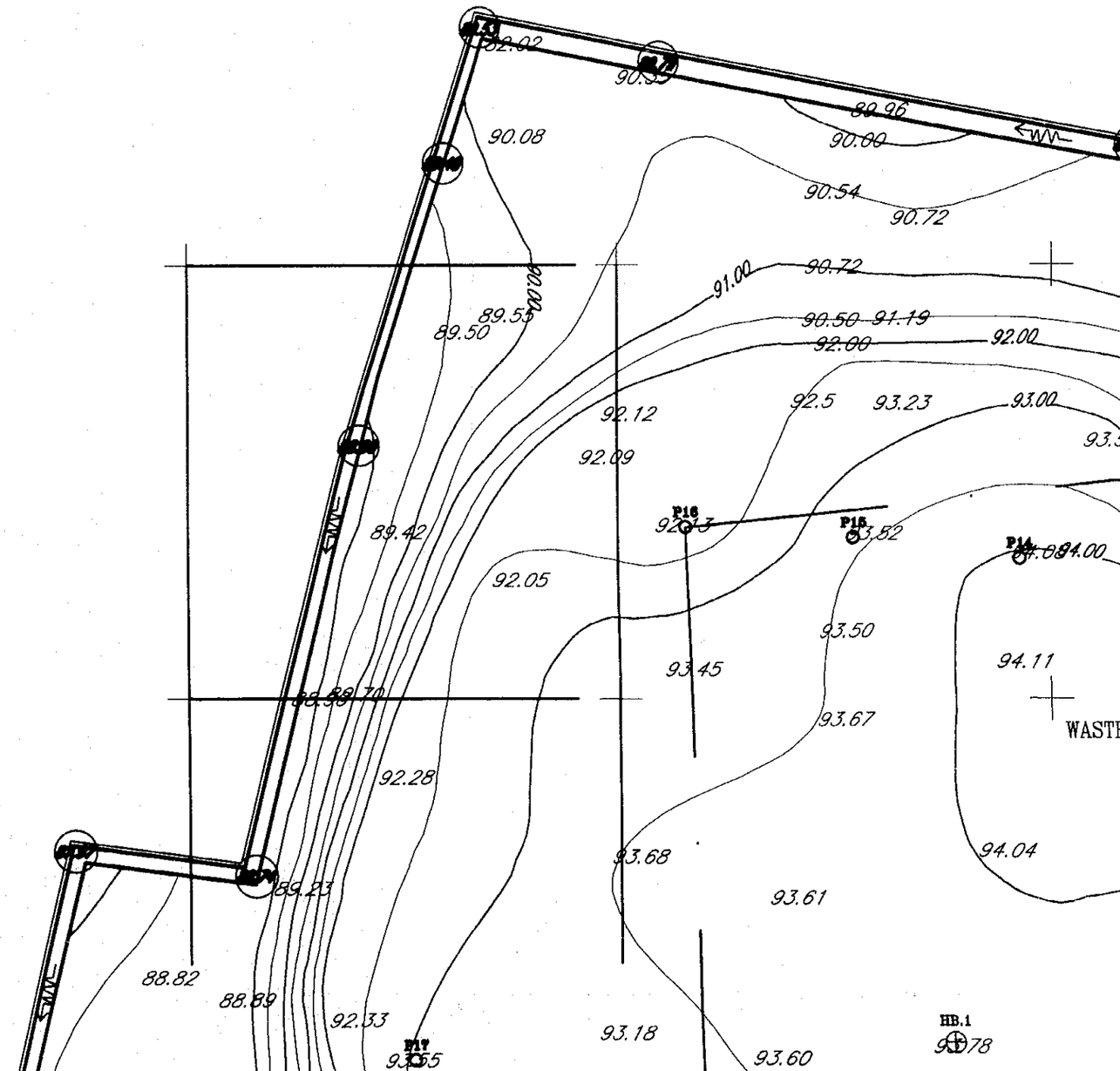
N 775.000

N 800.000

N 825.000

E 1075.000

E 1100.000



N 800.000

N 825.000

N 850.000

N 875.000

N 900.000

TENNIS COURT

JICA.2
E = 1080.489
N = 897.394
ELV = +96.648

PARKING AREA

ASPHALT ROAD

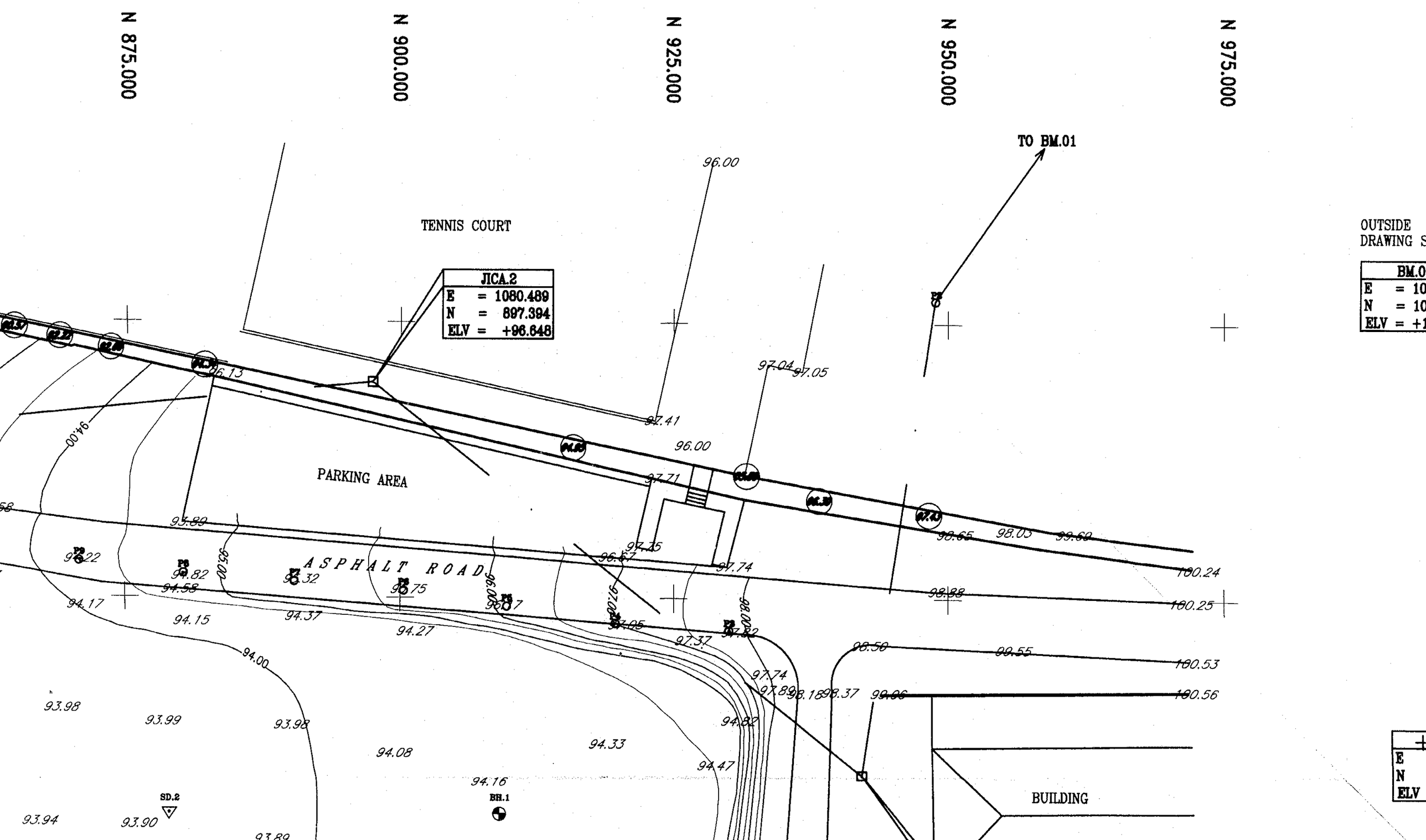
WASTE

HB.1

BH.3

SD.2

BH.1



N 875.000
N 900.000
N 925.000
N 950.000
N 975.000
TO BM.01
TENNIS COURT
JICA.2
E = 1080.489
N = 897.394
ELV = +96.648
PARKING AREA
ASPHALT ROAD
BUILDING
OUTSIDE
DRAWING S
BM.0
E = 10
N = 10
ELV = +1
SD.2
BH.1

N 975.000

N 1000.000

TO BM.01

TO BM.01

OUTSIDE
DRAWING SPACE

BM.01	
E	= 1000.642
N	= 1000.093
ELV	= +100.102

98.65 98.03 99.68 100.24

98.88 100.25

99.55 100.53

100.56

BUILDING

BM.02	
E	= 1120.117
N	= 1005.167
ELV	= +102.477

NO PART OF THIS DOCUMENT MAY BE REPRODUCED,TRANSMITTED OR RECORDED FOR THE PURPOSE OF OTHER THAN THIS PROJECT IN ANY FORM OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF PT. BITA ENARCON ENGINEERING

NOTES

1. **Reverence is teken from BM.02**
   (E=1120.117, N=1005.167, ELV=102.477)

   IKIP Local Coordinates System

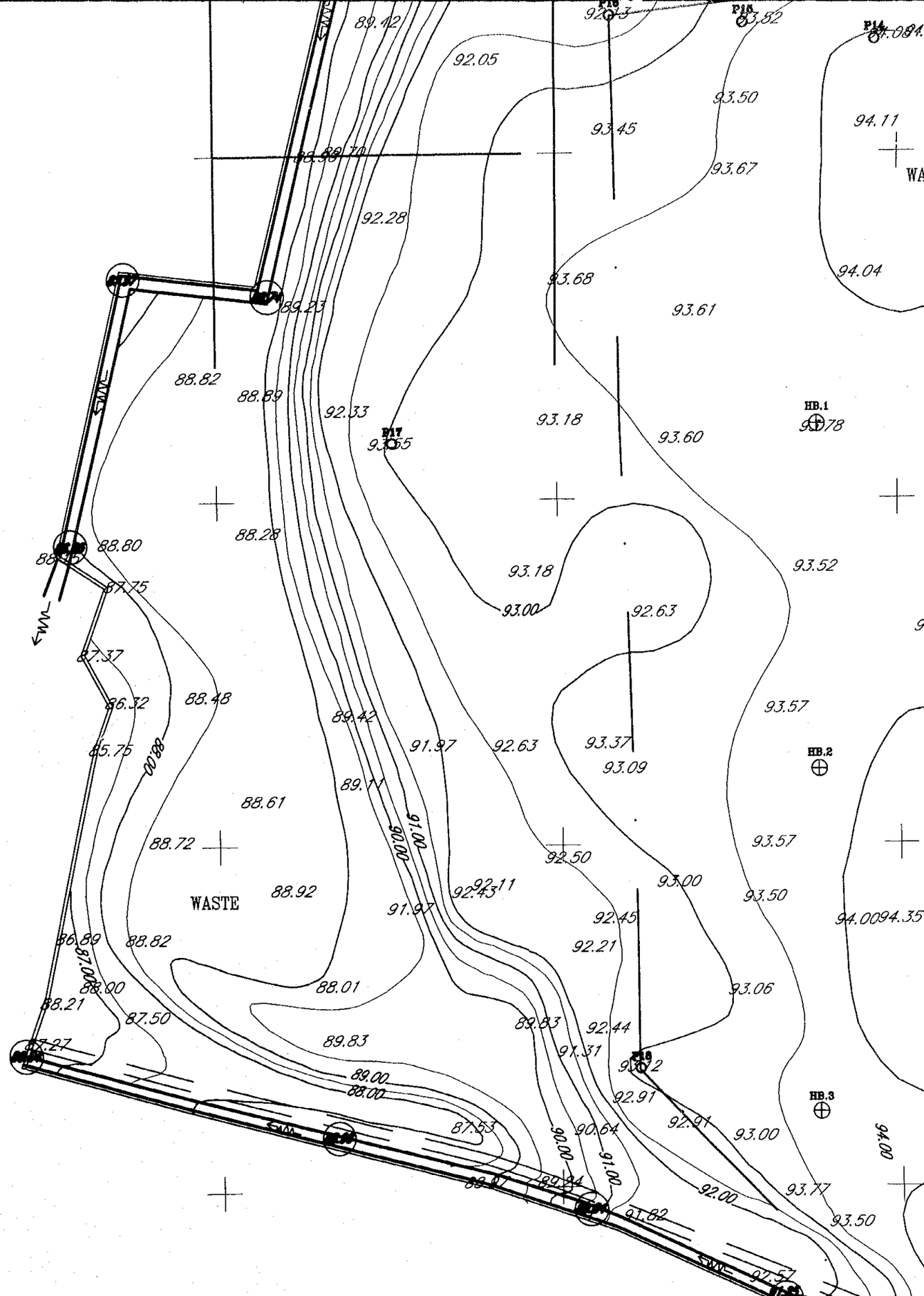
2.
- ASPHALT ROAD
- DITCH
- BUILDING
- BRICK WALL
- JICA1 — BENCH MARK FOR THIS AREA
- P1 — TEMPORARY CONTROL POINT
- BARBED WIRE FENCE
- METAL FENCE
- POLYGON LINE
- CONTOUR LINE
- FOOT PATH
- BH.1 — BORE HOLE
- HB.1 — HAND BORE POINT
- SD.1 — DUTCH CONE PENETRATION POINT
- 90.57 — LEVEL AT BOTTOM OF DITCH
- MANHOLE COVER
- TREE
- FLAG POLE
- ELECTRICAL POLE

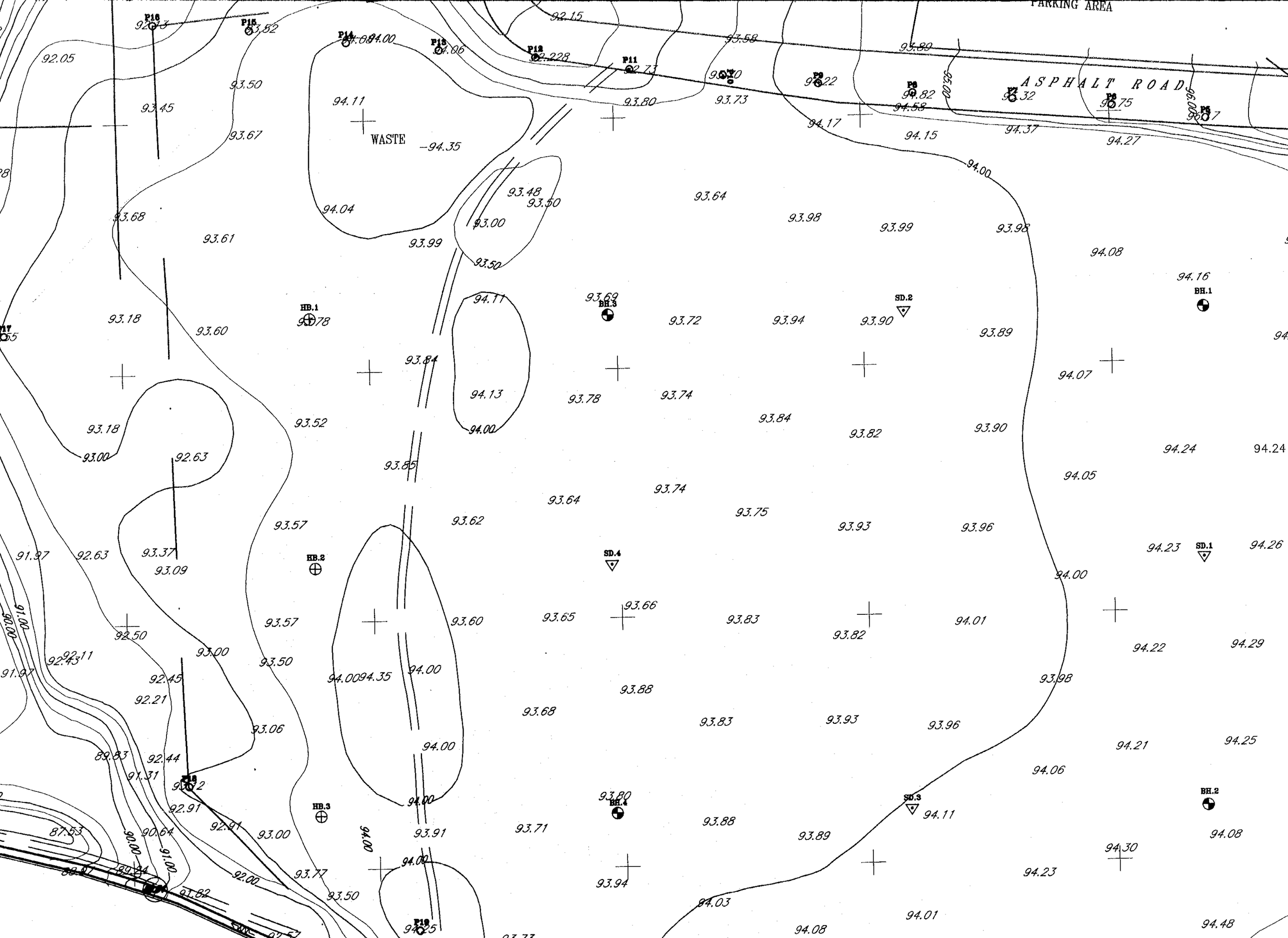
E 1100.000

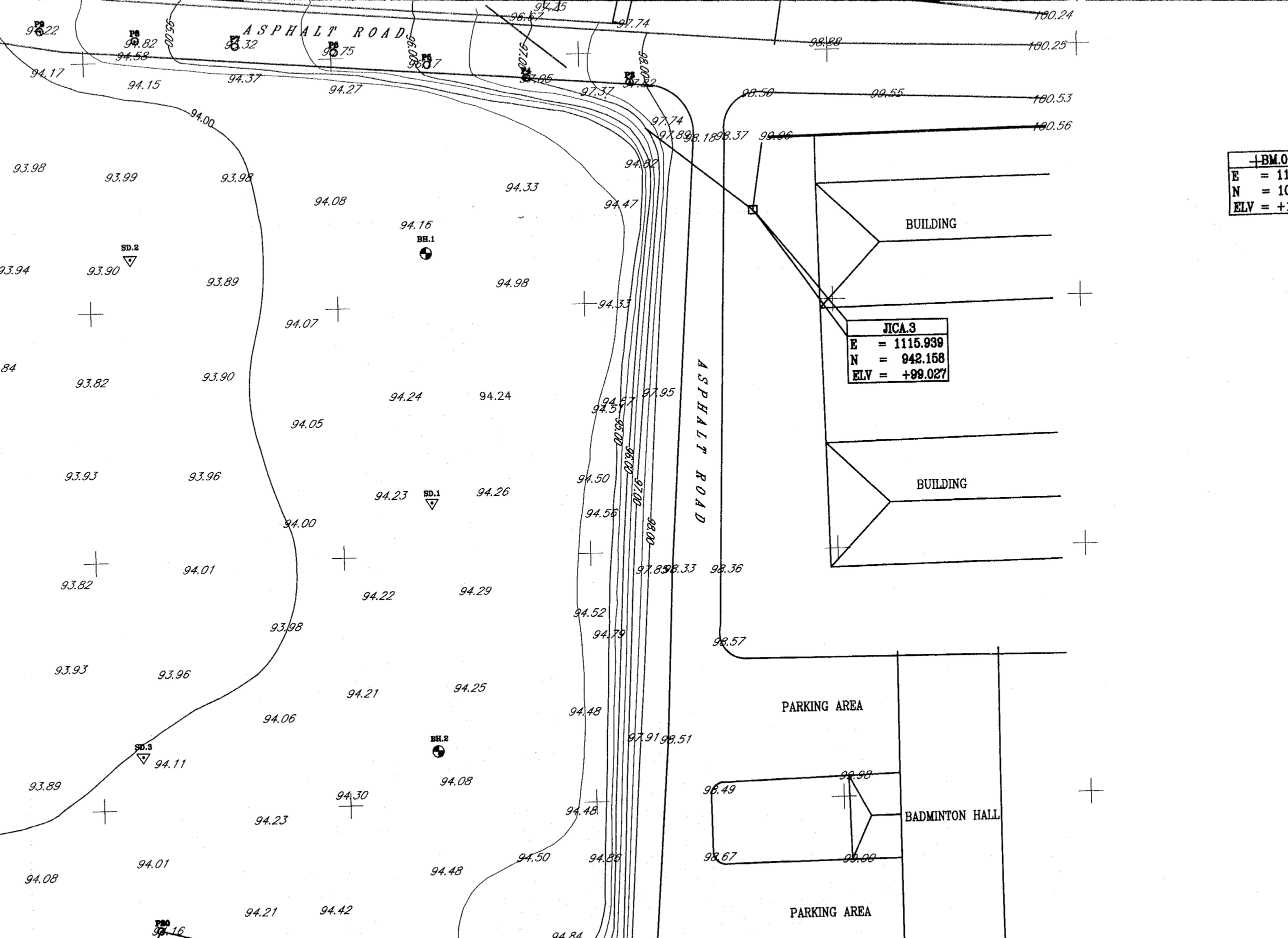
E 1125.000

E 1150.000

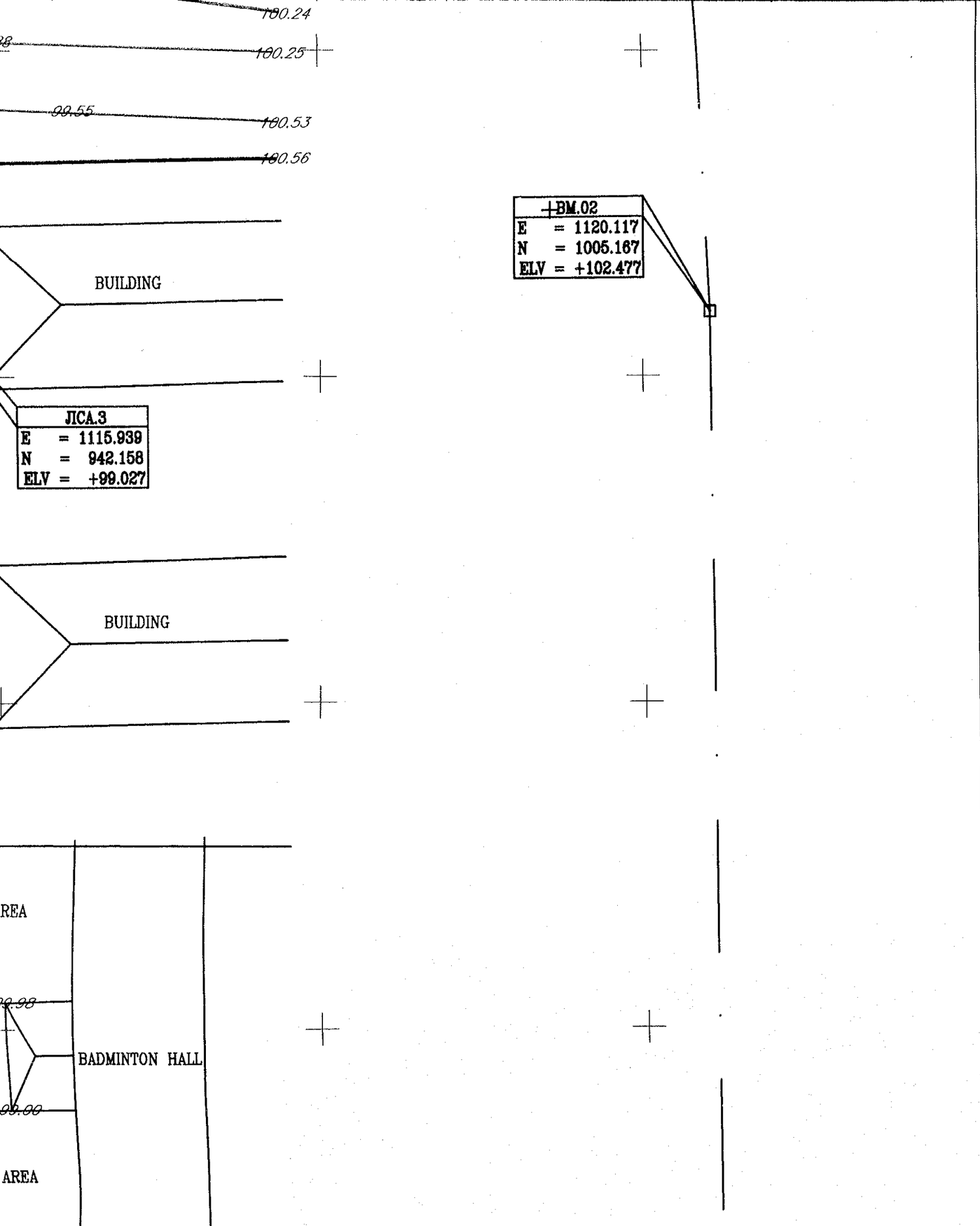
E 1175.000




PARKING AREA
ASPHALT ROAD
WASTE
P16
P15
P14
P13
P12
P11
P9
P8
P7
P6
P5
P17
P18
P19
HB.1
HB.2
HB.3
BH.1
BH.2
BH.3
BH.4
SD.1
SD.2
SD.3
SD.4
92.05
93.45
93.50
93.67
94.11
94.35
94.04
93.48
93.50
93.00
93.99
93.50
93.64
93.98
93.99
93.98
94.08
94.16
93.68
93.61
93.18
93.60
93.84
94.13
93.69
93.72
93.94
93.90
93.89
94.07
93.78
93.74
93.84
93.82
93.90
94.24
94.24
93.18
93.00
92.63
93.52
93.85
94.05
93.64
93.74
93.75
93.93
93.96
93.57
93.62
91.97
92.63
93.37
93.09
94.23
94.26
94.00
93.57
93.60
93.65
93.66
93.83
93.82
94.01
92.50
93.00
93.50
94.22
94.29
92.45
94.00
94.35
94.00
93.88
93.98
92.21
93.68
93.83
93.93
93.96
93.06
94.00
94.21
94.25
89.83
92.44
91.31
94.06
92.91
93.80
94.11
87.53
90.64
92.91
93.00
93.91
93.71
93.88
93.89
94.08
94.30
93.77
93.94
94.23
92.00
93.50
94.03
94.01
94.08
94.48
91.82



ASPHALT ROAD
ASPHALT ROAD
BUILDING
BUILDING
JICA.3
E = 1115.939
N = 942.158
ELV = +99.027
PARKING AREA
PARKING AREA
BADMINTON HALL
BH.1
BH.2
SD.1
SD.2
SD.3



TREE

FLAG POLE

ELECTRICAL POLE

REVISION

NO	CHECKED	APPROVED	DESCRIPTION	DATE
1	TM	SGH	FINAL REPORT	06-01-99
0	TM	SGH	FOR APPROVAL	30-09-98

OWNER

JAPAN INTERNATIONAL COOPERATION AGENCY

(J I C A)

CONSULTANT

PACIFIC CONSULTANTS INTERNATIONAL

CONSULTING ENGINEERS AND ARCHITECTS

7-5, SEKIDO 1-CHOME, TAMA-SHI, TOKYO-206 JAPAN, PH. 81-423-72-0111

SURVEY-CONSULTANT

PT BITA ENARCON ENGINEERING

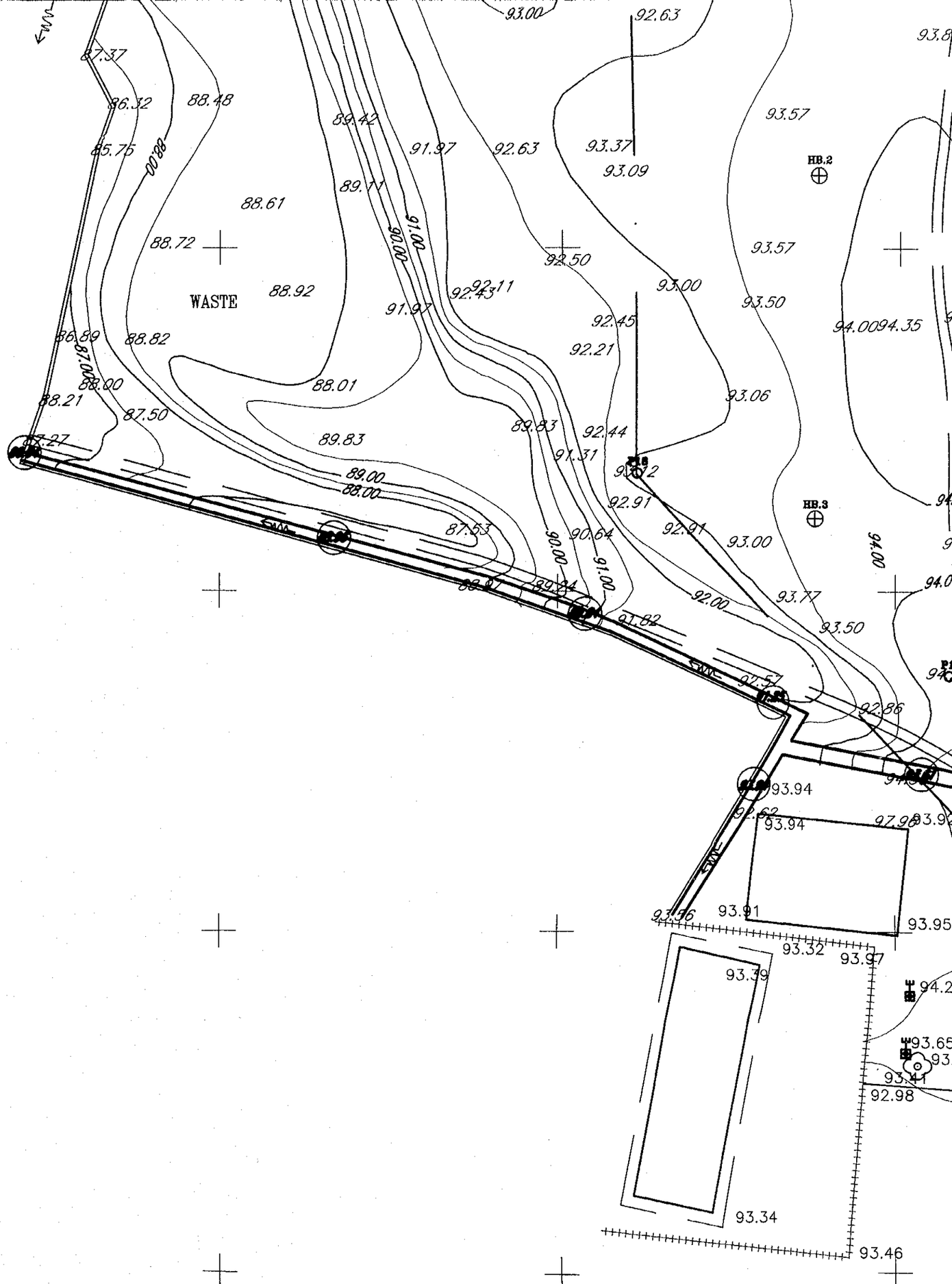
ENGINEERS ARCHITECTS CONSULTANTS

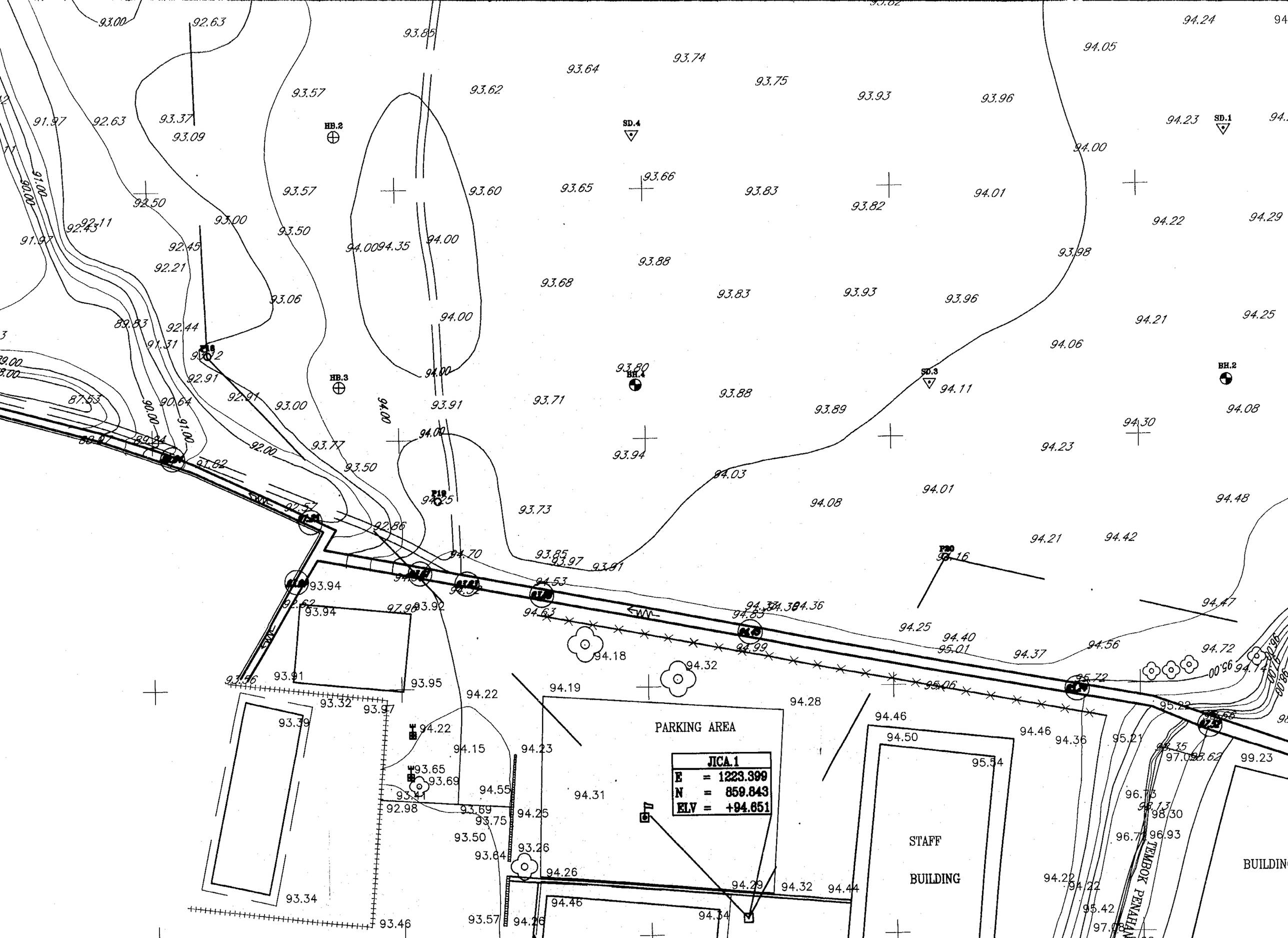
E 1150.000

E 1175.000

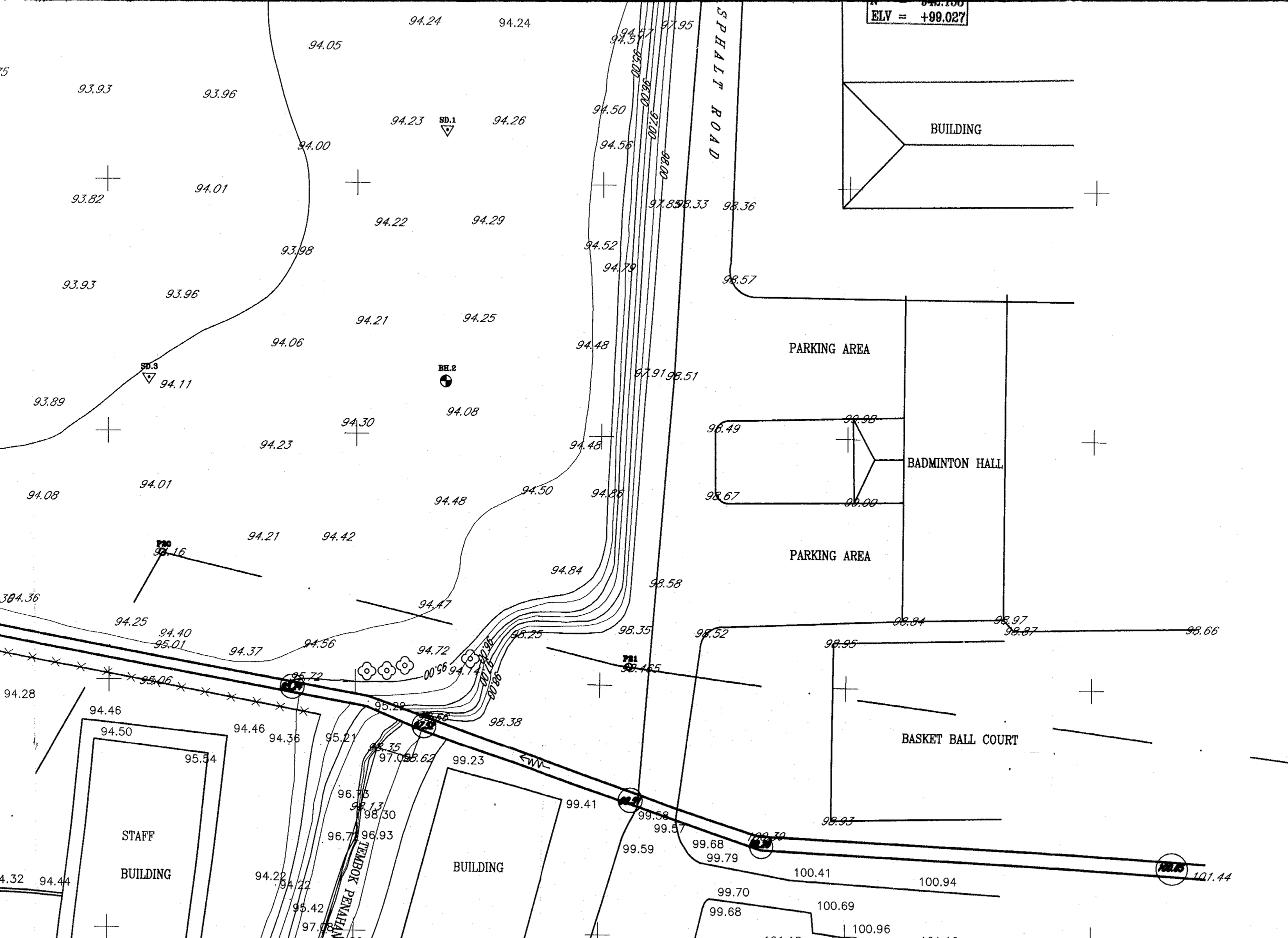
E 1200.000

E 1225.000



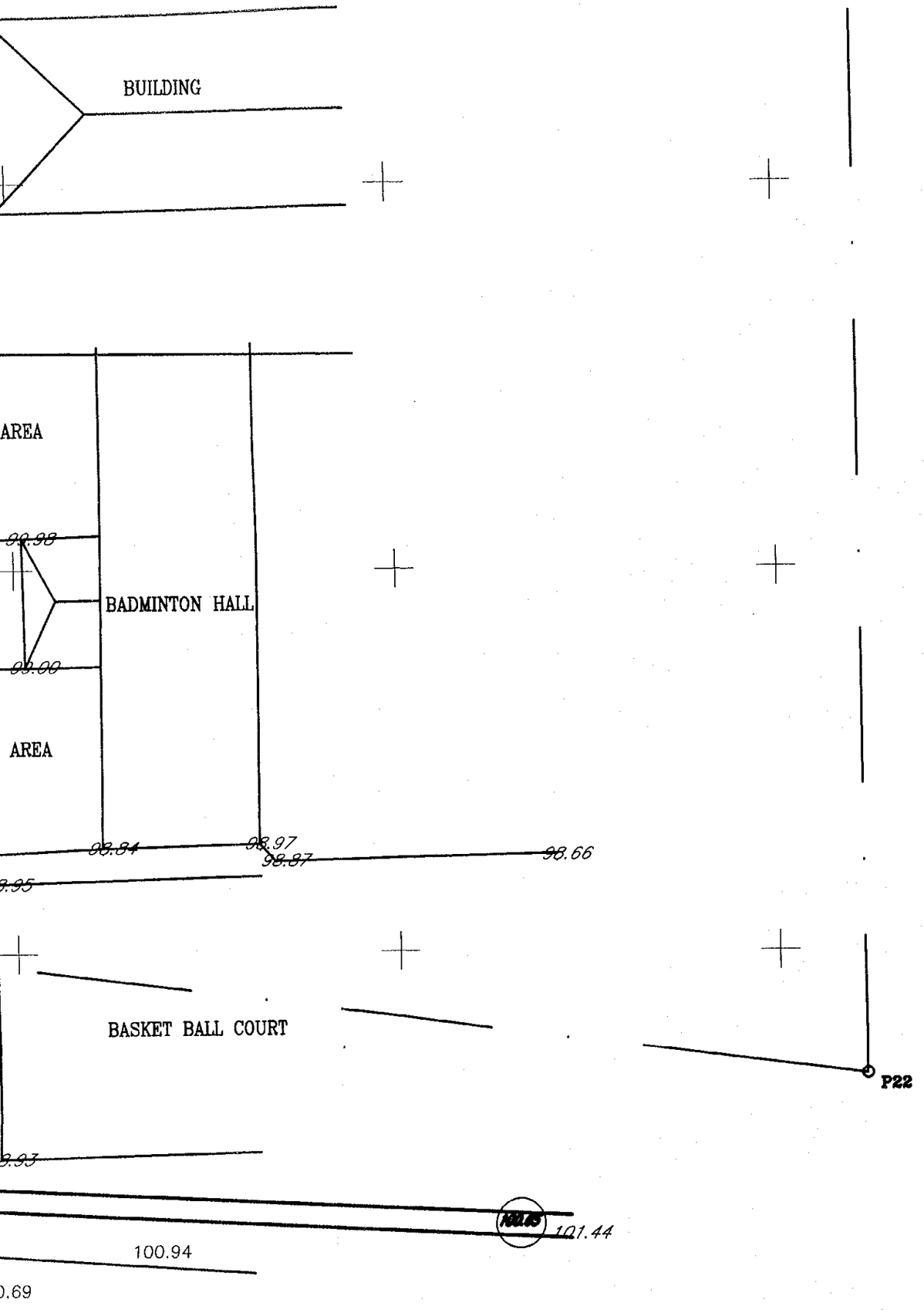


PARKING AREA
JICA.1
E = 1223.399
N = 859.843
ELV = +94.651
STAFF
BUILDING
TEMBOK PENAHAN
BUILDING
HB.2
HB.3
SD.4
SD.3
SD.1
BH.4
BH.2
P18
P19
P20



ELV = +99.027
SPHALT ROAD
BUILDING
PARKING AREA
BADMINTON HALL
PARKING AREA
BASKET BALL COURT
STAFF
BUILDING
BUILDING
TEMBOK PENAHAN
SD.1
SD.3
BH.2
P20
P21

N = 942.156
ELV = +99.027



REVISION

NO	CHECKED	APPROVED	DESCRIPTION	DATE
1	TM	SGH	FINAL REPORT	06-01-99
0	TM	SGH	FOR APPROVAL	30-09-98

OWNER

JAPAN INTERNATIONAL COOPERATION AGENCY
(J I C A)

CONSULTANT

PACIFIC CONSULTANTS INTERNATIONAL
CONSULTING ENGINEERS AND ARCHITECTS
7-5, SEKIDO 1-CHOME, TAMA-SHI, TOKYO-206 JAPAN, PH. 81-423-72-0111

SURVEY-CONSULTANT

PT BITA ENARCON ENGINEERING
ENGINEERS . ARCHITECTS . CONSULTANTS
JL PAHLAWAN 74 BDG 40124 PH. 022-702748 FAX. 022-702749

DISTRIBUTION

REVISION NO.	0	1								
INFORMATION										
ACTION										
CONTRACTOR										
OWNER	1	1								
INTERNAL	1	1								
DATE	30/9	06/1								

	NAME	SIGN	DATE
DRAWN	SBR		
DESIGN	-		

E 1225.000

E 1250.000

E 1275.000

93.34

93.46

93.43

93.40

93.20

93.98

94.60

C:\DATACAD\910-IKIP\910S001 Wed Jan 6 15:21:09 1999 P-402

JICA.1
E = 1223.399
N = 859.843
ELV = +94.651

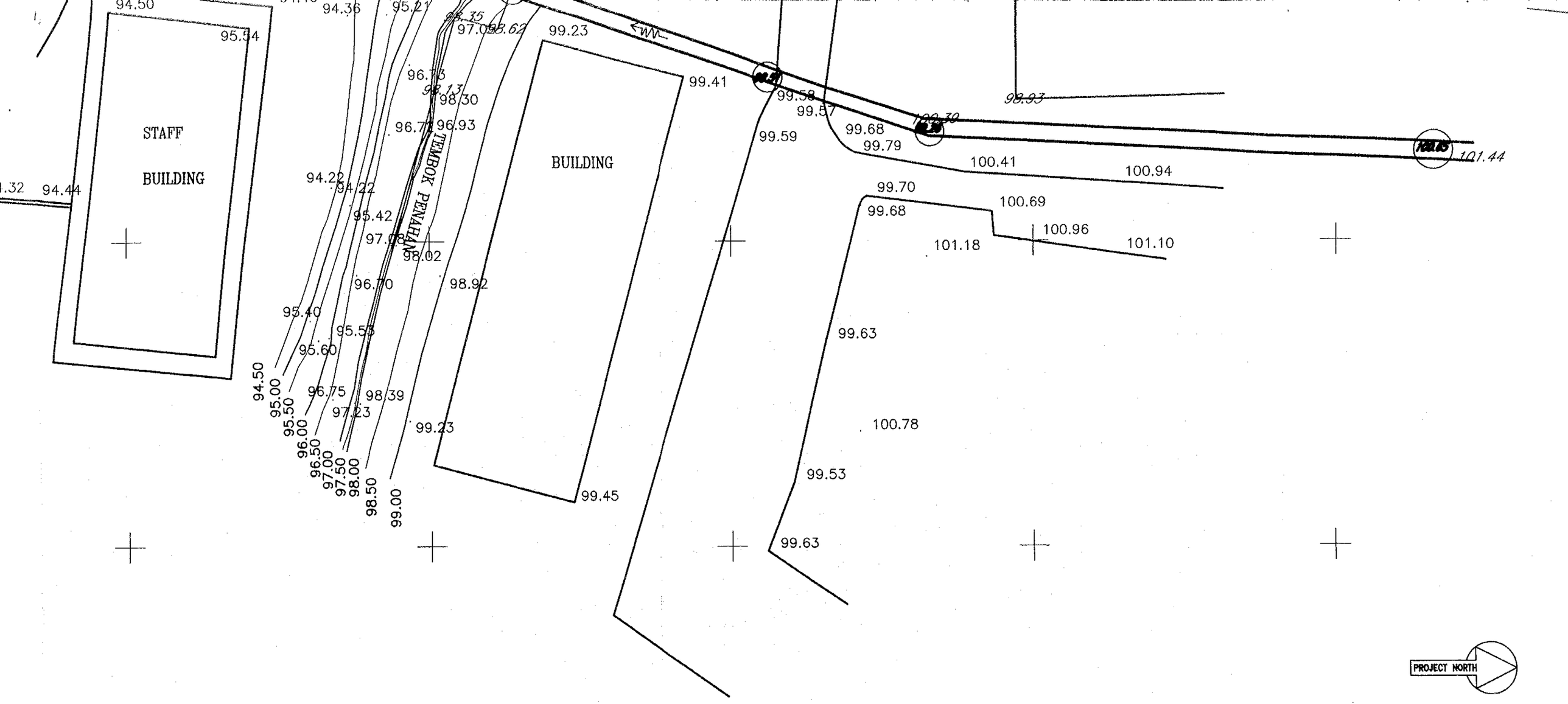
STAFF
BUILDING

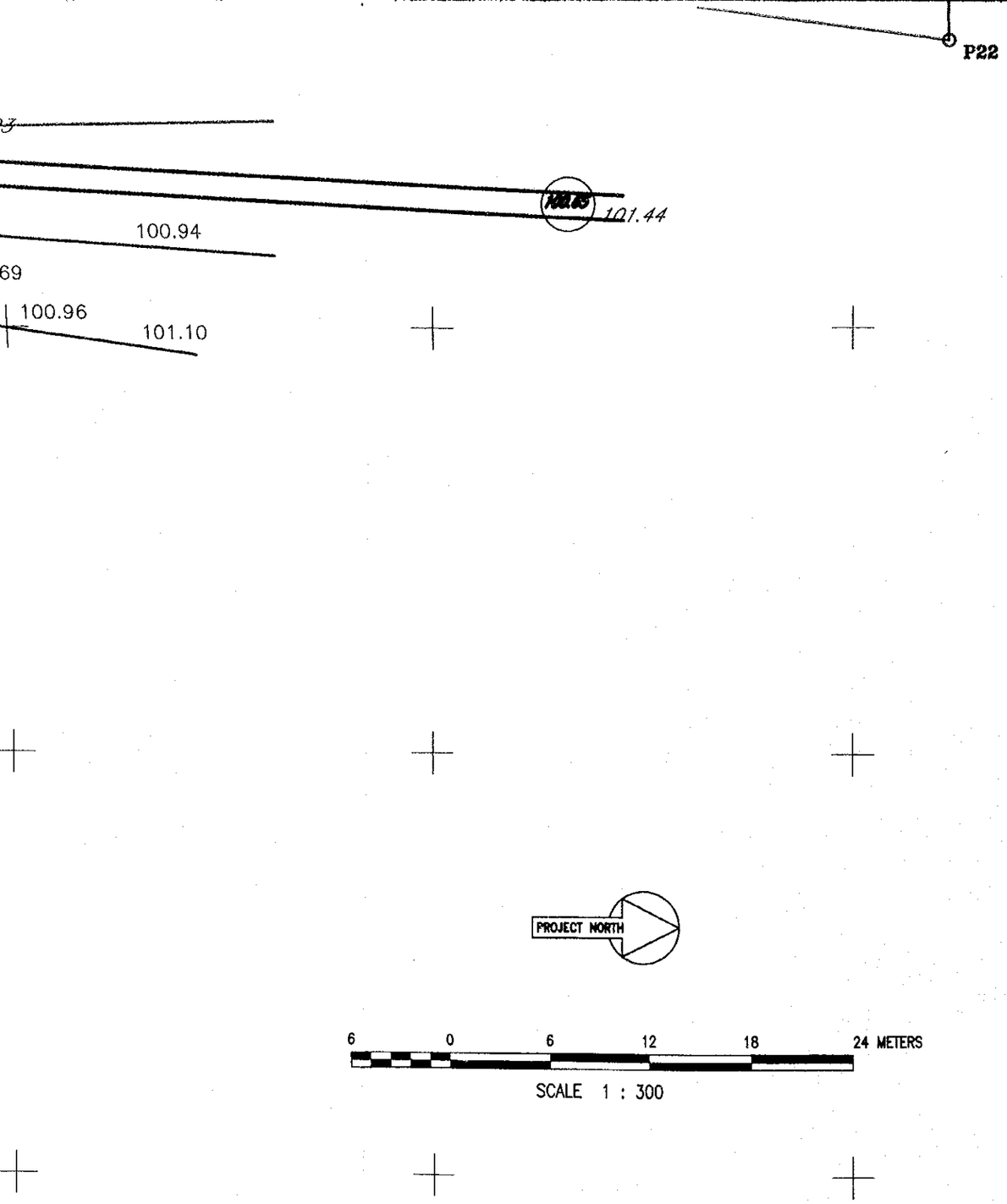
POST GRADUATE
BUILDING

ASHPALT ROAD

TEMBOK PENAHAN

94.15 94.23 93.65 93.69 93.41 92.98 94.55 94.31 93.69 93.75 94.25 93.50 93.64 93.26 94.26 93.34 93.46 93.57 94.26 94.46 94.29 94.32 94.44 94.34 95.54 94.22 94.22 95.42 97.08 98.02 96.70 98.92 95.40 95.53 95.60 94.50 95.00 95.50 96.00 96.50 97.00 97.50 98.00 98.50 99.00 96.75 98.39 97.23 99.23 93.32 93.36 93.43 93.41 94.27 93.25 93.34 94.25 93.46 93.40 93.18 93.22 93.32 94.26 93.18 93.30 94.21 93.46 93.20 93.76 93.8 94.27 94.52 94.14 93.98 94.28 94.19 94.32 94.62 94.60 94.68 94.74


STAFF
BUILDING
BUILDING
TEMBOK PENAHAN
94.50
95.54
94.36
95.21
97.09
98.62
99.23
96.73
98.13
98.30
96.71
96.93
94.22
94.22
95.42
97.08
98.02
96.70
98.92
95.40
95.53
95.60
94.50
95.00
95.50
96.00
96.50
96.75
98.39
97.23
97.00
97.50
98.00
98.50
99.00
99.23
99.45
99.41
99.58
99.57
99.59
99.68
99.79
98.93
100.41
100.94
99.70
99.68
100.69
100.96
101.18
101.10
99.63
100.78
99.53
99.63
101.44
94.32
94.44
PROJECT NORTH
6
0
6
12
SCALE 1 : 300



OWNER	1	1									
INTERNAL	1	1									
DATE	30/9	06/1									

	NAME	SIGN	DATE
DRAWN	SBR		
DESIGN	–		
CHECKED	TM		
APPROVED			
DESIGN MNG.	SGH		
PROJECT DIR.	AP		
PCI			

DISCIPLINE	ARC	CIV/STR	ELECT	MECH/PIP
INITIAL	–	–	–	–
DATE				

PROJECT

FMIPA IKIP BANDUNG DEVELOPMENT PROJECT

DRAWING TITLE

TOPOGRAPHYCAL MAP AND SITE LAY OUT (EXISTING CONDITION)

SCALE	FILE
1 : 300	

PROJECT NO.	BEE CONTRACT NO.	DISCIPLINE
98.910		CIVIL

CONTRACT NO.	DRAWING NUMBER
	910.001
REVISION NO.	
0	

