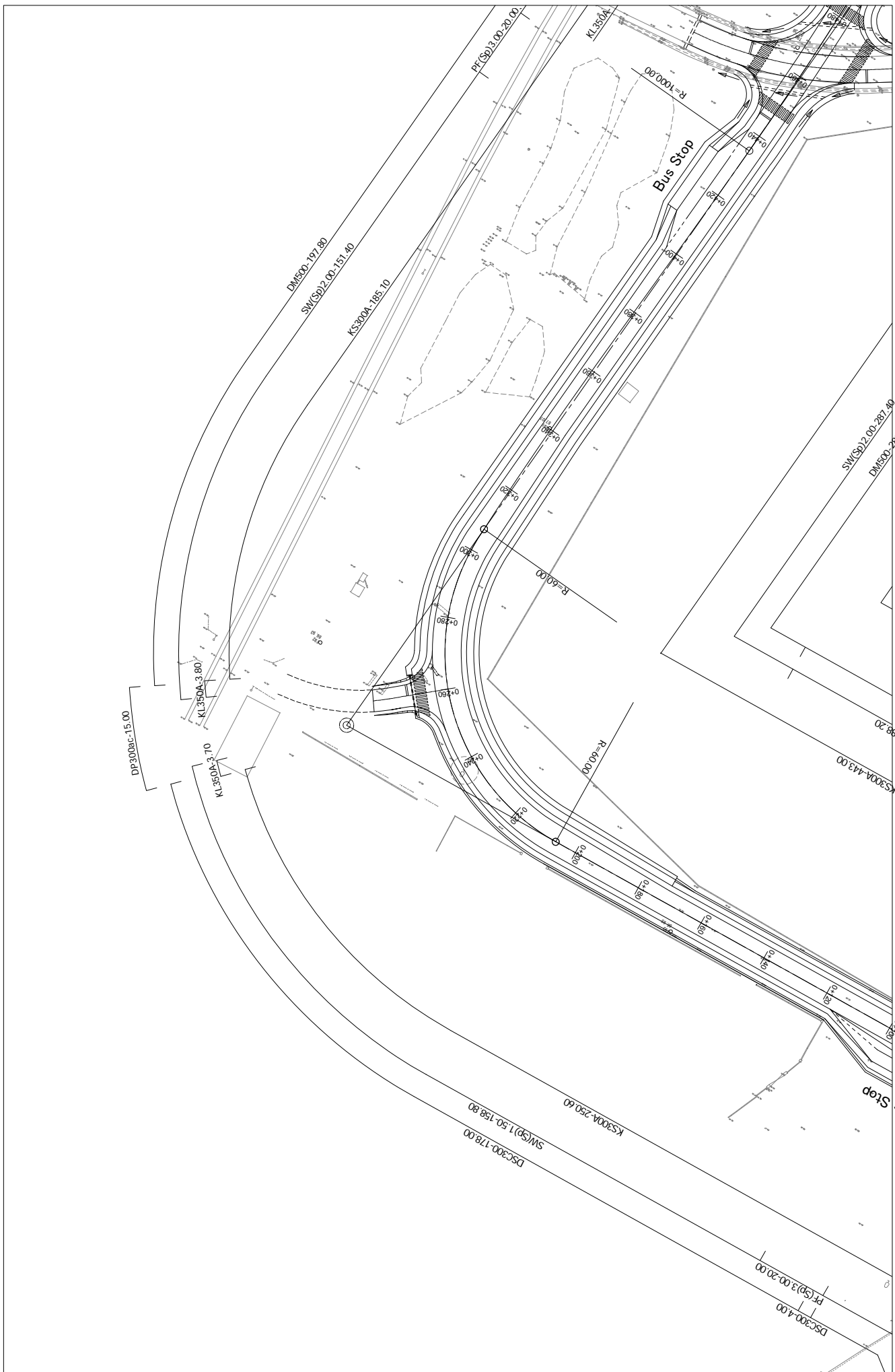
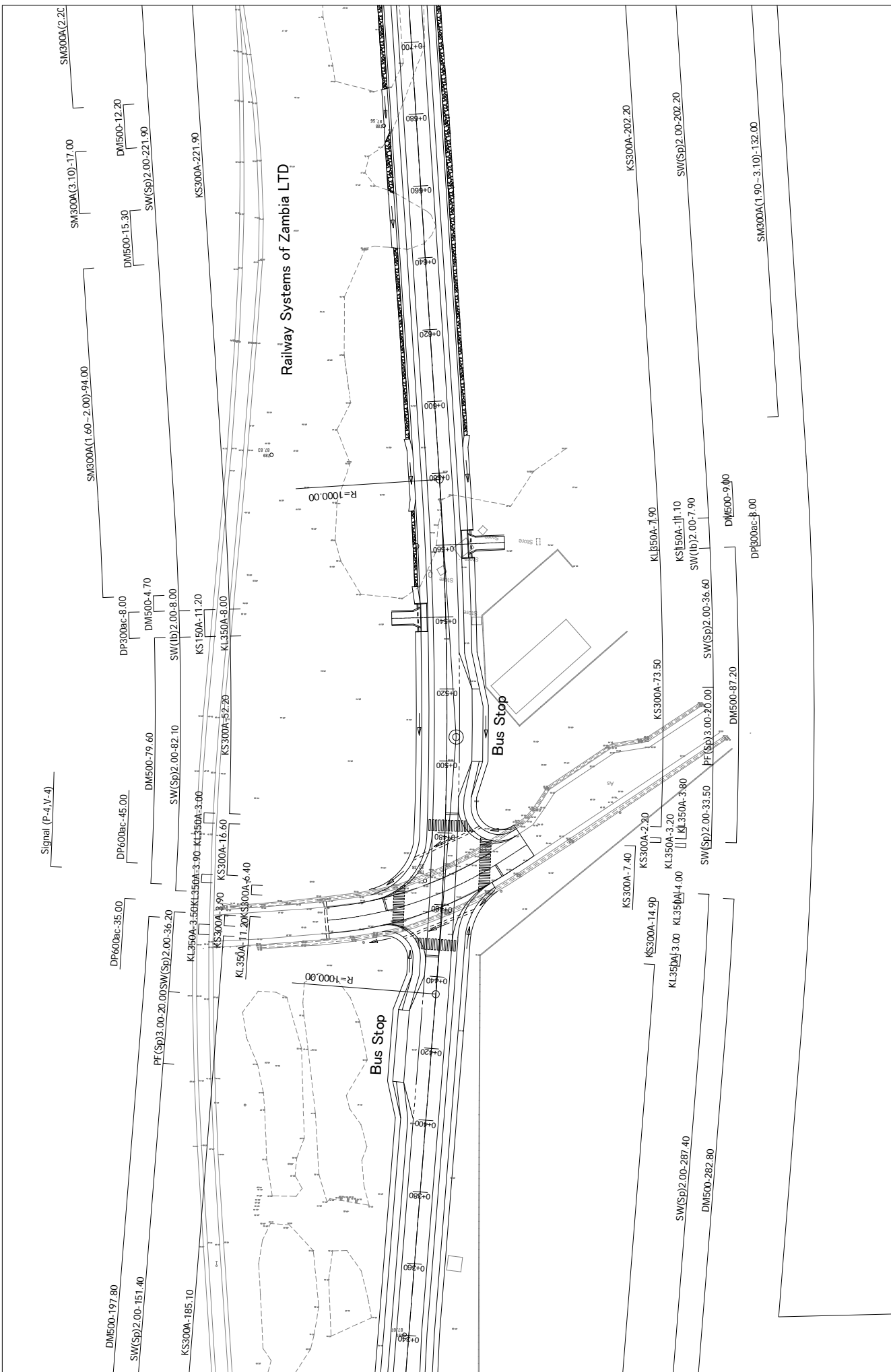


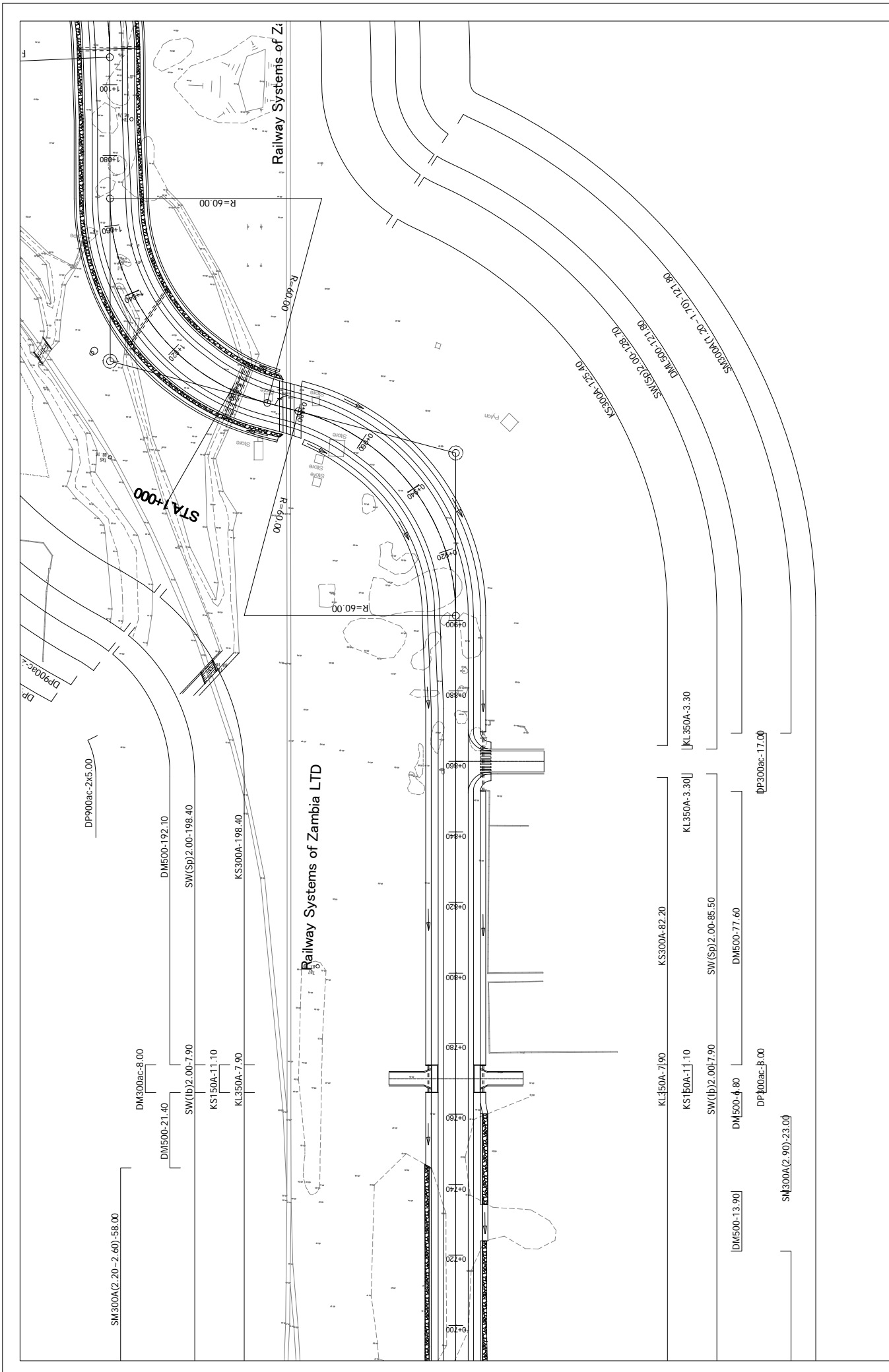
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | | TITLE: | PLAN | Drawing No. | PL-101 |
| | | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSI-OA-TUNYA JCT. ~LS-MFEZ (STA. 0+000 ~ STA. 0+180) | SCALE | 1/1000 |
| | | | | | | DATE | Jan. 2011 |



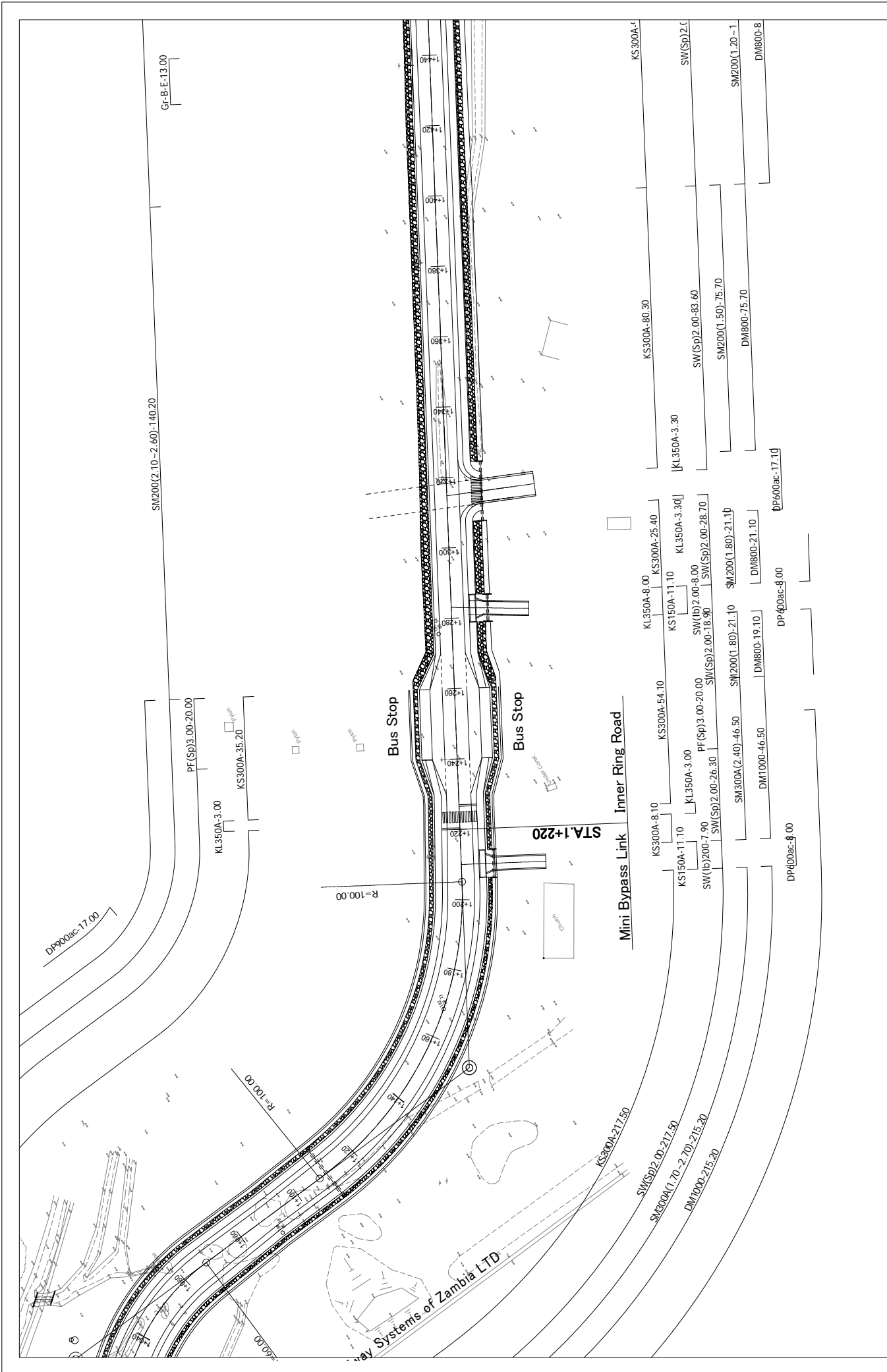
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~ MOSI-OA-TUNYA JCT ~ LS-MFEZ (STA. 0+180 ~ STA. 0+360) | Drawing No. | PL-102 |
| | | | | SCALE | 1/1000 |
| | | | | DATE | Jan. 2011 |



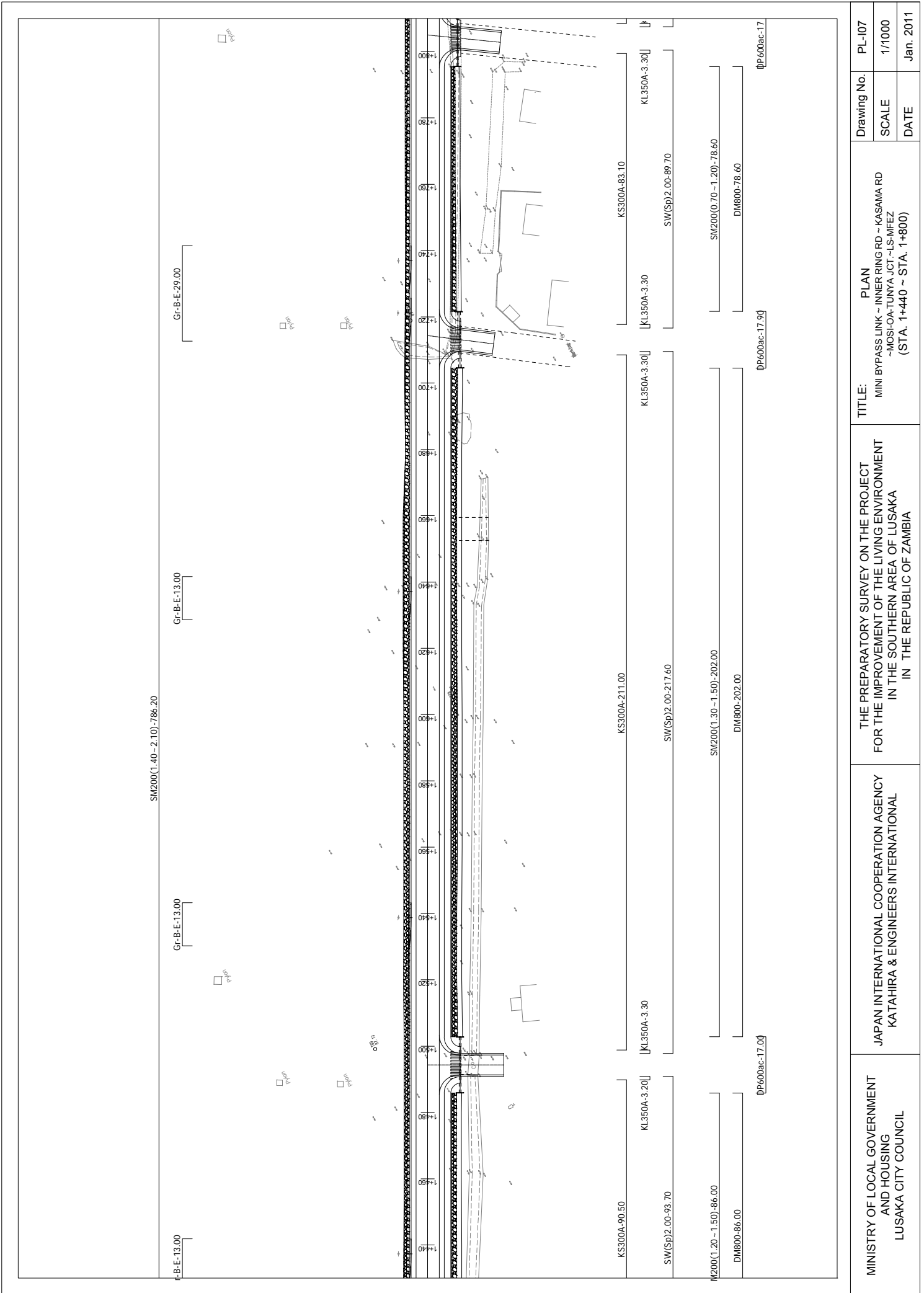
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | | TITLE: | PLAN MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSHOA-TUNYA JCT ~LS-MFEZ (STA. 0+360 ~ STA. 0+700) | Drawing No. | PL-103 |
| | | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSHOA-TUNYA JCT ~LS-MFEZ (STA. 0+360 ~ STA. 0+700) | SCALE | 1/1000 |
| | | | | | | DATE | Jan. 2011 |

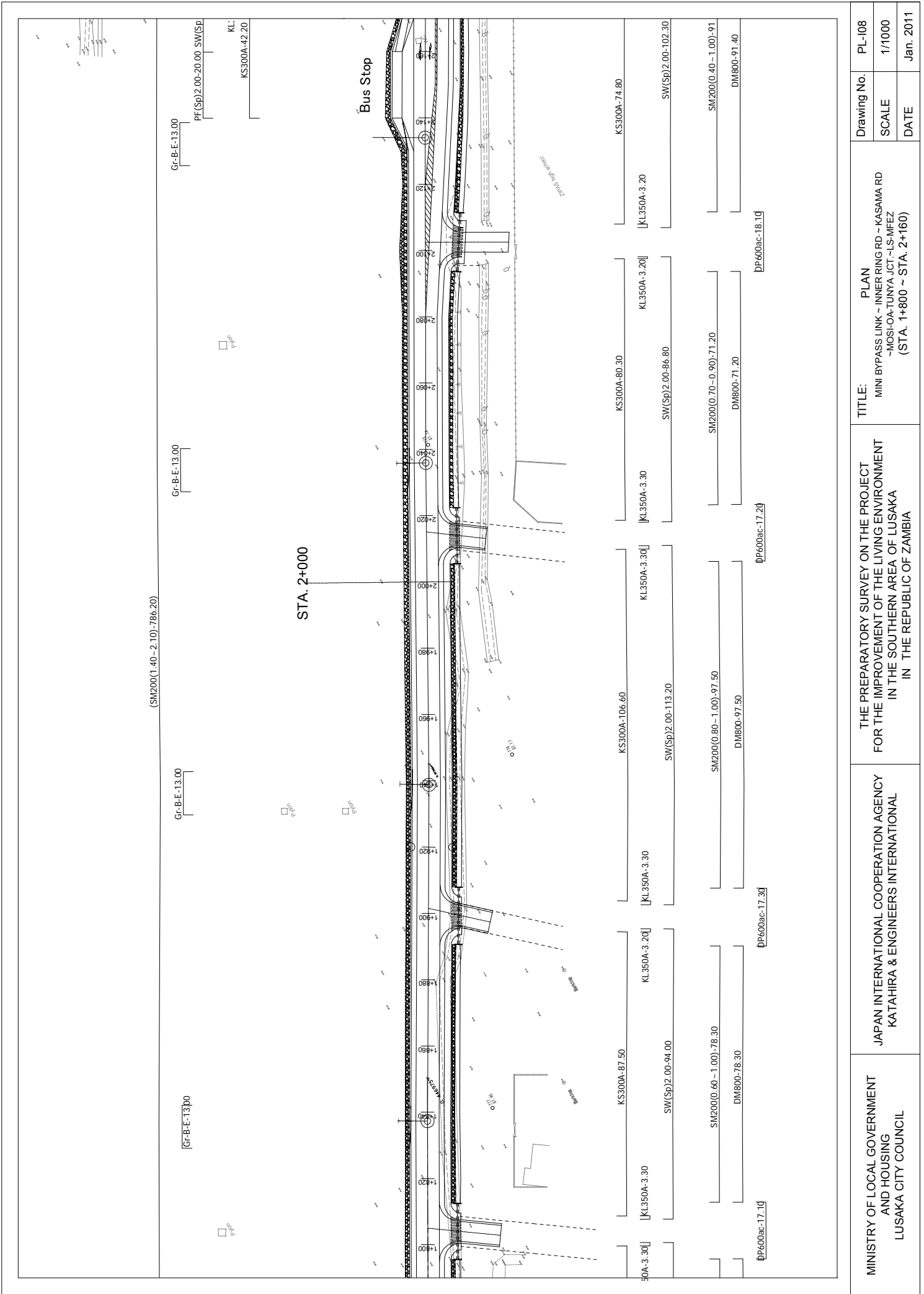


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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-104 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~ MOSI-OA-TUNYA JCT ~ LS-MFEZ (STA. 0+700 ~ STA. 1+000) | Drawing No. |
| | | | SCALE | 1/1000 |
| | | | DATE | Jan. 2011 |



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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-106 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSHOA-TUNYA JCT ~LS-MFEZ (STA. 1+160 ~ STA. 1+440) | SCALE 1/1000 |
| | | | DRAWING No. | DATE |
| | | | PL-106 | Jan. 2011 |





(SM200(1.40-2.10)-786.20)

Gr-B-E-13.00

Gr-B-E-13.00

Gr-B-E-13.00

PF(Sp)2.00-20.00 SW(Sp)

KL:
KS300A-42.20

STA. 2+000

Bus Stop

KS300A-74.80

KS300A-80.30

KS300A-106.60

KS300A-87.50

KS300A-87.50

KS300A-87.50

KL350A-3.20

KL350A-3.20

KL350A-3.30

KL350A-3.30

KL350A-3.30

KL350A-3.20

KL350A-3.30

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SW(Sp)2.00-113.20

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SW(Sp)2.00-94.00

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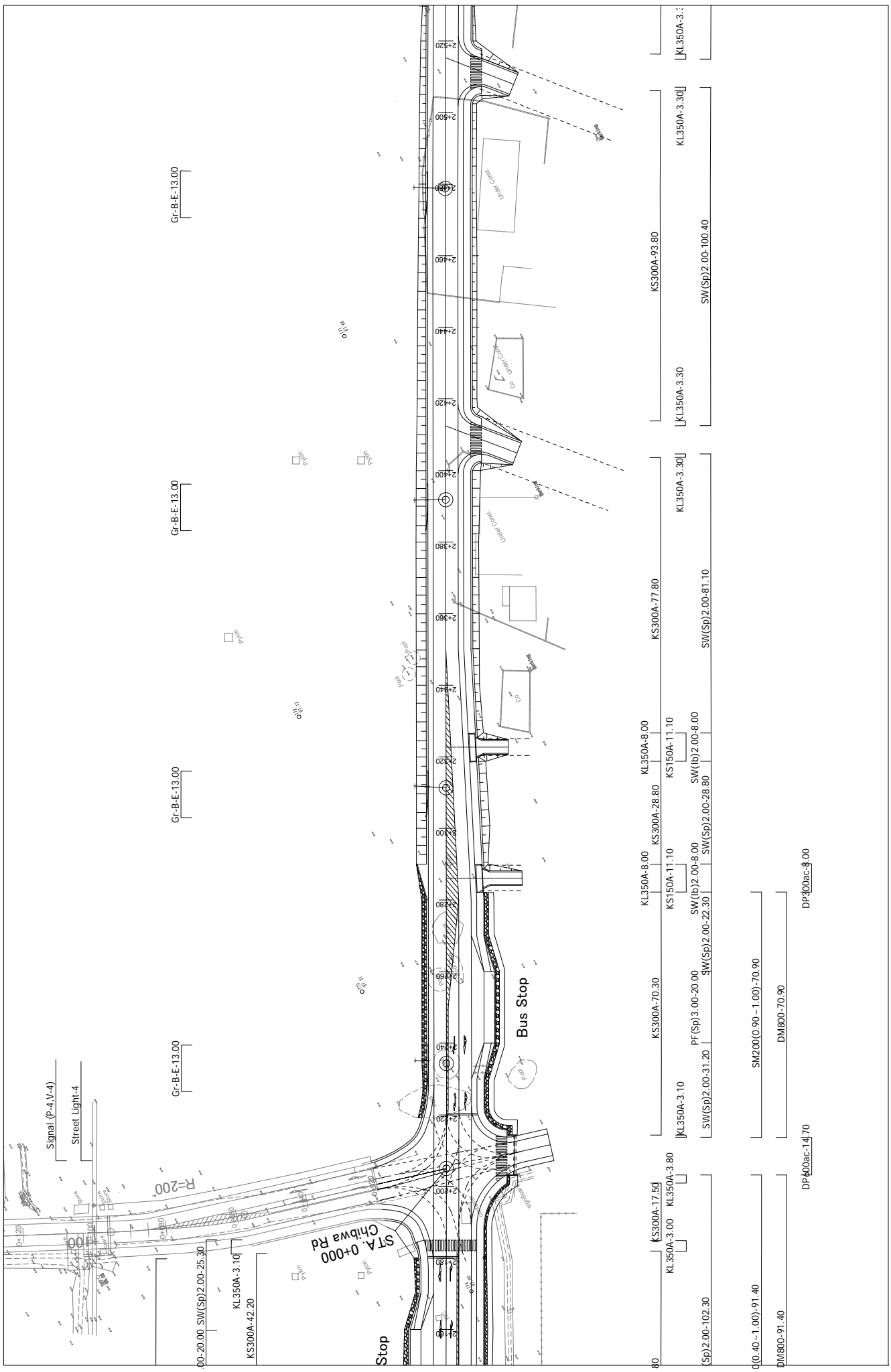
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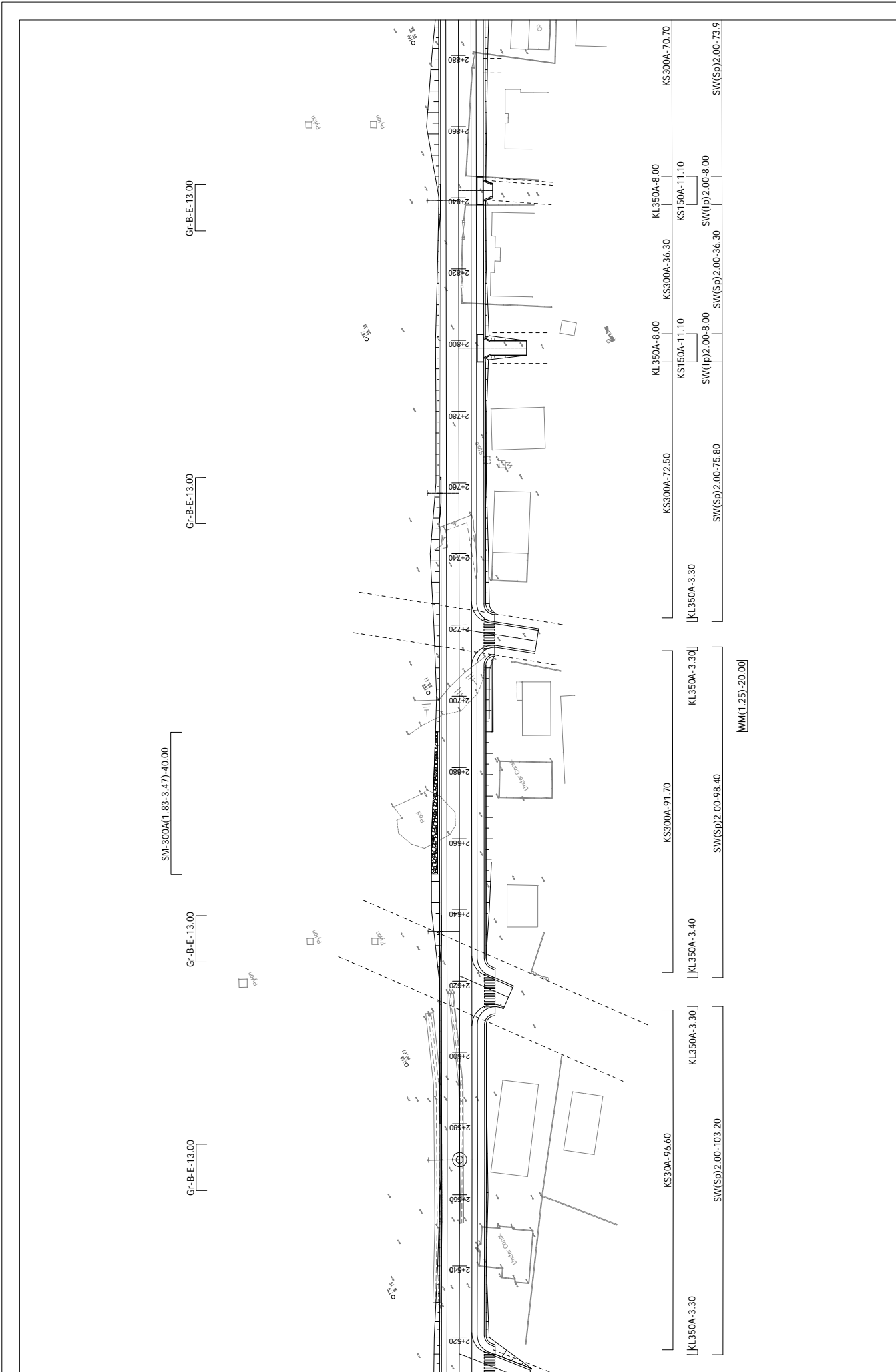
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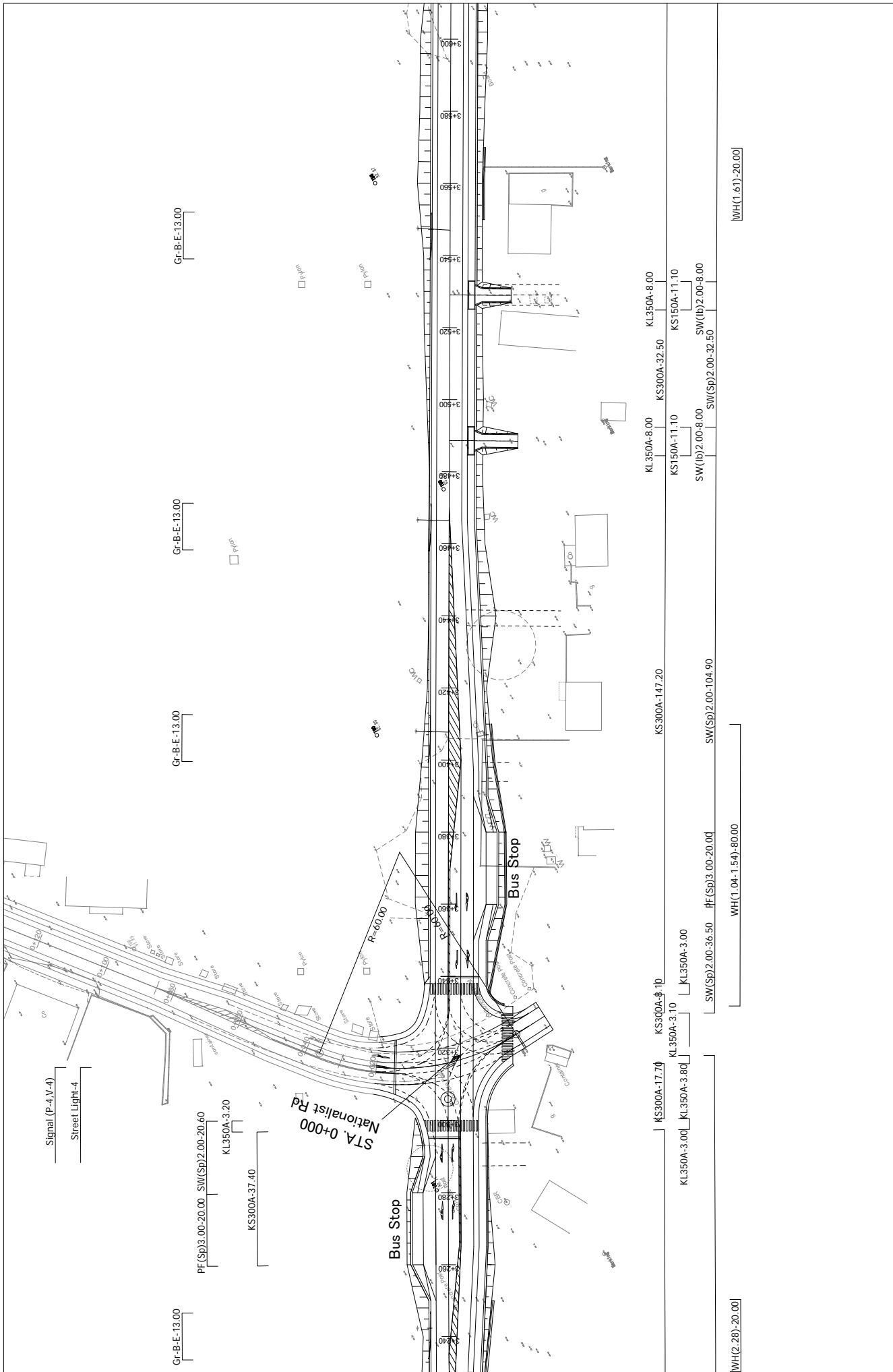
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-108 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 1+800 ~ STA. 2+160) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |



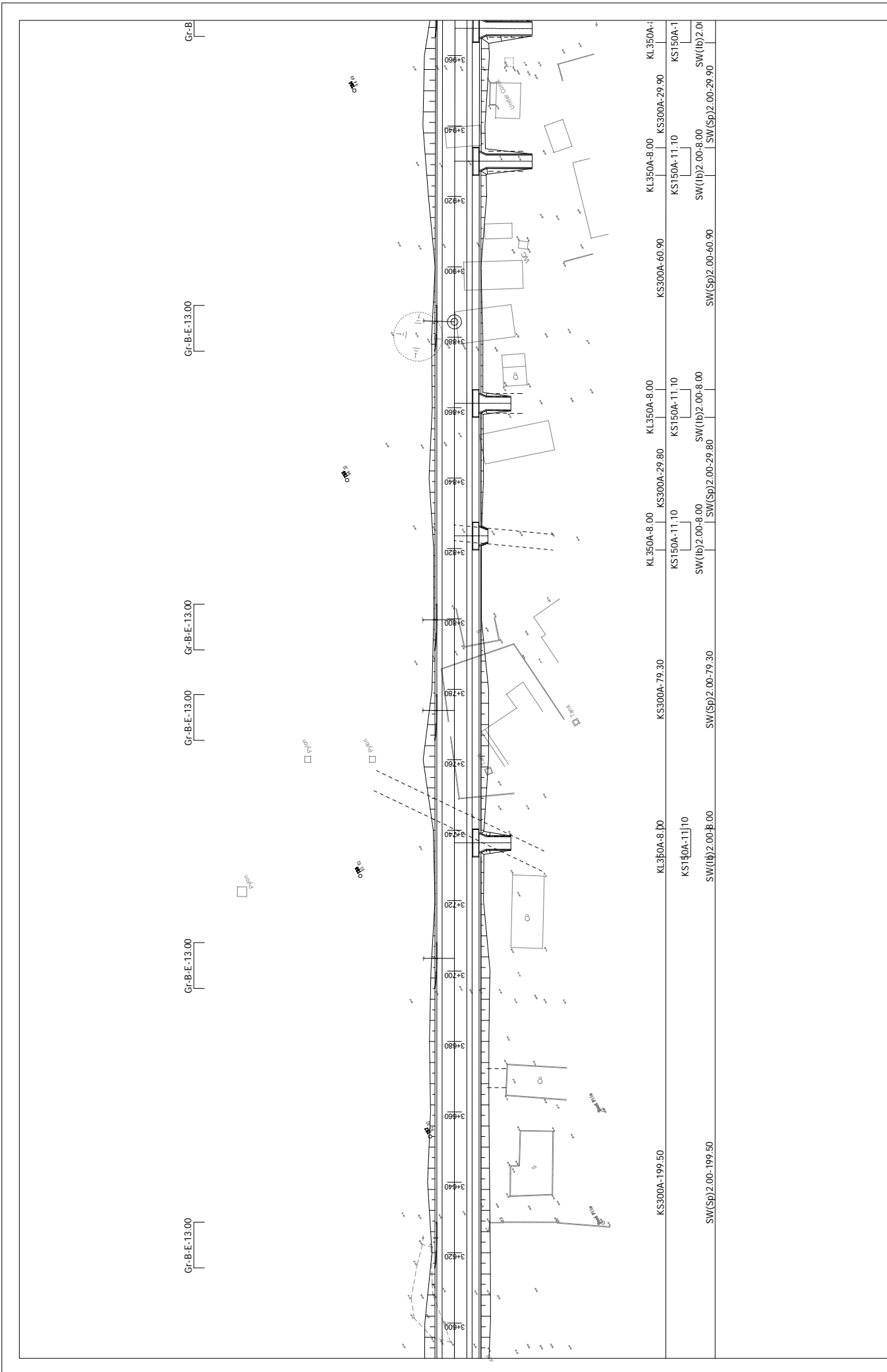
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | | TITLE: | PLAN MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 2+160 ~ STA. 2+520) | Drawing No. | PL-109 |
| | | | | SCALE | 1/1000 | DATE | Jan. 2011 |



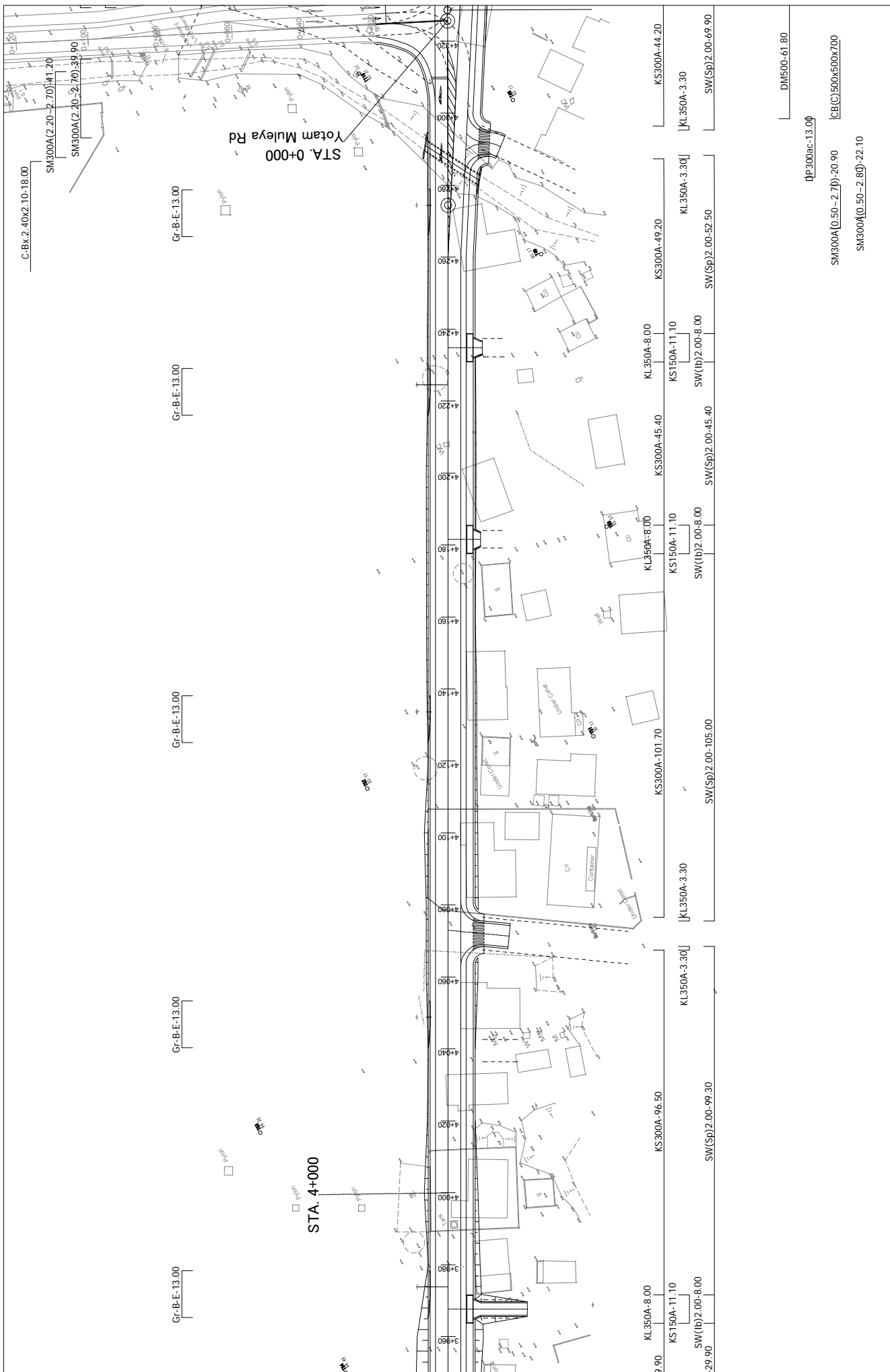
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-110 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSHOA-TUNYA JCT ~LS-MFEZ (STA. 2+520 ~ STA. 2+880) | Drawing No. |
| | | | SCALE | 1/1000 |
| | | | DATE | Jan. 2011 |



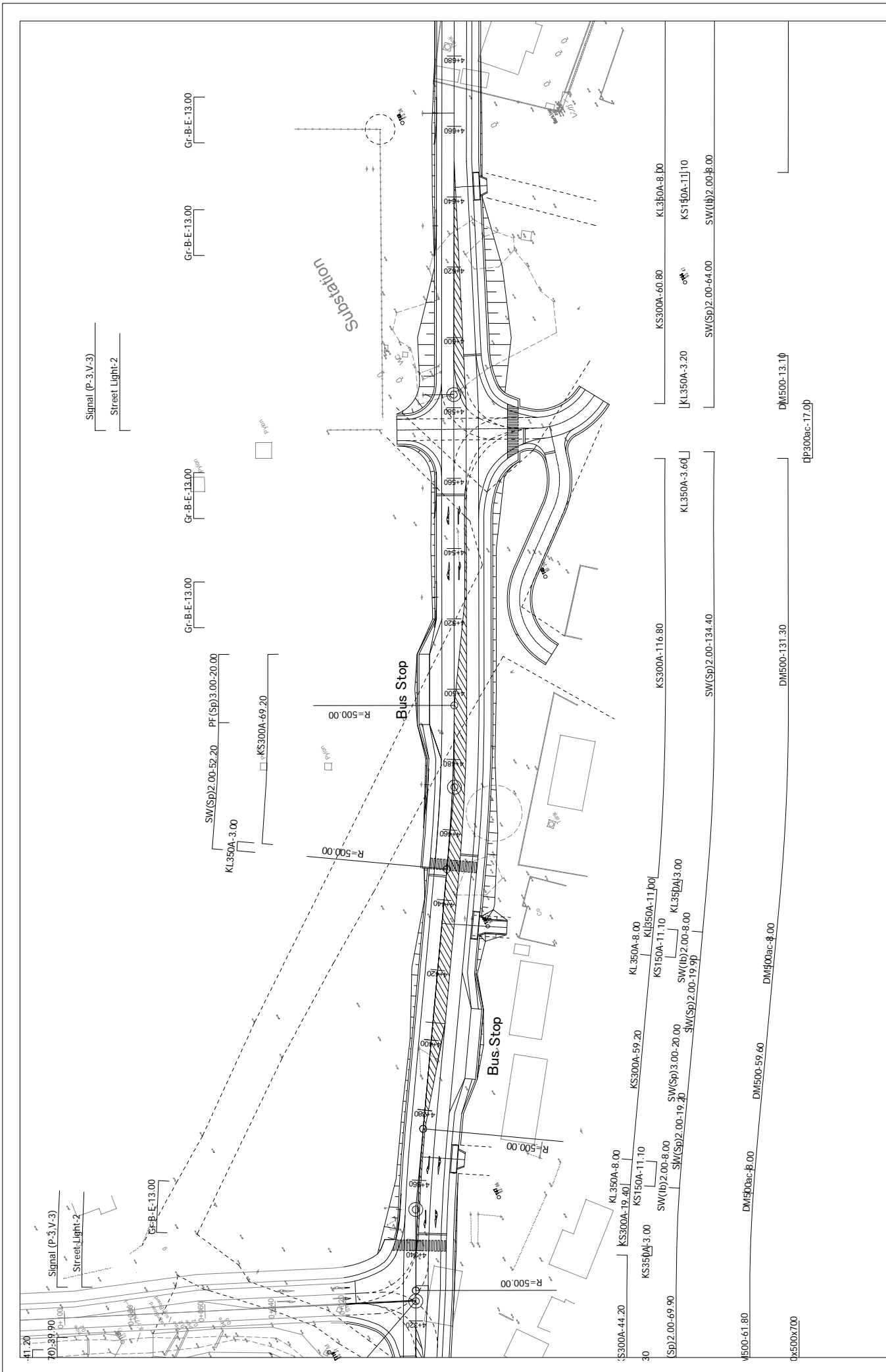
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | | Drawing No. PL-112 |
| | | TITLE: MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 3+240 ~ STA. 3+600) | | |
| | | | DATE Jan. 2011 | |



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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-113 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSI-OA-TUNYA JCT. ~LS-MFEZ (STA. 3+600 ~ STA. 3+960) | SCALE DATE |
| | | | Drawing No. | 1/1000 |
| | | | SCALE | DATE |
| | | | DATE | Jan. 2011 |



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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-114 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~ MOSI-OA-TUNYA JCT ~ LS-MFEZ (STA. 3+960 ~ STA. 4+320) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |

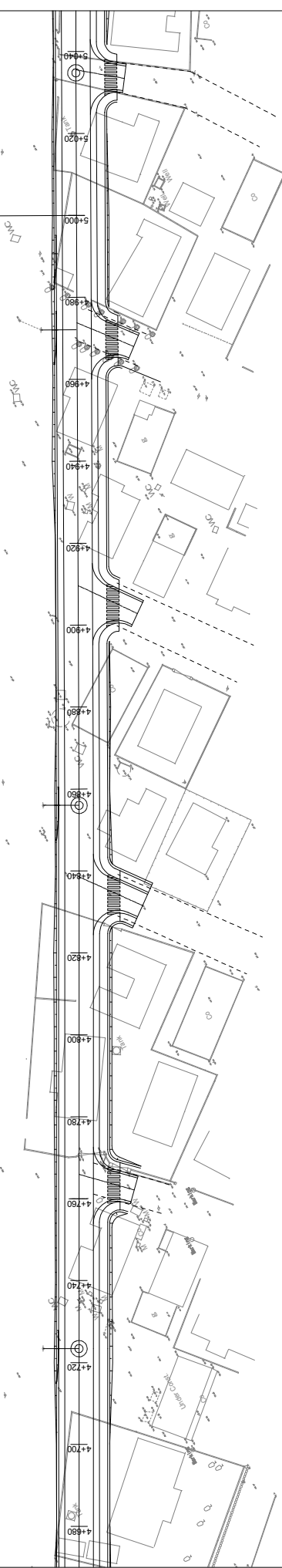


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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-115 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 4+320 ~ STA. 4+680) | DRAWING No. |
| | | | SCALE | 1/1000 |
| | | | DATE | Jan. 2011 |

Gr-B-E-13.00

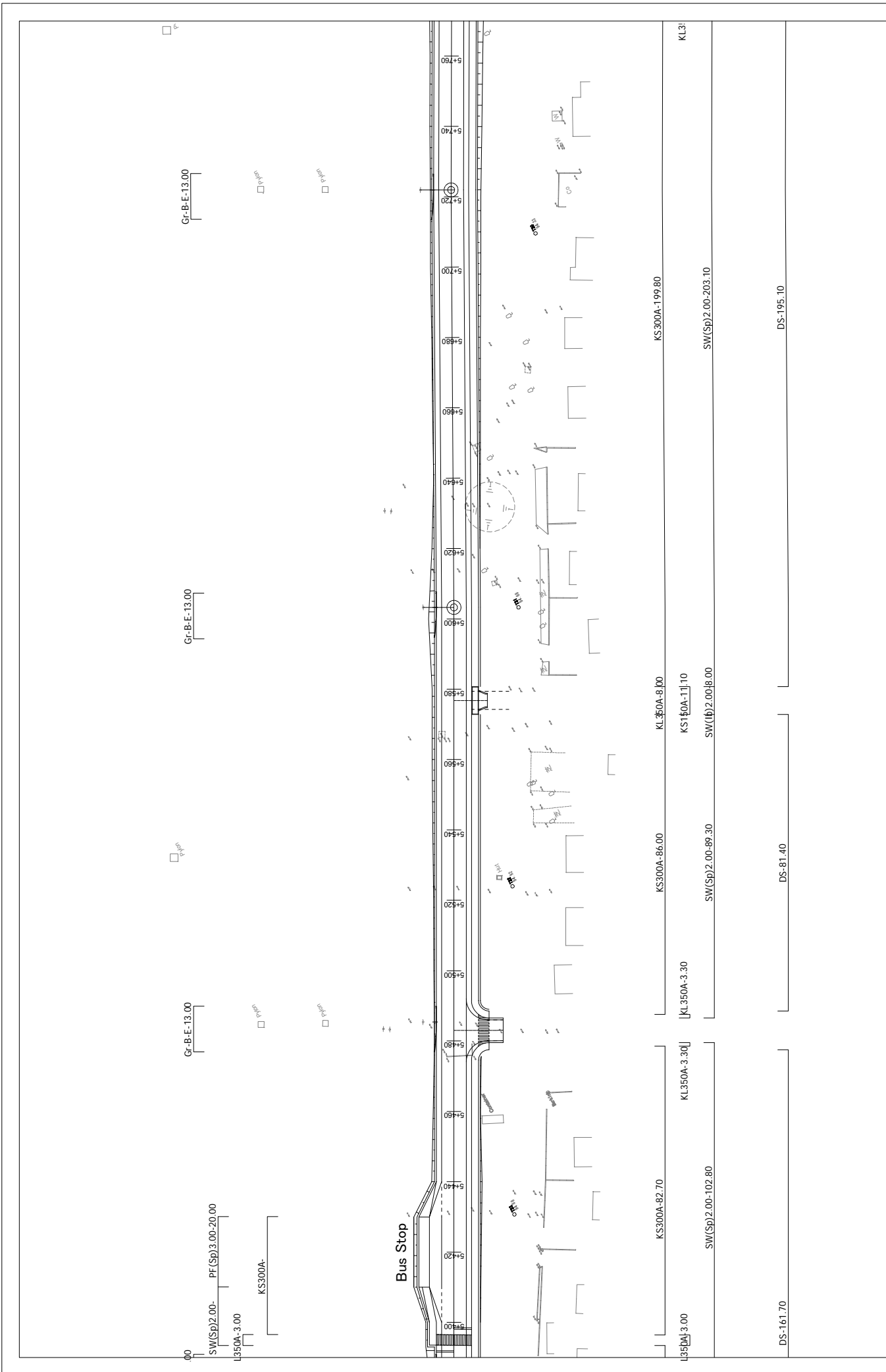
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STA. 5+000

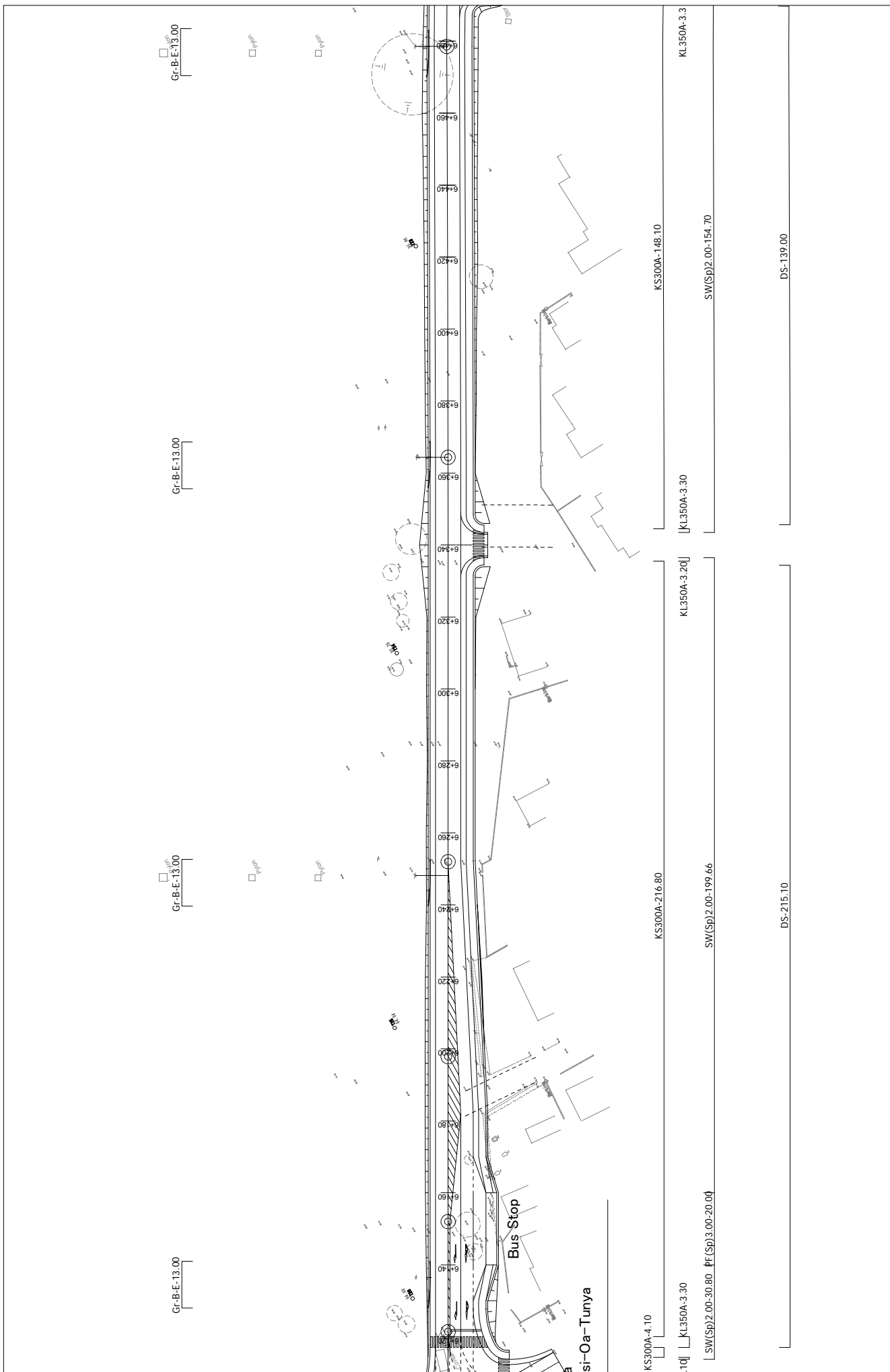


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| [KL350A-3.30] | [KL350A-3.30] | [KL350A-3.40] | [KL350A-3.30] | [KL350A-3.40] | [KL350A-3.30] |
| SW(Sp)2.00-115.30 | SW(Sp)2.00-68.70 | SW(Sp)2.00-68.10 | SW(Sp)2.00-62.10 | SW(Sp)2.00-62.30 | SW(S) |
| DS-107.30 | DS-52.80 | DS-52.20 | DS-46.10 | DS-46.30 | |

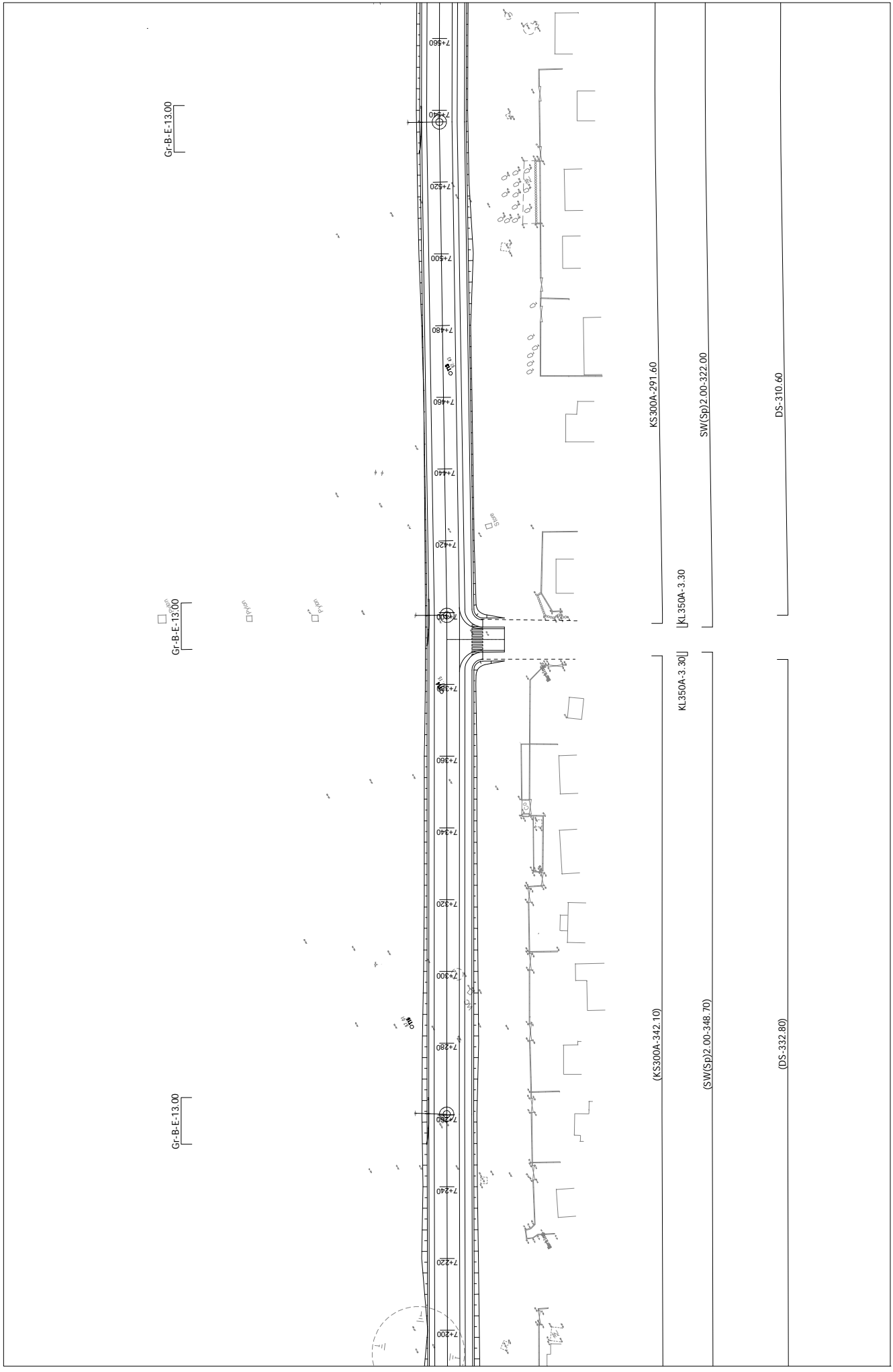
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-116 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSHOA-TUNYA JCT ~LS-MFEZ (STA. 4+680 ~ STA. 5+040) | Drawing No. |
| | | | SCALE | 1/1000 |
| | | | DATE | Jan. 2011 |



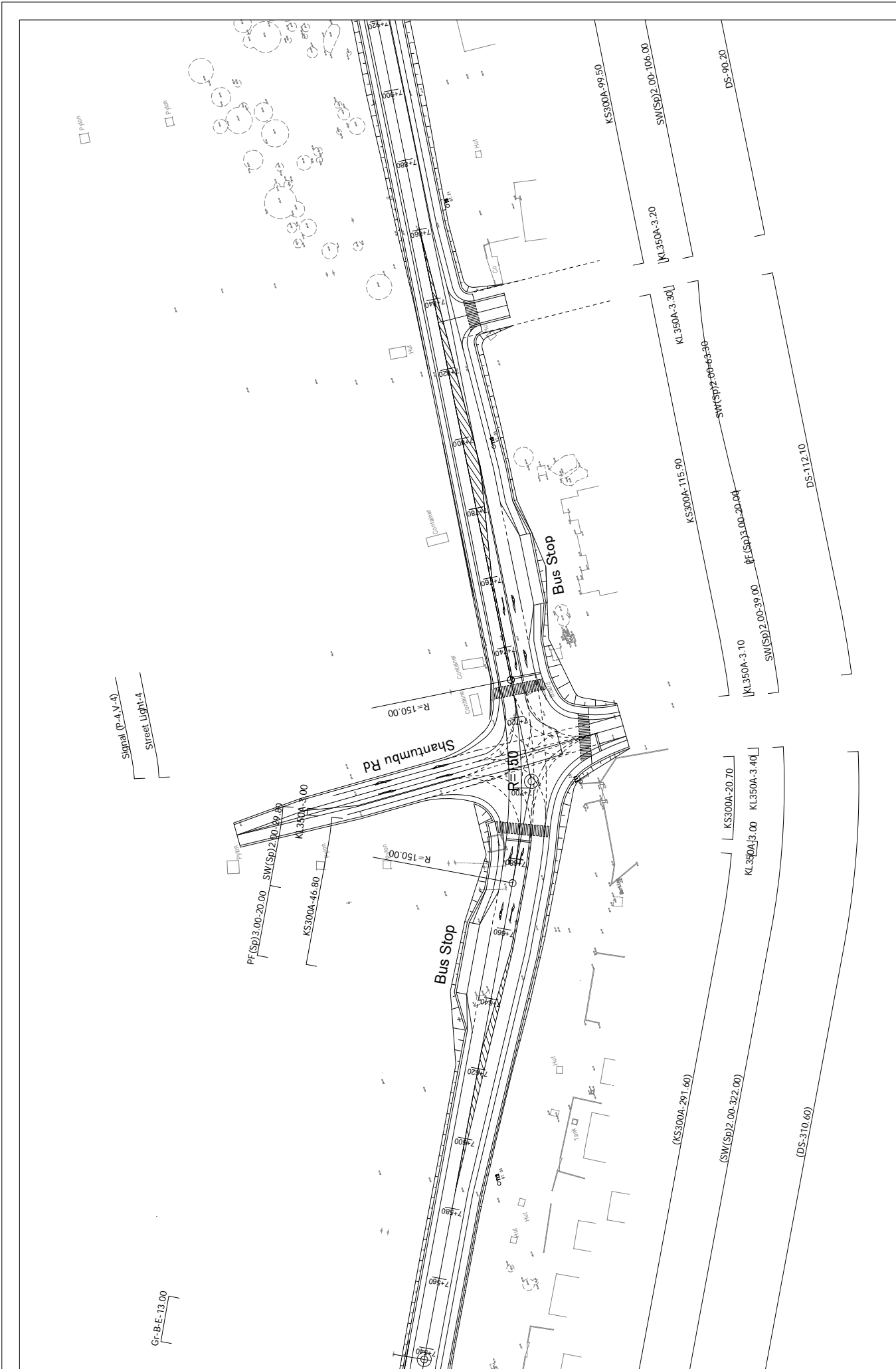
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-118 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 5+400 ~ STA. 5+760) | Drawing No. |
| | | | SCALE | 1/1000 |
| | | | DATE | Jan. 2011 |



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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-120 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 6+120 ~ STA. 6+480) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |



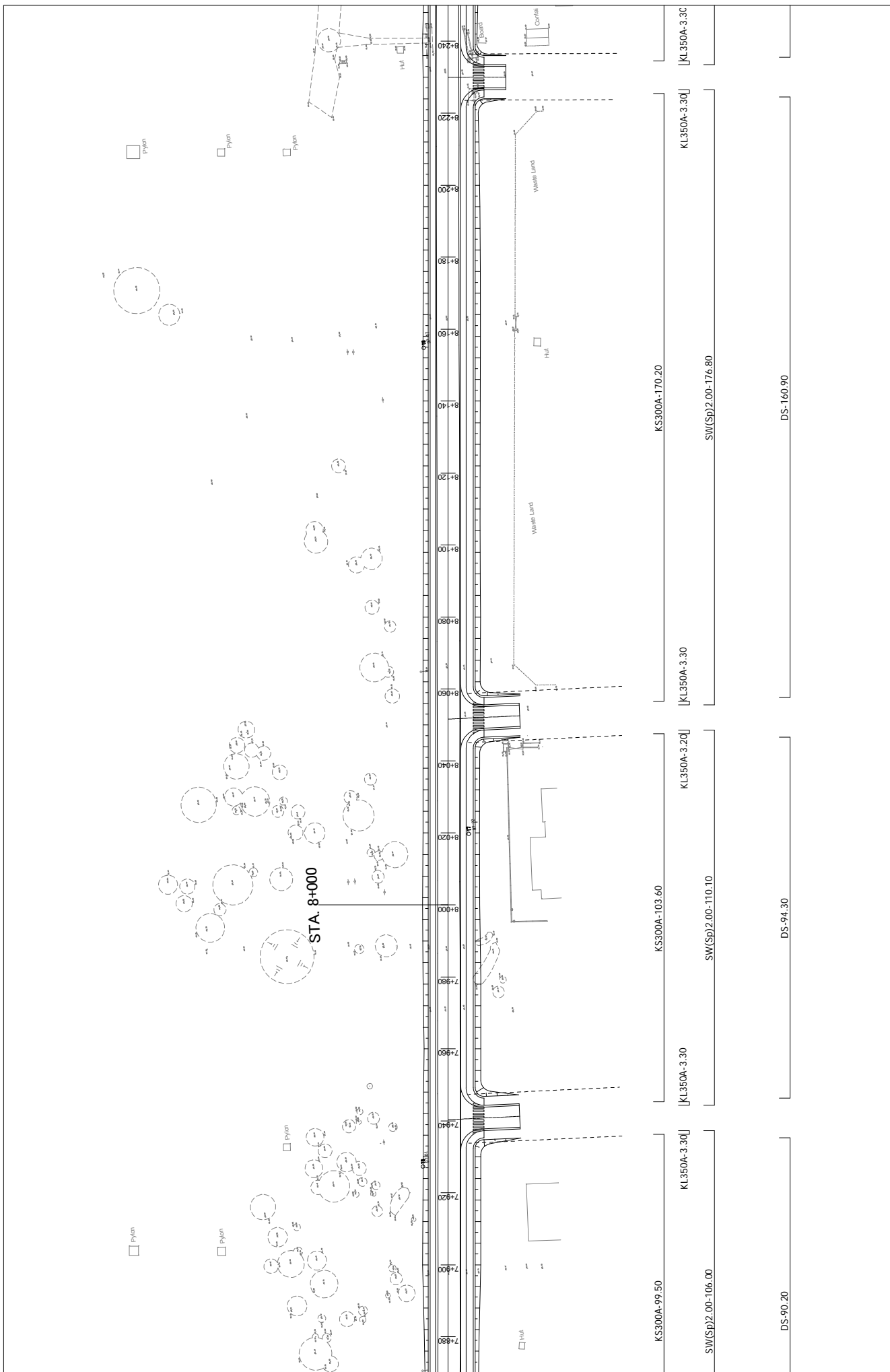
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-123 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~ MOSI-OA-TUNYA JCT. ~ LS-MFEZ (STA. 7+200 ~ STA. 7+560) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |



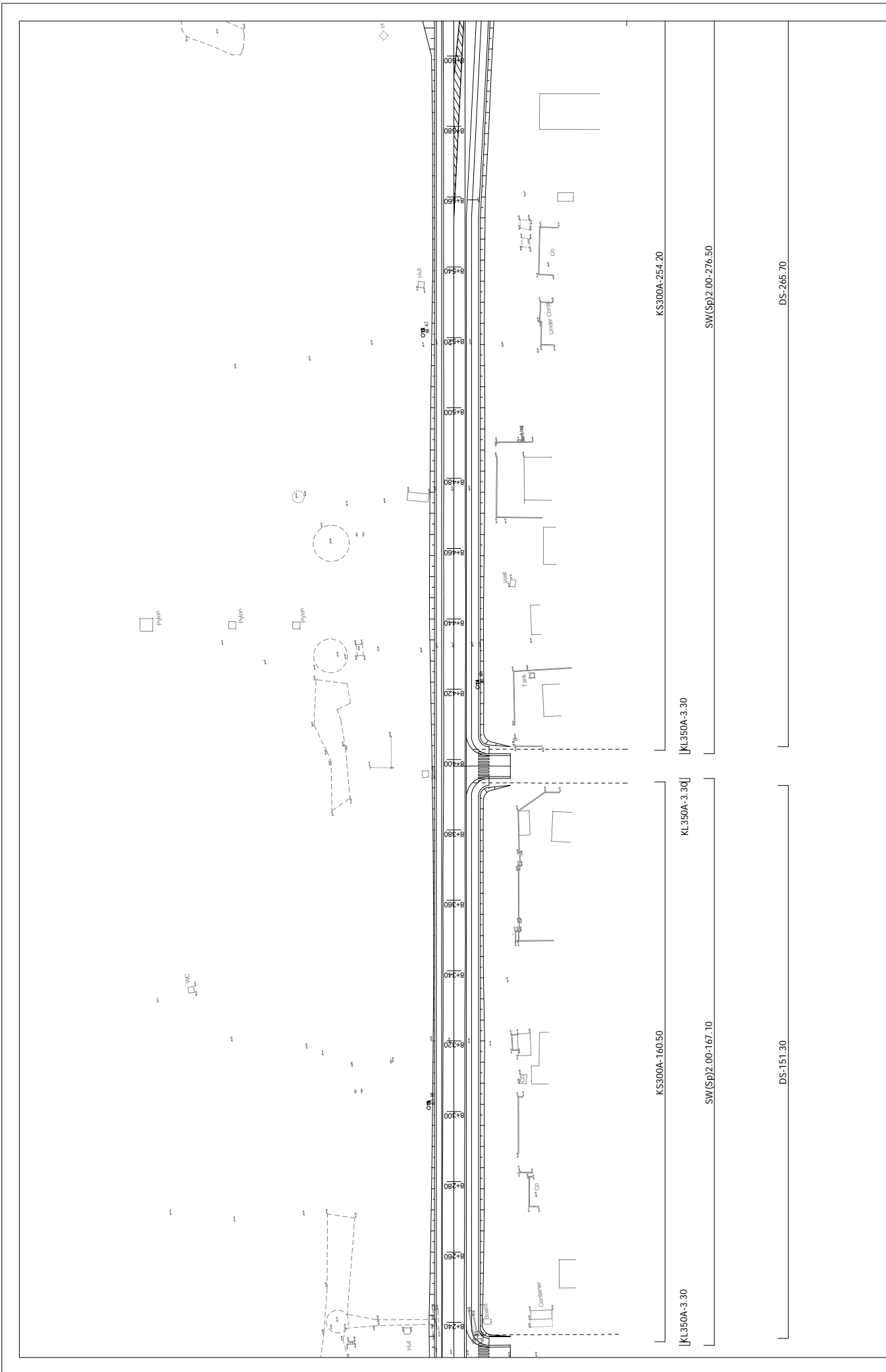
Signal (P-A-V-A)
Street Light-A

G.F-B-E-13.00

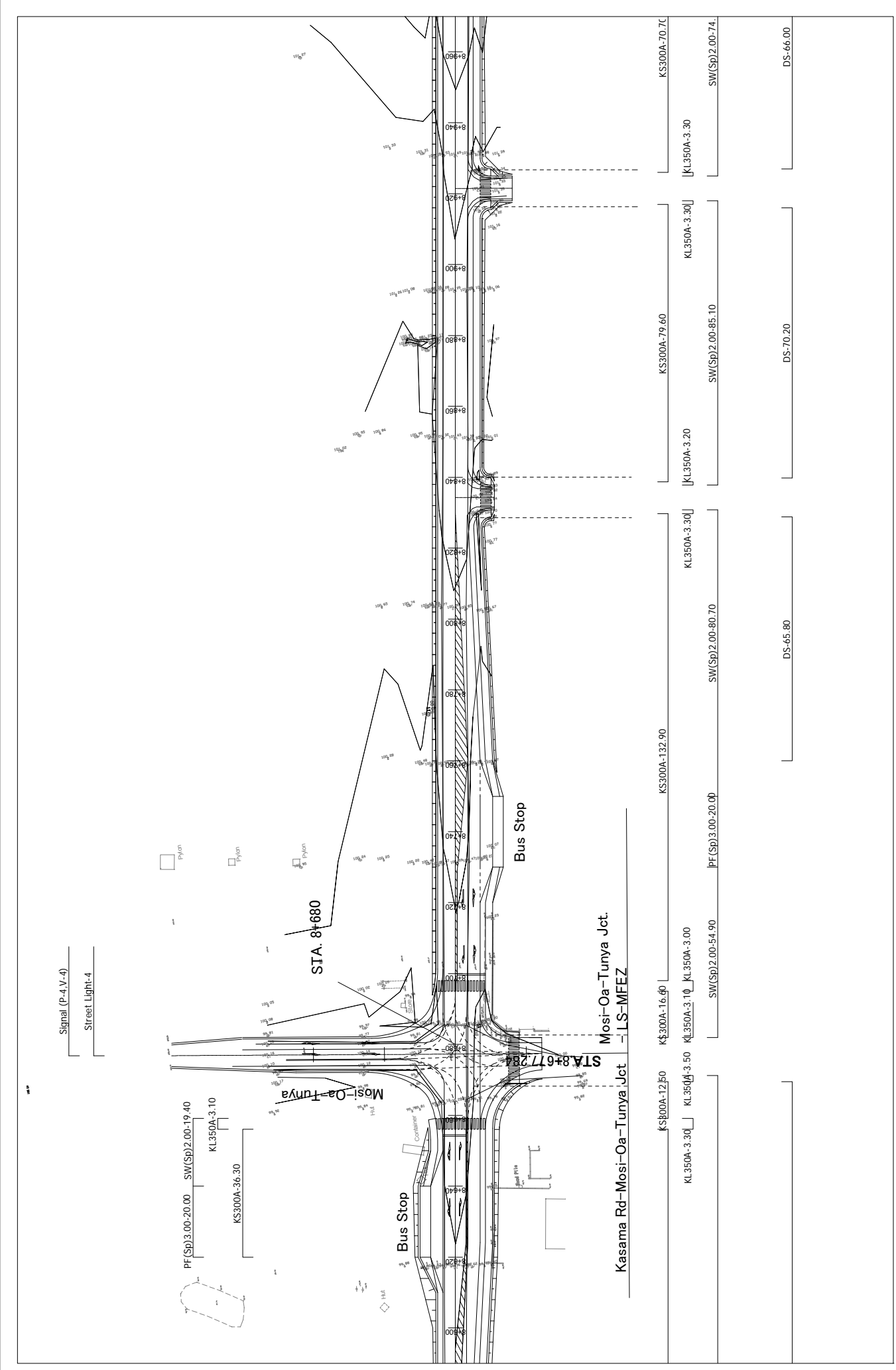
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-124 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 7+560 ~ STA. 7+880) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |



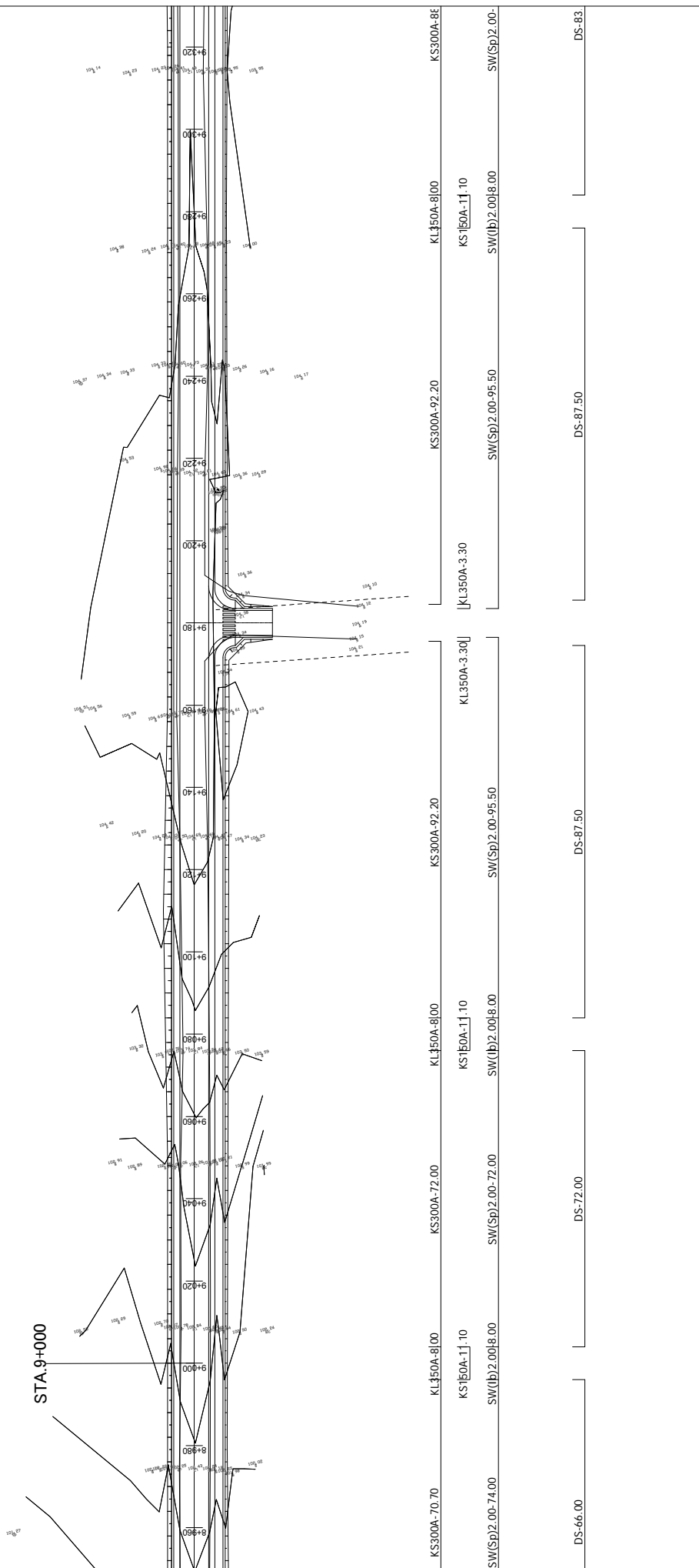
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-125 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 7+880 ~ STA. 8+240) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |



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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-126 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 8+240 ~ STA. 8+600) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |

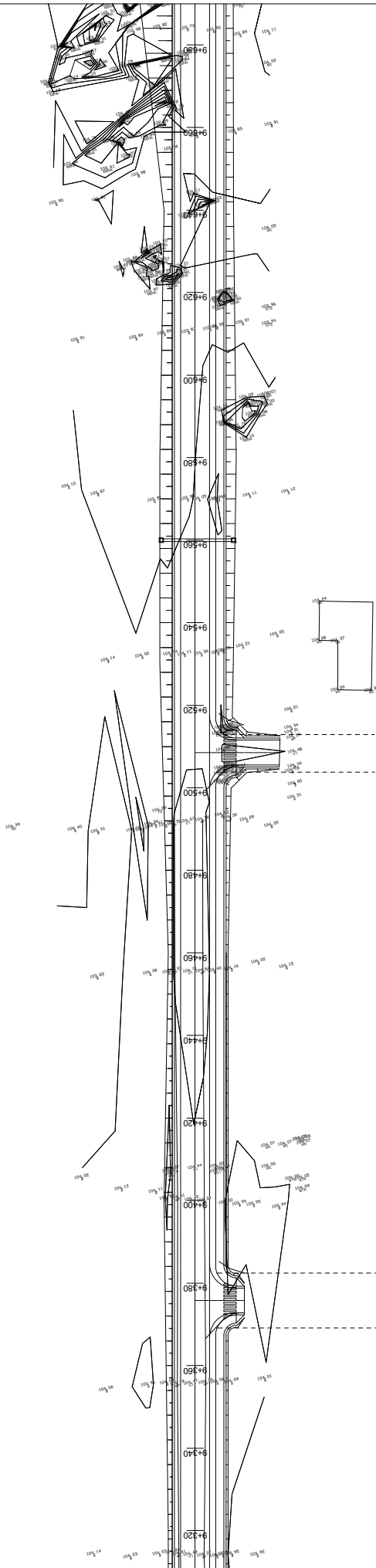


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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-127 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~ MOSI-OA-TUNYA JCT ~ LS-MFEZ (STA. 8+600 ~ STA. 8+960) | SCALE 1/1000 |
| | | | DRAWING No. | PL-127 |
| | | | SCALE | 1/1000 |
| | | | DATE | Jan. 2011 |



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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSI-OA-TUNYA JCT ~LS-MFEZ (STA. 8+960 ~ STA. 9+320) | Drawing No. | PL-128 |
| | | | | SCALE | 1/1000 |
| | | | | DATE | Jan. 2011 |

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CB(C)700x700x1200

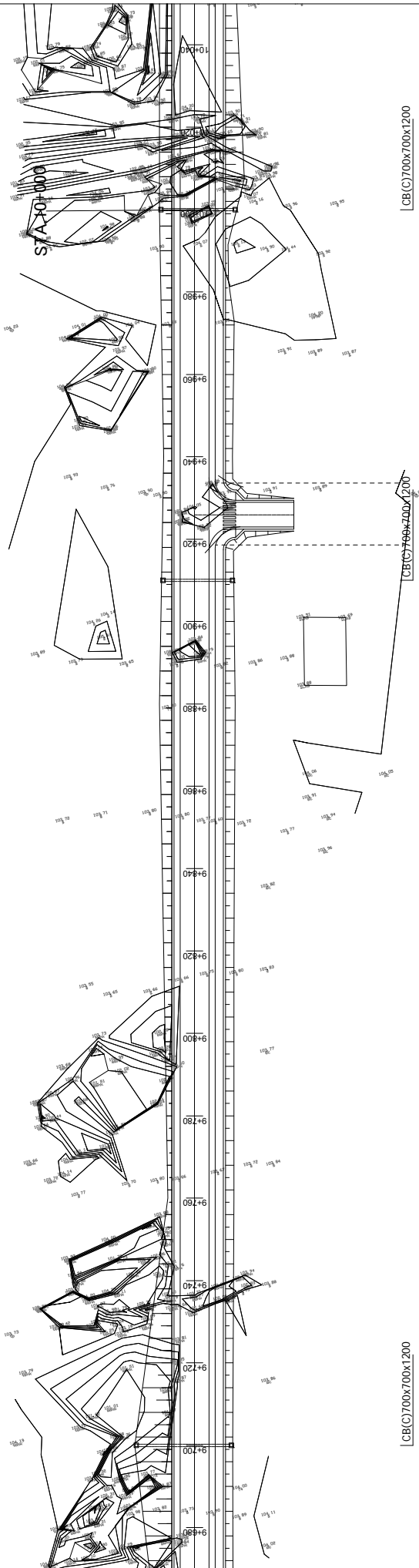
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| SW(Sp)2.00-91.30 | SW(Sp)2.00-59.70 | KS 150A-1 1.10 | SW(Sp)2.00-64.00 | SW(Sp)2.00-101.10 | KS 150A-1 1.10 | SW(Sp)2.00-77.80 |
| DS-83.30 | DS-51.80 | KL 350A-3.30 | DS-56.10 | DS-93.20 | KL 350A-3.30 | DS-77.80 |

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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PL-129 |
| | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 9+320 ~ STA. 9+680) | Drawing No. |
| | | | SCALE | 1/1000 |
| | | | DATE | Jan. 2011 |

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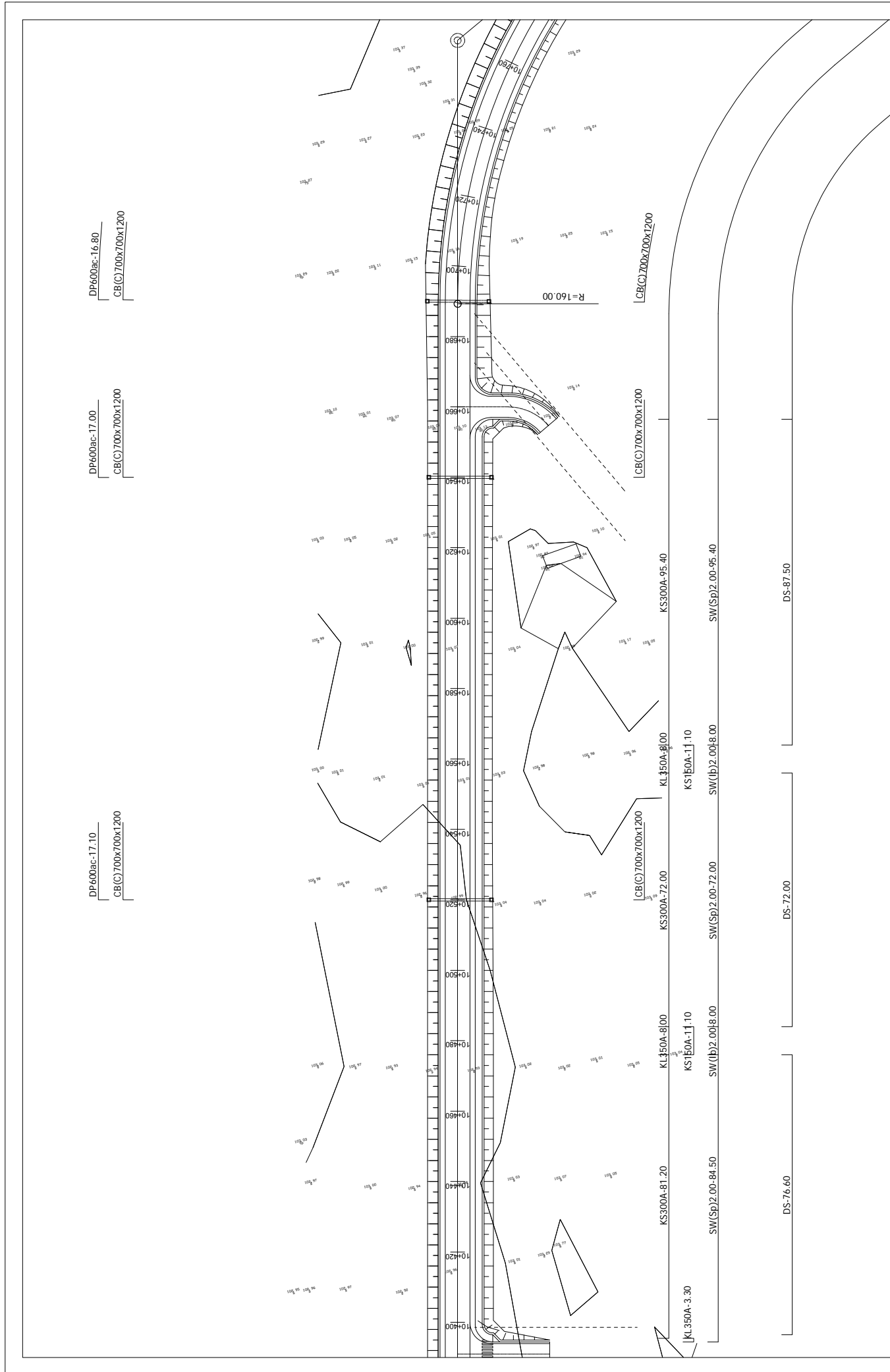
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 CB(C)700x700x1200

DP600ac-17.30
 CB(C)700x700x1200



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| KL 350A-8 00 | KS300A-72.00 | KL 350A-8 00 | KS300A-72.00 | KL 350A-8 00 | KS300A-66.20 | KL 350A-8 00 | KS300A-72.90 |
| KS 150A-11 10 | SW(lb)2.00 8.00 | KS 150A-11 10 | SW(lb)2.00 8.00 | KS 150A-11 10 | SW(Sp)2.00-69.50 | KS 150A-11 10 | SW(Sp)2.00-76.2 |
| SW(lb)2.00 8.00 | SW(Sp)2.00-72.00 | SW(lb)2.00 8.00 | SW(Sp)2.00-72.00 | SW(lb)2.00 8.00 | SW(Sp)2.00-61.40 | SW(lb)2.00 8.00 | SW(Sp)2.00-76.2 |
| DS-72.00 | DS-72.00 | DS-72.00 | DS-72.00 | DS-53.50 | DS-61.60 | DS-61.60 | DS-68.30 |

| | | | | | | |
|--|--|---|--------|---|-------------|-----------|
| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-130 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 9+680 ~ STA. 10+040) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |



| | | | | | |
|--|--|---|--------|--------|--|
| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | | TITLE: | PLAN MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 10+400 ~ STA. 10+760) |
| | | Drawing No. | PL-132 | SCALE | 1/1000 |
| | | | | DATE | Jan. 2011 |

DP-600ac-15.20
 CB(C) 700x700x1200

STA. 11+000

CB(C) 700x700x1200

R=160.00

CB(C) 700x700x1200

R=160.00

CB(C) 700x700x1200

MINISTRY OF LOCAL GOVERNMENT
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THE PREPARATORY SURVEY ON THE PROJECT
 FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT
 IN THE SOUTHERN AREA OF LUSAKA
 IN THE REPUBLIC OF ZAMBIA

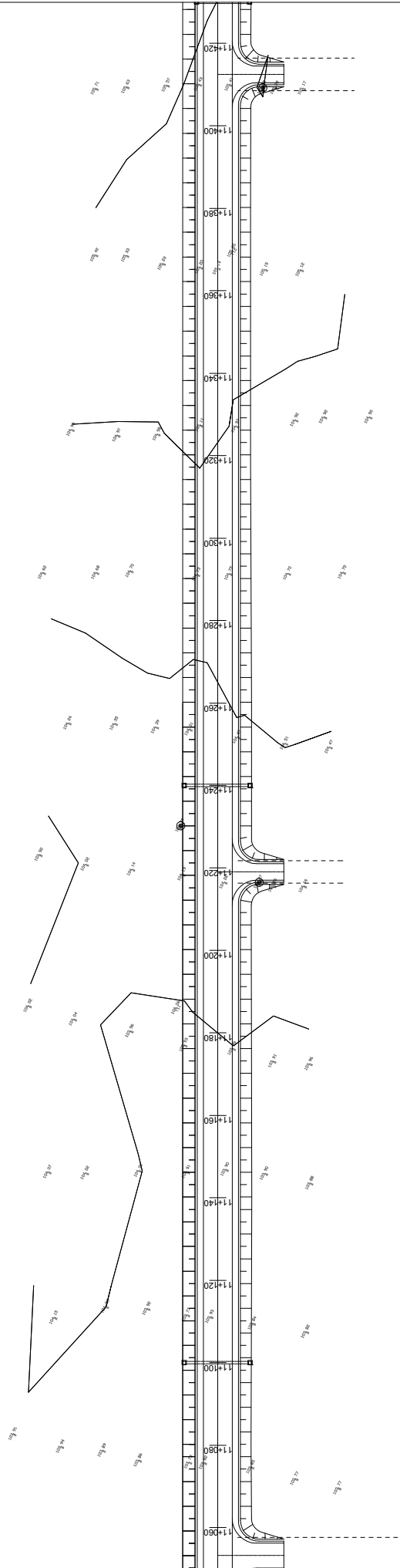
TITLE:
 PLAN
 MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD
 ~MOSHOA-TUNYA JCT ~LS-MFEZ
 (STA. 10+760 ~ STA. 11+060)

Drawing No.
 SCALE
 DATE

PL-133
 1/1000
 Jan. 2011

DP600ac-15.30
 CB(C)700x700x1200

DP600ac-15.30
 CB(C)700x700x1200



CB(C)700x700x1200

CB(C)700x700x1200

MINISTRY OF LOCAL GOVERNMENT
 AND HOUSING
 LUSAKA CITY COUNCIL

JAPAN INTERNATIONAL COOPERATION AGENCY
 KATAHIRA & ENGINEERS INTERNATIONAL

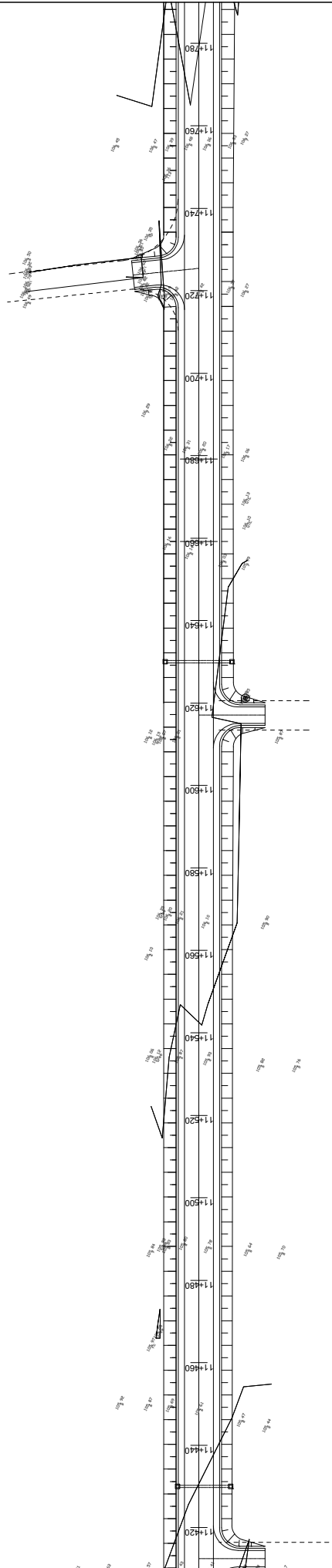
THE PREPARATORY SURVEY ON THE PROJECT
 FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT
 IN THE SOUTHERN AREA OF LUSAKA
 IN THE REPUBLIC OF ZAMBIA

TITLE:
 PLAN
 MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD
 ~MOSH-OA-TUNYA JCT ~LS-MFEZ
 (STA. 11+060 ~ STA. 11+420)

| | |
|-------------|-----------|
| Drawing No. | PL-134 |
| SCALE | 1/1000 |
| DATE | Jan. 2011 |

DP600ac-12.10
 [CB(C)700x700x1200]

DP600ac-15.50
 [CB(C)700x700x1200]



[CB(C)700x700x1200]

[CB(C)700x700x1200]

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THE PREPARATORY SURVEY ON THE PROJECT
 FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT
 IN THE SOUTHERN AREA OF LUSAKA
 IN THE REPUBLIC OF ZAMBIA

TITLE:
 PLAN
 MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD
 ~MOSH-OA-TUNYA JCT ~LS-MFEZ
 (STA. 11+420 ~ STA. 11+780)

| | |
|-------------|-----------|
| Drawing No. | PL-135 |
| SCALE | 1/1000 |
| DATE | Jan. 2011 |

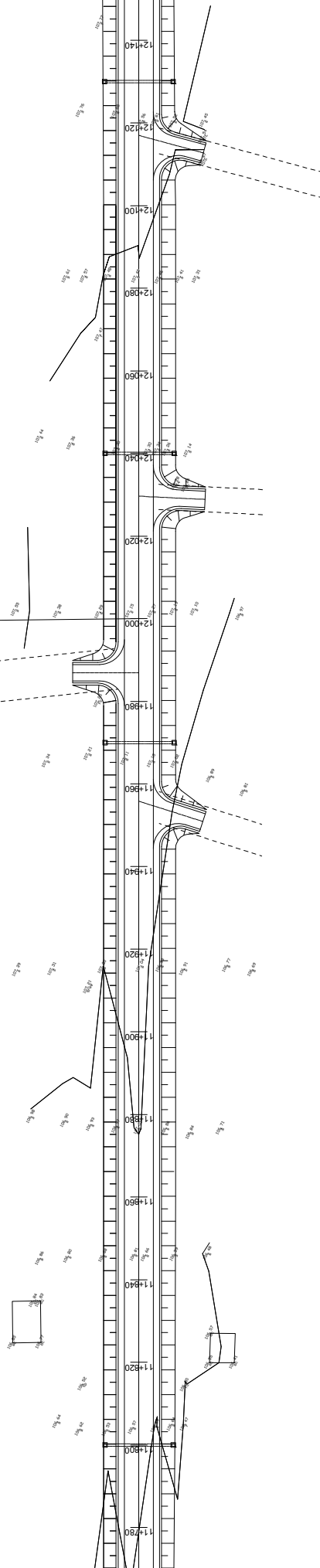
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[CB(C)700x700x1200]

DP600ac-16.00
[CB(C)700x700x1200]

DP600ac-16.00
[CB(C)700x700x1200]

DP600ac-15.90
[CB(C)700x700x1200]

STA. 12+000



[CB(C)700x700x1200]

[CB(C)700x700x1200]

[CB(C)700x700x1200]

[CB(C)700x700x1200]

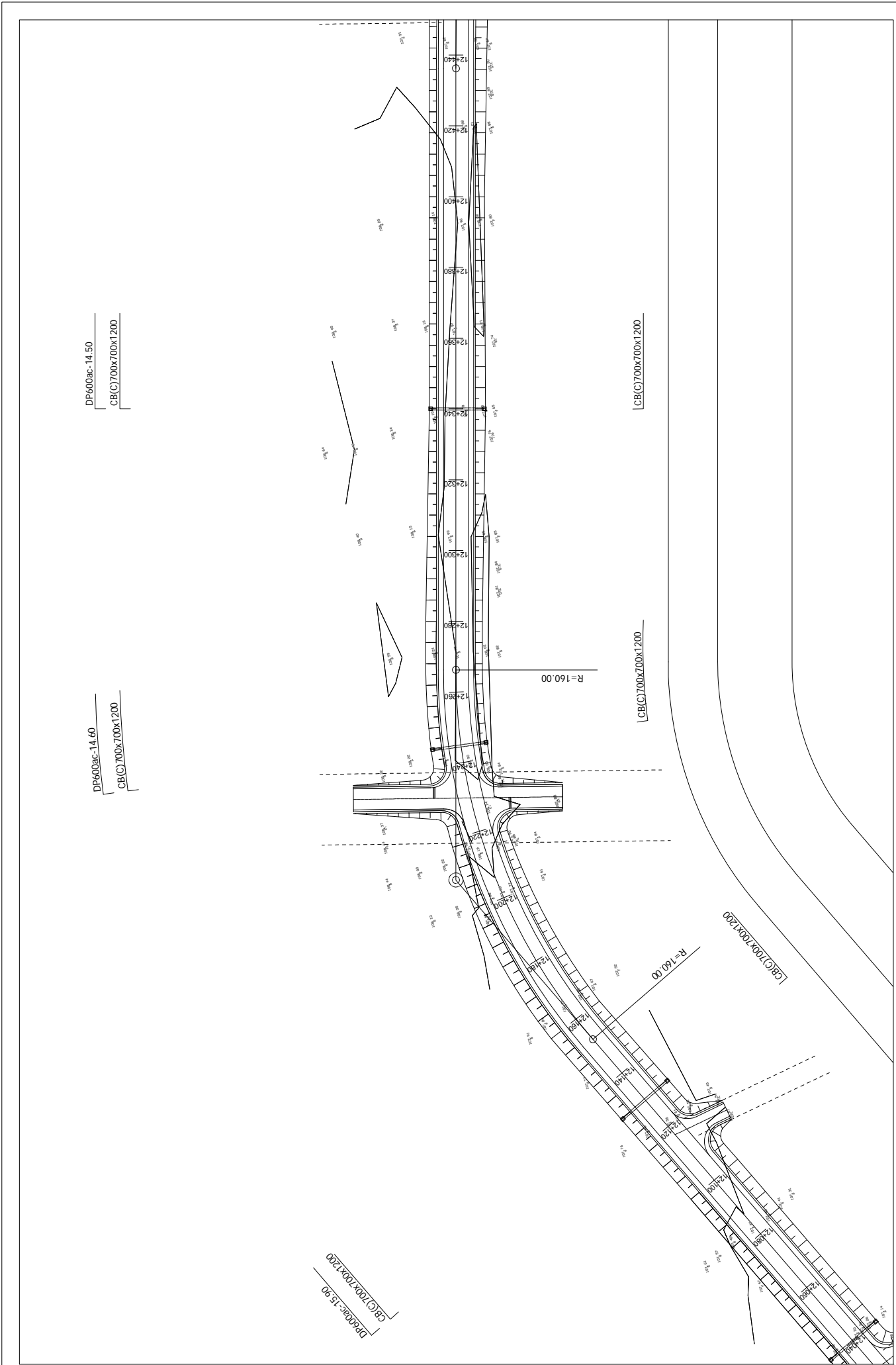
MINISTRY OF LOCAL GOVERNMENT
AND HOUSING
LUSAKA CITY COUNCIL

JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL

THE PREPARATORY SURVEY ON THE PROJECT
FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT
IN THE SOUTHERN AREA OF LUSAKA
IN THE REPUBLIC OF ZAMBIA

TITLE:
MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD
~MOSH-OA-TUNYA JCT ~LS-MFEZ
(STA. 11+780 ~ STA. 12+140)

| | |
|-------------|-----------|
| Drawing No. | PL-136 |
| SCALE | 1/1000 |
| DATE | Jan. 2011 |



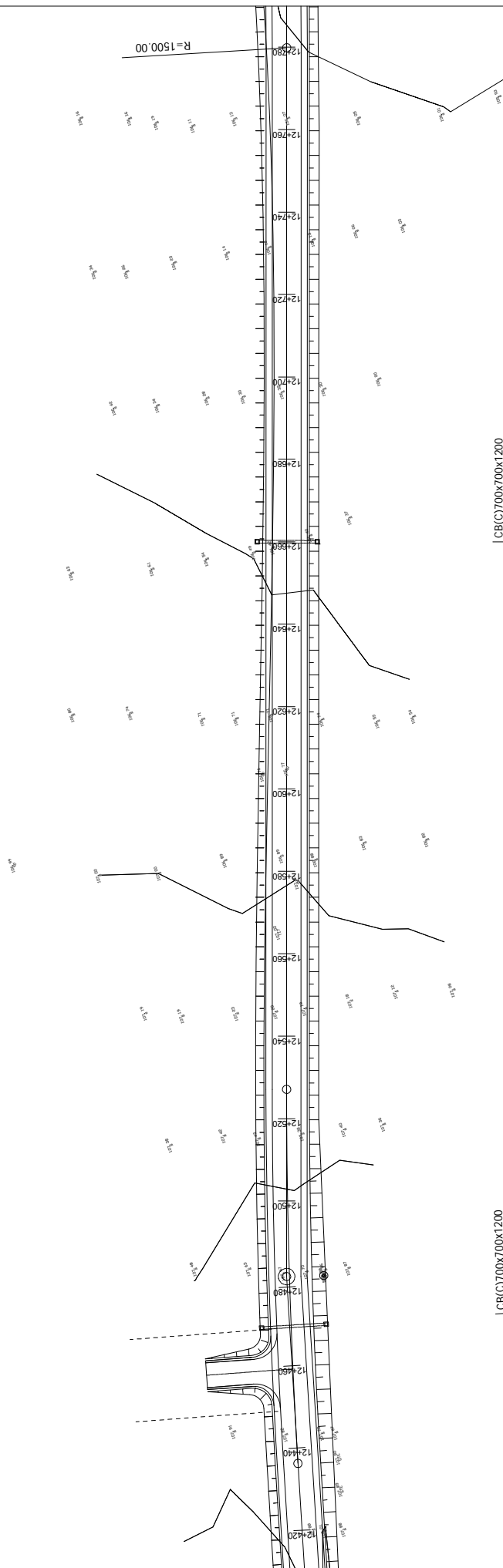
| | | | | | | | |
|--|--|---|--|--------|--------|-------------|-----------|
| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | | TITLE: | PLAN | Drawing No. | PL-137 |
| | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 12+140 ~ STA. 12+440) | | SCALE | 1/1000 | DATE | Jan. 2011 |

DP600ac-15.00

CB(C)700x700x1200

DP600ac-13.90

CB(C)700x700x1200



CB(C)700x700x1200

CB(C)700x700x1200

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FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT
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IN THE REPUBLIC OF ZAMBIA

TITLE:
MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD
~MOSH-OA-TUNYA JCT ~LS-MFEZ
(STA. 12+440 ~ STA. 12+780)

Drawing No.

PL-138

SCALE

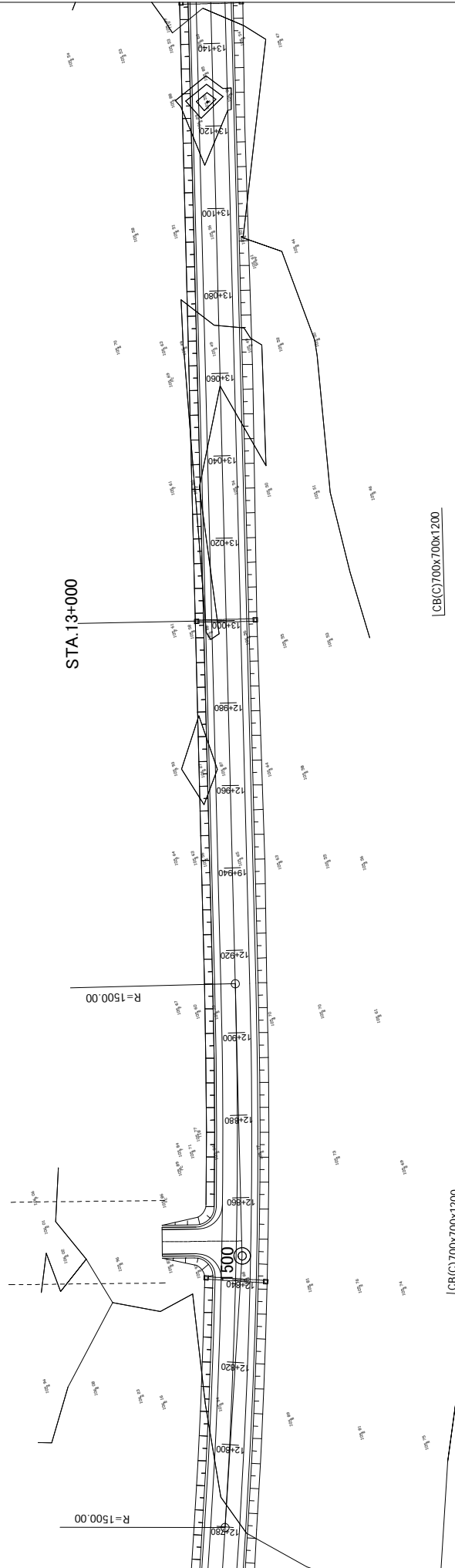
1/1000

DATE

Jan. 2011

DP600ac-13.50
CB(C) 700x700x1200

DP600ac-13.80
CB(C) 700x700x1200



CB(C) 700x700x1200

CB(C) 700x700x1200

STA. 13+000

R = 1500.00

R = 1500.00

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|--|--|---|--------|--|-------------|-----------|
| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN | Drawing No. | PL-139 |
| | | | | MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~MOSH-OA-TUNYA JCT ~LS-MFEZ (STA. 12+780 ~ STA. 13+140) | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |

DP600ac-13.90

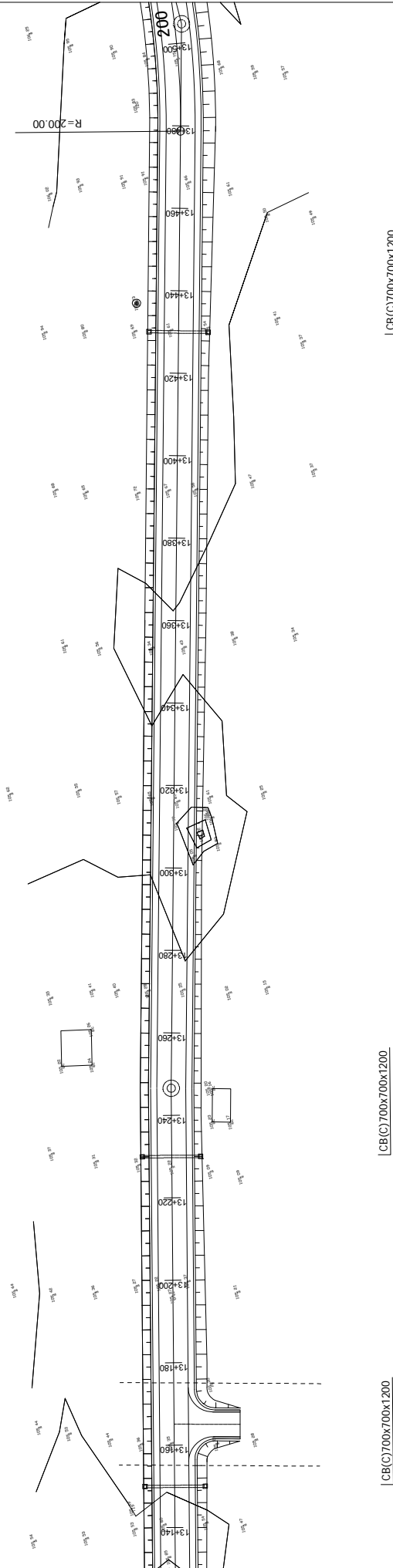
CB(C)700x700x1200

DP600ac-13.40

CB(C)700x700x1200

DP600ac-13.60

CB(C)700x700x1200



CB(C)700x700x1200

CB(C)700x700x1200

CB(C)700x700x1200

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THE PREPARATORY SURVEY ON THE PROJECT
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IN THE SOUTHERN AREA OF LUSAKA
IN THE REPUBLIC OF ZAMBIA

TITLE:
MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD
~MOSH-OA-TUNYA JCT ~LS-MFEZ
(STA. 13+140 ~ STA. 13+480)

Drawing No.

PL-140

SCALE

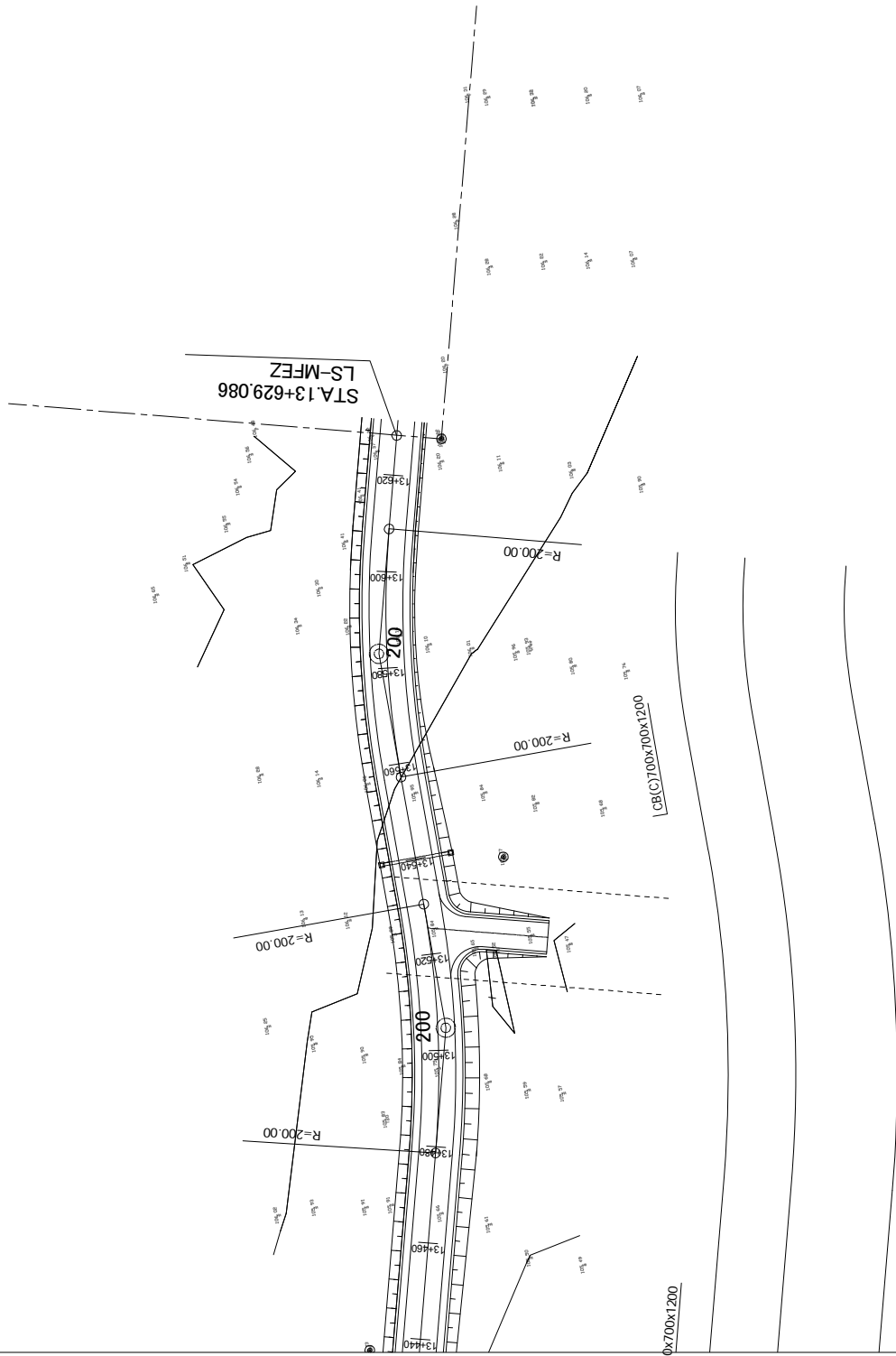
1/1000

DATE

Jan. 2011

DP600ac-13.90
 CB(C) 700x700x1200

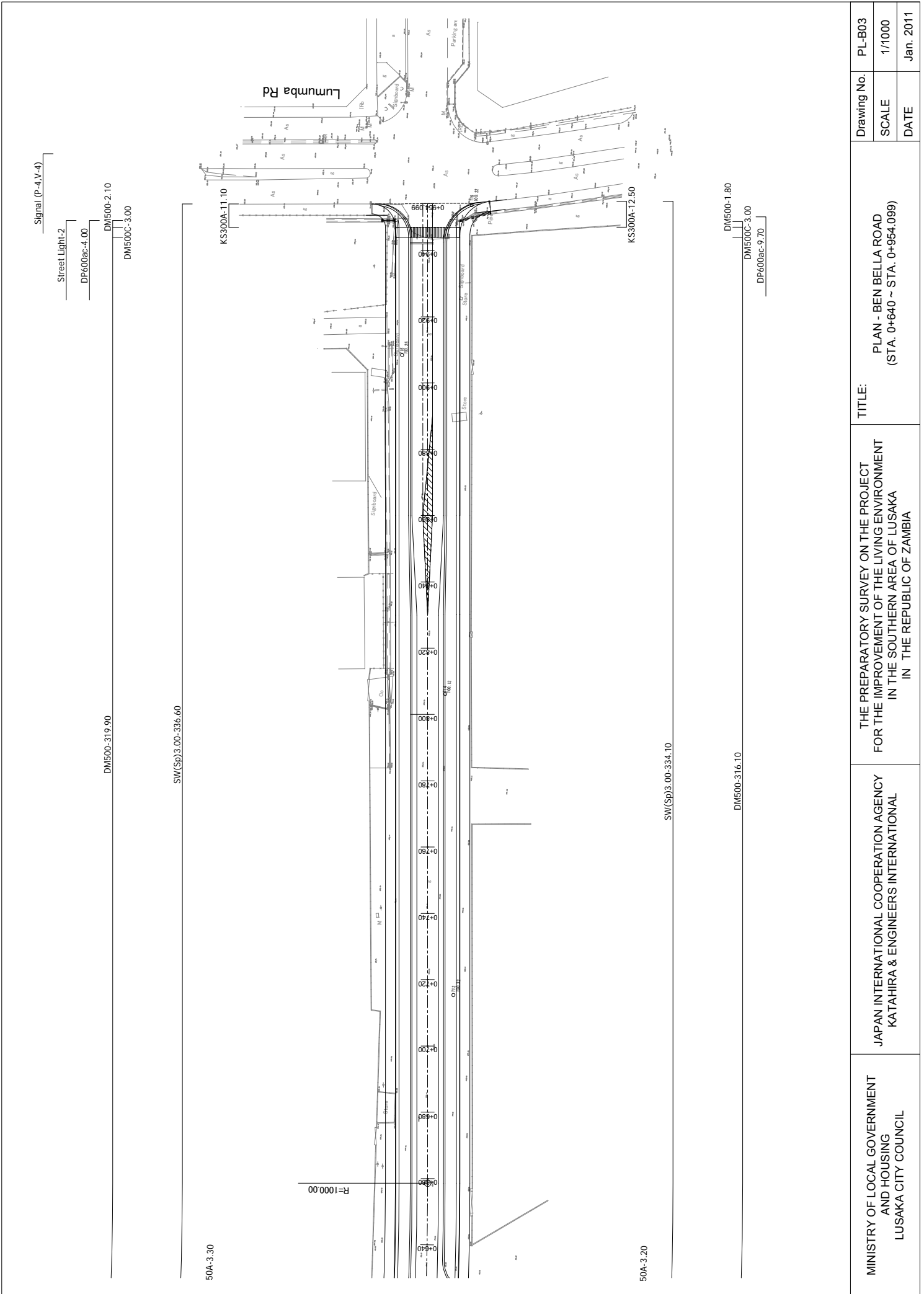
DP600ac-13.60
 CB(C) 700x700x1200



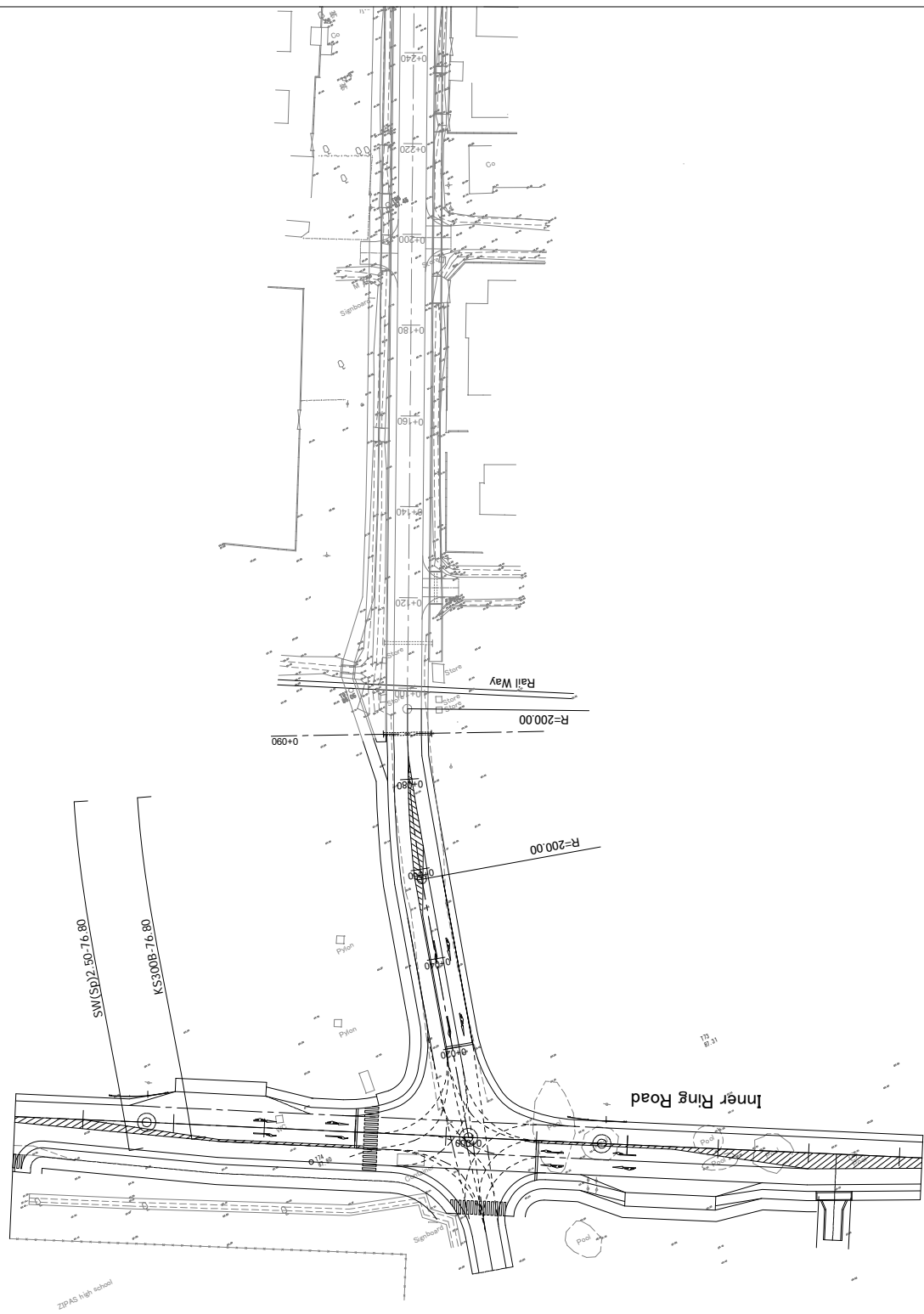
0x700x1200

CB(C) 700x700x1200

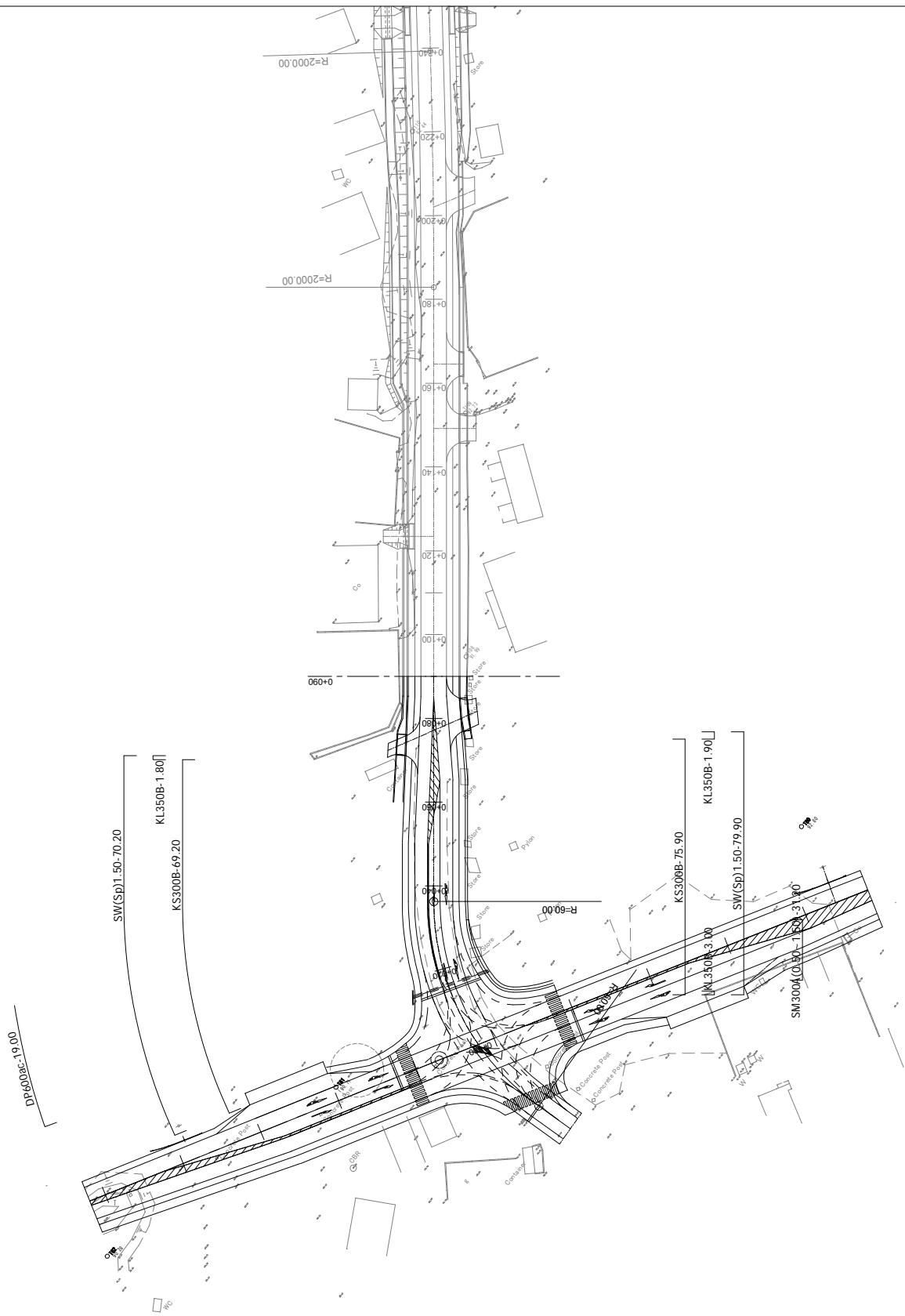
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: MINI BYPASS LINK ~ INNER RING RD ~ KASAMA RD ~ MOSI-OA-TUNYA JCT. ~ LS-MFEZ (STA. 13+480 ~ STA. 13+629.086) | Drawing No. PL-141 SCALE 1/1000 DATE Jan. 2011 |
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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | PLAN - BEN BELLA ROAD (STA. 0+640 ~ STA. 0+954.099) | Drawing No. | PL-B03 |
| | | | | | SCALE | 1/1000 |
| | | | | | DATE | Jan. 2011 |



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|--|--|---|--------|--------------------------------------|-------------|-----------|
| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: | INTERSECTION PLAN (1) CHIBWA ROAD | Drawing No. | IS-01 |
| | | | SCALE | 1/1000 | DATE | Jan. 2011 |



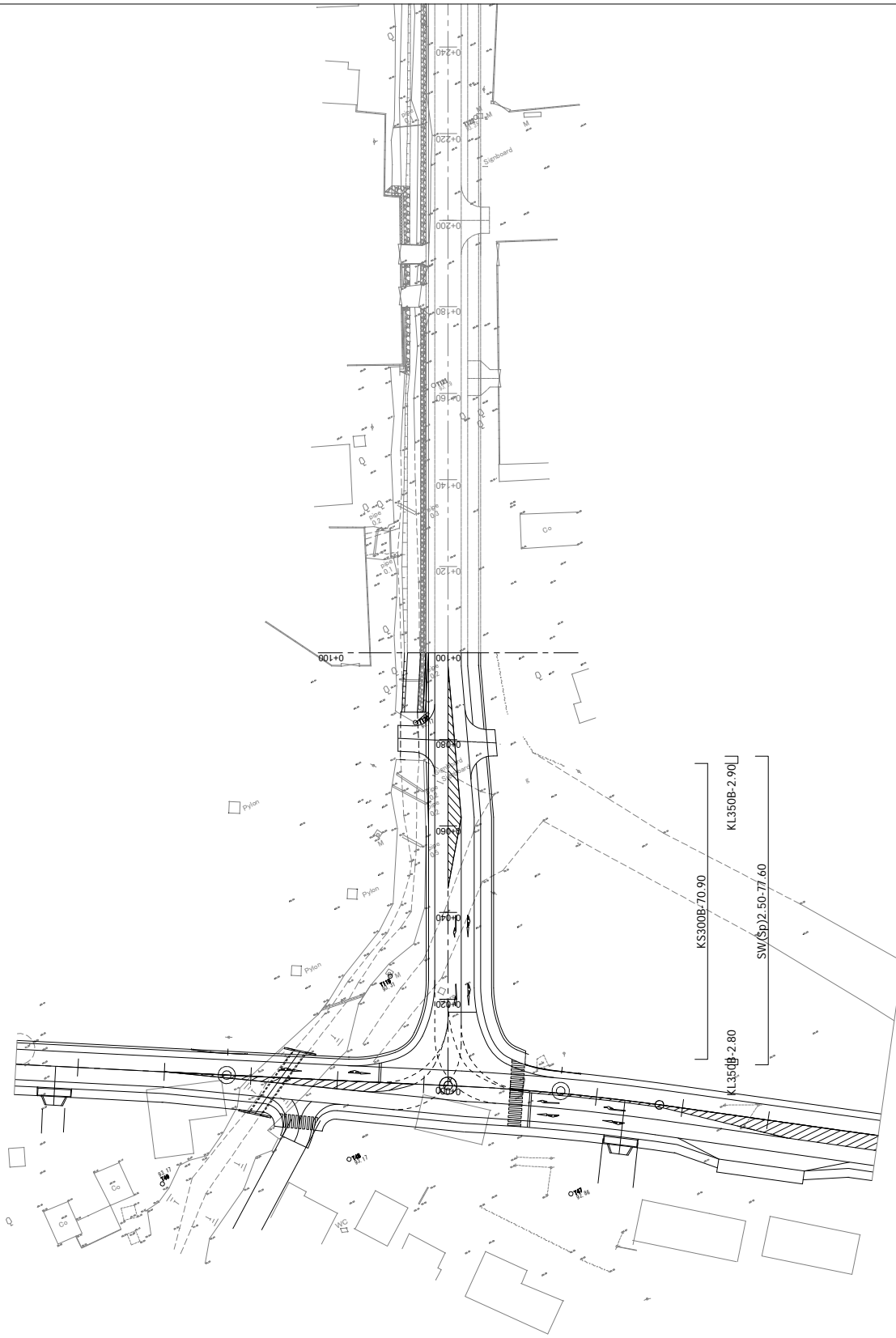
| | |
|-------------|-----------|
| Drawing No. | IS-02 |
| SCALE | 1/1000 |
| DATE | Jan. 2011 |

TITLE:
INTERSECTION PLAN (2)
NATIONALIST ROAD

THE PREPARATORY SURVEY ON THE PROJECT
FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT
IN THE SOUTHERN AREA OF LUSAKA
IN THE REPUBLIC OF ZAMBIA

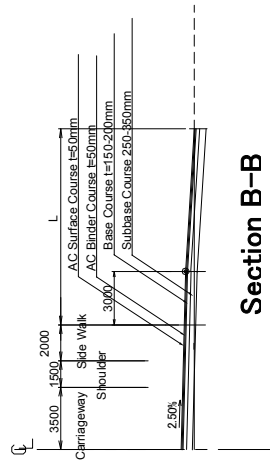
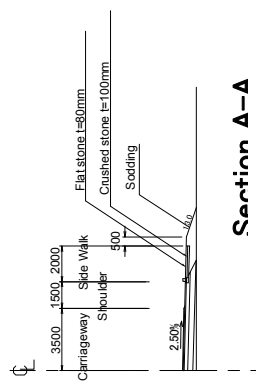
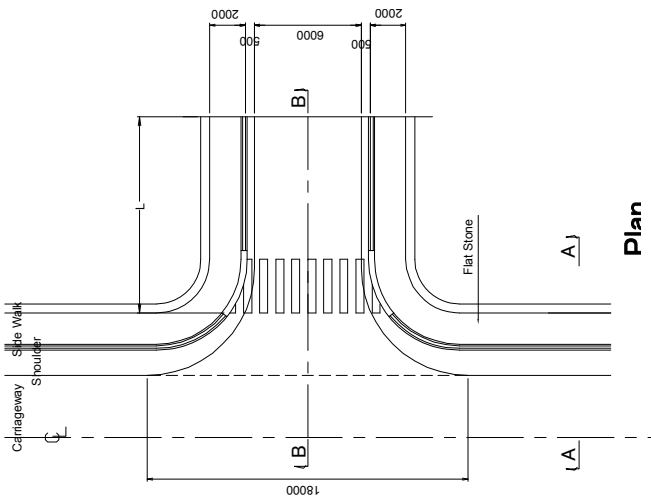
JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL

MINISTRY OF LOCAL GOVERNMENT
AND HOUSING
LUSAKA CITY COUNCIL

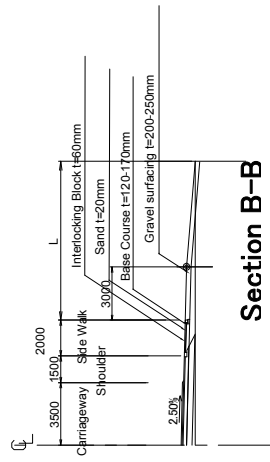
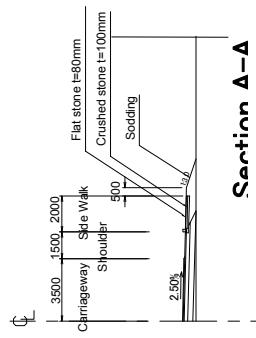
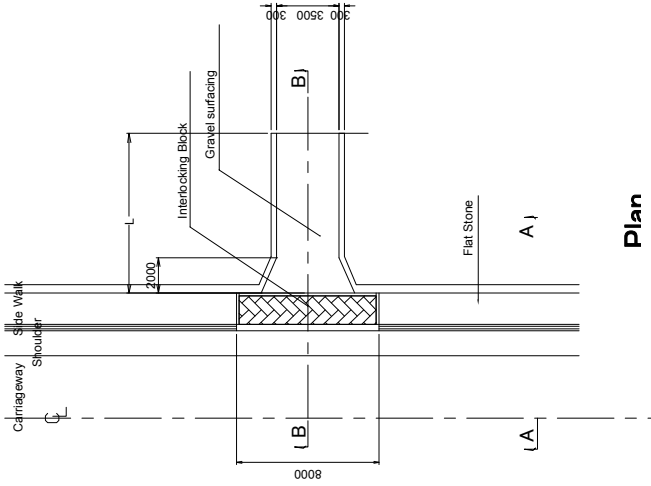


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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: INTERSECTION PLAN (3) YOTAM MULEYA ROAD | Drawing No. | IS-03 |
| | | | | SCALE | 1/1000 |
| | | | | DATE | Jan. 2011 |

Intersection Type



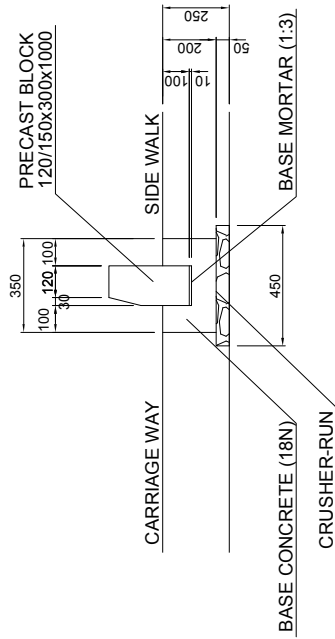
Access Way Type



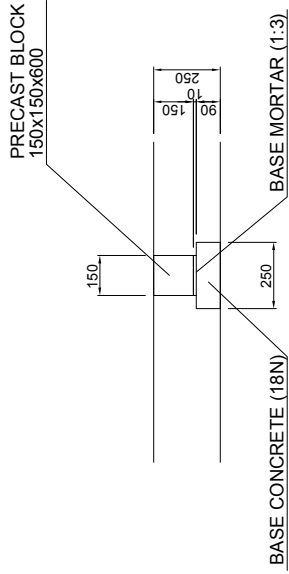
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|--|--|---|----------------------|-------|-------------|-----------|
| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: ACCESS WAY | | Drawing No. | AC-01 |
| | | | SCALE | 1/300 | DATE | Jan. 2011 |

KERB STONE

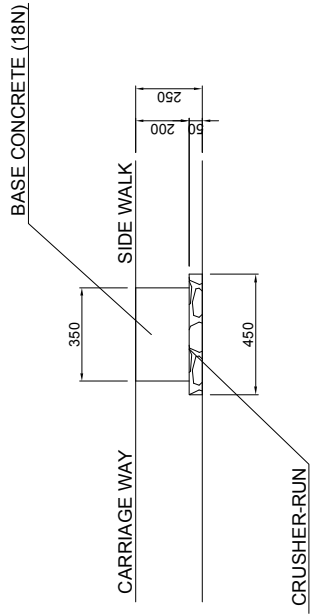
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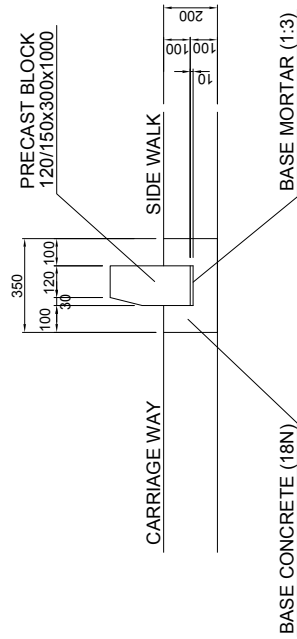
KS150A



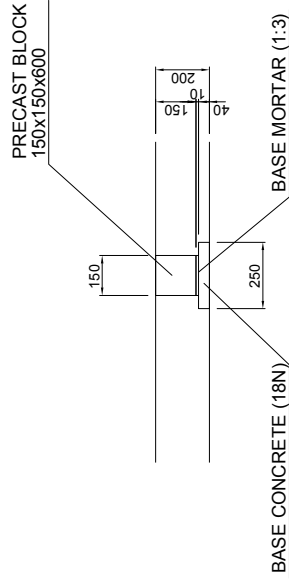
KL350A



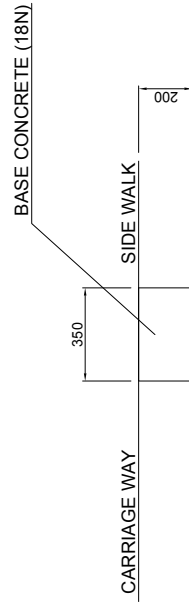
KS300B



KS150B

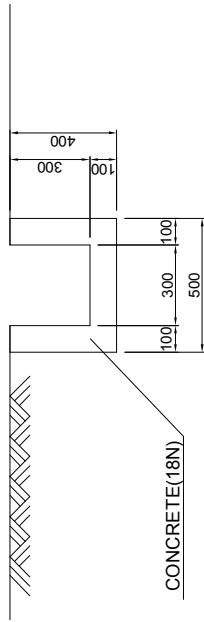


KL350B

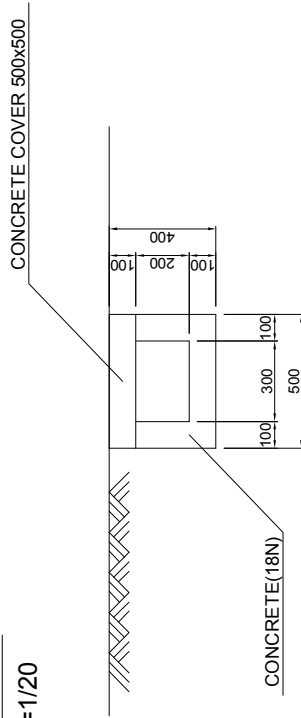


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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: KERB STONE | Drawing No. KS-01 SCALE 1/20 DATE Jan. 2011 |
|--|--|---|--------------------------|---|

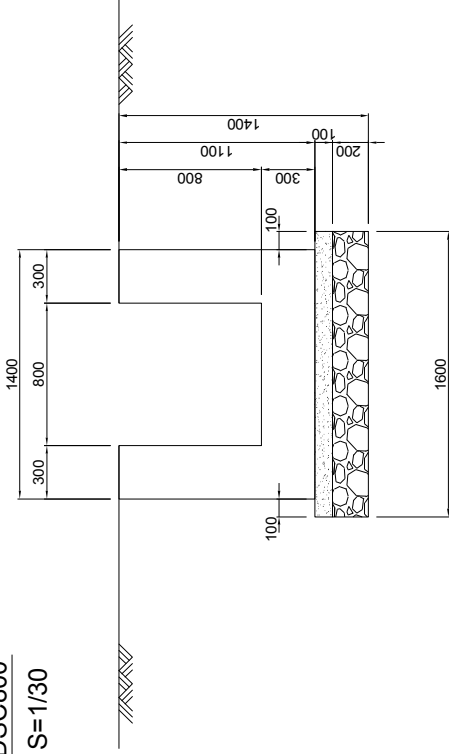
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S=1/20



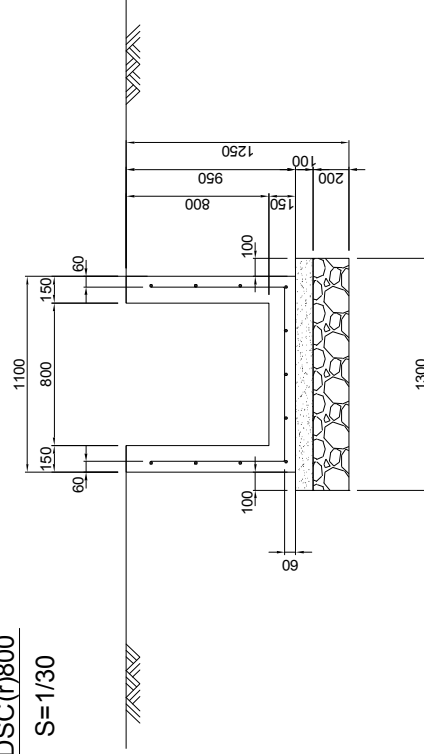
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S=1/20



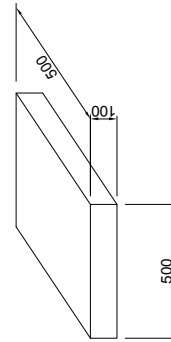
DSC800
S=1/30



DSC(r)800
S=1/30

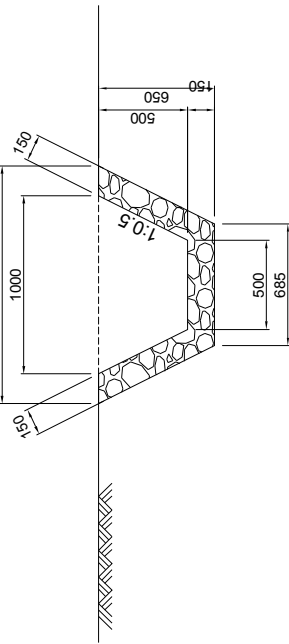


CONCRETE COVER 500x500

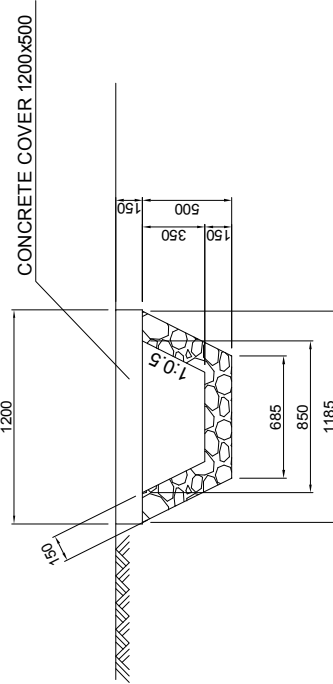


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| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: DRAINAGE STRUCTURE (1) LINE DITCH | Drawing No. | DS-01 |
| | | | | SCALE | 1/20 1/30 |
| | | | | DATE | Jan. 2011 |

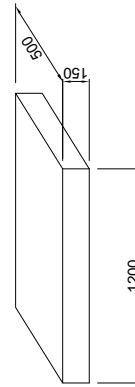
DM500



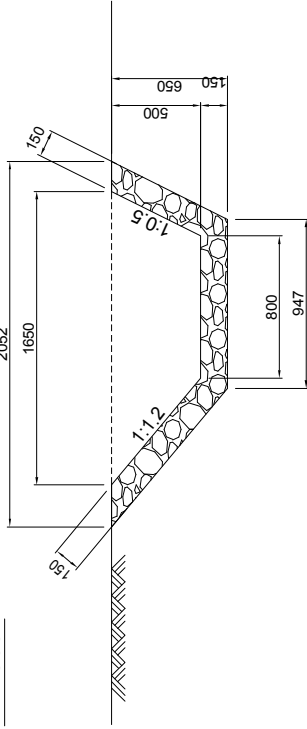
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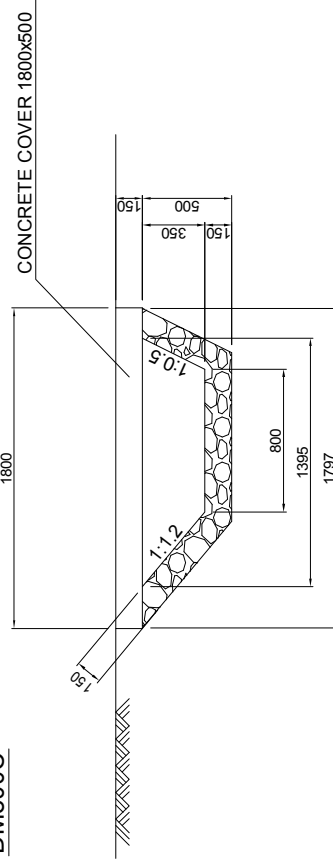
CONCRETE COVER 1200x500



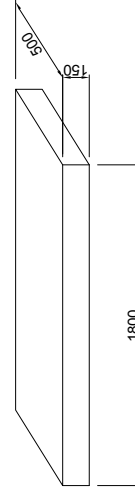
DM800



DM800C



CONCRETE COVER 1800x500



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IN THE SOUTHERN AREA OF LUSAKA
IN THE REPUBLIC OF ZAMBIA

TITLE:
DRAINAGE STRUCTURE (2)
LINE DITCH

Drawing No.

DS-02

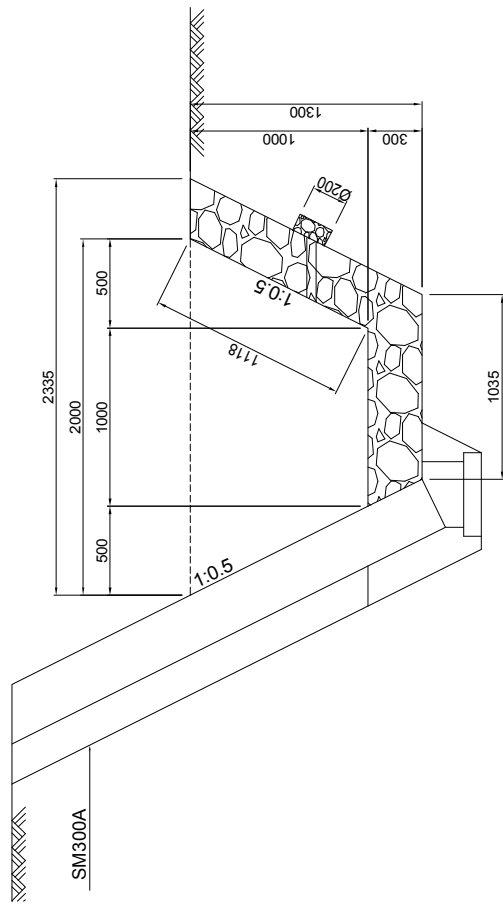
SCALE

1/30

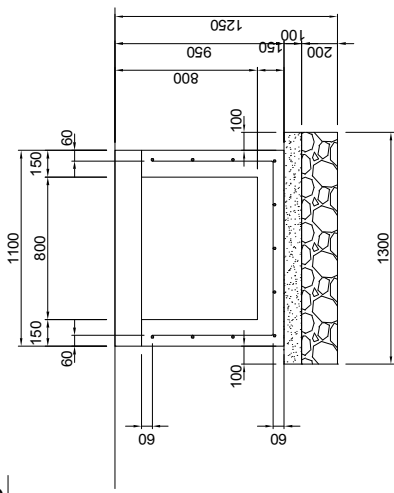
DATE

Jan. 2011

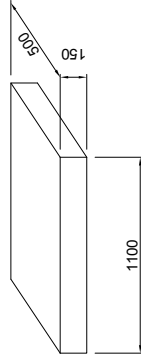
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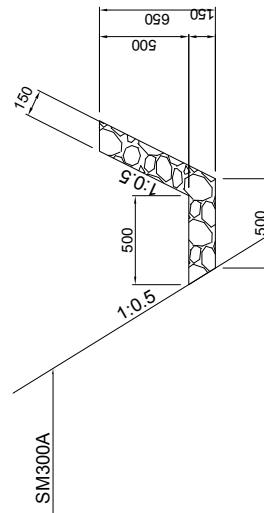
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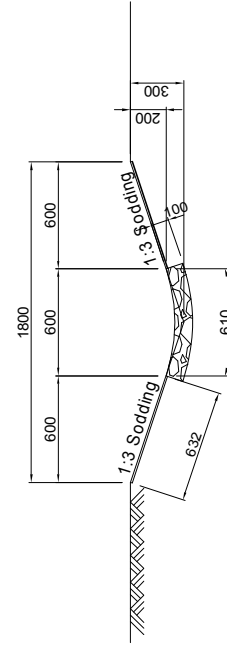
CONCRETE COVER 1100x500



DML500

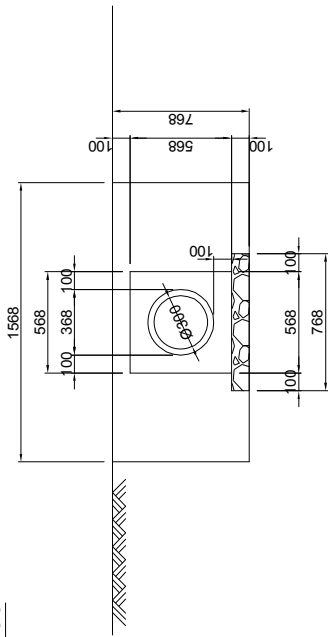


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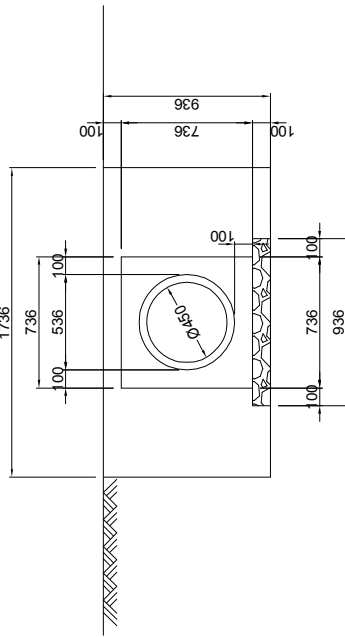


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| <p>MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL</p> | <p>JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL</p> | <p>THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA</p> | <p>TITLE: DRAINAGE STRUCTURE (3) LINE DITCH</p> | <p>Drawing No. DS-03 SCALE 1/30 DATE Jan. 2011</p> |
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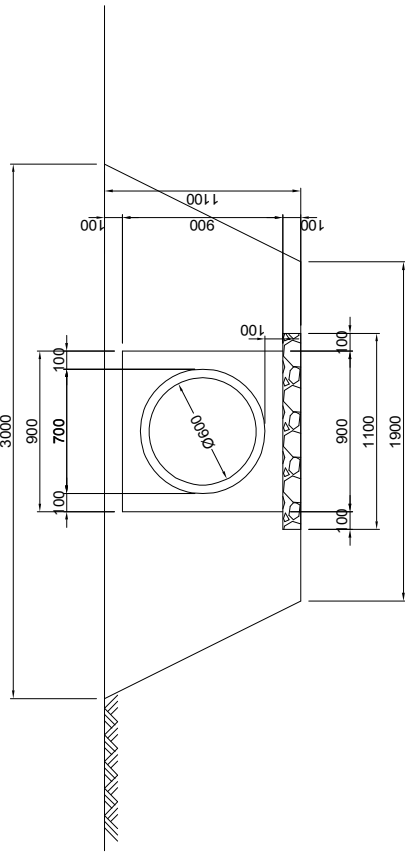
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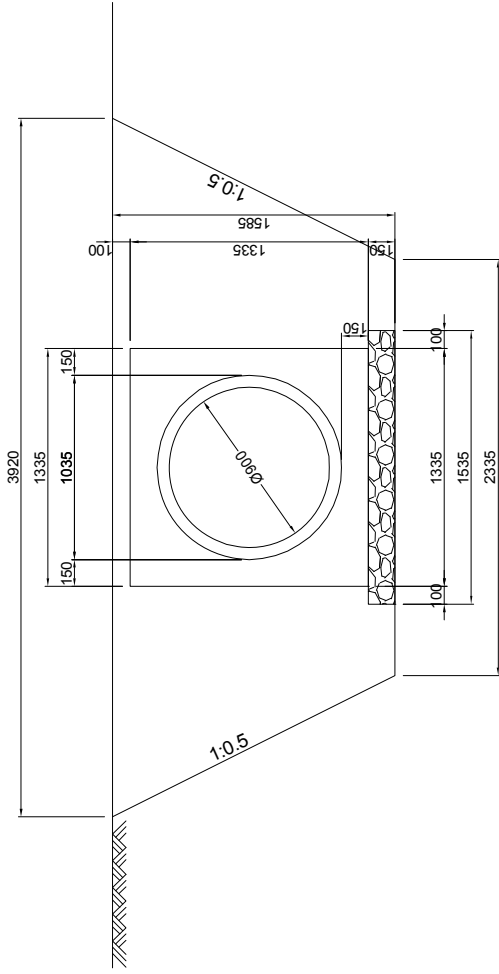
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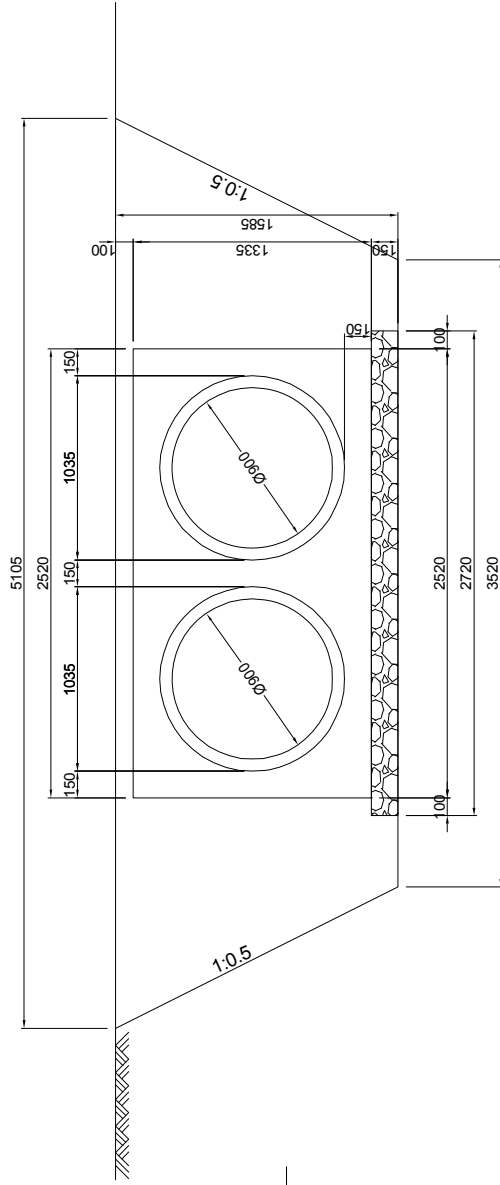
DP600ac



DP900ac



DP2x900ac



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TITLE:

DRAINAGE STRUCTURE (4)
CONCRETE PIPE

Drawing No.

SCALE

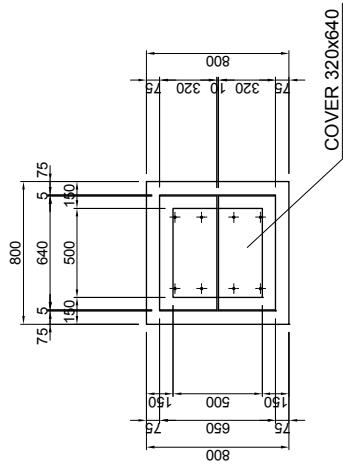
DATE

DS-04

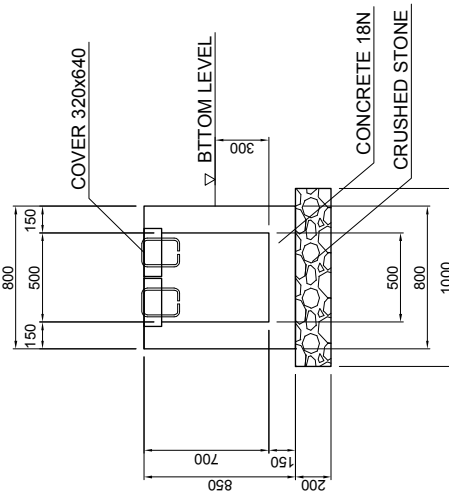
1/30

Jan. 2011

DB(C) 500x500x700

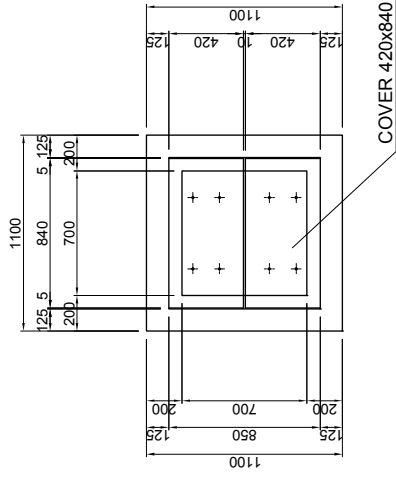


PLAN

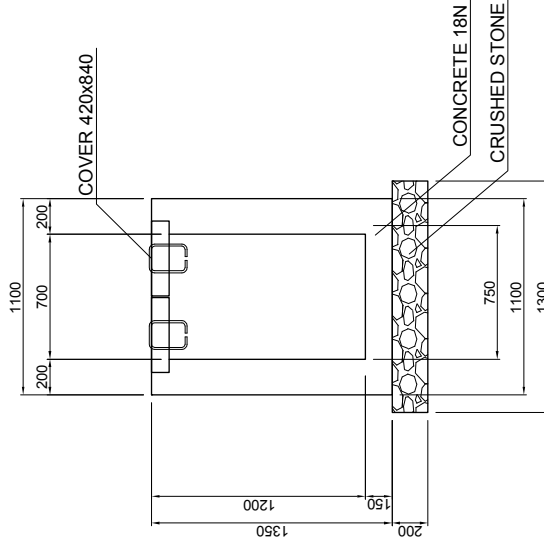


SECTION

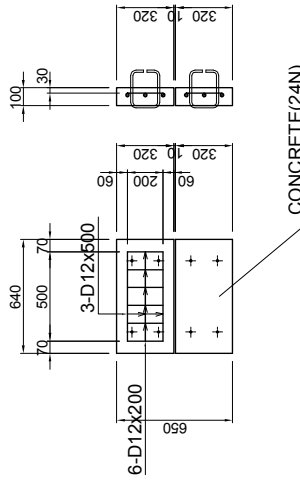
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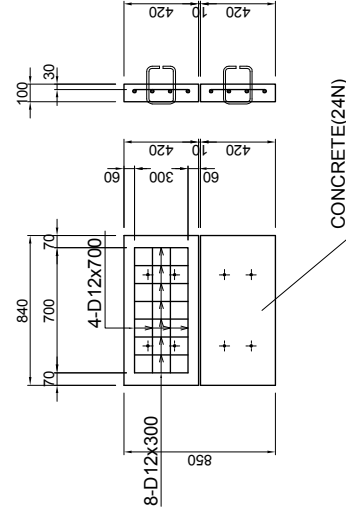
PLAN



SECTION

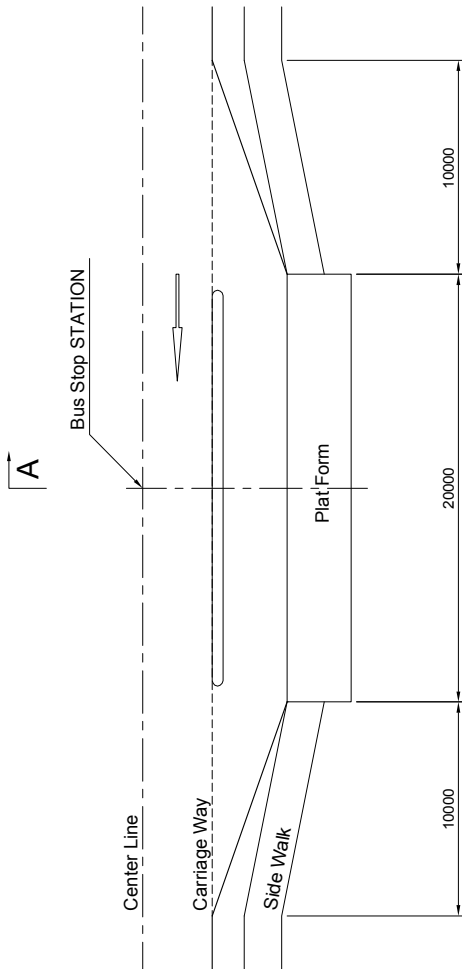


COVER 320x 640

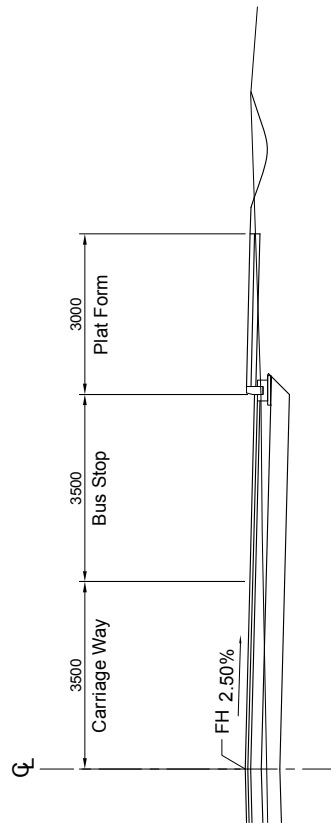


COVER 420x 840

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| | | | | SCALE | 1/30 |
| | | | | DATE | Jan. 2011 |



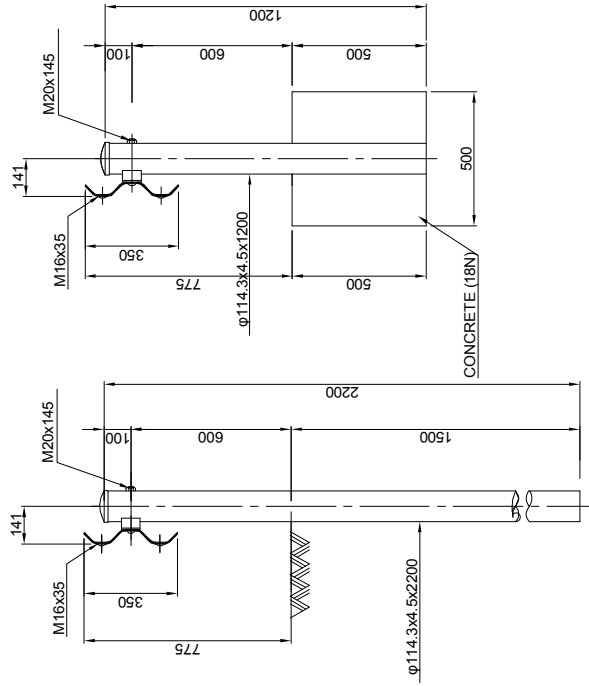
PLAN S=1:250



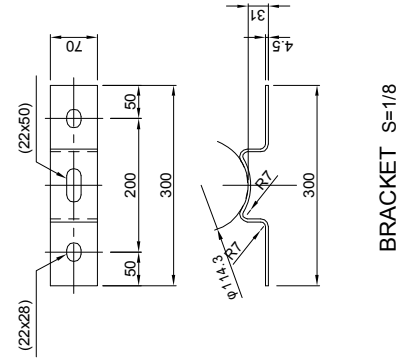
A-A SECTION S=1:100

SCHEDULED LIST OF BUS STOP

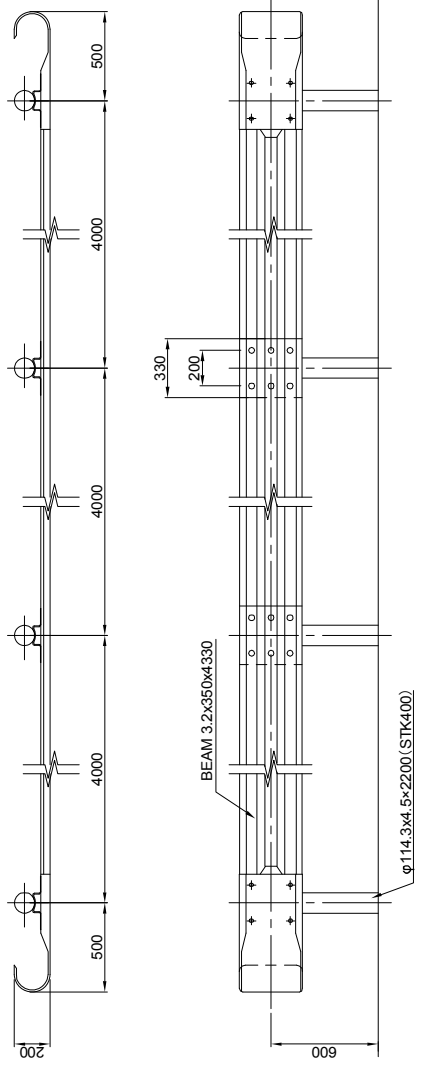
| NAME OF ROAD | STA. | L/R |
|---------------------------|----------|-----|
| Mini Bypass Link | 0+075.00 | R |
| | 0+090.00 | L |
| | 0+420.00 | L |
| Inner Ring Road | 0+510.00 | R |
| | 1+250.00 | L/R |
| | 2+270.00 | L |
| | 2+370.00 | R |
| | 4+400.00 | R |
| Inner Ring Road Extension | 4+500.00 | L |
| | 5+370.00 | R |
| | 5+420.00 | L |
| | 6+030.00 | L |
| | 6+150.00 | R |
| | 6+720.00 | L |
| | 6+770.00 | R |
| | 7+650.00 | L |
| | 7+760.00 | R |
| | 8+630.00 | L |
| | 8+740.00 | R |



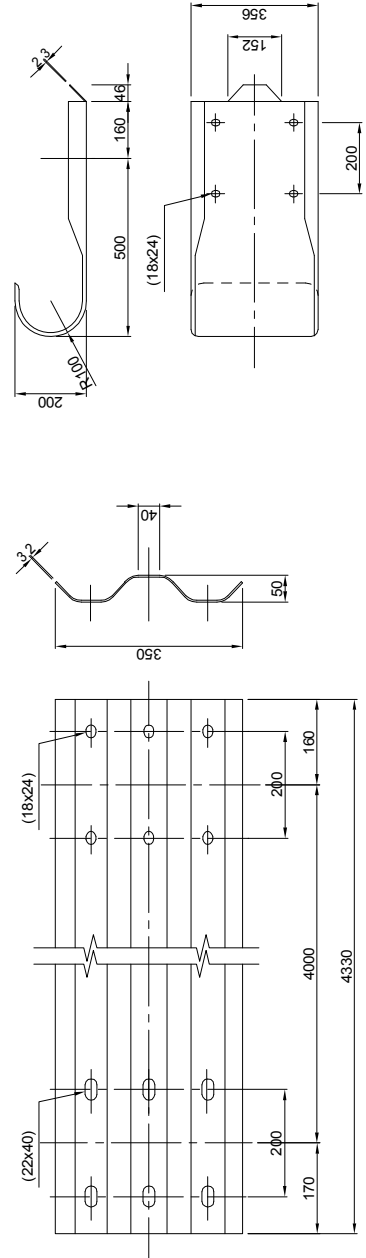
SECTION S=1/20



BRACKET S=1/8



PLAN AND ELEVATION S=1/30



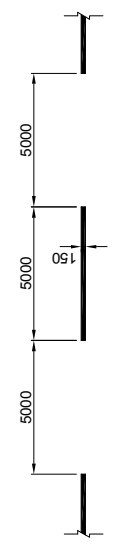
TERMINAL S=1/15

BEAM S=1/10

BOLT FOR BRACKET S=1/5
M16x35

BOLT FOR BRACKET S=1/5
M20x145

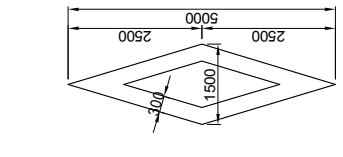
| | | | | | |
|--|--|---|-------------------------|-------------|-----------|
| MINISTRY OF LOCAL GOVERNMENT AND HOUSING LUSAKA CITY COUNCIL | JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL | THE PREPARATORY SURVEY ON THE PROJECT FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT IN THE SOUTHERN AREA OF LUSAKA IN THE REPUBLIC OF ZAMBIA | TITLE: GUARDRAIL | Drawing No. | GR-01 |
| | | | | SCALE | AS SHOWN |
| | | | | DATE | Jan. 2011 |



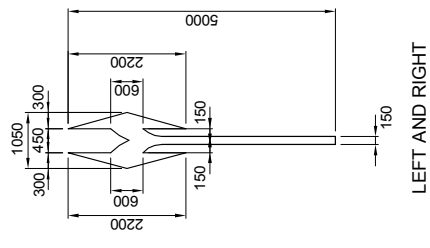
CENTRE LINE S=1/200



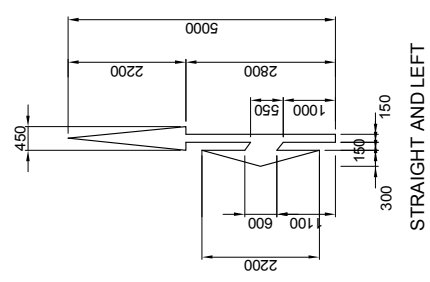
EDGE LINE S=1/200



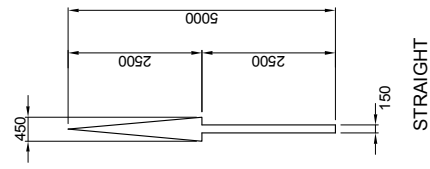
CROSS WALK



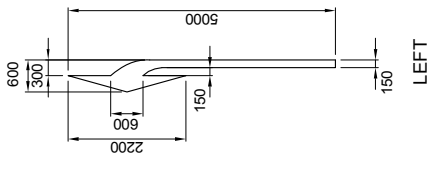
LEFT AND RIGHT



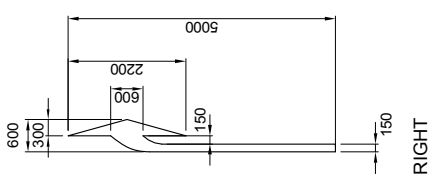
STRAIGHT AND LEFT



STRAIGHT



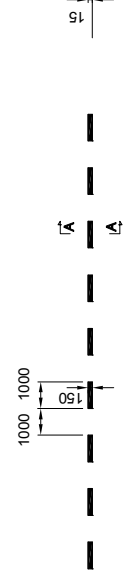
LEFT



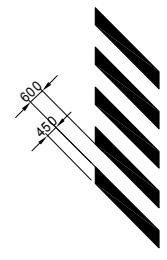
RIGHT



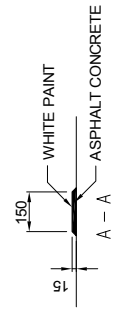
BROKEN LINE S=1/200



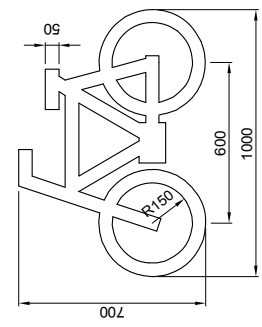
CHANNELIZING LINE S=1/200



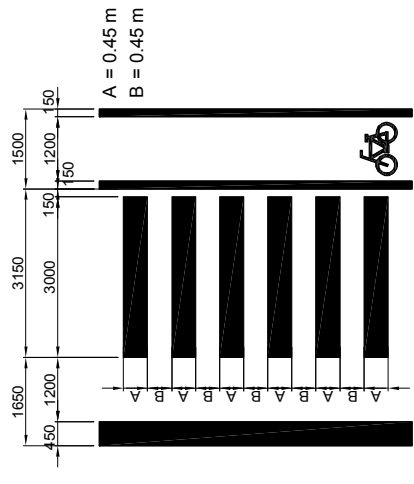
ZEBRA S=1/200



DIRECTIONAL ARROWS s=1/100

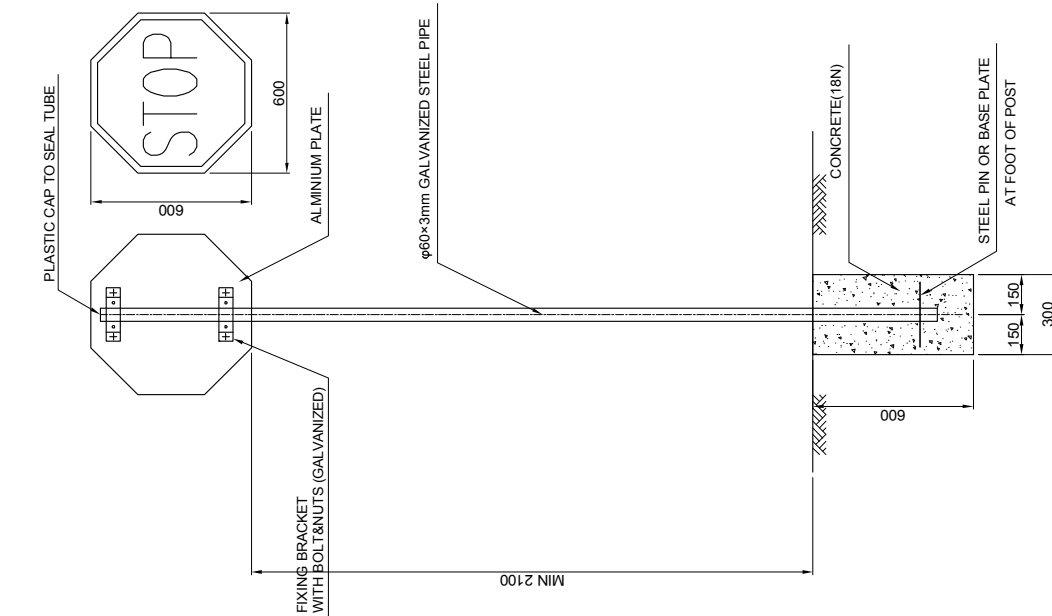


DETAIL OF BICYCLE LOGO S=1/200



STOP LINE/CROSS WALK/BICYCLE LANE S=1/100

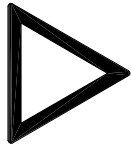
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| | | | Drawing No. | | SCALE | AS SHOWN |
| | | | | DATE | Jan. 2011 | |



DETAIL OF ROAD SIGN S=1/20



R1. STOP



R2. GIVE WAY



M1. TURN LEFT



M4. STRAIGHT &
TURN RIGHT



M7. CYCLE TRACK



M8. SIDE WALK



P22. U-TURN



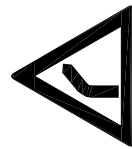
P25A. SPEED LIMIT
(40km)



P25B. SPEED LIMIT
(60km)



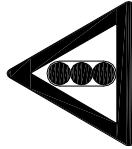
W1 SHARP
LEFT-HAND BEND



W2 SHARP
RIGHT-HAND BEND



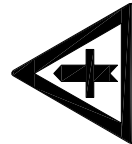
W17. CROSSWALK



W23. JUNCTION
(TRAFFIC LIGHT SIGNALS)



W27. JUNCTION
(X)



W28A JUNCTION
(X)



W28B JUNCTION
(T)



I41 BUS STOP
(size : 400x300)



I48. FILLING STATION
(size : 500x600)

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JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL

TITLE:
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IN THE SOUTHERN AREA OF LUSAKA
IN THE REPUBLIC OF ZAMBIA

ROAD SIGN

Drawing No.

RS-01

SCALE

NON SCALE

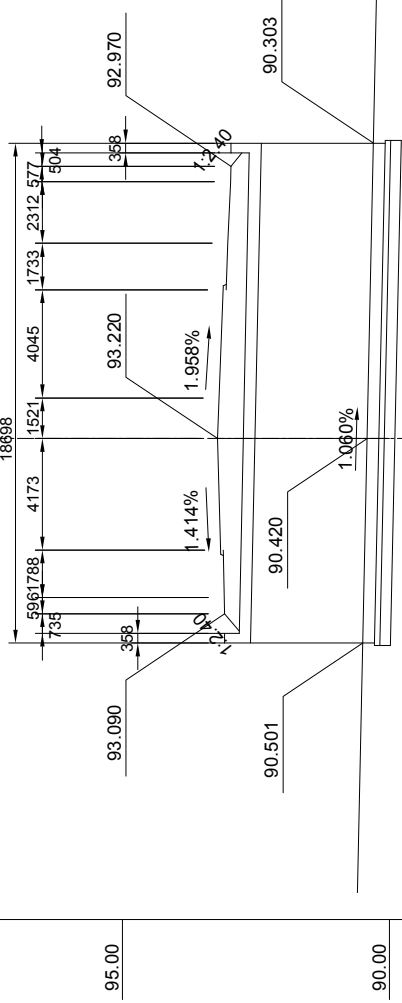
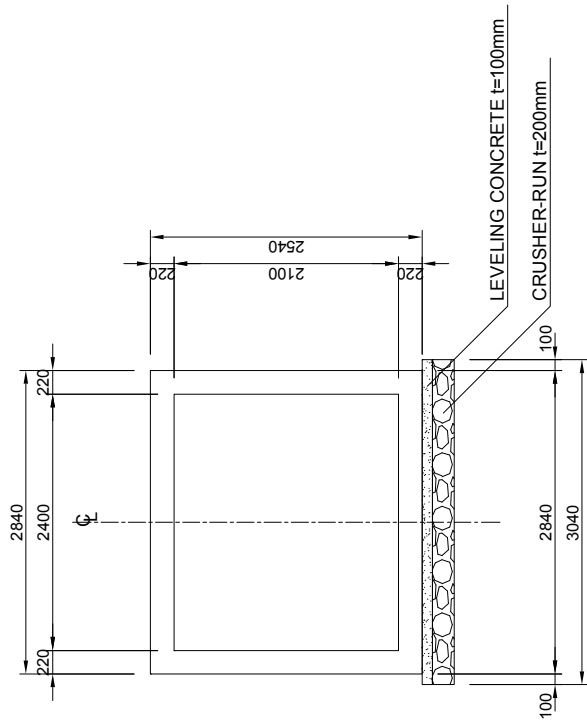
DATE

Jan. 2011

PROFILE H=1:200, V=1:100

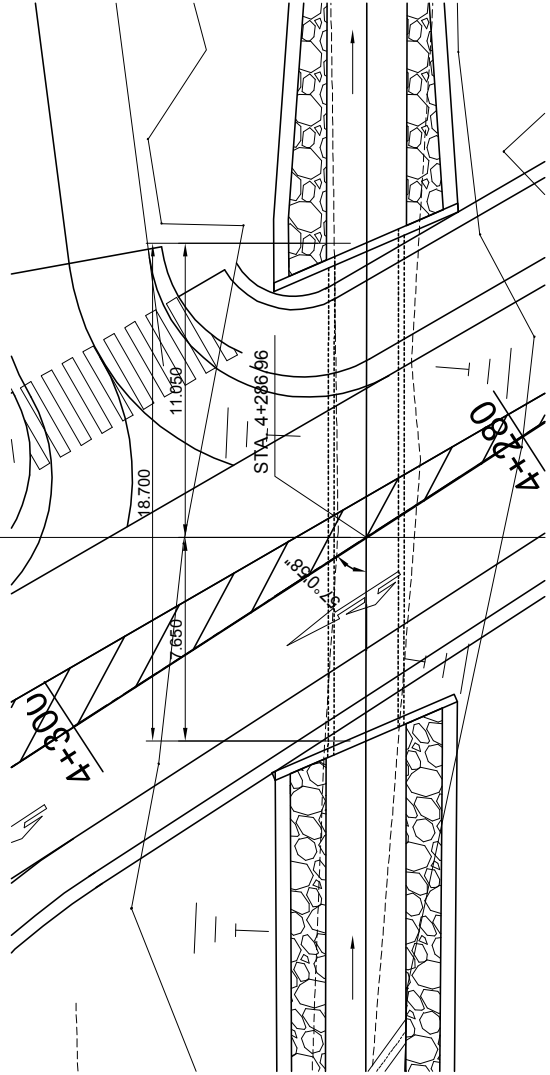
TYPICAL CROSS SECTION S=1:50

STA. 4+286.96



| | | | | | | |
|--------------|--------|----------|--------|-------|--------|----------|
| STATION | 90.509 | 0+008.40 | 90.420 | 0+000 | 90.303 | 0+012.60 |
| FINISH GRADE | | | | | | |

PLAN S=1:200



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FOR THE IMPROVEMENT OF THE LIVING ENVIRONMENT
IN THE SOUTHERN AREA OF LUSAKA
IN THE REPUBLIC OF ZAMBIA

TITLE:
C-Bx.2.40x2.10
INNER RING ROAD (STA.4+286.96)

Drawing No.
SCALE
DATE

BC-01
AS SHOWN
Jan. 2011

2.2.4 Implementation Plan

2.2.4.1 Implementation Policy

The basic concepts for implementation of the Project under the Japanese Grant Aid system are as follows:

- ✓ On reaching an agreement and signing of the Exchange of Note and Grant Agreement by both Governments of Japan and Zambia, the Project will be implemented in accordance with the guideline of Japanese Grant Aid.
- ✓ Ministry of Local Government and Housing (MLGH) is the lead ministry and Lusaka City Council (LCC) is responsible for the Project implementation.
- ✓ Assistance in tendering and construction supervision will be undertaken by Japanese consulting firm in accordance with a contract between the MLGH and Consultant.
- ✓ A Japanese pre-qualified tenderer who has been awarded the contract by the MLGH will undertake the implementation of the Project.

Main concepts for the implementation planning are as follows;

- ✓ Materials and labor for the project will be procured in Zambia as much as possible. If the required qualities and capacities are not enough, materials and labor can be procured effectively from third countries and/or Japan.
- ✓ Implementation method and schedule for the Project shall be planned on the basis of local meteorological, topographic and geological conditions as well as any natural conditions affecting the construction works.
- ✓ General and easy method without special equipment and technology shall be planned.
- ✓ Appropriate standards and specifications for construction shall be proposed, and site organizations of both the contractor and the consultant shall be arranged to comply to the above-mentioned standards and specifications.
- ✓ Facilities to strictly secure safety for construction staff and third parties shall be installed. Especially, educative training on environment and anti-AIDS/HIV shall be carried out.
- ✓ Protection against sound and vibration, air pollution, water pollution and soil flowing out at the work site, asphalt plant yard, quarry sites and borrow pits shall be done in order to preserve environment. Construction waste shall be treated and/or dumped in a proper site specified by the Government of Zambia.

2.2.4.2 Implementation Conditions

- ✓ Construction plan and method shall be prepared considering the safety of the construction staff and the third parties first, and preservation of environment for the road users and the road side residents.

2.2.4.3 Scope of Works

Undertakings of both governments of Japan and Zambia are listed in Table 2.2-8.

Table 2.2-8 Undertakings of both Governments

| Items | Contents | Undertaken by | | Remarks |
|---|--|---------------|--------|--|
| | | Japan | Zambia | |
| Procurement of Materials & Equipments | Procurement & Transportation | O | | |
| | In-land Transportation Clearance | | O | |
| Preparation Works | Lands & Right of Way Acquisitions | | O | Including spaces for site office, storage yard, workshop, etc. |
| | Relocation of Encroached Facilities | | O | |
| | Provision of Soil Disposal Areas | | O | |
| | Provision of Waste Disposal Areas | | O | |
| | Other Works | O | | |
| Relocation & Removal of various obstacles | Relocation of Underground & Aerial Obstacles | | O | |
| Main Works | Road Works | O | | |

2.2.4.4 Consultant Services

A Japanese consultant will carry out detailed design, assistance in tendering and construction supervision in accordance with the consultant agreement made between the Governments of Zambia and the Consultant.

(1) Detailed Design Services

The following services shall be carried out as the Detailed Design Services by the Consultant:

- ✓ To confirm the contents of the Project with the Implementing Agencies in Zambia through discussions and field investigations
- ✓ To conduct detailed design and preparation of detailed drawings
- ✓ To conduct detailed construction planning and project cost estimate

- ✓ To confirm the progress of relocation of houses in ROW.

Period for the Detailed Design Service will be as follows:

- ✓ 3.5 months from verification of the consultant agreement.

(2) Tender Related Services

The following services will be carried out by the Consultant in the period from tender notice to construction contract;

- ✓ Preparation of Tender Documents (shall be done in parallel with above-mentioned Detailed Design Services)
- ✓ Tender Notice
- ✓ Pre-Qualification
- ✓ Tendering
- ✓ Tender Evaluation
- ✓ Contract Facilitation

Period for the Tendering Related Services will be as follows;

- ✓ 4.5 months from the verification of the agreement of the detailed design

(3) Construction Supervision Services

The following services will be carried out by the Consultant during construction to be executed by the Contractor according to the contract and implementation plan:

- ✓ Inspections and Approvals of the Topographic Surveys
- ✓ Inspections and Approvals of the Construction Plans
- ✓ Quality Control
- ✓ Progress Control
- ✓ Control for Measurement of the Works
- ✓ Inspection of the Safety Aspects
- ✓ Final Inspection and Delivery
- ✓ Confirmation of the progress of house relocations.

The Consultant will provide a resident engineer and 2 assistant supervising engineers.

2.2.4.5 Quality Control Plan

Main quality control items for earth & pavement works and concrete works are shown in Table 2.2-9 and Table 2.2-10, respectively;

Table 2.2-9 Main Quality Control Items for Earth & Pavement Works

| Item | Test Item | Test Method (Specification) | Frequency of Tests |
|--|--------------------------------|--|--|
| Embankment | Field Density Test | AASHTO T191 | Once every 500 m ³ |
| Subgrade & Base Course | Filed Density Test | AASHTO T191 | Once every 1,000 m ³ |
| | Field Compaction Test | AASHTO T180 | Once every 1,000 m ² |
| Asphalt Concrete (Surface & Binder Course) | Temperature of Asphalt Mixture | Temperatures while carrying, laying and compacting | 5 times a day |
| | Abrasion Test of Aggregate | AASHTO T96 | Once every 1,500 m ³ , and when material is changed |

Table 2.2-10 Main Quality Control Items for Concrete Works

| Item | Test Item | Test Method (Specification) | Frequency of Tests |
|------------------|---------------------------|-----------------------------|---|
| Cement | Physical Property Test | AASHTO M85 | Once before each trial mix; thence once in every 500m ³ of concrete or when material is changed |
| Fine Aggregate | Physical Property Test | AASHTO M6 | Once before each trial mix; thence once in every 500m ³ or when material source is changed |
| | Sieve Analysis | AASHTO T27 | Once a month |
| Course Aggregate | Physical Property Test | AASHTO M80 | Once before each trial mix; thence once in every 500m ³ or when material source is changed |
| | Sieve Analysis | AASHTO T27 | Once a month |
| Water | Quality Test | AASHTO T26 | Once before each trail mix |
| Concrete | Slump Test | AASHTO T119 | Twice a day |
| | Air Content Test | AASHTO T121 | Twice a day |
| | Compressive Strength Test | AASHTO T22 | 6 specimens in each concreting. In case of large amount in each concreting, 6 specimens in every 75 m ³ (3 specimens for 7-day strength and 3 specimens for 28-day strength) |
| | Temperature Test | — | Twice a day |
| | Salinity Test | — | Twice a day |

2.2.4.6 Procurement Plan

(1) Procurement Plan for Construction Materials

All construction materials necessary for the Project such as asphalt mixtures, sands, aggregates, crushed stones, ready-mixed concretes and lumbers are usually available from Zambian markets either locally or through imports.

Procurement plan for major materials and equipment are shown in Table 2.2-11 and Table 2.2-12.

Table 2.2-11 Procurement Plan for Major Materials

| Item | Procured from | | | Remarks |
|---|---------------|-------|---------------|---------|
| | Zambia | Japan | Third Country | |
| <u>Materials for Structures</u> | | | | |
| Crushed Stone (for foundation) | √ | | | |
| Cement | √ | | | |
| Sand | √ | | | |
| Subbase Material | √ | | | |
| Crushed Stone (for aggregate of Concrete) | √ | | | |
| Embankment Material (exp. Laterite) | √ | | | |
| Ready Mixed Concrete | √ | | | |
| Crushed Stone (for Asphalt Mixture) | √ | | | |
| Asphalt Mixture | √ | | | |
| Re-bar ; D9 ~ D32 mm | √ | | | |
| Admixture (for Concrete) | √ | | | |
| RC Pipe ; D = 600 ~ 1,500 mm | √ | | | |
| Street Light | √ | | | |
| Sign Board | √ | | | |
| Traffic Light | √ | | | |
| Road Marker | √ | | | |
| Plywood | √ | | | |
| Timber (for Support) & Log (for Scaffold) | √ | | | |
| Fuel & Lubrication | √ | | | |

(2) Procurement Plan for Equipment

Procurement policies for equipment are as follows;

- ✓ Common type of equipment owned by local contractors will be hired or leased.
- ✓ All equipment required for the Project is available in Zambia.

Table 2.2-12 Procurement Plan for Major Equipments

| Equipment | Size | Lease / Purchase | Procured from | | | Reason of Procurement | Transport Route |
|------------------|-----------------------|------------------|---------------|-------|---------------|-----------------------|-----------------|
| | | | Zambia | Japan | Third Country | | |
| Backhoe | 0.28m ³ | Lease | √ | | | | |
| Backhoe | 0.50m ³ | Lease | √ | | | | |
| Backhoe | 0.80m ³ | Lease | √ | | | | |
| Bulldozer | 15t | Lease | √ | | | | |
| Bulldozer | 21t | Lease | √ | | | | |
| Motor Grader | 3.7m | Lease | √ | | | | |
| Road Roller | 10-12t | Lease | √ | | | | |
| Tire Roller | 8-20t | Lease | √ | | | | |
| Vibration Roller | 3-5t | Lease | √ | | | | |
| Wheel Loader | 2.4m ³ | Lease | √ | | | | |
| Wheel Loader | 3.1m ³ | Lease | √ | | | | |
| Asphalt Finisher | 2.4-4.5m | Lease | √ | | | | |
| Sprinkler Truck | 6.0kl | Lease | √ | | | | |
| Dump Truck | 10t | Lease | √ | | | | |
| Truck Crane | 20t | Lease | √ | | | | |
| Trailer Truck | 20t | Lease | √ | | | | |
| Trailer Truck | 35t | Lease | √ | | | | |
| Generator | 15kVA | Lease | √ | | | | |
| Generator | 35kVA | Lease | √ | | | | |
| Generator | 100kVA | Lease | √ | | | | |
| Generator | 250kVA | Lease | √ | | | | |
| Submersible Pump | 150mm | Lease | √ | | | | |
| Submersible Pump | 100mm | Lease | √ | | | | |
| Compressor | 5m ³ /min | Lease | √ | | | | |
| Concrete Mixer | 0.4-0.6m ³ | Lease | √ | | | | |

2.3 OBLIGATION OF RECIPIENT COUNTRY

GRZ will undertake the following measures when the Grant Aid by Government of Japan is extended to the Project;

- ✓ To provide data and information necessary for the Project
- ✓ To secure the land necessary for the execution of the Project, such as the land for construction works, stock yards, work shop, field offices, and others
- ✓ To provide soil and waste disposal areas
- ✓ To bear commissions to the bank in Japan for its banking service in connection with the Project
- ✓ To ensure prompt tax exemption, customs clearance, and effective measures for smooth inland transportations of materials and equipment
- ✓ To exempt Japanese nationals engaged in the Project from any customs duties for purchasing of products and services necessary for the Project
- ✓ To provide all necessary permission, licenses and certificates for the implementation of the Project (construction permission, traffic control permission, detour permission, earthwork permission etc.)
- ✓ Preparing RIA/RAP report and verification of EIA/RAP, and implementation of relocation of houses in ROW.
- ✓ To relocate all obstruction structures such as electric poles and wires, telephone poles and cables, street lights, water pipes, sewer pipes, etc. in the Project road.
- ✓ To arrange proper use and effective maintenance of the road after the completion of the project
- ✓ To coordinate and solve any issue related to the Project that may be raised from residents and/or third parties
- ✓ To bear all the expenses other than covered by the Japanese Grant Aid necessary for the Project
- ✓ To secure safety of the construction site in terms of public order

2.4 PROJECT OPERATION AND MAINTENANCE PLAN

2.4.1 Organization for Road Operation and Maintenance

Road operation and maintenance after the project is under the responsibility of civil engineering division under the operation department of LCC. The civil engineering division has 114 members, and undertakes cleaning work and daily maintenance work. Large repair works are implemented by outsourcing to local contractor through Road Development Agency (RDA). It is observed that existing roads in Lusaka are being maintained appropriately. Road repair works as maintenance work for the project is common. From above mentioned circumstances it is assumed that the current organization for road operation and maintenance can properly manage and maintain the project roads.

2.4.2 Road Maintenance Plan

Necessary road maintenance works are as follows:

Routine inspection and daily maintenance

- ✓ Routine inspection and cleaning of road surfaces, drainage facilities, supplemental facilities and etc.

Repair work

- ✓ Ceiling cracks, patching potholes, repainting road markings and repair for other damaged parts

2.4.3 Present Road Maintenance Conditions and Recommendations

It is observed that recent LCC's road maintenance works such as routine maintenance including cleaning and repair are being implemented adequately.

To achieve the project effect and maintain good conditions of the road facilities, it is important to manage and maintain road facilities adequately keeping good conditions of the pavements and other supplemental facilities for extending their life spans, so the following recommendations are proposed:

- ✓ To check facilities regularly and keep figuring out their conditions
- ✓ To clean facilities, especially drainage sufficiently
- ✓ To secure necessary budget for maintenance

2.5 PROJECT COST ESTIMATION

2.5.1 Initial Cost Estimation

(1) Cost borne by the Government of the Republic of Zambia

- ✓ Total Cost : 9.24 Million US\$ (Approximately 839.7 Million Japanese Yen)
- ✓ Resettlement Cost : 8.58 Million US\$ (Approx. 780.0 M. Yen)
- ✓ Utility Relocation Cost : 0.64 Million US\$ (Approx. 58.3 M. Yen)
- ✓ Bank Commission : 0.02 Million US\$ (Approx. 1.4 M. Yen)

The breakdown of the resettlement cost and the utility relocation cost is shown in Table 2.5-1 and Table 2.5-2 respectively.

(2) Conditions in Cost Estimate

- ✓ Time of Cost Estimation : September 2010
- ✓ Exchange Rate : 1 US Dollar = 90.90 Yen 1 ZMK=0.01818 Yen
- ✓ Construction Period : As shown in the Implementation Schedule
- ✓ Other Condition : Cost estimate is implemented in accordance with the guideline of Japan's Grant Aid

2.5.1 Operation and Maintenance Cost

LCC is in charge of the routine inspection and daily maintenance, and RDA is in charge of rehabilitation and repair work for the project road.

Annual maintenance cost necessary for the road is estimated at approximately US\$ 422,800. Details are shown in Table 2.5-3.

Table 2.5-1 Breakdown of Resettlement Cost

| | Cost (ZMK) | Cost (US\$) |
|---------------------------------------|----------------|-------------|
| Compensating and relocating | 42,274,093,350 | 8,454,819 |
| Demolition and disposal of structures | 655,000,000 | 131,000 |
| Total | 42,929,093,350 | 8,585,819 |

Table 2.5-2 Breakdown of Utility Relocation Cost

| Owner | Location /Items | Detail Items | Spec. /Notes | Quantities | Unit | US Dollar | | Japanese Yen (Converted) | Remarks |
|----------------------------|---------------------------------|--|--------------|------------|------|------------|------------|--------------------------|-----------------------------------|
| | | | | | | Unit Price | Amount | | |
| Power line and pole | | | | | | | | | |
| | Mini-Bypass | | | | | | | | |
| | | Removal of single pole | | 1 | Nos. | 69.49 | 69.49 | 6,317 | 11kVA, near Commuter railway |
| | | Installation of single pole | | 1 | Nos. | 362.36 | 362.36 | 32,939 | ditto |
| | | Removal of double pole | | 1 | Nos. | 139.01 | 139.01 | 12,636 | ditto |
| | | Installation of double pole | | 1 | Nos. | 802.26 | 802.26 | 72,925 | ditto |
| | | Removal of 11kVA overhead cable | | 200 | m | 7.90 | 1,580.00 | 143,622 | ditto, two cable lines |
| | | Installation of 11kVA overhead cable | | 200 | m | 73.38 | 14,676.00 | 1,334,048 | ditto, two cable lines |
| | | Removal of double pole | | 2 | Nos. | 139.01 | 278.02 | 25,272 | Inner Ring-Railway crossing |
| | | Installation of double pole | | 2 | Nos. | 802.26 | 1,604.52 | 145,851 | ditto |
| | | Removal of overhead 11kVA cable | | 100 | m | 7.90 | 790.00 | 71,811 | ditto, one cable line |
| | | Installation of overhead 11kVA cable | | 100 | m | 73.38 | 7,338.00 | 667,024 | ditto, one cable line |
| | Chibuwa Extension | | | | | | | | |
| | | Removal of double pole | | 2 | Nos. | 139.01 | 278.02 | 25,272 | Chibuwa-Inner Ring junction |
| | | Installation of double pole | | 2 | Nos. | 802.26 | 1,604.52 | 145,851 | ditto |
| | | Removal of overhead cable | | 100 | m | 7.90 | 790.00 | 71,811 | ditto |
| | | Installation of overhead cable | | 100 | m | 73.38 | 7,338.00 | 667,024 | ditto |
| | Yotam-Muleya | | | | | | | | |
| | | Installation of underground 33 kVA | | 100 | m | 126.10 | 12,610.00 | 1,146,249 | 11kVA, along Yotam-Muleya |
| | | Installation of underground 11 kVA | | 200 | m | 104.65 | 20,930.00 | 1,902,537 | ditto, two cable lines |
| | | Exploration excavation | | 5 | Nos. | 385.05 | 1,925.25 | 175,005 | along Yotam-Muleya |
| | Substation | | | | | | | | |
| | | Removal of double poles | | 4 | Nos. | 139.01 | 556.04 | 50,544 | 11kVA, near sub-station |
| | | Installation of double pole | | 4 | Nos. | 802.26 | 3,209.04 | 291,702 | ditto |
| | | Removal of overhead 11kVA cable | | 200 | m | 7.90 | 1,580.00 | 143,622 | ditto, one cable line |
| | | Installation of overhead 11kVA cable | | 200 | m | 73.38 | 14,676.00 | 1,334,048 | ditto |
| | | Installation of underground 11kVA cables | | 180 | m | 104.65 | 18,837.00 | 1,712,283 | ditto, six cable lines |
| | | Exploration excavation | | 12 | Nos. | 385.05 | 4,620.60 | 420,013 | near sub-station |
| | Water Distribution Station | | | | | | | | |
| | | Installation of underground 11 kVA | | 40 | m | 104.65 | 4,186.00 | 380,507 | from Water Distribution Station |
| | | Exploration excavation | | 2 | Nos. | 385.05 | 770.10 | 70,002 | near Water Distribution Station |
| | Access to LS-MFEZ | | | | | | | | |
| | | Removal of single pole | | 4 | Nos. | 69.49 | 277.96 | 25,267 | along Access to LS-MFEZ |
| | | Installation of single pole | | 4 | Nos. | 362.36 | 1,449.44 | 131,754 | ditto |
| | | Removal of 11kVA overhead cable | | 250 | m | 7.90 | 1,975.00 | 179,528 | ditto |
| | | Installation of 11kVA overhead cable | | 250 | m | 73.38 | 18,345.00 | 1,667,561 | ditto |
| | Ben-Bella Extension | | | | | | | | |
| | | Removal of single pole | | 2 | Nos. | 69.49 | 138.98 | 12,633 | under Power lines |
| | | Installation of single pole | | 2 | Nos. | 362.36 | 724.72 | 65,877 | ditto |
| | | Removal of overhead cable | | 150 | m | 7.90 | 1,185.00 | 107,717 | ditto |
| | | Installation of overhead cable | | 150 | m | 73.38 | 11,007.00 | 1,000,536 | ditto |
| | | Removal of single pole | | 7 | Nos. | 69.49 | 486.43 | 44,216 | Soccer ground to Los Angeles |
| | | Installation of single pole | | 7 | Nos. | 362.36 | 2,536.52 | 230,570 | ditto |
| | | Removal of overhead cable | | 400 | m | 7.90 | 3,160.00 | 287,244 | ditto |
| | | Installation of overhead cable | | 400 | m | 73.38 | 29,352.00 | 2,668,097 | ditto |
| | Sum of Power line and pole | | | | | | | | |
| | | Subtotal of works | | 1 | set | | 192,188.28 | 17,469,915 | |
| | | Overhead and supervising of ZESCO (30%) | | 1 | set | | 57,656.48 | 5,240,974 | |
| | | Total Amount of Power line and pole | | 1 | set | | 249,844.76 | 22,710,889 | |
| | Water pipe line | | | | | | | | |
| | Chibuwa | | | | | | | | |
| | | Installation of Water PVC dia.200 | | 100 | m | 62.22 | 6,222.00 | 565,580 | along Chibuwa |
| | | Exploration excavation | | 3 | Nos. | 385.05 | 1,155.15 | 105,003 | along Chibuwa |
| | Yotam Muleya | | | | | | | | |
| | | Installation of Water Steel pipe dia.200 | | 100 | m | 97.67 | 9,767.00 | 887,820 | along Yotam-Muleya |
| | | Installation of Water Steel pipe dia.450 | | 200 | m | 224.64 | 44,928.00 | 4,083,955 | ditto, two pipe lines |
| | | Exploration excavation | | 5 | Nos. | 385.05 | 1,925.25 | 175,005 | along Yotam-Muleya |
| | Substation | | | | | | | | |
| | | Installation of Water Steel pipe dia.200 | | 40 | m | 97.67 | 3,906.80 | 355,128 | at Y. Muleya-Power lines junction |
| | | Installation of Water Steel pipe dia.200 | | 40 | m | 97.67 | 3,906.80 | 355,128 | near Substation |
| | | Exploration excavation | | 4 | Nos. | 385.05 | 1,540.20 | 140,004 | near Substation |
| | Water Distribution Station | | | | | | | | |
| | | Installation of Water Steel pipe dia.914 | | 30 | m | 473.61 | 14,208.30 | 1,291,534 | near Water Distribution Station |
| | | Installation of Water Steel pipe dia.450 | | 30 | m | 224.64 | 6,739.20 | 612,593 | ditto |
| | | Exploration excavation | | 4 | Nos. | 385.05 | 1,540.20 | 140,004 | near Water Distribution Station |
| | Kasama | | | | | | | | |
| | | Installation of Water PVC dia.200 | | 20 | m | 62.22 | 1,244.40 | 113,116 | at Kasama-Inner Ring junction |
| | | Exploration excavation | | 2 | Nos. | 385.05 | 770.10 | 70,002 | at Kasama-Inner Ring junction |
| | Bem-Bella Extension | | | | | | | | |
| | | Installation of Water Steel Pipe dia.150 | | 900 | m | 51.02 | 45,918.00 | 4,173,946 | along Bem-Bella |
| | | Exploration excavation | | 20 | Nos. | 385.05 | 7,701.00 | 700,021 | along Bem-Bella |
| | Miscellaneous Pipes Adjustment | | | | | | | | |
| | | Installation of small diameter pipes | | 1 | set | | 100,000.00 | 9,090,000 | individual house connectings, etc |
| | Sum of Water pipe line | | | | | | | | |
| | | Subtotal of works | | 1 | set | | 251,472.40 | 22,858,841 | |
| | | Overhead and supervising of LWSC (30%) | | 1 | set | | 75,441.72 | 6,857,652 | |
| | | Total Amount of Water pipe line | | 1 | set | | 326,914.12 | 29,716,494 | |
| | Telephone cable | | | | | | | | |
| | Miscellaneous Cable Adjustment | | | | | | | | |
| | | Installation of small cable connectings | | 1 | set | | 50,000.00 | 4,545,000 | individual house connectings, etc |
| | Sum of Telephone cable | | | | | | | | |
| | | Subtotal of works | | 1 | set | | 50,000.00 | 4,545,000 | |
| | | Overhead and supervising of ZAMTEL (30%) | | 1 | set | | 15,000.00 | 1,363,500 | |
| | | Total Amount of Telephone cable | | 1 | set | | 65,000.00 | 5,908,500 | |
| | Grand Total of Zambia Side Cost | | | 1 | set | | 641,758.88 | 58,335,882 | |

Table 2.5-3 Maintenance Work and Annual Cost

Routine Inspection

(unit: US\$)

| Facility | Inspection Item | Frequency | No. of Staff | Equipment | Quantity | Unit Price | Cost |
|--|--|----------------------|--------------|---|-------------------|------------|-------|
| Pavement Shoulder/slope Road marking Drainage | Crack, deformation, pothole, etc. Rainwater erosion & collapse, etc. Injury, deformation, stain, splitting Damage and obstruction | 12 times a year | 2 persons | Scoop, hammer, sickle, barricade, pick-up truck | 48 man-day / year | 50 | 2,400 |
| | | 2 days for each time | | | 24 veh-day/ year | 300 | 7,200 |
| | | | | | | Total | 9,600 |

Daily Maintenance Work

(unit: US\$)

| Facility | Inspection Item | Frequency | No. of Staff | Equipment | Quantity | Unit Price | Cost |
|--|---|-------------------|---------------------|---|--------------------|------------------|--------|
| Cleaning Drainage Pavement Shoulder Road marking | Cleaning soil, obstacles Cleaning Cutting grass, cleaning Cleaning | 4 times a year | 5 persons/ party | Scoop, hammer, sickle, barricade, Pick-up truck | 400 man-day / year | 10 | 4,000 |
| | | 10 days each time | | | 1 veh/ party | 80 veh-day/ year | 300 |
| | | 2 parties | | | | | |
| | | | | | | Total | 28,000 |

336,000

Repair

(unit: US\$)

| Facility | Repair Item | Frequency | Unit Price (per Year, per km) | Road length |
|---|------------------------|--------------------|-------------------------------|-------------|
| Pavement Shoulder/slope Drainage Road attached facilities Structure | Patching pothole | 1 times / 5 years | 6,000 | 14.6 km |
| | Repairing damaged part | 1 times / 5 years | 2,000 | |
| | Repairing damaged part | 1 times / 2 years | 7,000 | |
| | Repairing damaged part | 1 times / 5 years | 4,000 | |
| | Repairing damaged part | 1 times / 10 years | 7,000 | |
| Total | | | 26,000 | 379,600 |

422,800

CHAPTER 3 PROJECT EVALUATION

3.1 RECOMMENDATIONS

3.1.1 Prior Condition for Project Implementation

“Obligation of Recipient Country” shown in 2.3 has to be reliably conducted by GRZ.

3.1.2 External Condition for Overall Plan of the Project

Adequate maintenance of the project roads by GRZ is crucial in order to develop and maintain the Project effects. And it is necessary for continuous mitigation of traffic congestion to improve roads and intersections appropriate to future traffic condition such as the extension of Inner Ring Road and the construction of Middle Ring Road.

Also it is desirable for improvement of life environment of the citizen and activation of local economy to promote the development of LS-MFEZ.

3.2 PROJECT EVALUATION

3.2.1 Adequacy

- ✓ Beneficiary of the Project reaches throughout the city, particularly in the south area of Lusaka. The total population of beneficiaries in Lusaka City is 1.391 Million people which is numerous.
- ✓ GRZ can operate and maintain the project roads by itself. Excessively special techniques are not necessary.
- ✓ This Project contributes to attain the goal of the Fifth National Development Plan 2006-2010 and the Road Sector Investment Program Phase II.
- ✓ With regards to environmental and social consideration, mitigation of traffic congestion on the road network in Lusaka City improves air pollution in the city.
- ✓ Because sanitary condition in the project area will be improved, epidemic of infectious diseases such as cholera will be reduced.
- ✓ Since the similar road improvement projects have been implemented successfully in Lusaka and the Japanese Grant Aid scheme is familiar to GRZ, it is expected that this Project will be implemented without difficulties.

3.2.2 Effectivity

(1) Quantitative Impact

- ✓ Vehicles going to the center of the city have to use Independence Ave. or Chilimbulu Rd. or Los Angeles Rd. only, however the new Project Road will be a detour route of these roads and can reduce traffic congestion in Lusaka.
- ✓ Travel time by using the Project road will be shorter than now as shown below.

| From Chilenje to Center of the Lusaka City (L=8.2km) | Before Implementation (Present) | After Implementation (Future) |
|--|---------------------------------|-------------------------------|
| | 35min. (Ave. speed; 14km/h) | 14min. (Ave. speed; 35km/h) |

| From Kanyama to Center of the Lusaka City (L=3.0km) | Before Implementation (Present) | After Implementation (Future) |
|---|---------------------------------|-------------------------------|
| | 12min. (Ave. speed; 15km/h) | 5min. (Ave. speed; 35km/h) |

- ✓ The Road which is impassable during rainy season at the present will be passable after the implementation of the Project.

(2) Qualitative Impact

- ✓ Living condition will be improved by improvement of convenience of public buses, increase of travel speed of cars, reduction of cost for commuting to offices, schools, hospitals and etc. Upon the completion of the Project, the road will be passable throughout the year. As the result, it will enhance the accessibility to the public services / facilities.
- ✓ Development of LS-MFEZ will be promoted by the Project because heavy vehicles will be able to access to LS-MFEZ by using the project roads.