

REPUBLIC OF RWANDA

Kigali, 09 OCT 2024
Ref N°: 3004/SPIU/024



RWANDA TRANSPORT DEVELOPMENT AGENCY

P.O Box 6674

KG 563 St., Queen's Land House, 1st Floor

Email: info@rtda.gov.rw

KIGALI

**REQUEST FOR EXPRESSIONS OF INTEREST(REOI)
(CONSULTING SERVICES – FIRMS SELECTION)**

Title of Assignment: Consultancy Services to carry out international road assessment program survey

Reference No: RW-RTDA-442967-CS-QCBS

1. The Government of Rwanda (GOR) has received financing from the World Bank toward the financing of the Lake Victoria transport program-Rwanda Project and intends to apply part of the proceeds toward payments under the contract for **Consultancy Services to carry out international road assessment program survey to assess the safety performance of classified National and Urban roads and measure the benefits of improvements made on infrastructures.**The procurement process will be governed by World Bank's guidelines and procedures.

2. The objectives of iRAP survey are to carry out a survey to assess the safety performance of classified roads in Rwanda and measure the benefits of improvement made on infrastructures. The consultant will collect data on the road corridor, analyze and issue a report on Rwanda national road safety assessment and measures to be implemented to further improve road safety. The assignments duration period shall be 4 months as detailed in terms of references here enclosed. Each phase will have a corresponding duration as detailed in terms of reference.

3. The services include among others:

- Road survey
- Road attribute coding
- Analysis and reporting including Safer Road Investment Plans
- Training

The detailed scope of services is well defined in terms of reference(TOR), here attached and posted on the following RTDA website link: www.rtda.gov.rw.

4. The Rwanda Transport Development Agency (RTDA) now invites eligible consulting firms ("Consultants") to express their interest in carrying and providing the stated Services. Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services. The shortlisting criteria are:

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- i. Technical and managerial organization of the firm. (Provide only the structure of the organization, Availability of appropriate skills among staff, general qualifications and number of key staff (Do not provide CV of staff);
- ii. Firm's eligibility supported by trade license or certificate of incorporation;
- iii. Brochures (Optional);
- iv. Detailed description of similar assignments performed, including related contracts and completion certificates;
- v. General experience of at least 8 years for the firm;
- vi. Certificate of iRAP accreditation for road survey, road attribute coding, analysis and reporting

5. The attention of interested Consultants is drawn to paragraph 3.14 of the World Bank's procurement regulations for IPF Borrowers, July 2016, setting forth World Bank's policy on conflict of interest.

6. Consultants may associate with other firms in the form of a joint venture or a sub-consultancy to enhance their qualifications. The nature of association, whether it is a joint venture or a sub-consultancy should clearly be stated in expression of interest. In case of joint venture the leading firm should be mentioned. For skills and technology transfer, international consultants are encouraged to associate with local consultants.

7. A Consultant will be selected in accordance with the Quality and Cost Based Selection (QCBS) method set out in the Consultant Guidelines.

8. Bidding will be conducted through Open International Competitive Bidding and participation is open on equal conditions to all interested consultancy firms. The Terms of Reference containing detailed requirements and conditions for participation may be obtained from www.rtda.gov.rw , free of charge.

9. Interested consultants may obtain further information at the address below: **RTDA Head Office, Queen's Land House, 2nd Floor, procurement office**, during office hours from 9:00 to 17:00 local time on Monday to Fridays or may seek clarifications via [**info@rtda.gov.rw**](mailto:info@rtda.gov.rw) or [**procurement@rtda.gov.rw**](mailto:procurement@rtda.gov.rw).

10. Interested consultants are requested to submit their Expressions of interest through [**procurement@rtda.gov.rw**](mailto:procurement@rtda.gov.rw) not later than **October, 2024 at 16:00pm** or hard copy may be submitted to the above indicated addresses.

Sincerely,


Imena MUNYAMPENDA
Director General



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TERMS OF REFERENCE

“Consulting services to carry out International Road Assessment Program survey (IRAP) to assess the safety performance of classified National roads and measure the benefits of improvements made on infrastructures”.

STUDY INFORMATION SHEET

1	Country	The Government of Rwanda
2	Consultancy services	to carry out international road assessment program survey to assess the safety performance of classified National roads and measure the benefits of improvements made on infrastructures
3	Road Names	Classified National Roads
4	Location of the roads	<i>Map of the classified National Roads</i>
5	Recipient	The Government of Rwanda
6	Executing Agency	Rwanda Transport Development Agency P.o. Box: 6674, Kigali- Rwanda E-mail: procurement@rtda.gov.rw info@rtda.gov.rw
7	Project Description	The Government of Rwanda intends to carry out the International Road Assessment Program survey to assess the safety performance of classified National roads in Rwanda and measure the benefits of improvements made on the infrastructures. A firm will be recruited to collect data on the road corridor, analyze and issue a report on Rwanda National road safety assessment and measures to be implemented to further improve road safety.
8	Estimated Duration:	Total duration of the services: four (4) Months



1. PROJECT BACKGROUND

The IRAP was established to help tackle the devastating social and economic cost of road crashes. Without intervention, the annual number of road deaths worldwide is projected to increase to some 2.4 million by 2030. The majority of these will occur in low and middle-income countries, which already suffer nine out of ten of the world's road deaths. Almost half of those killed will be vulnerable road users – motorcyclists, bicyclists and pedestrians.

Rwanda reported 593 fatalities in 2018 (population of 11.92m) and 655 fatalities in 2021 (with an increased population of 13.46m) while numbers of vehicles also increased in the same period from 180.140 to 270.600. The report shows that more male fatalities were reported in Rwanda (86.2%) compared to women (13.8%).

According to traffic police figures, between January 2020 and November 2022, a total of 21,459 road accidents were recorded. About 4,000 were recorded in 2020 and another 8,000 in 2021, while 8500 were recorded in 2022. The Motorcyclists, cyclists and pedestrians constitute the majority road users involved in accidents and related fatalities.

Large as the problem is, making roads safe is not an insurmountable challenge. The requisite research, technology and expertise to save lives already exists. Road safety engineering makes a direct contribution to the reduction of road death and injury. Well-designed intersections, safe roadsides and appropriate road cross-sections can significantly decrease the risk of motorized vehicle crashes occurring and the severity of crashes that do occur. Footpaths, pedestrian crossings and bicycle paths can substantially cut the risk that pedestrians and bicyclists will be killed or injured by avoiding the need for them to mix with motorized vehicles. Motorcycle lanes can minimize the risk of death and injury for motorcyclists.

The infrastructure development and improving road transport services are among the main strategic policy objectives of the Government of Rwanda in terms of economic development and poverty reduction. In order to support programs and projects on rehabilitation and development of infrastructure, the RTDA (Rwanda Transport Development Agency) is undertaking IRAP survey to assess the safety performance of classified roads in Rwanda and measure the benefits of improvements made on the infrastructure. It is found that, in fact, many crashes on the classified road network are caused by insufficient consideration of road safety measures in design road standards and implementation of infrastructure projects.

To overcome aforementioned challenges, the Government of Rwanda put in place the National Transport Policy and Strategy for Rwanda aiming to address the current transport sector challenges through three main policy pillars: (i) Promotion of sustainable development of an integrated transport infrastructure network, (ii) Enhancement of the quality of transport services; (iii) Reinforcement of capacity building in transport sector and addressing crosscutting issues.

These Terms of Reference (TOR) aim to select a consultant to collect data on the road corridors,



(the list will be provided later in ToR), analyze them and issue a report on Rwanda national road safety assessment with measures to be implemented to further improve road safety. The road safety performance will focus on road safety aspects of existing classified road network (comprising urban sections). The IRAP survey report, to be drafted, will be a document to inform, on the one hand, the necessary technical improvements to the existing classified road network, and on the other hand, the security measures and standards of future programs. It will help to implement road safety actions in programs and projects on road infrastructure in Rwanda.

The consultant undertaking IRAP will play an important role in ensuring transparency and understanding of the analysis, assumptions and use of the results. Any IRAP activities in Rwanda should be undertaken in consultation with existing IRAP programme partners. Details of the existing programme, including contact details of the programme leader, are available at www.IRAP.org/about-us

For the purpose of this project, key stakeholders are:

- Ministry of Infrastructure;
- Rwanda National Police
- Rwanda Transport Development Agency
- City of Kigali/ (District authorities)

2. Study objectives

The objectives of IRAP survey are to carry out a survey to assess the safety performance of classified roads in Rwanda and measure the benefits of improvement made on infrastructures. The consultant will collect data on the road corridor, analyze and issue a report on Rwanda national road safety assessment and measures to be implemented to further improve road safety.

3. SCOPE OF WORK

The scope of services for this project will be conducted by consultants fulfilling the requirements for IRAP Accreditation for survey, attribute coding, analysis and reporting as follows:

3.1. Road survey

The consultant/supplier will conduct IRAP survey in order to collect geo-referenced images of roads which can be used for road attribute coding. Collection of samples of traffic flows, pedestrian flows, bicyclist flows and speeds on the roads is also typically performed during a survey. The Data collected will be used in subsequent coding activities and to produce Star Ratings and Safer Roads Investment Plans (SRIP); poor quality or erroneous data will be quickly identified so it can be rectified and Data will be collected in a repeatable way in future Star Rating and Safe Road Investment Plan (SRIP) assessments. The IRAP survey will be in line with IRAP Survey Manual available at: www.IRAP.org/specifications



3.1.1. Survey team

The survey team should include (noting that one person may play multiple roles):

- A supervisor who oversees the survey and is able to represent the project and present basic information at stakeholder briefings.
- One or more professional drivers or personnel trained to operate the survey vehicle.
- Technical staff capable of completing IRAP survey manual activities.

The following should also be considered:

- a. During a survey, the team may be required to conduct demonstrations of data collection during stakeholder briefings.
- b. All team personnel should have necessary travel documentation and approvals.
- c. The team should be suitably attired to participate in stakeholder briefings and demonstrations as required.
- d. Team members should be responsible for, and act in accordance with, the health and safety plan and ensure all safety and security issues are adequately addressed.
- e. Additional stakeholder personnel may participate in the survey at their request. This may include the local navigator from RTDA, CoK, RNP, MININFRA and Districts to ensure all road referencing details align to authority practices. Other stakeholders may participate in the survey from a training and awareness raising perspective. The survey team should ensure that any additional personnel comply with the health and safety plan, including using seat belts inside the survey vehicle at all times and wearing hi-vis vests during roadside inspections and supporting data collection.

3.1.2. Survey vehicle

A range of technologies and systems shall be used to collect geo-referenced images of the road. Systems that are IRAP accredited are listed on the IRAP [website: \(http://www.IRAP.org\)](http://www.IRAP.org). A survey system shall be attached to a car or van. The following are standard requirements for a vehicle that will be used in a survey:

- The survey vehicle should be in a safe, well-maintained condition and comply with the Health and Safety Plan.
- The survey vehicle should meet all license, registration and insurance requirements (e.g. width, height, signage) for operation in the survey jurisdiction.
- The survey vehicle should be clean and presentable (suitable for media, steering committee, stakeholder and promotional activities).
- High quality logos of the stakeholder organizations shall be placed on the survey vehicle for the duration of the survey.
- The survey vehicle should have sufficient space for the survey team as well as provide for additional stakeholder personnel and their luggage who may participate in parts of the activities.
- The vehicle should be available for viewing and inspection during events such as a commencement mission or official project launch



3.1.3. Survey images

The minimum requirements for images collected during a survey are:

- Resolution of 1280 x 960 pixels.
- 140-degree field of view (centered on the travel lane). This may be accomplished with either a single camera or with multiple cameras with overlapping fields of view.
- For still images, captured at fixed intervals of no greater than 20 metres.
- Geo-referenced with the following data recorded for each image:
 - a. Unique image number
 - b. Road name
 - c. Road section
 - d. Distance along the road
 - e. Section length
 - f. Date
 - g. Time
 - h. Latitude and longitude.
- Recorded with latitude and longitude data in WGS84 projection and decimal degrees units. Latitude and longitude data are recorded with a minimum accuracy of $< +/- 10$ meters for at least 90% of images and must not 'drop-out' for any more than 500 meters at a time.
- Road and roadsides are clearly visible. Images should not be compromised by factors such as sun glare, rapid changes in shade/sun, poor lighting, dirty camera lenses, fog and blurring.
- Forward space within the images is kept clear of vehicles as much as possible to ensure the required attributes can be viewed and assessed. This may require an escort for congested urban areas.
- Recorded for a minimum of 500 metres before the official start point and 500 meters after the official end point of each section of road. Road sections should be segmented in accordance with advice from the relevant road authority.
- Collected for all divided carriageway road lengths (surveyed in both directions) regardless of length. The definition of a divided carriageway road for the purposes of this project is all road sections where the median type is classified as code 1-7, 12, 15 as listed in IRAP Coding Manual.

3.1.4. Daily survey records

Each day's survey activities should be recorded. The records should include the date, start and end locations, total length surveyed, the name of the road or corridor being surveyed, the file name, and any other details, such as landmarks or if the day's survey is a repeat of a previous days to address quality issues and so on.

Daily survey records are valuable for tracing data issues and understanding where errors may have been made. As part of this, it is useful to check that road names and sections are labelled correctly in the data, and that the correct roads have been surveyed.

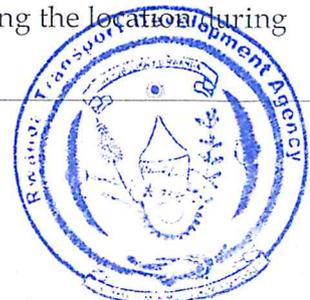


3.1.5. Flow and speed sample process

Flow and speed data is required for a Star Rating and Safer Road Investment Plan (SRIP) analysis. Samples of these data are typically collected during the survey.

The minimum requirements for flow and speed data is as follows:

- The sample locations should be representative of the network including, for example, rural, urban, schools, straight, curved, flat and sloping sections of road.
- The number of sites at which data is collected must be sufficient to describe the general flow and speed characteristics various types of sections of the road network. Unless otherwise specified, the number of locations should be at least:
 - a. 3 for surveys less than 100km in length
 - b. 10 for surveys for less than 2,500km in length
 - c. 20 for surveys less than 10,000km in length
 - d. 40 for surveys greater than 100,000km in length.
- Sampling should be conducted on days of normal traffic periods, avoiding national, local and school holidays. Special attention should be given to schools. Data collection periods should overlap with school start and finish times.
- The following descriptive information should be collected for each location:
 - a. Site number
 - b. Road name
 - c. Road section
 - d. Area type (urban/rural)
 - e. Location description (e.g. rural, urban, school, straight, curved, flat and sloping)
 - f. Latitude
 - g. Longitude
 - h. Date
 - i. Start time
 - j. End time
 - k. Time period
 - l. Posted speed limit(s)
 - m. Number of traffic lanes in each direction.
- All motorized vehicles passing each location during the sample period should be counted collecting flows. Where the road is divided, numbers of vehicles should be reported separately for each travel direction. Speed sampling should be conducted for a minimum period of 1 hour and must include at least 100 vehicles. At sites with very low vehicle volumes, the collection of speed data may be ended after 1 hour, even if 100 vehicles have not yet been measured.
- All pedestrians walking along and across the road during the sample period should be counted and recorded separately. Numbers of people walking along the road should be reported separately by travel direction.
- All bicycles, including conventional bicycles and e-bikes, passing the location during



3.2. Road attribute coding

The consultant should conduct the road attribute coding. Road attribute coding is the heart of an IRAP project. The purpose of road attribute coding is to use geo-referenced images collected during a survey or road designs to record road attributes for each 100m segment of road. This coding data is then combined with other supporting data and uploaded in ViDA to produce Star Ratings, Safer Roads Investment Plans and, ultimately promote the implementation of road safety countermeasures that can save lives. The road attribute coding will be in line with IRAP Coding Manual.

3.2.1. Types of coding

The coding shall be performed on existing roads. The coding of an existing road will require the availability of geo-referenced images. Coding will be performed for a single location (i.e. a single 100m segment of road) or for a length of road (with coding performed for each 100m segment).

3.2.2. Coding team

3.2.2.1. Coders

Coders should have the background in road engineering. It is important that they:

- have good computer skills
- display good attention to detail
- are able to focus solely on the coding task in assigned shifts. People who are expected to undertake coding in addition to their regular jobs are prone to making mistakes.

To ensure the quality and accuracy of IRAP road attribute coding, coders have to fulfil the requirements for IRAP Accreditation for Road Attribute coding.

Coding team members

Name	Email address	Role (s) in project	IRAP accreditation number	IRAP accredited since date	IRAP accredited renewal due date

For a 3,000km study, the recommended size of a coding team would be four members. A team of this size will generally take at least one month to complete the coding process for 3,000km.

A rate of approximately 15 to 25km of coding per day can be expected from an experienced individual coder using a good quality coding software and set-up.

3.2.2.2. Coding supervisor

Supervision and mentoring are an important part of ensuring that the coders produce good results. A coding supervisor should be present during the coding task so that coders are able to



ask questions of them and they can manage the review processes. The coding supervisor has to fulfil the requirements for IRAP Accreditation for Road Attribute coding and he will ideally have previously been involved in at least one coding project, have additional management skills and extra coding training. The coding supervisor will:

- Manage the coding process
- Perform quality checks
- Have regular contact with other senior coders and management to share and work through issues.

3.2.3. Coding system

3.2.3.1. Coding of a single locations and short lengths of road

For very short lengths of road, or single locations (that is, a single 100m segment), it will be feasible for coding to be performed using the Star Rating Demonstrator, which is available in ViDA with Demonstrator Road attributes that can be recorded and downloaded into Microsoft Excel .csv.

3.2.3.2. Coding of longer roads and networks

When coding is being performed for longer lengths of road and road networks, it is good practice to make use of a system that has the following capabilities and characteristics:

- Able to simultaneously display to the coder an image for a particular location and a coding form.
- A coding form that includes the all the road attributes listed in coding manual and allows coders to select attribute categories by entry of numeric or alphanumeric data, drop-down menus or attribute buttons.
- Able to display images at no greater than 20m intervals and able to store coding data for images at 100m intervals.
- Able to automatically advance 100m to the next location in a convenient fashion, preferably with a single mouse click or hot key.
- Able to display both the image and coding form in a size large enough for effective use by a coder. This may require display across two monitors to obtain displays of suitable size, clarity and resolution.
- Where multiple cameras were used to achieve a wide field of view during the survey, be able to align the separate images on the screen to obtain a continuous view of the roadway and roadside at each location.
- Allow the coder to easily review coding data for all images at any time with and without making amendments to the coding data.
- Able to automatically incorporate the geo-referencing data collected during the survey and associated with each image into the stored coding data, without the need for the



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- Able to automatically incorporate the geo-referencing data collected during the survey and associated with each image into the stored coding data, without the need of the



- coder to manually rekey the geo-referencing data.
- Able to retain the values entered in selected fields of the coding form from one 100m data set to the next, so that coders only need to modify coding for those attributes that have changed.
 - Able to convert the stored coding data to a .csv file that complies with the Upload File Specification.
 - Allows the coders to make accurate measurements of attributes such lane width and offset to roadside hazards.
 - Able to be shared with others, including the client and others nominated by the client.

3.2.4. Managing quality

The consultant should manage the quality. High quality coding requires good management of coder fatigue, quality reviews and data. To help manage the coding process, it is good practice for the coding supervisor to keep a record of:

- which road sections have been coded
- who they were coded by
- when they were coded, and
- details and results of quality reviews and other similar details relating to the coding process.

This record helps to track the progress of individual coders and the team and can also help in finding and rectifying errors.

3.2.4.1. Fatigue

Tiredness and mental fatigue can affect concentration and performance. Tired eyes and inattention can lead to distraction and carelessness whereby important information may be missed and coding errors occur. To ensure the highest quality of coding and to maintain a happy and healthy coding team, it is good practice that a 5 to 10 minute break from the coding task is taken every hour or two. However, during these breaks and during the coding, coders should avoid returning to their regular work, since this may reduce the effectiveness of the break.

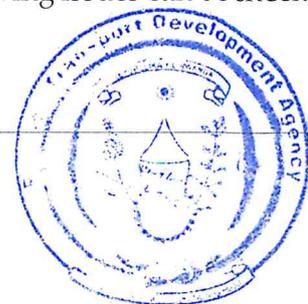
To minimize errors, it is good practice that shifts for each coder is limited to 4 hours. Thus, a maximum of 8 hours of coding per day will be possible using 2 shifts.

3.2.4.2. Progress quality reviews

It is good practice for the coding supervisor (and other members of the coding team as necessary) to review a sample of coded data from each member of the coding team at the end of each day. This helps to ensure that errors are identified and resolved and that the outputs are in accordance with the required level of accuracy. This type of quality review helps to identify coding errors early so that corrections can be made, and further training needs identified in order to minimize further mistakes.

In addition to checking the coding against the specifications, the following issues can be checked. Typical scenarios that can cause errors include:

- duplicate records



- missing 100m sections not coded (gaps between coded sections), and
- missing data in some attributes only.

Some general checks of the data may include:

- correct lengths
- consistent use of road names and sections, and
- that there is consistency between the two directions of a divided carriageway.

Minor, isolated coding errors and inconsistencies can be highlighted and corrected by the coding supervisor. It is important to discuss the findings of the progress review with each coder at the earliest opportunity in order to maintain quality and minimize the need for re-coding.

It is good practice for all errors to be recorded by the supervisor. This helps the supervisor recognize patterns in the errors for each coder, or the coding team as a whole, and any weaknesses with the coding system. It is good practice for the coding supervisor to prepare a weekly report containing details of coding progress and the coding errors found.

3.2.4.3. Independent quality reviews

It is good practice for coding to be subject to independent quality reviews. The reviewer should have demonstrated experience in performing road attribute coding and should be independent of the coding activity for which they are conducting a review. It is good practice for independent reviews to be undertaken for at least 10% of the road that have been coded. The reviews should include segments:

- in urban areas
- in rural areas
- with intersections
- with curves
- with vulnerable road users.

It is good practice to perform the independent reviews at set stages throughout the coding process. For example, reviews could be undertaken at the completion of 25%, 50%, 75% and 100% of the overall coding task. This approach enables coding errors, inconsistencies and other quality issues to be identified and resolved early in the coding process, reducing the amount of recoding that may be required to ensure high quality results.

To complete an independent review, the reviewer must have access to the georeferenced images, the coded data and also any specialized coding system that is in use by the coders. The coding supervisor should ensure that the relevant data is available to the independent reviewer in order that the quality checks can be successfully undertaken.

Upon completion of the independent review a formal report should be produced, summarizing issues identified, recommendations and agreed rectifications.



3.2.4.4. Mapping checks

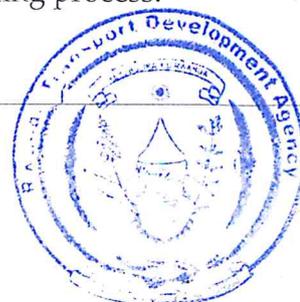
Checks should be carried out on the raw coding data and upload data files (for road attributes that are visible from above) by mapping specific attribute categories and reviewing where changes occur relative to each other when compared with aerial photography or satellite imagery.

The mapping of recorded road attribute data enables a large-scale review to be undertaken in which the accuracy and consistency of the coding task can be ascertained and corrected across large networks. The table below shows examples of several mapping checks that can be undertaken to review the quality of the data.

IRAP upload data file mapping checks

Item	Check
Carriageway type	Aerial photography can be used to review the correct code has been assigned to the relevant carriageway type (divided or undivided).
Area type	Aerial photography/satellite imagery can be used to review the correct code has been used for rural and urban areas.
Curvature (horizontal)	Mapping curvature codes can quickly highlight where inconsistencies have occurred.
Land use – driver-side and passenger-side	Aerial photography can be used to review the correct code has been assigned to the recording of land use type. Note: Care should be taken to ensure that the correct roadside is being reviewed, i.e. the survey direction must be known.
Speed limit	Speed limits are often set according to the surrounding environment, therefore adjacent land use and area type can be useful indicators for changes to speed limits.
Median type	The median feature can often be identified using aerial mapping.
Intersection type and property access points	Aerial photography/satellite imagery can be used to identify intersections and property access points that have been missed during the coding and also to review the type of intersection recorded.
Intersecting road volume	Mapping can be used to estimate intersecting road volumes. For example traffic volumes will likely differ between a 'no through road' that leads to a small village and that of a major distributor road which may not be easily discernable using the road survey images alone.
Pedestrian crossing facilities	Pedestrian crossings can often be seen on aerial photography and can be checked against the coding.

Note that some satellite imagery and aerial photography used by geographic information systems could be up to several years old and therefore care should be taken when relying on them for comparison with the road attribute categories recorded during the coding process.



3.2.4.5. Validation check

Coding must be recorded in a Microsoft Excel file that complies with the Upload File Specification. It is noted that the following supporting data attributes are not required to be completed as part of the road attribute coding activity (these are explained in the Star Rating and Investment Plan Manual).

1. Vehicle flow (AADT)
2. Motorcycle %
3. Pedestrian peak hour flow across the road
4. Pedestrian peak hour flow along the road driver-side
5. Pedestrian peak hour flow along the road passenger-side
6. Bicycle peak hour flow
7. Operating Speed (85th percentile)
8. Operating Speed (mean)
9. Roads that cars can read
10. Vehicle Occupant Star Rating Policy Target
11. Motorcycle Star Rating Policy Target
12. Pedestrian Star Rating Policy Target
13. Bicycle Star Rating Policy Target
14. Annual Fatality Growth Multiplier

It is good practice to regularly perform validation checks of the coding using IRAP tools:

1. The coding validation tool is an excel tool that can be used to perform logic checks on IRAP coding data files before they are uploaded to ViDA such as:
 - a. Create an upload file in accordance with the Upload File Specification. In doing so, insert a value of 1 for each 100m for the 14 supporting data fields (listed above).
 - b. Follow the instructions in the coding validation tool.
 - c. If errors are identified, make the necessary corrections. If 'possible errors' are identified, review each possible error and, where necessary, record an explanation of why the coding is deemed to be correct
2. ViDA performs an additional validation check for all data uploaded:
 - a. Register to use the IRAP online software, ViDA (available at <http://vida.IRAP.org>) and, if necessary, apply for a Provisional Creator license.
 - b. Create an upload file in accordance with the Upload File Specification. In doing so, insert a value of 1 for each 100m segment for the 14 supporting data fields (listed above).
 - c. Create a dataset in ViDA and upload the coding to the dataset (refer to the Star Rating and Investment Plan Manual)
 - d. If validation errors are identified, make the necessary corrections.



3.3. IRAP Star Rating and Safer Roads Investment Plans

IRAP Star Ratings and Safer Roads Investment Plans (commonly referred to as a 'SRIP') are the outputs of an IRAP assessment. Star Ratings show the inherent risk of the assessed road network, while an Investment Plan guides future safety upgrades on the road network. The manual that provide guidelines for creating star ratings and investment plans shall be consulted to help ensure that:

- Star Ratings and Investment Plans are prepared in a way that meets best practice.
- Poor quality and erroneous data are quickly identified so it can be rectified.
- Assessments are performed in a way that can be repeated for future assessments.

The accredited firm/ consultant firm will be used in a Star Rating and Investment Plan project, the following information on the team members should be displayed:

3.3.1. Star Rating and Safer Road Investment Plan team members

Name	Email address	Role (s) in project	IRAP accreditation number	IRAP accredited since date	IRAP accredited renewal due date

3.4. Team

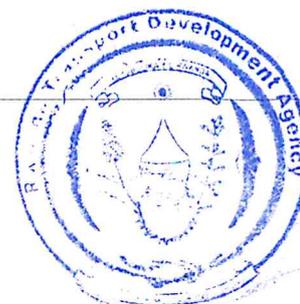
The Star Rating and Investment Plan assessment require:

- Expertise in using the IRAP methodology and software
- An ability to manage large and often complex sets of data
- An ability to make reasonable estimates for variables, such as countermeasure costs
- Experience in road engineering safety and an ability to interpret road safety results and data, and
- Excellent written and spoken communications skills.

Depending on the nature of the project, the assessments will be performed by a team of four people. Ideally, people will have experience in road engineering safety activities such as road safety audits. The IRAP recommends that people preparing to undertake an IRAP project take training and it is beneficial to have accredited suppliers/consultants involved in the project.

3.5. Supporting data

Every IRAP project requires supporting data. It is important to know what supporting data will be required to avoid unforeseen delays during the analysis stage of a project. A supporting data checklist is provided below.



Supporting data includes:

- Speed and flow (vehicles, pedestrians and bicyclists) data, which is described in the IRAP Survey Manual. This may have been collected during the survey stage of the project or supplied by the road or related authority. For design assessments where no road survey will be done, or where no road current exists, methods of collecting or estimating speed and flows will need to be agreed with the client/local authority. Supporting data for designs may be available in feasibility studies or similar planning documents.
- Crash data, including fatalities and serious injuries, for the road network. This may be supplied by the road or related authority. If it is not available, an acceptable method of estimating fatalities and serious injuries will need to be agreed with the client/local authority.
- Local economic data and countermeasure costs. This should be supplied by the road or related authority or may be found using other sources.

3.6. Managing quality

The consultant firm should manage the quality. It is good practice to perform quality and compliance reviews regularly throughout the project. If problems are found and corrected early, then subsequent complications can be minimized and/or the need for re-surveys can be avoided.

3.7. Star Ratings

The consultant firm should conduct IRAP Star Ratings. IRAP Star Ratings measure the likelihood of a road crash occurring and the severity of the outcome. The focus is on identifying and recording the road attributes which influence the most common and severe types of crash, based on scientific evidence-based research.

In this way, the level of risk to a road user on a particular road section or network can be defined without the need for detailed crash data, which is often the case in low- and middle-income countries where data quality is poor. Research shows that a person's risk of death or serious injury is highest on a 1-Star Road and lowest on a 5-Star Road. Star Ratings are produced for vehicle occupants, motorcyclists, pedestrians and bicyclists.

Star Ratings represent the risk of a fatal injury to an individual road user. For example, for vehicle occupants, Star Ratings equate to the number of deaths and serious injuries per vehicle kilometer travelled on a road. Collective risk, that is the number of fatalities and serious injuries of a road, is a function of individual risk (Star Ratings) and traffic volume.

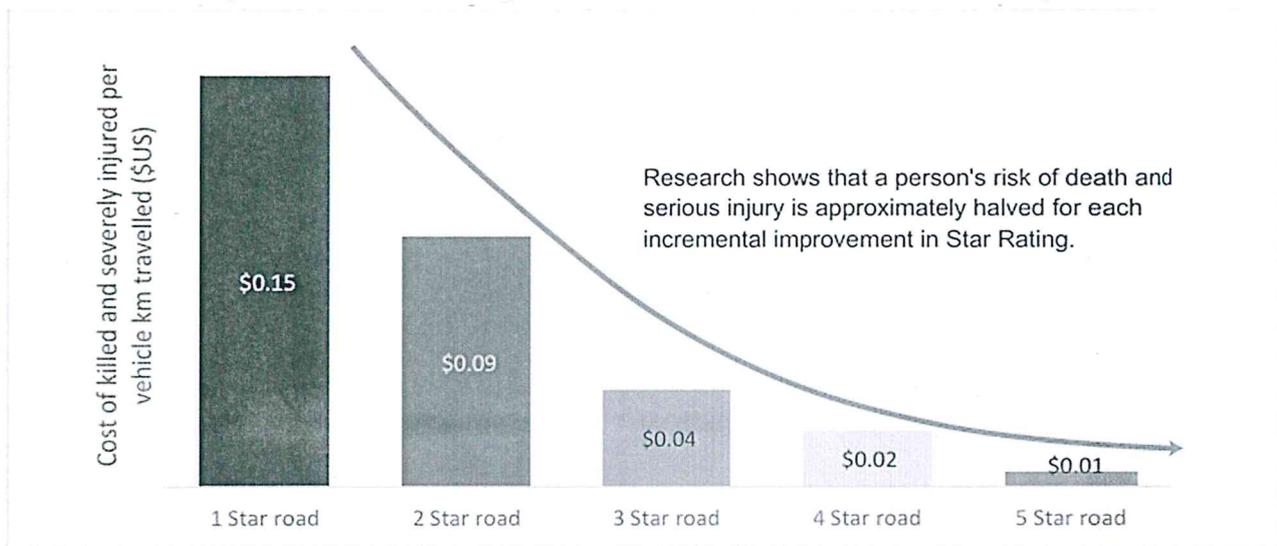
Star Ratings can be used to objectively quantify the level of risk associated with new road designs (where crash data is not available) to assist in evidence-based decisions on safety improvements. They are also useful where low crash frequency limits the ability of crash analysis to influence performance monitoring and investment prioritization.



3.7.1. Star rating and crash costs

The consultant firm will show a direct relationship between Star Ratings and the cost of fatalities and serious injuries. And shows how for every incremental increase in Star Ratings, the cost of fatalities and serious injuries are typically halved.

The relationship between star rating and the cost of fatalities and serious injuries



3.7.2. Calculation of star rating scores

A Star Rating Score (SRS) is calculated for each 100m segment of road for vehicles occupants, motorcyclists, pedestrians and bicyclists.

The SRS that is, the relative risk of death and serious injury for an individual road user, is calculated using the following equation:

$$\text{crash type score} \times \frac{\text{likelihood} \times \text{severity}}{\text{operating speed} \times \text{external flow influence}} \times \text{risk factors}$$

Motorized road user scores (vehicle occupants and motorcyclists) are based on head on, run off road and intersection crash types. Pedestrian scores are based on walking along and across the road crash types. Bicyclist scores are based on riding along the road and intersections crash types.

Risk factors are associated with road attributes, which are recorded during the survey and coding part of the assessment, for different crash types.



3.7.3. Star rating bands

Star Rating Scores should be apportioned to Star Rating bands to determine the Star Rating for each 100 meter of road as shown in the table below.

Separate bands should be used for motorized road users (vehicle occupants and motorcyclists), bicyclists and pedestrians because their scores are calculated using different equations. That is, motorized road user scores are based on head on, run off road and intersection crashes; pedestrian scores are based on walking along and across the road crashes; and bicyclist scores are based on riding along the road and intersections crashes.

Star Rating	Star Rating Score				
	Vehicle occupants and motorcyclists	Bicyclists	Pedestrians		
			Total	Along	Crossing
5	0 to < 2.5	0 to < 5	0 to < 5	0 to < 0.2	0 to < 4.8
4	2.5 to < 5	5 to < 10	5 to < 15	0.2 to < 1	4.8 to < 14
3	5 to < 12.5	10 to < 30	15 to < 40	1 to < 7.5	14 to < 32.5
2	12.5 to < 22.5	30 to < 60	40 to < 90	7.5 to < 15	32.5 to < 75
1	22.5 +	60+	90 +	15 +	75 +

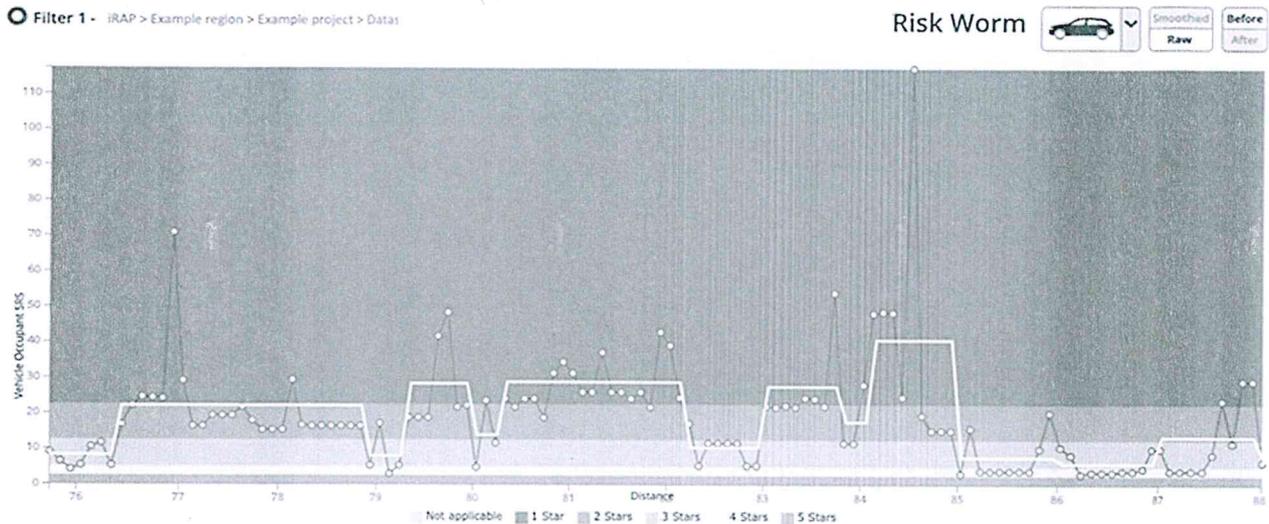
3.7.4. Raw and smoothed star ratings

For the purposes of producing a network level map showing Star Ratings, 100 meters may be too granular for mapping and analysis. To address this, the 100m segments will be 'smoothed' into longer sections.

The effect of smoothing is illustrated in the chart below, which shows unsmoothed (raw) SRS in blue and smoothed SRS in white. The target length for smoothing is 3km for roads in rural areas and 1km for roads in urban areas.



Raw (blue) and smoothed (white) Star rating scores



3.8. Safer Roads Investment Plans (including Analysis and reporting)

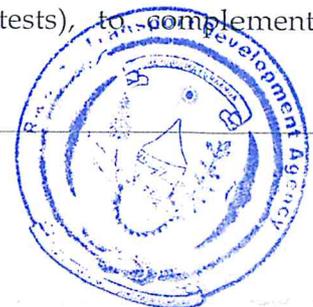
The consultant firm should conduct a safer roads investment plan. An Investment Plan is a prioritized list of countermeasures (safety treatments) that can cost-effectively improve Star Ratings and reduce infrastructure related risk. More than 90 road improvement options can be analyzed by the IRAP model to generate affordable and economically sound investment that improve a road's Star Ratings and, when implemented, can save lives.

Investment Plans are based on an economic analysis of a range of countermeasures, which is undertaken by comparing the cost of implementing the countermeasure with the reduction in crash costs that would result from its implementation. They contain extensive planning and engineering information such as road attribute records, countermeasure proposals and economic assessments for 100-meter segments of a road network.

In interpreting the results of an IRAP assessment, it is important to recognize that an Investment Plan is designed to provide a network-level assessment of risk and cost-effective countermeasures. For this reason, implementation of countermeasures identified in an Investment Plan will ideally include:

- Local examination of proposed countermeasures (including a 'value engineering' type workshop including all relevant stakeholders)
- Preliminary scheme investigation studies, and
- Detailed design and costing, final evaluation and construction

Furthermore, significant benefits can often be realized through coordinated targeting of risk factors for road users (such as speeding, seat belt wearing and alcohol) and vehicles (such as seat belt installation and crash performance as measured in GNCAP tests), to complement the upgrades recommended in the Investment Plan.



3.8.1. Fatalities and serious injuries (FSI) calibration

The consultant firm should conduct the fatalities and serious injuries calibration. Calibration factors are used to ensure that the total estimated number of fatalities and serious injuries (FSI) on the network is equal to the actual number of FSI on that network. In this way, the IRAP model takes account of factors that influence the number of fatalities on a road other than infrastructure, speed and flows.

If two roads in different countries have exactly the same design, operating speeds and traffic volume, then the vehicle occupant Star Ratings will be the same. However, even if the infrastructure is the same, the road safety context can vary significantly between countries, regions and even cities for the following reasons:

- Vehicle safety features (e.g. airbags, advanced structural design, dynamic stability control)
- Driver behavior (e.g. education and training, drink driving, seat belts, adherence to road rules), and
- Local laws and enforcement (e.g. mandatory motorcycle helmets and enforcement of road rules).

As a result of these factors, there can be vastly different fatality outcomes. Calibrating datasets according to fatality data adjust for these factors.

There are two steps to calibration:

- Specifying the number of fatalities on the road network, and
- Breaking down those fatalities by road user type and crash type.

3.8.2. Fatalities estimations

The consultant firm should conduct fatalities estimations. Estimation of fatalities and serious injuries are used in Investment Plans to assess the benefits and costs of implementing infrastructure safety countermeasures on a road. FSI estimates are made for each 100m segment of the existing road under existing conditions.

Where Star Ratings represent the individual risk of a road to a user (i.e. likelihood and severity of a crash), fatality estimations represent collective risk which accounts for exposure (i.e. road user volumes) and actual crash rates.

3.8.3. Crash risk mapping

The consultant firm should use detailed crash data to illustrate the distribution of recorded fatalities and serious injuries on a road network map for all road surveyed. The crash risk mapping will help to track road safety performance.



3.8.4. Speed

The consultant firm should put attention on the speed. The issue of speed management is particularly important in road safety. Vehicle operating speeds also have a significant bearing on the IRAP Star Ratings. As such, it warrants special attention in any Star Rating and SRIP assessment.

The risk of death or serious injury is minimized in any crash, where:

- Vulnerable road users (e.g. motorcyclists, bicyclists and pedestrians) are physically separated from cars and heavier vehicles, or traffic speeds are 30km/h or less.
- Opposing traffic is physically separated and roadside hazards are well managed.
- Traffic speeds are 70km/h or less for occupants of cars on roads where opposing traffic is not physically separated.
- Traffic speeds are 30km/h or less for occupants of cars on roads where roadside hazards are not mitigated.
- Traffic speeds at intersections are 50km/h or less for occupants of cars where there is a risk of side impact.

Impact speeds for different crash types after which the risk of death escalates

Crash Type		Impact speed
	head on	70 km/h
	side-impact	50 km/h
	side impact with tree	30 km/h
	pedestrian	30 km/h

It is not uncommon for there to be a discrepancy between permitted (posted) speeds and the speeds at which vehicles actually travel. In some locations, posted speed limits are set at very low speeds and are unlikely to be complied with in the absence of continuous enforcement or robust traffic calming measures.

In IRAP results, roads with very low posted speed limits may achieve a relatively high Star Rating (4 or 5-star), even though the road may have high risk features. It is possible to perform the IRAP



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analyses using speed estimates or data to ensure that Star Rating results reflect the speeds actually travelled and the most appropriate countermeasures are triggered.

The raw data collected as part of the IRAP process can provide a valuable resource to authorities investigating appropriate speed management initiatives. This may include a more detailed analysis of results to investigate where there are lower speed limits without accompanying engineering solutions or may include a review of the speed limits and facilities in place on roads that rate poorly for pedestrian or bicycle safety.

The IRAP results therefore should help enable a professional discussion between police and highway authorities about their goals and respective roles in enforcement and engineering so each can contribute best to ensuring safe speeds.

3.9. Upload file

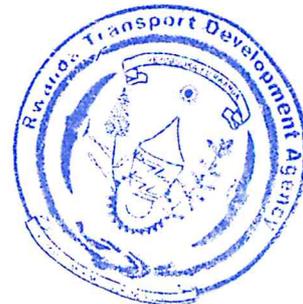
The consultant firm should create star rating and investment plan using ViDA, the road attribute coding data must be compiled in a .CSV file.

An upload file should have already been created in ViDA and most fields populated during the road attribute coding phase as per IRAP coding manual. The upload file should now be checked and the supporting data entered, before the data can be uploaded into ViDA

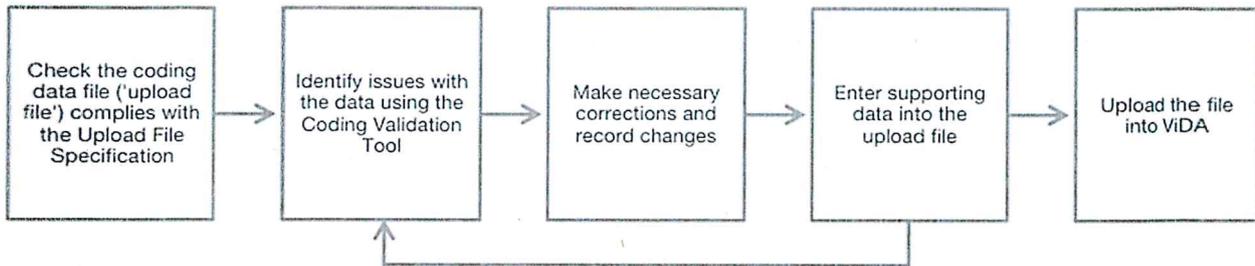
3.9.1. Upload file validation

It is good practice to regularly perform validation checks of the coding using IRAP tools. The Coding Validation Tool is an excel tool that can be used to perform logic checks on IRAP coding data files before they are uploaded to ViDA.

- a. Ensure that the Upload File is prepared in accordance with the Upload File Specification.
- b. Follow the instructions in the Coding Validation Tool.
- c. If errors are identified, make the necessary corrections. If 'possible errors' are identified, review each possible error and, where necessary, record an explanation of why the coding is deemed to be correct.



Preparing an upload file process



The Coding Conversion Tool can also be used to assist with quality checks of coding data. It does so by converting road attribute coding from numerical codes into text.

3.10. Coding supporting data

The consultant firm should provide the coding specification for supporting data as follow:

- Attribute column X / XX, Input: X (e.g. Attribute column 1/A, Input: Text) refers to the column number/letter in the Upload File Specification and the type of record to be used for each 100m segment (i.e. text, date, number or code).
- Code X (e.g. Code 6) refers to the code that should be entered into the corresponding field.

3.11. Producing star ratings and investment plan in ViDA

The consultant firm should produce star rating and investment plan in ViDA. The ViDA web application is the core of the IRAP suite of online tools. Its function is the calculation, management, analysis and presentation of IRAP Star Ratings and Safer Roads Investment Plans. ViDA provides tools, services and workflows to manage the RAP data lifecycle, from dataset setup and processing to on screen reports and downloadable files. ViDA also allows users to drill down through and analyze assessments using filter and search tools.

3.12. Stakeholder engagement

The consultant firm should do the presentation of the project objectives, background and results to key stakeholders.

3.13. Training

The consultant firm should provide training, technology and support that will build and sustain national, regional and local capability of survey, coding and using IRAP results to track road safety performance so that the concerned agencies can assess the benefits of their investment in road safety.

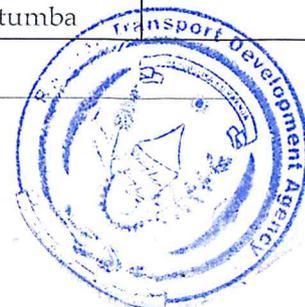


4. SCHEDULE OF THE ROADS

The table below details some of the existing roads to be assessed. The distance to be assessed and exact distance or chainages and length will be confirmed prior to commencement of activities.

Roads to be assessed.

S/N	Road Name	Link ID	Start point	End point	Length (km)
1	Kigali-Muhanga-Nyanza-Huye-Akanyaru	NR1	Km 0.00 Main roundabout, Kigali	Km:157.488 Akanyaru border post	158
2	Kigali-Musanze-Rubavu	NR2	Km 5.068 NR1: Giticyinyoni	Km 149.921 Rubavu border posts	150
3	Kigali-Rukomo-Gatuna	NR3	Km 2.390 NR1: Nyabugogo, Kigali	Km 77.970: Gatuna border post	78
4	Kigali-Rwamagana-Kayonza-Rusumo	NR4	Km 0.00 Main roundabout, Kigali	Km 169.339: Rusumo bridge	169.5
5	Kicukiro-Nyamata-Nemba	NR5	Km 6.242 NR4: Sonatube roundabout	Km 61.980: Nemba border post	62
6	Huye-Kibeho-Ndago-Munini-Bitare	NR9	Km 124.541 NR1: Huye	Km 77.236: Bitare border post	66.5
7	Huye-Nyamagabe-Kitabi-Buhinga	NR10	Km 123.169 NR1: Karubanda	Km 75.115 NR11: Buhinga	115.5
8	Ruhwa-Bugarama-Rusizi-Buhinga-Karongi-Rusiro-Rubavu	NR11	Km 0.000: Ruhwa border post	Km 139.475 NR2: Pfunda	270.5
9	Muhanga-Nyange-Rubengera	NR15	Km 47.028 NR1: Muhanga	Km 183.921 NR11: Rubengera	61.5
10	Muhanga-Ngororero-Kabaya-Mukamira	NR16	Km 3.748 NR15 Meru	Km 98.593 NR2: Mukamira	99
11	Cyakabiri-Nyabikenke-Musanze-Cyanika	NR17	Km 43.808 NR1: Cyanika	Km 123.603: Cyanika border post	34.5
12	Musanze-Kinigi-Kabatwa-Busasamana	NR18	Km 99.491 NR17: Musanze	Km 94.046: Petite barriere border post	22.5
13	Base-Kiruri-Miyove-Kisaro-Gicumbi-Nyagatare-Ryabega	NR19	Km 43.826 NR2: Base	Km 75.550 NR24: Ryabega	142
14	Kayonza-Kiramuruzi-Kabarore-Gabiro-Kagitumba	NR24	Km 74.570 NR4: Kayonza roundabout	Km 116.261: Kagitumba	116.5



				border post	
15	Simba Kimironko-ALU (City of Kigali)	KG 11 Ave	KG17 Ave junction	Junction Musave cell office	6
16	BPR Kimironko-EPsi-Kinyinya Junction (City of Kigali)	KG 19 Ave	KG 11 Ave junction	KG 12 Ave junction	4
17	Minagri junction-Kigali Golf Resort-Akabuga ka Nyarutarama (City of Kigali)	KG 548 St - KG 13 Ave	KG 7 Ave junction	KG 9 Ave junction	3
18	Giporoso-Kabeza-Rubilizi-Busanza (City of Kigali)	KK 18 Ave-KK 231 St-KK 160 St	KN 5 Rd junction	KK 20 Ave junction	7
19	Simba Kicukiro-St Joseph-Kabeza junction (City of Kigali)	KK 21 Ave-KK 12 Ave - KK 295 St	KK 15 Rd junction	KK 18 junction	4
20	Kimironko market-Kigali Parents (City of Kigali)	KG 15 Ave	KG 11 Ave junction	KK 3 Rd junction	2
21	Nyabugogo-Nyamirambo tapis	KN 20 Ave	KN 1 Rd junction	KN 2 Ave junction	5.5
22	Kinamba-ULK-Kagugu-Nyarutarama-Gishushu	Kg 14 Ave-KG 9 Ave	KN 8 Ave junction	KN 5 Rd	12
23	Nyarutarama-Kibagabaga	KG 10 Ave	KG 9 Ave junction	KG 19 Ave junction	3
TOTAL					1592.5

5. DELIVERABLES

The following deliverables are required:

5.1. Road survey

Standard deliverables for an IRAP road survey project are:

- i. An **inception report** including details on the following:
 - a. Survey plan
 - b. Health and safety plan
 - c. Survey team
 - d. Survey vehicle
 - e. Survey images
 - f. Daily survey records
 - g. Flow and speed sampling required, and



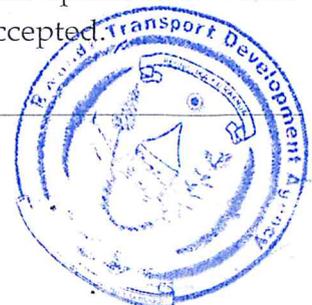
- h. Quality and compliance reviews.
- ii. **Licensed copies of any specialized software** used for viewing georeferenced images and data.
- iii. **Short weekly reports** summarizing:
 - a. Progress (measured in terms of km completed)
 - b. A summary of key activities completed
 - c. Health, quality and compliance review processes completed
 - d. Health, quality and compliance issues that have been identified and rectifications made
 - e. Photos of activities
 - f. Planned activities for the next 2 weeks, and
 - g. Any issues that may affect performance of the survey, and
 - h. Samples of survey data for the road sections where surveys are complete.
- iv. An **electronic copy of all geo-referenced images** upon completion of the survey.
- v. An **electronic copy of traffic flow, pedestrian flow, bicyclist flow and traffic speed data** and corresponding descriptive information for each sample location in Microsoft Excel format (where collection of this data is required in the project).
- vi. A **final report** describing activities undertaken, key data and results and any issues that those who will use the data need to take into consideration.

5.2. Road attribute coding

Standard deliverables for an IRAP coding project are:

- i. An **inception report** including details on the following:
 - a. Team members and roles
 - b. Schedule
 - c. Coding system to be used, and
 - d. Plan for quality reviews including confirmation of the independent coding quality reviewer.
- ii. **Licensed copies of any specialized software** used for viewing and coding georeferenced images or designs and coding.
- iii. **Short weekly reports** summarising:
 - a. Progress (measured in terms of km completed)
 - b. Quality review processes completed
 - c. Quality issues identified and rectifications made
 - d. Photos of activities
 - e. Planned activities for the next two weeks, and
 - f. Any issues that may affect performance of the project.

The weekly reports should also include coding for the sections of roads or designs where coding has been completed, in a .csv format that complies with the [Upload File Specification](#) and does not produce any validation errors in the [Coding Validation Tool](#) and when uploaded in ViDA. Data that has not been subject to quality review processes should not be accepted.



- iv. **Final coding for all the roads/designs** in .csv format that complies with the Upload File Specification and does not produce any validation errors in the Coding Validation Tool and when uploaded in ViDA.
- v. An independent **coding quality review report** prepared by the independent quality reviewer and explaining the review processes completed, issues identified and recommended corrections.

5.3. Analysis and Reporting (Star Ratings and Investment Plans)

Standard deliverables for an IRAP Star Rating and Investment Plan project are:

- i. An **inception report** including details on the following:
 - a. Work plan
 - b. Supporting data obtainment plan
 - c. Health and safety plan
 - d. Team members, and
 - e. Quality and compliance reviews.
- ii. **Licensed copies of any specialized software** used during the assessment.
- iii. **Short weekly reports** summarizing:
 - a. Progress
 - b. Health, quality and compliance review processes completed
 - c. Health, quality and compliance issues that have been identified and rectifications made
 - d. Photos of activities
 - e. Planned activities for the next 2 weeks, and
 - f. Any issues that may affect performance of the project.
- iv. An **electronic copy of data** compiled during that assessment and corresponding descriptive information for each sample location in Microsoft Excel format (where collection of this data is required in the project).
- v. **Datasets in ViDA.**
- vi. A **final report** that describes the assessments, supporting data, analysis results and recommendations.

5.4. Crash Risk Mapping

Standard deliverables for a Crash Risk Mapping project are:

- i. An **inception report** including details on the following:
 - a. Work plan
 - b. Health and safety plan
 - c. Team members, and
 - d. Quality and compliance reviews.
- ii. **Licensed copies of any specialized software** used during the assessment.
- iii. **Short weekly reports** summarizing:
 - a. Progress



- b. Health, quality and compliance review processes completed
- c. Health, quality and compliance issues that have been identified and rectifications made
- d. Photos of activities
- e. Planned activities for the next 2 weeks, and
- f. Any issues that may affect performance of the project.
- iii. An **electronic copy of any presentation materials** developed and used during the assignment.
- iv. A **final report** that describes the activities and recommendations.

5.7. Training

Standard deliverables for training are:

- i. An **inception report** including details on the following:
 - a. Work plan
 - b. Health and safety plan
 - c. Team members, and
 - d. Quality and compliance reviews.
- ii. **Short weekly reports** summarizing:
 - a. Progress
 - b. Health, quality and compliance review processes completed
 - c. Health, quality and compliance issues that have been identified and rectifications made
 - d. Photos of activities
 - e. Planned activities for the next 2 weeks, and
 - f. Any issues that may affect performance of the project.
- iii. An **electronic copy of any presentation materials** developed and used during the assignment.
- iv. A **final report** that describes the activities and recommendations.

6. TIMING

The table below details the key milestones for the project that should be delivered 120 days. The exact timing will be confirmed prior to commencement of the project.

Schedule of activities

Task	Completion date
Road survey	60 days
Road attribute coding	15 days
Quality assurance	5 days
Supporting data collection	5 days
Upload file	5 days
Analysis and reporting (Star Ratings and Investment Plans)	15 days



Risk Mapping	15 days
Total time for the study	120 days

7. DELIVERY TEAM/ TEAM COMPOSITION

The accredited consultant firm and staffs and/or an accredited system with 7 years experience in IRAP will be used in a project, the requirement to supply the following information on the team members and inspection system should be included in the table below.

Team members

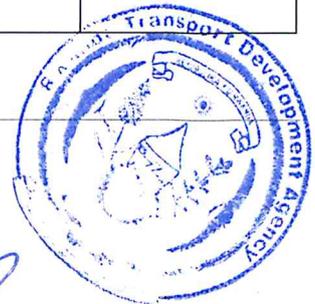
Name	Email address	Role (s) in project/ position	IRAP accreditation number	IRAP accredited since date	IRAP accreditation renewal due date
		<p>Survey Supervisor (1):</p> <ul style="list-style-type: none"> - He should oversee the survey and is able to represent the project and present basic information at stakeholder briefings. - He should have 7 years or more experience in IRAP. - He should have a deeper understanding of road safety assessment principles, extensive fieldwork experience and may be involved in training and mentoring junior IRAP members - He should have minimum Bachelor's degree in civil 			



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		<p>engineering, transportation planning or road safety background</p> <ul style="list-style-type: none"> - He should have specialization in specific technical aspects within IRAP, such as data analysis, GIS, and road safety engineering <p><u>Professional driver (1):</u></p> <p>He should be professional driver with driving license of used vehicle trained to operate the survey vehicle with at least 3 years of experience</p> <p><u>Technical staffs (2):</u></p> <ul style="list-style-type: none"> - The technical staffs should be capable of completing IRAP survey manual activities - They should have at least an experience of 5 years in IRAP survey - They should have minimum Bachelor's degree in civil 			
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		<p>engineering, transportation planning or road safety background</p> <ul style="list-style-type: none"> - They should have technical skills, fieldwork experience and familiarity with road safety assessment methodologies 			
		<p>Attribute coding <u><i>Coding supervisor</i></u> <u>(1):</u></p> <ul style="list-style-type: none"> - Manage the coding process - Perform quality checks - Have regular contact with other senior coders and management to share and work through issues. - He should have 7 years or more experience in IRAP attribute coding. - He should have experience in leading coding IRAP projects - He should have minimum Bachelor's degree in civil engineering, 			



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	<p>transportation planning or road safety, computer science, software engineering or related fields background</p> <ul style="list-style-type: none"> - He should have specialization in specific technical aspects within IRAP, such as data analysis, GIS, and road safety engineering <p><u><i>Coders four (4):</i></u></p> <ul style="list-style-type: none"> - They should have at least an experience of 5 years in IRAP attribute coding - They should have minimum Bachelor's degree in civil engineering, transportation planning or road safety, computer science, software engineering or related fields background - They should have specialization in specific technical aspects within IRAP, such as data 			
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		analysis, GIS, and road safety engineering			
		<p><u>Analysis and reporting including safer road investment plan team members (4):</u></p> <ul style="list-style-type: none"> - They should have at least an experience of 5 years in IRAP analysis and reporting including safer road investment plan - They should have minimum Bachelor's degree in civil engineering, transportation engineering or related field backgrounds. - They should also possess knowledge of road safety standards, guidelines and best practices. - They should have experience in road engineering safety activities such road safety audits, road safety inspections, ... 			

N.B: all team members must be IRAP accredited



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1. INPUTS TO BE PROVIDED BY THE CLIENT

The client will provide support to get the data needed for successful completion of the project

2. PAYMENT MODALITIES

Task	Percentage
Road survey	35 upon approval of road survey
Road attribute coding	25 upon approval of road attribute coding
Analysis and reporting including Safer Road Investment Plans	25 upon approval of star rating and investment plans
Training	15 upon completion

