

Japan International Cooperation Agency

The Supplemental Study

for

Metropolitan Sanitation Management Investment Program:

Sewerage System Development in DKI Jakarta (E/S)

in

Republic of Indonesia

FINAL REPORT

VOLUME 2 : Supporting Report

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Water Agency Inc.

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TOPOGRAPHIC SURVEY

APPENDIX – 1 TOPOGRAPHIC SURVEY

1. SCOPE OF WORKS

The Work shall be carried out at each project site as directed by JICA Study Team (JST), and comprises following schedule:

Schedule 1.1: Topographical Survey

Schedule 1.2: Line Survey

Schedule 1.3: Levelling Survey

1.1 TOPOGRAPHICAL SURVEY

Sewer: Two (2) sites for Vertical Shafts, about 0.4 ha in total

WWTP: Site for WWTP, about 4.0 ha

The topographical survey is to obtain topographical features (contour line of one (1) meter) and land use at the locations for three vertical shafts and wastewater treatment facilities. Output of the survey should be necessary drawings which are printed out and digital files with the format of Auto-CAD.

The topographical survey also includes setting of temporary bench mark at each site.

The survey shall be carried out by the following manner:

(1) Survey Instruments:

- Measurement of angle: Total Station
- Measurement of distance: Steel tape or esrone tape
- Measurement of level: Level with 1 mm reading

The survey instruments other than the above may be allowed as the JICA Study Team judged them adequate and acceptable.

(2) Accuracy of Measurement:

Accuracy of survey shall be as follows:

- Angle survey: Measurement: Two times
Deviation: 20"
- Distance survey: 1/2,000
- Level survey: within value of 2 cm \sqrt{S} (S: one way distance)

In addition to the drawings, all survey data including field notes, photographs of site survey and others obtaining during the field surveys should be submitted.

Location	Site	Unit	Quantity
Mobilization & Demobilization	Vertical shaft construction & WWTP	Nos.	2
Establish & Constr. of BM	Vertical shaft construction & WWTP	Nos.	1
Vertical shaft Construction	Two locations along Pluit Timur Raya at Point B and C in Figure 2	ha	0.4
WWTP	At Pluit	ha	4.0

Location	Site	Unit	Quantity
Reporting & Drawings	—	L.s.	1

1.2 LINE SURVEY

Sewer: Sewer lines to be surveyed are located along Pluit Timur Raya and the access road to the WWTP site, which is expected, about 1km. Figure 4 shows the trunk sewer route for the line survey.

The Line Survey is composed of centerline survey, profile survey along the sewer line, and topographic survey for the Pilot Project. At present the location of the line survey is expected to be sewer line along Pluit Timur Raya and the access road to the WWTP site. The exact location of the line survey should be determined by the Engineer. The centerline survey is to measure distance at every station markers and degree at each turning point along the pipeline alignment. Along the centerline, the width of road or street shall be measured and features of land use such as houses, buildings, cultivate land, name of road or street, name of major property etc., along the centerline shall be investigated and marked with their limit. The range of such land use profile is approximately 25 meters from the centerline at its both sides. The profile survey is to measure ground levels at points specified and cross-sections in changing points of road configuration in all routes.

The Contractor shall provide a temporary bench mark at the convenient locations. The temporary bench mark shall be fixed into the ground with durable materials as approved to avoid any movement and loss. The Line Survey shall be carried out by the following manner:

(1) Survey Instruments:

The instruments shall be the same as schedule 3.3.1.

The survey instruments other than the above may be allowed as the JICA Study Team judged them adequate and acceptable.

(2) Interval of station marker: every 100 m plus every turning points other necessary points as directed.

(3) Temporary Bench Mark shall be followed from National Bench Mark.

(4) Accuracy of Survey

Accuracy of survey shall be as follows:

- Angle survey: Measurement : Two times
Deviation : 20"
- Distance survey: 1/2,000
- Level survey: within value of $2\text{ cm } \sqrt{S}$ (S: one way distance)

Output of the survey should be necessary drawings which are printed out and digital files with the format of Auto-CAD. In addition to the drawings, all survey data including field notes, photographs of site survey and others obtaining during the field surveys should be submitted.

Location	Route	Unit	Quantity
Mobilization & Demobilization	1 sewer line	Nos.	1
Establish & Constr. of BM	1 sewer line	Nos.	1
Sewer constructed as the	1 sewer line along Pluit Timur	km	1.0

Location	Route	Unit	Quantity
Pilot Project	Raya and the access road to the WWTP site		
Reporting & Drawings	—	L.s.	1

1.3 LEVELING SURVEY

Sewer: Trunk Sewer lines, about 25 km

The Levelling Survey is composed of centerline survey and profile survey. At present the location of the leveling survey is expected to be the roads along the trunk sewer routes shown in Figure 5. The exact location of the leveling survey should be determined by the Engineer. The centerline survey is to measure distance at every station markers and degree at each turning point along the pipeline alignment.

The Contractor shall provide a temporary bench mark at the convenient locations. The temporary bench mark shall be fixed into the ground with durable materials as approved to avoid any movement and loss. The Leveling Survey shall be carried out by the following manner:

(1) Survey Instruments:

The instruments shall be the same as schedule 3.3.1.

The survey instruments other than the above may be allowed as the JICA Study Team judged them adequate and acceptable.

(2) Interval of station marker: every 100 m plus every turning points other necessary points as directed.

(3) Temporary Bench Mark shall be followed from National Bench Mark

(4) Accuracy of Survey

Accuracy of survey shall be as follows:

- Angle survey: Measurement : Two times
Deviation : 20"
- Distance survey: 1/2,000
- Level survey: within value of $2\text{ cm } \sqrt{S}$ (S: one way distance)

Output of the survey should be necessary drawings which are printed out and digital files with the format of Auto-CAD. In addition to the drawings, all survey data including field notes, photographs of site survey and others obtaining during the field surveys should be submitted.

Location	Route	Unit	Quantity
Mobilization & Demobilization	2 trunk sewer lines	Nos.	2
Establish & Constr. of BM	2 trunk sewer lines	Nos.	2
Sewer constructed under E/S loan	Main Trunk Sewer lines	km	25
Reporting & Drawings	—	L.s.	1

1.4 DRAWING

The Contractor shall prepare and submit drawing with the following scale upon the completion of the field survey:

- (1) Topographical Survey for Vertical Shafts:
 - Scale: 1/100
 - 5 m mesh
- (2) Topographical Survey for WWTP:
 - Scale: 1/500
 - 50 m mesh
- (3) Line Survey:
 - Plan: 1/500
 - Longitudinal Section
 - Horizontal: 1/500
 - Vertical: 1/100
 - Lateral Section : 1/100
(Lateral Section shall be constructed in changing points of road configuration in all routes.)
- (4) Leveling Survey:
 - Plan: 1/500
 - Longitudinal Section
 - Horizontal: 1/500
 - Vertical: 1/100

In addition to the above drawings, the Contractor shall submit all survey data including field notes, photographs of site survey and others obtaining during the field surveys.

The drawings shall be printed out and digital files of all drawings with the format of Auto-CAD and Survey Notes (pdf or Excel) shall be submitted.

1.5 SURVEY LOCATIONS

Survey areas for topographic survey for three vertical shafts and wastewater treatment plant are shown in Figure 1, 2, and 3. Survey area for the line survey and the leveling survey of trunk sewers are shown in Figure 4 and 5, respectively.



Figure 1 Topographic Survey Area (Sites for WWTP and 3 Vertical Shafts)

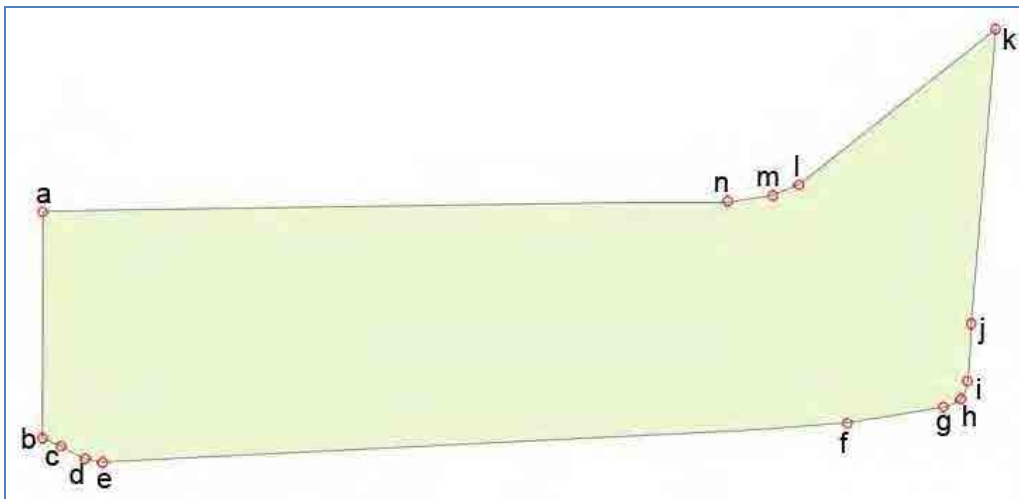


Figure 2 Topographic Survey Area for WWTP

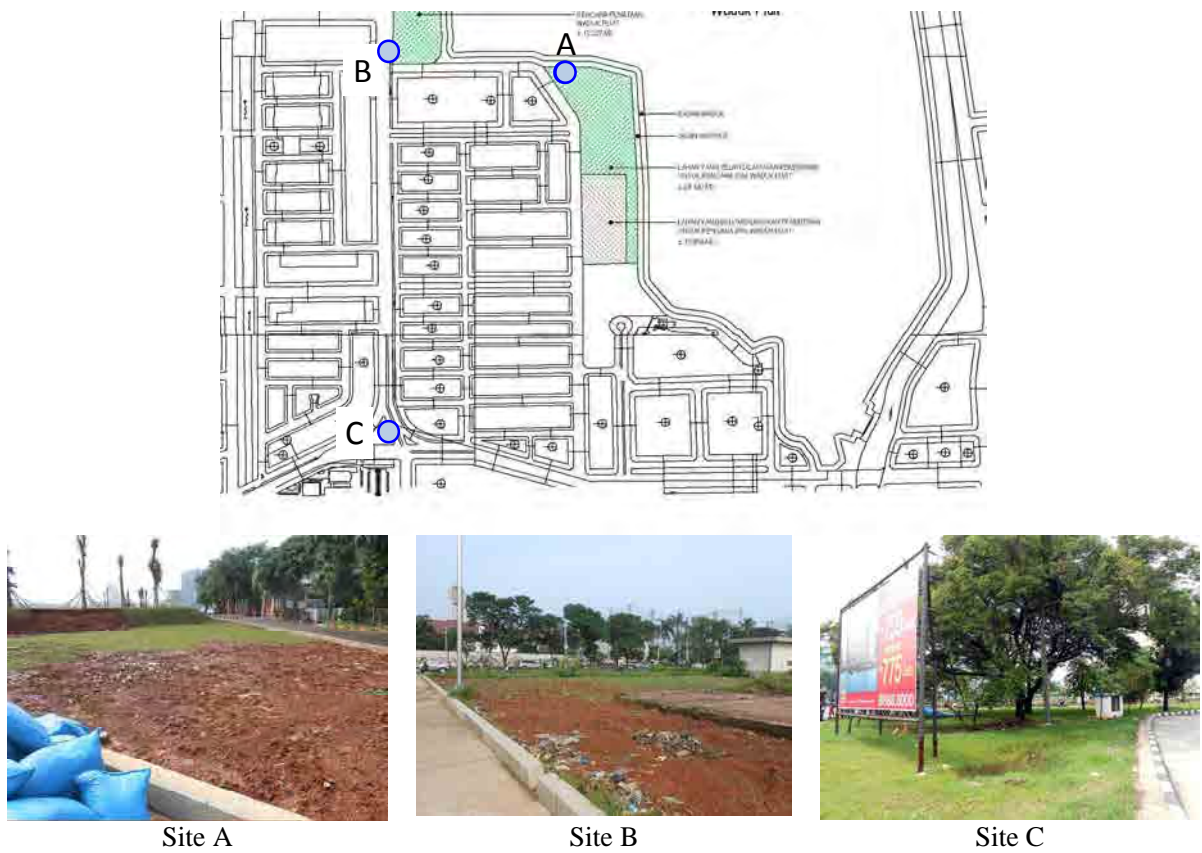


Figure 3 Topographic Survey Area for 3 Vertical Shafts

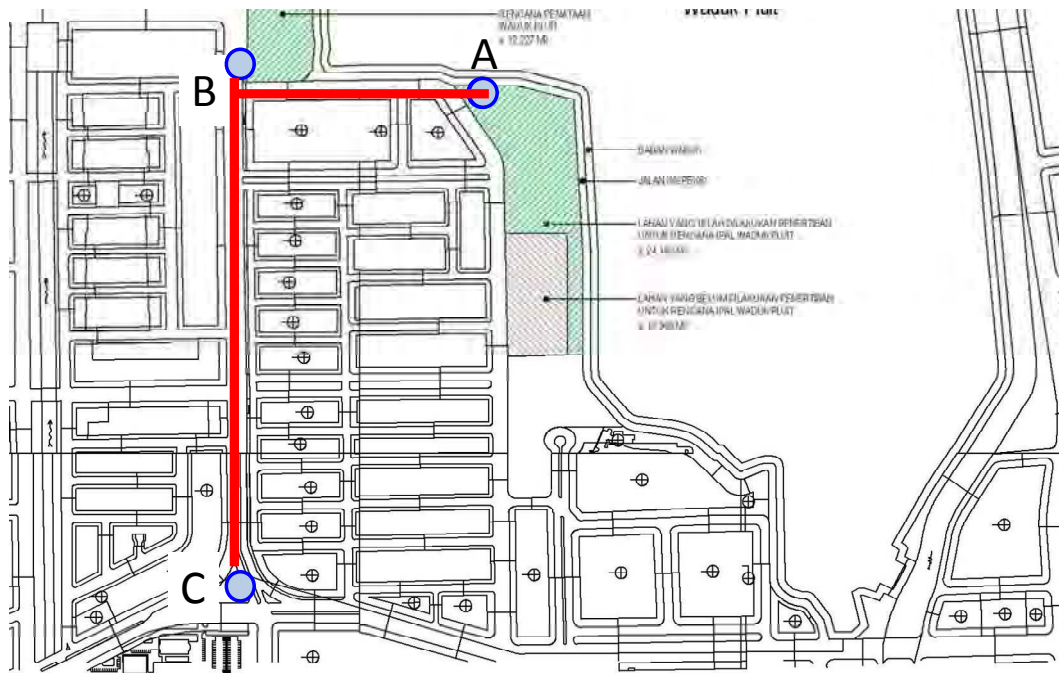


Figure 4 Locations of Line Surveys for Trunk Sewer Route, showing in red color line.

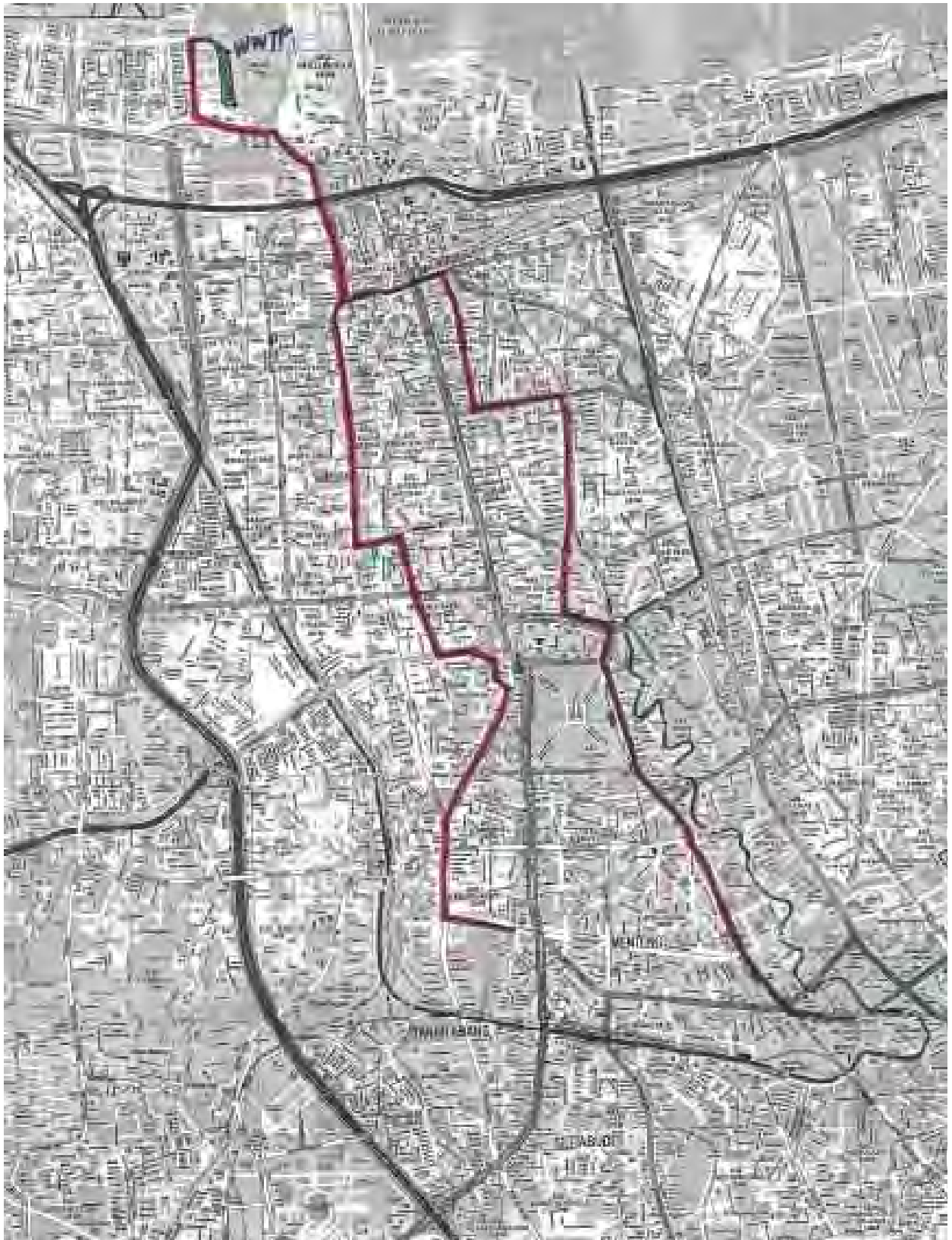


Figure 5 Levelling Survey for Sewer Line
(Sewer lines highlighted in red are expected as a trunk sewer.)

PART 3. SURVEY RESULT

3.1 Benchmark establishment

A total 29 (Twenty nine) benchmarks were established by red color as follows :

- Leveling survey,
 - o East line, a total 10 (ten) benchmarks
Code BMBT1 ... BMT10
 - o West line, a total 12 (twelve) benchmarks
Code BMB1 ... BMB12
- Additional area , a total 7(seven) benchmarks
Code BMQ1 ... BMQ3, BMR1 ... BMR2, BMS1 ... BMS2
- Line survey, a total 2 (two) benchmarks
Code BMB and BMA
- Topographic survey, a total 2(two) benchmarks
Code BM1 and BM2

3.2 Station Marking

A total 5 (five) lines were made for stationing, line routes as follows :

- East Line
 - o Code T0 T433,
 - o a total length approximate 10.875m connected to West line at
KM 8+400
- West Line
 - o Code B0 B445,
 - o a total length approximate 11250m connected to Vertical shaft C
area
- Additional area
 - Route Q
 - o Code Q0 Q151
a total length approximate 3800m
 - Route R
 - o Code R0 R46
a total length approximate 1650m
 - Route S
 - o Code S0 S62
a total length approximate 1600m

3.3 Traverse Measurement

In the traverse measurement, one traverse route were set up along the survey area The following section showing the Traverse route for all survey activity,

Traverse route

BM2-BM1-TB3-TB4-TB5-PR17-PR19-PR24-BMB12-PR34-TB6-TB7-TB8-
BM2-BM1

The result of Traverse measurement as follows :

- Total Traverse point = 13
- Total Traverse length = 2300 m
- Linier error = 1/10176

3.4 Leveling Measurement

Leveling route on recent survey consist of several section as follows :

Section 1) BMPORT – BMB11 (Leveling route for elevation connection from reference point)

BM PORT- 1- 2... 23-TL-1A-2A...15BM...31...C1..C3-BMB11

The Result of Leveling measurement

- Leveling measurement start from one control point
- Each section of leveling route were measured by double stand observation
- Total length approximate 3km

Section 2) BMB11 BM1

The Result of Leveling measurement

- Leveling measurement start from one control point
- Each section of leveling route were measured by double stand observation
- Total length approximate 2.1km

Section 3) BMB11 T1

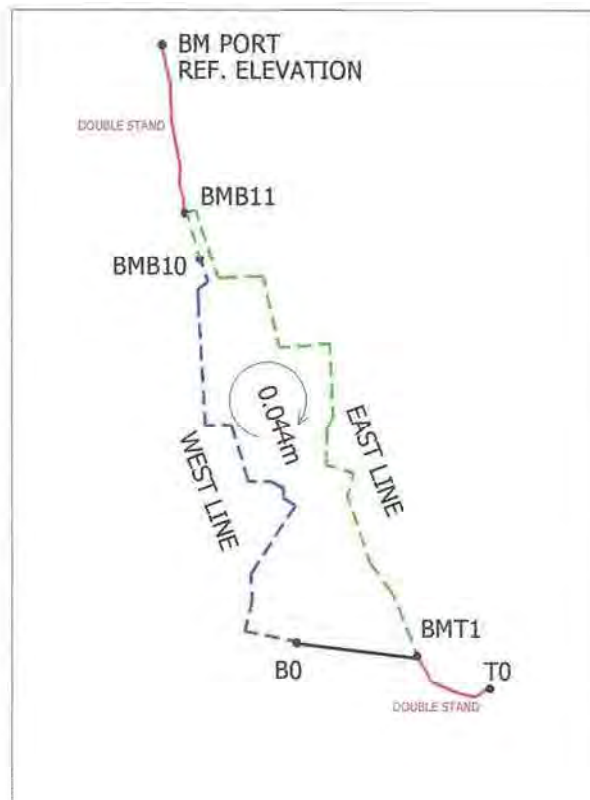
The Result of Leveling measurement

- Leveling measurement start from one control point
- Each section of leveling route were measured by double stand observation
- Leveling measurement with go and back system
- Total length approximate 9km
- Leveling closed system to West line
- Closed error 0.044m to west line (20.2km)

Section 4) BMB10 B0

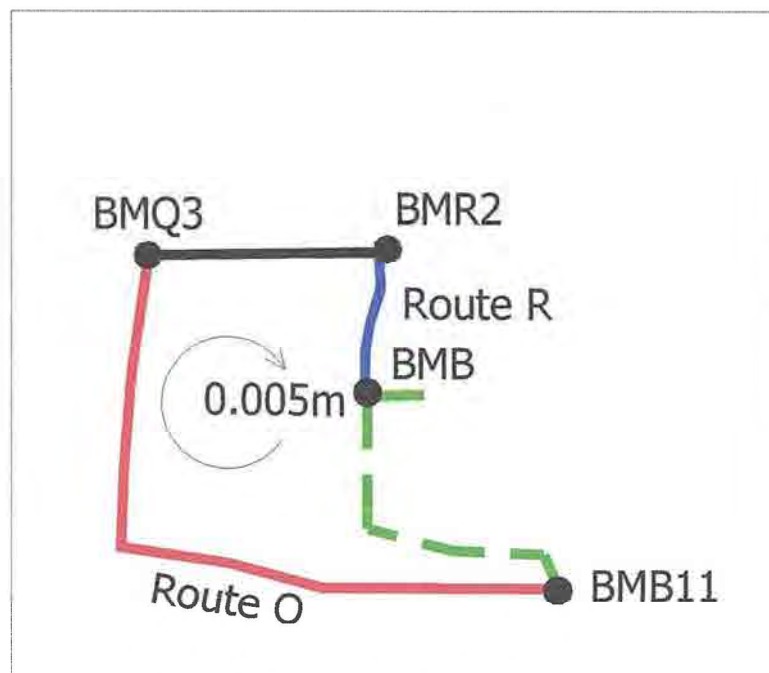
The Result of Leveling measurement

- Leveling measurement start from one control point
- Each section of leveling route were measured by double stand observation
- Leveling measurement with go and back system
- Total length approximate 11.2km
- Leveling closed system to East line
- Closed error 0.044m to East line (20.2km)



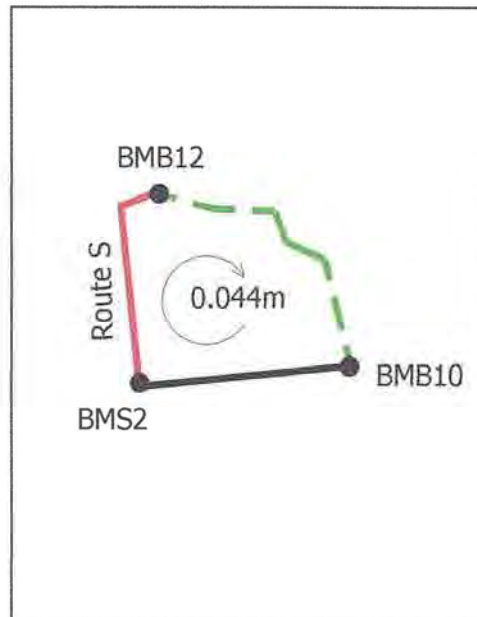
Section 5) BMB11 BMQ3 (ADD ROUTE Q)

- Leveling measurement start from one control point
- Each section of leveling route were measured by double stand observation
- Leveling measurement with go and back system
- Total length approximate 3.8km
- Leveling closed system to Route R
- Closed error 0.005m to Route R



Section 6) BMB12 BMS2 (ADD ROUTE S)

- Leveling measurement start from one control point
- Each section of leveling route were measured by double stand observation
- Leveling measurement with go and back system
- Total length approximate 1.65km
- Leveling closed system to West line
- Closed error 0.017m to West line



Section 7) Q127 BMR2 (ADD ROUTE R)

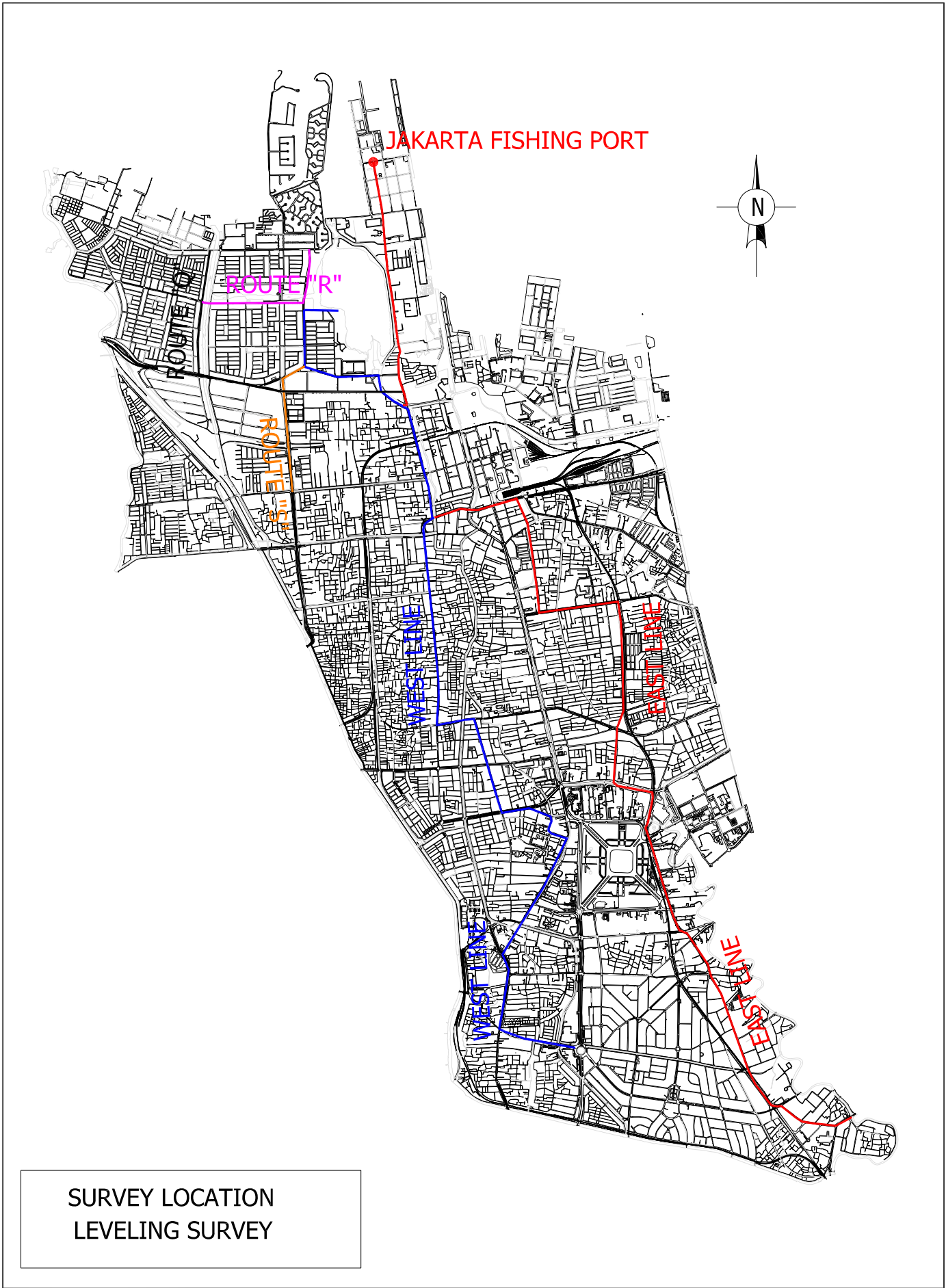
- Leveling measurement start from Route Q
- Each section of leveling route were measured by double stand observation
- Leveling measurement with go and back system
- Total length approximate 1.6km
- Leveling closed system to Route Q
- Closed error 0.005m to Route Q

Leveling measurement route and computation attached on APPENDIX of this report.

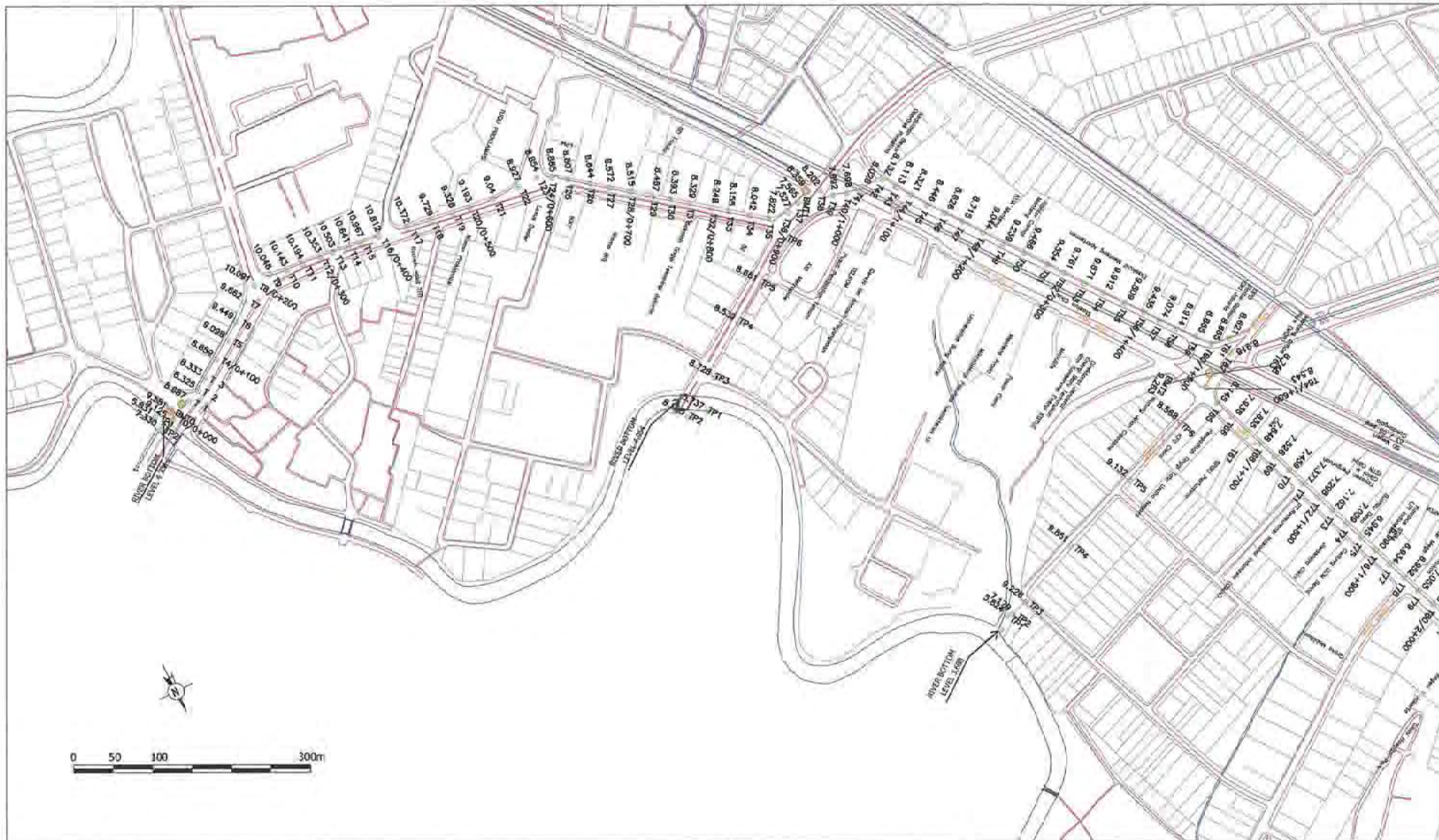
3.5 Drawings

As survey result, a set of Topographic drawing were produced

- Leveling Map along survey drawing were plotted on not scale (size A3)
- Topographic Map on Vertical Shafts drawing were plotted on scale 1 : 500 (size A3)
- Topographic Map on WWTP drawing were plotted on scale 1 : 2000 (size A3)
- Cross section drawing should be plotted on scale of horizontal, 1 : 200, and vertical 1 : 200. (size A3)
- Plan and Longitudinal section drawing should be plotted on scale of horizontal 1 : 2000, and vertical 1 : 500. (size A3)

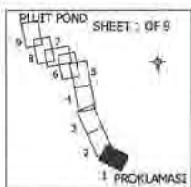


SPOT ELEVATION SURVEY (ZONE - 1)

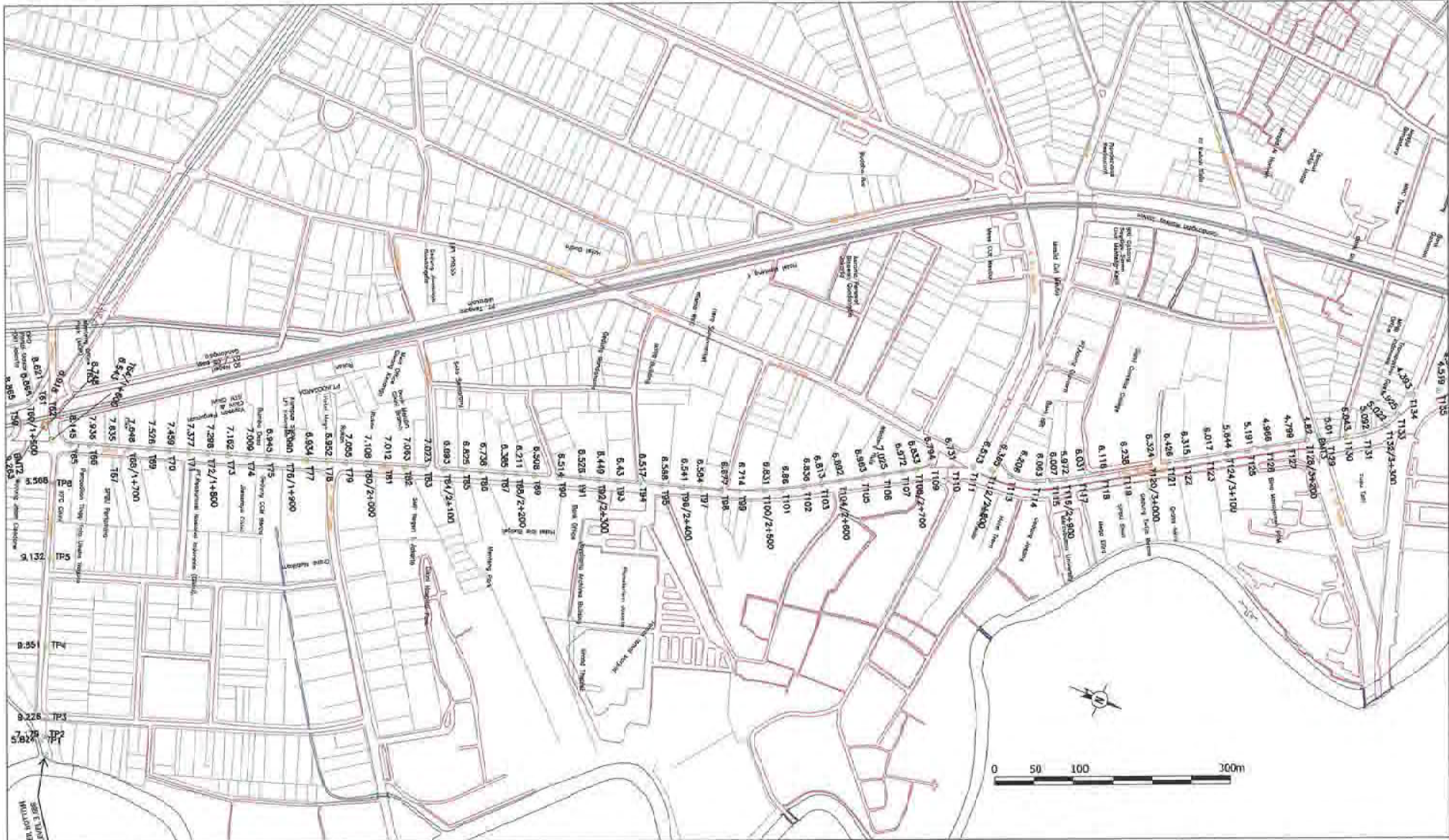


ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)

- LEGEND :
- BENCHMARK
 - STATIONING POINT
 - POINT CODE/STATIONING
 - ELEVATION

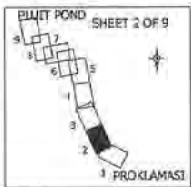


SPOT ELEVATION SURVEY (ZONE - 1)

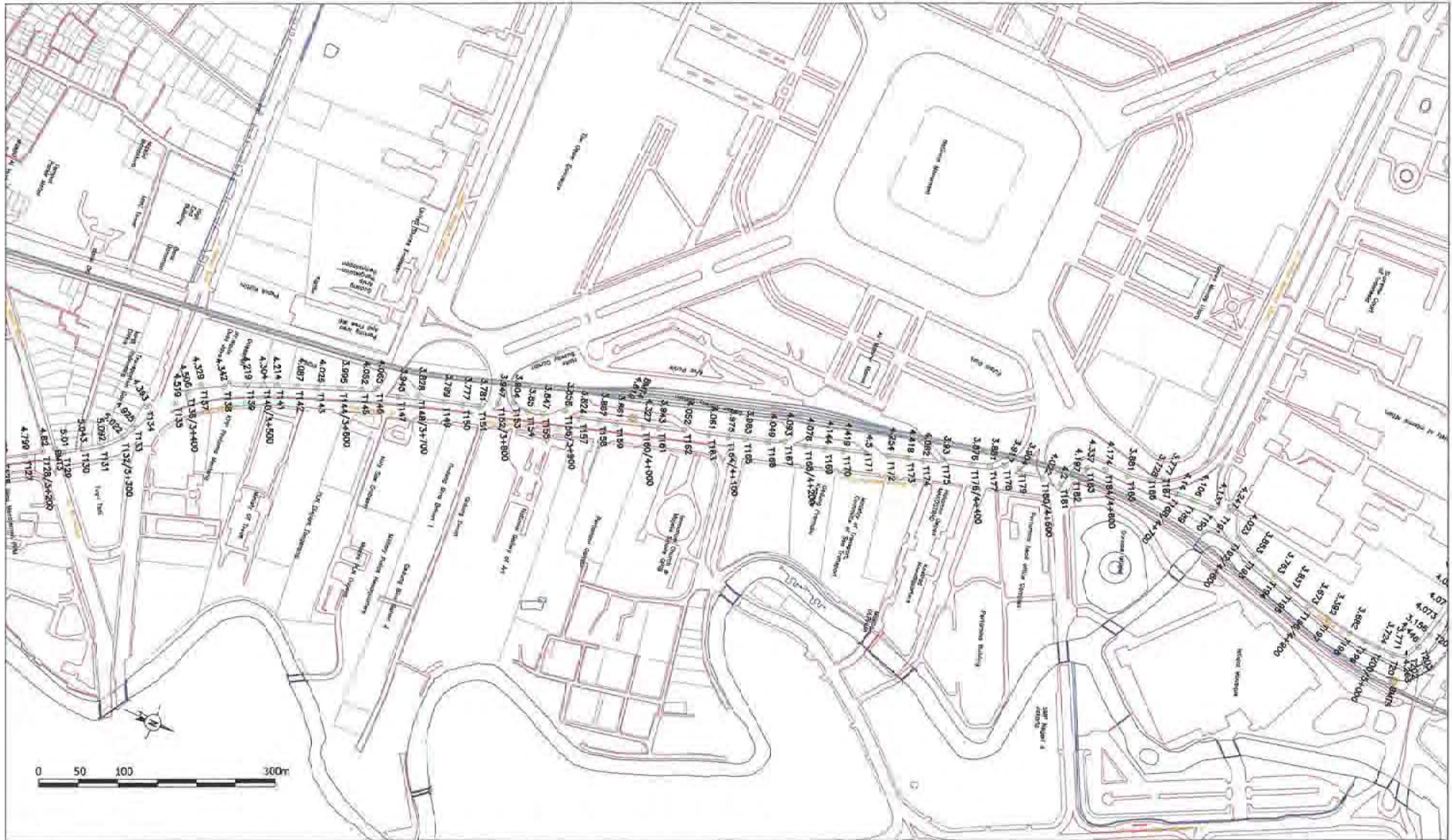


ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)

- LEGEND :
-  : BENCHMARK
 -  : STATIDING POINT
 -  : POINT CODE/STATIONING
 -  : ELEVATION

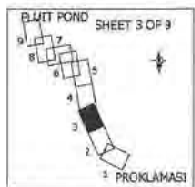


SPOT ELEVATION SURVEY (ZONE - 1)

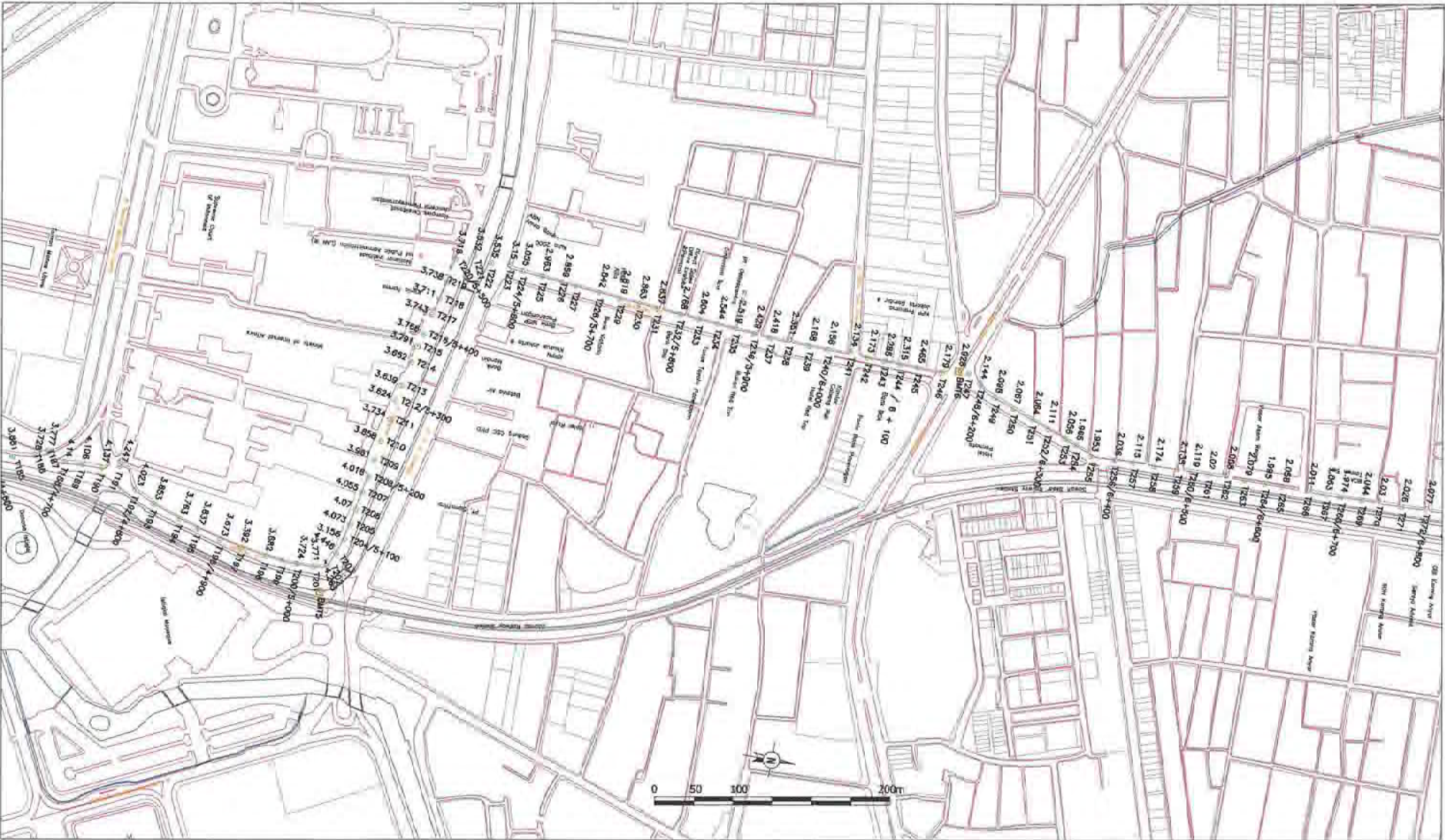


ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)

- LEGEND :
- : BENCHMARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION



SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)

- LEGEND :**
- ⊙ : BENCHMARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION

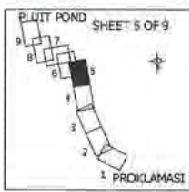
SPOT ELEVATION SURVEY (ZONE - 1)



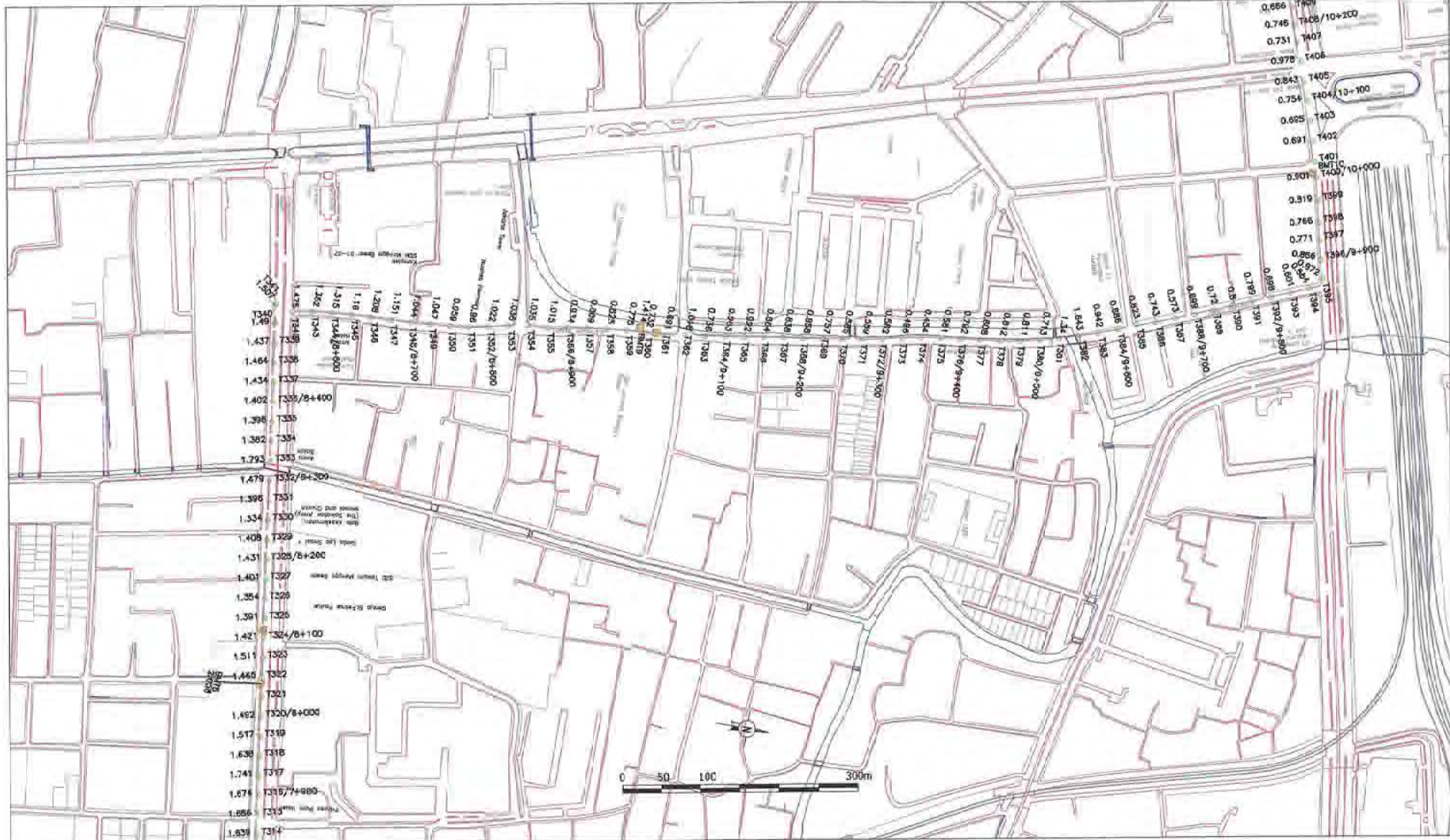
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	: BENCHMARK
	: STATIONING POINT
	: POINT CODE/STATIONING
	: ELEVATION

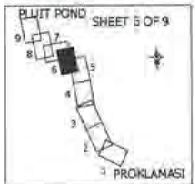
ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)



SPOT ELEVATION SURVEY (ZONE - 1)



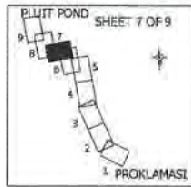
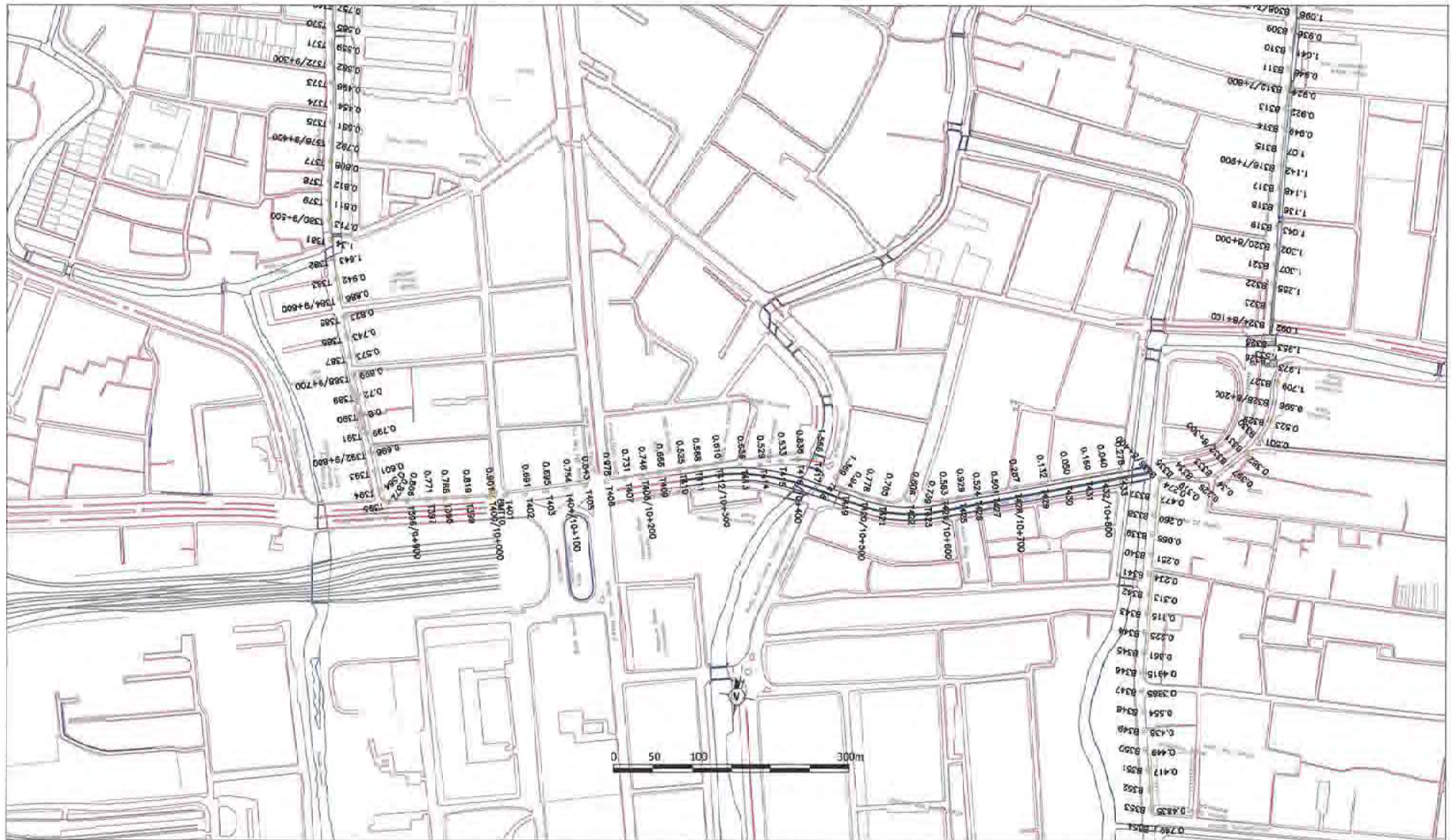
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ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)

- LEGEND :**
- : BENCHMARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION

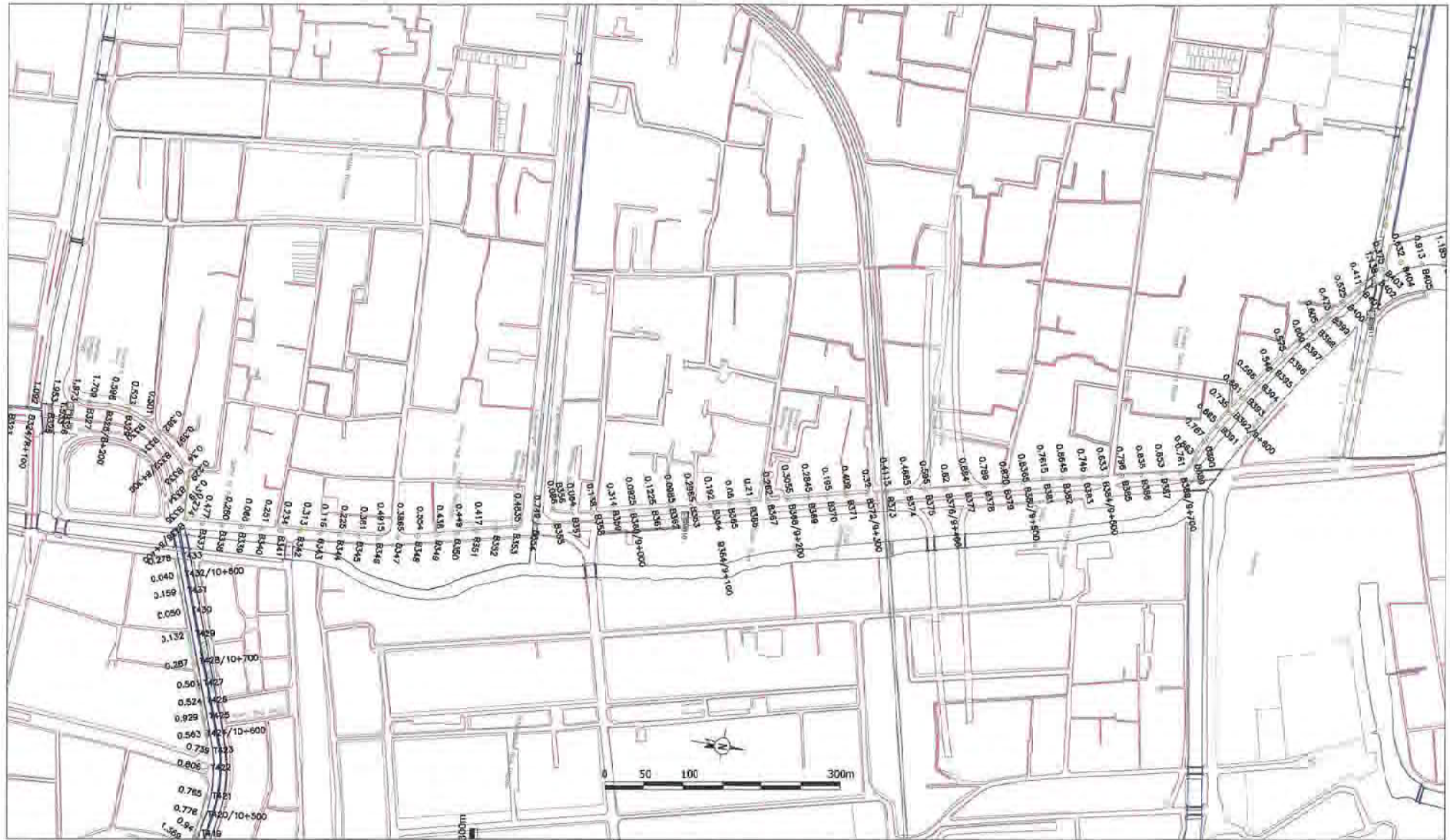
SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)

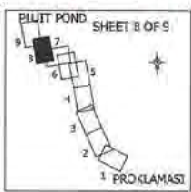
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- : BENCHMARK
 - : STAT. CNING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION

SPOT ELEVATION SURVEY (ZONE - 1)

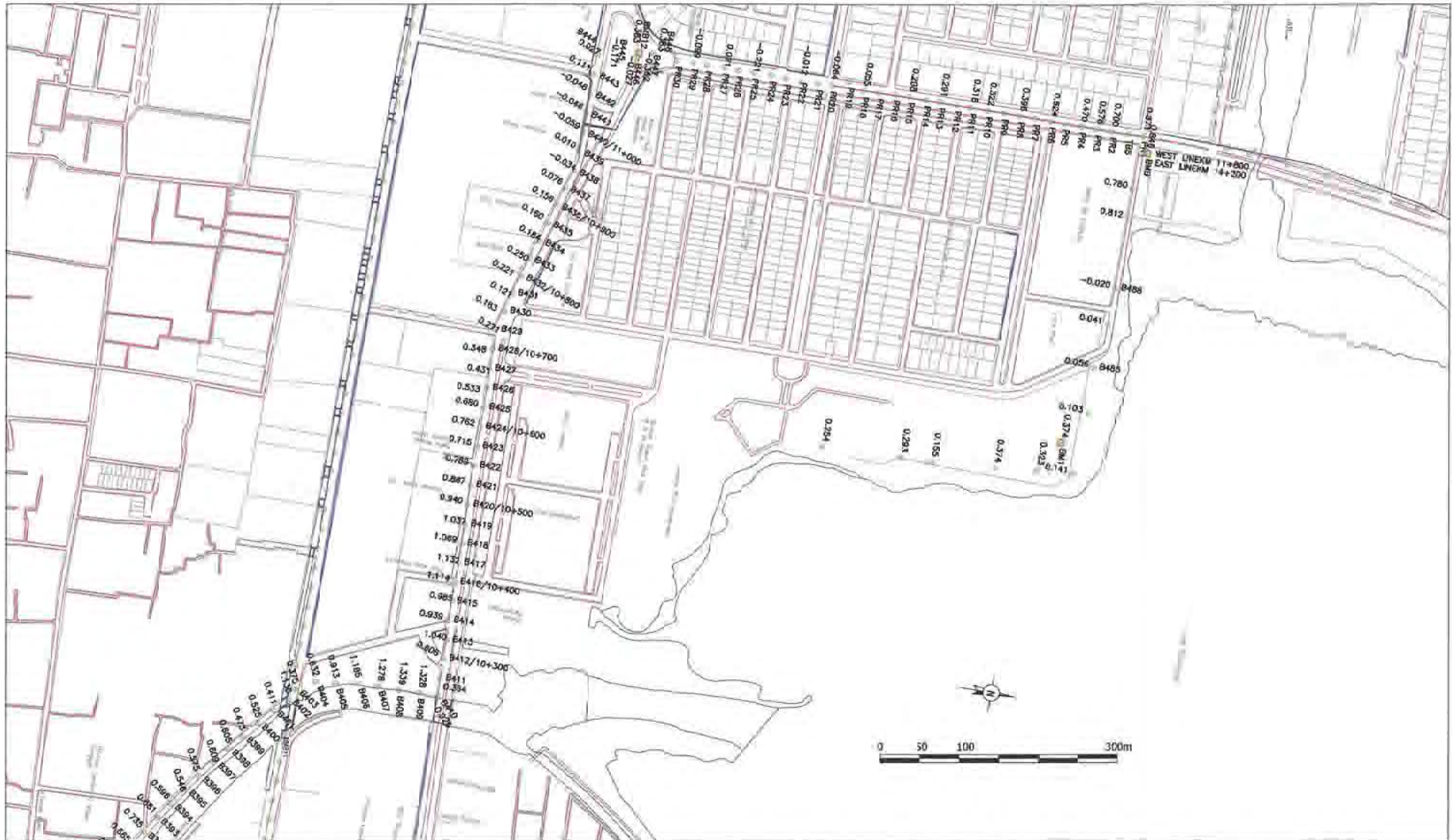


ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)

- LEGEND :
- BENCHMARK
 - STATIONING POINT
 - POINT CODE/STATIONING
 - ELEVATION

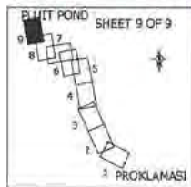


SPOT ELEVATION SURVEY (ZONE - 1)

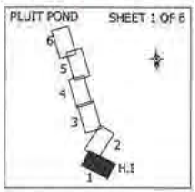
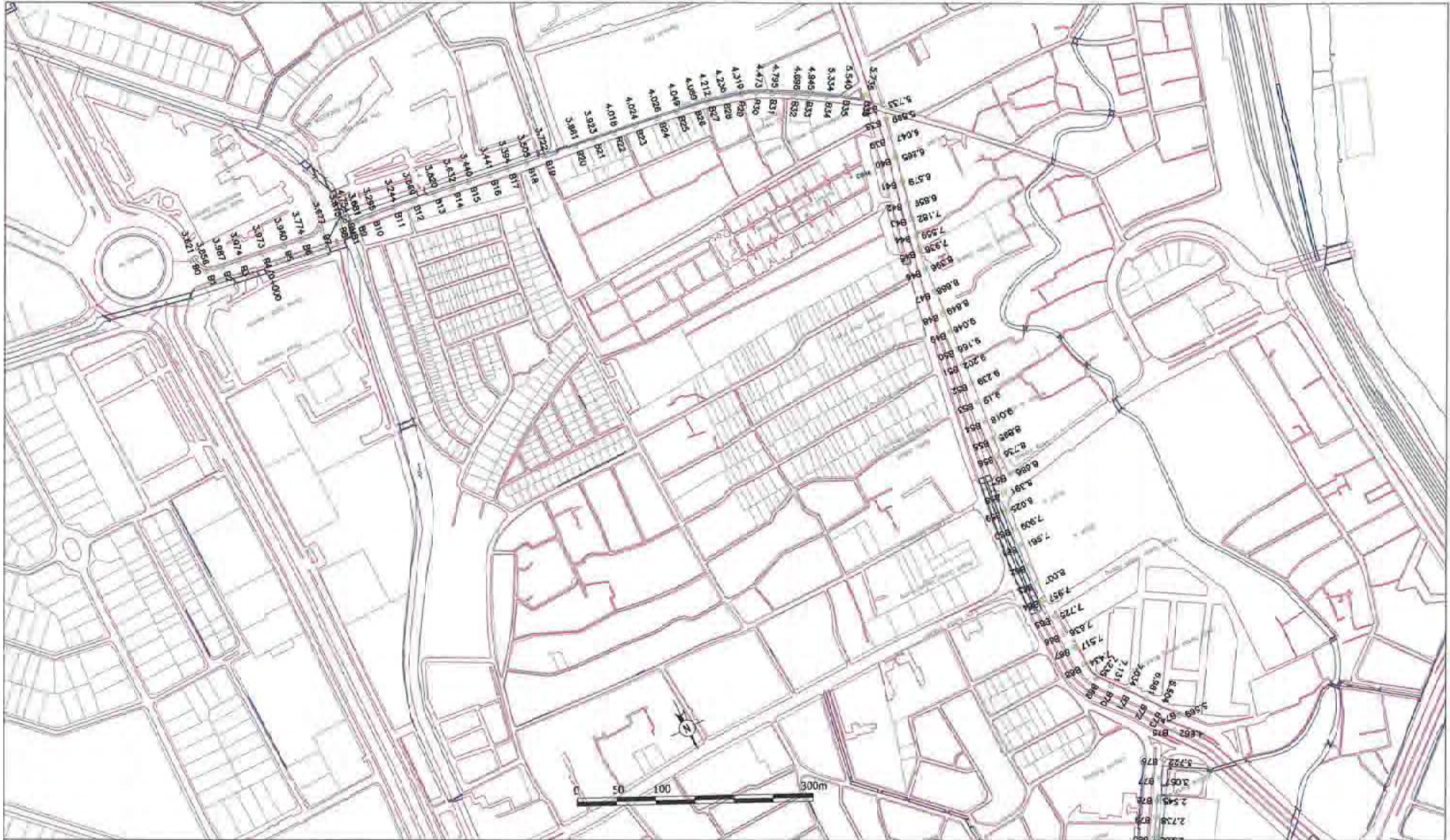


ROUTE = EAST LINE (PROKLAMASI - PLUIT POND)




- LEGEND :
- : BENCH MARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION



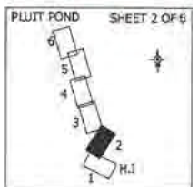
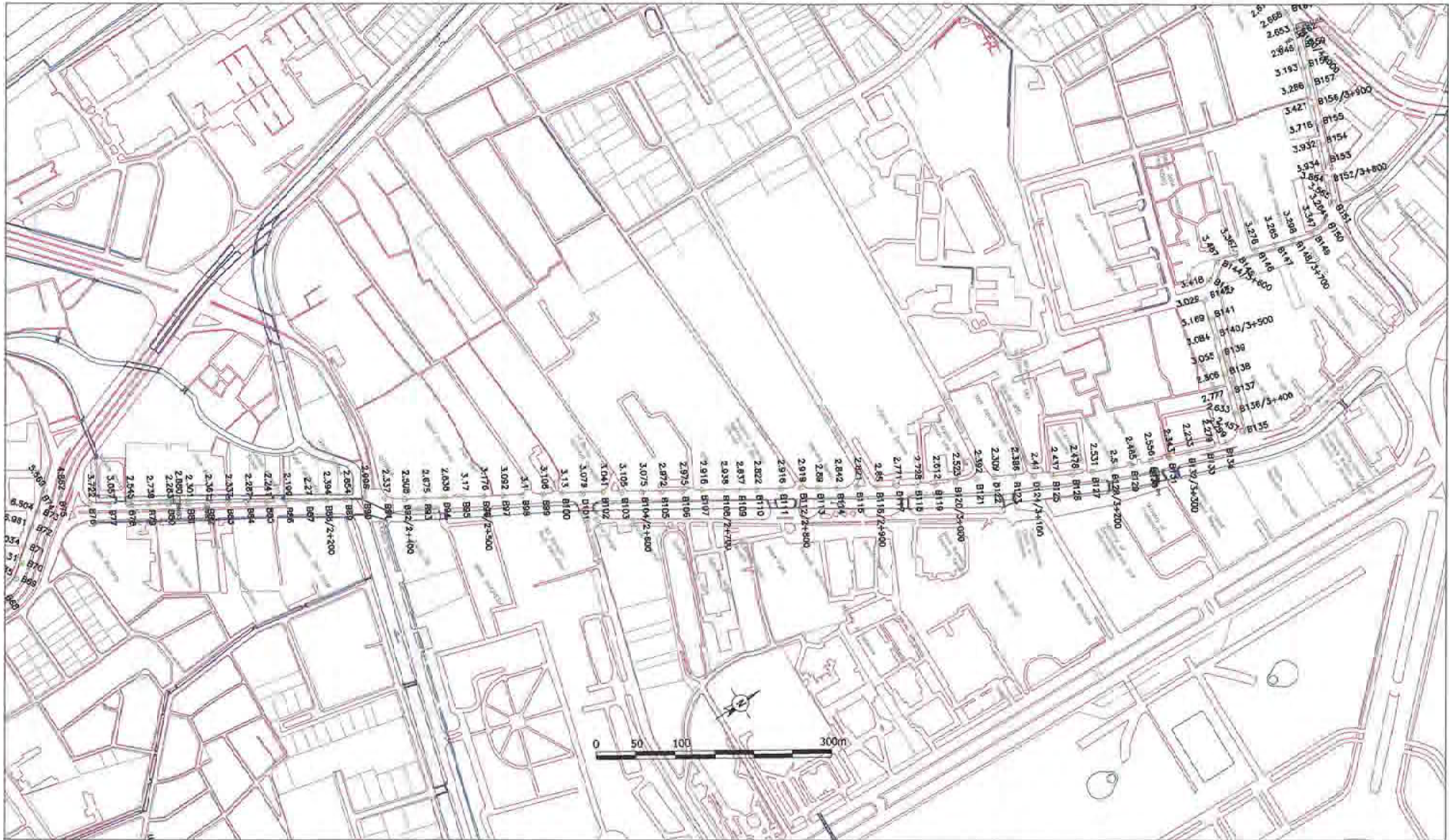
SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = WEST LINE (HOTEL INDONESIA - PLUIT POND)

- LEGEND :
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 -  : STATIONING POINT
 -  : POINT CODE/STATIONING
 -  : ELEVATION

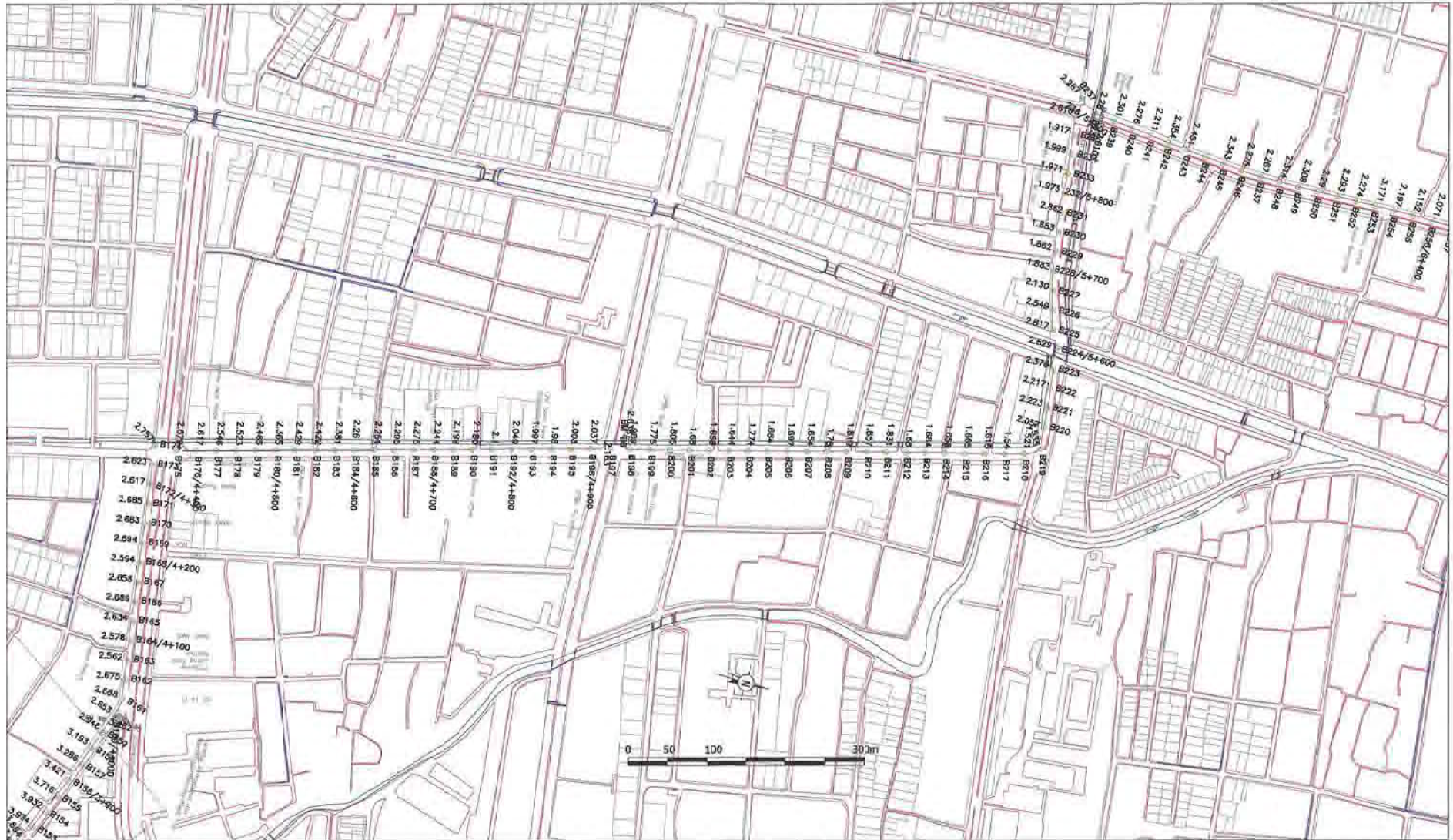
SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = WEST LINE (HOTEL INDONESIA - PLUIT POND)

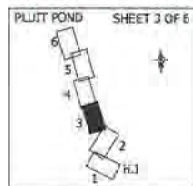
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 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION

SPOT ELEVATION SURVEY (ZONE - 1)

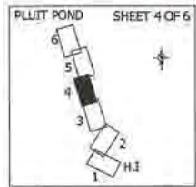


ROUTE = WEST LINE (HOTEL INDONESIA - PLUIT POND)

- LEGEND :
- : BENCHMARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION



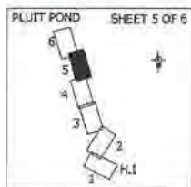
SPOT ELEVATION SURVEY (ZONE - 1)







ROUTE = WEST LINE (HOTEL INDONESIA - PLUIT POND)

- LEGEND :
- BM102 : BENCHMARK
 - Stationing symbols : STATICHING POINT
 - T200/54-000 : POINT CODE, STATIONING
 - 3.724 : ELEVATION

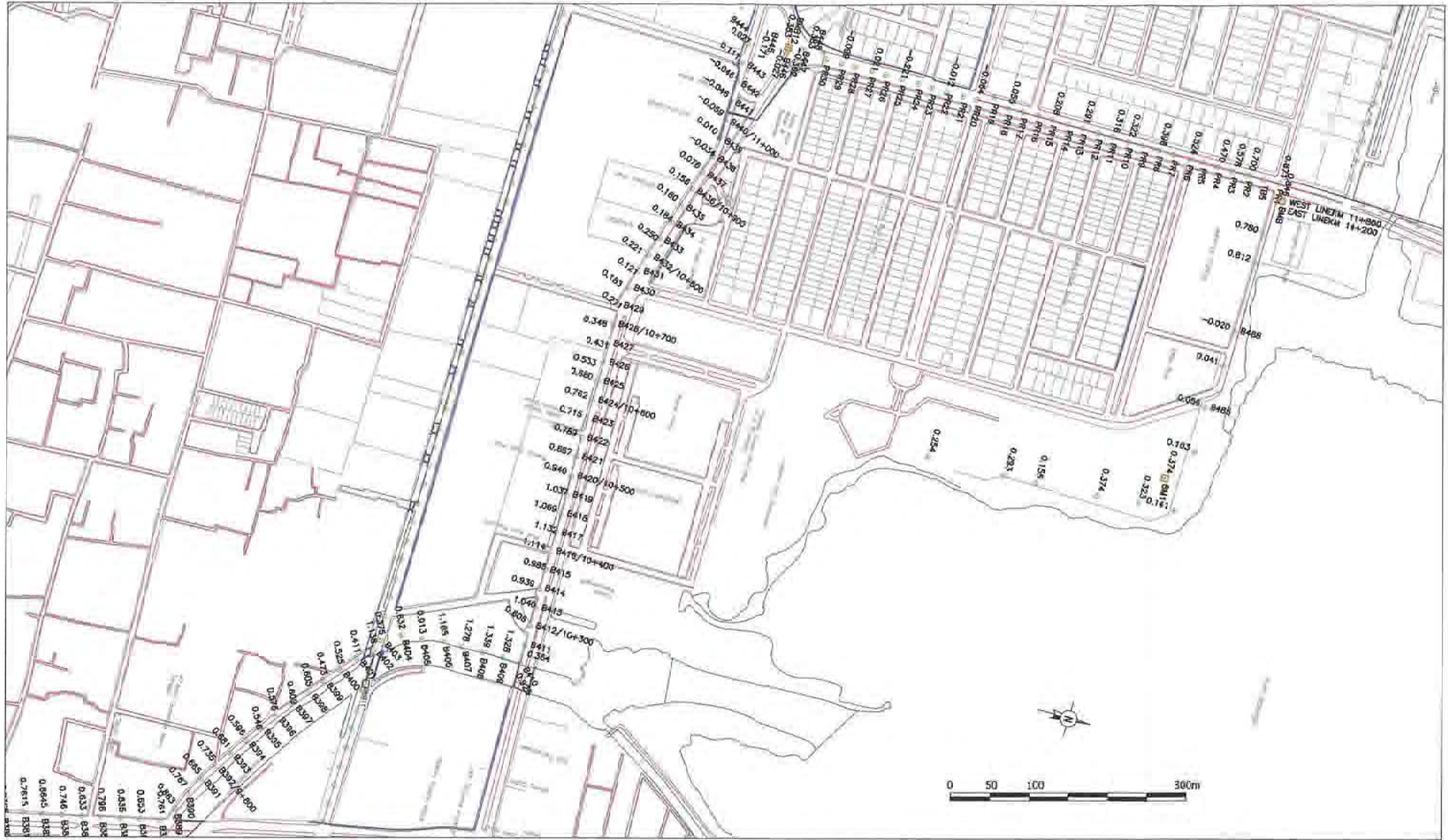
SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = WEST LINE (HOTEL INDONESIA - PLUIT POND)

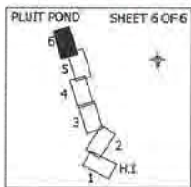
- LEGEND :**
-  : BENCHMARK
 -  : STATIONING POINT
 -  : POINT CODE/STATIONING
 -  : ELEVATION

SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = WEST LINE (HOTEL INDONESIA - PLUIT POND)

- LEGEND :
- BENCHMARK
 - STATIONING POINT
 - POINT CODE/STATIONING
 - ELEVATION

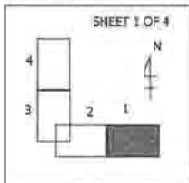


SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = Q

- LEGEND :
- : BENCHMARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION

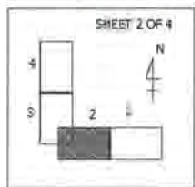


SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = Q

- LEGEND :
- BM05 : BENCHMARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION

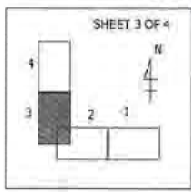


SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = Q

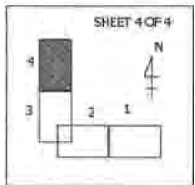
- LEGEND :
- : BENCHMARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION



SPOT ELEVATION SURVEY (ZONE - 1)



ROUTE = Q



LEGEND	
	ELEVATION
	POINT CODE/STATIONING
	BENCHMARK
	STATIONING POINT

SPOT ELEVATION SURVEY (ZONE - 1)







SHEET 1 OF 1



1

ROUTE = R

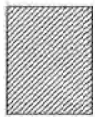
LEGEND :

-  BENCHMARK
-  STATIONING POINT
-  POINT CODE/STATIONING
-  ELEVATION

SPOT ELEVATION SURVEY (ZONE - 1)



SHEET 1 OF 1



ROUTE = -S-

- LEGEND :
- : BENCHMARK
 - : STATIONING POINT
 - : POINT CODE/STATIONING
 - : ELEVATION

NOTE

Date :

CHECKED	NAME	SIGN

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LINE SURVEY

Surveyed by :
PT. TIGENCO GRAHA PERSADA
Date :

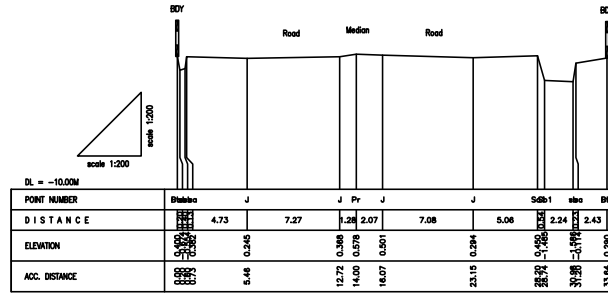
	NAME	SIGN
APPROVED		

CHECKED		
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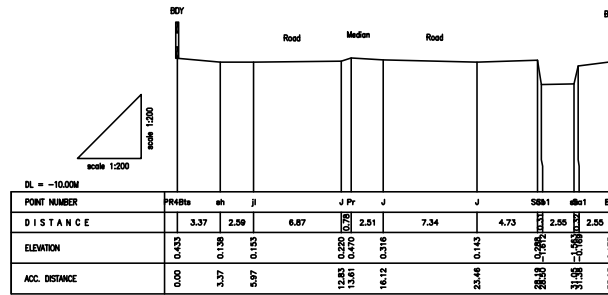
DRAWN		
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CROSSSECTION

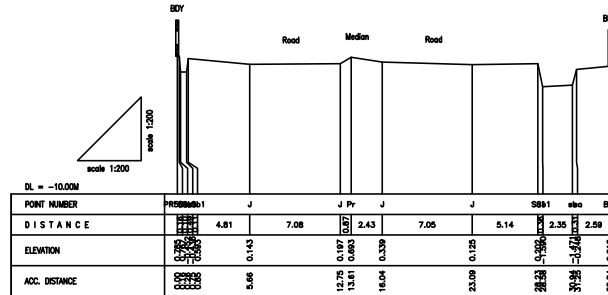
SCALE	TOTAL DRAWING	DRAWING NO.
1:400	5	1



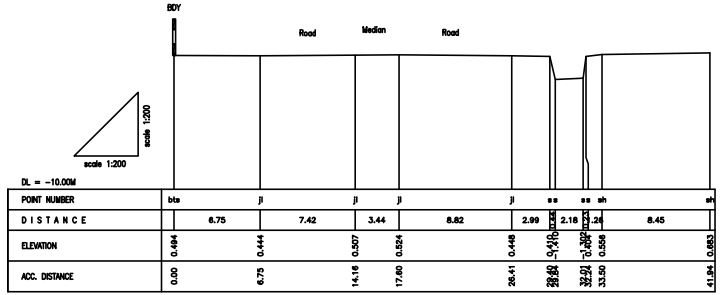
PR3



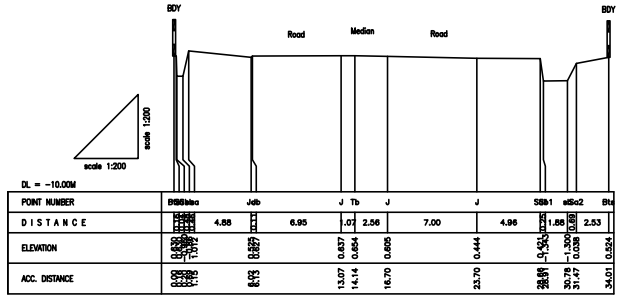
PR4



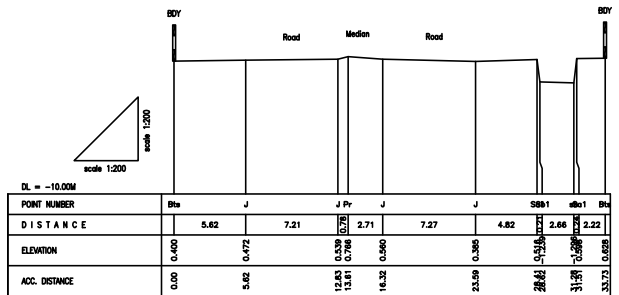
PR5



PR1



PR1a



PR2

NOTE

Date :

CHECKED	NAME	SIGN

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LINE SURVEY

Surveyed by :

PT. TIGENCO GRAHA PERSADA

Date :

	NAME	SIGN
APPROVED		

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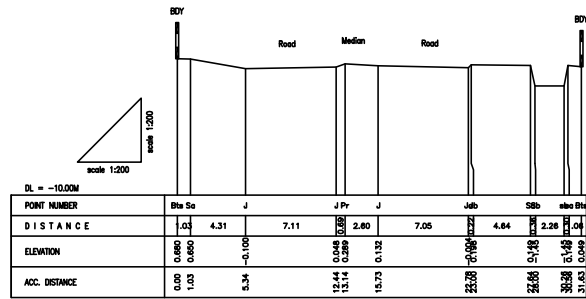
CHECKED		
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DRAWN		
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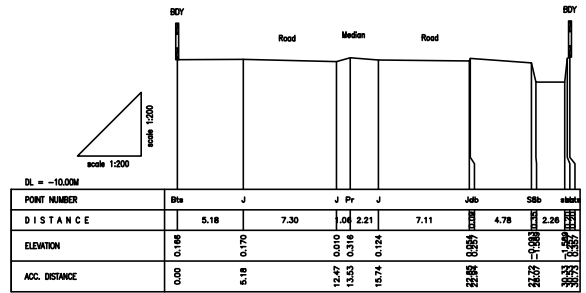
CROSSSECTION

SCALE	TOTAL DRAWING	DRAWING NO.
1:400	5	2

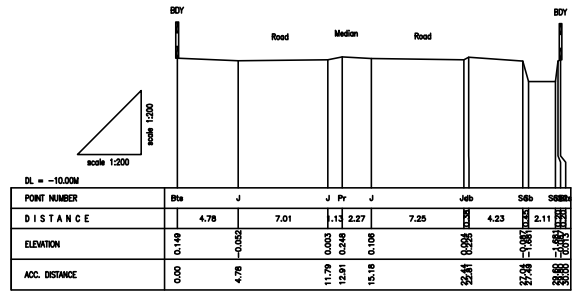
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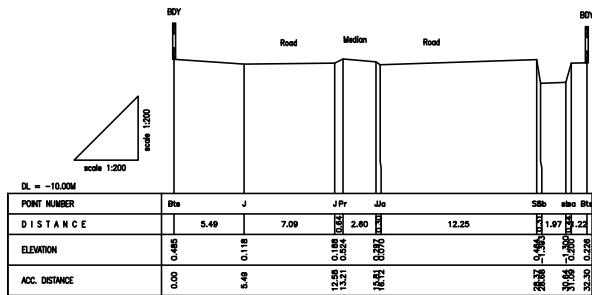
PR9



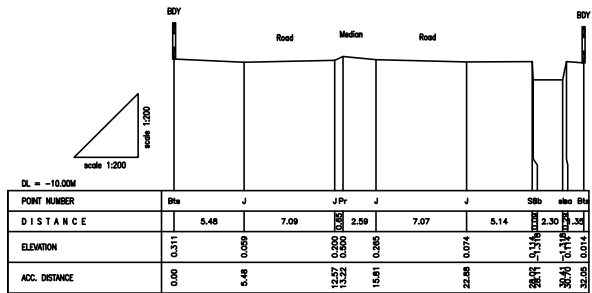
PR11



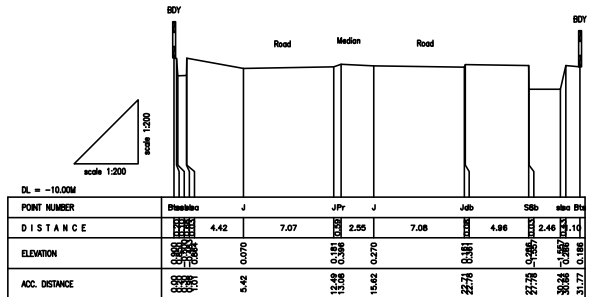
PR12



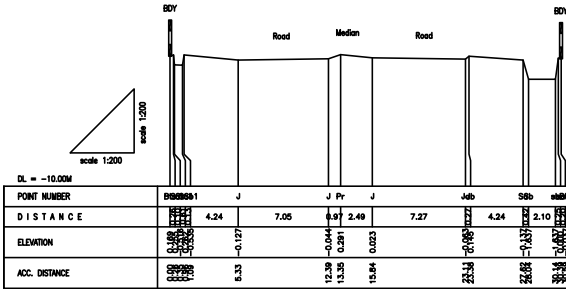
PR6



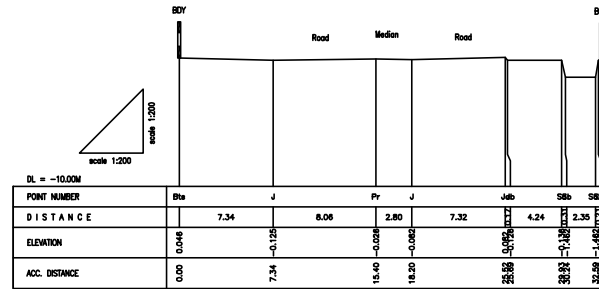
PR7



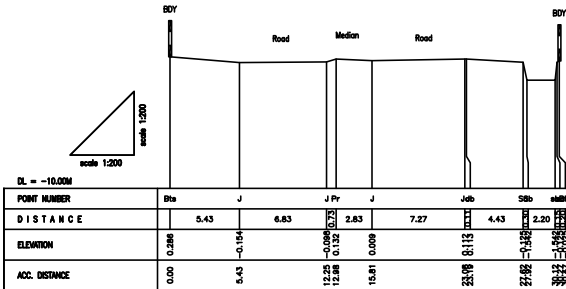
PR8



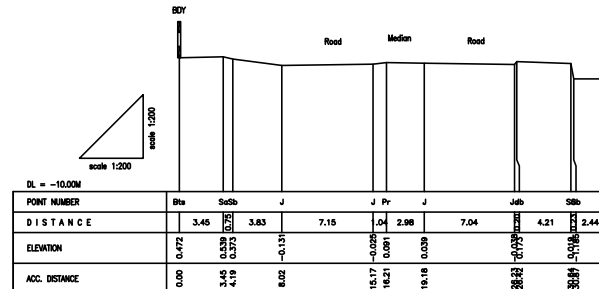
PR13



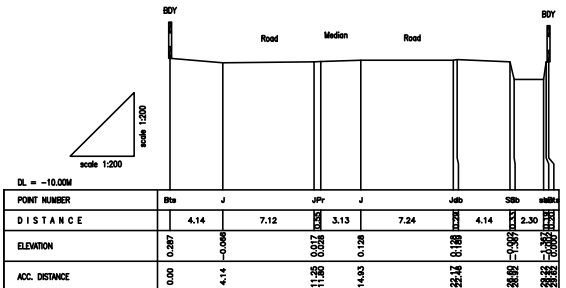
PR16



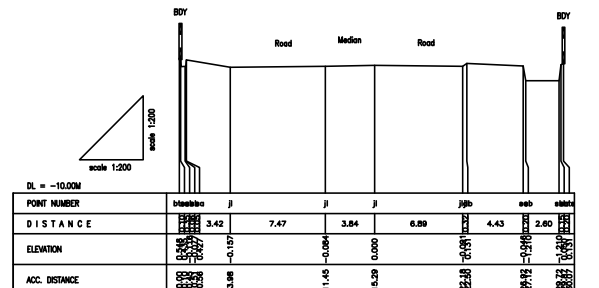
PR14



PR17



PR15



PR18

NOTE

Date :

CHECKED	NAME	SIGN

CHECKED	NAME	SIGN

CHECKED	NAME	SIGN

CHECKED	NAME	SIGN

LINE SURVEY

Surveyed by :

PT. TIGENCO GRAHA PERSADA

Date :

NAME	SIGN

APPROVED

CHECKED

DRAWN

CROSSSECTION

SCALE	TOTAL DRAWING	DRAWING NO.
1:400	5	3

NOTE

Date :

CHECKED	NAME	SIGN

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LINE SURVEY

Surveyed by :
PT. TIGENCO GRAHA PERSADA

Date :

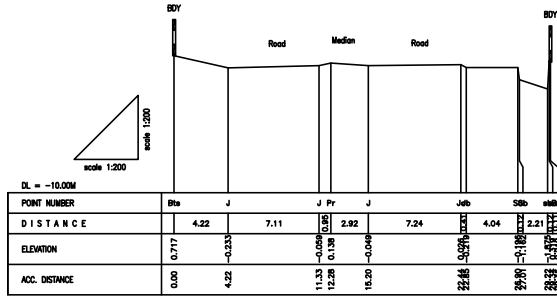
	NAME	SIGN
APPROVED		

CHECKED		
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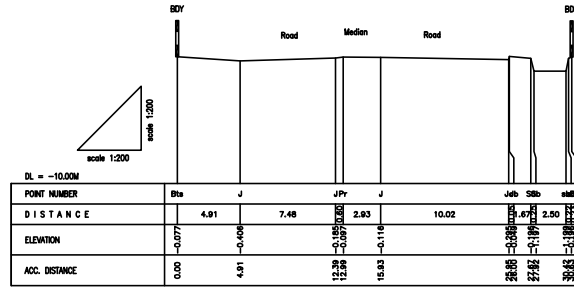
DRAWN		
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CROSSSECTION

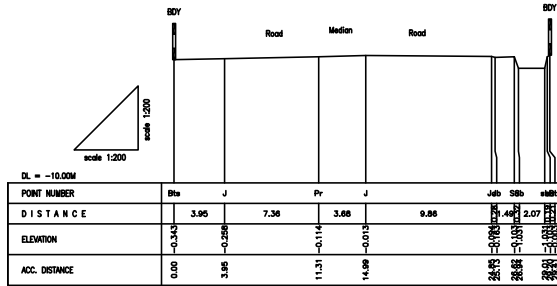
SCALE	TOTAL DRAWING	DRAWING NO.
1 : 400	5	4



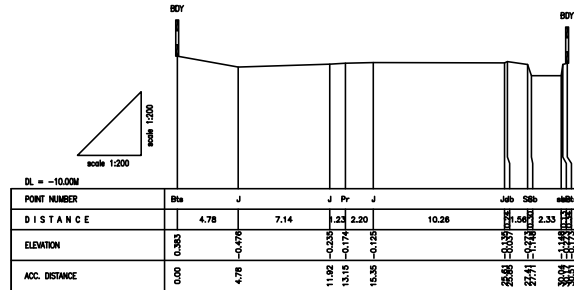
PR19



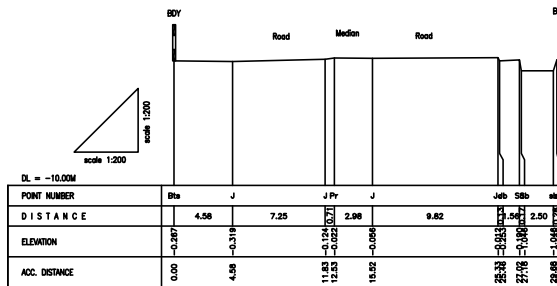
PR23



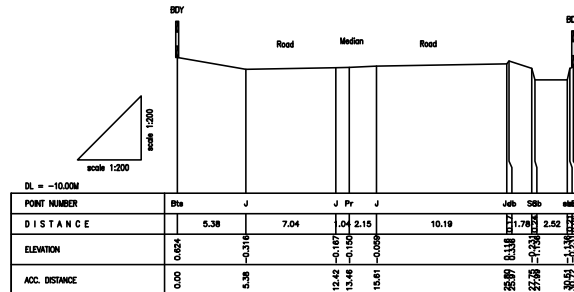
PR21



PR24



PR22



PR26

NOTE

Date :

CHECKED	NAME	SIGN
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LINE SURVEY

Surveyed by :

PT. TIGENCO GRAHA PERSADA

Date :

	NAME	SIGN
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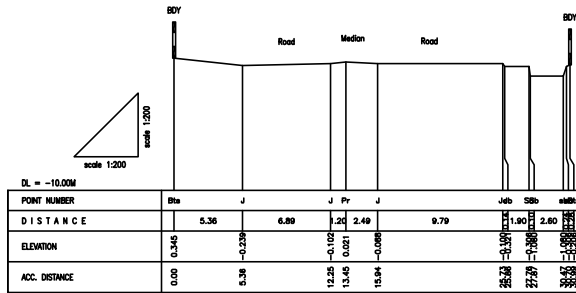
APPROVED		
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CHECKED		
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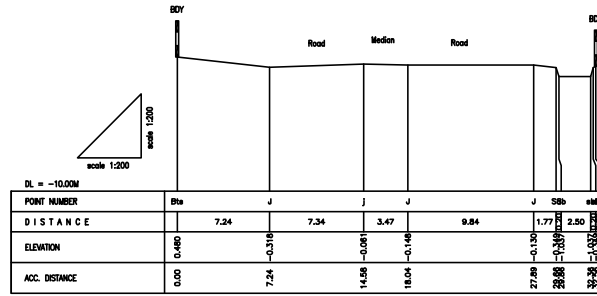
DRAWN		
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CROSSSECTION

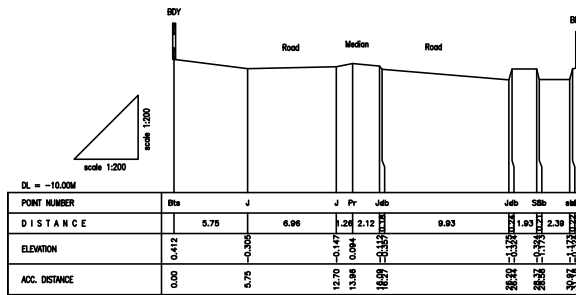
SCALE	TOTAL DRAWING	DRAWING NO.
1:400	5	5



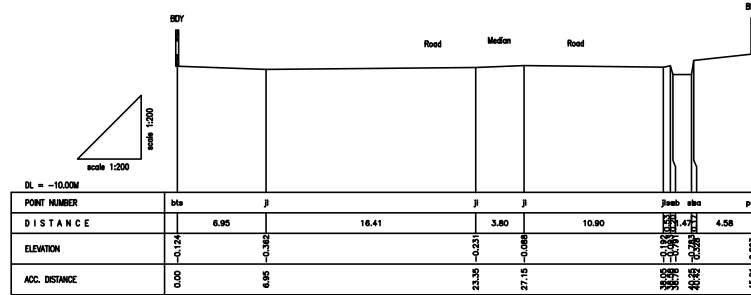
PR27



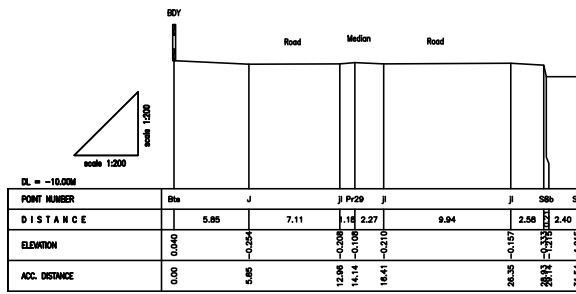
PR30



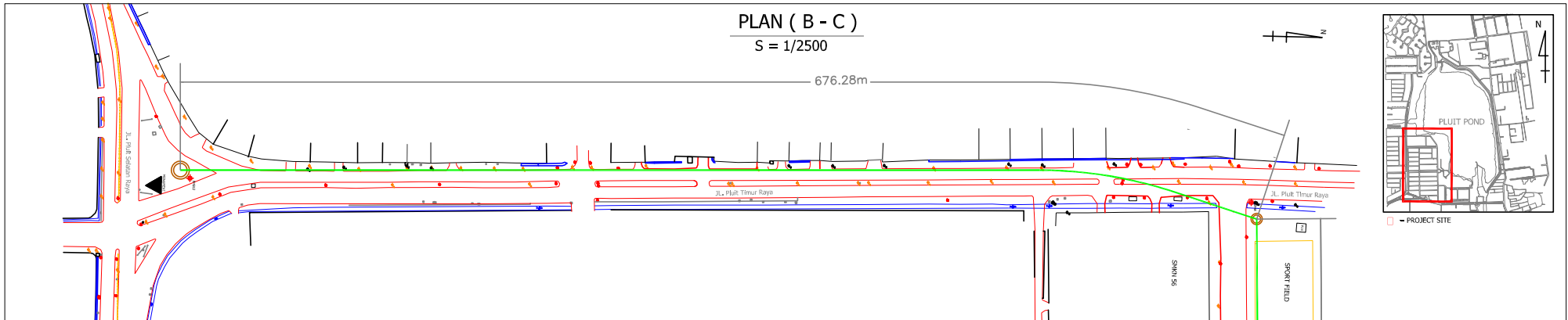
PR28



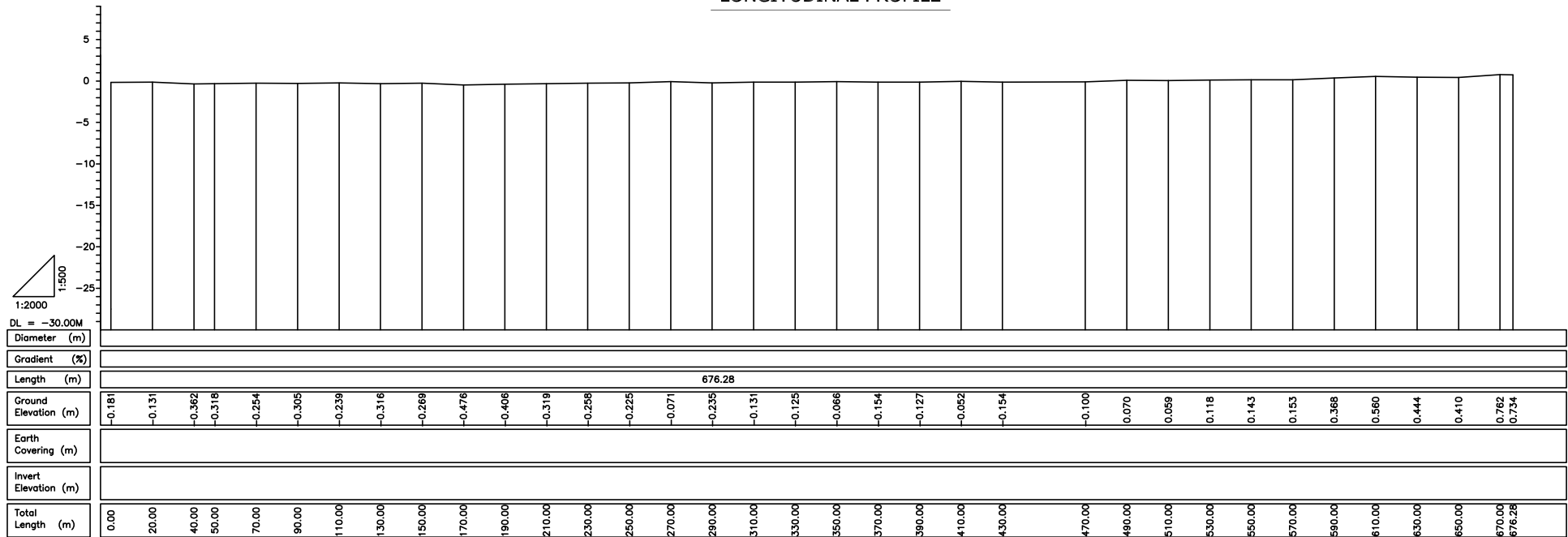
PR31



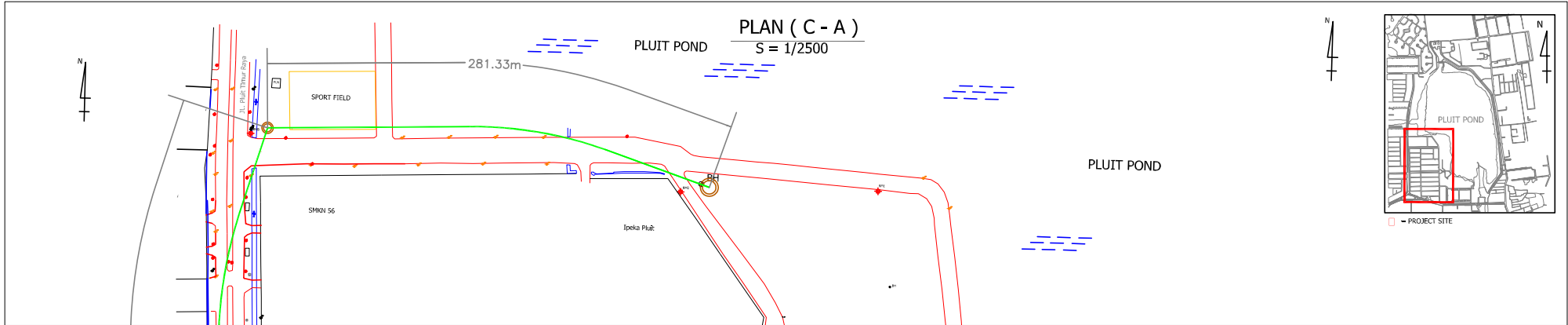
PR29



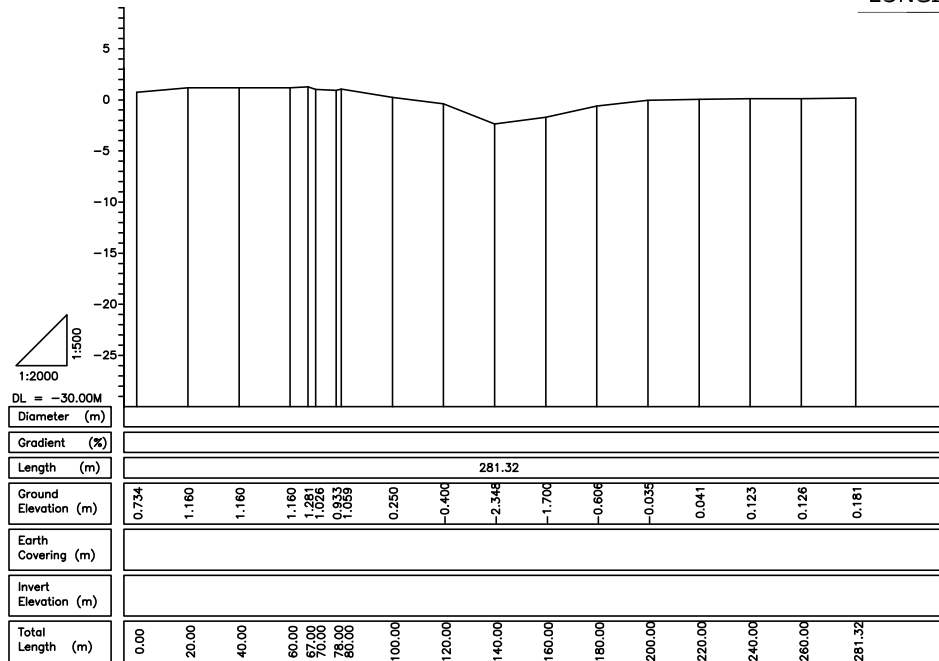
LONGITUDINAL PROFILE



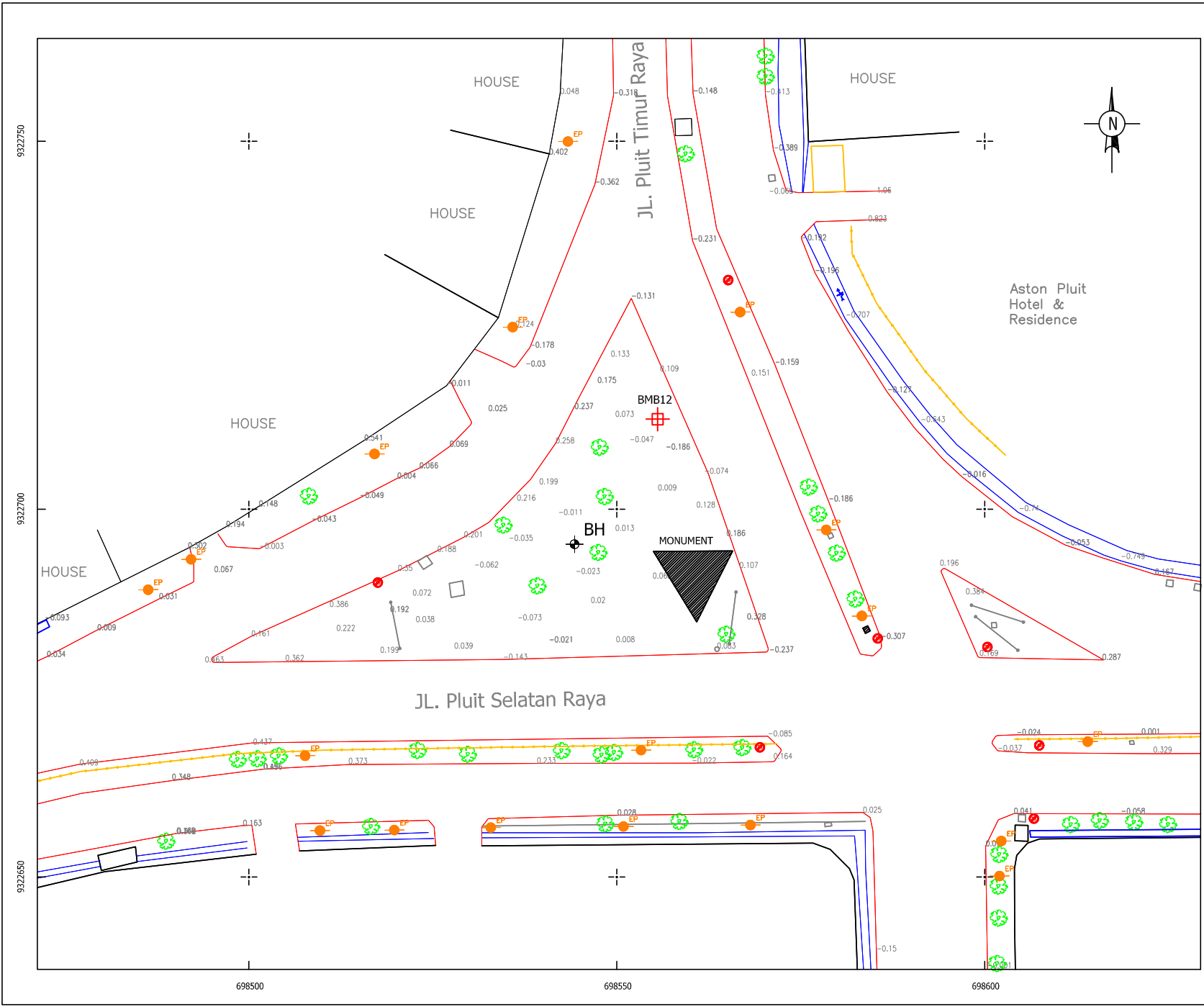
LINE SURVEY AT PLUIT TIMUR RAYA			
SCALE :	TITLE :		
1:2000	PLAN AND LONGITUDINAL PROFILE		
SIZE :			
A3			
	DATE	NAME	DWG NO : 01/02
DRAWN	-	-	
CHECKED	-	-	



LONGITUDINAL PROFILE



LINE SURVEY AT PLUIT TIMUR RAYA			
SCALE :	TITLE :		
1:2000	PLAN AND LONGITUDINAL PROFILE		
SIZE :			
A3			
	DATE	NAME	DWG NO : 02/02
DRAWN	-	-	
CHECKED	-	-	



NOTE

- THIS MAP WAS BASED ON THE FIELD SURVEY CONDUCTED ON MAY 2014 FOR THE SURVEY REFERENCE, THE FOLLOWING PARAMETER ARE ADOPTED
- HORIZONTAL CONTROL**
FOR THE HORIZONTAL CONTROL POINTS, LOCAL COORDINATE SYSTEM WAS ADOPTED THE REFERENCE POINTS IS BM1 WITH COORDINATES AS FOLLOWS
- | NO | CODE | NORTHING (Y) | EASTING (X) | ELEV |
|----|------|--------------|-------------|-------|
| 1 | BM1 | 9323350.000 | 698944.000 | 0.374 |
| | | | | |
| | | | | |
| | | | | |
- AZIMUTH CONTROL**
FOR THE AZIMUTH CONTROL COMPAS SYSTEM WAS ADOPTED BM1 TO BM2 AZIMUTH REFERENCE 88° 13' 26"
 - VERTICAL CONTROL**
ALL ELEVATION STARTED FROM PORT BENCHMARK WITH ELEVATION = 3.370 METER

LEGEND

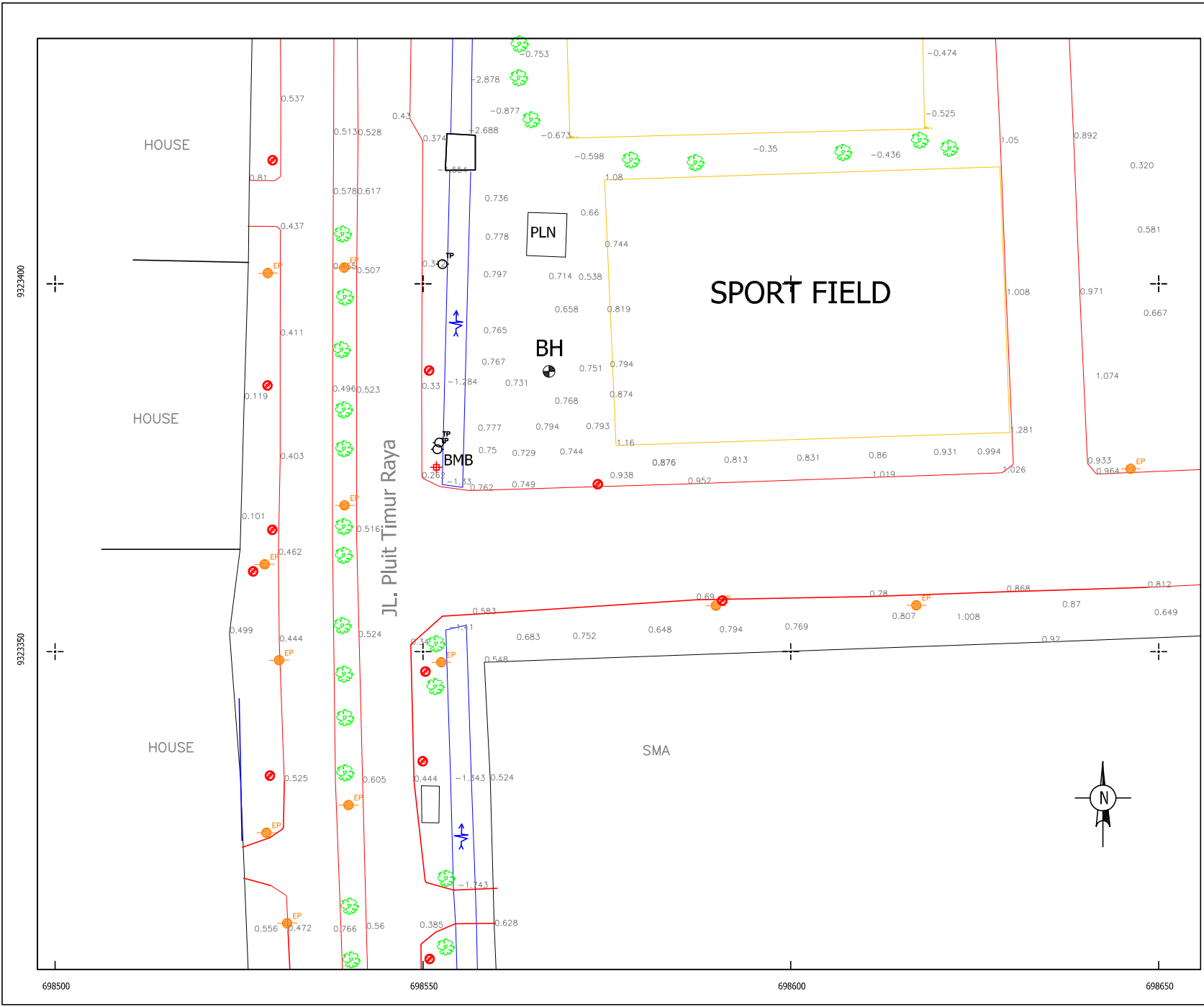
- = BENCHMARK
- = BOUNDARY POINT
- = CONTOUR LINE
- = ELEVATION POINT
- = ROAD
- = BOUNDARY LINE
- = BEACH LINE / DRAINAGE
- = TREE
- = ELECTRICAL POLE
- = BOREHOLE
- = TELECOMMUNICATION POLE
- = TRAFFIC SIGHT
- = BUILD

BY	DATE	DESCRIPTION

PT. Dacrea Design & Engineering Consultants

SURVEY :
PT. TIGENCO GRAHA PERSADA

SCALE :	TITLE :
1:500	TOPOGRAPHIC MAP AT VERTICAL SHAFT "C" PLUIT RAYA, JAKARTA
A3	
DATE 	DATE
DWG NO : 01/01	



NOTE

- THIS MAP WAS BASED ON THE FIELD SURVEY CONDUCTED ON MAY 2014 FOR THE SURVEY REFERENCE, THE FOLLOWING PARAMETER ARE ADOPTED
- HORIZONTAL CONTROL**
FOR THE HORIZONTAL CONTROL POINTS, LOCAL COORDINATE SYSTEM WAS ADOPTED THE REFERENCE POINTS IS BM1 WITH COORDINATES AS FOLLOWS
- | NO | CODE | NORTHING (Y) | EASTING (X) | ELEV |
|----|------|--------------|-------------|-------|
| 1 | BM1 | 9323350.000 | 698944.000 | 0.374 |
| | | | | |
| | | | | |
| | | | | |
- AZIMUTH CONTROL**
FOR THE AZIMUTH CONTROL, COMPAS SYSTEM WAS ADOPTED BM1 TO BM2 AZIMUTH REFERENCE 88° 13' 26"
 - VERTICAL CONTROL**
ALL ELEVATION STARTED FROM PORT BENCHMARK WITH ELEVATION = 3.370 METER

LEGEND

- = BENCHMARK
- = BOUNDARY POINT
- = CONTOUR LINE
- = ELEVATION POINT
- = ROAD
- = BOUNDARY LINE
- = BEACH LINE / DRAINAGE
- = TREE
- = ELECTRICAL POLE
- = BOREHOLE
- = TELECOMMUNICATION POLE
- = TRAFFIC SIGHT
- = BUILD

BY	DATE	DESCRIPTION

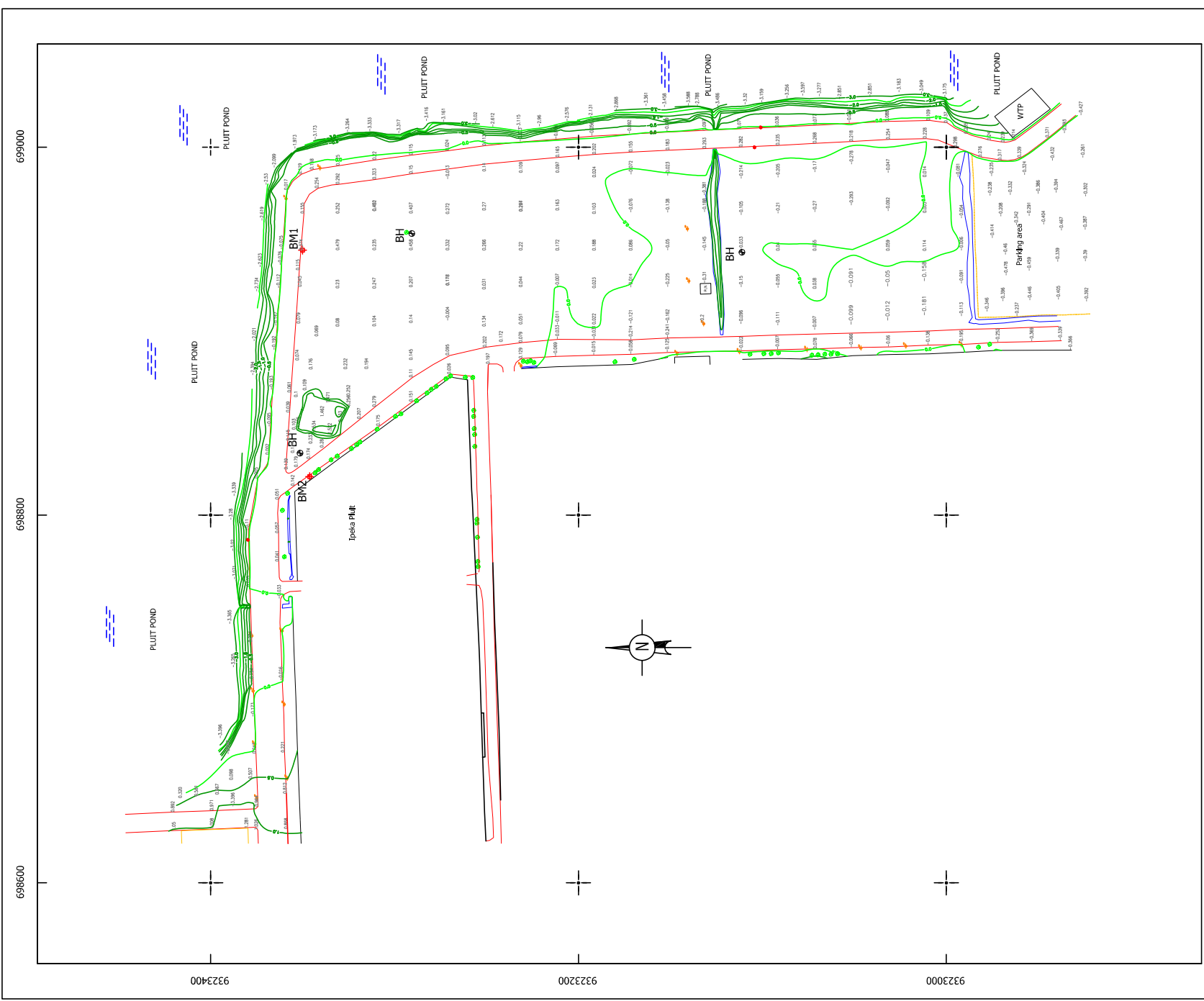
PT. Dacrea Design & Engineering Consultants

SURVEY :
PT. TIGENCO GRAHA PERSADA

SCALE : 1:1500
TITLE : TOPOGRAPHIC MAP AT VERTICAL SHAFT "B" PLUIT RAYA, JAKARTA

DATE	BY	CHK	DESCRIPTION

DWG NO : 01/01



NOTE

THIS MAP WAS BASED ON THE FIELD SURVEY CONDUCTED ON MAY 2014
 FOR THE SURVEY REFERENCE, THE FOLLOWING PARAMETER ARE ADOPTED

1. HORIZONTAL CONTROL
 FOR THE HORIZONTAL CONTROL POINTS, LOCAL COORDINATE SYSTEM WAS ADOPTED
 THE REFERENCE POINTS IS BM1 WITH COORDINATES AS FOLLOWS

NO	CODE	NORTHING (Y)	EASTING (X)	ELEV
1	BM1	9323350.000	698944.000	0.374

2. AZIMUTH CONTROL
 FOR THE AZIMUTH CONTROL, COMPAS SYSTEM WAS ADOPTED
 BM1 TO BM2 AZIMUTH REFERENCE 88° 13' 26"

3. VERTICAL CONTROL
 ALL ELEVATION STARTED FROM PORT BENCHMARK WITH ELEVATION = 3.370 METER

LEGEND

	= BENCHMARK
	= BOUNDARY POINT
	= CONTOUR LINE
	= ELEVATION POINT
	= ROAD
	= BOUNDARY LINE
	= BEACH LINE / DRAINAGE
	= TREE
	= ELECTRICAL POLE
	= BOREHOLE
	= TELECOMMUNICATION POLE
	= TRAFFIC SIGHT
	= BUILD

NO	DATE	DESCRIPTION
1		

PT. Dacrea Design & Engineering Consultants

SURVEY :
PT. TIGENCO GRAHA PERSADA

SCALE : 1:2000	TITLE : TOPOGRAPHIC MAP AT WWT AREA PLUIT , JAKARTA
DATE : A3	DATE : -
DATE : -	DATE : -

10/10 : NO DWG