TRAFFIC SAFETY AND MANAGEMENT PLAN

PROJECT NAME: Upgradation of Road from Badami Bypass junction (Km2+870) to Pattadakallu (Km 21+530) in link 21E and Pattadakallu (Km 0+000) to Kamatagi (Km 22+280) link 21F including additional length for Badami bypass (2.190 kms) in link 21E

ASHOKA BUILDCON LIMITED

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1.0 General

The arrangement for traffic during construction shall be in accordance with the following:

- Clause 112 & Clause 800 of MORTH specifications.
- IRC: SP:55-2001-"Guidelines on safety in road construction zones".

The traffic arrangement during construction shall be so as to ensure that.

i) Road users are accommodated through and around the construction zones safely with minimum of delays;

ii) Traffic control and the construction activities are coordinated to provide for safe and efficient flow of traffic together with efficient, safe and rapid progress of the construction activity. Prior approval from IR &/ Environmental Specialist of CSC will be taken before commencing of any construction work

iii) Where construction activities are taking place at multiple sites along the same or on parallel routes, construction activity and the movement of road users is co-ordinated to ensure that the total delay along the route or on signed alternative routes is within acceptable limits.

iv) Driver behaviour is effectively influenced so that the speeds are reduced to the desired levels on the approaches to and within the construction zones;

v) In the urban environment, works requiring partial road closures on alternative routes should be phased, where possible, so that they are not undertaken at the same time.

Vi) The arrangement of traffic diversion during construction will be accordance with Environmental Management Plan of ADB approved IEE Report

Vii) Safety measures will be as per safety sub clauses 4.8, 4.15 and 6.7 mentioned in Contract Agreement Vol. I

The contractor shall at all times carry out work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway, the Contractor shall, in accordance with the directives of the Engineer, provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement, or along a temporary diversion constructed close to the highway.

1.1 Traffic safety and control

The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic approaching or passing through the section of the highway under improvement.

The barricades erected on either side of the carriageway / portion of the carriageway closed to traffic, shall be of strong design to resist violation, and painted with alternate black and white stripes. Red lanterns of warning lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

At the points where traffic is to deviate from its normal path (whether on temporary diversion or part width of the carriageway) the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or similar devices as per the directions of the Engineer. At night, the passage shall be delineated with lanterns or other suitable light source.

1.2 Maintenance of Diversions and Traffic Control Devices

Signs, lights, barriers and other traffic control devices, as well as the riding surface of diversions shall be maintained in a satisfactory condition till such time they are required as directed by the Engineer. The temporary diversion road shall be kept free of dust by frequent applications of water, if necessary.

2.0 **Safety in road construction zones**

The construction zone creates an environment where the road user is faced with a series of unusual hazards in the form of unfamiliar routes, substandard horizontal and vertical alignment, adverse cambers, construction equipment etc. The road user also has to watch for traffic control devices apart from performing normal driving functions of vehicle control and responding to other traffic and hazards. These factors increase the strain on driver performance and lead to accidents. The safety practices in construction zones should, therefore, be orientated towards reducing conditions which lead to such hazards and consequent stress whereby risk of accidents is increased. The guiding principles for safety in road construction zones are :

i) Warn the road user clearly and sufficiently in advance;

ii) Provide safe and clearly marked lanes for guiding road users;

iii) Provide safe and clearly marked buffer and work zones;

iv) Provide adequate measures that control driver behavior through construction zones.

2.1 Precautionary Measures during Road Work

1. Safety measures will be taken including the work zone and buffer zone considering the curvature of the mobile construction equipment while in operation particularly at Excavation Sites or Material Storage Sites.

2. Accident prone areas throughout the project road stretch will be identified and required Safety measures will be provided.

3. Personal safety will be given prior importance by providing Personal Protective Equipment (PPE) and ensuring workers to wear these regularly during the Construction period so as to avoid undue accidents which may lead to facility.

4. Construction vehicle will be regularly inspected for back lights and back horns to avoid undue incidents.

5. Safety Officer/ Accident Prevention Officer will be employed to ensure Traffic Safety during construction work.

3.0 **Construction zone**

Highest regard is to be given to traffic safety as well as to provide a safe working environment to the workmen. Before starting the construction work, which will influence traffic, the contractor has to get the legal permission of the road traffic authority and local police about the means and extent of securing the construction zone. The traffic management strategies to be used at construction zones should ensure that traffic safety is an integral and high priority element of the project. This can be ensured by avoiding inconvenience to traffic as far as possible and by guiding the drivers in a clear and positive way. Routine inspections of traffic control elements and traffic operations must be carried out so that care and attention to roadside safety is never slack during the progress of project.

3.1 **Traffic control zone**

The construction zone describes that area of the road which is affected by the works and which affects traffic flow and road users. The main area of interest can be called in this context as the "Traffic Control Zone". It includes all those areas of carriageway in advance of the actual work site which are required for advanced warning of the hazard as well as safety zones, the transition zones and the working zone itself.

The traffic control zone can be divided into three components, that is, the advance warning zone, the transition zone, and working zone. All construction zones will have a working zone, which is flanked, by a transition zone for each direction of approaching traffic and an advance warning zone will precede these in turn.

3.1.1 **Advance warning zone**

The "advance warning zone", is the area to warn the road user of the approaching hazard and to prepare them for the change in driving conditions. It is essential for traffic control in the construction zone. It should provide information on :

i) The presence of the hazard through the "Road Works Ahead" sign, accompanied by the distance to the hazard;

ii) Any changes affecting traffic arrangements (such as a reduction in the number of lanes and / or in the speed limit) within the traffic control zone;

iii) Extent of the hazard (for example; the length of restriction); and for general information;

iv) The type of hazard

The advance warning zone is also where the reduction in speed of vehicles should be notified. The drivers should be advised to reduce their speed so as to achieve the desired approach speed before reaching the approach transition zone. The information in this zone is conveyed through a series of traffic signs along the length of the zone.

3.1.2 **Approach transition zone**

The transition zone is the area in which the traffic is guided into the altered traffic flow pattern around the working zone. This is one of the most crucial zones as far as safety aspects are concerned because most of the movements involved are merging / turning movements. The transition zone has two components : The Approach Transition Zone and Terminal Transition Zone.

The initial part of the transition zone called "Approach Transition Zone" should further reduce the approach speed of vehicles and channel them into the narrower and / or restricted number of lanes, if this is necessary.

The traffic is taken across the transition zone mostly with the help of signs, barricades, channelisers and pavement markings. The guiding principle for their design is that they should convey the message clearly and unambiguously.

All the signs / barricades are to be maintained properly and kept clean of dust at all times. Sufficient stock of these should be maintained at the site so as to replace the damaged or vandalized signs / barricades. Proper lighting arrangements for

illuminating these signs must be made during the night hours. Most of the accidents at night involve collision between vehicles and objects rather than vehicle to vehicle collisions. Reflective paints / sheets must therefore be used for making the signs / barricades so that these are visible at all times.

Very often the road width available through the transition and working zones is quite insufficient for simultaneous passage of both the up and down traffic. Traffic control has, therefore, to be provided for these areas. The control may be by manual flagging or by traffic signals. In both the cases a waiting area with a properly demarcated stop line has to be provided for the vehicles.

3.1.3 Working Zone

The working zone is where the actual construction is being undertaken. It contains the work area and a working space, as well as lateral and longitudinal buffer zones to create the safety zone to protect both the workforce from wayward vehicles entering the area of actual work and the road users from construction equipment.

Speeds should continue to be controlled in this zone because of the close proximity of moving construction plant and site operatives. Further, there may also be a difference in the elevation of the road and the diverted path in this zone.

The path of the traffic must be very clearly delineated through the traffic control zone to avoid vehicle intruding into the work area. Delineators and channelisers must be used effectively for this purpose. Where the work site uses machinery with revolving booms like cranes or excavators the intrusion of moving parts must be taken into account when determining the lateral clearances for the buffer or safety zone.

3.1.4 Terminal Transition Zone

The Terminal Transition Zone (TTZ) provides a short distance to clear the work area and to return to normal traffic lanes. It extends from the downstream end of the work area to the sign indicating the end of works.

A downstream or closing taper may be placed in the TTZ. It may be useful in smoothening the flow of traffic. However, it may not be advisable when the trucks carrying material move into the work area by reversing from the downstream end of working zone. The length of the down stream taper may be 25-30 mtr.

3.1.5 Length of traffic control zone

The distance between two traffic control zones should be such that the flow of traffic can return to normal stream between them. Separation should permit fast moving traffic to overtake slow moving vehicles so that platoons can be dissipated and traffic normalized.

The length of traffic control zone will vary and depend on the work being undertaken. The lengths of the advanced warning and transition zones are governed by the speed of approaching vehicles and the location of the site. The recommended lengths for each component of the zones for a well located site (with a clearly visible approach) are given in Table 1. It may be necessary to extend the advanced warning zone where approach visibility is poor and this will vary on a site by site basis but should not be less than that specified. On occasions additional signing may need to be provided to give not only sufficient warning but additional reminders through the advanced warning zone.

Table 1
Recommended Length of Traffic Control Zones

Average Approach Speed (km/h)	Length of Advance Warning Zone (m)	Length of Approach Transition Zone (m)	Length of Working Zone (m)
50 or less	100	50	)
50 - 80	100 - 300	50 - 100	)
81 - 100	300 - 500	100 - 200	) Varies
Over 100	1000	200 - 300)	)

4.0 **Traffic Control Devices**

Traffic control devices are the equipment and installations over and on the road, which individually and collectively perform the following tasks:

i) Warn the road user;
ii) Inform the road user;
iii) Guide the road user;
iv) Modify road user behavior;
v) Protect the road user and the vehicle;
vi) Ensure safe passage to the road user; and
vii) Provide a safe working area.

The primary traffic control devices used in work zones are signs, delineators, barricades, cones, pylons, pavement markings and flashing lights.

4.1 **Signs**

The road construction and maintenance signs fall into the same three major categories as do other traffic signs, that is Regulatory Signs, Warning Signs and Direction (or Guidance) Signs. The IRC: 67 (Code of Practice for Road Signs) provides a list of traffic signs. Where possible, the size, colours and placement of sign shall conform to IRC: 67.
Each sign should be well located so that its message is seen and is clear, which will be assisted if the surroundings are devoid of "unnecessary" signs and other clutter. These signs should be of retro reflective sheetings of engineering grade depending upon the importance of the road.
On kerbed roads, the extreme edge of the sign adjacent to the road shall not be less than 600 mm away from the edge of the kerb. On un-kerbed roads, the extreme edge of the sign adjacent to the road shall be at a distance of two to three metre away from the edge of the carriageway depending on local conditions but in no
case, shall any part of sign come in the way of vehicular traffic. Where signs are in position for some time and pedestrians are expected, the lower edge of the lowest sign (plate) should not be less than two metre above the surface on which it stands.

4.1.1 **Regulatory signs**

Regulatory signs impose legal restriction on all traffic. It is essential, therefore, that they are used only after consulting the local police and traffic authorities. The most

likely type of regulatory signs to be used in traffic control zones are: STOP, Give Way, Do Not Enter.

Various other signs that are needed to regulate traffic may be required which have not been standardized. They should confirm with the general requirements of shape and colour, and their message should be brief, legible and clearly understandable.

4.1.2 Warning Signs

Warning signs in the traffic control zone are utilized to warn the drivers of specific hazards that may be encountered. Drivers should be alerted to potential hazards in sufficient time to adjust their movement and speed. The most common type of warning signs for the use in the traffic control zone are: Men At Work, Road Narrows Traffic Signal Ahead, Two Way Traffic, Rough Road, Slippery Road, Loose Chippings, Divided Road and Divided Road Ends.

Wherever it would be advisable to make the meaning of a sign suitable and more explicit, an inscription is placed below the sign in a rectangular definition plate of width appropriate to the size of warning triangle. Definition/supplementary plate shall have white background and black letters and black border 20 mm wide. This definition plate shall be placed (below) 150 mm from the bottom of the triangle.

In case of divided carriageway, the signs should be provided both adjacent to the shoulder and on the central median so as to be visible from all lanes. Larger sign sizes than IRC: 67 are recommended for higher speed roads.

Table 2
Minimum Sightline Distances and Minimum Size of the Signs

Average Speed (km/h)	Distance of first sign in advance of the first channelising device (m)	Size of warning sign (mm)	Minimum number of signs in advance of the hazard
Under 50	100	600	3
51 - 60	100 - 300	750	3
61 - 80	120 – 300	900	3 or 4
81 - 100	300 – 500	1200	4
Over 100	1000	1200 to 1500	4

4.1.3 **Direction signs**

Direction or Guide signs are required at traffic control zones to provide the necessary information and guidance for the alternative route and work being done. These signs shall have black letters, arrows on yellow (Indian Standard Colour No. 368: Traffic Yellow, of IS:5-1978) background. The commonly used guide signs are: Diversion, Detour, Diverted Traffic.

4.2 **Delineators**

These channelizing devices such as cones, traffic cylinders, tapes, drums are placed in or adjacent to the roadway to control the flow of traffic. These should normally be retro-reflectorised. Delineators for the roadway edges have been discussed in detail in IRC:79 (Recommended Practice for Road Delineators). Few of the important practical types of delineators are as under.

4.2.1 Traffic cones and cylinders

Traffic cones are 500 mm, 750 mm and 1000 mm high and 300 mm to 500 mm in diameter or in square shape at base and are often made of plastic or rubber and normally have retro-reflectorised red and white band.

Cones and cylinders are easily blown over or displaced unless their bases are loaded with ballast or anchored. It may, therefore, be sometimes necessary to double the cones in order to provide added weight, use the cones with special weighted bases, use heavier weighted cones or use weights such as sand bag rings to provide increased stability but this weight should not present a hazard. The cones should be placed close enough together to give an impression of continuity. The spacing of cones should be 3 m (close) or 9 m (normal) or 18 m (wide). Where cones have to be used at between 45° and 90° to the line of traffic, their spacing should be 1.2 m. Larger size cones should be used where speeds are relatively high or wherever more conspicuous guidance is needed.

4.2.2 **Drums**

Drums about 800 mm to 1,000 mm high and 300 mm in diameter can be used as either channelising on warning devices. These are highly visible, give the appearance of being formidable objects and therefore command the respect of drivers.

The drums are normally metal drums e.g. empty bitumen drums cut to the required height. They can be made of plastic also. Plastic drums are lighter, pose fewer hazards to vehicles and workers and can be needed for easy transportation and storage and generally have one or more flat sides to preclude rolling. Drums may be filled up with earth or sand for stability. They should be painted in circumferential stripes of alternate black and white of 100 mm to 150 mm width. Drums should be reflectorised for use at night and should never be placed in the roadway without advance warning signs.

4.3 Barricades

Barricades are intended to provide containment without significant deflection or deformation under impact and to redirect errant vehicles along the barrier. They are designed to be easily relocated and have four specific functions to:

i). Prevent traffic from entering work areas, such as excavations or material storage sites;
ii). Provide protection to workers;
iii). Protect construction such as false work for culverts and other exposed objects.

Barricades can be portable or permanent. Portable barricades should be stable under adverse weather conditions and appear substantial but not so much as to cause excessive damage to the vehicle if they are struck.

4.4 Flagmen

Flags used for signaling should be minimum 600 mm by 600 mm in size, made of a good red cloth and securely fastened to a staff or approximately 1 m in length. Sign paddles should be at least 600 mm wide and provided with a rigid handle. The background colour of STOP should be red and its shape shall be octagonal conforming to IRC:67.

The word STOP should be in white, in the middle of the sign. The background of SLOW should be yellow with black letters and borders.

5.0 Traffic Management

5.1 Introduction

The traffic management strategies to be used at traffic control zones must include the following fundamental principles:

i). Make traffic safety an integral and high priority element of project,

ii). Avoid inhibiting traffic as much as possible,

iii). Guide drivers in a clear and positive way,

iv). Perform routine inspection of traffic control elements and traffic operations,

v). Give care and attention to road safety.

5.2 Works at Junctions

Two-way traffic should be kept flowing past the works if possible. If this is not possible, a diversion route may be required and should be identified. Men at works signs with arrow plates will be required on the main route if the works are located on a side road.

5.3 Pedestrian Safety

It should be ensured that there is no danger to pedestrians from falling objects or sharp edges and that they will not fall over or bump into anything. Scaffolding be marked with white bands at eye level and at least 2.1m head room.

Kerb ramps or raised footways should be provided to help blind, poorly sighted, elderly and disabled people and for those with pram or wheelchairs.

5.4 Pedestrian Barriers

Pedestrian barriers should be used to mark out any temporary footway. A rigid barrier must always be used to protect pedestrians form traffic, excavations, plant or materials. Place road danger lamps at the ends of the barriers at night. Portable pedestrian barriers, which may include mesh, should be reasonably rigid and have:

- a hand rail fixed at between 1.0m and 1.2m above ground level, which should be reasonably smooth and rigid for pedestrians to hold to obtain guidance and some measure of support;
- a visibility panel at least 150mm deep which may be integral with the handrail or if separate must be fixed so that its upper edge is a minimum of 0.9m above ground level. Visibility panels of yellow, white or orange colours are best for detection by partially sighted people, while the red and white rail gives contrast and provides interchangeability with traffic barriers; and
- a tapping rail (for blind people with a white stick) (or equivalent reasonably rigid area if the barrier is a vertically continuous one) of minimum depth 150mm with a lower edge at ground level or up to a maximum height of 200mm above the ground.

Alternatively, when covers are to be removed from underground chambers or manholes and someone will always be there, a barrier with a hand rail fixed no lower than 0.8m above ground level will be satisfactory. In this case the barrier must be large enough to enclose the opening and its cover.

5.5 Visually Handicapped

It should be ensured that the barriers can be detected easily by a visually handicapped person using a cane stick.

5.6 Deep Excavations

If excavations are deeper than 1.2m, stronger barriers will be required.

5.8 Pedestrian Crossings

If the works are on or near formally marked pedestrian crossings, care must be taken to avoid confusing pedestrians. Clear guidance must be given as to where they are expected to cross while the works are ingoing.

5.9 Execution of maintenance operations

Minor maintenance operations should be confined to small lengths, at a time say 30 m, or so, on half the pavement width, leaving the other half for use by traffic. The basic layout and its variations should be used in all cases to ensure optimum safety during these operations including:

i) Repairing the edges of the carriageway, shoulders, cleaning out drains, cutting grass etc., where carriageway is basically not affected. Before starting the work, all warning signs and traffic control devices should be placed as discussed above. These should, however, be suitably modified duly keeping in view the size of construction activities and whether it is in a rural or urban area. A flagman is probably sufficient and should be present during the work duration;

ii) Repairing small areas of the carriageway, the traffic is to be restricted only due to repairs being carried out such as major pothole and / or patch repairs. The work should preferably be so organized that only half width of carriageway is closed at a time and traffic is allowed on other half and traffic control devices as discussed above;

iii) While working on the center of the carriageway such as center line, lane marking necessitates the traffic to use restricted width on either side. This situation is generally not acceptable and, where possible, the work should be undertaken through the closure of half of the carriageway.

5.10 **Temporary Diversions**

Where the construction zone would close the road completely, the remaining carriageway space would be insufficient for the traffic and create large delays, and there is no suitable alternative route, it will be necessary to construct a temporary carriageway for all or part of the traffic. This is most common situation in the cases of any major repair or reconstruction of cross drainage works and of pavement failure due to floods etc.

The temporary carriageway must satisfy the following requirements:

i). It should have smooth horizontal and vertical profile with smooth vertical and horizontal curves;

ii). It should not get over-topped by flood or drainage discharges under any conditions;

iii). It should have adequate capacity to cater to the expected traffic;

iv). It should be dust free and should ensure clear visibility at all times of day and night; and

v). Barricading should be provided to prevent construction material falling on the diversion.

This requires that some of the existing work practices and procedures are changed or abolished. For example, any separate area for stock piling of construction material on or very near carriageway will have to be discontinued. The present practice of exposing the workman to traffic while carrying out works in the center of the carriageway must be discontinued.

5.11 Speed Control

The co-operation of the local police should be sought to the introduction of a temporary but mandatory speed limit, lower than the existing speed limit on the approaches and through the working zone. This may be as low as 50 km/h even for high speed road, where only one lane is available for traffic.

6.0 Planning and Implementation

Planning and implementation of traffic safety and control during construction shall harmonically blend with the work programme of the project. The planning should ensure the following:

i) Protection of traffic during the period of construction and the reduction of potential delays; and

ii) Safety of the workers engaged in construction activities.

The contractor should furnish and erect barricades, traffic signs etc., and make arrangements for adequate lighting, equipment and flagman etc., as required. He must ensure that these barricades are kept clean, properly painted and adequately lit during the entire period of construction.

The following steps should be taken at the planning and implementation stages to ensure safety of the workmen, safe and efficient passage of traffic:

i) Contractor should develop complete details of traffic diversion scheme along with the necessary signs, barricades etc., and traffic control method and signs. The same shall be discussed with the Engineer-in-charge for his approval;

ii) Proper location and operation of all traffic control devices should be checked at intervals. Traffic shall be adequately controlled during critical hours of darkness;

iii) At all times, the safety and convenience of pedestrians should be a major consideration.

6.1 General precautions

The following defined precautions shall apply to all the work sites:

i) All the signs and delineators shall be maintained in a clean and brightly painted condition at all times;

ii) Adequate lighting arrangements shall be made for proper visibility during the negotiation of the work area; and

iii) Adequate arrangements like frequent sprinkling of water shall be made to keep the area dust free.

For high traffic density roads, the following further precautions must be taken:

6.2 For Safety of Workmen

i) Workmen must be trained in use of tools and plant;

ii) Gum boots, tarring outfits, spectacles etc., must be given to persons handling bitumen. Their use should be mandatory;

iii) First aid training be provided to all workmen and enough safety kits should be available at site;

iv) Workers required on site during night hours must be provided with fluorescent yellow jackets with reflective tapes;

v) Safety helmet must be given to all workmen at site; and

vi) First aid posts should also be set up at important sites.

6.3 For Safety of Road User

i) As far as possible, the material, equipment and machinery should be installed/parked in places sufficiently away from the berms in the available road land. Only in unavoidable cases, the same shall be allowed to be collected/installed/parked near the edge berms. In any case, no material should be collected nor any equipment/machinery installed/parked near and on curves;

ii) Machinery should be parked at appropriate places with red flags and red lights on; and

iii) Minimum quantity of material required for one operation should be collected.

Details of size and siting distances shall be as indicated in Table 4. Buffer zone safety clearances (L & S) shall be as per Table 5.

Table 5
Buffer Zone Safety Clearances

Speed Restriction (kmph)	Minimum Longitudinal Buffer Zone (L), m	Minimum Lateral Buffer Zone (S) ,m
50 or less	5.0	0.5
60	15	0.5
80	30	1.2
100	60	1.2
120	120	1.2

Table 4 Size and siting distance : Detail of Signs and Cones

Type of Road	Minimum and normal maximum siting distance "D" of first sign in advance of transition zone (m)	Minimum clear visibility to first sign (m)	Minimum size of signs (m)	Minimum height of cones (or equivalent delineator) (m)	Details of lead-in cone tapers (Note 2	Width of hazard (m) 1	2	3	4	5	6	7
All purpose single carriageway road, urban, restricted to 50 km/hrs or less	25 to 50	60	600	500	Length of transition zone "T" (m) Minimum number of cones Minimum number of lamps at night	13 4 3	26 4 3	39 6 5	52 7 6	65 9 8	78 10 9	91 12 11
All purpose single carriageway road, restricted to 60 km/hrs or less	50 to 110	60	750	500	Length of transition zone "T" (m) Minimum number of cones Minimum number of lamps at night	20 4 3	40 6 5	60 8 7	80 10 9	100 13 12	120 15 14	140 17 16
All purpose divided carriageway road, urban, restricted to 60 km/hrs or less	110 to 275	60	750	500	Length of transition zone "T" (m) Minimum number of cones Minimum number of lamps at night	25 4 3	50 7 6	75 10 9	100 13 12	125 15 14	150 18 17	175 21 20
All purpose single carriageway road with speed limit 80 km/hrs or less	275 to 450	75	50	500	Length of transition zone "T" (m) Minimum number of cones Minimum number of lamps at night	25 4 3	50 7 6	75 10 9	100 13 12	125 15 14	150 18 17	175 21 20
All purpose divided carriageway road, with speed limit 80 km/hrs or more	725 to 1600	105	1200	750	Length of transition zone "T" (m) Minimum number of cones Minimum number of lamps at night	32 5 4	64 9 8	96 12 11	128 16 15	160 19 18	192 23 22	224 26 25

Notes:

1. On roads with speed limits to 80 km/hrs or more all advance signs should have plates giving the distance to the works in m or km.
2. Lead-in tapes used with traffic control and all exit tapers, shall be about 45 to the kerb line with cones spaced 1.2 m apart.
3. The maximum spacing distance of cones in longitudinal lengths of coning shall be 9 m, but not less than 2 cones shall be used in any length between tapers.
4. he range of siting distance (D) is given to allow the sign to be placed in the most convenient position bearing in mind available space and visibility for drivers.
5. It may be appropriate to use the next larger size of cone in lead-in tapers i.e 750 mm cones in tapers where 450 mm conees are indicated in the Table . It 1.0 m high cones become available, these are recommended for expressway and hig speed roads.