Carnival Public Safety Report Design Guidance

Design Guidance from the 2001 Notting Hill Carnival Public Safety project

prepared by Intelligent Space Partnership for the GLA Carnival Review Group

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About this report

Intelligent Space led a team of consultants in an assessment of crowd safety and route design at the Notting Hill Carnival. The project involved both state of the art computer modelling of the crowd and best practice risk assessment. This provided the GLA Carnival Review Group with guidance on improving crowd safety and an evaluation of the merits or risks of alternative routes that were proposed by various Stakeholders.

Intelligent Space won the prestigious 2002 AGI Award for Innovation for their advanced computer modelling of crowds at the Carnival. Ken Livingstone, Mayor of London, said “I am delighted that Intelligent Space have been given this award for innovation. Their research has been absolutely vital to the review of Notting Hill Carnival.”

This document contains the Design Guidance chapter from the final report. Also available for download from our website is the executive summary.

Further information

The following additional publications about ISP’s work on the Notting Hill Carnival are available from our website (click titles to download):

• GLA Carnival Review Group final report
• CASA Working Paper 56: The Discrete Dynamics of Small-Scale Spatial Events
• Safety in Numbers? Modelling Crowds and Designing Control for the Notting Hill Carnival

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Chapter 6: Design Guidance

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6 DESIGN GUIDANCE
6.1 Design Guidance

In the previous chapter, an analysis of the 2001 Carnival was presented which highlighted the pattern of crowding and identified a number of contributing factors. Using this data and an on-site survey, a risk assessment of Carnival for 2001 was undertaken and the potential effects of crowding on safety were evaluated. The hazards identified from the study of Carnival 2001 can be seen in Appendix A.

This chapter of the report outlines the design guidance that was generated from these findings. They were presented to the Stakeholders in order to assist their decision making process. The design guidance focuses on issues to do with the route, as this was the key decision facing the Stakeholders. As the brief for this project was on crowd safety evaluation, it was beyond the remit of this project to carry out the individual Health and Safety Risk Assessments for the employees, carnivalists and organisers involved in the event. Nonetheless, some issues to do with the safety of the carnivalists were noted during the assessment and these have been included, even though they did not directly relate to route choice.

In creating the design guidance, we were using two general principles. Firstly, the design guidance had to be evidence based, so that any suggestions for change were always focused on real problems identified at Carnival. Secondly, guidance had to be generalised and strategic, rather than just prescriptive, so that Stakeholders could apply the guidance in the context of other criteria. For example, the purpose of the guidance was not to mandate the choice of particular roads, as there are all sorts of other logistical and political criteria to be evaluated by the Stakeholders in making their choices. So the guidance aimed to identify general principles for the Stakeholders to consider when evaluating different route options. These principles will be described individually in the following sections.
6.2 The Design Guidelines

6.2.1 DG 1: Removing the enclosure of the route\(^1\)

The first aspect of the design guidance related to the route itself. One of the key risks identified from the observation study was that crowd density at Carnival was heightened on the route by cross-flows for access and egress. This is because the entertainment area is completely enclosed by the circular route, making it compulsory for all visitors to cross the route in order to get to the other attractions. Consequently, this leads to increased demand for space on the route.

\(\text{FIGURE 47} \quad \text{ALL VISITORS TO SOUND SYSTEMS ARE FORCED TO CROSS THE ROUTE AT PRESENT}\)

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1. For the sake of clarity, the guidance points have been renumbered since they were first presented to Stakeholders.
6.2.2 DG 2: Avoiding Pinch Points

Also relating to the demand for space on the route is the guidance note to avoid significant pinch points in choosing a new section of route. Typically, a pinch point arises when the Carnival procession passes through a narrow street or a part of the street where there is a sudden reduction in the road width. The reduction in the amount of space available to the spectators could lead to crowding at the vicinity of the pinch point and build up of crowds in the adjacent areas. In parts of the route that are likely to be heavily used, whatever the reason, the avoidance of pinch point is particularly important.

Pinch points tend to lead to exacerbated crowding problems for spectators because they have to have route barriers for safety purposes. The danger posed by the vehicles is heightened in narrower streets and so it is more likely that the police will have to deploy route barriers to keep the wheels of the vehicles away from the spectators (and to keep the procession moving and prevent even further congestion). These barriers remove more space from spectators and the congestion is worsened. As was seen in the crowd modelling (see Section 4.3 on page 54), the higher the proportion of overall street width taken up by floats and vehicles, the worse the crowding. The average width of all streets in the Carnival area can be seen in Figure 34 on page 79.
6.2.3 DG 3: Spreading out the arrival flows

A key risk identified from the observation study was the congestion at specific locations caused by the uneven distribution of arrival flows into Carnival from a small number of streets. In particular, the concentration of over half the arrival flows on just four streets was identified, as summarised in Figure 49 below. This leads to additional pressure on the route and heightens the crowding related risks.

FIGURE 49 THE FOUR MAIN ROUTES INTO CARNIVAL

The design guidance relating to this risk was to locate the future route to encourage more evenly spread access, e.g. using public transport and attraction locations.
6.2.4 DG 4: Minimising the need for vehicles to cross the route

The guideline to minimise the need for vehicles to cross the route related to the observations made at Carnival 2001. Congestion on the route is further heightened by the need for emergency vehicles to cross the route in order to access the interior. Every time a vehicle has to get into or out of the interior area, the procession is broken up and spectators have to be moved back (see the ambulance example in the top of Figure 50 below). This also delays the access of emergency vehicles and increases the risk to health and safety posed by any incidents inside the Carnival area, as the response time for emergency vehicles is slowed down by the time it takes to get through the crowd.

![Figure 50: Vehicles Crossing the Route](image)

6.2.5 DG 5: Choosing areas with a permeable street grid

Access and departure flows at Carnival have been concentrated between large urban barriers, particularly from the canal and railway lines in the North of the area. The effect of these barriers can be seen in Figure 33 on page 78, which shows the marked differences in the size of street blocks within the Carnival area.

Following this analysis, the guidance recommended that the Stakeholders should attempt to choose areas with a more permeable street grid if the route is to change. This is aimed at helping to even out access and departure flows. However, using more permeable street areas would also provide more flexibility for contingency planning in the case of a serious threat to crowd safety. If the police need to block a road in case of emergency, it is important that crowd
dispersal can take place on adjacent streets. This is not possible in areas where movement is already concentrated on routes around big blockages to access, such as the two entry streets to the North.

6.2.6 DG 6: Minimising turns on the route

198 Turns in the route are conflict points for vehicles and pedestrians and the design guidance recommended that any new route should attempt to minimise them. Not only do spectators tend to concentrate near turns in the route (where visibility is better), but vehicles also require additional space to turn. Consequently more pressure is put on the available space for pedestrians, increasing the danger posed to crowd safety (see Section 5.6 on page 88 for the importance of available space on the route on density).

199 Turns also add complexity to the route and make it more difficult for crowding spectators who are moving along the route to find their way around. Trying to minimise turns is therefore also part of a general aim of making it possible for spectators in crowds to understand as much as possible about crowd conditions around them, in order to minimise the potential for flows of people to surge towards each other without knowing that a crushing situation may arise.

FIGURE 51 TURNS IN THE ROUTE ARE CONFLICT POINTS
6.2.7 DG 7: Moving the judging point to a quieter location

The judging point is itself an important attraction at Carnival and it requires a large area of street space (see Figure 52 below). The issue for crowd safety on the existing route is that the current location of the judging point is between the main attractions of the Sound Systems and the main transport links of the South.

The second safety issue with the location of the Judging Point relates to the build up of static crowds (i.e. spectators) in areas near it, particularly upstream of the judging point where the floats tend to stack up waiting for the judges to call them. Areas where a significant number of spectators can be expected should have sufficient space to cater for both the floats, the spectators and the pedestrian flows that are likely to pass through.

The problem with the existing location of the judging point is that there is a combination of large numbers of spectators lining up along the route, as well as heavy pedestrian flows passing across it to get to the entertainment area (owing to the main arrival roads of Kensington Park Rd. and Westbourne Grove East). The decision on where to locate the judging point in future should take into consideration not only the crowd build-up in the vicinity but also the presence of spectators in areas near it, especially further ‘upstream’ of judging.

6.2.8 DG 8: Fitting the Traffic Exclusion Zone around the new route

Although it is clear that any new route will probably require a new Traffic Exclusion Zone, this guideline simply serves as a reminder for the broader public participation in route design discussions. This is because vehicles travelling on
the surrounding streets could pose a danger to the arrival or departure crowds. This is especially so if people have to cross the road or if the crowd is likely to spill over onto the carriageway. The relationship between the existing route and the TEZ can be seen in Figure 4 on page 29.

6.2.9 DG 9: Separating entry and exit points for floats away from main crowd

Another way in which the problem of crowding is increased is when the space available for crowds is reduced by Carnival floats accessing the route (see Figure 53 below). An example of this problem in the existing route is the access that takes place in the southern part of Ladbroke Grove. The recommendation was to avoid any access points in busy areas, in order to reduce the additional compression to the crowd that this causes.

FIGURE 53 FLOATS ACCESSING THE ROUTE IN A CROWDED AREA

As well as separating floats accessing the route from crowded areas of spectators, it is also important to separate the entry and exit of float vehicles from each other. The main safety concerns for allowing vehicles to enter and exit at the same time on the same stretch of road are of twofold. Firstly, float vehicles will take up more of the road width, thus further reducing the space available for the crowds. This is particularly important where the road width is already limited or where people's choice of access routes is severely restricted by
the urban barriers and therefore have to use the same access routes as the floats (e.g. in the North, such as at the top end of Ladbroke Grove).

Having entry and exit of vehicles at the same point also leads to an increased likelihood of people being hit by vehicles. This is partly due to a higher number of vehicle using the road and partly because of the danger of people getting trapped in the middle of the road in between two streams of long vehicles travelling in opposite directions. Therefore, as a general guidance, it is also recommended that there should be separate entry and exit points for the float vehicles.

6.2.10 DG 10: Improving the use of safety cordons around vehicles

This aspect of the design guidance did not specifically relate to route choice, but was raised in response to the risk posed by vehicles to both Carnivalists and spectators on the route. Although a number of Masquerade bands and mobile sound systems already use cordons around vehicles (similar to the one shown in Figure 54 below), the guidance was to make cordons a requirement for all large vehicles on the route.

FIGURE 54 AN EXAMPLE OF CORDONS AROUND A VEHICLE (LOVE PARADE BERLIN)

6.2.11 DG 11: Introducing access points at the back of vehicles

This guideline did not specifically relate to route choice, but was in response to a risk of injury to Carnivalists identified in the observation study. As some access
to vehicles does appear to take place on-route, the design guidance was to avoid the risk of crushing under vehicles by mandating access at the back of the vehicle. An example of stairs at the back of a mobile sound system can be seen in Figure 55 below. Pedestrians step up the stair structure between the speakers on the truck.

FIGURE 55 STAIR ACCESS AT THE BACK OF A MOBILE SOUND SYSTEM (LOVE PARADE BERLIN)

6.2.12 DG 12: avoiding conflict between pedestrian movement and sound systems

This recommendation relates to the location of sound systems, as the initial comments from Stakeholders suggested that the redesign of the route might also include moving some static sound systems. The recommendation was to take into account important pedestrian movement routes when locating static sound systems, in order to avoid conflict between pedestrians who are passing through the area and revellers gathering in front of the sound systems. The risk to be avoided is that if two flows of pedestrians converge on a sound system from two sides, they may not be aware of what is happening and attempt to push through the crowd, causing crushing in the middle.

As can be seen in the example in Figure 56 below, dancing crowds at a static sound system can block the entire width of a route and make movement very
difficult. It is therefore recommended that the static sound systems are located off movement routes for some of the bigger sound systems.

FIGURE 56 STATIC SOUND SYSTEMS BLOCKING PEDESTRIAN FLOWS

211 Static Sound Systems at Carnival are events in their own right, and they require their own risk assessment for key local hazards. As a general recommendation, some of the bigger sound systems may require more structured approach to managing the conflict with movement, such as with straddling or separate movement paths. Given the large crowd in the close vicinity of a static sound system, it is also recommended that they should not be located too close together.

212 The design guidelines are summarised in Table 9 overleaf along with the relevant risks:
TABLE 9  DESIGN GUIDANCE FOR CARNIVAL

<table>
<thead>
<tr>
<th>DG</th>
<th>RISK</th>
<th>DESIGN GUIDANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG1</td>
<td>Crowd density heightened on route by cross-flows for access and egress</td>
<td>Remove the circular enclosure by the route to end the compulsory crossing of route for all visitors.</td>
</tr>
<tr>
<td>DG2</td>
<td>Crowd density heightened on the route by narrowness of street</td>
<td>Avoid significant pinch points on the route.</td>
</tr>
<tr>
<td>DG3</td>
<td>Uneven distribution of crowd and concentration of access on a small number of streets</td>
<td>Locate the route to encourage more evenly spread access, using public transport and attraction locations.</td>
</tr>
<tr>
<td>DG4</td>
<td>Vehicles disrupt pedestrian flows and create congestion when crossing the route. Access of emergency vehicles to crowds is hindered by route.</td>
<td>Minimise the need for vehicles to cross the route using alternative access streets.</td>
</tr>
<tr>
<td>DG5</td>
<td>Access and departure flows are concentrated between large urban barriers (e.g. canals, railway)</td>
<td>Choose areas with a permeable street grid both for egress and to allow for contingency diversion.</td>
</tr>
<tr>
<td>DG6</td>
<td>Turns in route are conflict points for vehicles and pedestrians and crowd concentrates at junctions</td>
<td>Minimise turns on the route.</td>
</tr>
<tr>
<td>DG7</td>
<td>Judging point increases concentration of South Western half of the route</td>
<td>Move the judging point to quieter street or to a larger area.</td>
</tr>
<tr>
<td>DG8</td>
<td>Vehicle movements on surrounding streets may pose a danger to crowds</td>
<td>Fit a Traffic Exclusion Zone around any new route.</td>
</tr>
<tr>
<td>DG9</td>
<td>Float entry and exit from the route disrupts crowds and reduces available space. Entry and exit at the same point increases risk of accident with vehicles.</td>
<td>Put entry and exit points for floats away from the most crowded areas. Separate entry and exit point from each other.</td>
</tr>
<tr>
<td>DG10</td>
<td>Risk of crushing under vehicles on route.</td>
<td>Implement safety cordons around all vehicles.</td>
</tr>
<tr>
<td>DG11</td>
<td>Risk of injury to carnivalists boarding vehicles from the side.</td>
<td>Introduce safe access points on vehicles away from wheel path.</td>
</tr>
<tr>
<td>DG12</td>
<td>Static sound systems block pedestrian flows</td>
<td>Locate sound systems off key pedestrian movement routes. Locate sound systems so that peak zones do not overlap with other sound systems. Manage flows around big sound systems with stewarding. Introduce separation between dancers and pedestrian traffic in the vicinity of big sound systems.</td>
</tr>
</tbody>
</table>