PART 1 – ROADS
JUNE 2015

CONTENTS

1.1 INTRODUCTION

1.2 ROADS: GENERAL DETAILS
   See index in section.

1.3 ROADS: DESIGN
   See index in section.

1.4 COMPLETE STREETS: DESIGN (including BRT and NMT)
   See index in section.

1.5 ROADS: BRT (BUS RAPID TRANSIT)
   See index in section.

ACKNOWLEDGEMENTS

City of Tshwane:
Parts of drawings JRA-SD-RD-060 and JRA-SD-RD-140.

DISCLAIMER

The drawings in this document are intended as Standard Design Details. As such their principles should be adhered to.

However, designers are responsible for their own final designs undertaken on behalf of the Johannesburg Roads Agency SOC Limited, and as such they should amend or supplement the Standard Design Details according to specific design requirements.
1.1 INTRODUCTION

The Johannesburg Roads Agency’s “Roads & Stormwater Manual” comprises two volumes:

- Volume 1: Code of Procedure;
- Volume 2: Standard Design Details for Roads & Stormwater:
  - Part 1: Roads; and
  - Part 2: Stormwater.

In this part “Roadway Design” is divided into two sections, namely:

- Roads: General; and
- Roads: Design.

The “Roads: General” section deals with overarching details such as a road hierarchy matrix and various typical road cross sections which include cross-over references to the basic location of stormwater pipes within the different road cross sections and which is not repeated in Part 2: Stormwater. The “Roads: Design” section deals individually with many of the elements which may comprise parts of the detailed design of a section of roadway.

- Disabled roadway users include those pedestrians with sight impairment and/or physical mobility limitations.

The Standard Design Details have been grouped into four sets, namely:

- Section 1.2: Roads – General covering:
  - Road Classification;
  - Urban Access Management;
  - Basic Road Reserve Services Cross Sections.

- Section 1.3: Roads – Design covering the following categories of details:
  - Kerb Types;
  - Entrances;
  - Public Transport Laybys;
  - Guardrails;
  - Enclosed Areas;
  - Parking Details;
  - Traffic calming.

- Section 1.4: Roads – Complete Streets covering RISFSA road classes developed to future potential including provision for BRT and NMT:
  - Mobility & Access;
  - RISFSA Classes 2 to 6;
  - Pedestrian/Disabled Persons Crossings Details.

- Section 1.5: Roads – BRT incorporating existing BRT standard details prepared by Royal Haskoning DHV.

It is understood that the “Standard Design Details for Roads & Stormwater” will be used within JRA and will be made available to developers and their consultant designers for application within the Greater Johannesburg Metropolitan area.

The numbering of drawings within sections has been carried out in open ended groups to permit additional drawings to be inserted in future in the most appropriate group. For example, in section 1.3 Roads: Design, if an additional parking detail is required it can be inserted as JRA-SD-RD-113. The index sheet for section 1.3 will be amended accordingly with the drawing issue. The section index may run to extra pages if required.
## 1.2 - ROADS: GENERAL

<table>
<thead>
<tr>
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<th>DRAWING DESCRIPTION</th>
<th>REVISION NUMBER</th>
<th>REVISION DATE</th>
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<tr>
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<td>Road Hierarchy Matrix-Urban Functional Road Classification</td>
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<tr>
<td>JRA-SD-RG-011</td>
<td>Road Hierarchy Matrix-Urban Access Management Requirements and Features</td>
<td>300615</td>
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</tr>
<tr>
<td>JRA-SD-RG-020</td>
<td>Contractor’s Board</td>
<td>300615</td>
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</tr>
<tr>
<td>JRA-SD-RG-030</td>
<td>Services Cross Sections 10.5 m</td>
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<td>Services Cross Sections 13 m</td>
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<td>Typical Cross Section – Lightly Surfaced</td>
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<td>JRA-SD-RG-051</td>
<td>Typical Cross Section – Dust Palliative Road</td>
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### URBAN FUNCTIONAL ROAD CLASSIFICATION

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<th>Function</th>
<th>Description</th>
<th>Mobility</th>
<th>Traffic</th>
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<tr>
<td>Basic Function</td>
<td>Alternative Functional Descriptions</td>
<td>Determining Function</td>
<td>Class No. (U)</td>
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<tr>
<td>Mobility</td>
<td>Vehicle priority, vehicle only, long distance, through, high order, high speed, numbered, commercial, economic, strategic. Route, arterial, road or highway. Movement is dominant, through traffic is dominant, the majority of traffic does not originate or terminate in the immediate vicinity, the function of the road is to carry high volumes of traffic.</td>
<td></td>
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<tr>
<td></td>
<td>Access, mixed pedestrian and vehicle traffic; short distance, low order, low speed, community, street.</td>
<td>Mobility</td>
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<td>5b</td>
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<td></td>
<td></td>
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<td>6a</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>6b</td>
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1. This table is a direct representation of Table C: Urban Functional Road Classification as given in the Committee of Transport Officials (COTO) "TRH 26-SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL" Version 1.0, August 2012.
2. See also JRA-SD-RG-011 "U R B A N A C C E S S M A N A G E M E N T REQUIREMENTS AND FEATURES."
3. Note the inclusion of BRT trunk routes in the table "COMPLETE STREETS- MOBILITY AND ACCESS" UNDER CLASS 2 - DRAWING JRA-SD-RCS-010.
## URBAN ACCESS MANAGEMENT REQUIREMENTS AND FEATURES

<table>
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<tr>
<th>Basic Function</th>
<th>Description</th>
<th>Requirements</th>
<th>Typical Features (use appropriate content sensitive standards for design)</th>
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</thead>
<tbody>
<tr>
<td>Mobility</td>
<td>1 Principal arterial</td>
<td>Freeway, Yes (M10), 2.4 km (0.5 km - 3.6 km), Not allowed, no</td>
<td>Speed: 70 - 120, Intersection: Interchange (4-lane), Lane Width: 3.5 - 3.7 m, Road Reserve Width: 60 - 120 m (50 m), Public Transport Stops and Pedestrian Crossings: Not applicable, Yes, No, No</td>
</tr>
<tr>
<td></td>
<td>2 Main arterial</td>
<td>Highway, Yes (M15), 2.4 km (0.5 km - 3.6 km), Not allowed, no</td>
<td>Speed: 80, Coordinated traffic signal, Interchange: Yes, Lane Width: 3.5 - 3.7 m, Road Reserve Width: 56 - 62 m (40 m), Public Transport Stops and Pedestrian Crossings: Yes at intersections, OFFroad, Yes - winder by 1.2 m, No</td>
</tr>
<tr>
<td></td>
<td>3 Minor arterial</td>
<td>Main road, Yes (M10), 480 m (600 m - 2.0 km), Not allowed, no</td>
<td>Speed: 70, Coordinated traffic signal, Interchange: Yes, Lane Width: 3.5 - 3.7 m, Road Reserve Width: 25 - 40 m (50 m), Public Transport Stops and Pedestrian Crossings: Yes at intersections, Yes, Yes - winder by 1.2 m, No</td>
</tr>
</tbody>
</table>

### Access / Utility

<table>
<thead>
<tr>
<th>Access / Utility</th>
<th>Requirements</th>
<th>Typical Features (use appropriate content sensitive standards for design)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4a Collector, commercial</td>
<td>180 m, Yes (larger properties), no conditions</td>
<td>Speed: 80, Traffic signal, Prior to intersection, Lane Width: 20 - 25 m (35 m), Public Transport Stops and Pedestrian Crossings: Yes at intersections, Yes, Yes - winder by 1.2 m, Medium for pedestrians, curved roadway</td>
</tr>
<tr>
<td>4b Collector, residential</td>
<td>&gt; 180 m, Yes</td>
<td>Speed: 80, Resided, prior to priority, Lane Width: 19 - 20 m (20 m), Public Transport Stops and Pedestrian Crossings: Yes anywhere, Yes, Yes - winder by 1.2 m, Residential pedestrian crossing</td>
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<tr>
<td>5a Local street, commercial</td>
<td>&gt; 180 m, Yes</td>
<td>Speed: 40, Prior to intersection, Lane Width: 15 - 25 m (22 m), Public Transport Stops and Pedestrian Crossings: If applicable, anywhere, Normally not, Local roadway</td>
</tr>
<tr>
<td>5b Local street, residential</td>
<td>&gt; 180 m, Yes</td>
<td>Speed: 40, Prior to intersection, Lane Width: 10 - 16 m (14 m), Public Transport Stops and Pedestrian Crossings: If applicable, anywhere, Not normally, Pedestrian crossing, Local roadway</td>
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<tr>
<td>6a Walkway, non-motorized priority</td>
<td>&gt; 630 m, Yes</td>
<td>Speed: 30, Pedestrian priority, Right of way, Surfaced, Public Transport Stops and Pedestrian Crossings: If applicable, anywhere, Yes - winder by 1.2 m, Yes - winder by 1.2 m</td>
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<tr>
<td>6b Walkway, non-motorized only</td>
<td>&gt; 630 m, Yes</td>
<td>Speed: 30, Pedestrian priority, Right of way, Surfaced, Public Transport Stops and Pedestrian Crossings: If applicable, anywhere, Yes - winder by 1.2 m, Yes - winder by 1.2 m</td>
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### Notes
1. This table is a slightly modified version of Table E: URBAN ACCESS MANAGEMENT as given in the COMMITTEE OF TRANSPORT OFFICIALS (COTO) "TRH 26- SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL" Version 1.0, August 2012. Boxes outlined in blue have been amended to JRA REQUIREMENTS.
2. See also JRA-SD-RG-010 "URBAN FUNCTIONAL ROAD CLASSIFICATION".
3. Note the inclusions of BRT TRUNK ROUTES in the table "COMPLETE STREETS - MOBILITY AND ACCESS" UNDER CLASS 2 - DRAWING JRA-SD-RCS-010.

*Partial and marginal access at reduced spacing may be allowed to relieve congestion, reduce excessive travel distances, or remove the need for a full intersection.*
1. ALL SLEEVES TO BE INSTALLED TO 1000mm BACK OF KERBING.
2. TREES AND LAMP POLES ALTERNATE AT 15m
3. REFER TO JRA-SD-SW-021 FOR PIPE DETAILS.
4. TREES AND LAMP POLES ON THE SAME SIDE.
5. CONCRETE GUTTER SHOULD BE PLACED ON THE LOW SIDE OF THE ROAD. REFER TO JRA-SD-RD-011 FOR DETAILS.
6. WHERE A PAVED SIDEWALK IS REQUIRED, IT SHOULD BE PLACED ON THE SAME SIDE OF LAMP POLES AND THE UNDERLYING LAYER SHOULD BE STABILISED.
7. MOUNTABLE KERB FIGURE 8C REQUIRED.
8. ALL ROAD RESERVES TO BE 10.5m MINIMUM (SUBJECT TO JRA APPROVAL).
9. WHEN PRACTICAL, THE STORMWATER PIPE SHOULD NOT BE LOCATED UNDER THE ROAD.

LEGEND
EC - ELECTRICAL CABLE
SW - STORMWATER
WP - WATER PIPE
FH - FIRE HYDRANT
SP - SEWER PIPE
PT - TELKOM AND OTHER COMMUNICATIONS SERVICES.

NOTES
1. All sleeves to be installed to 1000mm back of kerb.
2. Trees and lamp poles alternate at 15m.
3. Refer to JRA-SD-SW-021 for pipe details.
4. Trees and lamp poles on the same side.
5. Concrete gutter should be placed on the low side of the road, refer to JRA-SD-RD-011 for details.
6. Where a paved sidewalk is required, it should be placed on same side as the lamp poles and the under-lying layer should be stabilised (see JRA-SD-RD-040.)
7. Mountable kerb figure 8c required (subject to JRA prior approval).
8. All road reserves to be 13m minimum.
9. When practical the stormwater pipe should not be located under the road.
1. ALL SLEEVES TO BE INSTALLED TO 1000mm BACK OF KERBING.
2. TREES AND LAMP POLES ALTERNATE AT 15m.
3. REFER TO JRA-SD-SW-021 FOR PIPE DETAILS.
4. TREES AND LAMP POLES ON THE SAME SIDE.
5. CONCRETE GUTTER SHOULD BE PLACED ON THE LOW SIDE OF THE ROAD. REFER TO JRA-SD-RD-011 FOR DETAILS.
6. WHERE A PAVED SIDEWALK IS REQUIRED, IT SHOULD BE PLACED ON THE SAME SIDE OF LAMP POLES AND THE UNDERLYING LAYER SHOULD BE STABILISED.
7. MOUNTABLE KERB FIGURE 8C REQUIRED SUBJECT TO JRA PRIOR APPROVAL.
8. ALL ROAD RESERVES TO BE 16m MINIMUM.
PLACING OF SERVICES WITHIN ROAD RESERVES (20m AND GREATER ROAD RESERVE FOR SINGLE CARRIAGeway)

NOTES
1. ALL CABLE DUCTS TO BE INSTALLED TO 1000mm BACK OF KERBING.
2. TREES AND LAMP POLES ALTERNATE AT 15m INTERVALS.
3. MINIATURE SUBSTATIONS ARE PLACED IN SERVITUDE ADJACENT TO ROAD RESERVE UNLESS PROBLEM THEN ON SIDEWALK ONLY IF WIDER THAN 4.5m.
4. REFER TO JRA-SD-SW-021 FOR PIPE DETAILS.
5. TREES AND LAMP POLES ON THE SAME SIDE.
6. CONCRETE GUTTER ON THE LOW SIDE OF THE ROAD.
7. WHERE A PAVED SIDEWALK IS REQUIRED, IT SHOULD BE PLACED ON THE SAME SIDE OF LAMP POLES AND THE UNDERLYING LAYER SHOULD BE STABILISED.
8. SURFACING OF CYCLE LANE SHOULD BE PREMIX ON 150mm SUBBASE(S).
9. IF PAVED SIDEWALK IS SHARED AS A CYCLE LANE, SIDEWALK SHOULD BE HALF WIDTH PAVED WITH INTERLOCKING BLOCKS AND HALF WIDTH PREMIX.

LEGEND
EC - ELECTRICAL CABLE
SW - STORMWATER
WP - WATER PIPE
FH - FIRE HYDRANT
SP - SEWER PIPE
PT - TELKOM AND OTHER COMMUNICATIONS SERVICES
1. All cable ducts to be installed to 1000mm back of kerbing.
2. Trees and lamp poles alternate at 15m intervals.
3. Miniature substations are placed in servitude adjacent to road reserve unless problem then on sidewalk only if wider than 4.5m.
4. Refer to JRA-SD-SW-021 for pipe details.
5. Kerbs, fig 3 barrier and channel.
6. Surfacing of cycle lane should be premix on 150mm stabilised subbase to 93% Mod AASHTO.
7. Where a paved sidewalk is required the underlyng layer should be stabilised.
8. If paved sidewalk is shared as a cycle lane, sidewalk should be half width paved with interlocking blocks and half width premix.
1. Sidewalks in cut and fill to have a min. of 2m width sloping towards the road surface at 2% gradient.
2. All side fill to be compacted to a minimum of 90% of MOD. AASHTO density.
3. All materials & construction to conform to the requirements of SANS 1200 DM.
4. Sub soil drains must be placed where necessary to control high water tables.
1. Sidewalks in cut and fill to have a min. of 2m width sloping towards the road surface at 2% gradient.
2. All side fill to be compacted to a minimum of 90% of MOD. AASHTO density.
3. All materials & construction to conform to the requirements of SANS 1200 DM.
4. Concrete drains must be placed where slopes exceed 2%.
5. Gradients steeper than 5% require special design by engineer to prevent undue erosion.
## 1.3 - ROADS: DESIGN

<table>
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<tr>
<th>DRAWING NUMBER</th>
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<td>Standard Type Kerbs - 2</td>
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<td>JRA-SD-RD-020</td>
<td>Kerb Transitions</td>
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<td>JRA-SD-RD-030</td>
<td>Vehicle Entrance Slab</td>
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<td>JRA-SD-RD-031</td>
<td>Mid to High Order Priority Access</td>
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<td>JRA-SD-RD-040</td>
<td>Typical Minibus Taxi Layby</td>
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<td>Typical Bus Layby</td>
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<td>Guardrails - 3</td>
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<td>Handrails, Balustrades, Bollards</td>
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<td>Standard Turning Circles</td>
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<td>Hammerhead Turning Circle</td>
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<td>Parking Details – 90° Parking</td>
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<td>Parking Details – 60° &amp; 40° Angle Parking with Interlocking</td>
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<td>Traffic Calming/Speed Hump Detail</td>
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<td>Typical Raised Pedestrian Crossing</td>
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<td>Raised pedestrian Crossings – Disabled Friendly</td>
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<td>Other Traffic Calming Options</td>
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<td>Typical Layout Mini Circle</td>
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<td>JRA-SD-RD-140</td>
<td>Walkways and Cycle Tracks</td>
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</table>
1. MOUNTABLE KERBS TO BE FIG. 8C UNLESS OTHERWISE SPECIFIED.
2. ALL KER SHAPES AND STRENGTH TO COMPLY WITH SANS 927.
3. CONCRETE HAUNCHING TO BE PLACED AT BACK OF KERBS AT ALL JOINTS ON STRAIGHTS.
4. EXCLUDING THE USE OF CAST-IN-SITU CONCRETE KERBS IN EXISTING DEVELOPED SUBURBS AND TOWNSHIPS.
PRECAST MOUNTABLE KERB (FIG. 8B OR 8C)

1. MINIMUM CONCRETE STRENGTH OF ALL CAST IN-SITU KERBS TO BE CLASS 25/19.
2. CONCRETE GUTTER TO HAVE A STEEL TROWEL FINISH.

NOTE: BACKFILL TO BE STABILIZED AND COMPACTED IN 100mm LAYERS TO 93% MOD. AASHTO DENSITY.
MOUNTABLE KERB AND GUTTER TO BARRIER KERB AND GUTTER
MOUNTABLE KERB TO BARRIER KERB
MOUNTABLE KERB TO SEMI-MOUNTABLE KERB
MOUNTABLE KERB AND GUTTER TO BARRIER KERBAND GUTTER

200x200 IN-SITU CONCRETE HAUNCHING BEHIND PRECAST KERBS (SEE DWG. JRA-SD-R012)

NOTES
1. MINIMUM CONCRETE STRENGTH OF ALL CAST IN-SITU KERBS TO BE CLASS 25/19.
2. CONCRETE GUTTER TO HAVE A STEEL TROWEL FINISH.
3. TRANSITIONS NEED TO BE STEEL TROWEL FINISHED.

JOHANNESBURG ROADS AGENCY (PTY) LTD
CITY OF JOHANNESBURG

DRAWING NUMBER: JRA-SD-RD-020
AMENDMENT NUMBER: TYPICAL KERB TRANSITIONS

SCALE AS SHOWN: NTS
DATE: 27/11/2014
ROADS: DESIGN
DRAWN BY: JRA
DESIGNED BY: JRA
DRAWING CHECKED BY: JRA
CHECKED BY: JRA
DRAWING APPROVED BY: JRA

AMENDMENTS
No. DATE APPROVED DESCRIPTION

LEGEND

ROADS: DESIGN
Johannesburg Roads Agency (Pty) Ltd  
City of Johannesburg  

**Typical Vehicle Entrance Slab**

- *In Situ Concrete Class 25/19*  
- *Existing Kerb*  
- *Existing Gutter*  
- *150mm Road Kerb Lay Flat*  
- *Existing Road*  
- *Backfill to be compacted in 100mm layers to 93% Mod AASHTO Density*  
- *Bedding, Concrete Class 25/19*  
- *Mines Sand*  

**Plan**

1. **Existing Gutter**  
2. **Existing Kerb**  
3. **Road**  
4. **150mm Road Kerb Lay Flat**  
5. **Existing Kerb**  
6. **Blocks**  
7. **Side Walk**  

**Notes**

- **Vehicle Entrance (Kerb Opening)**
- **JRA-SD RD-030**
- **Drawing Sub-set**
- **Roads: Design**
1. MID TO HIGH ORDER PROPERTY ACCESS FOR TYPICAL PROPERTY TYPES AS FOLLOWS (BUT NOT LIMITED TO):
   1.1. RESIDENTIAL DEVELOPMENT
   1.2. SMALL SHOPPING CENTER
   1.3. TEACHING INSTITUTION
   1.4. INDUSTRIAL DEVELOPMENT
2. TURNING RADIUS ARE INDICATIVE ONLY AND SHOULD SUIT THE TURNING CIRCLE OF THE REQUIRED DESIGN VEHICLE.
3. THE PAVEMENT STRUCTURE IS TO SUIT ANTICIPATED TRAFFIC LOADING.
4. ROAD MARKINGS TO SUIT APPLICATION ON SITE.
5. THE MINIMUM LONGITUDINAL GRADE IN THE ACCESS LANE TO BE 0.5%.

** D3 - WIDTH OF PROPERTY ACCESS DECELERATION / STORAGE LANE. MINIMUM = 2.5m
** D4 - WIDTH OF PROPERTY ACCESS DEPENDENT ON ACCESS CONTROL FACILITY WIDTH
*** R1 - MINIMUM OF 8.0m BUT SHALL BE ADJUSTED TO SUIT THE TURNING CIRCLES OF THE REQUIRED DESIGN VEHICLE

D1 - LENGTH GOVERNED BY TAPER RATE
   REFER TO TABLE 8.2 IN UTG 1

D2 - DETERMINED BY STORAGE LENGTH
   REQUIRED TO PROPERTY ACCESS CONTROL POINT

D3* MAX 5%

CHANGE IN REGULAR CROSSFALL BETWEEN TRAVEL LANES

CHANGE IN REVERSE CROSSFALL BETWEEN TRAVEL LANES

SECTION A-A

SECTION A-A
1. SHOULD NO CHANNEL EXIST A SANS 927 FIGURE 3 KERB SHALL BE LAID ON ITS BACK TO FORM THE CHANNEL.
2. NO KERB INLET ALLOWED WITHIN LAY-BY.
3. WHERE FIGURE 3 KERBING IS TO BE USED, 1M LENGTHS WILL BE REQUIRED ON STRAIGHT PORTIONS AND 0.3m LENGTHS ON TRANSITIONAL CURVES WITH Radii < 15m.
4. SUBJECT TO FORMALISATION OF MINI-BUS ROUTES TACTILE PAVING, A SHELTER AND MINI-BUS STOP SIGN R326 MAY BE PROVIDED IN THE MANNER SHOWN ON JRA-SD-RD-041.

SANS 927 FIG.12 OR 5 KERB AS SPECIFIED
SANS 927 FIG. 3 KERB

60mm INTERLOCKING BLOCKS
20mm SAND
150mm SUB-BASE (C4) STABILISED AND COMPACTED TO 93% MOD AASHTO DENSITY

2500
2000

CAST IN-SITU EDGE BEAM OR CHANNEL OR FIG. 3 KERB LAID FLAT
EXISTING ROAD

TYPICAL CROSS SECTION

EDGING KERB, SANS 927 FIG. 12 OR 5 AS SPECIFIED
SABS 927, FIG. 3 KERB

FOOTWAY
LAYER-BY

TYPICAL MINIBUS-TAXI LAY-BY

SABS 927 FIG.12 OR 5 KERB AS SPECIFIED
SABS 927 FIG. 3 KERB
1. The bus layby detail is appropriate for REA VAYA feeder services and other Johannesburg bus services operating on RISFSA Class 3, 4 or 5 category roads.

2. In the context of NMT provision, however, the installation of a bus shelter severely restricts the sidewalk available to passing pedestrians and cyclists. It is therefore recommended that if a new RISFSA Class 3, 4 or 5 category road is being planned for NMT and public transport the road reserve widths should be increased. See Table RD041-1.

3. If a bus layby is required for multiple stops the length should be increased by 15m per stop. Bus stop signs R325 should show the service provider logo on the sign and routes on a supplementary plate.

4. For further details on the design and construction of bus bays in urban areas with jointed/segmented concrete pavement refer to PCI Road Note 3.
GUARDRAILS ARE REQUIRED IN THE FOLLOWING CASES:
1.1. WHERE WATER NEXT TO THE RD FORMATION IS DEEPER THAN 1.5m.
1.2. AT ALL BRIDGES ON SIDE OF ROAD.
1.3. ON THE OUTSIDE OF CURVES WITH RADII LESS THAN 300m WITHOUT RECOVERY AREAS.
1.4. WHERE OBSTRUCTIONS ARE LESS THAN 1m FROM THE SHOULDER BREAKPOINT.
1.5. WHERE AN OBSTRUCTION APPEARS TO BE MORE DANGEROUS THAN A GUARDRAIL WOULD BE.
1.6. IN THE CASE OF EMBANKMENTS / FILLS, THE WARRANTS DIAGRAM WILL APPLY.

BEFORE GUARDRAILS ARE ERECTED APPROVAL MUST BE OBTAINED FROM THE EXECUTIVE DIRECTOR: ROADS AND STORMWATER.

SPECIFICATIONS:
3.1. BOLT : HIGH TENSILE STEEL 16mm
3.2. WASHER : STEEL SPRING 10mm THICK.
3.3. CREOSOTE SHALL COMPLY WITH SANS 538 OR SANS 539.
3.4. SPACER BLOCK : GUM OR PINE TREATED WITH CREOSOTE ACCORDING TO ANY METHOD IN SANS 1999.
3.5. POLE : 150mm TO 230mm GUM OR PINE TREATED WITH CREOSOTE ACCORDING TO ANY METHOD IN SANS 1999.

ALL GUARDRAILS SHALL BE GALVANIZED AS SPECIFIED (NOT PAINTED).

ALL STRUCTURAL STEEL, INCLUDING TUBES, SHALL BE GALVANIZED IN ACCORDANCE WITH THE REQUIREMENTS OF SANS 32 EN 10240 FOR TYPE A1 OR B1 ARTICLES AS APPLICABLE (OR LATEST).

ALSO REFER TO SECTION 611 OF THE STANDARD SPECIFICATION FOR MUNICIPAL CIVIL ENGINEERING WORKS, 3rd EDITION, 2005.

NMT FACILITIES SHALL BE PROVIDED IN TERMS OF RISFSA ROAD CLASSIFICATION (SEE RCS-010 AND RCS-011). IF A CYCLIST FACILITY IS "OFF-ROAD" SURFACING SHALL BE AN APPROPRIATE QUALITY PREMIX NOT INTERLOCKING BRICKS.
1. GUARDRAILS ARE REQUIRED IN THE FOLLOWING CASES:
1.1. WHERE WATER NEXT TO THE ROAD FORMATION IS DEEPER THAN 1.5m.
1.2. AT ALL BRIDGES ON SIDE OF ROAD.
1.3. ON THE OUTSIDE OF CURVES WITH RADIUS LESS THAN 300m WITHOUT RECOVERY AREAS.
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4. ALSO REFER TO SECTION 611 OF THE STANDARD SPECIFICATION FOR MUNICIPAL CIVIL ENGINEERING WORKS, 3rd EDITION, 2005.

5. THE USE OF A CRASH CUSHION SHALL BE SUBJECT TO ENGINEERING ASSESSMENT AND DESIGN. SPECIFIC CUSHION TYPE SHOULD BE BASED ON JRA REQUIREMENTS.
1. GUARDRAILS ARE REQUIRED IN THE FOLLOWING CASES:
   1.1. WHERE WATER NEXT TO THE RD FORMATION IS DEEPER THAN 1.5m.
   1.2. AT ALL BRIDGES ON SIDE OF ROAD.
   1.3. ON THE OUTSIDE OF CURVES WITH RADIUS LESS THAN 300m WITHOUT RECOVERY AREAS.
   1.4. WHERE OBSTRUCTIONS ARE LESS THAN 1m FROM THE SHOULDER BREAKPOINT.
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4. ALSO REFER TO SECTION 611 OF THE STANDARD SPECIFICATION FOR MUNICIPAL CIVIL ENGINEERING WORKS, 3rd EDITION, 2005.
AMENDMENT NUMBER: AMENDMENTS

HANDRAILS/BALUSTRADE AND BOLLARDS

SECTION A-A
150 CONCRETE BOLLARD (SMOOTH FINISH)

SECTION B-B
250 CONCRETE BOLLARD (SMOOTH OR EXPOSED AGGREGATE FINISH)

SECTION C-C

NOTE: THE HANDRAIL SHALL NOT BE FIXED TO BRICK WORK

NOTE: HANDRAIL SHALL BE GALVANIZED FINISHING SEE NOTE 3.6

BASE PLATE DETAIL FOR STEEL HANDRAIL

NOTE: TO BE USED ON ROAD RESERVE 500mm FROM KERB.

NOTE: ALL TIMBER TO BE CRESOTED / CCA TREATED TO SANS 638 OR 593.

NOTE: EXCAVATION TO BE BACKFILLED WITH 1:1 CEMENT : SOIL MIXTURE MIXED AT OPTIMUM MOISTURE CONTENT AND THOROUGHLY RAMMED IN LAYERS NOT EXCEEDING 100mm IN COMPACTED THICKNESS.

TYPICAL POST AND RAIL TIMBER BALUSTRADE

NOTE: FOR STEEL BALUSTRADE SEE NOTE 2.6

NOTE: CONCRETE BALUSTRADE TO BE FIXED TO BRICK WORK.

NOTE: EXPOSED CONCRETE BACKFILL AROUND BOLLARD SPACE TO BE DETERMINED BY PAVING PROFILE.

NOTE: REFLECTIVE TAPE MUST BE FIXED IN HOLES FOR M12 BOLTS.

NOTE: BOLT SHANKS SHALL BE DEGREASED BEFORE EMBEDDING IN CONCRETE.

NOTE: EACH BOLT MUST BE ABLE TO RESIST A FORCE IN DIRECT TENSION OF NOT LESS THAN 15kN.

NOTE: FIXING DEVICES MUST BE DESIGNED TO WITHSTAND 10kN PER SOCKET.

NOTE: CONCRETE DECK OR CONCRETE WORK TO BE IN CONCRETE.

NOTE: HANDRAILS/BALUSTRADE AND BOLLARDS TO BE COVERED WITH A 5mm THICK COVER PLATE WELDED TO THE HOLLOW SECTION.

NOTE: ALL OPEN ENDS OF HOLLOW SECTIONS TO BE COVERED WITH A 5mm THICK COVER PLATE WELDED TO THE HOLLOW SECTION.

NOTE: THE HANDRAIL SHALL NOT BE FIXED TO BRICK WORK

NOTE: HANDRAIL SHALL BE GALVANIZED FINISHING SEE NOTE 3.6

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NOTE: TO BE USED ON ROAD RESERVE 500mm FROM KERB.

NOTE: ALL TIMBER TO BE CRESOTED / CCA TREATED TO SANS 638 OR 593.

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NOTE: HANDRAILS/BALUSTRADE AND BOLLARDS TO BE COVERED WITH A 5mm THICK COVER PLATE WELDED TO THE HOLLOW SECTION.
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<tr>
<td>32m</td>
<td>-</td>
</tr>
<tr>
<td>40m</td>
<td>-</td>
</tr>
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</table>

**ROADS: DESIGN**

**STANDARD SPLAYS**
**DEFLECTION ANGLE = \( \Delta^\circ \)**

**MINIMUM B = 3.5 EXCEPT AT INTERSECTIONS**

\[ \Delta^\circ = \frac{X}{\sqrt{(R-B) - (R-A)}} \]

### TABLE OF SPLAY DIMENSIONS "X"

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<tr>
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<td>49 22</td>
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**NOTES**

1. WHEN CONSIDERING SPLAY REQUIREMENTS DESIGNERS SHOULD DETERMINE THE ULTIMATE SPATIAL NEEDS FOR THE PROVISION OF EFFECTIVE NMT FACILITIES.
2. REFER TO COMPLETE STREETS DETAILS IN THE CONTEXT OF RISFSA ROAD CLASSIFICATION REQUIREMENTS.
SYMMETRICAL TURNING CIRCLE

OFFSET TURNING CIRCLE
RESIDENTIAL AREAS
DETAIL - 080 - 1

OFFSET TURNING CIRCLE
COMMERCIAL / INDUSTRIAL AREAS
DETAIL - 080 - 2

NOTES

RESIDENTIAL AREAS:
1. USE 25m RESERVES FOR SHORT CULS-DE-SAC.
2. "HAMMER HEAD" TURNING BAYS (T, Y OR L) ARE NOT FAVOURED AS THE REVERSING MANOEUVRE IS HAZARDOUS FOR TRUCKS, BUT THEIR USE IN CERTAIN CIRCUMSTANCES MAY BE PERMITTED (SEE JRA-SD-RD-081).
3. NO PARKING PERMITTED WITHIN THE TURNING CIRCLE.

COMMERCIAL / INDUSTRIAL AREAS:
1. OFFSET TURNING CIRCLE IS NORMALLY PREFERABLE.
2. DESIRABLE MAX. CROSSFALL ON SURFACE OF 4%.
3. TURNING CIRCLE (BETWEEN STRAIGHTS) TO HAVE BARRIER KERBS WITH 0.2m WIDE GUTTER.
4. ALL ROAD WORKS TO COMPLY WITH SANS 1200 SERIES.
5. AN ISLAND MAY BE CONSTRUCTED IN THE CIRCLE AND LANDSCAPED IF DESIRED. REFER TO JRA-SD-RD-081.
1. Minimum of 2m sidewalk must be provided.
2. All road works to comply to SANS 1200.
3. Kerb Type 8C is to be used throughout.
4. Offset turning is preferable.
5. Desirable max. cross-fall on surface 4%.
6. Dimensions vary according to reserve width.
7. All road dimensions are edge of "black top".
8. "Hammer head" turning bays (T, Y or L) are not favoured as the reversing manoeuvre is hazardous for trucks, but their use in certain circumstances may be permitted.

**NOTES**

**DETAIL - 081 - 1**

**DETAIL - 081 - 2**

**DETAIL - 081 - 3**

**DETAIL - 081 - 4**

Preferred Offset Turning Circle

**CROSS SECTION A-A**

Through Turning Circle showing max. slopes with crossfall

**Johannesburg Roads Agency (Pty) Ltd**

**City of Johannesburg**

**Roads: Design**

**Hammer Head Turning Circles**

**Legend**

**Amendments**

<table>
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<th>No.</th>
<th>Date</th>
<th>Approved</th>
<th>Description</th>
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**Date:** 27/11/2014

**Drawing Number:** JRA-SD RD-081

**Ext:**

**Amendment Number:**
NOTES

A. GENERAL

1. Any application deviating from these standards will be subject to approval by the Johannesburg Roads Agency.

2. Professional Investigations required to accompany application for road closures for safety and security purposes:
   (i) Traffic Impact Study addressing the effect on all adjoining primary and secondary roads.
   (ii) Drainage investigation required if any permanent structure affects the existing roadway width.
   (iii) Engineering design for road layout if roadway is restricted by centre island for gate support.

3. After approval for the road closures for safety and security purposes has been granted, application must be made for a wayleave to be issued by the Johannesburg Roads Agency, prior to proceeding with the installation of the various structures.

   NO WORK SHALL BE UNDERTAKEN WITHOUT AN APPROVED WAYLEAVE (SEE VOLUME I CODE OF PROCEDURE).

B. STANDARD REQUIREMENTS CLOSURE TYPE 1: ACCESS CONTROL, ENTRY INTO SECURE AREA

1. All access gates shall be manned. No remote access control shall be erected.

2. Gateway:
   a. Distance from intersecting road.
      (i) Distance to be determined by Traffic Impact Study.
      (ii) Minimum 10m.
   b. Width of thoroughway:
      (i) Roadway less than 7.4m (See Detail 1 - JRA-SD-RD-091).
         (1) Minimum - width of roadway.
         (2) Permanent structure to be outside roadway behind the kerbline.
      (ii) Roadway width greater than 7.4m (See Detail 2 - JRA-SD-RD-091).
         (1) Minimum road reserve 10.5m.
         (2) Centre support for boom to be provided and subject to special application. Engineering design will be required (See 2(iii) above).

3. Barrier:
   The barrier shall be constructed of steel palisade or other approved material to a maximum height of 2.4m. Barbed or razor wire shall not be used.

4. Pedestrian access:
   Applications must ensure that pedestrian, bicycle and wheelchair access is available at all times. The access configuration shall also be disabled user friendly, but shall require cyclists to dismount through the access.

C. STANDARD REQUIREMENTS CLOSURE TYPE 2a, 2b AND 3: PERMANENTLY CLOSED GATE OR PERIOD CLOSURE

1. A gateway with closing leaves shall be provided in all cases. No permanent structure shall be erected within the roadway save the provisions of (4) below.

2. Locking may only be done by using a chain and padlock. The gates may be kept in position by a solid bolt.

3. The gates are to open towards the inside of the closed area unless otherwise detailed on application.

4. Closure Type 1, gateway, barrier and pedestrian access requirements and dimensions shall apply.

D. ROAD SIGNS AND OTHER SIGNS

1. No advertising shall be allowed.

2. All road signs shall be subject to the conditions of the SADC Road Traffic Signs Manual.

3. Description of Information Type Sign:
   All materials to comply with SANS 1519 standards.
   Border radius: 57mm
   Border colour: Black semi-matt
   Border width: 14mm
   Panel background: Yellow class: Retroreflective - Class 1
   Text Mod: Text-B Mod
   Text height: 100mm
   Text colour: Black semi-matt
   Distance from left edge: 42mm min
   Distance between text: 42mm

4. Mounting position and height of prohibition and warning signs:
   a. The distance from the ground level to the bottom of sign must be between 1.8m and 2.1m.
   b. The distance from the back of kerb must be between 0.3m and 0.5m.
   c. The applicant shall ensure that signs are located in positions according to the recommended guidelines and are visible to the travelling public taking note of obstructions on the road edge.
**NOTE 1**
ALL BOOMS TO BE WRAPPED IN ALTERNATING RED AND WHITE CLASS 1 RETRO-REFLECTIVE MATERIAL.

**NOTE 2**
ALL SIGNS AND BOOMS TO BE MAINTAINED IN EFFECTIVE VISIBLE CONDITION FOR NIGHT-TIME USE.
1. The salient criteria for a pedestrian/wheelchair friendly opening in a palisade fence are illustrated opposite. Specific materials are not given to allow some freedom in design and aesthetics.

2. Applicants for area closure should submit specific details with their application.
1. The salient criteria for a pedestrian/wheelchair friendly opening in a palisade fence are illustrated opposite. Specific materials are not given to allow some freedom in design and aesthetics.

2. Applicants for area closure should submit specific details with their application.
PROPOSED SOUTH AFRICAN DESIGN VEHICLE
FROM THE "RED BOOK"

** TURNING CIRCLE KERB-TO-KERB = 2 X R1
** TURNING CIRCLE WALL-TO-WALL = 2 X R

MINIMUM TURNING RADII**

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<td>OVERALL LENGTH</td>
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</tr>
<tr>
<td>W</td>
<td>OVERALL WIDTH</td>
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</tr>
<tr>
<td>B</td>
<td>WHEEL BASE</td>
<td>2.86m</td>
</tr>
<tr>
<td>Or</td>
<td>FRONT OVERHANG</td>
<td>0.75m</td>
</tr>
<tr>
<td>Or</td>
<td>REAR OVERHANG</td>
<td>1.20m</td>
</tr>
<tr>
<td>h</td>
<td>OVERALL HEIGHT</td>
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INSIDE REAR WHEEL 3.10m
OUTSIDE FRONT WHEEL 5.85m
OUTSIDE POINT, FRONT BUMPER 6.20m

ZONE OF PROPOSED PARKING DIMENSIONS

SUMMARY OF PROPOSED PARKING DIMENSIONS

<table>
<thead>
<tr>
<th>PARKING ANGLE Ø</th>
<th>BAY WIDTH BW (m)</th>
<th>BAY DEPTH BD (m)</th>
<th>AISLE WIDTH AW (m)</th>
<th>MODULE WIDTH MW (m)</th>
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BASIC PROPOSED STANDARD

SUMMARY OF PROPOSED PARKING DIMENSIONS
NO INTERLOCKING

CITY OF JOHANNESBURG
JOHANNESBURG ROADS AGENCY (PTY) LTD

PARKING DETAILS (SHEET 1 OF 3)
### SUMMARY OF PROPOSED PARKING DIMENSIONS

<table>
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<tr>
<th>PARKING ANGLE $\theta$</th>
<th>BAY WIDTH BW (m)</th>
<th>BAY DEPTH BDn * (m)</th>
<th>BAY DEPTH BDi ** (m)</th>
<th>INTERLOCK OVERLAP Oi (m)</th>
<th>AISLE WIDTH AW (m)</th>
<th>MODULE WIDTH MW1 *** (m)</th>
<th>MODULE WIDTH MW2 **** (m)</th>
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* BDn - BAY DEPTH FOR NON INTERLOCKING
** BDi - BAY DEPTH FOR INTERLOCKING
*** MW1 - MODULE WIDTH WITH BAYS ON ONE SIDE INTERLOCKING
**** MW2 - MODULE WIDTH WITH BAYS ON TWO SIDES INTERLOCKING

NOT INTERLOCKING

INTERLOCKING PATTERNS
INTERLOCKING AT CENTER STRIP

INTERLOCKING AT EDGE

INTERLOCKING NOSE TO NOSE PARKING BAYS

INTERLOCKING 45° DIAGONAL PARKING BAYS

INTERLOCKING AT CENTER STRIP

INTERLOCKING AT EDGE

INTERLOCKING AT CENTER STRIP

INTERLOCKING AT EDGE

INTERLOCKING AT CENTER STRIP

INTERLOCKING AT EDGE

INTERLOCKING AT CENTER STRIP

INTERLOCKING AT EDGE

ANGULAR PARKING
TWO WAY

ANGULAR PARKING
ONE WAY
PARALLEL PARKING
ON STREET PARKING
2.5m
0.9m
100mm Ø DOT
6.5m
PARALLEL PARKING
PAIRED PARKING
2.2m
2.0m
5.0m
KERB
PAVEMENT
100
Y
100
W
PARALLEL PARKING
RM16 PARALLEL PARKING PARKING BAY
FOR DISABLED PERSONS 7.0m (Min)
THIS TYPE OF PARKING
SHOULD PREFERABLY BE
LOCATED AT ONE END
OF A BLOCK OF BAYS
2.5m
2.0m
5.0m
KERB
PAVEMENT
100
Y
100
W
RM17.3
ANGLED PARKING
PARKING BAYS FOR DISABLED PERSONS RM16
PERPENDICULAR PARKING
PARKING BAYS FOR DISABLED PERSONS RM16
* = OPTIONAL SIGNS AND MARKING
JRA-SD
RD-112
PARKING DETAILS (SHEET 3 OF 3)
**SPEED HUMP LAYOUT**

**SECTION B-B**

- **NO PROVISION OF DISABLED ACCESS**

**SECTION A-A 1**

- **DAY 1 CONSTRUCTION**
  - CONTINUOUSLY GRADED COARSE ASPHALT WITH 4.5% BITUMEN

**SECTION A-A 2**

- **DAY 2 CONSTRUCTION**
  - 25mm CONTINUOUSLY GRADED MEDIUM ASPHALT WITH 5.5% BITUMEN

**LEGEND**

- **NOTES**

**CITY OF JOHANNESBURG**

**JOHANNESBURG ROADS AGENCY (PTY) LTD**

 Drawing Sub-set **ROADS: DESIGN**

 RAISED PEDESTRIAN CROSSING (SHEET 1 OF 2)

**SCALE AS SHOWN: NTS**

**DATE: 04/12/2014**

**DRAWING NUMBER**

JRA-SD RD-121

**AMENDMENT NUMBER:**
RAISED PEDESTRIAN CROSSING SUGGESTED EDGE TREATMENT / PEDESTRIAN ACCESS OPTIONS

1
PEDESTRIAN RAMPS SUITABLE FOR DISABLED ACCESS

2
RAISED PEDESTRIAN CROSSING FROM TOP OF KERB TO TOP OF KERB AT A CREST IN THE ROADWAY

3
RAISED PEDESTRIAN CROSSING FROM TOP OF KERB TO TOP OF KERB WITH PROVISION OF STORMWATER INLET ON UPSTREAM SIDE OF THE PEDESTRIAN CROSSING. THIS WILL NEED TO TIE INTO AN EXISTING PIPED STORMWATER SYSTEM.

LEGEND

NOTES
1. The examples shown have one representative. In the main, they are techniques which can be used as part of a retro-fit traffic calming/complete streets programme.

2. Detail 122-1 shows two one-way streets converted with a raised table junction with related NMT facilities.

3. Detail 122-2 indicates a decorative street width reduction. Detail 122-5 shows a similar technique where alternating one-way operation & traffic calming with cycle lanes has been introduced.

4. Detail 122-3 shows bulb-outs to reduce traffic speeds. NMT facilities utilise these bulb-outs for improved safety.

5. Detail 122-4 illustrates how a wide street can be constrained by a marked median to reduce speeds. Such an arrangement may suit a local or collector bus route.
TYPICAL APPROACH ISLAND

MINI-CIRCLE ROAD SIGNS

NOTES

1. ALL ROAD SIGNS AND MARKINGS TO BE MANUFACTURED ACCORDING TO THE SPECIFICATIONS OF SADC-RTSM, MAY 2012.

2. IT IS RECOMMENDED THAT THE MAXIMUM DIAMETER OF A MINI-CIRCLE, CONTROLLED BY SIGN R2.2 BE 6m.

3. IF A LARGER CIRCLE IS REQUIRED IT SHOULD BE TREATED AS A TRAFFIC CIRCLE OR ROUNDABOUT. IN THIS CASE CONTROL IS BY R2 YIELD SIGN AND THE ISLAND IS IDENTIFIED BY R137 ROUNDABOUT SIGNS, ON THE CIRCLE, FACING ALL APPROACHES.

4. TRAFFIC CIRCLE WARNING SIGN W201 MAY BE USED IN ADVANCE OF BOTH MINI-CIRCLES AND ROUNDABOUTS.
TYPICAL LONGITUDINAL SECTION OF WALKWAY / CYCLE TRACK

1. GENERAL
   - THE WIDTH OF ALL WALKWAYS AND CYCLE TRACKS SHALL BE ACCORDING TO TABLE A UNLESS OTHERWISE INDICATED ON THE DETAIL DRAWINGS OR SPECIFIED BY THE ENGINEER.

2. POLES OR BOLLARDS
   - IF REQUIRED REGULATORY TRAFFIC SIGNS R110 TO R115, APPROPRIATE TO THE APPLICATION, SHALL BE ERECTED AT POSITIONS INDICATED ON THE DETAIL DRAWINGS OR SPECIFIED BY THE ENGINEER.

3. SIDEWALKS AND CYCLE TRACKS
   - SIDEWALKS AND CYCLE TRACKS SHALL BE DESIGNED FOR A MAXIMUM CROSS FALL OF 2% (1:50).

4. CYCLE TRACKS
   - CYCLE TRACKS MAY BE SHARED WITH WALKWAYS.

5. ROAD HYDRAULIC DESIGN
   - THE ROAD HYDRAULIC DESIGN OF THE ROAD RESERVE SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SANS 6224.

6. ROAD RESERVE
   - ROAD RESERVE shall be at the average slope of the Natural Ground Level.

7. ERF BOUNDARY
   - ERF BOUNDARY lines shall be at the Natural Ground Level.

8. OUTSIDE EDGE
   - OUTSIDE EDGE shall extend 2000 mm (6.5') from the Kerb Rampe for Cycle Track.

9. OUTSIDE EDGE - VEGETATION
   - OUTSIDE EDGE - VEGETATION is 3m (9') for 60km/h lanes and 2m (6.5') for 30km/h lanes.

10. OUTSIDE EDGE - BARRIER, RAISED KERB
    - OUTSIDE EDGE - BARRIER, RAISED KERB shall be 1.80m (5.9') for 60km/h lanes and 1.50m (4.9') for 30km/h lanes.

11. OUTSIDE EDGE - TRAFFIC SIGNS
    - OUTSIDE EDGE - TRAFFIC SIGNS shall be placed at positions indicated on the detail drawings or specified by the Engineer.

12. POLIE OR BOLLARDS
    - POLE OR BOLLARDS shall be placed at positions indicated on the detail drawings or specified by the Engineer.

13. BUFFER STRIPS
    - BUFFER STRIPS shall be 1.50m (4.9') for 60km/h lanes and 1.25m (4.1') for 30km/h lanes.

14. PEDESTRIANS
    - PEDESTRIANS shall be provided with a minimum of 3000 mm (9.8') from the Kerb Rampe for Cycle Track.

15. CYCLISTS
    - CYCLISTS shall be provided with a minimum of 3000 mm (9.8') from the Kerb Rampe for Cycle Track.

16. ROAD RESERVE TRANSITION
    - ROAD RESERVE TRANSITION shall be provided with approved joint forming material at 6m intervals maximum.

17. ROAD RESERVE TRANSITION TO N.G.L.
    - ROAD RESERVE TRANSITION TO N.G.L. shall be provided with approved joint forming material at 6m intervals maximum.

18. ROAD RESERVE TRANSITION TO ERF BOUNDARY
    - ROAD RESERVE TRANSITION TO ERF BOUNDARY shall be provided with approved joint forming material at 6m intervals maximum.

19. ROAD RESERVE TRANSITION TO KERB RAMPE
    - ROAD RESERVE TRANSITION TO KERB RAMPE shall be provided with approved joint forming material at 6m intervals maximum.

20. ROAD RESERVE TRANSITION TO CURB
    - ROAD RESERVE TRANSITION TO CURB shall be provided with approved joint forming material at 6m intervals maximum.

21. ROAD RESERVE TRANSITION TO GRAVEL Base
    - ROAD RESERVE TRANSITION TO GRAVEL Base shall be provided with approved joint forming material at 6m intervals maximum.

22. ROAD RESERVE TRANSITION TO ROAD RESERVE
    - ROAD RESERVE TRANSITION TO ROAD RESERVE shall be provided with approved joint forming material at 6m intervals maximum.

23. ROAD RESERVE TRANSITION TO ROAD RESERVE
    - ROAD RESERVE TRANSITION TO ROAD RESERVE shall be provided with approved joint forming material at 6m intervals maximum.

24. ROAD RESERVE TRANSITION TO ROAD RESERVE
    - ROAD RESERVE TRANSITION TO ROAD RESERVE shall be provided with approved joint forming material at 6m intervals maximum.
### 1.4 - COMPLETE STREETS: DESIGN

<table>
<thead>
<tr>
<th>DRAWING NUMBER</th>
<th>DRAWING DESCRIPTION</th>
<th>REVISION NUMBER</th>
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<tbody>
<tr>
<td>JRA-SD - RCS-010</td>
<td>Mobility &amp; Access</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD - RCS-011</td>
<td>Summary of Design Elements (CoJ – Complete Streets)</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD - RCS-020</td>
<td>RISFSA Class 2: Arterial/Regional Distributor – Typical Details</td>
<td>300615</td>
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<tr>
<td>JRA-SD - RCS-021</td>
<td>RISFSA Class 2: Arterial/Regional Distributor – Typical Intersection with BRT Station</td>
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<tr>
<td>JRA-SD - RCS-022</td>
<td>RISFSA Class 2: Arterial/Regional Distributor – Typical Station Details – Mid-Block</td>
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<td>JRA-SD - RCS-023</td>
<td>RISFSA Class 2: Arterial/Regional Distributor – 62 m Cross Section</td>
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<tr>
<td>JRA-SD - RCS-024</td>
<td>RISFSA Class 2: Arterial/Regional Distributor – 62 m Cross Section – Additional Details</td>
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</tr>
<tr>
<td>JRA-SD - RCS-025</td>
<td>RISFSA Class 2: Arterial/Regional Distributor – Road Marking Details for BRT Lanes</td>
<td>300615</td>
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<tr>
<td>JRA-SD - RCS-030</td>
<td>RISFSA Class 3: District Distributor – Typical Details</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD - RCS-031</td>
<td>RISFSA Class 3: District Distributor – Typical Details with BRT</td>
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</tr>
<tr>
<td>JRA-SD - RCS-040</td>
<td>RISFSA Class 4: CBD/Activity Street/Local Distributor/Boulevard – Typical Details</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD - RCS-041</td>
<td>RISFSA Class 4: Industrial Road – Typical Details</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD - RCS-050</td>
<td>RISFSA Class 5: Residential Collector – Typical Details</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD - RCS-051</td>
<td>RISFSA Class 5: Residential Streets – Typical Details</td>
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</tr>
<tr>
<td>JRA-SD - RCS-060</td>
<td>RISFSA Class 6: NMT/Greenway/Multi-User Path – Typical Details</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD – RCS-070</td>
<td>Basic Pedestrian/Disabled Persons Crossing Ramp Types</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD – RCS-072</td>
<td>Typical Tactile Pedestrian Crossing – Signalised Intersection – Combination Ramping</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD – RCS-073</td>
<td>Typical Tactile Pedestrian Crossing – Signalised Intersection – Parallel Ramping</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD – RCS-074</td>
<td>Typical Tactile Pedestrian/Disabled Persons Ramp – Typical Section</td>
<td>300615</td>
</tr>
</tbody>
</table>
1. The left portion of this table is a direct representation of the table on pages 10 and 11 of the City of Johannesburg "Complete Streets" guideline with cyclist facility classes added - this info. also from "Complete Streets" guideline.

2. The right portion is a rotated version of the RISFSA Mobility and Access diagram.

3. Refer as necessary to Drawing JRA-SD-RG-010 "Urban Functional Road Classification" and Drawing JRA-SD-RG-011 "Urban Access Management Requirements and Features".

### Complete Streets: Mobility & Access

<table>
<thead>
<tr>
<th>RISFSA Classification</th>
<th>Complete Streets Considerations</th>
<th>New Typology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>The primary function is high mobility. Various complete streets principles are applicable primarily in ensuring adequate provision of grade separation crossovers for pedestrians and cyclists.</td>
<td>Arctic Fwy/ Primary Distributor</td>
</tr>
<tr>
<td>Class 2</td>
<td>This class of road represents major arterials and has historically catered for most of motorised travel. In the context of complete streets, the following needs to be taken into account: These routes are the most direct linkages between zones and work centres, hence cycling space given to use these routes. Consider promoting Class II cycling facilities. Some of these roads have low income residential settlements adjacent to them, hence special attention needs to be paid to pedestrian crossing facilities and access to public transport. Where these needs form part of the Strategic Public Transport Network, public transport routes need to be given priority.</td>
<td>Regional Distributor</td>
</tr>
<tr>
<td>Class 3</td>
<td>Special care needs to be taken in selecting recreation vehicles and pedestrians. Class III cycling facilities are appropriate.</td>
<td>Bikeway/Dedicated</td>
</tr>
<tr>
<td>Class 4</td>
<td>Due to high numbers of pedestrians along these roads, Class III cycling facilities are more appropriate. In CBD areas: Dedicated parking is important; hence special care needs to be taken when providing cycling facilities adjacent to on-street parking. Also, Class III is not appropriate due to high numbers of pedestrians and the absence of other activities in the area. In industrial areas: KVBs need to accommodate heavy vehicle turning movements, hence the presence of long crossing paths at intersections may not be available.</td>
<td>Industrial Road</td>
</tr>
<tr>
<td>Class 5</td>
<td>Speed reduction measures should be used to keep speeds within acceptable limits for the safe movement of pedestrians and cyclists.</td>
<td>Residential Street</td>
</tr>
<tr>
<td>Class 6</td>
<td>Motorised vehicles and permitted short-term emergency vehicles are in an emergency situation.</td>
<td>Emergency Vehicle</td>
</tr>
</tbody>
</table>

**Bicyclist Facilities:**

- Class I: Bicycle Roads: Have an independent alignment in a bicycle reserve. 3 m in width; 0.5 m lateral clearance; at least 2 m horizontal clearance; typically grade separated intersections.
- Class II: Bicycle Ways: Are provided with a road reserve, either on or adjacent to the carriageway. 1.5 m in width; 0.5 m lateral clearance; at least 0.5 m horizontal clearance; typically grade separated intersections.
- Class III: Bicycle Lanes: Are specifically marked on the roadway pavement; usually unpaved. Preferred with 0.5 m travel speed limit (optional to 50 km/h); allow for vehicle and bicyclist to filter.
- Class IV: Bicycle Routes: Are accommodated on the roadway and indicated by road signs. Max. vehicle speed 50 km/h; 0.5 m clear zone; preferred route width 0.5 m preferred.
1. THIS TABLE IS A REARRANGED VERSION TABLE 6.1 "SUMMARY OF DESIGN ELEMENTS" FROM CoJ "COMPLETE STREETS".

2. THE REARRANGEMENTS HAVE BEEN MADE TO CORRELATE WITH THE RISFSA ROAD CLASSIFICATION, AND INCLUDE:
   - ADDITION OF COLUMN 1- RISFSA ROAD CLASS;
   - LOCATING "BRT TRUNK ROUTE" LINE IN CLASS 2;
   - HIGHLIGHTING OF "(Small) CBD ROAD/ACTIVITY STREET" WHICH IS NOT CLASSIFIED BY RISFSA/COTO.

3. IN ROAD CYCLE LANES ARE OPTIONAL IN CLASS 2, 3 AND 4 ROAD RESERVES SUBJECT TO A PRIOR SAFETY AUDIT.

### Requirements vs. Typical Features

<table>
<thead>
<tr>
<th>RISFSA Road Class</th>
<th>Complete Streets Typology</th>
<th>Intersection Spacing</th>
<th>Access to Property</th>
<th>Parking</th>
<th>Speed km/h</th>
<th>Intersection Control</th>
<th>Typical Cross Section</th>
<th>Roadway Lane Width</th>
<th>Road Reserve Width</th>
<th>Public Transport Stops &amp; Ped. Xing</th>
<th>Pedestrian Footways (constructed)</th>
<th>Cycle Lanes</th>
<th>Traffic Calming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Freeway/Primary Distributor</td>
<td>2.4 km (1.6 km to 3.6 km)</td>
<td>Not allowed</td>
<td>No</td>
<td>100 – 120</td>
<td>Interchange</td>
<td>4/6/8 lane freeway</td>
<td>3.3 m – 3.7 m lanes</td>
<td>60 m – 120 m (60 m)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Class 2</td>
<td>Arterial/Regional Distributor</td>
<td>800 m (+/- 15%)</td>
<td>Not allowed</td>
<td>No</td>
<td>80</td>
<td>Coordinated traffic signal/interchange</td>
<td>4/6 lane divided, kerbed</td>
<td>3.3 m – 3.6 m lanes</td>
<td>38 m – 62 m (40 m)</td>
<td>Yes at intersections</td>
<td>Off road</td>
<td>Yes, in road or on verge</td>
<td>No</td>
</tr>
<tr>
<td>Class 3</td>
<td>BRT Trunk Route</td>
<td>500 m</td>
<td>Not allowed</td>
<td>No</td>
<td>70</td>
<td>Coordinated traffic signal with bus priority roundabout</td>
<td>2 lane BRT right of way in median, 2-4 mixed traffic lanes</td>
<td>3.3 m – 3.5 m lanes</td>
<td>30 m – 40 m</td>
<td>Only at BRT stations</td>
<td>Yes</td>
<td>Yes, in road or on verge</td>
<td>No</td>
</tr>
<tr>
<td>Class 4</td>
<td>District Distributor</td>
<td>600 m (+/- 20%)</td>
<td>Not allowed</td>
<td>No</td>
<td>70</td>
<td>Coordinated traffic signal roundabout</td>
<td>4 lane divided or undivided, kerbed</td>
<td>3.3 m – 3.5 m lanes</td>
<td>25 m – 40 m (30 m)</td>
<td>Yes at intersections</td>
<td>Yes</td>
<td>Yes, in road or on verge</td>
<td>No</td>
</tr>
<tr>
<td>(Main) CBD Road/Activity Street/Boulevard</td>
<td>&gt;150 m</td>
<td>Yes (larger properties)</td>
<td>Yes if conditions allow</td>
<td>60</td>
<td>Traffic signal, roundabout, or priority</td>
<td>4 lane, median at ped x-ing, roundabout, CBD one-way</td>
<td>3.0 m – 3.5 m lanes</td>
<td>20 m – 40 m (25 m)</td>
<td>Yes at intersections, or mid-block</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, in road or on verge</td>
<td>Yes, median for peds, curved roadway</td>
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<tr>
<td>Class 5</td>
<td>Residential Collector</td>
<td>&gt;150 m</td>
<td>Yes</td>
<td>Yes, if appropriate</td>
<td>50</td>
<td>Roundabout, mini-circle or priority</td>
<td>2 - 3 lane undivided</td>
<td>6 m – 9 m</td>
<td>75 – 93 m</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, in road or on verge</td>
<td>Yes, in road or on verge</td>
</tr>
<tr>
<td>Residential Street</td>
<td>Yes</td>
<td>Yes on verge</td>
<td>40</td>
<td>Mini-circle, priority or none</td>
<td>1 - 2 lane mountable kerbs</td>
<td>3 m – 5.5 m</td>
<td>10 m – 16 m (14 m)</td>
<td>Not applicable anywhere</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, but should not be necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 6</td>
<td>NMT Route Multi-use Pathway</td>
<td>500 m (maximum)</td>
<td>Yes</td>
<td>No vehicles</td>
<td>15</td>
<td>Yes</td>
<td>3 m – 5 m</td>
<td>6 m</td>
<td>If applicable anywhere</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Notes
1. **SUMMARY OF DESIGN ELEMENTS** FROM CoJ "COMPLETE STREETS".
2. THE REARRANGEMENTS HAVE BEEN MADE TO CORRELATE WITH THE RISFSA ROAD CLASSIFICATION, AND INCLUDE:
   - ADDITION OF COLUMN 1- RISFSA ROAD CLASS;
   - LOCATING "BRT TRUNK ROUTE" LINE IN CLASS 2;
   - HIGHLIGHTING OF "(Small) CBD ROAD/ACTIVITY STREET" WHICH IS NOT CLASSIFIED BY RISFSA/COTO.
3. IN ROAD CYCLE LANES ARE OPTIONAL IN CLASS 2, 3 AND 4 ROAD RESERVES SUBJECT TO A PRIOR SAFETY AUDIT.

### Amendments

<table>
<thead>
<tr>
<th>No</th>
<th>DATE</th>
<th>APPROVED</th>
<th>DESCRIPTION</th>
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</table>

### Scale

- SCALE AS SHOWN: NTS
- DATE: 04/02/2015
- DRAWING NUMBER: JRA-SD RCS-011
- EXTN.: |

### City of Johannesburg

- ROADS: COMPLETE STREETS
- SUMMARIZED OF DESIGN ELEMENTS

### Legend

- **JRA-SD RCS-011**
- **CITY OF JOHANNESBURG**
- **JOHANNESBURG ROADS AGENCY (PTY) LTD**

### Drawing Sub-set

- **DRAWN BY:**
- **DRAWING CHECKED BY:**
- **DRAWING APPROVED BY:**
- **DESIGNED BY:**
- **STRUCTURAL DESIGN BY:**
- **CHECKED BY:**
- **DRAWING APPROVED BY:**

### Amendment Number

- **AMENDMENTS NUMBER:**
MIN. INTERSECTION SPACING 800m (±15%) - NO ACCESS BETWEEN INTERSECIONS

GREEN ZONES

1 WAY CYCLE TRACK

INSET X

GM4-1(W)

GM4-1(W)

GM1 STANDARD W

GM1 REDUCED W

RM3(W)

RM4-2(W)

GM4-1(Y)

GM4-1(W)

GREEN ZONES

PEDESTRIAN SIDEWALK

TYPICAL 40m ROAD RESERVE - URBAN

INSET X

1

2

NON MOTORISED TRANSPORT

TYPICAL ROAD SIGNS

TACTILE RAMPS
(SEE DWGS IN JRA-SD-RCS 070 SERIES)

NOTES

1. ROAD MARKING DETAILS ARE REPRESENTATIVE BUT NOTIONAL. REFER TO SADC-RTSM VOLUMES 1, 2 & 4 FOR FULLY DIMENSIONED DETAILS.
2. REFER TO JRA-SD- RCS-021 FOR DETAILS WITH BRT.
3. THIS ROAD CLASS MAY BE PROVIDED IN ROAD RESERVES UP TO 62m IN WIDTH. SUBJECT TO PLANNED REQUIREMENTS ANY EXTRA WIDTH MAY BE DISTRIBUTED BY PROVIDING SHOULDERS (1.8m MIN. TO 3.0m MAX) WITHIN GREEN ZONES AND CENTRAL MEDIAN.
4. "SHOULDERS" INDICATED ARE NOMINAL CLEARANCES FOR ROAD MARKINGS RM4.1 AND RM4.2.
5. TRAFFIC SIGNALS OMITTED FOR CLARITY (REFER TO JRA-SD-RCS-070 SERIES).
6. ROAD SIGN OPTIONS RELATED TO NMT FACILITY USE ONLY ARE SHOWN.
7. CYCLE PATHS ARE ONE-WAY FACILITIES.

TYPICAL DETAILS

1. ROAD MARKING DETAILS ARE REPRESENTATIVE BUT NOTIONAL. REFER TO SADC-RTSM VOLUMES 1, 2 & 4 FOR FULLY DIMENSIONED DETAILS.

2. REFER TO JRA-SD- RCS-021 FOR DETAILS WITH BRT.

3. THIS ROAD CLASS MAY BE PROVIDED IN ROAD RESERVES UP TO 62m IN WIDTH. SUBJECT TO PLANNED REQUIREMENTS ANY EXTRA WIDTH MAY BE DISTRIBUTED BY PROVIDING SHOULDERS (1.8m MIN. TO 3.0m MAX) WITHIN GREEN ZONES AND CENTRAL MEDIAN.

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6. ROAD SIGN OPTIONS RELATED TO NMT FACILITY USE ONLY ARE SHOWN.

7. CYCLE PATHS ARE ONE-WAY FACILITIES.
CROSS SECTION A-A
TYPICAL 62m ROAD RESERVE WITH BRT STATION AT JUNCTION

1. A DETAIL OF THIS NATURE SHOULD BE CONSIDERED AS ILLUSTRATIVE. ACTUAL LANE CONFIGURATIONS WILL BE DICTATED BY PUBLIC TRANSPORT POLICY AND GENERAL TRAFFIC DEMAND RESULTING FROM THE IMPLEMENTATION OF SUCH POLICY. REFER ALSO TO DWGS JRA-SD-RCS-022 AND 023.

2. THE FULL DEVELOPMENT OF A RISFSA CLASS 2 ROAD IN A 62m RESERVE IS SHOWN.

3. REMOVABLE ISLANDS ARE SHOWN ON THE LINE OF FUTURE BRT BY-PASS LANES. THESE MAY ALTERNATIVELY BE PROVIDED AS PAINTED ISLANDS.

4. DRAWING JRA-SD-RCS-022 SHOWS A TYPICAL MID-BLOCK BRT STATION WITH BY-PASS LANES (50m ROAD RESERVE).

5. IF BRT BY-PASS LANES ARE PROVIDED IN FUTURE THE GENERAL TRAFFIC RIGHT TURN ONLY LANES WILL MOVE TO THE LEFT. THESE LANES MAY THEN REQUIRE BLOCKING ISLANDS ON THE FAR SIDE OF THE JUNCTION. SUCH TREATMENT WILL RESULT IN A SUBSEQUENT LANESHIFT TO THE RIGHT BEYOND THE JUNCTION.

NOTES

1. GENERAL TRAFFIC
2. LEFT ONLY LANE (SHOULDER)
3. PEDESTRIANS
4. CYCLISTS-2-WAY

REMovable ISLANDS are shown ON THE Line Of Future BRT BY-PASS LANes. thesE MAY ALternativELy be proviDeD as paInted ISLandS.

4. DRAWING JRA-SD-RCS-022 SHOWS A TYPICAL MID-BLOCK BRT STATION WITH BY-PASS LANES (50m ROAD RESERVE).

5. If BRT BY-PASS LANES are provided in future the general traffic right turn only LANES will move to the LEFT. these LANES may then require blocking ISLANDS ON the far side of the junction. such treatment will result in a subsequent LANESHIFT TO the right beyond the junction.

NOTES

1. GENERAL TRAFFIC
2. LEFT ONLY LANE (SHOULDER)
3. PEDESTRIANS
4. CYCLISTS-2-WAY

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RISFSA CLASS 2 WITH BRT AND NMT PROVISION

1. SEE ALSO NOTES ON DWGS JRA-SD-RCS-021 AND 023.
2. R348-BUS LANE; RIGHT RESERVATION SIGN OR R354- AUTHORIZED PASSENGER TRANSPORT VEHICLE LANE. RIGHT RESERVATION (REA VAYA) SIGN SHOULD BE PLACED ON BOTH SIDES OF THE MEDIAN ISLAND AT APPROX. 250m INTERVALS.
3. NMT SIGNS 4-6 (R114-R112) OR (R115-R113) MOUNTED BACK-TO-BACK APPROPRIATE TO PEDESTRIAN/CYCLE USE.
4. THIS DETAIL ILLUSTRATES A MID-BLOCK BRT STATION WITH ADDITIONAL BY-PASS LANES. THIS CONFIGURATION REQUIRES A WIDE MEDIAN FOR A STANDARD STATION PLUS BY-PASS LANES.
5. THE DECISION TO PROVIDE THIS LANE CONFIGURATION WILL BE BASED ON GENERAL TRAFFIC DEMAND, BRT ROUTE SCHEDULING AND PUBLIC TRANSPORT POLICY.
6. FOR TACTILE PAVEMENT TREATMENT REFER TO JRA-SD-RCS-070 SERIES.
7. THIS DETAIL REPRESENTS A MINIMUM CROSS SECTION FOR A 6 LANE CARRIAGEWAY IN A 50m ROAD RESERVE WITH MINIMAL SHOULDER. SEE DRAWINGS JRA-SD-RCS-021 &023 FOR DETAILS WITH FULL SHOULDERS.
8. FOR BRT MARKINGS REFER TO JRA-SD-RCS-024.

RISFSA CLASS 2: ARTERIAL/REGIONAL DISTRICT DISTRIBUTOR

TYPICAL INTERSECTION WITH BRT STATION

TACTILE PAVING RAMP DOWN IN DIRECTION OF ARROW - MAX.1 IN 15
REPRESENTS THE WORD BUS IN YELLOW (RM17.2).
OPTIONAL BICYCLE STORAGE.
PROPERTY BOUNDARIES

TYPICAL NMT TRAFFIC SIGNS

REA VAYA TRAFFIC SIGNS

NOTES

INDEX

DESIGN

DRAWING NUMBER JRA-SD-RCS-022
DRAWING CHECKED BY:
DRAWING APPROVED BY:
DRAWN BY:
DESIGNED BY:
STRUCTURAL DESIGN BY:
DRAWING CHECKED BY:
DRAWN BY:
DESIGNED BY:

AMENDMENTS

No. DATE APPROVED DESCRIPTION

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DATE: 11/05/2015
SCALE AS SHOWN: NTS

CITY OF JOHANNESBURG
JOHANNESBURG ROADS AGENCY (PTY) LTD
DRAWING NUMBER EXTN.

RISFSA CLASS 2: ARTERIAL/REGIONAL DISTRICT DISTRIBUTOR

TYPICAL INTERSECTION WITH BRT STATION

AMENDMENT NUMBER
TYPICAL CROSS-SECTION BETWEEN JUNCTIONS FOR 62m ROAD RESERVE. COMPARE TO 50m CROSS-SECTION JRA-SD-RCS022.

SEE DETAIL -023-3 FOR ATYPICAL TRANSITION BETWEEN MID-BLOCK AND STATION SECTIONS.

PARABOLIC REVERSE CURVE APPROPRIATE FOR BRT DESIGN SPEED.

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SEE DETAIL -023-3 FOR ATYPICAL TRANSITION BETWEEN MID-BLOCK AND STATION SECTIONS.

PARABOLIC REVERSE CURVE APPROPRIATE FOR BRT DESIGN SPEED.
1. DETAIL 024-1 ILLUSTRATES A TRANSITION FROM A SINGLE BRT LANE NEXT TO AN 11m MEDIAN ISLAND TO A SINGLE BRT LANE SERVING A STATION ON A 5.5m MEDIAN ISLAND.

2. DETAIL 024-2 ILLUSTRATES A TRANSITION FROM A SINGLE BRT LANE NEXT TO AN 11m MEDIAN ISLAND TO A DUAL LANE BRT FACILITY SERVING A STATION ON A 5.5m MEDIAN ISLAND WITH BY-PASS LANE CAPACITY. BRT BUSES WILL POTENTIALLY WEAVE BETWEEN LANES ON THE DUAL LANE STATION SECTION.

3. DETAIL 024-2 ALSO ILLUSTRATES HOW GENERAL TRAFFIC LANES NEED TO MOVE TO THE LEFT, TAKING UP THE SHOULDER SPACE, IN ORDER TO GENERATE A GENERAL TRAFFIC RIGHT TURN LANE AT THE APPROACHING JUNCTION.

TEMPORARY PAINTED OR RAISED ISLANDS

REFER TO DRAWING JRA-SD-RCS-021

REFER TO DRAWING JRA-SD-RCS-023

REFER TO DRAWING JRA-SD-RCS-025 FOR DETAILS OF BUS LANE ROAD MARKINGS

DETAIL - 024-1
TRANSITION APPROACH TO SINGLE LANE STATION

DETAIL - 024-2
TRANSITION APPROACH TO TWO LANE SECTION/STATION
1. DETAIL 024-1 REFERS TO A SINGLE LANE BRT SERVICE.
2. DETAIL 024-2 SHOWS AN ENLARGEMENT OF THE PRINCIPLE ROAD MARKINGS USED IN JOHANNESBURG BRT LANES.
3. DETAIL 024-3 REFERS TO A 2 LANE, HIGH ORDER, BRT CONFIGURATION.
4. DETAIL 024-4 SHOWS A SITUATION WHERE A 2ND LANED IS ADDED, EITHER LOCALLY AT A STATION, OR PRIMARILY TO INCREASE RUNNING CAPACITY OVER SOME DISTANCE.
5. THE LEGAL SIGNIFICANCE OF ENFORCEMENT OF BUS LANE PROVIDED FOR BY THE USE OF REGULATORY SIGNS R302, R303, R353 OR OTHER VARIANTS- AND EXCLUSIVE USE LANE LINE MARKING RM9 AND RM17.2 "BUS" WORD MARKING.
6. THE ADDITIONAL USE OF YELLOW RUMBLE BARS TO THE LEFT OF REGULATORY LINE RM9 AND RM17.2 "BUS" WORD MARKING ARE TACTILE/VISUAL BUT NON-REGULATORY TRAFFIC CONTROL DEVICES EMPLOYED ON JOHANNESBURG BRT LANES.
7. REGULATORY SIGNS SUCH AS R302, R303, R353 OR R354 ARE REGULATORY "BUS" WORD MARKING RM17.2 ARE REQUIRED AT A MAXIMUM OF 250m INTERVALS.
1. This drawing shows two options for the provision of cyclist facilities in the one diagram and in two cross sections.

2. The road reserve width of a RISFSA Class 3 road is in the range 25m to 40m. These examples have a width of 32m to provide adequately for NMT.

3. Option "A" shows separate mandatory lanes designated by signs R110 and R111. Whilst the sidewalks can take two-way pedestrian traffic the cycle paths should operate in the direction of general vehicular traffic.

4. Option "B" shows in road cycle lanes which are restricted to cyclist use by sign R304 and yellow marking RM9. Plus bicycle symbol marking GM6.1. These lanes should operate in a one-way direction with general traffic.

5. Feeder route bus stops may be required - see JRA-SD-RCS-040.

6. See JRA-SD-RCS-031 for example with BRT.

TYPICAL NMT TRAFFIC SIGNS
AMENDMENT NUMBER:

TYPICAL DETAILS WITH BRT

RCS-031

DRAWING APPROVED BY:

RISFSA CLASS 3: DISTRICT DISTRIBUTOR

ROADS: COMPLETE STREETS

DRAWING NUMBER EXTN.

JRA-SD

RCS-031

AMENDMENT NUMBER

CITY OF JOHANNESBURG

JOHANNESBURG ROADS AGENCY (PTY) LTD

NOTES

1. THIS DETAIL SHOWS A POSSIBLE JUNCTION BETWEEN BRT ROUTES.
2. ONE ROAD HAS A RESERVE WIDTH OF 35m WITH ONE BRT LANE AND 2 GENERAL TRAFFIC LANES IN EACH DIRECTION.
3. IT HAS BEEN ASSUMED THAT PROPERTY ADJACENT TO THIS ROAD HAS ACCESS FROM AN INTERNAL ROAD SYSTEM.
4. THE INTERSECTING ROAD RESERVE WIDTH IS 25m. PROPERTIES HAVE DIRECT ACCESS.
5. THE 35m ROAD REQUIRES THE NMT STANDARD TO BE REDUCED TO ACCOMMODATE THE BRT STATION WIDTH OF 5.5m.
6. THE 25m ROAD CAN ONLY FIT A 4.0m NARROW WIDTH STATION, PLUS A BRT LANE AND ONE NARROW GENERAL TRAFFIC LANE IN EACH DIRECTION. NMT PROVISION IS OF REDUCED STANDARD.
7. THIS BRT GENERAL TRAFFIC CONFIGURATION IS COMPLEX, AND IS SUBJECT TO THE ABILITY TO PROVIDE ADEQUATE AND SAFE TRAFFIC SIGNAL OPERATION. SUCH OPERATION MAY NEED TO INCLUDE PROVISION FOR TURNING BRT SERVICES.
8. THIS DRAWING DOES NOT INTEND TO PROPOSE THE BRT OPERATION SHOWN. RATHER ITS FUNCTION IS TO HIGHLIGHT THE POTENTIAL COMPLEXITIES OF SUCH OPERATION.

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2. ONE ROAD HAS A RESERVE WIDTH OF 35m WITH ONE BRT LANE AND 2 GENERAL TRAFFIC LANES IN EACH DIRECTION.
3. IT HAS BEEN ASSUMED THAT PROPERTY ADJACENT TO THIS ROAD HAS ACCESS FROM AN INTERNAL ROAD SYSTEM.
4. THE INTERSECTING ROAD RESERVE WIDTH IS 25m. PROPERTIES HAVE DIRECT ACCESS.
5. THE 35m ROAD REQUIRES THE NMT STANDARD TO BE REDUCED TO ACCOMMODATE THE BRT STATION WIDTH OF 5.5m.
6. THE 25m ROAD CAN ONLY FIT A 4.0m NARROW WIDTH STATION, PLUS A BRT LANE AND ONE NARROW GENERAL TRAFFIC LANE IN EACH DIRECTION. NMT PROVISION IS OF REDUCED STANDARD.
7. THIS BRT GENERAL TRAFFIC CONFIGURATION IS COMPLEX, AND IS SUBJECT TO THE ABILITY TO PROVIDE ADEQUATE AND SAFE TRAFFIC SIGNAL OPERATION. SUCH OPERATION MAY NEED TO INCLUDE PROVISION FOR TURNING BRT SERVICES.
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1. The road reserve width of a RISFSA Class 4 road is in the range 20m to 40m.
2. This example has a width of 25m and illustrates crossing one way and 2-way roads.
3. Cycle lanes are shown in both categories of road in addition to parallel parking. This format represents low quality NMT provision. A higher level of NMT facility will require a greater road reservation width.
4. Feeder or general service bus stops, with laybys, are shown in the 2-way road. The provision of laybys requires the integration of pedestrian and cyclists on the sidewalk around the laybys. If a bus shelter is to be provided, the remaining space for pedestrians and cyclists may commonly become sub-standard, subject to volumes.
5. See JRA-SD-RCS-041 for an example of this road class in an industrial area.
1. FOR NEW PLANNING, A TYPICAL MINIMUM ROAD RESERVE WIDTH SHOULD BE ±30m TO PROVIDE A HIGH STANDARD NMT CROSS SECTION.

2. A 30m ROAD RESERVE CAN PROVIDE 4 LANES WITH NO PARKING OR 2 LANES WITH 90° PARKING/BUS LAYBYS.

3. DETAIL 041-1 SHOWS LARGE INDUSTRIAL STANDS WITH ENTRANCE ROADS OF 15m AND 12m.

4. DETAIL 041-1 SHOWS ENTRANCE SPLAYS AS PART OF A HIGH STANDARD AND ENTRANCE DESIGN, INCLUDING SET-BACK ACCESS CONTROL.

5. NMT FACILITIES SHOULD BE ACCORDED FORMAL PRIORITY AND BE PROVIDED WITH TACTILE RAMPING FOR PEDESTRIANS.

6. DETAIL 041-2 SHOWS A 4 LANE CROSS SECTION WITH MID BLOCK SIGNALISED PEDESTRIAN CROSSING, AND BUS LAYBYS.

7. USE OF GM2 MARKING IS OPTIONAL - SUGGEST USE FOR TANGENT TO TANGENT OPENINGS >30m.

8. TRAFFIC SIGNALISED ROADSIGN OMITTED FOR CLARITY.
1. This drawing shows two options for the provision of cyclist facilities in the one diagram and in two cross sections.

2. The road reserve width of a RISFSA Class 5 road is in the range 16m to 30m. The examples shown have a width of 20m.

3. For this class of road direct property access has been shown. It is evident that pedestrians and cyclists will have reduced quality of use compared to higher order road classes.

4. Option "B" shows cycle lanes in the roadway. See JRA-SD-RCS-040 for possible treatment at a bus stop.

5. Option "A" shows cycle tracks on the sidewalk.

6. A 4-way stop intersection has been shown. Subject to traffic needs and the local environment, traffic signals may be specified; a raised table intersection or a traffic circle (which permits an effective U-turn) may also be used (see RCS-051).
1. This detail illustrates two options for residential streets:
   - 7.0m road in 14m reserve "A"
   - 5.6m road in 14m reserve "B"
2. 5.6m road assumed to have low traffic volumes.
3. 7.0m road assumed to serve higher residential densities and higher traffic volumes including cyclists.
4. Surfaced pedestrian sidewalks may be provided without kerbing of roads, subject to topography and drainage needs.
5. Traffic calming measures may become necessary.
6. 7.0m roadway may accommodate a bus route if required.
7. See drawing JRA-SD-RD-130 for mini-circle design detail.
8. Tactile paving has been indicated. This should be subject to the development of a basic warrant (such as bus route/stop).
1. The 3 details indicate different forms of Class 6 non-motorised transport adaptations of "complete streets".
2. Detail -060-1 illustrates a typical pedestrian/cycle street mall created by a road closure.
3. Detail -060-2 shows how a pedestrian/cycle "access" can be provided for in the planning process to serve residents of a high density suburb with connection to a main road and public transport.
4. Detail -060-3 represents visually how an NMT pathway, with lighting, could connect a shopping centre to an adjacent public transport route.

**NOTES**

**LEGEND**

- STREET LIGHTING
- ROAD TRAFFIC SIGNS
- SHADE TREE
- PLINTH FOR ART/STATUE WITH SEATING
- BENCH
- BOLLARDS/RUBBISH BIN
- TACTILE PAVING

**AMENDMENTS**

- DESIGNED BY:
- DRAWN BY:
- STRUCTURAL DESIGN BY:
- DRAWING CHECKED BY:
- CHECKED BY:
- DRAWING APPROVED BY:

**CITY OF JOHANNESBURG**

JOHANNESBURG ROADS AGENCY (PTY) LTD

Drawing Sub-set: RCS-060

ROADS: COMPLETE STREETS

RISFSA CLASS 6: NMT/GREENWAY/MULTIUSER PATH - TYPICAL DETAILS

DATE: 15/04/2015

DRAWING NUMBER: RCS-060

EXTN.

AMENDMENT NUMBER
DETAIL SHOWN AT LEFT REPRESENT THE BASIC WAYS IN WHICH SIDEWALKS MAY BE RAMPED IN ORDER TO ASSIST DISABLED USERS TO REACH THE CHANNEL LINE LEVEL PRIOR TO CROSSING A STREET. (THE DETAILS RELATE MOST CORRECTLY TO MID-BLOCK PEDESTRIAN CROSSINGS).

ULTIMATELY RAMPING SOLUTIONS WILL DEPEND ON INDIVIDUAL SITE SLOPES, SIDEWALK WIDTHS & PROVISION ON THE SIDEWALK FOR CYCLISTS.

DRAWINGS JRA-SC-RCS-072 & 073 SHOW EXAMPLES OF COMBINATION & PARALLEL RAMPS.

THE BEST END PRODUCT IS LIKELY TO BE OBTAINED IF THE PEDESTRIAN CROSSINGS & TACTILE PAVING ARE LOCATED ON THE STRAIGHT APPROACH TO THE INTERSECTION "A" AT 90° TO THE KERB BEFORE THE START OF THE CURVE RADIUS.
1. The details for tactile paving standards in South Africa are currently under review. The details on this drawing are therefore subject to alteration once the standard is finalised.

2. This detail shows partial downward ramping on the sidewalk on the approach to the pedestrian crossings. The balance of ramping to the top of channel will occur in the area of tactile paving. Ramp slopes will depend on individual site conditions.

3. The kerb side tactile paving in this detail is staggered to accommodate the curve in the kerb line. See JRA-SD-RCS073 for an alternative which involves cutting the tactile paving.

4. The detail recommends careful siting of traffic signal poles with control buttons in order to maintain clear paths for pedestrians with sight disabilities.
1. THE DETAILS FOR TACTILE PAVING STANDARDS IN SOUTH AFRICA ARE CURRENTLY UNDER REVIEW. THE DETAILS ON THIS DRAWING ARE THEREFORE SUBJECT TO ALTERATION ONCE THE STANDARD IS FINALISED.

2. THIS DETAIL SHOWS FULL RAMPS ON EACH APPROACH TO A LOW LEVEL SIDEWALK LINKING BOTH PEDESTRIAN CROSSINGS. THIS LOW LEVEL AREA SHOULD HAVE A 1 IN 50 CROSSPULL TOWARDS THE CHANNEL LINE. INCLUDING THE TACTILE PAVING, THIS TREATMENT MAY REQUIRE A DRAIN BEHIND THE KERB LINE. THE APPROACH RAMPS SLOPES WILL DEPEND ON INDIVIDUAL SITE CONDITIONS BUT SHOULD BE GRADED AS GENTLY AS IS PRACTICAL.

3. THE KERB SIDE TACTILE PAVING IN THIS DETAIL HAS BEEN ALIGNED TO THE CHANNEL LINE ON THE CURVE AND REQUIRES SEVERAL Pavers TO BE CUT TO FORM THIS CURVE. THIS PROBLEM CAN BE AVOIDED OR REDUCED BY ALIGNING THE PEDESTRIAN CROSSINGS WITH THE TANGENTS TO THE CORNER CURVE.
1. The cross sections shown cover the 2 most likely basic types of sidewalk ramping likely to be specified in Johannesburg. See drawing JRA-SD-RCS-070.
2. The sections show 300x300x65 tactile pavers which may offer benefits in sidewalk shaping. 400x400x65 tactile pavers may be specified in which case the rise of the secondary slope will increase slightly.
3. The rates of slope shown for ramps are notional & subject to individual sight design. A slope of 1 in 8 may be used only over very short distances. In steeply sloping situations it may be necessary to develop a primary sidewalk ramp in more than one stage with short, level, intermediate sections.
<table>
<thead>
<tr>
<th>DRAWING NUMBER</th>
<th>DRAWING DESCRIPTION</th>
<th>REVISION DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>JRA-SD-RBRT-010</td>
<td>Typical Cross Section between Intersections</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD-RBRT-020</td>
<td>Typical Cross Section at Intersections</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD-RBRT-030</td>
<td>Typical Cross Section at BRT Stations</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD-RBRT-040</td>
<td>Long Section – Road @ 5% - Station @ 0%</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD-RBRT-041</td>
<td>Cross Section - Road @ 5% - Station @ 0%</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD-RBRT-050</td>
<td>Long Section – Road @ 5% - Station @ 3%</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD-RBRT-051</td>
<td>Cross Section - Road @ 5% - Station @ 3%</td>
<td>300615</td>
</tr>
<tr>
<td>JRA-SD-RBRT-060</td>
<td>Typical Details</td>
<td>300615</td>
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<td>JRA-SD-RBRT-101</td>
<td>Station Modules - 2</td>
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TYPICAL TRUNK ROUTE CROSS-SECTION BETWEEN ROAD INTERSECTIONS

<table>
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<tr>
<th>DESCRIPTION</th>
<th>RECOMMENDED (MINIMUM)</th>
<th>ABSOLUTE (MINIMUM)</th>
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<tr>
<td>MEDIAN ISLAND</td>
<td>0.60 m</td>
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<tr>
<td>BRT LANE</td>
<td>3.50 m</td>
<td>3.00 m</td>
</tr>
<tr>
<td>RUMBLE STRIP SEPARATOR</td>
<td>0.30 m</td>
<td>0.25 m</td>
</tr>
<tr>
<td>MIXED TRAFFIC LANE</td>
<td>3.50 m</td>
<td>3.20 m</td>
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**TYPICAL CROSS-SECTION AT INTERSECTION WITH DEDICATED BRT LANES**

- **Polymer Rumble Strip Separator or Similar Approved**
- **Fig. 3 Barrier Kerb and Channel**

**TYPICAL CROSS-SECTION AT INTERSECTION WITH SHARED LANE FOR MIXED TRAFFIC AND BRT LANE**

- **Polymer Rumble Strip Separator or Similar Approved**
- **Fig. 3 Barrier Kerb and Channel**

### NOTES

1. *Minimum Median Width to be used at the intersection to be 2m in order to accommodate traffic light head if required.
2. **Width of shared right turning lane and BRT lane to be dropped to 3m only at localised pinch points or at BRT stop areas.

### AMENDMENTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Approved</th>
<th>Description</th>
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### DRAWING INFO

- **City of Johannesburg Roads Agency (PTY) Ltd**
- **Drawing Sub-set**: ROADS: BUS RAPID TRANSIT (BRT)
- **Typical Cross Section at Intersections**
- **JRA-SD RBRT-020**
- **Date**: 29/04/2015
- **Drawing Number**: JRA-SD RBRT-020

### LEGEND

- **NMT Requirements**
- **Details as per NMT Requirements**
- **Fig. 3 Barrier Kerb and Channel**
- **Polymer Rumble Strip Separator or Similar Approved**

### DESIGNED BY:

- **Structural Design By**
- **Drawing Checked By**

### DRAWN BY:

- **Drawing Checked By**
- **Drawing Approved By**

### AMENDED BY:

- **Amended By**
- **Amended Checked By**
- **Amended Approved By**
TYPICAL CROSS-SECTION AT BRT STATION
(WITHOUT BY-PASS LANE)

TYPICAL CROSS-SECTION AT BRT STATION
(WITH BY-PASS LANE)

DESCRIPTION
BRT BY-PASS LANE 3.50 m 3.30 m
BRT STOPPING LANE 3.00 m -
MIXED TRAFFIC LANE 3.50 m 3.20 m
SEPARATOR 0.30 m 0.25 m

POLYMER RUMBLE STRIP SEPARATOR
OR SIMILAR APPROVED

NOTES
1. WHERE A BYPASS LANE IS PROVIDED THE WIDTH OF THE STOPPING LANE SHOULD BE 3.0 m, WITH THE BYPASS LANE HAVING A WIDTH OF 3.5 m
2. WHERE NO BYPASS LANE IS PROVIDED THE WIDTH OF THE BRT LANE SHOULD BE 3.5 m
TYPICAL TREATMENT TO PROVIDE BRT STATION AT 0.0 % GRADE WHERE EXISTING ROAD IS AT 5.0 % GRADE

- PEDESTRIAN ACCESS RAMP: LENGTH = 76.3m
- BRT STATION: LENGTH = 50.5m
- EMERGENCY PEDESTRIAN EXIT RAMP: LENGTH = 41.5m
- BRT STATION PLATFORM: LENGTH = 50.5m
- RETAINING WALL: BETWEEN BRT LANES AND MIXED TRAFFIC LANES.
- ROAD LEVEL: VC L = 10.0 m
- TOP OF MEDIAN: VC L = 10.0 m
- MAX GRADE = 10.0 %
- BRT BUS LANE GRADE LINE: JOIN POINT WITH EXISTING ROAD GRADE LINE

CITY OF JOHANNESBURG
JOHANNESBURG ROADS AGENCY (PTY) LTD
DRAWING NUMBER: JRA-SD RBRT-040
SCALE AS SHOWN: NTS
DATE: 29/04/2015
LONG SECTION - TYPICAL TREATMENT TO PROVIDE BRT STATION AT 0.0 % GRADE WHERE EXISTING ROAD IS AT 5.0 % GRADE
SECTION A - A

TYPICAL SECTION THROUGH STATION IN FILL
GRADE OF EXISTING ROAD = 5.0 %
GRADE OF BRT STATION = 0.0 %

SECTION B - B

TYPICAL SECTION THROUGH STATION IN CUT
GRADE OF EXISTING ROAD = 5.0 %
GRADE OF BRT STATION = 0.0 %
TYPICAL TREATMENT TO PROVIDE BRT STATION AT 3.0 % GRADE WHERE EXISTING ROAD IS AT 5.0 % GRADE

PEDESTRIAN ACCESS RAMP
LENGTH = 26.6 m

BRT STATION
LENGTH = 50.5 m

EMERGENCY PEDESTRIAN EXIT RAMP
LENGTH = 20.6 m

EXISTING GROUND LEVEL

RETAINING WALL
LENGTH = 96.7 m

TOP OF MEDIAN

ROAD LEVEL

VC L = 10.0 m
LENGTH = 16.7 m

VC L = 10.0 m

TYPICAL TREATMENT TO PROVIDE BRT STATION AT 3.0 % GRADE WHERE EXISTING ROAD IS AT 5.0 % GRADE
SECTION C - C
TYPICAL SECTION THROUGH STATION
GRADE OF EXISTING ROAD = 5.0 %
GRADE OF BRT STATION = 3.0 %

SECTION D - D
TYPICAL SECTION THROUGH STATION
WITH GRADE OF EXISTING ROAD = 5.0 %
AND GRADE OF BRT STATION = 3.0 %

PROJECT SPECIFIC STORMWATER DESIGN REQUIRED IN ORDER TO SIZE DRAIN.

CITY OF JOHANNESBURG
JOHANNESBURG ROADS AGENCY (PTY) LTD
CROSS SECTION - TYPICAL TREATMENT TO PROVIDE BRT STATION
AT 3.0 % GRADE WHERE EXISTING ROAD IS AT 5.0 % GRADE
TYPICAL MEDIAN KERB AND SLEEVE INSTALLATION DETAILS WHERE BRT LANES DIFFER IN LEVEL

TYPICAL DETAIL OF RUMBLE BLOCK BETWEEN BRT AND MIXED TRAFFIC LANES

TYPICAL RUMBLE STRIP INSTALLATION DETAIL BETWEEN BRT LANE AND MIXED TRAFFIC LANES

TYPICAL RETAINING WALL DETAIL AT BRT STATIONS WHERE THE MIXED TRAFFIC AND BRT LANES ARE AT DIFFERENT LEVELS
ES100 PAVEMENT STRUCTURE

CRUSHED STONE BASE

HOT MIX ASPHALT BASE

CONCRETE PAVEMENT

*(2 x 90 mm LAYERS)*

Legend:

1. Continuously Medium Graded Asphalt Surfacing
2. Concrete Pavement
3. Crushed Stone Base
4. Continuously Graded Asphalt Base
5. Stabilized Crushed Stone Base
6. Stabilized Natural Gravel Subbase
7. Stabilized Natural Gravel Subbase
8. Selected Gravel Subgrade
9. Selected In-situ Gravel Subgrade

Table:

<table>
<thead>
<tr>
<th>Layer No.</th>
<th>Thickness (mm)</th>
<th>TRH 14 Material Type</th>
<th>Description</th>
<th>COLTO Section of Specification</th>
<th>Compaction as % of Mod AASHTO Density (min)</th>
<th>PI (max)</th>
<th>GM (min)</th>
<th>UCS/CBR @ % of Mod AASHTO</th>
<th>Max CBR Swell</th>
<th>ITS (KPa) @ min</th>
<th>Concrete Strength (MPa)</th>
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<td>Concrete Pavement</td>
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<td>125</td>
<td>C2</td>
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<td>98%</td>
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<td>6</td>
<td>150</td>
<td>C3</td>
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<td>3400 &amp; 3500</td>
<td>97%</td>
<td>3.5</td>
<td>1.5</td>
<td>1.5</td>
<td>0 @ 100%</td>
<td>-</td>
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<tr>
<td>7</td>
<td>150</td>
<td>C4</td>
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<td>95%</td>
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<td>12 or 30C@10</td>
<td>0.75</td>
<td>15 or 93%</td>
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<td>93%</td>
<td>12 or 30C@10</td>
<td>0.75</td>
<td>15 @ 93%</td>
<td>1.5</td>
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</tbody>
</table>

Johannesburg Roads Agency (Pty) Ltd

City of Johannesburg

Johannesburg Roads Agency (Pty) Ltd

Date: 29/04/2015

Scale as Shown: NTS

Roads: Bus Rapid Transit (BRT)

Typical Pavement Structure - ES100
ES10 PAVEMENT STRUCTURE

CRUSHED STONE BASE

HOT MIX ASPHALT BASE

CONCRETE PAVEMENT

1. CONTINUOUSLY MEDIUM GRADED ASPHALT SURFACING
2. CONCRETE PAVEMENT
3. CRUSHED STONE BASE
4. CONTINUOUSLY GRADED ASPHALT BASE
5. STABILIZED CRUSHED STONE BASE
6. STABILIZED NATURAL GRAVEL SUBBASE
7. STABILIZED NATURAL GRAVEL SUBBASE
8. SELECTED GRAVEL SUBGRADE
9. SELECTED INSITU GRAVEL SUBGRADE

Layer |
| Thickness (mm) | TRH 14 Material Type | Description | COLTO Section of Specification | Compaction as % of Mod AASHTO Density (min) | PI (max) | GM (min) | UCS/CBR @ % of Mod AASHTO | Max CBR Srell (kPa) min | ITS (kPa) | Concrete Strength (MPa) | Concrete Fracture Strength (MPa) |
---|---|---|---|---|---|---|---|---|---|---|---|---|
1 | 40 | ACM | Continuously Medium Graded Asphalt Surfacing | 4200 | | | | | | | |
2 | 150 | CCM or CCMP | Concrete Pavement | 7100 | | | | | | | |
3 | 150 | G1 | Crushed Stone Base | 3600 | 88% of ARD | 4 | | | | | |
4 | 90 | BC3 | Continuously Graded Asphalt Base | 4200 | | | | | | | |
5 | 100 | C2 | Stabilised Crushed Stone Base | 3400 & 3500 | 98% | SP | 1.5 | 3.0 - 6.0 Mpa @ 100% | | | |
6a | 125 | C3 | Stabilised Natural Gravel Subbase | 3400 & 3500 | 97% | 0 (after stabilisation) | 1.5 | 1.5 - 3.0 Mpa @ 100% | | 250 @ 100% | |
6b | 150 | C3 | Stabilised Natural Gravel Subbase | 3400 & 3500 | 97% | 6 (after stabilisation) | 1.5 | 1.5 - 3.0 Mpa @ 100% | | 250 @ 100% | |
7a | 125 | C4 | Stabilised Natural Gravel Subbase | 3400 & 3500 | 95% | 0 (after stabilisation) | 1.5 | 0.75 - 1.5 Mpa @ 100% | | 200 @ 100% | |
7b | 100 | C4 | Stabilised Natural Gravel Subbase | 3400 & 3500 | 95% | 6 (after stabilisation) | 1.5 | 0.75 - 1.5 Mpa @ 100% | | 200 @ 100% | |
8 | 150 | G7 | Selected Gravel Subgrade | 3400 | 93% | | 12 @ 30A#10 | 0.75 | 15 @ 90% | 1.50 | | |
9 | 150 | G7 | Selected Insitu Gravel Subgrade | 3400 | 93% | | 12 @ 30A#10 | 0.75 | 15 @ 90% | 1.50 | | |
1 MODULE STAGGERED (NO BYPASS)

1 MODULE SINGLE SIDE (NO BYPASS)

1 MODULE SINGLE SIDE (NO BYPASS)

2 MODULES (NO BYPASS)

2 MODULES (WITH BYPASS)
3.500 3.800 5.000 3.800 3.500
25.600
12.000 18.500 18.500 18.500 40.000 18.500
0.0 18.500
165.000
STATION
MODULE
STATION
ACCESS
MODULE
TICKET
ACCESS
OFFICE
STATION
OFFICE
4 MODULES (NO BYPASS)

4 MODULES (WITH BYPASS)

REFER TO NMT STANDARDS

NOTES

LEGEND

BRT LANE
BRT BUS STOP
PLATFORM
SIDEWALK

DRAWN BY:
DRAWING CHECKED BY:
DRAWING APPROVED BY:

DESIGNED BY:
STRUCTURAL DESIGN BY:
CHECKED BY:

DATE, 29/04/2015
DRAWING NUMBER
EXTN.

STATION MODULES - SHEET 2 OF 2
Directors:
Chairman: K Shubane. Managing Director: D S Macozoma. Non-Executive Directors: M Miamane, Dr J Maina, E Ngomane, L Masamaife, J Nxumalo, H Mashele
Company Secretary: Adv. T P Bokako
Registration No. 2000/028993/07

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