TEN STEP PLAN
TANZANIA
SAFER ROAD INFRASTRUCTURE

The Ministry of Works and Transport, Tanzania

FINAL REPORT

Road Infrastructure Safety National Training & Accreditation Scheme

FEBRUARY 2023

UN ROAD SAFETY FUND
Global Road Safety Facility
UKaid from the British people
ECA
International Road Federation
Fédération Routière Internationale
Federación Internacional de Carreteras
iRAP
PIARC

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Other resources about the Ten Step Project in Tanzania can be accessed on:

https://www.gtkp.com/themepage/road-safety/ten-step-plan-for-safer-road-infrastructure/ten-step-project-tanzania/

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Acronyms

ACE	Association of Consulting Engineers
CRSP	Certified Road Safety Professional (Institute of Transportation Engineers, USA)
CBET	Competence-Based Education and Training
CPD	Continuous Professional Development
DoARS	Decade of Action for Road Safety
ERB	Engineering Registration Board
EBRD	European Bank for Reconstruction and Development
FSI	Fatal and Serious Injuries
GRSF	Global Road Safety Facility
iRAP	International Road Assessment Programme
IRF	International Road Federation
MoWT	Ministry of Works and Transport
NRSC	National Road Safety Council
NACTE	National Council for Technical Education
NIT	National Institute of Transport
NGO	Non-Governmental Agency
PIARC	World Road Association
PO-RALG	President's Office, Regional Administration and Local Government
RSA	Road Safety Audit
RSP	Road Safety Professional (Transportation Professional Certification Board, USA).
SDG	Sustainable Development Goals
TCU	Tanzania Commission for Universities
TANROADS	Tanzania National Roads Agency
TARURA	Tanzania Rural and Urban Roads Agency
UKAid	Foreign Commonwealth and Development Office
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNRSF	United Nations Road Safety Fund
USD	United States Dollar
WHO	World Health Organization

1 Introduction

1.1. Background

To address the scourge resulting from road crashes, in August 2020 the United Nations (UN) General Assembly adopted a resolution, proclaiming the Decade of Action for Road Safety 2021-2030. The ambitious target set requires countries and stakeholders to implement actions that contribute to the reduction of road Fatalities and Serious Injuries (FSI) resulting in the halving (50%) of FSIs by 2030.

As part of the Safe System, road safety engineering makes a direct contribution to the reduction of road death and injury. Looking specifically at the contribution that infrastructure can have on safety, countries should be able to assess the safety capacity of the road network for all road users and implement infrastructure improvements through targeted investment programs. The UN Global Road Safety Performance Targets indicate in target 3 that by 2030 all new roads are to achieve a 3-star rating or better standard for all road users; and target 4 that 75% of travel on existing roads is to achieve a 3-Stars or better technical safety standards. Through the iRAP Methodology, locations which do not meet the minimum 3-star rating Target can be identified and interventions implemented to improve safety for all road users.

The Ten Step Plan for Safer Road Infrastructure was developed by the United Nations Road Safety Collaboration 'Safer Roads and Mobility' group. It is designed to provide countries with a proven step by step process to build national capacity for safer road infrastructure, and to help them achieve Targets 3 and 4 of the UN Global Road Safety Targets. The Tanzania Ten Step project is a jointly funded initiative by the United Nations Road Safety Fund (UNRSF) and by the Foreign Commonwealth and Development Office (UKAid), through the Global Road Safety Facility (GRSF) of the World Bank. It is implemented by the United Nations Economic Commission for Africa (UNECA), International Road Federation (IRF), World Road Association (PIARC), International Road Assessment Program (iRAP), and delivered in close collaboration with the World Bank and the Government of Tanzania through TANROADS and TARURA, other key agencies and including research institutions, NGOs and industry stakeholders.

In the WHO published, Global Status Report on Road Safety,2018, it is reported that 16,252 people were killed in road crashes in Tanzania in 2016. Of these, 30% were vehicle occupants, 23% were motorcyclists, 30% were pedestrians, and 8% bicyclists. Road infrastructure in one of the key components of the Safe system that plays a significant role in influencing the likelihood and severity of the road crashes. It is therefore critical that stakeholders and players in the development and maintenance of road infrastructure play their part in ensuring safer and forgiving road infrastructure is in place. To do this, well trained and experienced road safety practitioners are needed to ensure crashes are prevented and severity where they occur is minimised. A clear framework to build capacity and accredit professionalism would be advantageous in ensuring that Tanzania has the adequate experts to assure that safer road infrastructure is in place.

The purpose of establishing an effective training and accreditation scheme is to support the acquisition of new skills, the continuous improvement and/or extension of existing skills to support the routine and regular development of safer roads in Tanzania and the wider region through the Regional Centre of Excellence for Road Safety. This training plan aims to outline the training strategies, activities, and deliverables that are proposed for use to train the targeted audience and includes the parameters that will help identify the targeted trainees, as well as the success matrix and indicators that will be used to track the training accomplishments.

1.2. Basis of a Training and Accreditation Scheme

Road infrastructure safety is of paramount importance to ensure the smooth and efficient functioning of a country's transportation system. It is an essential aspect of transportation that must safeguard the protection of road users, including vehicle occupants, motorcyclists, pedestrians, and bicyclists.

There has been a growing concern about the safety of road users, particularly with regards to the influence infrastructure has on the outcome of a crash and hence the impact that can be gained through the design and maintenance of roads. Poorly designed or maintained roads can lead to crashes that can result in fatalities and serious injuries, a critical issue that must be addressed. In the same light, well designed roads can create a forgiving environment for when road users make mistakes. Therefore, it is essential that those responsible for the development of our roads are prioritising safety and are adequately trained and qualified to do so.

To address this issue, it is proposed to develop a well-designed and implementable training and accreditation scheme which can play a crucial role in promoting road infrastructure safety by ensuring that those responsible for the design, construction, and maintenance of our roads are adequately trained and certified. This can also help in promoting best practices that ensure road infrastructure designed, built, and maintained to the highest possible safety standards. The philosophy behind this programme is based on a Competence-Based Education and Training (CBET) approach, reflected in the defined learning outcomes, supported by well-structured instructional methods and materials as well as relevant assessment criteria, methods and tools.

This training proposal aims to take advantage of best practices in road safety, including the use of innovative technologies and materials. The scheme is also to provide a means of accrediting individuals who have demonstrated their knowledge and expertise in this area. Therefore, upon successful completion of the training, professionals would be eligible to take a certification assessment to appraise their knowledge and skills in road infrastructure safety. Those who pass would be awarded a road infrastructure safety certification / accreditation, which would demonstrate their competence and qualifications in the field. There would also be a requirement to maintain their certification through continuing education and regular recertification to ensure opportunities to update knowledge, exposure to new innovations and regular up-skilling.

There are several benefits to certification, namely;

- ensuring that individuals who are responsible for the safety of roads are adequately trained and qualified therefore leading to a reduction in the risk of crashes and injuries caused by poorly designed or maintained roads.
- certification enables individuals to demonstrate their knowledge and skills in the subject.
- the certification program provides a measure of accountability for those working in the industry.

2 Formulation of the National Training and Accreditation Scheme

As part of the Tanzania Ten Step project, training was offered to a number of local practitioners from various backgrounds. This training was closely monitored by the project partners to capture any issues relating to the methodology, participation and advancement of the trainees. A number of activities were also carried out to support the training offering under the project with a view of informing this National Training and Accreditation Scheme proposal.

Three key components were actively tracked during the project in order to inform this National training scheme namely,

- Gap Analysis on Training and Accreditation in Tanzania
- Ten Step Training and Accreditation
- Evaluation of the Ten Step Training and Accreditation

The suggestions and recommendations in this proposal aim to resolve various challenges identified and close some of the gaps found but is not exhaustive. The findings are detailed below.

This proposal focus on the three key training courses offered in the Ten Step project. It is recommended that the submissions herewith are further analysed by a competent authority to narrow down what is plausible within specified time limits and a Work Plan / Action Plan prepared on how the recommendations can be addressed. Additional concepts may also be considered within the ordinance of this proposal.

2.1. Gap Analysis on Training and Accreditation in Tanzania

A local consultant engaged through the Tanzania Ten Step project and Working Group 3 carried out a gap analysis on the training and accreditation opportunities in Tanzania. The gap analysis was performed in order to understand and analyse the existing training provision, capability and professional accreditation schemes in road infrastructure safety within Tanzania. The study identified universities and training institutions around the country that offer civil engineering, infrastructure trainings and accreditation services where surveys were conducted.

The results from the survey showed that there are training needs in the following areas;

- Road Safety Impact Assessment,
- Road Safety Data System,
- Road Safety Engineering,
- Road Safety Audits
- Risk Assessment and Mapping,
- iRAP Methodology training

The following additional road safety related courses were recommended:

- Road sign allocation guidelines
- Standard allocation of bus bays
- Road speed control infrastructure standards and guideline
- Drivers' training in road safety
- Fleet Management
- Road Crash Rescue Program

The top three challenges reported by institutions in providing trainings include:

- Lack of trainers/experts
- Lack of training materials/resources
- Lack of funds

The results of the gap analysis study highlighted the existing training, capability, and professional accreditation system in the country. The findings supported the establishment of a new national training, accreditation and certification scheme that responds to the new road safety targets and builds institutional capacity to sustain the National Road Assessment Programme.

The consultant recommended that:

- Institutional/organization accreditation is done through the following channels:
  i. Universities apply through the Tanzania Commission for Universities (TCU)
  ii. Technical institutions apply through the National Council for Technical Education (NACTE)
  iii. Organisations/associations/firms apply through the Engineering Registration Board (ERB) using the Management Information System (MIS)
- The accreditation renewal process follows a similar procedure as when first applying for accreditation.

This proposal supports the findings of the gap analysis study and seeks to propose potential solutions to close knowledge gaps. This proposal considers this recommendation and looks at how the various institutions can be engaged and included while ensuring a seamless and clear path to developing capacity and certification of professionals.

2.2. Ten Step Training and Accreditation

The Tanzania Ten Step project included training and accreditation activities (that is, activities that involve structured learning content and tests) and capacity building activities such as workshops and field activities. The purpose of this training was to address skill gaps supporting Tanzanian nationals and Non-Tanzanians practitioners living and working in Tanzania by giving participants the opportunity to strengthen their skills at designing and building safer road infrastructure.

The trainees completing these activities were expected to build onto the pool of Road Safety Engineers and professionals with a good knowledge base in engineering safer road infrastructure, undertaking road assessments on both existing roads and road designs using the iRAP Star Rating methodology, assessing school zones and undertaking Road Safety Audits to ensure built in safety in road infrastructure. The overall outcome of this was to ensure skills in infrastructure safety leading to road networks adhering to the UN Decade of Action targets 3 and 4. Indeed the core training modules offered in this training are now enhanced for ongoing upskilling through this Tanzanian Infrastructure Training and Accreditation Scheme.

The training and accreditation implemented contained 3 components.

1. Remote training using both online resources, and live training
2. Live classroom training
3. Hands-on, on the job training
4. Additional ad hoc capacity building activities such as meetings and workshops

Under the formal training, three (3) training courses - each with its own unique modules and varying dissemination styles – were carried out as detailed briefly below:

Road Safety Engineering: aims to provide a comprehensive introduction on how to ensure road development projects prioritise safety for all road users. It aims to give road engineers, designers and planners a robust introduction to the fundamental principles of good road safety engineering based on a Safe System Approach. Expected learning outcomes were to demonstrate a good understanding of traffic safety engineering and the contextual factors which influence decision making within the discipline as well as understand critical elements in road safety and identify practical preventive measures to address road safety issues.

IRAP Road Assessments: iRAP assessments are an internationally recognised approach to managing road safety risk and saving lives. The iRAP methodology offers the global standard for measuring the built-in safety of road infrastructure. In order to meet Target 3 and 4 of the Global Road Safety Targets, Agencies must have the capacity to measure the Star Rating utilising the iRAP methodology on which these targets are based. iRAP accreditation helps ensure that iRAP assessments are performed to the same consistently high level of quality worldwide. Those who successfully complete the iRAP training were eligible to apply for iRAP Accreditation.

Road Safety Audits: The course was designed to give a comprehensive introduction to road safety auditing. The course provided "hands-on" experience for carrying out Road Safety Audits on road schemes and encouraged participants to share their experiences of road safety and road design. Expected learning outcomes were to ensure participants have the capacity to identify and analyze what elements of the road may present a safety concern, to what extent, to which road users, and under what circumstances as well as the competence in suggesting solutions to eliminate or mitigate identified safety concerns.

Under the on-the-job training element, trainees completing the iRAP Road Assessments training and especially those that had attained the iRAP Accreditation were given a chance to participate in the Survey and Attribute Coding protocols of the iRAP methodology through an iRAP assessment component of the Tanzania Ten Step project. For the Road Safety Audit course, participants who successfully undertook Part 1 and Part 2 classroom sessions were given an opportunity to carry out the practical part 3 session.

Additional capacity building activities such as dissemination workshops, design review workshops, stakeholder engagement meetings and field activities were also held and these provided further opportunity for learning and also demonstration of knowledge and skills.

This training proposal is developed in consideration of the experiences of the training and accreditation offered as part of the Tanzania Ten Step project. This helps ensure that everyone in the road development chain is up to par and can contribute adequately to the development of safer road infrastructure on every project. It is hoped that this training will support career development enabling ambitious personnel to attain the necessary skills to grow and maximise their potential.

2.3. Evaluation of Ten Step training

It was necessary to evaluate the progression and the impact that training has on participant's, the organization they work for and the success of the training in achieving the goals of the Tanzania Ten Step project. This was a systematic process to analyse whether the training has achieved its objectives and the expected impact. Evaluation mechanisms have been developed for the various stages of the project to monitor and evaluate the impact of the various activities. These tools helped determine the success of the training and metrics. Before, during and after implementing the training sessions, the project partners used the tools developed to measure the: knowledge gaps before training; effectiveness of the training programs; and change adoption and enablement of the new skills and knowledge gained.

A number of evaluation mechanisms of the Tanzania Ten Step training were carried out as follows:

1. Participation rates were monitored enabling, for example, analysis of the rates of participation from different organisations.

2. The trainees were required to complete the *Tanzania Ten Step Knowledge and Perceptions Tracking Survey* at the start of their training as a pre-requisite to attend any of the courses offered under the Tanzania Ten Step project. The purpose of the tracking survey was to gauge exposure, knowledge and experience in Road Safety prior to participating in the training. The information glimpsed from this survey would help develop a baseline in knowledge and capacity for Road Safety Engineering prior to the training.

3. Post Training knowledge and perceptions surveys were conducted to evaluate the impact of training given to students. This is essential in ensuring that students are learning effectively, and that training programs are meeting their intended goals. This was carried out to determine the effectiveness of the training, and whether it is meeting the intended learning outcomes. This information was used to identify areas of the curriculum that are not effectively preparing students for their future careers, so that they can be updated or improved.

4. The in-module tests and assignments were utilised as a mechanism to examine intermediate learning and ensure the topics are thoroughly understood prior to moving forward to the next module. This helps the trainee to gradually build their expertise and confidence that they are understanding the topics as they progress. These metrics also provided a means of evaluating impact on capacity overall.

5. On completion of some of the live online training sessions, participants were required to complete a course evaluation questionnaire. This evaluation report was to gauge the impact and effectiveness of the methodology and organisation of each training course to enable the training administrator to find gaps and areas of weakness which could be improved in the organization, administration and delivery of each training course.

The evaluation essentially used a combination of quantitative and qualitative indicators such as Participation rates in training and capacity building activities, test results for training activities, Self-reported levels of knowledge and capability, demonstrated knowledge and skills in capacity building activities (eg working groups, and participation in on-the-job activities).

At the time of writing this proposal, the capacity building evaluation was yet to be finalised. The preliminary findings of the evaluation of the training and accreditation scheme inform the recommendations in this proposal. Key outcomes are:

- Overall, the Tanzania Ten Step project resulted in very high participation rates, indicating a high level of engagement in the project. Since 2020, Tanzanian trainees now represent 20% of the overall people that have taken the iRAP Star Rating Essentials course internationally and in line with this, 10% of the total number of people becoming accredited for Star Rating Essentials from a single country.

- Participants from a variety of professions related to road development and management were well represented in the training and capacity building activities offered aligning well with the Safe System approach which is founded on the shared responsibility.

- While many women participated in the training and capacity building activities, the number was a small percentage compared to overall numbers and this was consistent across all training activities. However, this could be due to the comparable numbers of females in the profession as the opportunity to take part was open to all. However, in line with the Sustainable Development Goals (SDG), increased participation by females should be encouraged in future initiatives.

Overall, it is apparent that the combination of the road safety engineering, iRAP road assessment methodology and Road Safety Audit training courses offered in the Tanzania Ten Step project was successful and therefore, in this proposal, it is determined that these should form the core training offering in Tanzania. This finding recognising the highest pass rate being related to face-to-face learning is also recognised but also appreciates the benefits of online prospects.

It is hoped that a post project component to follow-up with trained persons and provide additional training as needed will also be developed. The findings from the Monitoring and Evaluation exercises are used to develop / determine frequency of refresher training possible through the normal training modalities which already exist with each of the partner organisations (PIARC, TARA, iRAP, IRF and others) and support the development of the national infrastructure training and accreditation / certification scheme.

3 Governance Structure

It is proposed that the training be coordinated by the National Institute of Transport (NIT) through the Regional Centre of Excellence for Road Safety (RCoERS) proposed for establishment under NIT and coordination and reporting mechanism through the Tanzania Road Assessment Program (TanRAP) supported by the National Road Safety Council.

3.1. National Institute of Transportation

The National Institute of Transport (NIT) is a Public Higher Learning Institution established by Act No. 24 of 1982 cap 187 Revised Edition 2002 with the primary objective of provision of education and training, conduct research and consultancy in the field of logistics, management and transport technology in Sub-Saharan countries and beyond. NIT is fully accredited by the National Council for Technical Education (NACTE) to provide Competence-Based Education and Training (CBET) programmes at the level of Certificate, Diploma and Degree (National Technical Awards - NTA level 4 to level 8). In addition to that, the Institute offers Master of Science Degree in Transport and Logistics Management. It also collaborates with the Open University of Tanzania (OUT) to offer MBA in Logistics and Transport Management. The institute is accredited by Tanzania Civil Aviation Authority (TCAA) to offer Ab Initio Cabin Crew and Recurrence Courses. It is also accredited by the International Air Transport Association (IATA) to conduct training in the Airline Marketing, Airline Customer Service, Airport Operations Fundamentals and Global Distribution Systems.

The National Institute of Transport provides support in ensuring road safety standards are adhered to, which is achieved through their capacity to offer training programmes covering all pillars of road safety in support of the Safe System. As such, the National Institute of Transport has been identified as the institute to run and manage the Regional Centre of Excellence for Road Safety (RCoERS) being funded by the African Development Bank (AfDB) through the Tanzania Nationals Roads Agency (TANROADS).

The National Institute of Transport has been identified by stakeholders in Tanzania through Technical Working Group 3 and approved by the Steering Committee of the Tanzania Ten Step project as detailed in the Tanzania Road Assessment Program (TanRAP) Memorandum of Cooperation as the institute to run take on the Technical lead role within the coordination of the TanRAP. It is anticipated that this lead role will be executed through the various areas of research and specifically through the RCoERS. NIT becomes the technical contact point and should have expertise on the iRAP methodology as it will be responsible for building the in-depth knowledge and expertise on the iRAP protocols, evidence-base models and software. It is deemed to have the capacity to undertake research in road development innovations that support infrastructure safety and road safety training that supports the safe system at various levels. NIT through liaison with other stakeholders is to manage technical issues related to monitoring the impact of interventions, model improvements, trainings and Quality Assurance. It is required to ensure that knowledge is shared across all stakeholders, and that local research and expertise can contribute to the global network of technical experts.

3.2. Tanzania Road Assessment Program (TanRAP) in Summary

The Tanzania Road Assessment Programme (TanRAP) is a locally owned and led programme of the International Road Assessment Programme (iRAP). TanRAP has been established through local leadership of local experts and aims to produce local results and local impact. TanRAP launched on 14 September 2022 as part of the deliverables of the Tanzania Ten Step project. Hosted by the Ministry of Works and Transport, TanRAP aims to address the highest risk roads in the country in partnership with national government agencies, development banks, mobility clubs, research institutions, road safety NGOs and industry.

Tanzania RAP programme shall consist of four (4) key roles – (i) Program Coordinator, (ii) Technical Lead, (iii) Road Upgrade Management Lead, and (iv) Stakeholder Communications Lead. Through the leads, roles are expected to support each organization's existing activities by enabling better coordination with others; facilitating the efficient sharing of data that enables informed decisions; promoting buy-in from various stakeholders enabling activities to be championed; enhancing collaboration activities; smoothing efficient information flow; amongst others. The purpose of an effective coordination mechanism is to ensure resources are better utilised to achieve a common goal and the establishment of TanRAP is expected to achieve that.

During the process of determining lead roles for coordinating the Tanzania Road Assessment Program (TanRAP), the National Institute of Transport was unanimously selected by members from various institutions from public, private, NGO and academia as best placed to be the technical Lead responsible for coordinating the training and capacity building in Tanzania under TanRAP. With NIT charged with establishing the RCoERS, it places NIT well to concurrently manage a TanRAP Centre of Excellence alongside the Regional Centre of Excellence for Road Safety and therefore coordinate and offer the training proposed under the TanRAP in line with their Mandate. This prospect further opens up the opportunity to support the region through this Regional Centre of Excellence negating the need to duplicate resources rather strengthening the RCoERS as the regional knowledge hub.

3.3. Regional Centre of Excellence for Road Safety

The Regional Centre of Excellence for Road Safety (RCoERS) at the National Institute of Transport is to be established through a road upgrading project funded by the African Development Bank (AfDB). The purpose of the RCoERS is to address the need of skilled human capital in Road Safety and support the establishment of a road safety data centre. The focus of RCoE for Road Safety is to offer both short and long programs as well as workshops, outreach, exhibitions, summit and seminars for Road Safety covering all areas of the Safe System. It is expected that the RCoERS will;

- Provide highly trained professionals and experts for road safety subsector and promote road safety awareness;
- Provide state-of-the-art training facilities and learning environment for road safety;
- Conduct research and consultancy services on road safety;
- Establish a database for road safety matters in the region; and
- Promote the development, piloting, and objective validation of innovative road safety indicators, such as the safety rating of roads.

The RCoERS is to be established under the NIT. Establishing a Centre of Excellence under an academic institution can provide several benefits, including:

- *Advancing research:* They often focus on specific areas of research and bring together experts from different disciplines to collaborate on projects. This can lead to significant advancements in knowledge and breakthroughs in technology.
- *Attracting funding:* They often have a strong track record of producing high-quality research, which can attract funding from government, industry, and other sources.
- *Enhancing the reputation of the institution:* They can enhance the reputation of the academic institution, by highlighting its expertise in a particular field and attracting top talent.
- *Providing training and development opportunities:* They can provide training and development opportunities for students, post-doctoral researchers, and faculty members, helping to ensure that they are well-prepared to contribute to the field.
- *Facilitating technology transfer:* They can facilitate the transfer of technology and knowledge from the academic world to industry and other sectors, helping to ensure that new developments are put to practical use.
- *Building networks:* These foster collaborations and networks among researchers, industry & other stakeholders, helping improve the effectiveness of research & development activities.
- *Promoting innovation:* They can help to promote innovation by providing a platform for the development of new ideas, technologies and products.
- *Encouraging entrepreneurship:* Can encourage entrepreneurship by providing students and faculty members with the resources and support to turn their ideas into viable businesses

Through the Training Gap Analysis study, the benefits of setting up the training scheme under the RCoERS included to ensure there is a continuous and dedicated promotion of Safer Roads,Training Road Safety Professionals to ensure Staff Capacity Building, supporting Research and Consultancy in Road Safety, Training of Trainers for sustainability of programs, and availability of appropriate training facilities. Through their already existing roles and activities, the NIT is well placed to govern, implement and coordinate the National training and accreditation scheme.

3.4. Engagement with other stakeholders

Through their coordination mechanism in TanRAP, it may be worthwhile for the NIT to liaise and collaborate with other institutions or organizations which offer training in Engineering and ensure alignment with the training proposed here and report on the impact of the training offered. These institutions may include, but are not limited to, the Engineering Registration Board, Association of Consulting Engineers, and the various Associations of Engineers, Consultants, and Contractors in Tanzania including their Member organizations. Indeed, it is advised to engage with the Engineering Registration Board in Particular to accredit each of the stand-alone modules with CPD credits in order to further encourage participation.

It is also important to note that for the iRAP Accreditation, only iRAP can Accredit suppliers. It is also worth noting that Tanzania currently does not have a certification agency for road safety audits which is something that should be considered. Suggestions from some members of Working Group 3 were to institute some sort of Federation or Society for East African Road Safety Auditors (SEARSA) under NIT as part of this mandate, the National Road Safety Council, or even TanRAP. There is also a need to further define the role of the Tanzania National Road Safety Council.

4 Delivery and Assessment Methods

The training program can be delivered through a combination of classroom-based instruction, hands-on training, and online learning. Classroom-based instruction will provide individuals with the opportunity to learn from experienced industry professionals and to ask questions and engage in discussions. Hands-on training allows individuals to apply what they have learned in a practical setting, and online learning provides individuals with the flexibility to learn at their own pace and on their own schedule.

4.1. Course Delivery Methods

Training should be offered widely for participants meeting the minimum criteria specified to undertake the various Road Safety courses. It is proposed that all formal classroom style training be delivered through one or more of the various modes namely;

- **Online, pre-recorded self-paced programs:** through pre-recorded teaching with presentations and assignments for each module ensuring clear understanding prior to trainees moving onto the next module. Although online self-paced courses have the potential to provide a flexible, accessible, personalized learning experience and can be retained and re-used for a long period of time without revising which can be less costly for both the trainers and trainees. However, they also have some drawbacks, including a lack of structure in meeting set deadlines; limited interaction and collaboration with colleagues; potential technical problems such as connectivity issues or compatibility problems; and the need for a high degree of self-discipline and motivation.
- **Virtual (Online) live programs:** through online sessions with a live trainer. These can be both in the form of webinars where participants send in questions and comments throughout the training or smaller interactive sessions where participants are able to interact directly with the trainer in moderated sessions. Live online training courses have the potential to provide a convenient, flexible, and interactive learning experience, with unlimited access to a wider range of trainers from different parts of the world giving trainees the opportunity to learn from experts in their field without the travel inconveniences or sharing experiences with fellow trainees from various cultures. However, they also have some drawbacks, including technical issues, limited control over the environment which can be distracting, and a dependence on technology which can be a challenge for those who are not familiar with the technology or do not have access to reliable internet.

- **Face-to-face training:** Classroom style training methodologies provides an opportunity for participants to interact with each other and the instructor which can lead to a more engaging learning experience and facilitate the sharing of ideas and experiences. It can also enable effective and immediate feedback from the trainer which can help to reinforce their learning. Classroom training can also promote teamwork and collaboration among participants, which can be beneficial in developing problem-solving and communication skills and the structured environment provides a set schedule and curriculum, which can help to ensure that all participants receive access to the same level of education and training. However, this methodology can be inflexible being especially detrimental for trainees who have conflicting schedules or who are located in different geographical locations. It can also be more expensive than other forms of training, as it requires physical facilities, instructional materials, and instructors.

- **Practical hands-on training:** Hands-on training is an essential aspect of education and skill development, as it provides practical experience and helps to reinforce theoretical knowledge. it allows trainees to apply the theoretical concepts they have learned in a real-world setting which helps to deepen their understanding of the subject matter and makes it easier for them to retain the information. It also provides an opportunity for individuals to develop and refine their skills in a controlled environment allowing for experimentation, making mistakes and learn from them in a supportive environment. Indeed, by successfully completing practical training, individuals can develop a sense of confidence in their abilities and a greater sense of self-efficacy. This can help them to pursue their goals with greater determination and drive. Therefore, it is proposed that a number of training modules benefit from some practical exercises which could include but is not limited to site work to undertake surveys and data collection in the field as well as liaising with other agencies to collect and collate supporting data such as crash and road attribute data.

- **Blended learning:** Combining traditional classroom-based instruction with online training. can allow students to complete some portions of the training online and others in a physical classroom setting. This can be organized to take advantage of the benefits of both methodologies.

As part of the Tanzania Ten step project, opportunities for trainees to work on the project deliverables provided an opportunity to solidify training attained through practical project experience. Trainees in the iRAP Methodology were given opportunities to take on active roles in the various phases of the project deliverables whereas trainees on the Road Safety Audit course were given practical field exercises to carry out which would contribute towards their Accreditation / Certification. Once Accredited / Certified, this is an internationally recognised qualification.

From the learnings of the Ten Step training, a Trainer-of-Trainers (ToT) should be considered whereby a number of individuals are trained as trainers in the three courses offered. These ToT are then responsible for developing and delivering training programs to a group of lecturers / trainers, who in turn will train others coming into the institution for these learning opportunities. This would equip the institution with the requisite skills and knowledge to continue advancing the skill. Through the Tanzania Ten Step project, opportunities and collaborations have been build amongst academic institutions and it may be worth exploiting these opportunities to enhance Road Safety Engineering capacity in Tanzania. Consideration should be given to the NIT sharing resources with other academic institutions in Tanzania to offer elements of these courses within their civil engineering courses. This is likely to open up the road safety curriculum to a wider pool of engineers further impacting the road safety situation in Tanzania.

4.2. Assessment Methods

There are several assessment methods that can be used for these road infrastructure safety training courses and it is proposed that a combination of Formative and Summative assessment methodologies are utilized.

Formative assessments are evaluations of student learning and progress during the learning process, while summative assessments are evaluations of student learning at the end of a specific learning period or course. It is proposed that formative assessment be employed in order to provide both trainers and trainees with ongoing feedback that can be used to inform instruction and improve learning. The summative assessments can then be used at the end of the course to provide a final evaluation of the trainee's understanding and mastery of the course, and to provide a comprehensive evaluation of student learning.

Examples which can be employed are:

- **Observations:** Participants can be observed as they perform tasks related to road infrastructure safety. This type of assessment provides a hands-on evaluation of their knowledge and skills.
- **Group projects:** Participants can work in teams to complete a road infrastructure safety project. This type of assessment not only tests their knowledge and skills, but also their ability to work with others and communicate effectively.
- **Continuous assessment:** Participants can be continuously assessed throughout the course through a combination of the above methods. This allows for a more comprehensive evaluation of their learning and provides a more accurate picture of their overall understanding of the subject matter.
- **Oral presentations:** Participants can make presentations on a topic related to road infrastructure safety. This type of assessment allows them to demonstrate their understanding of the subject matter and their ability to present information effectively.
- **Online assessments:** Participants can complete online assessments to test their knowledge of road infrastructure safety. These assessments can be in the form of quizzes, surveys, or interactive simulations.
- **Written exams:** Participants can take written exams to assess their understanding of key concepts and principles covered in the course. These exams can be multiple choice, short answer, or essay-style.
- **Practical assessments:** Participants can be evaluated on their ability to apply what they have learned in real-life scenarios through practical assessments. For example, they could be asked to complete a design project, evaluate a road construction site, or perform a safety inspection. For the road safety audits training, the practical assessment is a must since RSA are about practice and it is fundamental to test trainees in real scenarios situations.

All of the above can be employed either as interim methods of assessment (Formative) of final assessments (Summative) to determine progress or effective completion of a course.

5 Course Options

The duration of a course can vary depending on the level and type of education being pursued. The NIT offers training courses based on various lengths and categories. The courses being offered under this proposal can be combined to fit into a longer duration or kept separate to capture a specific training need. The courses offered under this proposal can best fit into one of the following 2 course types.

5.1. Professional Certificate Programs:

Professional certificate programs can range from a few weeks to several months and are designed to help individuals acquire skills and knowledge in a career-focused field. These are aimed at individuals who need to enter a specific field or those who already have a bachelor's degree and are looking to specialize in that specific field.

It is proposed that the three (3) courses proposed here can be combined into a professional certificate program offering the introduction to Road Safety Engineering and the Safe System; Road Safety; and iRAP Assessments as one course. Trainees can sign up and take these over a 2 to 6 month period depending on whether it is offered as a part-time or full-time course.

5.2. Continuing Education Courses:

Continuing education courses can vary in length, ranging from a single day to several weeks. These courses are designed to help professionals maintain and improve their skills and knowledge in their chosen field and are often required by professional organizations and regulatory bodies as a means of ensuring that professionals keep up-to-date with the latest developments and standards in their field enabling them to stay ahead of the curve in terms of new developments and advances.

Each of the courses could be delivered as a stand-alone training course on either a full time or part time basis which will affect the duration. Indeed, the iRAP course and the Road Safety Audit course can be split and delivered as various separate components allowing trainees with limited time to take on a segment of the training at a time.

5.3. Meetings, Workshops and Events

In addition to the formal courses presented here, through the Tanzania Ten Step project, opportunities to engage with road development and road safety professionals were maximised through opportunities to share experiences and outcomes of studies and road safety projects. These opportunities are often short and succinct lasting from several hours to1-day. These types of capacity building activities where data and/or information is shared should be considered for onward engagement. Opportunities lie within existing stakeholder engagements in Tanzania through existing events and workshops such as the Tanzania Road Safety National Workshop recommended through the Tanzania Ten Step project to sustain these engagements as a supplement to the core training and accreditation.

6 Proposed Core Training Courses

In line with the findings of the training and accreditation scheme, the associated evaluation of the same and in consideration of the findings of the Gap Analysis study, all undertaken under the Tanzania Ten Step project, three (3) formal training courses are recommended and detailed below:

- Road Safety Engineering
- IRAP Road Assessments
- Road Safety Audits

6.1. Road Safety Engineering Course

The Road Safety Engineering Course aims to provide comprehensive knowledge on the principles and practices of road safety engineering ensuring road development projects prioritise safety for all road users. It aims to give road engineers, designers and planners a robust introduction to the fundamental principles of good road safety engineering based on a Safe System Approach. The course provides a comprehensive understanding of the various factors that contribute to road safety and the ways in which these factors can be mitigated to reduce the risk of crashes and fatalities on the road. The goal of the course is to equip participants with the knowledge and skills needed to design and maintain safe road systems, including knowledge of traffic engineering, road design, road signage and markings, and road safety audits.

High-quality content is to be developed in collaboration with global road safety and engineering experts, covering core topics related to road safety engineering from speed management to the economics of road safety. It should provide participants with an understanding of the different measures essential for well-functioning road infrastructure safety management system considering the interaction between infrastructure safety and the other 4 road safety pillars – road safety management, safer people, safer vehicles and emergency care.

The detailed program carried out in the Tanzania Ten Step project was developed on the basis of the curricula developed by the European Bank for Reconstruction and Development (EBRD). The EBRD online modules and associated exercises were found to be suitable in helping consolidate the acquired knowledge. Alongside the training, the modules were supplemented with reading materials, case studies, quizzes, and assignments.

6.1.1. Course Content

The following Training Modules are proposed for the Road Safety Engineering course. These modules align with current international best practices ensuring a rounded road safety engineer. It is recommended that the course combine both theoretical learning as well as practical exercises to engage and demonstrate the principles within the various modules. The approximate timescales associated with the modules below is illustrated.

No.	Module	Duration (hours)
1	Introduction to Global Road Safety	2
2	A Systematic Approach to Road Safety	2
3	Introduction to Road Safety Engineering	2
Interim Assessment		
4	Crash Causation and introduction to crash investigation	6
5	Speed Management	6
Interim Assessment		
6	Forgiving Roadsides and Cross-Sections	4
7	Intersection Safety	3
8	Effective Road Signs and Street Lighting	3
9	Designing for All Road Users	4
Interim Assessment		
10	Safety at Road Works	2
11	Effective Black Spot Programmes	2
12	Introduction to Road Safety Audit and Inspection	2
Interim Assessment		
13	Economics of Road Safety	2
14	Climate Resilience and Road Safety Engineering	2
15	Stakeholder Engagement	2
Interim Assessment		
FINAL ASSESSMENT FOR CERTIFICATION		

6.1.2. Expected Learning Outcomes

Upon completion of the course, individuals will have a deeper understanding of the importance of road safety and be better equipped to make informed decisions that promote safe and efficient road systems. The course can benefit a range of professionals, including transportation engineers, traffic safety professionals, road designers, and consultants. Key outcomes for participants are to;

- Demonstrate a good understanding of traffic safety engineering and the contextual factors which influence decision making within the discipline; and
- Understand critical elements in crash investigations, road safety audits and assessments as well as identify practical preventive measures to address road safety issues.

6.1.3. Course Entry Requirements

The course is designed for engineers and technicians working in road development agencies, consultancies, contracting firms, financing organizations, and executive agencies. It is suitable for road safety officers and other professionals concerned with road safety. Trainees are better placed when they have a background in Engineering either as practitioners or as students in the process of attaining their Engineering degrees.

The programme is open to;

- Anyone who would like an understanding of Road Engineering from a design or construction point of view.
- Existing Road Safety Engineers wishing to refresh / enhance their skills.

- People who are post-Graduate or people in employment having gained some highway-related qualification and / or experience.
- Highways or Traffic Engineers; or Transport Planners or Road Safety Practitioners or Traffic Police.
- Non-Governmental Organizations (NGOs) concerned or working in the road development or road safety field.

6.1.4. Delivery and Assessment Methods

For the road safety engineering training course, it is proposed that the Trainer of Trainers method is employed. To ensure they are adequately skilled to carry out training of this course, trainers conducting this training should have a combination of technical knowledge, industry experience, and training skills to effectively deliver high-quality and impactful training programs. The trainers should possess the following minimum qualifications:

- The trainer should have a degree in civil engineering or a related field. A master's degree or a doctorate in transportation engineering or a related field is preferable. The minimum requirements for a lecturer in NIT and Tanzania should be met.
- The trainer should have a professional certification in road safety engineering. Examples of such certifications include the Certified Road Safety Professional (CRSP, Institute of Transportation Engineers, USA) and the Road Safety Professional (RSP, Transportation Professional Certification Board, USA).
- The trainer should have significant industry experience in road safety engineering. This experience should be relevant to the specific training being provided if the course is taught by various lecturers and specialists. Guest appearances are accepted.
- The trainer should have experience in designing and delivering training programs in road safety engineering. This experience should be demonstrated through a portfolio of training materials and successful trainees.
- The trainer should have excellent oral and written communication skills; be able to explain technical concepts clearly and concisely and engage trainees in interactive learning activities.
- The trainer should be up-to-date on the latest developments and best practices in road safety engineering. This knowledge should be demonstrated through participation in professional organizations and conferences, as well as ongoing professional development.
- The trainer should be able to adapt to the needs and learning styles of different trainees. and be able to modify training materials and methods to suit the needs of the specific audience.

Overall, a trainer for road safety engineering should have a combination of technical knowledge, industry experience, and training skills to effectively deliver high-quality and impactful training.

The training can be delivered in any or a combination of the modes presented in the *Delivery and Assessment Methods* chapter, to suit the available resources and learning preferences of the trainees. It is important to choose the most appropriate delivery method to ensure effective learning and knowledge retention.

6.1.5. Certification

The course is modular with each module consisting of video training tools, reading materials, case studies, assignments and practical exercises. It is proposed that each module comes with an assignment which has a minimum pass rate before the participant can move onto the next module. On completion of a particular set of modules, the participant should take an interim assessment to ensure knowledge transfer and connectivity between modules in the same set.

On successful completion of the entire course, each participant receives a certificate of Completion.

As was done for the training in the Tanzania Ten Step project, application to the Tanzania Engineering Registration Board could be made to secure Professional Development Units (PDUs).

6.2. iRAP Assessments Course

The purpose of taking International Road Assessment Programme (iRAP) assessment courses are to educate individuals on the principles and practices of road safety assessments and to provide training on the use of the iRAP methodology. iRAP is an independent road safety assessment program that uses a star rating system to evaluate the safety of roads and road infrastructure.

iRAP assessments are an internationally recognised approach to appraising road safety risk and saving lives. The iRAP methodology offers the global standard for measuring the built-in safety of road infrastructure with Star Ratings reflecting the level of protection provided to road users in the event of a crash. We know the road features that affect the safety on a journey, using evidence-based research of their impact on safety, a Star Rating is calculated along existing roads and on designs of road networks, where 1-star is the least safe and 5-star is the safest. The United Nations (UN) have adopted 12 Global targets for road safety of which target 3 and target 4 require that all new roads and at least 75% of existing roads respectively are constructed and maintained to a 3-Star or better standard.

The goal of the iRAP training course is to equip participants with the knowledge and skills needed to perform iRAP assessments, including an understanding of the iRAP methodology, data collection techniques, and the use of iRAP's various software and tools. The course covers the various aspects of road design and management that impact road safety and provides participants with the knowledge and skills needed to make informed decisions on road safety improvements.

6.2.1. Course Content

The core iRAP training proposed for Tanzania comprises 5 modules. These modules align with current international best practices ensuring a rounded road safety engineer. It is recommended that the course combine both theoretical learning as well as practical exercises to engage and demonstrate the principles within the various modules. The approximate timescales associated with the modules below is illustrated.

No.	Modules and Topics	Duration (hours)
1	**Introduction to iRAP global road safety and the 'safe system'**	**2**
2	**Star Rating Essentials (SRE) Course**	**32**
2.1	Introduction to iRAP methodology	1
2.2	Road Survey	1
2.3	Road Attribute Coding	15
2.4	Using the ViDA software to produce Star Rating and Safer Roads Investment Plans (SRIP);	10 5
3	**Star Rating for Design (SR4D) Course**	**6**
3.1	Introduction to SR4D and Creating Star Ratings	1
3.2	Creating design layout	1
3.3	Fatality estimations and investment plans	2
3.4	Quality assurance & reporting	2
4	**Advanced Coding**	**5**
4.1	The coding manual and principles	2
4.2	Coding techniques and quality assurance	3
5	**Advanced star rating and investment plan**	**6**
5.1	Impact of infrastructure and speed management improvements on Star Ratings and estimated FSIs	2
5.2	ViDA investment planning techniques and achieving a Star Rating target	4
6	**Star Rating for Schools**	**11**
6.1	Introduction to SR4S and using the SR4S tool	2
6.2	Creating Star Ratings at schools (Data collection)	4
6.3	Analysis and Safer Roads Investment Plans (SRIP);	3
6.4	Quality assurance & reporting	2

6.2.2. Expected Learning Outcomes

Overall, the iRAP training courses aim to equip participants with the knowledge and skills necessary to make roads safer for all road users, with a focus on reducing the number of deaths and injuries from road crashes. Upon completion of the course, individuals will be able to use the iRAP methodology to assess road safety both on existing roads and designs; and make recommendations for improvements. They will be better equipped to contribute to the overall goal of reducing road crashes and fatalities. Key outcomes for participants are;

- Participants will gain a deeper understanding of the issues surrounding road safety, including the causes of road crashes, the consequences of road crashes, and the importance of road safety in saving lives and reducing injuries.
- Participants will learn about the iRAP methodology, including developing the skills necessary how to conduct road safety assessments including how to identify road safety risks, interpret the results of assessments, evaluate the safety performance of roads, recommend improvements and implement effective road safety solutions.
- Participants will learn about best practices in road safety, including how to design safer roads, implement effective road safety management systems, and work with communities to raise awareness of road safety issues.

6.2.3. Course Entry Requirements

The course can benefit a range of professionals in the road safety and road infrastructure sectors, including transportation engineers, traffic safety professionals, road designers, consultants, Road safety practitioners and advocates, NGOs and international organizations working in road, Academics and researchers in the field of road safety and government officials responsible for delivering a safe and efficient road transport system.

The programme is open to;

- Road Project planners who would like to determine where the highest risk roads are so that they can better allocate resources and financing for road improvements.
- Existing Road Safety Engineers wishing to design and construct safer roads.
- Highways or Traffic Engineers; or Transport Planners or Road Safety Practitioners or Road Police.
- Non-Governmental Organizations (NGOs) concerned or working in the road development or road safety field.

6.2.4. Delivery and Assessment Methods

International Road Assessment Programme (iRAP) training is typically delivered by accredited iRAP practitioners to ensure the quality and consistency of the training. Trainees can verify the credentials of a trainer by checking their accreditation status on the iRAP website. These practitioners are authorized by iRAP to deliver training on iRAP's behalf. Therefore, the Training Institution has to have trainers attain iRAP Accreditation in order to be able to deliver the same to others. iRAP provides support and resources to accredited trainers, including training materials, guidance documents, and ongoing professional development opportunities.

iRAP training can be delivered through a combination of the modes presented in the *Delivery and Assessment Methods* chapter. Indeed, iRAP already have the course available online through a Self-Paced program as delivered through the Tanzania Ten Step project. The training and accreditation process detailed here is similar to that available with iRAP and trainees can register directly through the iRAP website.

It is worth considering taking the local training scheme as it will be more likely to reflect on local country specific conditions than the Global Training program. Accordingly, it is proposed that the training institution have capacity to deliver the iRAP training through a formal method recognised by iRAP to ensure uniformity and quality of the learning.

The course is modular with each module consisting of video training tools, reading materials, case studies, assignments and practical exercises. At the end of each topic within each module, participants will be required to complete an assignment related to the topic's content. On passing the assignment, participants will then be able to continue onto the next topic until the module and finally the course is completed.

6.2.5. Certification and Accreditation

Each module acts as a stand-alone achievement. Therefore, once each module and associated assignments are completed, the participants will be able to receive a completion certificate.

As was done for the training in the Tanzania Ten Step project, it can be arranged with the Engineering Registration Board for each module to receive Professional Development Units (PDUs) recognised Nationally.

iRAP accreditation helps ensure that iRAP assessments are performed to the same consistently high level of quality worldwide. Consultants that are accredited can become part of a market of suppliers and are able to bid competitively to provide iRAP-specification services. Although not mandatory, organisations that are performing and/or commissioning iRAP assessments are encouraged to make use of accredited practitioners.

Those who successfully complete the iRAP training will be eligible to apply to iRAP for Accreditation. Currently, this is offered by iRAP only and on completion of each topic within the Star Rating Essentials Course for 2.2-Road Survey; 2.3-Attribute Coding; and 2.3-Analysis and Reporting. The Accreditation is renewable every 12Months directly through iRAP after demonstrating use of the iRAP tools and methodology in the respective competencies as well as receiving a good reference from a client or supervisor. Signing of the iRAP Code of Conduct is a requirement of Accreditation.

6.3. Road Safety Audit Course

Road Safety Audits can contribute to the improvement of road safety standards. To achieve this, independent and experienced experts are required to ensure these are done well for the improvement of infrastructure safety. Skills as a Road Safety Auditor can best be obtained through a combination of formal training in the relevant disciplines as and sufficient practical experience enabling auditors to use their professional judgement and expertise in identifying, assessing and proposing mitigations for potential safety risks in a road or traffic design or existing road environment.

Road Safety Audits fulfil a vital role in checking that roads have been designed and built to the highest safety standards. Road Safety Audits are a specialist process intended to ensure that operational road safety experience is applied during the design, construction and use process in order that the number and severity of collisions are kept to a minimum. For this reason, it's extremely important that Road Safety Auditing is carried out as an independent review process.

The purpose of taking a road safety audit course is to provide individuals with a comprehensive understanding of the road safety audit process, the various aspects of road design that impact road safety and the principles of road safety management. The goal of the course is to equip participants with the knowledge and skills needed to conduct road safety audits effectively, identify road safety problems, and make recommendations for improvements.

Becoming a Road Safety Auditor requires a combination of education, training, certification, experience, and continuous professional development. The course provides an in-depth understanding of the principles of road safety and the ways in which these principles can be applied to real-world road design and management problems. It should therefore be designed to give a comprehensive understanding of the road safety audit process. The course should also provide practical "hands-on" experience for carrying out Road Safety Audits on a number of different road schemes and encourage participants to share their experiences of road safety and road design.

6.3.1. Course Content

By educating individuals on how to conduct effective road safety audits, the training helps to ensure that roadways are designed and operated in a manner that promotes safety for all users, including motorists, motorcyclists, pedestrians, and bicyclists. In addition to reducing crashes and promoting safety, Road Safety Audit training can also help to improve the efficiency and cost-effectiveness of road design and construction projects by identifying potential safety issues early in the planning process, before they become costly to address.

The purpose and goal of road safety audit (RSA) training is to provide individuals with the knowledge and skills necessary to conduct thorough and comprehensive assessments of roadways with the aim of identifying potential safety hazards and making recommendations for improvements. The primary goal of RSA training is to reduce the number of crashes, injuries, and fatalities on the roads by promoting a proactive approach to road safety. RSA training focuses on teaching individuals how to identify and assess road design and operational factors that can contribute to crashes.

The structure of the Syllabus and the content are outlined in the table below:

No.	Modules	Duration (hours)
1	Technical and Legal Framework - Road Safety Policies	5
2	Collision Investigation - Road Safety Technology	5
3	Safe Road Infrastructure Design	5
4	Vehicle Restraint Systems	10
5	Human Factors	5
6	Road Safety Audit and Inspection Procedures	5
7	Road Safety in Work Zones	10
8	Practical Training for Rural Roads and Interchanges (Grade Separated)	5
9	Practical Training for Urban Roads and Intersections (At Grade)	5
10	Practical Training for Work Zones	5

6.3.2. Expected Learning Outcomes

Upon completion of the course, individuals will have a deeper understanding of the importance of road safety and be better equipped to identify and address road safety problems in their communities. The course can benefit a range of professionals, including transportation engineers, traffic safety professionals, road designers, consultants, and local government officials responsible for road safety. Key outcomes for participants are to;

- Understanding of the purpose and benefits of road safety audits, including the identification of road safety hazards and the development of practical recommendations for improvement. Knowledge of the key components of road safety management, including the identification of road safety problems, the development of appropriate interventions, and the evaluation of their effectiveness.
- Knowledge of international and national best practices for road safety audits, including relevant guidelines, standards, and legislation.
- Ability to apply a systematic and comprehensive approach to conducting road safety audits, including the use of appropriate tools, techniques, and methods. Also the ability to integrate audit findings into road safety plans and programs.

6.3.3. Course Entry Requirements

This course is relevant to individuals who wish to become Road Safety Auditors or have already some experiences with Road Safety Audits, those who commission Road Safety Audits or those required to manage the Road Safety Audit process and its outcomes.

The course is designed for National and Local government personnel, engineers, planners, designers, traffic managers, consultants involved in road safety auditing, and Road Safety practitioners.

Participants in this training course will generally be required to demonstrate studies in the transportation sector, as well as to have accumulated road design experience through participation in design and construction projects, either as a member of the design team or as a reviewer. In parallel, a participant needs to have been exposed to the field of road crash analysis, either as a student (having followed a relevant course) or as a professional.

Therefore, to qualify for this course, participants must hold the following minimum requirements:

- Bachelor's Degree in Civil Engineering
- At least 3 years of professional experience after obtaining the degree.
- A Post-Graduate qualification in Highways, transportation or construction management is of added advantage
- Relevant experience through participation in road design, maintenance, upgrades and construction projects, either as a member of the team or as a reviewer. Involvement (as Designer, Contractor or Reviewer) in at least 1 road design or construction project.
- Basic Knowledge of road crash analysis.

6.3.4. Delivery and Assessment Methods

Road Safety Audit Training should be delivered by a qualified and Certified Road Safety Auditor. This can be done both through online tools and face-to-face interactions with the trainer. The Road Safety Audit training elements are based on both knowledge sharing and practical hands-on experiences which provides participants with the practical skills and experience they need to be effective in the field. Therefore, in order to undertake training that leads to an ably qualified road safety auditor, the training offering needs to give trainees an opportunity for the practical auditing on site.

The course is modular with each module consisting of video training tools, reading materials, case studies, assignments and practical exercises. An evaluation test will be performed at the end of each module which participants will be required to pass before moving on to the next module. At the end of the course, a final exam will be set.

6.3.5. Certification and Accreditation

Road Safety Auditors are required to have a formal Certificate of Competency in Road Safety Audit. Therefore, to be recognized as a qualified Road Safety Auditor, you must be certified by a reputable organization – As far as we know there is no such recognised organization in Tanzania. However, there are some internationally recognised organizations such as the Society of Road Safety Auditors (SoRSA, UK). These certifications demonstrate that you have the required knowledge and skills to conduct road safety audits. In order to ensure that Auditors will possess the minimum experience required to actively participate in the Audits and Inspections and execute their duties with the highest degree of capability and responsibility, an incremental qualification process is employed.

The training proposed under this scheme is the first step towards this certification. After successfully completing this training course and associated assignments, trainees will be required to undertake an examination in order to demonstrate their learning. The examination will consist of both theoretical and practical exercises and after successful completion, the trainee receives a certificate of Completion. At this stage, successful candidates will initially be allowed to participate in Audit Teams as Observers.

It is proposed that following the accumulation of experience as observers for at least 5 Road Safety Audit studies within at least 1 calendar year, the trainee can then be promoted to Team Member. After undertaking an additional 5 Road Safety Audit studies as a Team Member within at least 1 calendar year, the Team Member can then be promoted to Team Leader. In order to maintain the Team Leader Status, they must participate in at least 1 Road Safety Audit or Inspection per year as an Accredited Road Safety Auditor and demonstrate a minimum of 2 days CPD in a related subject every year.

As was done for the training in the Tanzania Ten Step project, application to the Tanzania Engineering Registration Board could be made to secure Professional Development Units (PDUs).

7 Measuring Impact

7.1. Evaluation Mechanisms

There are a number of methodologies the NIT can evaluate the impact of the training offered. An evaluation mechanism should be developed to help capture before data, progression data and after data to help monitor the impact of the training. Various mechanisms can be employed to do this and some of these can be along the lines of

- Alumni Surveys: Surveying alumni on their experiences in the program and the impact it had on their career can provide valuable insights into the effectiveness of the training.
- Placement Rate: Tracking the placement rate of graduates in the field can be an indicator of the effectiveness of the training. Determining the opportunities to use the new knowledge can also have an input into the value and useability of the training offered.
- Employer Feedback: Obtaining feedback from employers on the skills and knowledge of graduates can provide insight into the effectiveness of the training. Considering the improvement into the deliverables of the employer – e.g. through safer roads being built or more road safety audits being carried out on projects can be a good indicator on the need and value attached to the knowledge gain.
- Research Output: The number of research publications, patents, and other output generated by faculty and students can be used as a measure of the impact of the training.
- Student Feedback: Surveying students during and after the program on their experiences and the impact of the training can provide valuable insights into the effectiveness of the training. This information can also help better tailor the course and resources to improve where there is negative feedback.
- Impact on Society: measuring the impact of the training on society or industry by tracking the innovations, new startups or social impact that came out of the program.
- Peer review: Having academic peers review the training program and providing feedback on its effectiveness can be an important measure of impact.
- Uptake and Completion: The regularity and popularity of the uptake of the courses offered can also be an indicator of interest and value expectations from the training. If there is regular and strong interest in the course being offered with spaces being exceeded this is a good indicator that the course is viewed as valuable. This coupled with timely completion of the course content, assignments and seeking certification is an indication of industry acceptance of the course offering.

It is important to note that a combination of these measures can give a more comprehensive view of the impact of the training. Also, it's important to tailor the evaluation methods to the specific goals of the program and its audience.

Therefore, it is important to develop a monitoring mechanism for the training being offered with a view of using the findings to improve the delivery methods, content, resources, learning / study material etc until optimum.

7.2. Reporting through TanRAP

A coordination and reporting mechanism has been developed through the Tanzania Road Assessment Program (TanRAP) which can be utilised to share progression of road safety professionals in Tanzania. As NIT is the Technical lead within TanRAP responsible for reporting on Road Safety capacity building activities in Tanzania, there is an opportunity for training records to be shared with NIT and for NIT to liaise with other agencies and institutions to ably report on the skills enhancement in the Country. This reporting can progress onto the Ministry coordinating TanRAP and hence be a standard metric.

7.3. Celebrating Success

Celebrating the success of a training scheme is important for several reasons such as;

- Motivation: Celebrating success can help to motivate and inspire both the individuals who have completed the training, as well as those who have yet to go through it. It can create a positive atmosphere that encourages others to strive for similar success.
- Recognition: Celebrating success allows for the recognition of the hard work and dedication of the individuals who have completed the training. This can help to boost their confidence and self-esteem.
- Building a sense of community: Celebrating success can help to build a sense of community among those who have completed the training, as well as those who have been involved in delivering it. This can help to foster a positive and supportive environment.
- Encouraging participation: Celebrating success can help to encourage participation in future training schemes, as individuals see the tangible benefits of the training and the positive impact it can have on their lives and careers.
- Improving the training scheme: Celebrating success can also provide valuable feedback on the training scheme itself. By hearing the success stories and feedback from the participants, the training providers can improve the scheme and make it more effective.
- Building reputation: Celebrating success can help to build the reputation of the academic institution, training organization or the training program. This can attract more students, participants, and funding opportunities.

In summary, celebrating the success of the Training and Accreditation scheme can have a positive impact on the individuals who have completed the training, as well as on the training scheme itself. It can help to motivate, recognize, build a sense of community, encourage participation, improve the scheme and build reputation.

8 Conclusion

A training and accreditation scheme is a comprehensive program aimed at providing individuals with the necessary skills, knowledge and credentials to succeed in their chosen field. The scheme provides a structured approach to learning, assessment and recognition, and helps ensure that individuals are equipped with the latest knowledge and best practices. The benefits of such a scheme are numerous, including improved job performance, increased career opportunities, enhanced professional credibility, and increased earning potential. Overall, a training and accreditation scheme is a valuable investment in personal and professional development, and an effective way to stay ahead in a competitive job market.

A road infrastructure safety training and accreditation scheme is an important initiative aimed at reducing road crashes and improving road safety. By providing individuals with the necessary skills, knowledge, and training, this scheme promotes a culture of safety and responsibility on road engineers and helps ensure that road infrastructure is designed, built, and maintained in a way that promotes safe and efficient trave. Participants in the scheme learn about best practices for safe road design, construction, and maintenance, as well as the importance of following safety standards and guidelines. The accreditation they receive serves as recognition of their commitment to road safety and their ability to implement safe road infrastructure practices. The benefits of such a scheme are numerous, including reducing the number of road crashes, reducing the number of fatalities on the roads, creating a safer driving environment for all and enhancing the overall quality of the road network. Overall, a road infrastructure safety training and accreditation scheme is a valuable investment in the safety and well-being of road users and a crucial step towards creating a safer and more sustainable road network.

Three road safety training courses – Road Safety Engineering; iRAP Road Assessments; and Road Safety Audit - are proposed for the Tanzania Infrastructure Training and Accreditation Scheme as these have been trialled through the Tanzania Ten Step project to determine the most appropriate delivery methods, timescales, resources and content. The findings of the evaluation undertaken on this training have informed the recommendations presented and look to ensure sustainability of the training and capacity building in the Country. Collaborations with the Tanzania Ten Step project Working Groups and Steering Committee have been instrumental in ensuring the proposed activities in this proposal are considerate of the region.

The application of this training scheme can be through the NIT as proposed in the main document but should also seek to get external endorsement from professional organizations such as the Engineering Registration Board (ERB) and the Association of Consulting Engineers (ACE), earning participants additional Continuous Professional Development (CPD) Credits.

It is recommended that agencies such as TANROADS, TARURA road engineering departments within the Ministry of Works and Transport (MoWT), President's Office, Regional Administration and Local Government (PO-RALG), road design consultants and contractors and other professional firms / organizations in the road development space include the various modules and courses in their minimum entry requirements for new staff members and/or offer regular refreshers and training opportunities to their staff ensuring that the quality of engineers in their respective organizations have these skills.

This proposed Training and Accreditation Scheme encourages practical on-the-job experiences as a requirement of full accreditation and certification. In addition to this, collaboration with other academic and professional institutions should be considered to enhance opportunity to promote the training. Consideration and discussions with curriculum development and academia professionals should be had to determine the potential for enhancing the academic modules with road safety engineering elements.

In addition, it is highly encouraged to continue supporting skills development through the practical application of the skills learned. Adopting the 3-Stars or Better policy for all new and existing roads in line with Target 3 and 4 of the Global Road Safety Targets will require this human capital to remain engaged in the capacity to undertake iRAP Assessments and Road Safety Audits and as such this skill should be utilised for all upcoming projects ensuring a sustainable enhancement of these skills.

The iRAP Accreditation and the Road Safety Audit Certification require annual renewal of certification which ensures that practitioners are either actively undertaking Assessments and Audits or re-training and re-taking tests to remain accredited. This ensures that the personnel skills are up-to date and being used in the field.

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