

# Traffic Management & Work Zone Safety during Construction

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## ABSTRACT

The purpose of this study is to describe the strategies and processes needed to implement a traffic management system. Such a system would significantly reduce the fatalities and accidents during the construction of Highways, improve the transportation within the construction period, and increase business profitability. Five themes or action requirements emerged from the data analysis: to improve transport operations and transport services profitability, reduce traffic jams and fatalities, provide sufficient driving training, maintain road infrastructure, and maintain traffic law enforcement. The findings and recommendations from this study may improve the profitability of businesses, reduce the traffic jams and fatalities, thereby contributing to positive social change.

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## I. INTRODUCTION

Why to Prepare Traffic Management Plans – Reasons

- Unexpected road conditions by the Work Zones resulting in higher degree of vulnerability to the workers present near roadway
- Work Zones- Areas of conflict between normal operating traffic, construction workers, road building machineries and construction traffic
- Problem accrue in urban roads with significant proportion of vulnerable road users
- To provide reasonable safe and efficient movement of road users through or around the work zones
- To provide Safety for road users, workers and road equipments
- To provide continuity of the movement for motor vehicle, bicycle, pedestrian traffic, transit operations and access to properties and utilities
- To minimize hindrance or delay to road users
- To provide clear and positive guidance to road users
- To ensure roadside safety maintenance

## II. POINTS TO BE KEPT IN MIND WHILE PREPARING WORK ZONE TRAFFIC MANAGEMENT PLAN ( WTMP )

- a) Length of Advance Warning Zone (AWL); shape, size, background color, placement location of traffic signs.
- b) Length of Approach Transition Zone; rate of taper according to lateral buffer distance & approaching speed of vehicles.
- c) Length Terminal Transition Zone; rate of taper according to lateral buffer distance & approaching speed of vehicles.

- d) Width of carriageway of proposed diversion lane: It should be equal to the width of lane closed as per CA.
- e) Provision of pavement marking and road studs on entire Work Zone length.
- f) Fixing of 200mm nominal diameter flashing light blinkers in approaching direction of travel to diversion.
- g) Fixing of blinking lights on top of barricading along the complete activity zone for safety of road user during night.
- h) Pedestrian facilities to cross over from one carriageway to other carriageway like, temporary footpaths, pedestrian crossing points with zebra crossing, and also refuges.
- i) Speed reduction measures on cross roads and at the work zone like construction of Rumble Strips, table tops, raise bar markings, etc.
- j) Deployment of flagman to regulate the traffic on junctions.
- k) Location of Entry/ Exit of construction vehicles movement to & from activity zone.

### III. ELEMENTS OF TEMPORARY TRAFFIC CONTROL ZONE

- Advance Warning Zone
- Approach Transition Zone
- Activity Zone
- Terminal Transition Zone
- Work Zone End

**Advance Warning Zone** This is the section of road in which the road users are warned in advance about the presence of work zone/hazard and are advised for change in driving conditions/to reduce their speed. This information is conveyed through a series of traffic signs along the length of the zone like: Men at Work, Diversion Ahead, Speed Limit, No Overtaking, Shift to Other Carriageway, Rumble Strips, Keep Left.

**Approach Transition Zone** In this section of transition zone, road users are redirected from their normal path through lateral shifting of normal pathway by strategic use of tapers or with circular curves. Tapers are created by using a series of channelizing devices and /or pavement markings.

**Activity Zone** It is the section of highway where the construction activity takes place. It comprises of

- Work Space – This space is used by Workers, Equipment & Material.
- Traffic Space – This space is used for the movement of construction vehicles.
- Buffer Space – This space is a lateral or longitudinal length/width that separates the normal traffic flow from work space or unsafe area and includes some recovery space for errant vehicle. This space is not used for any work activity, storage of equipment, vehicles and material.

**Terminal Transition Zone** In this zone, traffic is redirected from deviated path to their normal path and is achieved through tapering of section length or through circular curves. Tapers are created by using a series of channelizing devices and /or pavement markings.

**Work Zone End** This the point where last temporary traffic sign is posted to indicate the end of the work zone and normal traffic operations resumes from this point.

#### IV. SUGGESTED LENGTHS FOR TEMPORARY TRAFFIC CONTROL ZONES

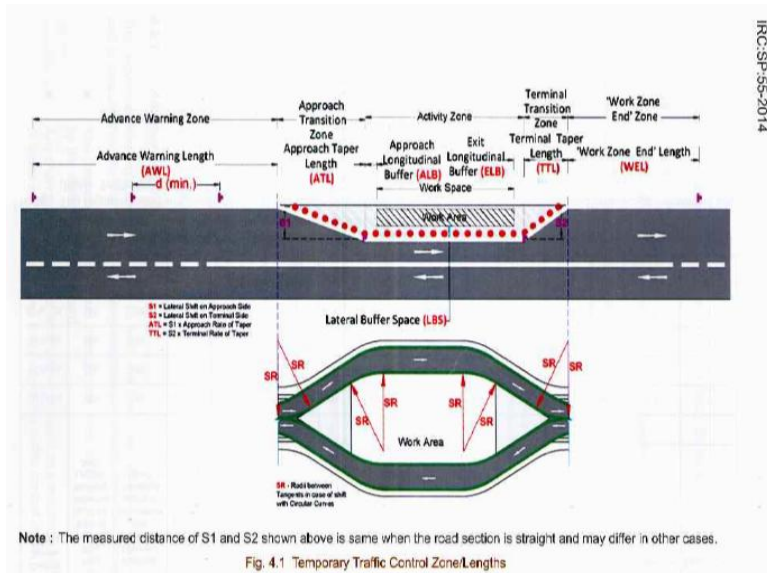
Table 4.1 Suggested Lengths for Temporary Traffic Control Zones

Speed at the Start of Traffic Control Zones (kmph)	Advance Warning Zone Length		Transition Zone Length								Buffer Space			Work Space	Distance Between Sites in kilometers			
	First Sign from Start of Taper i.e. Advance Warning Length-ATL	Minimum Distance between two successive signs in meters-d (min.)	Approach Taper Length in Meters-ATL				Terminal Taper Length in Meters-TTL				Radius in Case of Circular Curves in meters - SR	Work Zone End Length in meters - WEL	Minimum Approach Longitudinal Buffer in meters - ALB		Minimum Exit Longitudinal Buffer in meters - FLB	Minimum Lateral Buffer Space in meters - LBS	Desirable	Exceptional
			Rate of Taper	Example Width of Hazard (S1) including Buffer Space in meters			Rate of Taper	Examples Lateral Shift Including Buffer Space (S2) in meters										
				1	2	4		1	2	4								
Up to 50	180	40	1:12	12	24	48	1:10	10	20	40	30	45	10	5	0.5	Varies**	2	1
51 to 65	270	55	1:15	15	30	60	1:12	12	24	48	60	60	15	10	0.9		5	2
66 to 80	350	80	1:18	18	36	72	1:15	15	30	60	165	75	30	15	1.2		10	5
81 to 100	500	100	1:20	20	40	80	1:18	18	36	72	250	105	60	30	1.2		10	5
101 to 120	1100	120	1:25	25	50	100	1:20	20	40	80	400	135	100	60	1.5		10	5

\*\* The length of work space depends upon the nature of work actually taken up. For example for routine maintenance work, it can be quite small, whereas for major improvement work, it can be upto 5 km.

Note : The recommended length of work zone and distance between two sites given in this Table is based on practice followed in UK (Refer: Traffic Sign Manual, Chapter 8, 2009, DoT)

Reference: IRC:SP: 55-2014, Page no. 23



Reference: IRC:SP: 55-2014, Page no. 24

#### V. ROAD SAFETY GUIDELINES

- i. Providing clear illustrations and diagrams in the media to educate much of the public before new interchanges open.
- ii. Installing clear road signs and direction indicators to aid motorists in deciding their path of travel well in advance.
- iii. Painting lane markings that guide road users through the interchange without obstructing the flow of traffic.

- iv. Performing safety inspections and audits to determine effectiveness of road design and clarity of signage.
- v. Proper visibility of Line Of Sight, especially at the junction so that the rider can control his speed over vehicle.

## VI. TRAFFIC CONTROL DEVICES TO BE USED

- **Road Signs** Standard highway signs for information, speed limits, and work zones will assist drivers in identifying, in designated traffic paths, such directives as: EVACUATION ROUTE; DO NOT ENTER; REDUCED SPEED AHEAD; ROAD CLOSED; and NO OUTLET. Using standard highway signs for internal construction worksite traffic control will assist workers in recognizing the route they are to use at the construction site.

- **Channelizing Devices:**

- Traffic Cone
- Tubular Markers
- Hazard Markers
- Drums
- Barricades
- New Jersey Barrier
- Water Filled Barricades
- Delineators

- **Lightning Devices**

**Flood Lights-** Used at night during maintenance or construction activities when vehicular traffic volumes are lower and when work is to be done on a double shift basis

**Flashing Beacon Lights-** Yellow light of 200mm nominal diameter with rotating/flashing amber light to be operated round the clock used to alert the road drivers about the changing roadway conditions

- **Temporary Pavement markings & Road studs** Pavement marking shall be provided on intended vehicle path along the entire length of work zone and shall remain there in day, night, under wet and dry pavement conditions. The pavement marking shall be provided as per IRC: 35.

The road studs of amber color shall be provided on pavement marking @ spacing of 1.5m to 1.90m at acute temporary diversions and to separate the contra flow traffic.

- **Pedestrian Facilities**

1. Temporary Footpaths
2. Crossing points for pedestrians & cyclists with pavement marking and also refuges.
3. Construction of Speed reduction measures like Rumble strips on cross roads before zebra crossing and before approach taper zone.

- **Deployment of Flagman** The flagman should be specific and assigned personnel for controlling the traffic during peak and off peak hours of traffic flow at the construction zones.

He must be provided with reflective jacket, safety helmet, safety shoes ,He must be equipped with red signaling flag of size 600mm x 600mm, octagonal & round shaped retro reflective hand paddles of 600mm x 600mm and blinking torch.



## CONCLUSION

There must be a traffic control plan for the movement of vehicles in areas where there are also workers conducting other tasks. Drivers, workers on foot, and pedestrians must be able to see and understand the routes they are to follow. The authority in charge, Federal, state, or local, will determine the configuration of the temporary traffic control zone for motorists and pedestrians. The construction project manager will determine the internal traffic control plan within the construction/demolition worksite. When there are several projects, coordinated vehicle routes and communication between contractors will reduce vehicular struck-by incidents.

## REFERENCES

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