Technical Assistance Consultant's Report

Project Number: 48356
March 2016

India: Supporting Sustainable Urban Transport I Aizawl City

(Financed by the Technical Assistance Special Fund)

Vol. 2 – Traffic and Road Safety Improvements (2 of 2)

Prepared by CDM Smith Inc. United States

For Public Work Department, Government of Mizoram
Urban Development Poverty Alleviation Department, Government of Mizoram
Aizawl Municipal Council, Government of Mizoram

Asian Development Bank

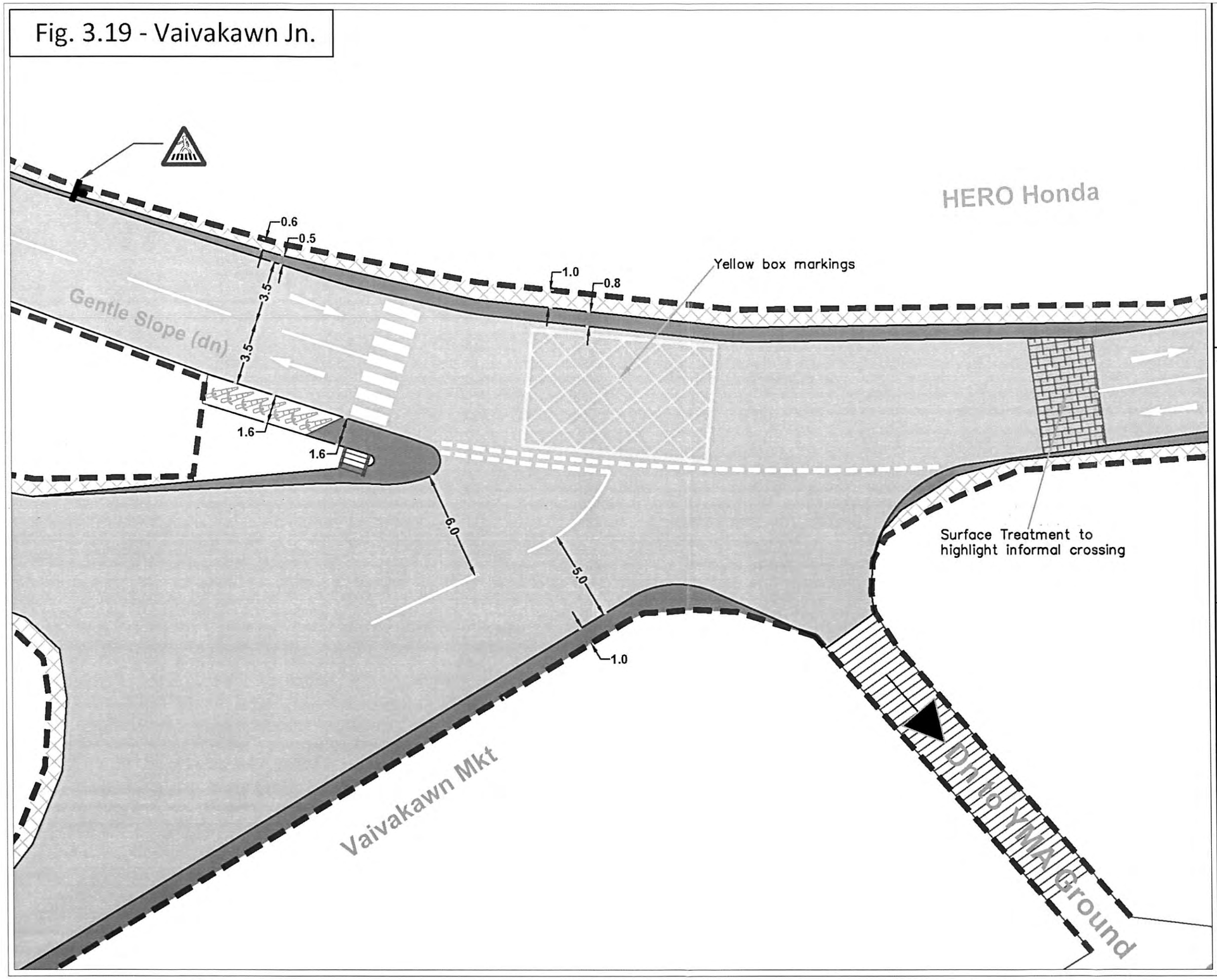
Junction No-18	Location: Vaivakawn East Jn.
Existing Situation: The following features highlight the existing situation at the intersection that warranted improvements. • Main east-west route • Bottle-neck where two roads merge into one, at either end of Vaivakawn section • On a City bus route • Limited road width (carriageway is 7m wide at narrowest point, with no footways) • High pedestrian volumes • On-street parking by motorcycles, loading vehicles and taxi drop-off • Existing 30kph speed limit on this section • Traffic police control point at Vaivakawn Junction East (R. Zobela Point) • Important traffic improvement scheme undertaken at Vaivakawn Junction West (around market) by PWD a few years ago.	

Proposed Improvements:

Schematic improvements at the intersection is presented in the Figure 3.19. Highlights of the proposed intersection improvements are shown below:

- Provision of mini-roundabout with an ICD of 9.5m and circulating carriageway of 6.5m
- Widening of footpath on the south side of junction to allow for up to 2.3m at the junction.
- Police control point at island nose to provide shelter for traffic police.
- Pedestrian refuge island with dropped kerbs on the west approach.
- Widening of footpaths on either sides of the road between the two Vivakawn junctions.
- Widening of footpaths along the Church frontage.
- Surface treatment to highlight informal crossings.
- Retroreflective signs and road markings.

Fig. 3.19 - Vaivakawn Jn.



N

Legend:

- Property Line/ Building edge
- Existing Carriageway
- Police Control Point
- Non- Motorable User Path
- Proposed Footpath
- Island
- Informal Crossing

Design Consultant:

CDM Smith.

Client:

Asian Development Bank

Government of Mizoram - PWD Department

Project Name:

ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

Drawing Title:

Vaivakawn Junction-1 (Jn 18)

Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: DEC-2015	Date: DEC-2015
Scale: 1: 200	
Drawing No.	REV NO

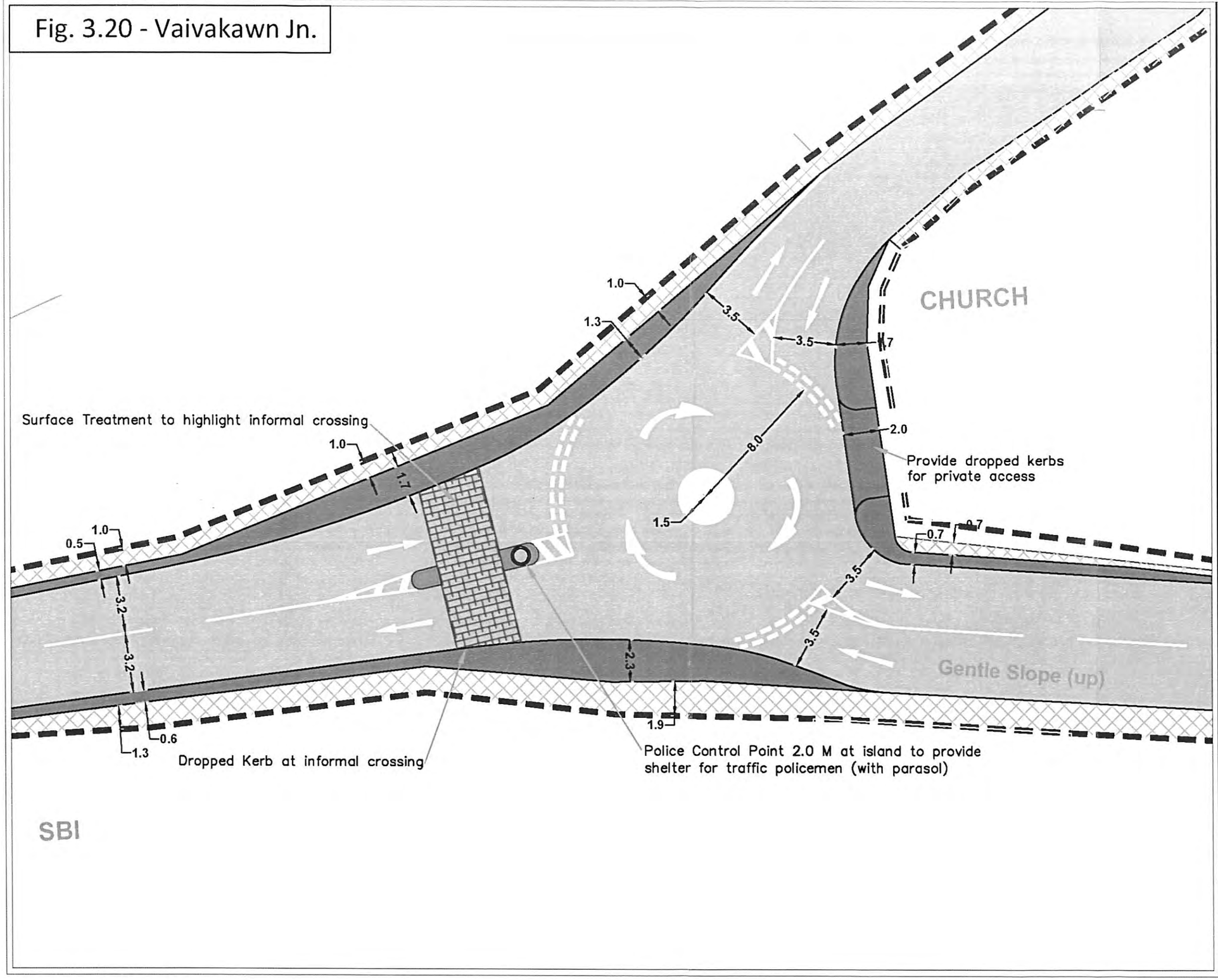
Junction No-19	Location: VAIVAKAWN WEST JN. (Zobela)
Existing Situation: The following features highlight the existing situation at the intersection that warranted improvements. • Situated on the Main East-West link in North Aizawl. • Busy Commercial Street • High pedestrian volumes • Vegetable vending activities permitted on select days. • On-street parking by motorcycles, loading vehicles and taxi drop-off • Existing 30kph speed limit on this section • Located on City bus Route	

Proposed Improvements:

Schematic improvements at the intersection is presented in the Figure 3.20. Highlights of the proposed intersection improvements are shown below:

- Redesign and reconstructing intersection corner between Luangmual Road and Middle Kanan Street.
- Widening of footpath along Market side of Middle Kanan Street.
- Yellow box markings.
- Surface treatment to highlight informal crossing on the east approach.
- Retroreflective signs and road markings.

Fig. 3.20 - Vaivakawn Jn.



Legend:

- Property Line/ Building edge
- Existing Carriageway
- Police Control Point
- Non- Motorable User Path
- Proposed Footpath
- Island
- Informal Crossing

Design Consultant: CDM Smith.

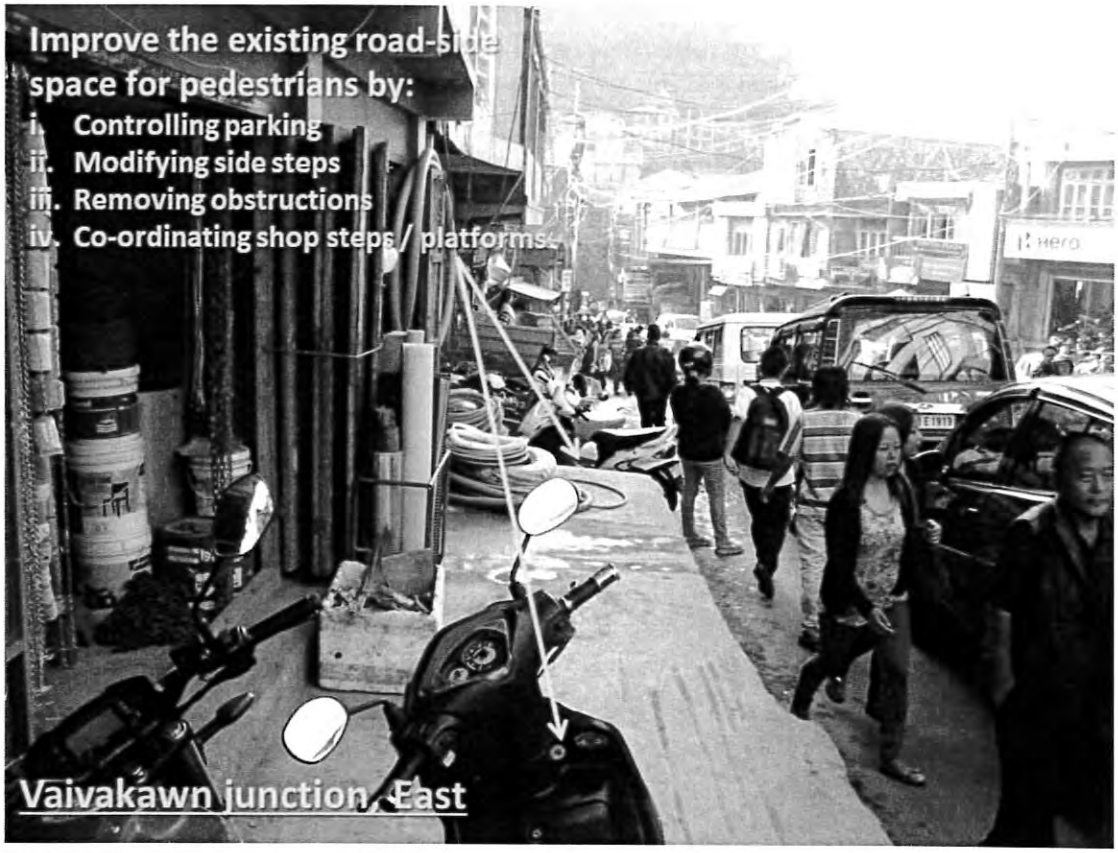
Client: Asian Development Bank
Government of Mizoram - PWD Department

Project Name: ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

Drawing Title: Vaivakawn Junction-2 (Jn 19)

Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: DEC-2015	Date: DEC-2015
Scale: 1 : 200	
Drawing No:	REV NO:

Vaivakawn Junction (west)


Improve the existing road-side space for pedestrians by:
i. Controlling parking
ii. Modifying side steps
iii. Removing obstructions
iv. Co-ordinating shop steps / platforms
Vaivakawn junction, East

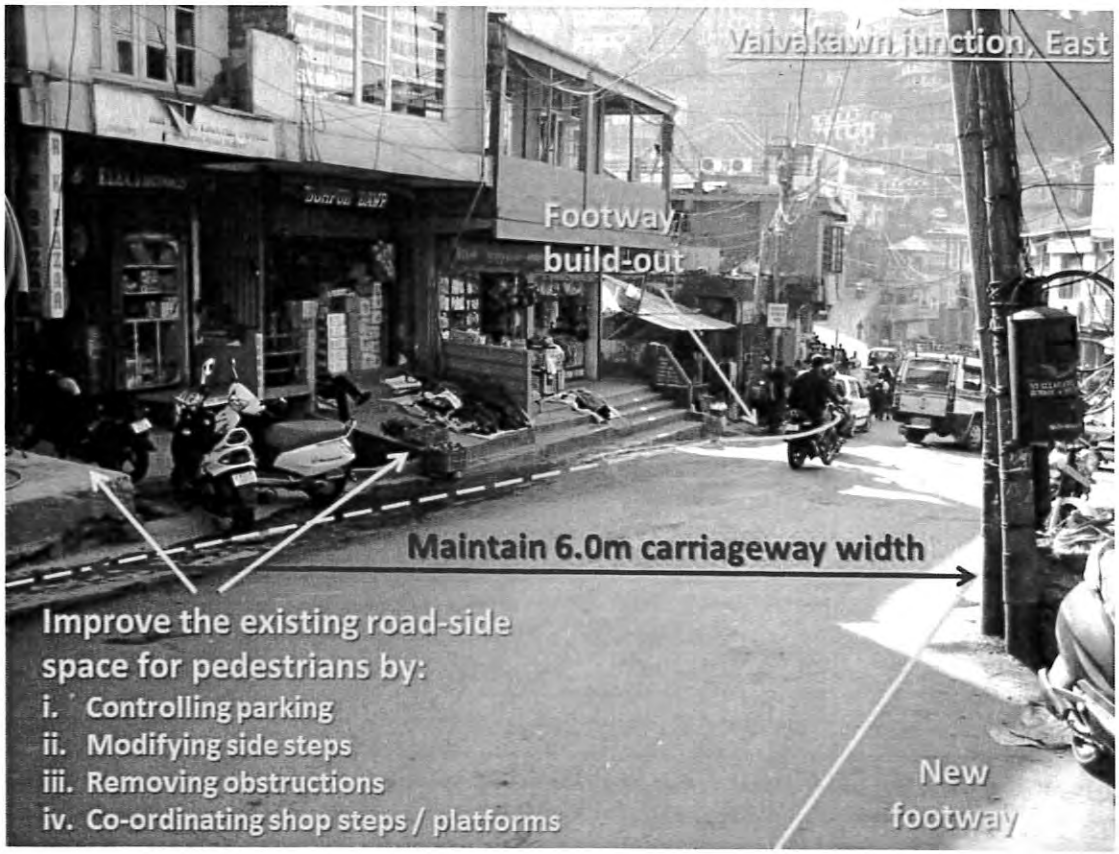

Vaivakawn junction, East
Footway build-out
Maintain 6.0m carriageway width
Improve the existing road-side space for pedestrians by:
i. Controlling parking
ii. Modifying side steps
iii. Removing obstructions
iv. Co-ordinating shop steps / platforms
New footway

Fig. 3.21 - Khatla Jn. 27 and 30

Legend:

- Property Line/ Building edge
- Existing Carriageway
- Police Control Point
- Non- Motorable User Path
- Proposed Footpath
- Island

Design Consultant: CDM Smith

Client:
Asian Development Bank
Government of Mizoram - PWD Department

Project Name:
ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

Drawing Title:
Khatla Junction (Jn 27 & 30)

Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: DEC-2015	Date: DEC-2015
Scale: 1 : 400	
Drawing No:	REV NO:

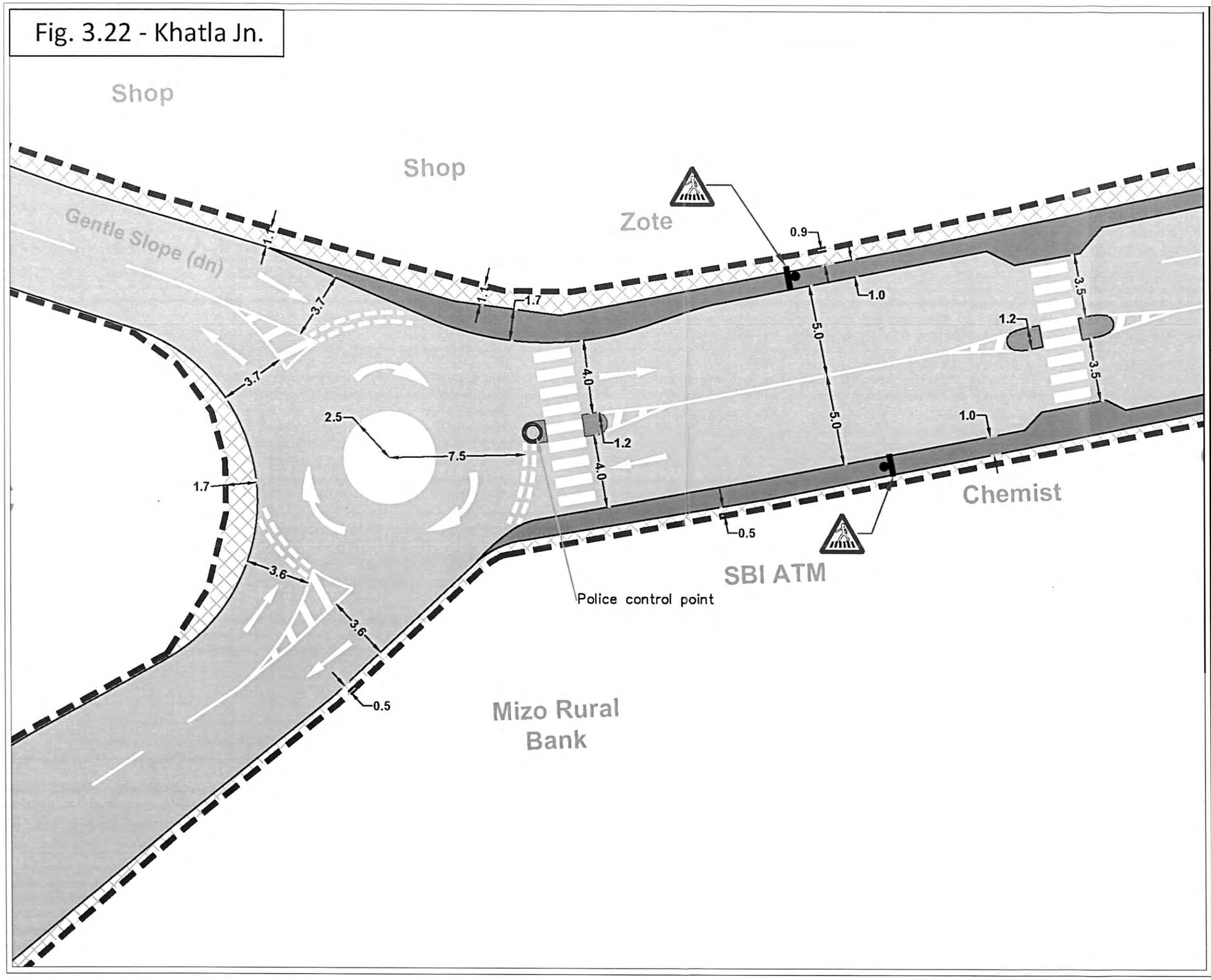
Junction No-27	Location: KHATLA WEST JUNCTION (Pangi Peng)
Existing Situation: The following features highlight the existing situation at the intersection that warranted improvements. • Key Junction linking New Secretariat road with N-S Corridor • Busy Commercial Street • High pedestrian volumes • Vegetable vending activities permitted on select days. • On a City bus route • Limited road width (carriageway is 7m wide at narrowest point, with no footways) • High pedestrian volumes • On-street parking by motorcycles, loading vehicles and taxi drop-off • Taxi Stand is located close to the junction	

Proposed Improvements:

Schematic improvements at the intersection is presented in the Figure 3.22. Highlights of the proposed intersection improvements are shown below:

- Mini roundabout traffic operation with an ICD of 15m and carriageway of 5m and over runnable roundabout.
- Pedestrian refuge island on the east approach along with Police Control Point.
- Widening of footpath on the north side to deflect approach at yield line.
- Widening of footpath on the south side of the Khatla Kawn Road to provide dedicated strips for pedestrians and vendors.
- Retroreflective signs and road markings.

Fig. 3.22 - Khatla Jn.



Legend:

- Property Line/ Building edge
- Existing Carriageway
- Police Control Point
- Non- Motorable User Path
- Proposed Footpath
- Island

Design Consultant: CDM Smith

Client:
Asian Development Bank
Government of Mizoram - PWD Department

Project Name:
ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

Drawing Title:
Khatla Junction (Jn 27)

Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: DEC-2015	Date: DEC-2015
Scale: 1 : 200	
Drawing No:	REV NO:

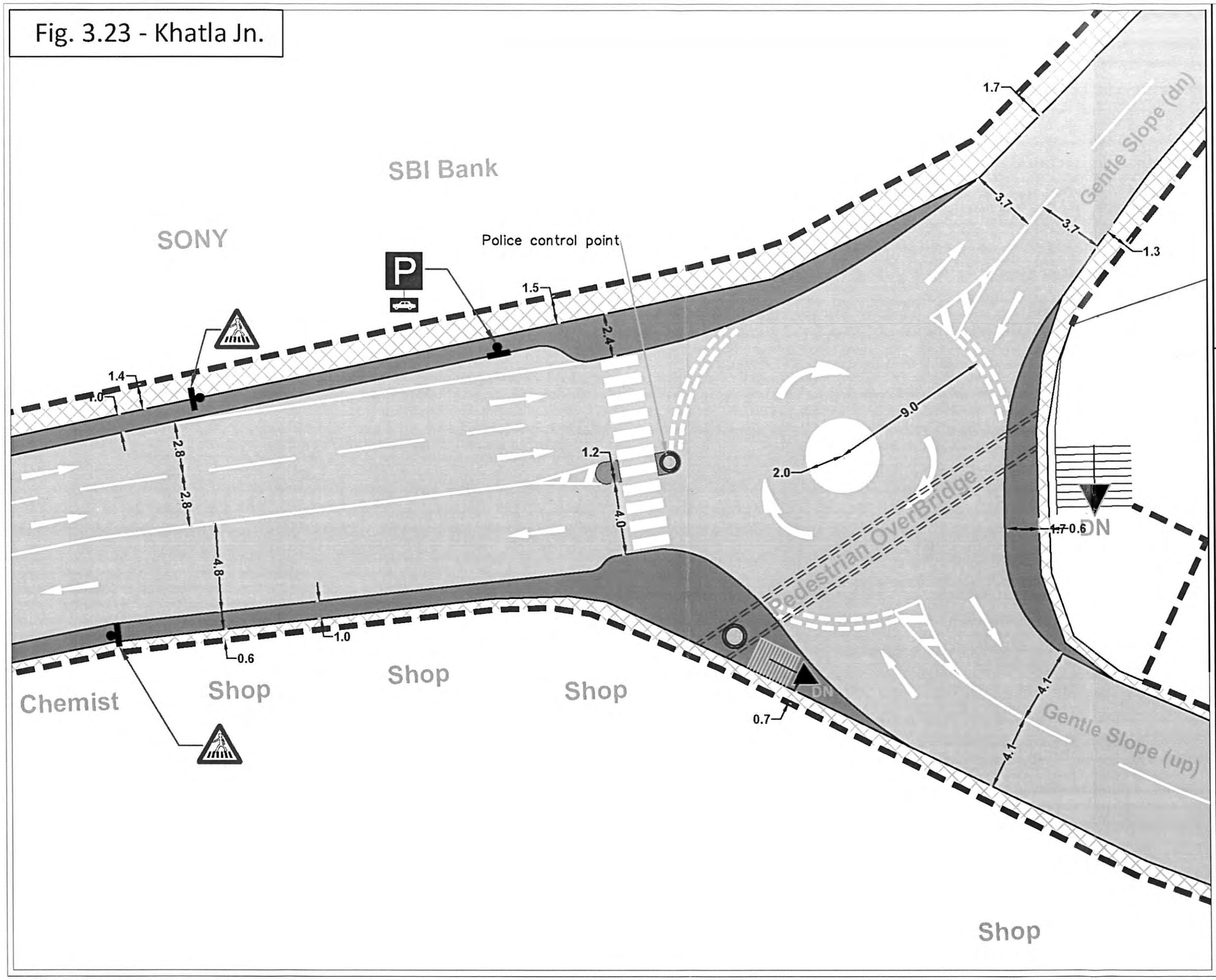
Junction No-30	Location: Khatla East Junction. (Zokaithanga Pt)
Existing Situation: The following features highlight the existing situation at the intersection that warranted improvements. • Key Junction linking New Secretariat road with N-S Corridor • Busy Commercial Street • High pedestrian volumes • Vegetable vending activities permitted on select days. • On a City bus route • Existing pedestrian bridge which also connects MG road • Limited road width (carriageway is 5m wide at narrowest point, with no footways) • High pedestrian volumes • On-street parking by motorcycles, loading vehicles and taxi drop-off • Taxi Stand is located close to the junction	

Proposed Improvements:

Schematic improvements at the intersection is presented in the Figure 3.23. Highlights of the proposed intersection improvements are shown below:

- Mini roundabout operation with an ICD of 18m and circulating width of 7m and over runnable roundabout.
- Widening of footpath near south west corner to reduce approach width.
- Retaining and reorganizing taxi parking on the north side of Khatla Kawn Road.
- Widening of footpath on the north side of Khatla Kawn Road.
- Treatment of private stairs near footpath to allow continuous and uninterrupted footpaths.
- Retroreflective signs and road markings.

Fig. 3.23 - Khatla Jn.



Legend:

- Property Line/ Building edge
- Existing Carriageway
- Police Control Point
- Non- Motorable User Path
- Proposed Footpath
- Island

Design Consultant: CDM Smith.

Client: Asian Development Bank
Government of Mizoram - PWD Department

Project Name: ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

Drawing Title: Khatla Junction (Jn 30)

Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: DEC-2015	Date: DEC-2015
Scale: 1 : 200	
Drawing No.	REV NO

4. DETAILS OF NORTH-SOUTH CORRIDOR IMPROVEMENTS (CHANMARI TO MILLENNIUM CENTRE)

This chapter focuses on proposals for the main north-south corridor, especially improved facilities for pedestrians such as footways and safer crossings.

The general approach to improving road junctions and links was discussed in Volume 1, Chapter 3, Sections D1 and D2. This chapter (in Volume 2) takes a 1km section of the north-south corridor between Chanmari to Millennium Centre, and presents detailed proposals for traffic improvements along the corridor. These are complementary to the junction designs presented in the previous chapter.

The Chanmari-Millennium Centre section is one of the most critical sections on the north-south corridor because it has:

- Some of the highest vehicle and pedestrian volumes in Aizawl;
- Narrow right of way, typically 7.0 to 10.0m along much of its length;
- Almost no footways available;
- No pedestrian crossings;
- Heavy demand for car and two-wheeler parking, causing pedestrians to walk on the carriageway.

The proposals recommended for the north-south corridor involve:

1. Low-cost measures;
2. Improvements within the existing Right of Way (i.e. no land acquisition required);
3. No major road re-construction or utilities re-location (this will belong to the medium-term measures and will require more substantial funds).

Main Measures Proposed

The main measures proposed for the Chanmari-Millennium Centre section include:

1. Providing a **2.0m wide footway on the east side**. (NOTE: In some places this measure will require recovering public space from building frontages, and the cost and complexity make it likely that this might be implemented as a medium-term measure).

2. Providing a **0.8 to 1.0m wide footway on the west side,** by constructing a drain cover over the existing roadside open drain. (NOTE: The limited right of way makes it difficult to provide two standard width footways on both sides of the road – the east side appears to be more suitable for the wider footway and also has the higher pedestrian flows).

3. Provision of **zebra crossings**, particularly at main junctions and other locations where crossing demand is likely to be high.

4. Provision of **informal pedestrian crossings** at suitable locations where demand may not justify a full zebra crossing. Two types of informal crossing are proposed: (i) **pedestrian**

islands where width permits; (ii) **footway build-outs** where width does not permit an island. At these informal crossings, special **surface treatment** is proposed, to highlight the crossing point both to vehicle drivers and pedestrians.

The footway build-outs provide several benefits:

(a) Improved visibility for pedestrians;

(b) Shorter crossing distances;

(c) Reduced road width can also help to reduce vehicle speeds;

(d) Build-outs prevent vehicle parking at the designated crossing points.

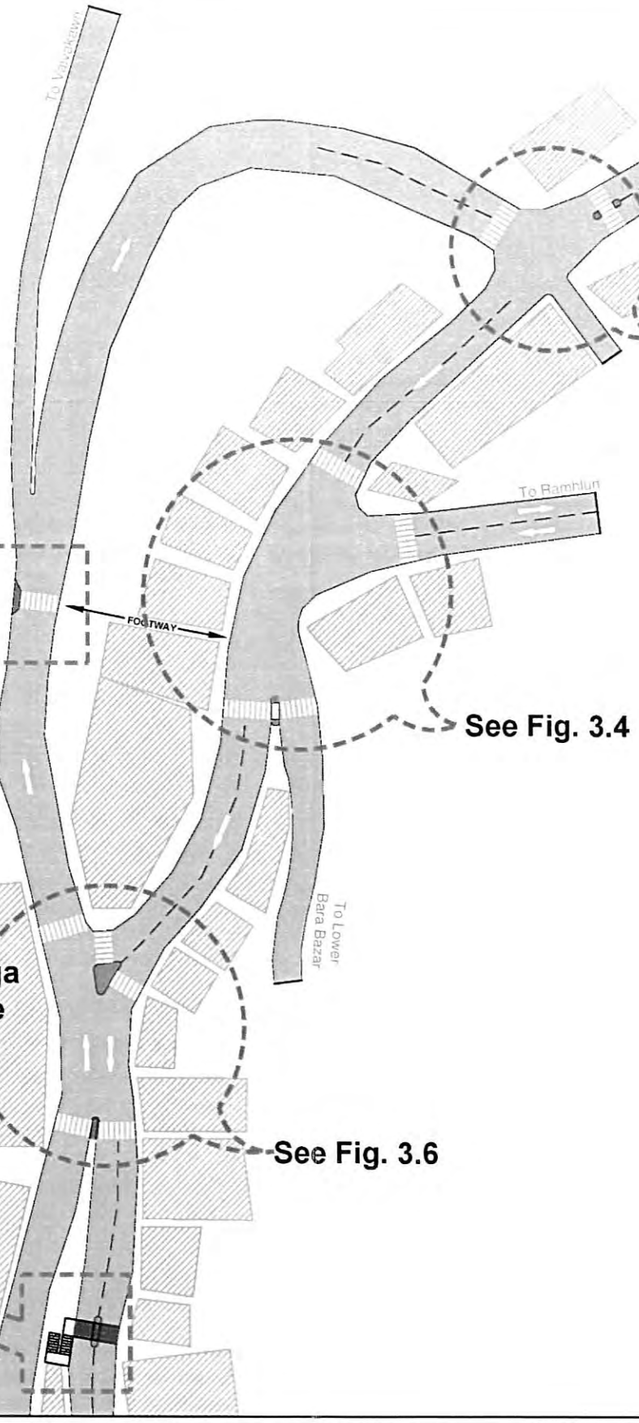
5. **On-Street vehicle parking:** Effective management of on-street parking on the north-south corridor is critical to providing good facilities for pedestrians and smoother traffic flow on the corridor. As mentioned in Volume 1, Chapter 3, surveys conducted for this project found a total of nearly 1,700 vehicles parked on-road between Chanmari and Raj Bhaban (both arms of the n-s corridor), of which three-quarters were two-wheelers.

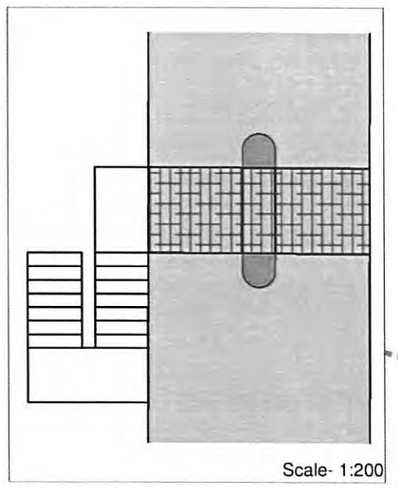
In the following proposals, parking has been treated as a 'residual' component. In other words, the first step is to provide for the moving vehicles (as these are bulky and inflexible); the second step is to provide the facilities for pedestrians (footways, crossings and traffic speed management). Only after these two key components have been satisfactorily designed can the parking be considered.

Hence parking spaces along the corridor can be provided where there is sufficient room, AFTER providing for moving vehicles and pedestrians. In the following design drawings, some spaces are provided for on-street parking: this can also be controlled on a time basis (e.g. no parking at peak periods; short-stay parking only, etc.), or a vehicle basis (e.g. two-wheelers only), and also on a cost basis (e.g. significantly higher charges for long-stay parking).

It is recommended that parking should be generally restricted at road junctions, bus stops, pedestrian crossings and narrow road sections.

STRIP PLAN A





N

Legend:
- Carriage Way
- Building Line
- FootPath
- Zebra Crossing
- Pedestrian Island
- Build-outs, with Surface Marking

Design Consultant :

CDM Smith

Client:

Asian Development Bank

Government of Mizoram - PWD Department

Project Name:

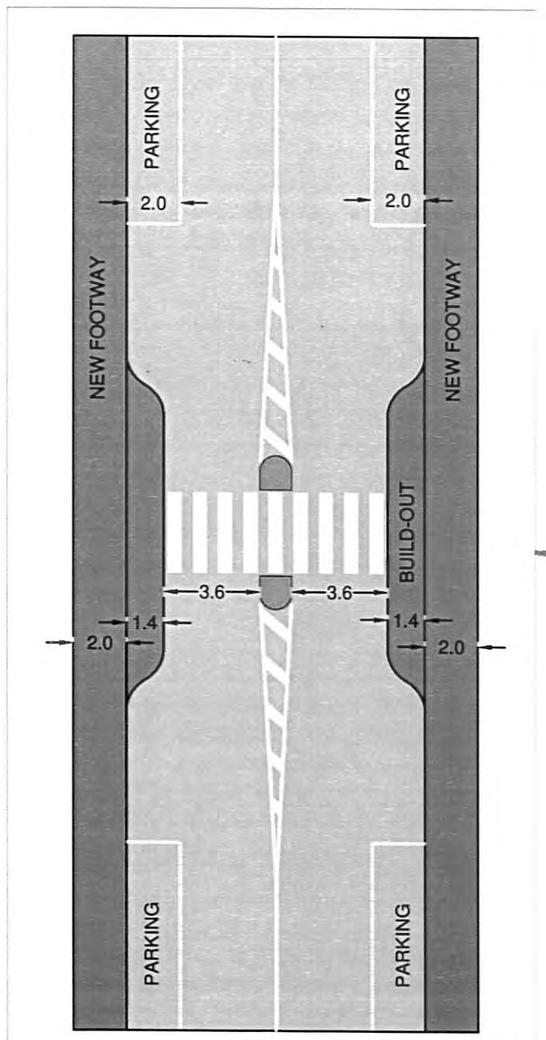
ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

Drawing Title:

Chanmari to Millennium Centre
Strip Plan-A

Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: MAR-2016	Date: MAR-2016
Scale: 1 : 1000	
Drawing No.	REV.NO:

STRIP PLAN B



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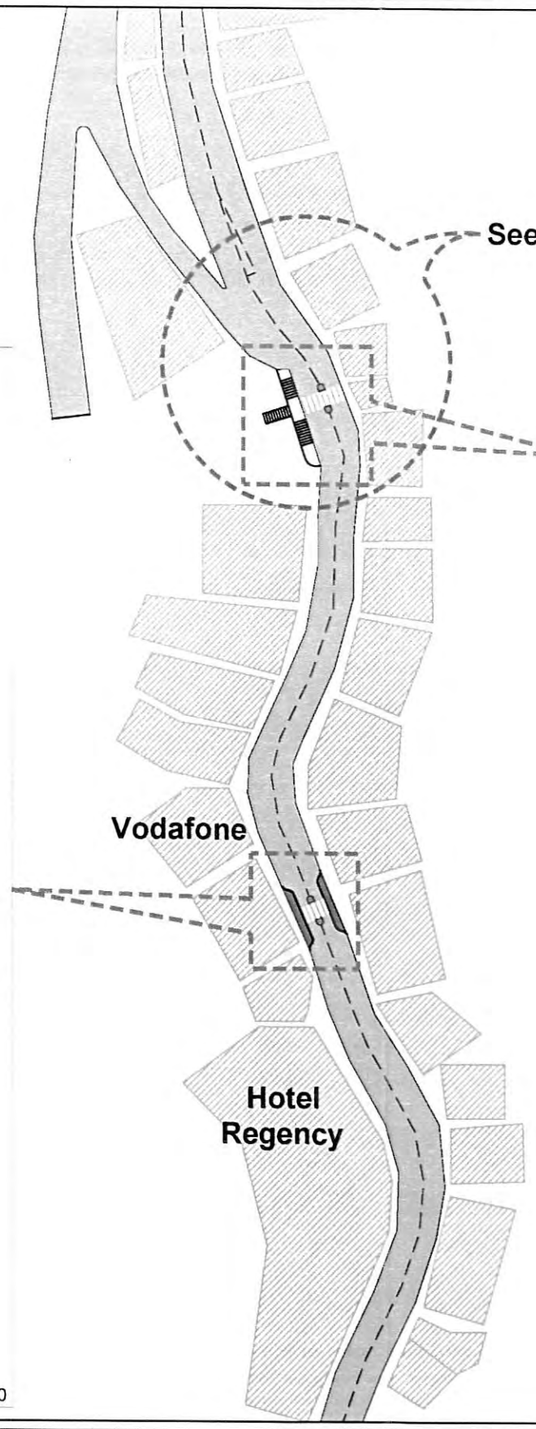


N

Legend:
- Carriage Way
- Building Line
- FootPath
- Zebra Crossing
- Pedestrian Island
- Build-outs, with Surface Marking

Design Consultant :

CDM Smith

Client:

Asian Development Bank

Government of Mizoram - PWD Department

Project Name:

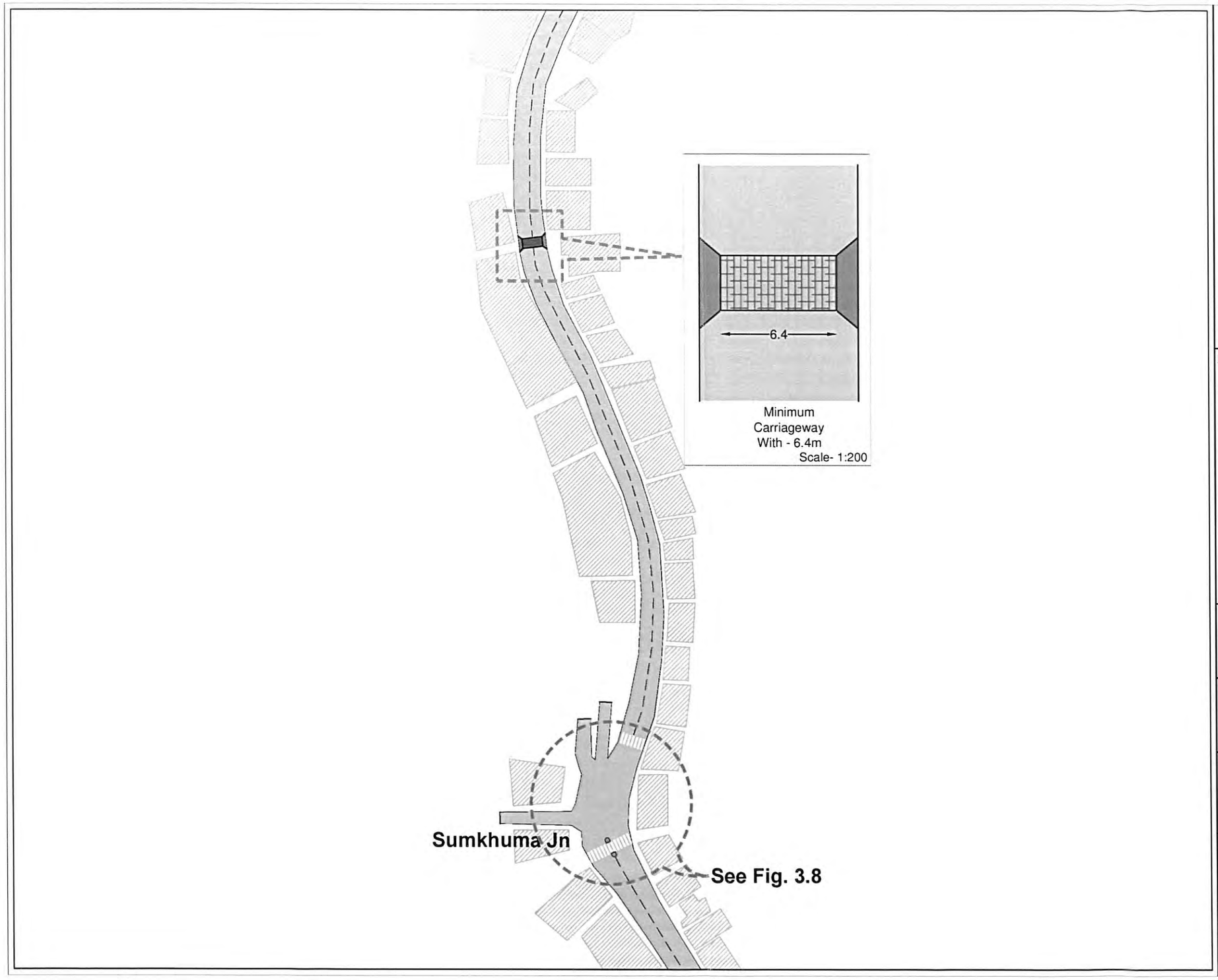
ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

Drawing Title:

Chanmari to Millennium Centre
Strip Plan-B

Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: MAR 2016	Date: MAR 2016
Scale: 1 : 1000	
Drawing No.	REV NO:

STRIP PLAN C



N

Legend:
- Carriage Way
- Building Line
- FootPath
- Zebra Crossing
- Pedestrian Island
- Build-outs, with Surface Marking

Design Consultant :

CDM Smith

Client:

Asian Development Bank

Government of Mizoram - PWD Department

Project Name:

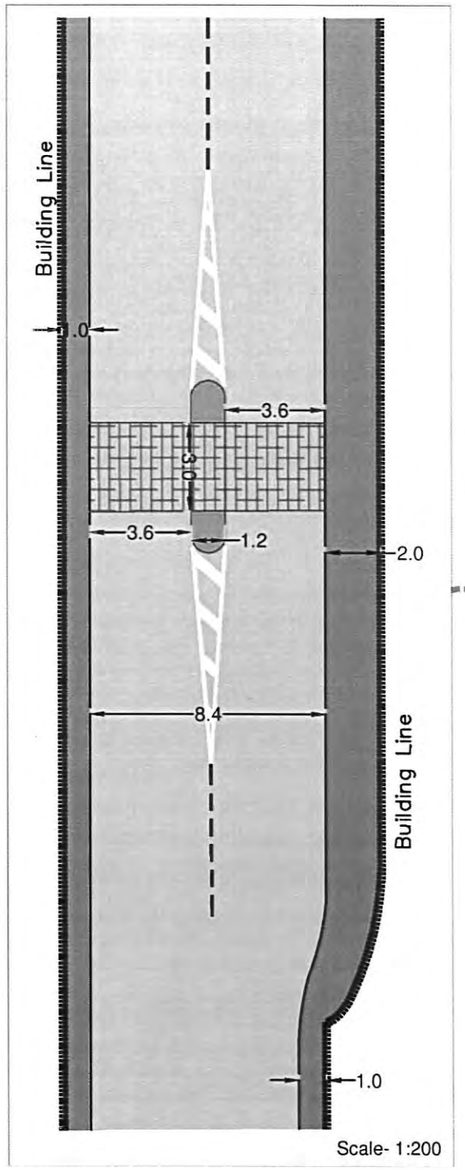
ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

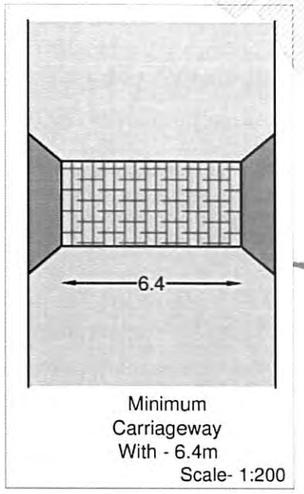
Drawing Title:

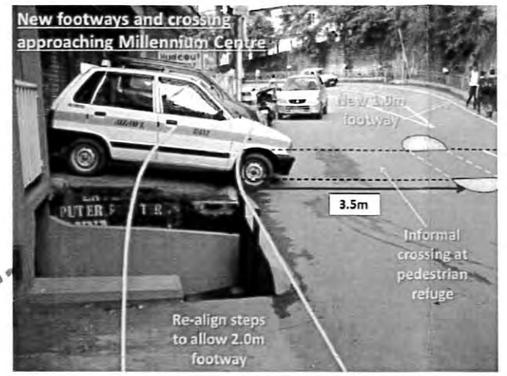
Chanmari to Millennium Centre
Strip Plan-C

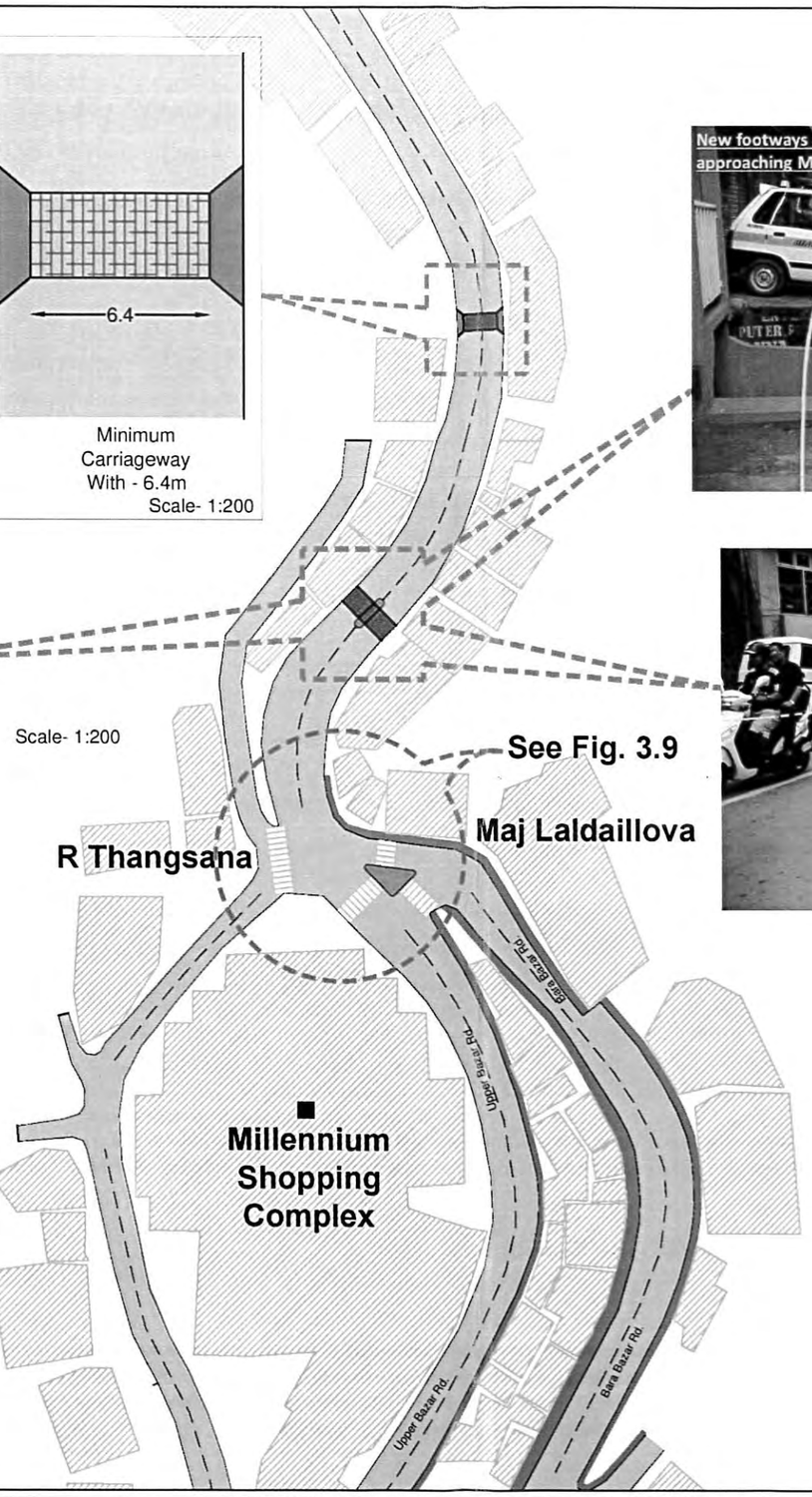
Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: MAR-2016	Date: MAR-2016
Scale: 1 : 1000	
Drawing No.	REV NO:

STRIP PLAN D









Legend:
- Carriage Way
- Building Line
- FootPath
- Zebra Crossing
- Pedestrian Island
- Build-outs, with Surface Marking

Design Consultant :

CDM Smith

Client:

Asian Development Bank

Government of Mizoram - PWD Department

Project Name:

ADB TA 8765:
Supporting Sustainable Urban Transport in Aizawl City

Drawing Title:

Chanmari to Millennium Centre
Strip Plan-D

Designed: VP	Checked: VP
Drawn: CR	Approved: RG
Date: MAR-2016	Date: MAR-2016
Scale: 1 : 1000	
Drawing No.	REV.NO:

5. APPROACH – MEDIUM TERM MEASURES

The medium term proposals will involve more complex engineering, higher costs and longer construction timelines compared with the short term proposals They could potentially be implemented as part of the Bus and Ropeway packages as discussed in Vol 1 – Main Report, though there will inevitably be some overlap between the short and medium term measures .

To improve the traffic flow efficiency and reduce travel times for public transportation users, bus priority schemes and traffic signals are included in the medium term measures. Some of the selected junctions are likely to operate under traffic signals. It is expected that the traffic signals would continue to be manned by traffic police initially.

The road and junction layouts proposed for the medium term measures are similarly based on measurements taken from Google Earth and then checked on-site by the project consultants.

The proposed medium-term measures are presented in the following chapters:

Chapter 6: Examples of Proposed Bus Lanes and Bus Priorities
Chapter 7: Travel Demand Management Measures

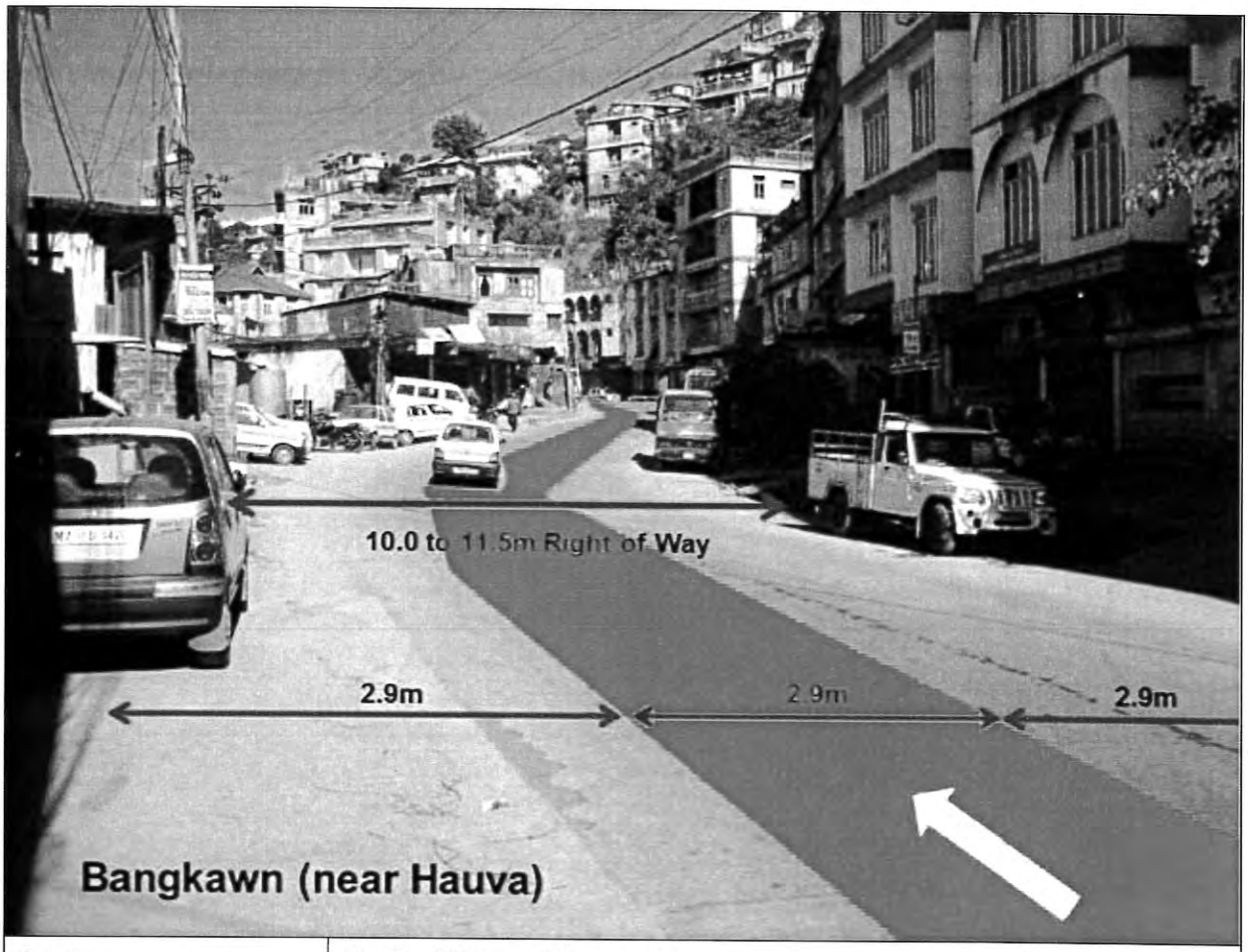
6. EXAMPLES OF PROPOSED BUS LANES AND BUS PRIORITIES, NORTH-SOUTH CORRIDOR

(Outline proposals, for implementation as part of a bus package)

The following Chapter presents ideas and suggestions for bus lanes and bus priorities along the main north-south corridor in Aizawl. In all cases the right of way has been measured by the consultants, and considered to be feasible for the introduction of bus lanes / priorities. Further detailed investigation and design is recommended for the medium term, as part of an overall bus improvement package for Aizawl.

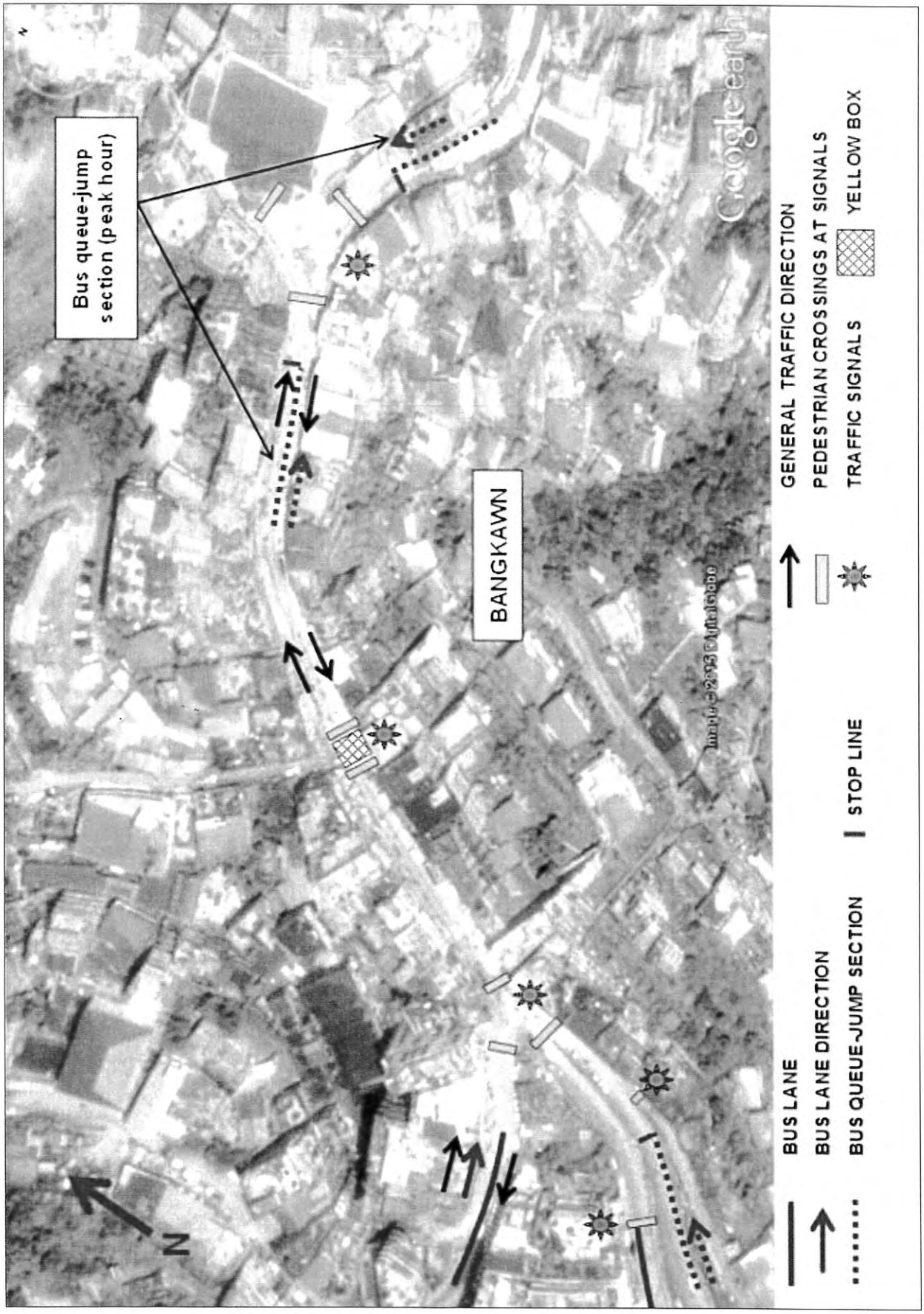
Table 6-1: Some Locations where Bus Lanes / Priorities may be feasible

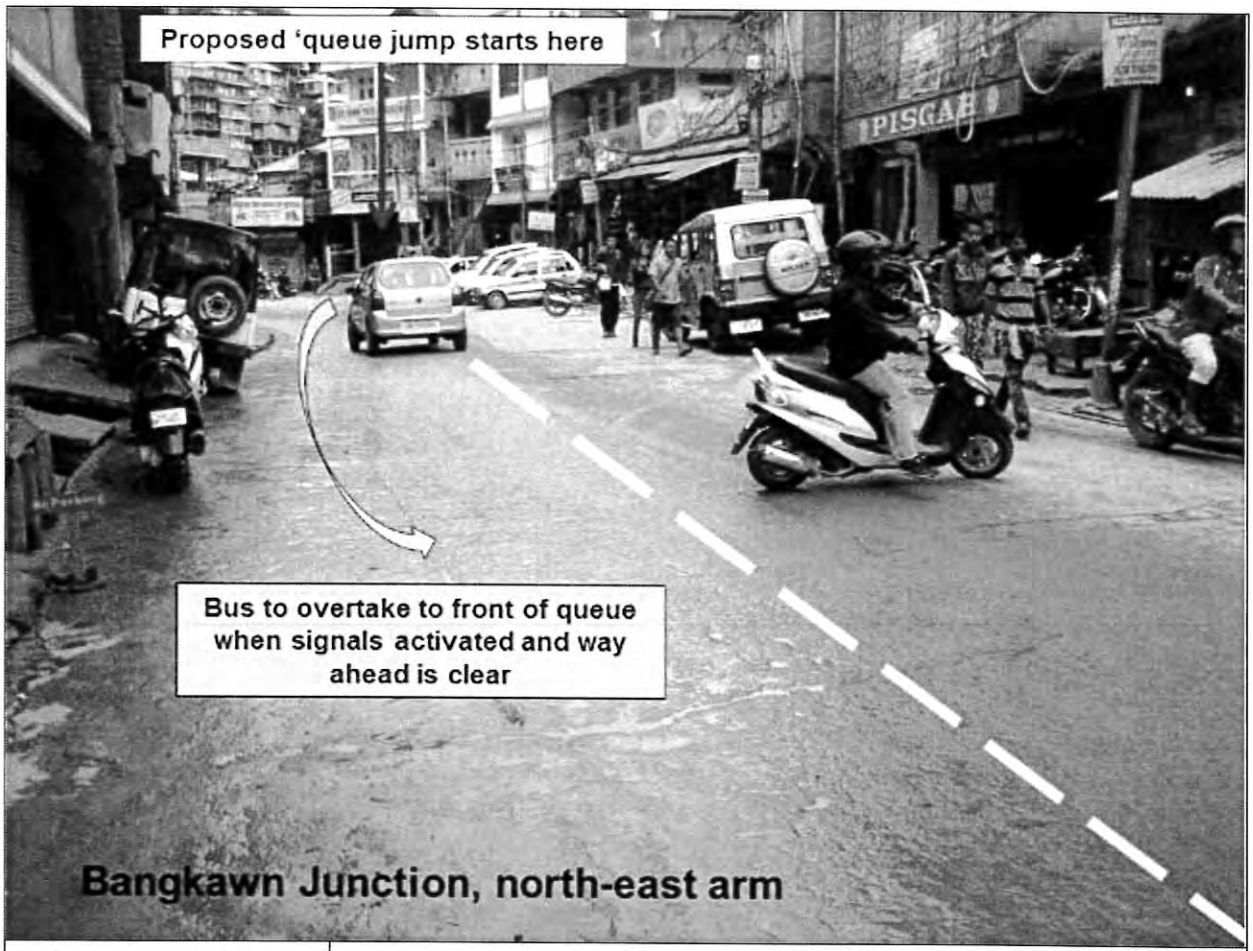
Sl. No.	Location	Direction	Type of Bus Priority	Length (m)	Illustration in Text?
1	Bangkawn, North of Hauva filling station	N-west-bound	Bus lane	200	Yes
2	Bangkawn Junction 3, north-east arm	N-west-bound	Bus queue jump	55	Yes
3	Bangkawn Junction 3, north-west arm	South-bound	Bus queue jump	45	
4	Bangkawn Junction 3, south arm	N-east-bound	Bus queue jump	65	Yes
5	Bangkawn Junction 4, west arm	East-bound	Bus lane	70	
6	Bangkawn Junction 4, s-w arm (Chaltlang)	N-east-bound	Bus lane	80	Yes
7	Bangkawn Junction 4, s-w arm (Rahmlun)	N-east-bound	Bus queue jump	90	
8	Ramhlun (South)	West-bound	Signals, shuttle working	100	
9	Chanmari Gyratory, n arm (to Chaltlang)	N-east-bound	Bus lane	50	Yes
10	Chanmari Gyratory, east side	North-bound	Bus lane	60	Yes
11	Chanmari Gyratory, south arm (from Zarkawt)	North-bound	Bus queue jump	30	
12	Lower Zarkawt Road (Bara Bazar)	South-bound	Bus signal advance	n.s.	
13	Lower Zarkawt Road (Zion Street)	South-bound	Bus signal advance	30	
14	Bara Bazar (s. of Israel Point)	South-bound	Bus Lane	200	Yes
15	Upper Bazar (City Hospital)	North-bound	Bus Lane	200	Yes
16	Zodin to Raj Bhaban	South-bound	Bus Lane	n.s.	
17	Temple Square to Zodin	North-bound	Bus Lane	100	Yes
18	Sikulpuikawn Junction, north arm	South-bound	Bus queue jump	30	
19	Sikulpuikawn Junction, south arm / New Street	North-bound	Bus Lane	120	Yes



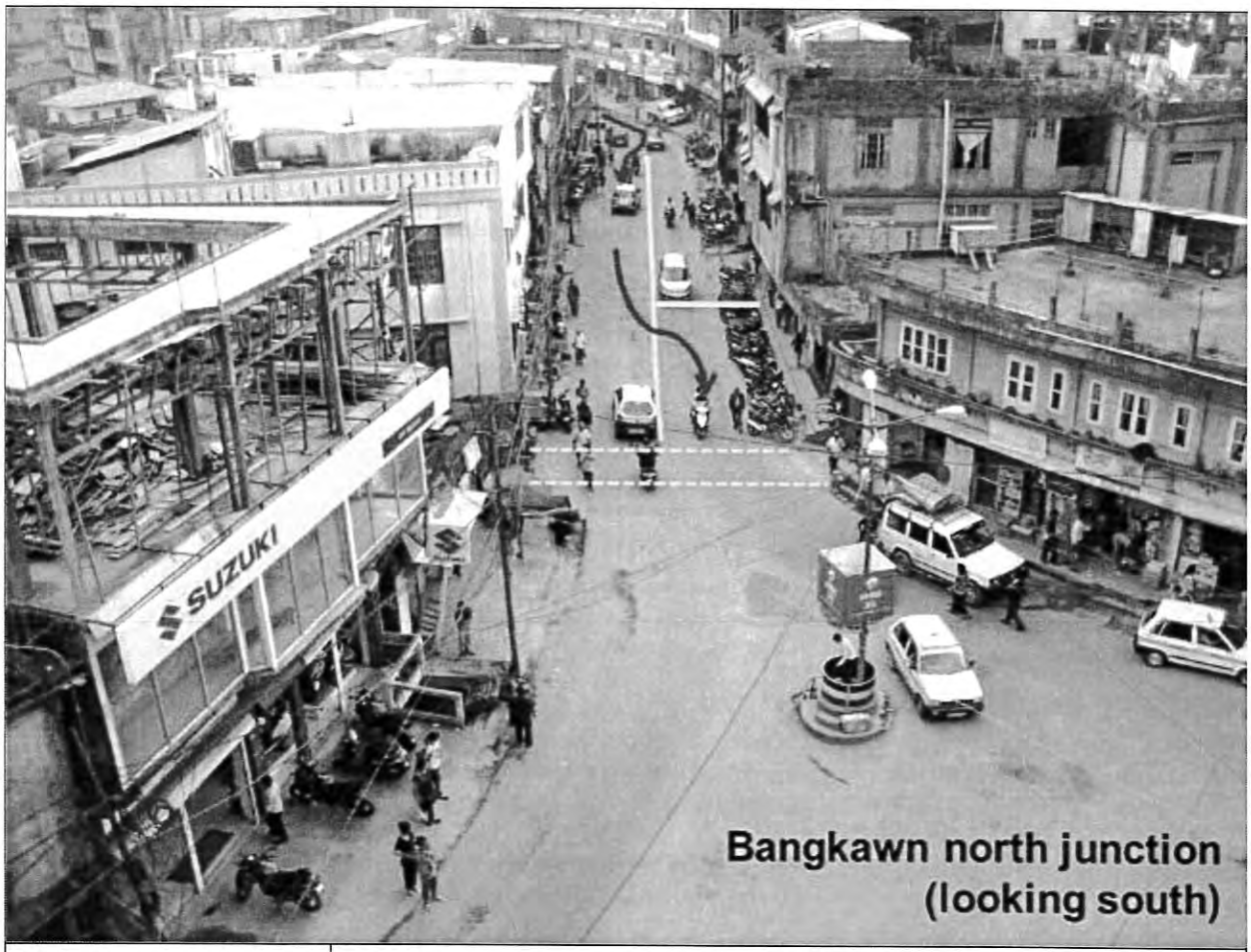
Section	North of Hauva filling station
Direction	North-west bound
Proposal	Bus lane
Length	200m
Road width	10 to 11.5m wide
Comments	No footways on either side. On-street parking and goods loading for shops, residences and wholesalers.

Bangkawn: Overview of Proposed Bus Lanes and Queue-Jumps

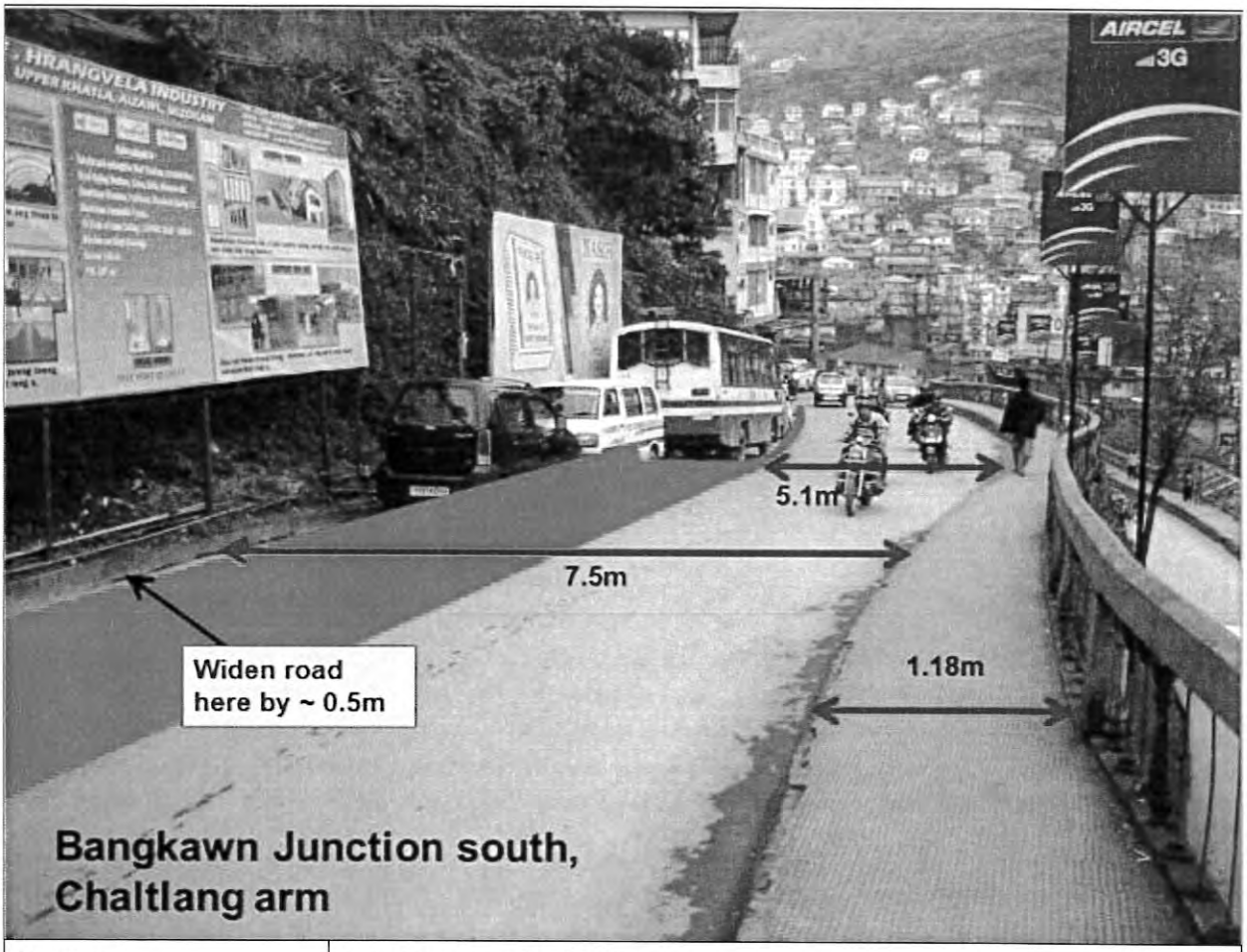




Section	Bangkawn junction, north-east arm (National Highway)
Direction	West, towards Bangkawn north junction
Proposal	Bus queue-jump at approach to Bangkawn junction
Length	55m (maximum distance for clear forward view to junction stop line)
Road width	Narrowest point is 8m (building to building)
Comments	No footways on either side. Scope for footway on new drain cover on north side, and by re-organising shop-front space and re-aligning private steps on south side

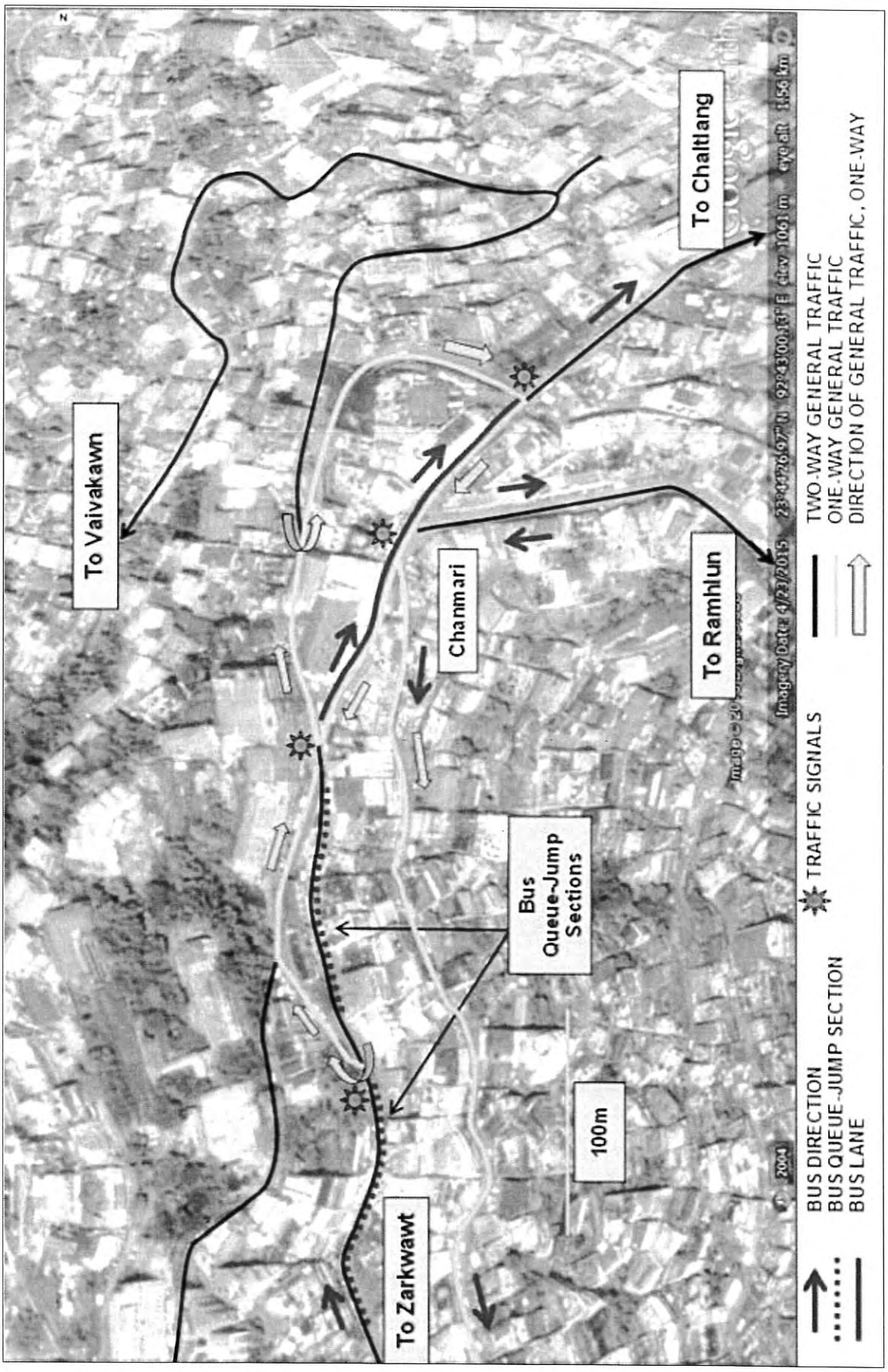


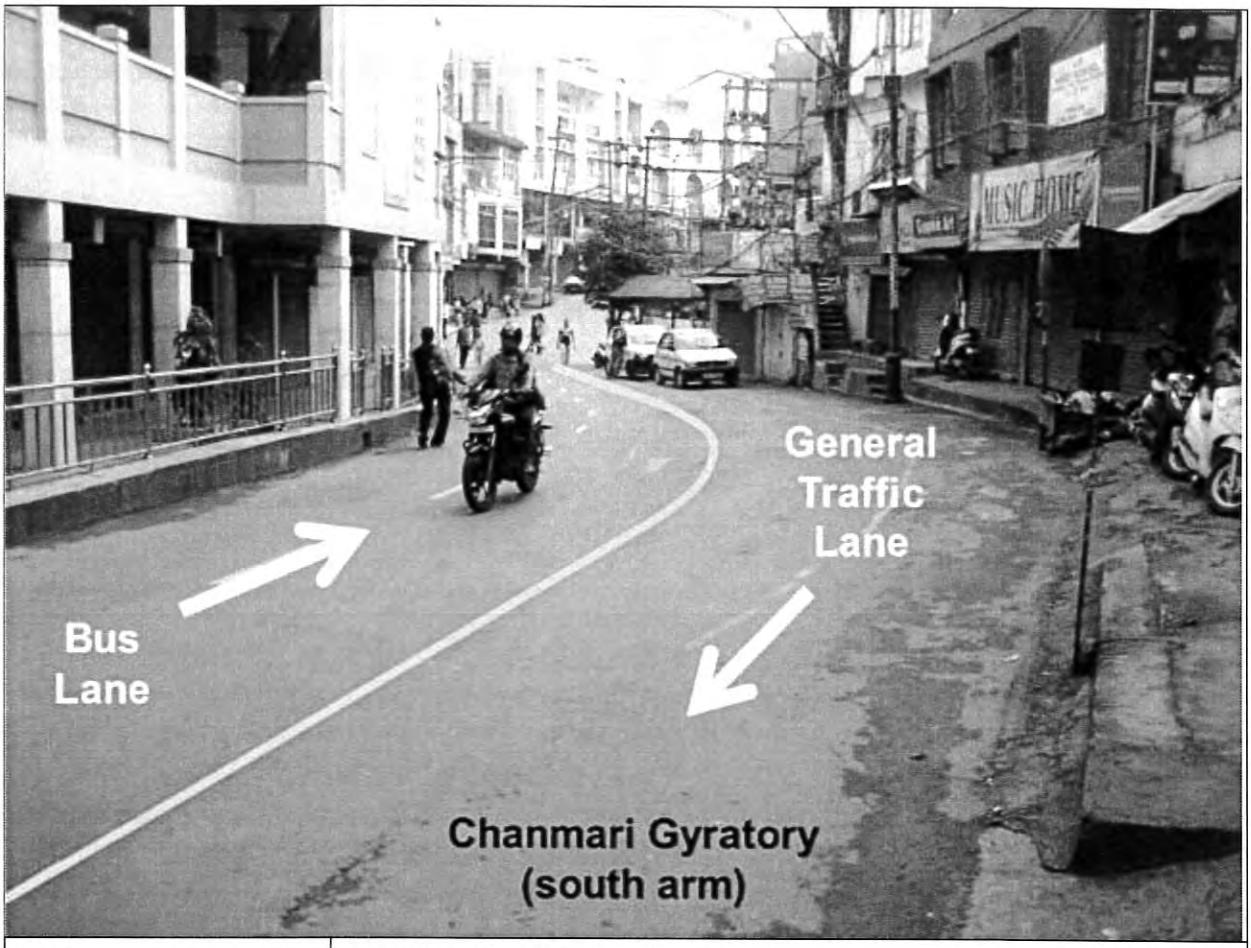
Section	Bangkawn north junction, south arm (National Highway)
Direction	Northbound, towards Bangkawn north junction
Proposal	Bus queue jump at approach to Bangkawn junction
Length	65m (maximum distance for clear forward view to junction stop line)
Road width	Narrowest point is 8m (building to building)
Comments	No footways on either side. Scope for new footways on both sides by re-organising shop-front space and re-aligning private steps



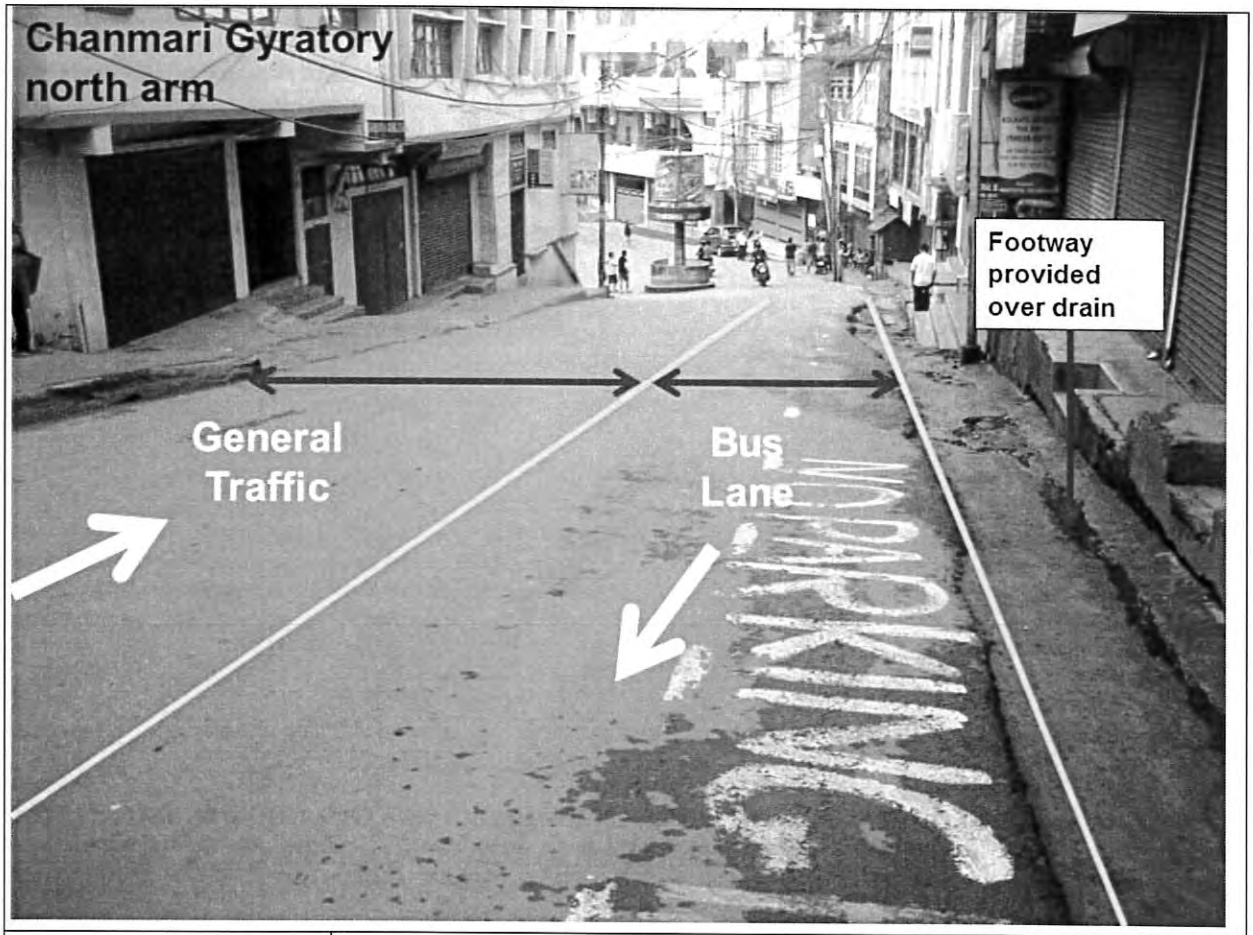
Section	Bangkawn to Chaltlang
Direction	Northbound, towards Bangkawn south junction
Proposal	Bus lane (peak hours only)
Length	80m
Road width	7.5m from edge of footway to edge of drain. Road will need to be widened slightly on west side
Comments	Proposed bus lane would stop approximately 100m before Bangkawn junction where road narrows. Limited on-street parking here would be restricted when bus lane is in operation

Chanmari Gyratory: Overview of Proposed Bus Lanes and Queue-Jumps

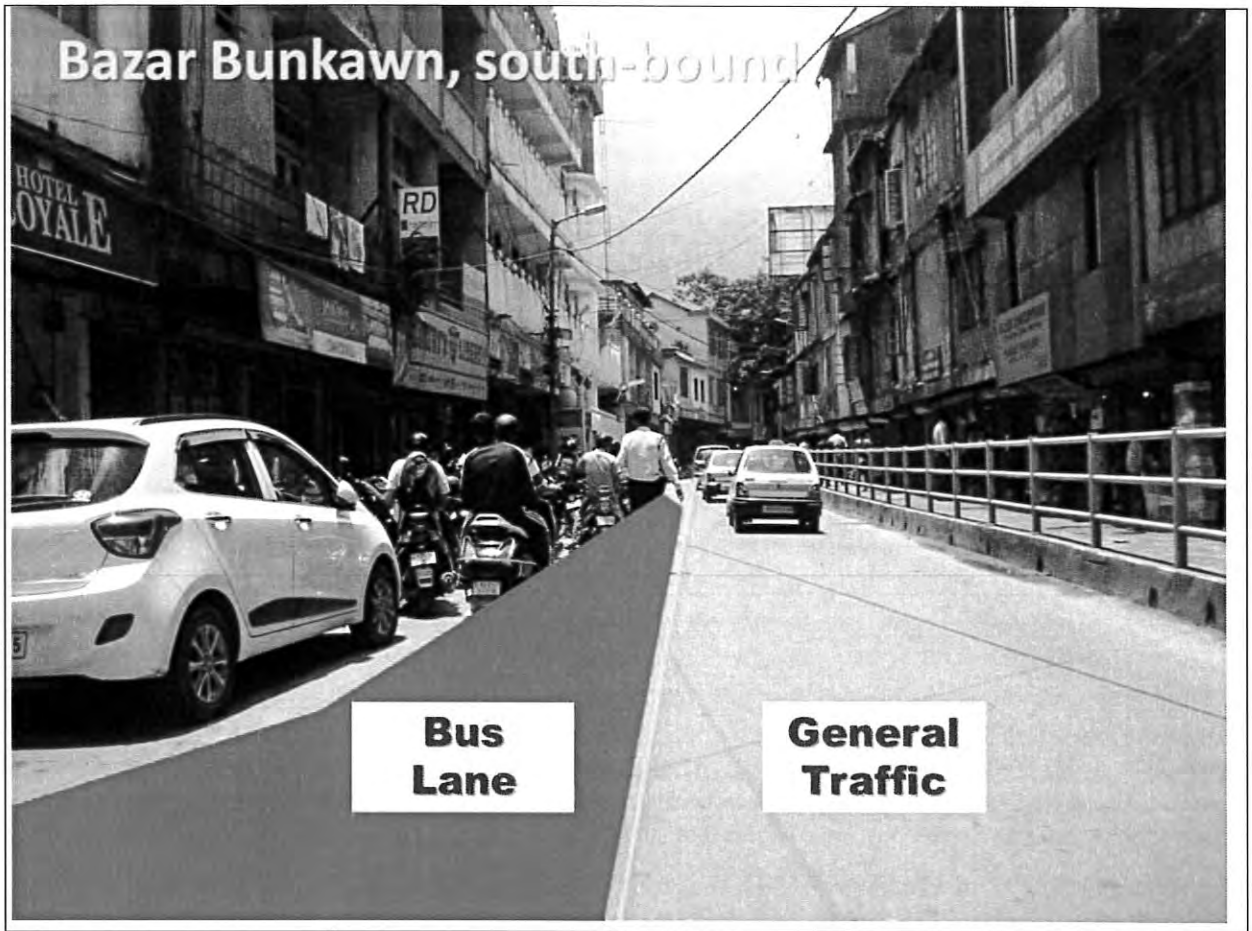




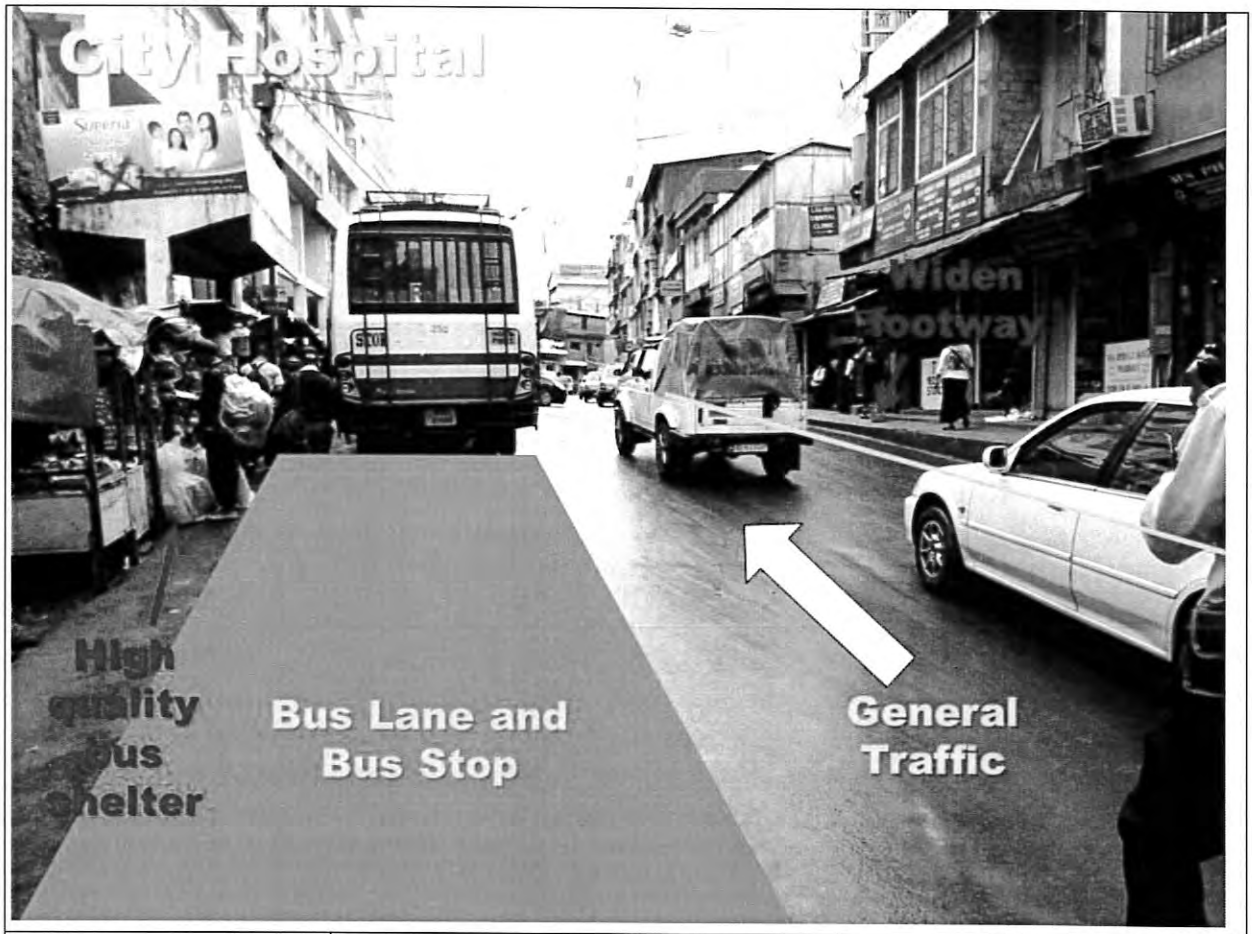
Section	Chanmari Gyratory (south-east arm)
Direction	Northbound, towards Chaltlang and Bangkawn
Proposal	Bus-only lane northbound
Length	60m
Road width	5.5m carriageway and .1.6m footway and drain at pinch point at junction
Comments	Will need to be widened to allow 2-way movement of large vehicles



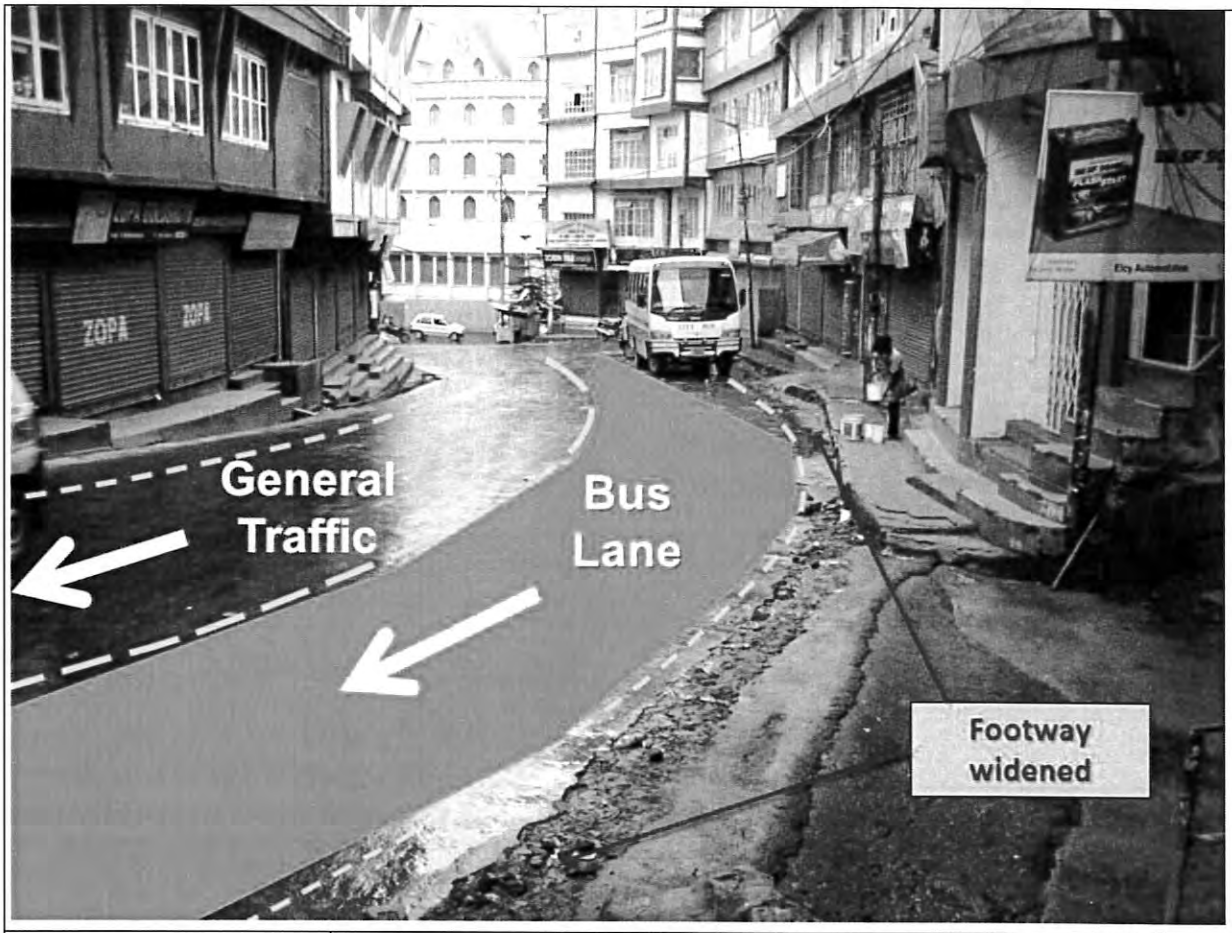
Section	Chanmari Gyratory, (north arm)
Direction	Northbound, towards Chaltlang and Bangkawn
Proposal	Bus lane
Length	50m
Road width	10.1m right of way
Comments	Re-grading of junction at Chanmari needed, due to sharp bend (left turn to Rahmlun) on steep slope



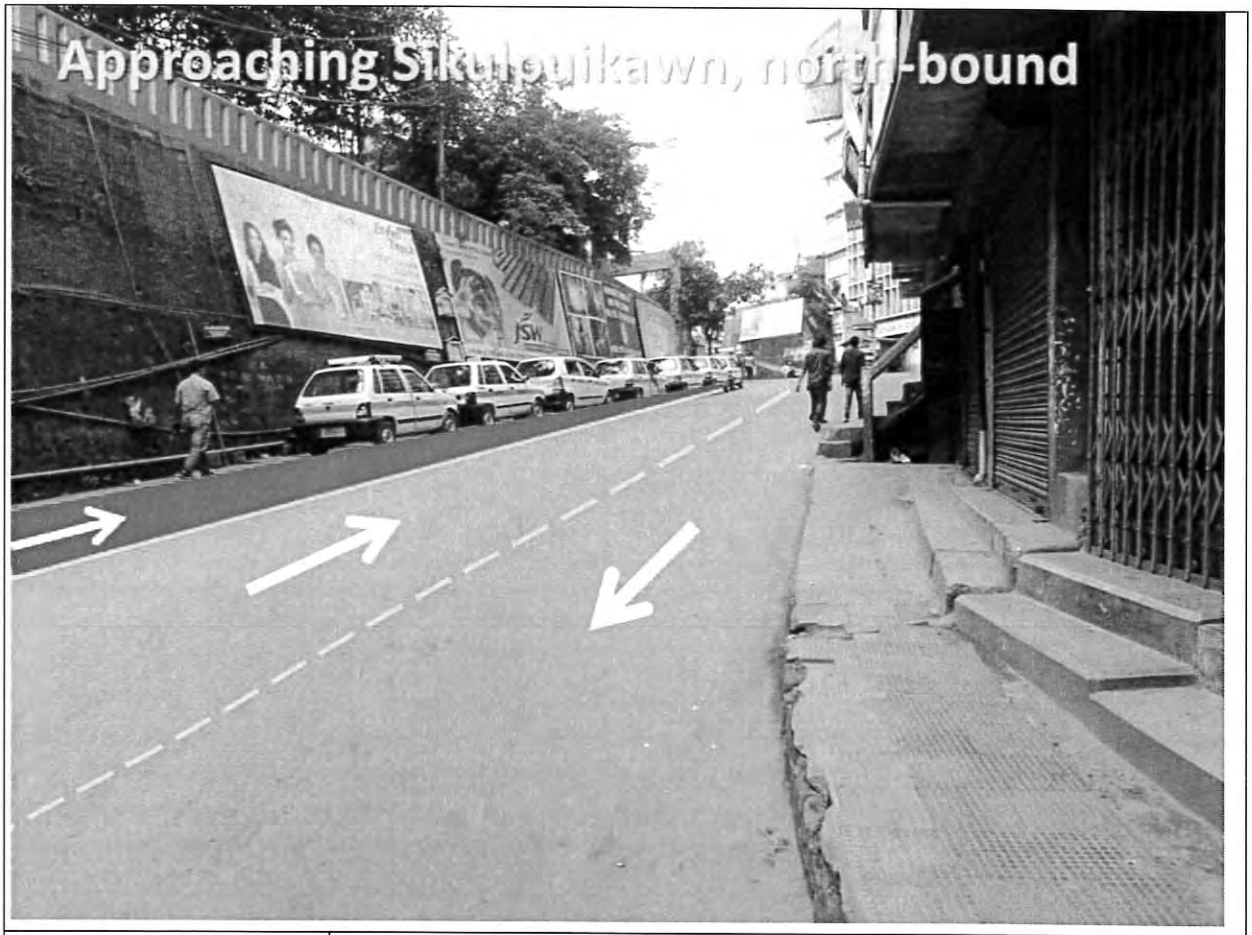
Section	Bazar Bunkawn
Direction	Southbound, towards Zodin Square
Proposal	Bus lane
Length	2000m
Road width	7-8m carriageway
Comments	Need to re-locate on-street parking (much of which is long-stay). Also need to recover footway from shops on east side.



Section	City Hospital, Bara Bazar
Direction	Northbound
Proposal	Bus lane
Length	200m
Road width	8.8m right of way (building to wall)
Comments	Extensive on-street two-wheeler parking



Section	Temple Square to Zodin
Direction	Northbound
Proposal	Bus lane
Length	110m
Road width	9.0m minimum right of way (building to building)
Comments	On-street car parking on west side



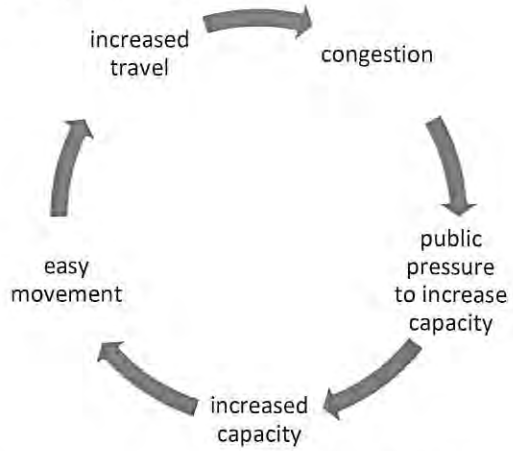
Section	Approaching Sikulpuikawn (New Street, from Mission Veng)
Direction	Northbound
Proposal	Bus lane
Length	120m
Road width	12m north of church; carriageway narrows to 8.7m at narrowest point just before Sikulpuikawn Junction
Comments	Moderate gradient on main road, rising from south to north

7. TRAVEL DEMAND MANAGEMENT MEASURES

The vehicular population in Aizawl has increased at a rapid rate over the last decade, especially in the last 2-3 years. The maximum increase has been in the number of two-wheelers. The roads of Aizawl are narrow and it is very difficult to widen the roads. As a result, there has been a reduction in the traffic flow along the main north-south corridor. During the peak period, traffic flow has reached saturation level.

The usual approach to address the problem of congestion is to increase supply. Most cities go through the "Cycle of traffic congestion" as shown below.

Figure 7.1: Cycle of traffic congestion



This is a result of the paradigm PREDICT AND PROVIDE. The problem can be addressed by another paradigm PREDICT AND PREVENT by applying principles of Travel Demand Management (TDM). TDM calls for reducing demand rather than extending facilities for ever growing demand.

The congestion reducing measures can be:

- On supply side: efficient use of existing facilities.

On demand side:

- Management of demand
- Controlling growth of demand
- Cutting down demand

These can be implemented by PULL measures and PUSH measures. Pull measures aim at attracting road users to alternative modes. Push measures try to demoralize private vehicle users. The various pull measures are:

- Traffic management
- Improvement of alternative modes
- Integrating multi-modal transport system
- New technology

The push measures are;

- Increasing vehicle occupancy
- Influencing time and need of travel
- Creating deterrence to travel by introducing charges

- Imposing restrictions
- Land use and urban planning

The various instruments for implementing TDM are:

Planning Instruments	Integration of Land Use and Transport Planning	e.g. Transit-oriented developement
	Public Transport Promotion	e.g. Priority at Intersections
	Strategies for Non-Motorised Modes	e.g. Cycling Policy
Regulatory Instruments	Physical Restraint Measures	e.g. Pedestrian zones
	Traffic Management Measures	ITS
	Regulation of Parking Supply	Maximum parking limits
	Low Emission Zone	In City Center
	Speed Restrictions (30 km/h)	In built up areas
Economic Instruments	Road Pricing	e.g. during peak hours
	Tax Incentives	e.g. for cleaner vehicles
	Parking Pricing	Off- and on-street parking
Information Instruments	Public Awareness Campaigns	E.g. participation in Mobility Weeks
	Stakeholder Conferences	On transport policy documents
	Driver Training / Eco Driving	e.g. for City drivers
	Promotion of Mobility Management in Companies	e.g. Employer Passes, flexible work hours
Technology	Promotion of Cleaner Technology	e.g. Green Procurement
	Modern technology for transport systems	ITS, passenger information, etc.

Source: Implementing Transport Demand Management Measures, GIZ Transport Policy Advisory Services, Urban Mobility India Conference, Delhi, December 2013

The specific measures for Aizawl can be:

1. Improvement of bus service to encourage less use of private vehicles and travel at a cheaper price
2. Better management of traffic on road with introduction of traffic signal and information system
3. Encourage walking by designating priority walk routes and providing improved walk ways along the roads, integrated with bus shelters / stops and improved stairs
4. Integrate ropeway stations with bus stops, and feeder services in terms of taxi-vans
5. Bring change to parking policy with restriction on street side parking along the main corridors and increased rate of parking at off street locations in the central area
6. Encourage car pools by proper information dissemination
7. Provide financial incentives for bus use by offering reduced fare monthly passes to office employees
8. Introduce congestion charging on private vehicles for the central area over the next five to ten years
9. Increase the tax amount for registration of personal vehicles, both cars and two wheelers and use the amount to set up an Urban Transport Fund at the city level which can be used for improving public transport
10. Introduce cess on fuel which contribute to Urban Transport Fund
11. Introduce staggered school hours depending on area and also staggered office hours

12. Improve internet facilities that will encourage application driven taxi service on demand rather than increasing the number of taxis waiting and driving around for passengers.

A detailed listing of travel demand management measures is given below

1) Land-use planning and building controls	**6) Motivational and awareness projects**
2) Vehicle and user taxes	**7) Promoting bus use**
3) Vehicle restrictions	**8) Promoting walking**
4) ITS (intelligent transport systems) applied to travel demand management	**9) Promoting cycling**
5) Car and motor-cycle sharing	**10) Applied university research**

TRAVEL DEMAND MANAGEMENT MEASURES

Sl. No	*MEASURE*	*DETAILS*	*ALREADY BEING DONE IN AIZAWL?*
1. LAND-USE PLANNING AND BUILDING CONTROLS			
1	Decentralisation		
2	Limits on building densities and plot ratios		
3	Rules and max. standards for off-street parking	Limitations on the number of parking spaces permitted in new developments: - Less in central areas - More in suburban areas with more land and less congestion	• No building-specific standards adopted yet. • Currently policy is to insist that all vehicle purchasers must have proof of off-street parking. • Also govt. policy to increase the amount of off-street parking at govt. and commercial buildings
4	Green travel plans for large developments	Package of measures to encourage people to travel to work or school using sustainable modes (bus, walk, cycle, car share, etc.)	
2. VEHICLE & USER TAXES			
1	Vehicle tax	Higher for larger vehicles Higher for fuel-hungry vehicles	
2	Fuel tax		
3	Road tolls		This project consists initially for implementing per day penalty for single occupancy vehicle for Zarkawt Road and MG Road between Chanmari up to Sikulpuikawn. The actual amount of charge would be estimated based on a feasibility study. If successful it will be

Sl. No	MEASURE	DETAILS	ALREADY BEING DONE IN AIZAWL?
			extended in medium term to congestion tolls to all vehicles by use of LPR cameras.
4	Area congestion charge		
5	Parking charges	On-street	See also 'Parking Restrictions' below
		Off-street	
3. VEHICLE RESTRICTIONS			
1	Traffic-free days		
2	Street closures for Saturday markets	Already being done around Aizawl (see photo on right: Saturday market at Chanmari, road to MacDonald Hill)	
3	Road closures for certain vehicles		Vehicle restrictions already in place all over Aizawl Scope to consider vehicle width restrictions
4	License restrictions	e.g. Ceiling on vehicle license numbers Auction of new licenses	
5	Odd-Even License Plate Scheme		For volume reduction of vehicles the city should do a pilot project of Odd/Even license plate scheme without the use of technology for limited days for private vehicles (white board vehicles only) in the CBD area. The scheme may be operated with Technology as Transport Department vehicle registration database is automated. Adequate user education and prior intimation if necessary before implementation.
6	Parking restrictions	e.g. Residents parking schemes (only local residents permitted to park in a designated residential area)	
4. USE OF ITS (Intelligent Transport Systems)			
1	VMS, Variable message signing (for car parks)		
5. CAR & MOTORCYCLE SHARING			
1	Car-pooling scheme		a car-pooling scheme for employees, offices and companies. Where feasible rewards in cash or kind may

Sl. No	MEASURE	DETAILS	ALREADY BEING DONE IN AIZAWL?
			be given to those who participate. Free mobile application may be developed by the state for use in the scheme. Such schemes are privately and voluntarily developed in other cities with voluntary user participation.
2	Car share		
3	Car club		
4	Shared taxis		
5	Shared motorcycles		
6	Staggering Work Time:	The city has already staggered the school hours to reduce conflict between traffic and school destined vehicles/users. Opportunities for staggering office hours particularly those in Zarkawt area exist. Some offices should operate on a 6-day week basis and some on a 5-day week basis to reduce week day congestion intensity	
6. MOTIVATIONAL & AWARENESS PROJECTS			
1	Walk-cycle-bus to work day		
2	Green travel website	Website with information on public transport, sustainable travel, etc.	
3	On-line travel planner for Aizawl	App showing route options for bus, walking, shared taxi and cycling	Google Maps already provides this in other cities
4	Public health education (benefits of active travel and exercise)	Publicity	
5	Twinning with international cities for 'travel awareness'	e.g. Switzerland Germany Japan	
6	Indian Hill Cities Transport Forum	Establish national forum for exchange of 'best practices'	
7	Personalized travel planning		
7. PROMOTING BUS USE			
1	'Bus Day', 'Bus Week'		Bus fares are either subsidized or waived to encourage public transport. The city can implement similar programs and may include taxis with state support after discussion with Taxi Owners Associations.

Sl. No	MEASURE	DETAILS	ALREADY BEING DONE IN AIZAWL?
2	Bus information	Bus route maps	
		Bus timetables	
		Real-time information at bus stops	
3	Concessionary fares	Free off-peak travel for pensioners and children	
4	Bus ticketing	Smart cards (integrated travel)	
		Quantity discounts	
		Off-peak discounts	
		Season tickets (weekly, monthly, yearly)	
5	Bus infrastructure	Bus lanes & bus priorities	
		'RED ROUTES'	Priority bus corridors given special status for parking restrictions, loading restrictions, etc. Red paint used to indicate a 'RED ROUTE'. High level of police enforcement applied here
6		High quality bus stops / shelters	
7		'RED ROUTES'	
8		High quality terminals and public transport interchanges	
9		Park-and-ride facilities on outskirts	
8. PROMOTING WALKING			
1	Improved pedestrian facilities	Footways Road crossings Control of on-street parking and hawkers Covered drains Removal of obstacles and pit-falls Street lighting	
2	Development of 'strategic' pedestrian routes	Improved facilities (as above) Pedestrian route signage City walking maps Local signboards showing routes Travel website showing routes	
3	Identify scenic walking routes for Aizawl (tourist and recreation)		
4	Public walking / jogging events, with road closures	Already being done in Aizawl – a Saturday morning youth jogging event is sometimes held on the north-south corridor early in the morning, organized by YMA?	
9. PROMOTING CYCLING			

Sl. No	MEASURE	DETAILS	ALREADY BEING DONE IN AIZAWL?
1	Bike day – Sunday		
2	Teach cycling at school		
3	Teach cycling to adults		
4	Support to local cycling clubs		
5	Establish Aizawl Mountain Bike Club		
6	Establish Aizawl Bicycle Forum	Cycling enthusiasts, traders, public health workers, educational and sports representatives – consultative group to advise the government on promoting cycling in Aizawl	
7	Cycling sports events	e.g. Sprint events at national stadium Establish the 'Tour-of-Aizawl' – an annual cycling competition for all-India competitors and foreign riders	
8	Inter-school cycling competitions		
9	Bicycle route map for Aizawl	Printed map On-line route map	
10	Loans for bike purchase	Through schools and large workplaces	
11	Organise bike-repair sessions at schools and large workplaces		
12	Bike hire scheme for north-south corridor	Photo shows Paris bike hire scheme (Velib). A small scale scheme could be tested in Aizawl centre, operated by bike shops	
13	Safe cycle parking	On-street facilities 	In basement car parks 

Sl. No	MEASURE	DETAILS	ALREADY BEING DONE IN AIZAWL?
14	Bike racks on buses and taxis		
15	Bicycle lift (as in Trondheim, Norway)		
16	Introduce folding bikes (for combined bus-cycling trips)		
17	Electrically-assisted bicycles		Electrically-assisted mountain bike (shown left), with 50km range and able to climb the steepest hills. 700,000 electrically-assisted bicycles were sold in Europe in 2011, compared with just 11,500 electric cars.
18	Bicycle 'Bus'	Group of (inexperienced) cyclists escorted to school or workplace by experienced cyclists, on a regular basis	
10. APPLIED UNIVERSITY RESEARCH			
1	Various	e.g. Research into travel patterns, urban development, policy studies, accidents & road safety, etc.	