

FEDERATED STATES OF MICRONESIA CLIMATE RESILIENT ROAD PROJECT

Terms of Reference and Scope of Services: Road Safety Audit Expert for the Department of Transport, Communications and Infrastructure

ROAD SAFETY AUDITS OF SELECTED ROADS IN THE FEDERATED STATES OF MICRONESIA, & DEVELOPMENT OF A FIELD GUIDE FOR ROAD SAFETY AT ROAD WORKS THAT INCLUDES TRAFFIC MANAGEMENT PLAN TEMPLATES FOR SAFE TRAFFIC CONTROL AT ROADWORKS

1. Introduction

The Government of the Federated States of Micronesia (FSM) is preparing the FSM Climate Resilient Road Project (CRRP) to improve the climate resilience of FSM's road network, with the support of the World Bank. The Project will include technical assistance and institutional strengthening to improve the management of the road network in relation to potential climate change impacts and will fund physical works on priority road assets to improve resilience to climate-related hazards or events.

The FSM Government now wishes to use project preparation funds to employ a Road Safety Audit (RSA) Expert to a) undertake a baseline and detailed design stage road safety audits for the critical near-term priority roads and b) develop a field guide for road safety at road works that includes traffic management plan templates setting out best practice for safe traffic control at roadworks. Within the National Government, the Department of Transportation, Communication & Infrastructure (DoTC&I) has the responsibility for the delivery of infrastructure, including Amended Compact projects, and similar authorities deliver infrastructure at the State level.¹The Consultant will work under the overall supervision of the DoTC&I, with day to day supervision from the designated representative in the DoTC&I CRRP Project Implementation Unit (PIU).When the word *Client* is used in this TOR, this refers to the DoTC&I.

Due to the current international and domestic travel restrictions in place for the COVID-19 pandemic, it is expected that this assignment will be conducted remotely with no travel to FSM. The Consultant will be provided with relevant reports and data relating to the assignment, and will be able to conduct consultations and key informant meetings with Federal and State government representatives.

1.1 Location and Setting

FSM is made up of four semi-autonomous states (Kosrae, Pohnpei, Chuuk, Yap) located between Palau and the Philippines to the west and the Marshall Islands to the east. Although its land area covers just 700 square km, FSM consists of more than 600 islands scattered over an area of about 2.6 million square km. Each State has a main, 'high' island (volcanic in origin) where most of

¹ (a) Pohnpei – State Office of Transport and Infrastructure; (b) Kosrae – Department of Transport and Infrastructure; (c) Chuuk – Department of Transport and Public Works; and, (d) Yap – Department of Public Works and Transport.

the State's population is located. The overall population of FSM is estimated to be 105,544 (2017), of which approximately 45 percent live in Chuuk, 37 percent in Pohnpei, 11 percent in Yap, and 7 percent in Kosrae. There is internal migration to Pohnpei, which hosts the Country's capital Palikir, as individuals are particularly drawn to employment with the National Government. Access to basic services is also generally higher in Pohnpei. Each State is diverse in terms of language, cultural norms and land tenure laws.

As with other small island nations in the region, FSM faces significant challenges related to its small size, remoteness, geographical dispersion, environmental fragility and sensitivity to external shocks. In particular, frequent natural disasters and climate change impose high costs and may even threaten the physical viability of some areas of both the main islands and more remote outer islands. Droughts, typhoons, storm waves, flooding and landslides all affect FSM. The islands are subject to typhoons and get frequent heavy rains and associated flooding from May through November. Tsunamis, storm surges, rising sea levels, particularly during king tides, and droughts are other natural threats.

1.2 FSM CRRP Project Concept

The FSCRRP Project is proposed to include the following components:

Component 1: Spatial and Sector Planning Tools. This Component involves technical assistance that will directly support FSM by bringing about transformative change in the way that climate change is addressed in the road sector. A key activity is the preparation and implementation of a *Vulnerability Assessment and Climate Resilient Road Strategy* to assess levels of vulnerability to climate change and severe weather events (e.g. sea-level rise, extreme rainfall, landslide, storm surge, etc.) across the road network in FSM and to identify measures to enhance resilience and prioritize investments to balance vulnerability reduction against cost implication. This component will also include: (i) establishment and operation of fit-for-purpose road asset management systems (new) that consider climate factors; (ii) road survey planning tools; and, (iii) training on these tools.

Component 2: Climate Resilient Infrastructure Solutions. This Component involves feasibility studies, design and construction of identified priority road assets to improve their resilience to climate-related hazards and/or events. The integration of climate change considerations into infrastructure activities will help strengthen the resilience of assets and improve functionality of the road network. Component 2 is split into two parts:

- **Sub-component 2.1:** Critical climate resilient road, bridge or drainage improvement works that should be implemented urgently to maintain a basic level of land transport connectivity in each state. Urgent works proposed for financing under the Project include: (i) improving the narrow, low-level Lelu causeway in Kosrae; (ii) replacing the 12 meter Awak bridge in Pohnpei; (iii) improving the 2.5 kilometer airport to Pou Bay bridge road in Chuuk; and, (iv) replacing two short-span (6-meter-long) steel and concrete composite bridges in Yap.

- **Sub-component 2.2:** In addition to the urgent priorities under Sub-component 2.1, a selection of near, medium and long-term road works would be financed to enhance the resilience of the network in each state to climate change impacts and natural hazards, as guided by the *Vulnerability Assessment and Climate Resilient Road Strategy* undertaken as part of Component 1. Works will be restricted to primary road networks within the existing legal road easements. Interventions will include measures to strengthen network resilience including but not necessarily limited to: pavement strengthening, drainage improvements, spot slope stabilization, rock wall revetment strengthening, improvements to causeways and bridges). This will constitute the bulk of the road works financed by CRRP.

Component 3: Strengthening the Enabling Environment. This Component will provide funding to support institutional and regulatory reforms for road sector asset management and maintenance, including measures to strengthen local capacity and to increase the sustainability of climate resilient road sector investments. In addition, this Component will help to strengthen coordination among relevant institutions, will look at ways in which road sector management can be improved, and will address any emerging priority issues that can help support the Government in addressing climate change risks.

1.3 Road Safety in FSM

A review of road safety statistics from the four FSM states indicate that there are about 500 road accidents per year, most of them on the island of Pohnpei which accounts for over half of the number of registered vehicles. However, there are few road fatalities, typically three or less annually. The World Health Organization (WHO) estimates that in 2018 there were 3 road fatalities, and that in 2013, there were two road fatalities. Information provided by the State Departments of Public Safety indicate that there was one fatality in the year 2019. The total number of registered vehicles across all states is about 11,000.

While there are laws in place to enhance road safety, there is need for a comprehensive review of the legal framework, the system of enforcement and the level of awareness among law enforcement offices, drivers and the community.

2. Scope of Services –Road Safety Audits

This assignment will require (A) baseline and (B) detailed design stage road safety audits for the critical near-term priority works **as specified in Sub-component 2.1**. These works include: (i) improving the narrow, low-level Lelu causeway in Kosrae; (ii) replacing the 12-meter Awak bridge in Pohnpei; (iii) improving the 2.5-kilometer airport to Pou Bay bridge road in Chuuk; and, (iv) replacing two short-span (6-meter-long) steel and concrete composite bridges in Yap. A design and supervision (D&S) consulting firm for these works is being hired under a separate assignment. The RSA consultant and D&S consulting firm will be required to work together closely.

The purpose of these road safety audits is to identify areas of concern for the safety of the travelling public. The audits will systematically analyze the potential risks making the infrastructure unsafe. The recommendations arising out of these audits will inform the detailed design of the works to mitigate the hazards. *Figure 1* below sets out the basic workflow of a road safety audit.

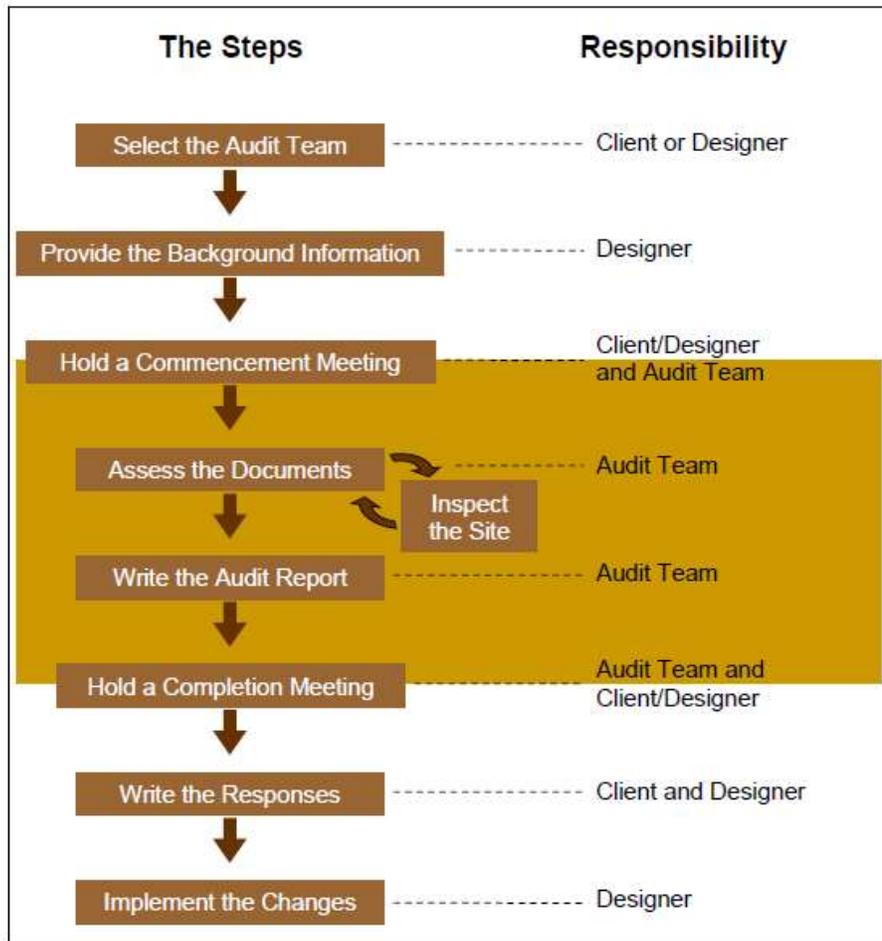


Figure 1 Schematic of steps in road safety audit process. From Austroads Guide to Road Safety Part 6A: Implementing Road Safety Audit, page 25.

It is expected that the Consultant will:

- a. Evaluate all roadways and roadside features, design elements and local conditions (see *Table 1* for suggested road safety elements to be audited) that would increase the likelihood and severity of an accident.
- b. From available accident statistics and their analyses, identify areas of greatest risk
- c. Review the interaction of the various design elements with each other and the surrounding road network.
- d. Gather information on driver behaviour through key informant interviews, analysis of available crash data and observation.
- e. Determine if the needs of all road users have been adequately and safely met
- f. Explore emerging operational trends or safety issues; and
- g. Examine physical evidence of past crashes and off-road excursions.

The Client will liaise with the Consultant to provide, as available:

- a. Extensive, detailed dashcam and drone photos and videos of the priority works sites, including photos of the sites at night

- b. As-built design drawings for baseline where available (noting whether these accurately reflect existing conditions)
- c. Detailed design documents including drawings for proposed works
- d. Previous accident investigations conducted
- e. Crash data, where available (by location, accident type, and severity)
- f. Volume data
- g. Speed data
- h. Roadway functional classification
- i. Existing design reports; and
- j. Existing policies, standards, and guidelines; and
- k. Any other plans to cover adjacent roads or to describe adjacent land and its uses which might be affected by the proposal or by the traffic changes it induces.

The consultant is expected to comply with the World Bank Environmental and Social Framework and Standards², in particular ESS4 Community Health and Safety, the relevant guidelines relating to ESS4 (in particular the World Bank Good Practice Note on Road Safety) and the World Bank Group Environmental, Health and Safety Guidelines³.

2.1 Road safety elements to be audited

The Road Safety Audit is expected to provide relevant road safety findings and recommendations on the following items, as relevant to each priority works site.

Table 1 Suggested road safety elements to be audited

Category	Elements to consider
<i>Road alignment and cross-section</i>	<ul style="list-style-type: none"> • Visibility, sight distance • Design speed • Speed limit/speed zoning • Overtaking • Readability of signage by drivers • Widths • Shoulders • Crossfalls • Batter slopes • Drains
<i>Intersections</i>	<ul style="list-style-type: none"> • Location • Visibility, sight distance • Controls and delineation • Layout
<i>Community assets and activities</i>	<ul style="list-style-type: none"> • Community assets close to the road / perhaps in the road reserve (markets, stalls) • Road access to sensitive receptors or vulnerable community members (schools, hospitals, markets, shops, emergency services) • Pedestrian crossings and footpaths used by school

²www.worldbank.org/esf

³https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

	children
<i>Signs and lighting</i>	<ul style="list-style-type: none"> • Lighting • General sign issues • Sign legibility • Sign supports
<i>Markings and delineation</i>	<ul style="list-style-type: none"> • General issues • Centrelines, edgelines, lane lines • Guideposts and reflectors • Curve warning and delineation
<i>Pedestrians and cyclists</i>	<ul style="list-style-type: none"> • General issues • Pedestrians • Cyclists
<i>Bridges and culverts</i>	<ul style="list-style-type: none"> • Design features • Crash barriers
<i>Pavement</i>	<ul style="list-style-type: none"> • Pavement defects • Skid resistance • Ponding • Loose stones/material
<i>Provision for heavy vehicles</i>	<ul style="list-style-type: none"> • Design issues • Pavements/shoulder quality
<i>Floodways and causeways</i>	<ul style="list-style-type: none"> • Ponding, flooding
<i>Miscellaneous</i>	<ul style="list-style-type: none"> • Landscaping • Fencing • Headlight glare • Roadside activities (other than as mentioned under community assets and activities above) • Animals
<i>Road user knowledge and behavior</i>	<ul style="list-style-type: none"> • Driver knowledge and behavior contributing to crashes • Pedestrian and cyclist behaviour contributing to crashes and injury • Driver behaviour at sites of sensitive receptors such as schools.

2.2 Road safety audit report contents

The road safety audit report for each priority works site should be laid out in a manner similar to the following:⁴:

1. Project information
 - a. A report title which includes the name of the road, the extent of the audited site (length of road or intersecting road name), the locality, the design stage of the audit (baseline or detailed design).
 - b. A brief description of the proposed works at the site, its objectives and any special road users⁵ or special aspects.
2. Background information
 - a. The audit consultant name and qualifications and names of involved GoFSM representatives.

⁴ This is adapted from the Austroads 2019 Guide to Road Safety Part 6A *Implementing Road Safety Audit*.

⁵ Road users include cyclists, motorists, pedestrians. Particular focus should be placed on the risks to vulnerable users (pedestrians and cyclists).

- b. An overall plan of the project or road length, with audit findings, and where requested by DoTC&I, recommendation item numbers added to the plan.
 - c. Advice that both a daytime and a night-time inspection were undertaken by FSM State Government representatives, with dates included.
 - d. A list of documents used during the audit, and all drawing numbers with their dates/amendment numbers.
 - e. Photos of significant issues
3. Findings and recommendations
 - a. A series of findings about all the safety risks which were identified, with recommendations (of an appropriate nature) if required by DoTC&I, directly after each finding. The risks should be presented in three categories – low, medium and high. This will be the most substantial part of the report.
 - b. A brief listing of major findings and recommendations, or repeated issues of concern, drawn out and placed ahead of the main body of findings and recommendations
 4. Formal statement
 - a. A concluding statement signed by the audit Consultant, advising they have undertaken the audit.

In summary, the road safety audit report should be a concise and succinct report on aspects of the sites which involve hazards, with findings or recommendations about corrective actions.

3. Scope of Services – Development of a Field Guide for Road Safety at Road Works including Traffic Management Plan Templates for Safe Traffic Control at Roadworks in FSM

The upcoming road works **as specified in Sub-component 2.1** will involve continual traffic control along the lengths of the road under construction during working hours, with half-width working and stop/go operations, which is likely to cause frustration to road users, and increased safety risks, so will need to be carefully and consistently managed and monitored. Each contractor will be required to submit a Traffic Management Plan (TMP) for controlling the traffic in a safe and orderly manner. To assist the works contractor, supervision consultants and Client in preparing, managing, monitoring and overseeing the TMPs, the consultant will develop a Field Guide for Road Safety at Road Works that includes TMP templates that sets out best practice for traffic management of vehicle and pedestrian traffic in FSM.

While the templates will be immediately applicable to the works contractors for the road assets specified in this TOR, the consultant shall also consider what modifications to the templates would be needed for it to be used in the construction of any road infrastructure asset (differentiation to be advised. i.e. by road category / speed limit etc.).

The TMP template must be compliant with AS1741 Part 3 and AS/NZS 3845, or an approved equivalent.

4. Outputs / Deliverables

The consultant will be required to deliver the following outputs / deliverables:

A. Road Safety Audit reports

- The Consultant will conduct a baseline safety evaluation for the road works sites **as specified in Sub-component 2.1** (based on data and information provided by Federal and State representatives) and prepare detailed Road Safety Audit reports (4 reports, one for each site) with findings and recommendations. These shall be presented in draft form

for Client review. The Client will provide comments for the reports within two weeks from the date of draft report submission. The draft reports are to be lodged with DoTC&I within one month from commencement.

- Pending availability of detailed designs for the road works sites **as specified in Sub-component 2.1**, the Consultant will prepare detailed Road Safety Audit reports on the technical measures included in the detailed designs (report, drawings, specifications); these audits reports will be undertaken as desk studies. The reports shall be presented in draft form for Client review. The Client will provide comments for the reports within two weeks from the date of draft report submission. The draft report is to be lodged with the DoTC&I within one month from the Consultant's receipt of the detailed designs.
- The Consultant will prepare and deliver power-point presentations via video conference to identified stakeholders in all four FSM states, summarising the detailed reports of the road safety findings including their recommendations, at a date to be determined in consultation with the Client. There will be two rounds of presentations – one for the baseline audit, and another for the detailed design audit. It is anticipated that the Consultant will also obtain comments from the Client during these presentations; and
- The Consultant will incorporate final comments from the Client into the Final Reports and upon approval by the Client of the Final reports by email, for both the baseline audit and the detailed design audit, four hard bound copies and one electronic copy shall be supplied to the Client.

B. Field Guide for Road Safety at Road Works including Traffic Management Plan Templates

The consultant will prepare a Field Guide for Road Safety at Road Works that includes Traffic Management Plan (TMP) templates for safe traffic control during road works which will be compliant with relevant works contractual requirements and the World Bank Environmental and Social Framework and Standards and the Project Environmental and Social Management Framework. The Field Guide will be presented in a draft form for Client review. The Client will provide comments for the reports within two weeks from the date of draft report submission.

C. Transfer of Knowledge

The Consultant will provide the DoTC&I, equivalent State transport departments and relevant line agencies with training via video conference on the basic requirements and analysis of a Road Safety Audit (4x 1-day training sessions) covering the general approach to RSA and also include some specific insights into the local conditions as observed during "virtual field visits". The Consultancy will also handover all underlying data, analysis and models to DoTC&I for future analyses.

5. Selection Criteria

The consultant is expected to:

- Have a degree in civil engineering or other relevant field with 15 years of relevant work experience in road safety engineering, including the identification and treatment of black-spots;
- Have road safety monitoring and evaluation experience;
- Have undertaken at least five formal road safety audits, including at least three at design stages;
- Successfully earned a road safety audit training course certification, of at least two days duration;
- Have experience in the development and implementation of traffic and road safety engineering schemes and management systems.

Experience in carrying out road safety audits in Pacific Islands countries will be preferred.

6. Timeframe

- The Duration of the Baseline Audits will be approximately 8 days input, and the work should be completed within one month from commencement.
- The Duration of the Field Guide including TMP templates will be 10 days input, and the work should be completed within one month from commencement.
- The Duration of training for transfer of knowledge shall be 4 days (1 day per State) and the training will be conducted via video conference at a date to be determined in consultation with the Government (but not later than one month after delivery of the Detailed Design Audits).
- The Duration of the Detailed Design Audits will be approximately 8 days input, and the work should be completed within one month from the Consultant's receipt of the detailed designs (the designs are expected to be completed in May, 2021)

7. Supervision Arrangements

The Consultant will work under the overall supervision of the DoTC&I and will report to Secretary of DoTC&I with day to day supervision from the designated representative in the DoTC&I CRRP Project Implementation Unit (PIU). The Consultant will also be required to work with other relevant federal and state agencies as required.

DoTC&I will make available the relevant personnel as required to provide local knowledge and assistance to the Consultant. The Consultant will provide all equipment needed to execute the study as part of the study cost.

The Consultant will be required to hold meetings with DoTC&I to discuss progress on the Road Safety Audits and further actions required.

The expert is required to provide their own laptop computer and any other specialized equipment required.

8. Duration, level of input and payment schedule

The assignment is expected to start on October 10, 2020 and require input of 30 working days until October 31, 2021. The expected outputs and payment rates are presented in Table 1. The consultant will have a lump sum contract. The payment will be conditional on the acceptance of final deliverables following revisions requested by DoTC&I.

No.	Outputs	Payment rate
1	Baseline RSA reports	30%
2	Field Guide and TMP Templates	30%
3	Training	10%
4	Detailed design RSA reports	30%

9. Payment procedure

Payments for deliverables will be made on the basis of the Client accepting deliverables, not on submission. The Client will be providing written feedback to draft reports which will be reviewed and potentially result in an adjusted final deliverable submission by the Consultant.

10. Annex 1: 2015 WHO road safety data factsheet

MICRONESIA (FEDERATED STATES OF)



Population: 103 549 • Income group: Middle • Gross national income per capita: US\$ 3 280

INSTITUTIONAL FRAMEWORK	
Lead agency	No
Funded in national budget	—
National road safety strategy	No
Funding to implement strategy	—
Fatality reduction target	—

SAFER ROADS AND MOBILITY	
Formal audits required for new road construction projects	No
Regular inspections of existing road infrastructure	No
Policies to promote walking or cycling	No
Policies to encourage investment in public transport	No
Policies to separate road users and protect VRUs	No

SAFER VEHICLES	
Total registered vehicles for 2010	8 337
Cars and 4-wheeled light vehicles	7 356
Motorized 2- and 3-wheelers	96
Heavy trucks	747
Buses	138
Other	0
Vehicle standards applied ^a	
Frontal impact standard	No
Electronic stability control	No
Pedestrian protection	No

POST-CRASH CARE	
Emergency room injury surveillance system	No
Emergency access telephone numbers	Subnational ^a
Permanently disabled due to road traffic crash	—

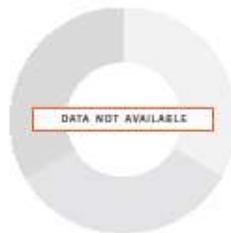
DATA	
Reported road traffic fatalities (2013)	2 ^a (100% M)
WHO estimated road traffic fatalities	2
WHO estimated rate per 100 000 population	1.9
Estimated GDP lost due to road traffic crashes	—

^a Department of Health and Social Affairs, Palpep and Top States only. Defined as died within 24 hours of crash.

SAFER ROAD USERS	
National speed limit law	Subnational ^a
Max urban speed limit	—
Max rural speed limit	—
Max motorway speed limit	—
Local authorities can modify limits	—
Enforcement	—
National drink-driving law	Subnational ^a
BAC limit – general population	—
BAC limit – young or novice drivers	—
Random breath testing carried out	—
Enforcement	—
% road traffic deaths involving alcohol	—
National motorcycle helmet law	Subnational ^a
Applies to drivers and passengers	—
Law requires helmet to be fastened	—
Law refers to helmet standard	—
Enforcement	—
Helmet wearing rate	—
National seat-belt law	Subnational ^a
Applies to front and rear seat occupants	—
Enforcement	—
Seat-belt wearing rate	—
National child restraint law	No
Restrictions on children sitting in front seat	No
Child restraint law based on	—
Enforcement	—
% children using child restraints	—
National law on mobile phone use while driving	Subnational ^a
Law prohibits hand-held mobile phone use	—
Law also applies to hands-free phones	—
National drug-driving law	No

^a All legislation is subnational.

DEATHS BY ROAD USER CATEGORY



TRENDS IN REPORTED ROAD TRAFFIC DEATHS



Source: Department of Health and Social Affairs, deaths in Palpep and Top States only.

Legislative information collected by WHO. Vehicle safety data from WHO (CI-MAP) (Other data collected by questionnaire and/or by the Department of Health and Social Affairs).