XAIS & THE RSTA STATISTICAL REPORT ON COLLISION BUFFER REVIEW

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Contents

Document Information

Title {Sub-Title}	***Statistical Report on Collision Buffer Review {Justifying the advice in the Skidding Resistance Annex to CS228}***
Product Number	*001*
Author	*XAIS Asset Management & RSTA*
Description	*This statistical report examines the differences in the number of collisions automatically assigned to a Skid Assessment Length (SAL Site) using various buffer sizes to justify the advice in the skidding resistance Annex to CS228*

Document History

Version No.	Status	Author	Date	Changes from Previous Version
01	**Final Report**	**XAIS/ RSTA**	**14/07/20**	**First Release of Report**

1. Executive Summary

In 2015 Highways England published an updated comprehensive methodology for managing carriageway skid resistance on motorways and trunk roads and this is set out in their design bulletin, HD 28/15.

Following a review of the Design Manual for Roads and Bridges (DMRB) in Autumn 2019 HD28/15 was withdrawn and replaced with CS228. The fundamentals of HD28/15 have been retained in CS228 and the update is primarily a 'cosmetic review' in line with all other documentation contained in DMRB.

The methodology detailed in CS228 can form a basis for a Local Authority Council's Skid Resistance Procedure.

It is recognised that the Councils highway network has significant differences and expectations from the road user to the UK's motorway and trunk road network.

In accordance with the advice in GG 101 The Introduction to the Design Manual for Roads & Bridges section 2.2 Note 3: "Other highway authorities or local authorities can develop their own application annexes to complement, supplement or replace the requirements and advice contained in the main DMRB document."
XAIS & RSTA have produced a Template Skidding Resistance Annex to CS228, primarily produced for Local Authorities to use as a template document when producing their variations to the Strategic Roads methodology defined in CS228.

Within this document on page 32 in section 7 the following variation to CS228 is recommended:

Given the limited accuracy of locating crash positions, it may be assumed for the purpose of this investigation that the position of a crash coincides with a Site if it occurred within 75m for urban roads (40 mph or less) and 200m for rural roads (50mph or greater). However, crashes in excess of 75m/200m can be 'tagged' to the site and crashes within the 75m/200m boundary can be 'untagged' if their location is deemed to not be relevant to the specific site. For example, there are some crashes that are within 75m of a site that occur on roads parallel to the site but cannot be accessed from the site.
Note: CS228 states a 200m buffer, but after reviewing the accuracy of the location of crashes, particularly in urban areas, it was deemed more appropriate to set a buffer of 75m for urban roads (40mph or less); the rationale for 75m is the stopping distance for 40 mph in the wet is 72m (75m accommodates a further 3m for location accuracy). Far too many crashes automatically tagged were clearly not relevant to the site as they were on parallel roads, etc.

This report has been produced to provide statistical evidence to justify the advice detailed in the template skidding resistance Annex to CS228.

2. Method Overview

Six of the many Local Authorities that currently use XAIS' XA© (formerly ExpertAssets) software have agreed for their data to be used in this Statistical Analysis report.

The process used within a standard skid resistance analysis is that XA© automatically assigns all collisions within the most recent 3 years to all skid deficient sites using a user-definable length buffer.

The Local Authority then uses the XA© software to manually review the automatically assigned collisions for each skid deficient site.
Within this XAIS' customer base there are a number of variations to the approach taken to identify whether a collision is relevant to the skid deficient site. Some Authorities' data is reviewed by the safety team and the collision information is examined in detail including vehicle directions and textual descriptions to determine if the collision is relevant.

Using the collision information and other relevant information the Local Authority can produce a prioritised list of sites in need of an on-site detailed investigation as detailed in their skidding resistance Annex to CS228 or alternative documentation within their Skid Resistance Strategy.

All participants of this study have as a minimum removed any collisions whose spatial location is clearly incorrect – for example, its location is on an adjacent or parallel road.

An important variation between Authorities is that most (all) Authorities do not have the resource to undertake detailed site investigations on all skid deficient sites and have therefore used the prioritised list methodology to identify the worst sites in need of a detailed investigation; this also means that many deficient sites that could never be at the top of the list even if no collisions were removed have not had their collision data manually analysed as this would be an unnecessary and time consuming exercise.

It is important to note that the manual review for all participating boroughs is a legitimate review undertaken by each organisation to identify sites for detailed investigation and NOT to produce the statistics used in this report; at the time of each review it was not known there may be a need for this report.

In summary this means that the statistic of number of collisions removed (and reported in the results section of this report) is likely to be exacerbated as many sites were not actually reviewed because mathematically, they could not achieve a sufficient score to invoke a detailed investigation.
Such sites could not be easily identified and removed from this study.

The following statistics have been produced for each participating Authority in this study:

- Number and lengths of skid deficient sites
- Number of collisions automatically identified for each site using a 200m buffer
- Number of collisions automatically identified for each site using a 100m buffer
- Number of collisions automatically identified for each site using a 75m buffer
- Number of collisions automatically identified for each site using a 200m buffer for high speed (>=50mph) roads and a 75m buffer for low speed (<=40mph) roads
- Number of collisions manually identified for each site
- Comparison of the collision statistics on the skid deficient sites that have also had a manual review: The number and percentage of collisions that have been switched off during the manual review process is compared to the automated process for the varying buffer lengths

The collision information provided details on whether an accident occurred in the wet or dry. Comparison of wet with all collisions yielded very similar results.

3. Results

Full details of the collision review are detailed in the following supplementary files:

!Collision Buffer Review Statistical Analysis - Summary.xlsx
Collision Buffer Review Statistical Analysis - Client A.xlsx
Collision Buffer Review Statistical Analysis - Client B.xlsx
Collision Buffer Review Statistical Analysis - Client C.xlsx
Collision Buffer Review Statistical Analysis - Client D.xlsx
Collision Buffer Review Statistical Analysis - Client E.xlsx
Collision Buffer Review Statistical Analysis - Client F.xlsx

In summary:
When using a 200m buffer, on average 62% of the collisions within the buffer were manually switched off as not relevant to the site.
This data ranged over the six participating boroughs from 52% to 70%.
In every case over 50% of the collisions were manually switched off; this value is exacerbated considering that not all the sites contained within the statistics were actually reviewed.
It is clear that using a 200m buffer for collision analysis requires a significant and arguably unnecessary manual review removing collisions that are clearly not relevant to the skid deficient site primarily based on location alone.

When using a 100m buffer, on average 27% of the collisions within the buffer were manually switched off as not relevant to the site.
This data ranged over the six participating boroughs from 7% to 40%
If a single buffer value were to be used for all roads, then 100m appears to be the most appropriate value.

When using a 75m buffer, on average 9% of the collisions within the buffer were manually switched off as not relevant to the site.
This data ranged over the six participating boroughs from **-17%** to 22%.
1 rural county council with many higher speed roads, would need to switch collisions on when using the small 75m buffer.
It is clear that the 75m buffer should not be used for all roads.

When using a 75m buffer on low speed (<=40mph) roads and 200m no high speed (>=50mph) roads, on average 25% of the collisions within the buffer were manually switched off as not relevant to the site.
This data ranged over the six participating boroughs from 9% to 49%.
Whilst the data range for the 6 participating borough is extensive there is also a legitimate case for setting these values based on the minimum stopping distance of vehicles in the wet.

4. Ongoing Research Project

Currently XAIS are working with Derby City Council and Enodamus on a research project funded by the Road Safety Trust to develop a crash model appropriate for Local Roads. Within this project various buffer lengths for collision analysis are being used. Whilst the project's objectives are not specifically related to collision buffer lengths, advice on appropriate buffer length may come out of the project.

5. Conclusion & Recommendation

It is clear that using a 200m buffer for collision analysis requires a significant and arguably unnecessary manual review removing collisions that are obviously not relevant to the skid deficient site primarily based on location.

Ongoing research is taking place, which may result in better advice regarding collision buffer size.
It is recommended in the meantime that the following advice detailed on page 32 chapter 7 of the XAIS/RSTA Annex to CS228 is followed:

Given the limited accuracy of locating crash positions, it may be assumed for the purpose of this investigation that the position of a crash coincides with a Site if it occurred within 75m for urban roads (40 mph or less) and 200m for rural roads (50mph or greater). However, crashes in excess of 75m/200m can be 'tagged' to the site and crashes within the 75m/200m boundary can be 'untagged' if their location is deemed to not be relevant to the specific site. For example, there are some crashes that are within 75m of a site that occur on roads parallel to the site but cannot be accessed from the site.

Note: CS228 states a 200m buffer, but after reviewing the accuracy of the location of crashes, particularly in urban areas, it was deemed more appropriate to set a buffer of 75m for urban roads (40mph or less); the rationale for 75m is the stopping distance for 40 mph in the wet is 72m (75m accommodates a further 3m for location accuracy). Far too many crashes automatically tagged were clearly not relevant to the site as they were on parallel roads, etc.

6. References

CS228 Skidding Resistance (Formerly HD28/15)
XAIS/RSTA - Template Local Authority Application Annex to CS228 Skidding Resistance
XAIS/RSTA – Guidance To The Template Local Authority Application Annex to CS228 Skidding Resistance

- !Collision Buffer Review Statistical Analysis - Summary.xlsx
- Collision Buffer Review Statistical Analysis - Client A.xlsx
- Collision Buffer Review Statistical Analysis - Client B.xlsx
- Collision Buffer Review Statistical Analysis - Client C.xlsx
- Collision Buffer Review Statistical Analysis - Client D.xlsx
- Collision Buffer Review Statistical Analysis - Client E.xlsx
- Collision Buffer Review Statistical Analysis - Client F.xlsx