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Identification of hazardous sites and the recommendation of remedial measures on selected rural roads

2nd Stakeholders' Workshop Report

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Cover Photo: A scene at the 2nd Stakeholders' Workshop at Department of Feeder Roads Conference Room

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ABSTRACT

In fulfilment of Milestone 4 in the contract, the second stakeholders' workshop for the ReCAP project was held on 1st December, 2016 at the Conference Room of the Department of Feeder Roads (DFR), Head Office, Accra at 10:30 am. The main objective for the workshop was to discuss the draft report and also confirm the proposed Accident Blackspot Management System (ABMS) for a coordinated road safety activities on the rural road networks by the DFR. The meeting which was attended by 28 participants was chaired by Mr. F. O. M. Digber, Director of DFR who delivered the welcome address. Dr. Paulina Agyekum, AfCAP Regional Technical Services Manager, also delivered a short address stating that the work carried out by the Consultant was good and that it should be replicated in other regions and that it should be integrated into normal DFR operations. The recommended cost-effective improvements should be implemented on the rural road sections identified as hazardous locations.

The Project Team Leader, made a power-point presentation of the Draft Report stressing that capacity building of a minimum of 5 DFR staff is one of the key objectives of the project and through a "train-the-trainer" programme this would be fulfilled. He reiterated that those who would be trained are required to train other staff members to ensure a successful uptake and embedment of road safety management within the DFR. He mentioned that the DFR now has the Accident Blackspot Management System (ABMS) in place and that the iMAAP cloud software can be accessed.

Discussions were held after the presentation to clarify matters which included whether the strip maps could be updated; whether hazardous locations were identified on some of the unpaved rural roads; that there were under-reporting of crashes on the rural roads; management of the hazardous locations by the road agencies; use of first year rate of return and the like. Recommendations from the stakeholders have also been incorporated in this report.

Key words: *Stakeholders' workshop report; accident blackspot; First Year Rate of Return; strip maps; iMAAP; cost-effective countermeasures; hazardous location*

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ABBREVIATIONS AND ACRONYMS

ABMS	Accident Blackspot Management System
AfCAP	African Community Access Partnership
BRRI	Building and Road Research Institute
DFR	Department of Feeder Roads
DUR	Department of Urban Roads
FYRR	First Year Rate of Return
GHA	Ghana Highway Authority
GIS	Geographical Information System
GPS	Global Positioning System
iMAAP	Internet-based Microcomputer Accident Analysis Package
MAAP	Microcomputer Accident Analysis Package
MRH	Ministry of Roads and Highways
NRSC	National Road Safety Commission
ReCAP	Research for Community Access Partnership
RSU	Road Safety Unit
ToR	Terms of Reference
TRL	Transport Research Laboratory
UK	United Kingdom
WHO	World Health Organization

EXECUTIVE SUMMARY

In fulfilment of Milestone 4 of the contract, the second stakeholders' workshop for the ReCAP project was held on 1st December, 2016 at the Conference Room of the Department of Feeder Roads (DFR), Head Office, Accra at 10:30 am. The main objective for the workshop was to discuss the draft report and also confirm the Accident Blackspot Management System (ABMS) for a coordinated approach to road safety on the road infrastructure under the control of DFR. The meeting which was attended by 28 participants was chaired by Mr. F. O. M. Digber, Director of DFR who delivered the welcome address. Dr. Paulina Agyekum, AfCAP Regional Technical Services Manager, also delivered a short address by stating that the works carried out by the Consultant was good and that it should be replicated in other regions and that it should be integrated into normal DFR design functions. She further recommended for the hazards on sealed and unsealed roads to be differentiated. The recommended cost-effective measures should be implemented on the rural road sections for the identified hazardous locations.

The Project Team Leader made a power-point presentation of the contents of the Draft Report stressing that the project objectives included capacity building of a minimum of 5 DFR staff through a "train-the-trainer" programme and that those trained would later be required to train other staff members to ensure the uptake and embedment of road safety management within the DFR. He mentioned that the DFR now has the Accident Blackspot Management System (ABMS) in place and that the iMAAP cloud software can be accessed at the DFR.

The Team Leader took the participants through the various stages of the project activities stressing the detailed tasks performed to accomplish the Accident Blackspot Management System (ABMS) framework for the DFR. The associated deliverables were also indicated.

After the presentation, discussions were held to clarify issues as follows:

- that the strip maps for referencing crashes on the roads must be updated periodically in order to secure the most current information on the roads. New roadside features must be captured and added to the existing dataset.
- on whether hazardous locations were identified on some of the unpaved rural roads, the Team Leader mentioned that on the current project, all the hazardous locations identified occurred on the paved sections of the rural roads network. The situation was attributed partly to the poor nature of the unpaved roads and the relatively low vehicular speeds on such roads thereby leading to low number of crashes.
- for under-reporting of crashes on the rural roads, it was affirmed that there was some level of under-reporting of crashes on the feeder roads, particularly with property damage- only crashes. It was noted that fatal and serious crashes were the most reported on the project.
- that countermeasures would also be recommended for the unpaved rural roads for adoption, similar to what has been done for the paved roads.
- on whether the DFR and GHA could work together to treat the blackspots on the road networks, the matter was discussed and agreed that such a system could be facilitated by the Ministry of Roads and Highways by allocating funds to that effect.
- the concept and use of FYRR as an economic appraisal tool to prioritize the identified hazardous locations for treatment were also highlighted.

Recommendations from the stakeholders have also been incorporated in this report.

1.0 PROCEEDINGS OF THE SECOND STAKEHOLDERS' WORKSHOP

1.1 Introduction

In fulfilment of Milestone 4, the second stakeholder workshop was held on 1st December, 2016 at the Conference Room of the Department of Feeder Roads (DFR), Head Office, in Accra after the submission and review of the draft report. The second stakeholders' workshop was done purposely to affirm that an Accident Blackspot Management System (ABMS) has been developed under the project and that it is now operational at the DFR for a coordinated approach to the improvement of road safety on the rural road infrastructure.

The meeting started at 10:30am with a short prayer . The workshop was attended by 28 participants including the AfCAP Regional Technical Services Manager, the Management and key staff of DFR, the Project Team from the Building and Road Research Institute (BRRI), representatives from the Department of Urban Roads (DUR), the National Road Safety Commission (NRSC) and Ghana Highway Authority (GHA).

The Director of DFR chaired the meeting and welcomed all members to the meeting. Thereafter, the AfCAP Regional Technical Services Manager, in a brief statement commended the Consultant for the good work done. She mentioned that the project should be extended to the other regions of the country and the DFR could collaborate with the Consultant to assist the Department to incorporate road safety into their projects. She added that if the recommended cost-effective countermeasures are implemented for the identified hazardous locations these would help considerably in the reduction of crashes on the rural road network. The Chairman then gave the go ahead for the Team Leader to present the draft report.

The power-point presentation of the Draft Report highlighted among other issues the project objectives, project team, study area, ABMS framework developed for DFR, and the methodological approach for executing the project deliverables. The Team Leader took participants through the various stages of the project activities highlighting in detail how the tasks were performed to achieve the deliverables. He mentioned the main stages in the work process culminating in the draft report of the project as summarised:

- ***Accident database and strip maps development***: which required accident data collection from the police in the three study regions; coding of the data in the office and entering the data into the iMAAP software for storage and subsequent analysis. The strip maps were developed using a moving pick-up vehicle and recording the kilometer posts for the roadside features to help reference the crashes. In all, over 2,200 km of strip maps were developed under the project for the inter-district and connector feeder roads in the study area represented by the Ashanti, Central and Eastern regions.
- ***Identification and ranking of hazardous locations***: the main criterion for the identification of hazardous locations was the registration of clusters of 5 or more crashes on a fixed 5 km rural road sections of the networks. These identified locations were then ranked using their severity scores established through the weighted severities of the crashes (a weight of 5 was for a fatal crash, 3 for serious and 1 for slight/damage-only).
- **Analysis and diagnosis of hazardous locations identified**: the identified hazardous locations were analysed using the stick diagram approach in the iMAAP cloud software, collision diagrams and road site inspections to establish the dominant crash types, patterns in the crashes and to understand how the road environment contributed to the crashes and injuries.

- ***Recommendation of cost-effective countermeasures***: based on the dominant crash types and patterns, as well as best international practices, low-cost remedial measures were recommended for the identified hazardous locations.
- ***Evaluation and prioritization of hazardous sites for treatment***: the FYRR was estimated for all the 14 identified hazardous locations earmarked for treatment. The FYRR defined as the crash savings over the construction cost for the treatment of sites was applied as an economic appraisal tool to prioritise the hazardous locations. Locations with high FYRR were ranked ahead of those with low FYRR.

The Project Team Leader reiterated that an Accident Blackspot Management System (ABMS) using the iMAAP cloud Road Safety Application software has been set up for the DFR. This system is for the in-depth analysis of crashes for identification and recommendation of remedial measures for the treatment of hazardous locations on the rural (feeder) road network.

Some of the issues discussed after the presentation of the draft report included how strip maps of roads could be updated; whether hazardous road sections were identified on some of the unpaved rural roads; under-reporting of crashes on rural roads; management of blackspots by road agencies; concept and use of first year rate of return and the like. Recommendations from the stakeholders have also been incorporated in this report.

2.0 MAIN DISCUSSION POINTS OF THE WORKSHOP

Presentation of the Draft Report on Identification of Hazardous Sites and Recommendation of Remedial Measures on Selected Rural Roads was done by the Team Leader, for the second stakeholders' workshop. He elaborated the key discussion points which included:

- *Accident Database and Strip Map Development*: which involved collection of crash data from the police, coding and entering the data into the iMAAP cloud software to create a database. The strip maps were developed for the various rural roads to assist in referencing the crashes.
- *Identification and Ranking of Hazardous Locations*: clusters of 5 or more crashes on a fixed 5 km rural road sections constituted hazardous locations. These identified locations were then ranked using their severity scores established through the weighted severities of the crashes (a weight of 5 was for a fatal crash, 3 for serious and 1 for slight/damage-only).
- *Analysis and Diagnosis of hazardous locations identified*: the identified hazardous locations were analysed using the stick diagram procedure in the iMAAP, collision diagrams and road inspection to establish the dominant crash types and to understand the associated environmental risk factors.
- *Cost-effective Countermeasures, Evaluation and Prioritization of hazardous sites for treatment*: based on the identified dominant crash types, low-cost countermeasures were recommended to treat the hazardous locations. The FYRR was then applied as an economic appraisal tool to prioritise the hazardous locations for treatment. High FYRR locations were ranked ahead of low FYRR locations for treatment.
- *Initial User Manual Guidelines*: a summary of the user manual highlighting the iMAAP software applications and a step by step approach in the use of the software.
- *Achievements, Constraints and Suggested Way Forward*: the main achievement is the development of an Accident Blackspot Management System (ABMS) for DFR and the way forward is for the selected staff to be trained in the use of the iMAAP to also train other staff members to ensure a successful uptake and embedment of road safety management in the normal DFR functions.

He also reiterated that the training of a minimum of 5 selected DFR staff on the use of the iMAAP cloud Road Safety Application has been scheduled to commence on 12th December, 2016 and be completed by 16th December, 2016. The training sessions shall take place at DFR Head Office. The DFR Management should get all the staff to be trained informed.

Again, he mentioned that the iMAAP cloud Road Safety Application software has been installed on 5No. computers and so the DFR, currently, has the Accident Database Management System (ABMS) in place.

Comments/queries and suggestions for the way forward are presented in the sub sections below.

2.1 Updating Road Strip Maps

It was discussed and agreed that depending on the level of roadside development the strip maps for the roads would have to be periodically updated to secure the most current information on the roads to reference crashes. New road side features could periodically be captured and added to the existing dataset.

2.2 Crashes and Countermeasures on Unpaved Rural Roads

A query was made concerning the number of hazardous locations identified on the unpaved sections of the rural roads. The Team Leader mentioned that, for now, all the locations which registered high number of crashes occurred on the paved sections of the rural roads. This may possibly be due to the poor nature of the unpaved roads and the relatively low vehicular speeds on the unpaved road sections. However, the few crashes recorded on the unpaved rural roads were dominated by ran-off, side swipe and head-on crashes.

With regards to the provision of countermeasures for unpaved rural roads, it was agreed that countermeasures would be proposed also for the unpaved roads. For example, signage and good road maintenance practices will be possible on the unpaved roads.

2.3 Under-Reporting of Crashes

It was noted that there is some level of under-reporting of crashes on the feeder road networks, particularly with property damage-only crashes gauged against the national crash data. Fatal and serious crashes were the ones which were most reported on the project.

2.4 Usage of iMAAP Software

It was enquired whether iMAAP is able to identify sections with similar road characteristics as hazardous locations. This was explained that, the iMAAP Application is a tool which helps identify hazardous locations based on the number and severity of crashes. Similar road sections may not all become hazardous locations due to other varied traffic and environmental factors.

2.5 Management of Hazardous Locations

As to whether the DFR and GHA could work together to treat the hazardous locations on the road networks, it was discussed and affirmed that with the support of NRSC, a budget could be allocated by the Ministry of Roads and Highways for the management of hazardous locations by the road agencies. A formula could be worked out on the allocation of funds for a blackspot treatment programme.

2.6 Accident Blackspot Improvement

It was explained that Accident Blackspot Improvement programmes are normally carried out to counter observable crash patterns in order to reduce the number of crashes. The sites to be treated may not only be those which project fatal crashes but a mix of crash severities. It was, however, established that the severity score is used as a procedure to rank the locations with most severe (fatal and serious) crashes ahead of those with less severe (slight and damage only) crashes.

It was asked whether apart from engineering measures, other measures were also adopted. It was realized after discussions that for accident blackspot improvements, the sole attention is on how best to use engineering measures to modify the road environment to help road users cope in traffic. However,

education and enforcement measures are employed to complement the engineering measures, so as to get the full effect of the road engineering measures put in place.

2.7 Identification of Hazardous Locations

It was acknowledged that crash densities did not form the basis for the analysis. Rather, only sections identified as hazardous locations were recommended for treatment and such treatments affect only the identified locations and it is not for the entire road length. It was stressed that only locations which presented clusters of 5 or more crashes were considered for further analysis to ascertain whether they were indeed hazardous locations based on the severity score criterion.

2.8 Concept of FYRR

It was asked whether the First Year Rate of Return(FYRR) was also based on weightings of the crash severity score. The Team Leader made it clear that the calculation of the FYRR was not based on the weightings (5 for fatal, 3 for serious and 1 for slight/damage only crashes) but rather on the economic costs of crashes estimated by crash severity. The FYRR is used as an economic appraisal tool to prioritize the identified blackspots to ascertain which hazardous locations when treated offer the highest economic returns. The locations with the highest FYRR would then be treated first, ahead of those with lowest FYRRs.

2.9 Countermeasures and Treatment of Hazardous Locations

When enquired whether the countermeasures and treatments were based on the crashes, the Team Leader was in the affirmative. He mentioned that the dominant crash types informed the kind of countermeasures to be recommended for the identified hazardous locations. The risk factors associated with the dominant crashes were then mitigated using the appropriate cost-effective remedial measures.

3.0 RECOMMENDED SUGGESTIONS AND CLOSING REMARKS

3.1 Some suggestions and recommendations

Some suggestions and/or recommendations made during the discussions included the following:

- Recommended countermeasures on paved and unpaved rural roads should be separated.
- Individual cost components of the overall cost of the countermeasures if indicated, would be appreciated.
- For precision, it was suggested to use GPS device in recording distances during strip-mapping of roads instead of vehicle odometer.
- Involvement of Police Personnel in similar Road Safety Workshops
- Inclusion of Road Safety Audit in geometric designs of rural road network to prevent occurrences of crashes on them. The DFR network is dense so such an integration is laudable.

4.0 CONCLUSION

The second stakeholders' workshop meant to discuss the draft report has duly taken place. An accident blackspot management system(ABMS) has been developed for identification and recommendation of remedial measures for hazardous locations on the rural road networks managed by the DFR. The next assignment is to train a minimum of five (5) DFR Staff on the use of the system. Those trained staff will be required to train others to ensure entrenching blackspot management in the normal operations of DFR.

ANNEX 1

List of participants at the Workshop

The list of those present at the workshop meeting is given below as:

1. F.O.M Digber	Director, DFR
2. Dr. Paulina Agyekum	West Africa Regional Manager, AfCAP
3. Ing. Francis Kwaku Afukaar	Project Team Leader, BRRI
4. Ing. William Agyemang	Project Engineer, BRRI
5. Kwadwo Opoku Agyeman	Project Computer Analyst, BRRI
6. Simon Ntramah	Principal Technical Officer, BRRI
7. K.N. Akosah-Koduah	Chief Engineer, DFR
8. Nathan Odjao	Bridge Mat. Engineer, DFR
9. Nii Sarpei-Nunoo	Chief Engineer, DFR
10. Dr. Patrick Amoah Bekoe	Snr. Engineer, DFR
11. Lanquaye Wellington	Civil Engineer, DFR
12. Kwabena Owusu Afrifa	Assistant Engineer, DFR
13. David Brobbey	Civil Engineer, DFR
14. E. Duncan-Williams	Civil Engineer, DFR
15. Eric Kofi Forson	Assistant Engineer, DFR
16. K. Omane-Brimpong	Principal Engineer, DFR
17. R.O. Otoo	Chief Engineer, DFR
18. Bernard Amoah	Mechanical Engineer, DFR
19. Dr. Michael Bekoe	Civil Engineer, DUR
20. Abdallah Fatma Yusif	Civil Engineer, DUR
21. Kenniworth Baaba Buckson	Assistant Engineer, DUR

22. Michael Sarpong	Assistant Engineer, DUR
23. J. Darkwah	Assistant Engineer, DUR
24. Catherine Hamilton	Regional Manager, NRSC
25. Abraham Zaato	Planning Officer-RME, NRSC
26. Victor Kojo Bilson	Planning Officer, NRSC
27. Rliys A. Agyemang	Maintenance Engineer, GHA
28. Charles Adubofour	Civil Engineer, GHA