MINISTRY OF COMMUNICATION, TRANSPORT, POST AND CONSTRUCTION

MAINSTREAMING APPROPRIATE LOCAL ROAD STANDARDS AND SPECIFICATIONS AND DEVELOPING A STRATEGY FOR THE MCTPC RESEARCH CAPACITY

PROGRESS REPORT 8
September 2007

SEACAP 03

UNPUBLISHED PROJECT REPORT

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Prepared for: Project Record: **SEACAP 03. Mainstreaming Appropriate Local Road Standards and Developing a Strategy for the MCTPC Research Capacity**

CONTENTS

ABBREVIATIONS & ACRONYMS

ADT	Average Daily Traffic
ASEAN	Association of South East Asian Nations
CBR	California Bearing Ratio
CNCTP	Cambodia National Community of Transport Practitioners
CSIR	Council for Scientific and Industrial Research (South Africa)
DBM	Dry Bound Macadam
DBST	Double Bituminous Surface Treatment
DCP	Dynamic Cone Penetrometer
DfID	Department for International Development
DoR	Department of Roads
EADT	Equivalent Average Daily Traffic
EDCs	Economically emerging and Developing Countries
ENS	Engineered Natural Surface
esa	equivalent standard axles
FHWA	Federal Highways Association (US)
FM	Fines Modulus
FWD	Falling Weight Deflectometer
GMSARN	Greater Mekong Sub-region Academic and Research Network
gTKP	global Transport Knowledge Partnership
HDM4	Highway Development and Management Model
HQ	Headquarters
HRD	Human Resource Development
IFG	International Focus Group
IFRTD	International Forum for Rural Transport Development
ILO	International Labour Organisation
IRI	International Roughness Index
Km	kilometre
LCS	Low Cost Surfacing
LRD	Local Roads Division (DoR)
LVRR	Low Volume Rural Road
m	metre(s)
MCTPC	Ministry of Communication, Transport, Post and Construction
mm	Millimetre(s)
MERLIN	**M**achine for **E**valuating **R**oughness using **L**ow-cost **IN**strumentation
MPa	Mega pascals
MoU	Memorandum of Understanding

1 Introduction

1.1 General

The SEACAP 3 project is part of the wider South East Asia Community Access Programme whose strategic theme is 'livelihoods of poor and vulnerable people in South East Asia, improved sustainability'. SEACAP 3 will contribute to this overall objective through the development and mainstreaming of local resource-based standards for low volume rural roads. The project seeks to achieve three key outcomes:

- Mainstream appropriate local road standards and specifications into the national road programme,
- Develop an affordable and sustainable strategy for attaining the necessary road (all road categories) research capacity,
- Increase the awareness of good practice experience from this project by disseminating the outcomes at the national, sub-regional and international levels.

This report outlines the work undertaken on the SEACAP 3 project during September 2007; presents a summary of staff resources used and outlines the anticipated programme for the coming month.

1.2 Contractual Arrangements

The Agreement for the project to be undertaken was established under a Memorandum of Understanding (MoU) between the Ministry of Communication, Transport, Post and Construction (MCTPC) on behalf of the Government of Lao PDR and the Department for International Development (DfID), UK. The MoU defines the scope of the project, that it will be undertaken by TRL Limited as the Consultant and implemented under Terms of Reference, and that the Consultant will be appointed by DfID. The MoU also expresses certain Exemptions and Facilities to be provided by MCTPC to the Consultant to facilitate implementation of the project. The MoU was signed on the 16th October 2006.

Thereafter, TRL provided a comprehensive technical proposal and a financial proposal for carrying out the project to DfID and subsequently entered into a contractual arrangement with DfID. TRL were appointed on 21st November 2006. The duration of the project is 12 calendar months.

TRL is supported in its undertaking of the project by associate firms and by competent and experienced individual consultants. The principal associate firm is Lao Transport Engineering Consultants (LTEC) who are providing comprehensive local consulting services.

TRL have entered into a contractual agreement with LTEC to provide a total of 68 person months of services over the duration of the project. Forty-Four (44) person months are for engineering and translation services and 24 person months are for administrative, secretarial and coordination services.

The other associate firm is Intech Associates consulting engineers who have worked extensively with TRL on other SEACAP projects in the region. Intech will provide a short-term specialist role on this project similar to that to be provided by the individual consultants.

2 Work Undertaken

2.1 General

The following sections summarise the work undertaken on SEACAP 3 during September 2007. Principal focus was on Task Group 1 and Task Group 2, although progress was also recorded on the other two Task Groups. The Progress on individual Modules within the Project Task Groups is summarised in Table 1. Project meetings are summarised in Table 2.

In addition to defined project work the TRL-LTEC team also supplied technical support for the SEACAP Coordination Committee presentation at the SEACAP Practitioners' Meeting (SPM) in Hanoi from 12-13th September. Dr Cook (Team Leader) and Bounta Meksavanh (Local Team Leader) also made presentations at this SPM.

2.2 Task Group 1: Standards and Specifications

Work was centred on the drafting of the Standards and Specifications based on the key principles identified at the Review Workshop and in subsequent technical discussions. The principal focus during September was primarily on Document 1: LVRR Classification and Geometric Standards, although significant progress was also made on Document 2: LVRR Technical Specifications.

An Environmentally Optimised Design (EOD) approach, encompassing a spectrum of solutions from Spot Improvements to an appropriate whole road length design, is currently seen as the best framework for the practical application of these LVRR Standards. Key issues with respect to this strategy were raised at the SPM and presented in a subsequent meeting with the SIDA-BAC delegation to Cambodia. A copy of this presentation is included as Appendix A to this report.

2.3 Task Group 2: Training

Simon Done, the TRL Training Specialist, was mobilised on 3rd September and as Task Group Leader has been principally responsible for the drawing up the pilot training programme and commencing the drafting of the associated training materials. As part of the technical needs assessment visits were made to local roads and district offices in Vientiane and Borikhamxay provinces.

The structure and outline content for the proposed Training Modules was submitted to, and agreed by, the SCC. This structure is included as Appendix B to this report.

Andreas Beush was mobilised on 17th September and part of his remit is to support and advise on the pilot training programme. He also commenced a review of specific HRD problems associated with increasing engineering responsibility at district level as required by the current rural road "decentralisation" policy. He is also tasked with identifying potential support links between the new undergraduate Rural Road Engineering modules at the National University of Lao (NUoL) and the training needs of MCTPC

2.4 Task Group 3 Research Capacity

Andreas Beusch commenced a short review to identify key HRD issues specific to the Lao PDR and the MCTPC with respect to implementing current SEACAP research into practice and in particular identify any barriers to the mainstreaming and practical take-up of research outcomes.

2.5 Task Group 4: Dissemination

SEACAP 3 Technical Paper 2 on website recommendations was distributed to the SCC for comment. The translation of this Technical Paper into Lao was commenced. Andreas Beusch also encompassed some comments on the mainstreaming of the SEACAP 3 outputs and the identification of potential problems into his work on HRD Strategy.

Table 1 Summary of Module Progress

No.	Module Description	Completed	Programme	Activity in September 2007
Task Group I: Develop Standards and Specifications				
1	Review current situation	95%	100%	Minor updating of review
2	Research to fill knowledge gaps	100%	100%	Minor updating
3	Draft technical standards	80%	100%	Drafting of standards.
4	Finalise technical standards	0%	0%	No activity this month
Task Group II: Develop a Relevant Training Programme				
5	Training needs assessment	100%	80%	Assessments undertaken
6	Training programme elaborated	60%	75%	Programme agreed and drafting of materials commenced
7	Training course tested and trialled	0%	0%	No activity this month
Task Group III: Develop an Appropriate Research Capability:				
8	Gaps in research capacity identified	100%	100%	No activity this month
9	Strategy for strengthening research capacity	95%	100%	No activity this month
10	Adoption of strategy by MCTPC	50%	50%	Ongoing discussions with DoR and NUOL
Task Group IV: Initiate Dissemination				
11	Materials for Dissemination	30%	25%	Website structure set up and reporting

Table 2: Key Meetings, September

Date	Organisation	Key Personnel	Comment
04/09	LRD	Sengdarith Kattignasack (Director, LRD)	Introduction of Simon Done – training discussions
10/09	LRD	Sengdarith Kattignasack (Director, LRD)	Pilot Training
12/09	Vientiane Province	DCTPC,, OCTPC staff	Discussion on LVRR Standards and training
13/09	SCC	Laokham Somphet; Sengadarith Kattignasack;Dr. Maysy Viengvilay	Agree on Training Module structure
14/09	Borikhamxay Province	DCTPC,, OCTPC staff	Discussion on LVRR Standards and training
18/09	PAD (DOR) Swe-Road BAC	Khamphou Duangthanom (Director of PAD, DOR); Dick Jonsson (Team Leader); Belal Hussein	Cooperation Training
20/09	LRD	Sengdarith Kattignasack (Director, LRD)	Pilot Training
21/09	Swe-Road	Dick Jonsson (Team Leader)	Exchange of information on -raining and HRD – with Andreas Beusch
22/09	SIDA – Basic Access Component	Belal Hussein	Presentation by JRC on EOD to SIDA-BAC delegation visiting Cambodia
24/09	PAD (MCTPC)	Souvanny Ratanavong (DDG, Personnel Dept, MCTPC	Introduction of Andreas Beusch
25/09	LRD	Sengdarith Kattignasack (Director, LRD)	Pilot Training
26/09	NUOL	Nhinxay Visane	Introduction of Andreas Beusch

3 Staff Resources

A summary of the SEACAP 3 staff resources utilised in September 2007 is presented in the following Table 4.

4 Programme and Status

The SEACAP 3 programme is included as Appendix C to this report, together with a manning schedule for the remaining months of the programme.

Table 1 indicates that the project progress is generally satisfactory, although the drafting of the Standards and Specifications is utilising more resources and time than originally anticipated. The programme has been adjusted to accommodate some slight delay in this task.

The following points should be noted with respect to project work in the coming months

1. A first draft of the Standards and Specifications (Document 1 and 2) is expected to be completed in mid-October. A workshop is planned for 15th November to review this work
2. The SCC has requested a delay in the Pilot Training Course from mid October to late November. This is in order to avoid the joint World Bank-SIDA-ADB mission which is due to take place towards the end of October and to give time for the SEACAP 3 standards and specifications to be reviewed in draft-final form by the MCTPC before being presented as part of the pilot training course. TRL-LTEC supports this view and has made arrangements to comply with the request.
3. TRL-LTEC will support the SEACAP 17 workshop in Bokeo on 6th-8th November. Presentations will be made by Dr J R Cook (LVRR Standards and Specifications) and Rob Petts (Low Cost Structures Manual)

Table 4: Staff Resources September s

Name	Position	Project Time : September
Dr Jasper Cook (TRL)	Team Leader Geotechnical Specialist	1st -6th and 21st September (1)
Michael O'Connell (TRL)	Transport and Road Engineering Specialist and Deputy Team Leader	1st- 29 September
Simon Done (TRL)	Training Specialist	3rd- 30th September
Trevor Bradbury (TRL)	Dissemination and IT Specialist	No input this month
Andreas Beusch	Training and Research Reviewer	17th – 30th September
Bounta Meksavanh (LTEC)	Local Team Leader and Road Engineer Specialist	1st -30th September
Saysongkham Manodham (LTEC)	Road Engineering Specialist	1st -30th September
Somphit B (LTEC)	Training Support	1st -30th September
Mr. Keithiphan Senamahmountry (LTEC)	IT Support	1st -30th September
Mr. Bounhom K. (LTEC)	Translator	No input this month
Ms Chanthida Ph (LTEC)	Office Management	1st -30th September
Mr. Thipdavanh V. (LTEC)	Project Coordinator	1st -30th September

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APPENDIX A

Presentation to SIDA-BAC Delegation to Cambodia

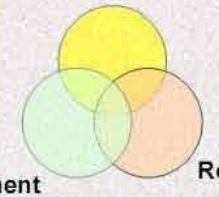
23rd September

Environmentally Optimised Design

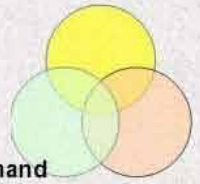
Its Role in Sustainable All Year Rural Access

Dr J R Cook
OtB-TRL

SUSTAINABLE RURAL ROADS: The Engineering Balance



SUSTAINABLE RURAL ROADS: The Economic Balance



An Appropriate Design Approach for Low Volume Rural Access

It is now appreciated that low volume rural roads tend to respond to the dominance of a range of factors, collectively know as the "Road Environment"

THE ROAD ENVIRONMENT

Regional Road Environment Issues

- Variable quality construction materials
- Very limited maintenance application – particular problem with a lack of any shape preservation
- High (frequently intense rainfall)
- Construction/supervision limitations
- Over-reliance on "one-club" designs

Environmentally Optimised Design (EOD)

Identifying and **applying** road designs that are specifically suited to the governing Road Environment factors.

This applies not only to pavement and surfacing but also to earthworks, slope protection, drainage and structure.

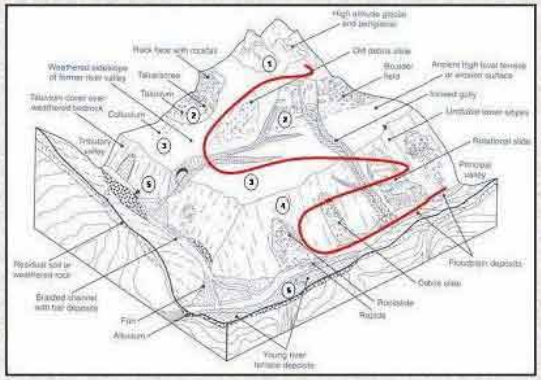
EOD for Low Volume Rural Access

EOD can be considered as the over-arching principle for a range of practical strategies for improving or creating low volume rural access – from dealing with individual critical areas on a road link (Spot Improvements) to providing a total whole rural link design (Composite Whole Road Design)

The EOD Spectrum

Spot improvement → **Composite Roads**

Strategy	Description	Impact
Composite Whole Road Design	Applying the principle of adapting designs to suit regional road environments at an individual road alignment scale.	Differing pavement, earthwork and drainage options to be selected in response to varying impacting factors along a whole road link. Hence a more focussed use of construction resources.
Spot Improvement	The appropriate improvement of specifically identified road sections either in actual need of upgrade or deemed to be at high risk of failure.	The appropriate application of limited resources to be targeted at key areas on existing earth or gravel road links to improve all year access.



Terrain-Road Interaction

Spot Improvement Solution

Spot Improvement Solution

Environmentally Optimised Design (EOD)

The application of EOD principles in finding a practical and sustainable solution to the problems of rural access in the region is a currently evolving process – as recently as last week the SEACAP Practitioners Meeting (SPM) identified some key issues.

SPM Discussion : EOD and Spot Improvements

- Why Spot Improvements?

Objective :

Within the context of upgrading to all year access: To solve identified and defined problems in a sustainable manner in conjunction with community concerns.

Key Issues: -1

- Clearly distinguish EOD (particularly Spot Improvement) applications from Routine, Periodic or Emergency Maintenance

EOD-Spots is **engineering based** – the root cause of problems are solved in an engineeringly correct manner

.

Periodic/Emergency Maintenance

Local (village) driven maintenance will address immediate concerns.

May actually cause gravel surface deterioration to earth condition rather than addressing underlying engineering problems

Key Issues-2

- Good engineering decision making required

Whilst the community should have a major input into identification of difficult or at risk areas, the definition of the underlying engineering problem and its solution requires engineering input.

Key Issues-3

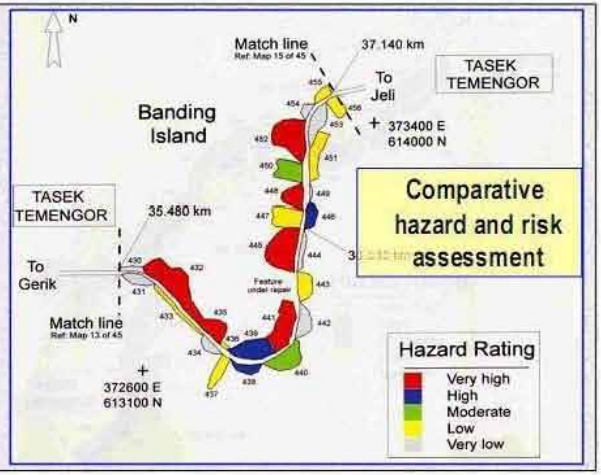
- Whole alignment corridor approach

Whilst problems may show themselves as a pavement surface failure or deterioration, the root cause may be above, below or beside the pavement.

Failure to address a down-slope failure issue – 3 times !!

An embankment height issue

A drainage issue



EOD Matrix Based on Terrain Sub-Units & Gradient

Road Cross Sections (To Be Developed)

Gradient (%)	Matrix of Possible Pavement, Earthwork, Slope Stabilisation & Drainage Options
<1	
1-3	
3-6	
6-9	
>9	

EOD : Summary

- Sustainable Rural Access
- Appropriate Design
- Targeting Resources
- Flexible Strategy

The EOD Spectrum: Summary

Spot improvement — Engineering Solution — Composite Roads

Responding to

Risk

Resource

The EOD Contribution

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APPENDIX B

Proposed Structure of the Pilot Training Course

SEACAP 3 LVRR Draft Training Modules

Outline Content

Module 1 LVRR Principles

1.1 LVRRs: definitions and needs

- LVRR definitions
- Need for Basic Access – a basic right and a trigger for development
- 11,000 km of rural roads required for 2020 poverty reduction target
- Working within a constrained budget
- Infrastructure-poverty links

1.2 The LVRR management framework

- Stakeholder involvement – OCTPCs and VMCs
- Need for a consistent framework within which all parties can work
- Community Roads and the Community Roads Committees
- The role of LRD

1.3 LVRR sustainability and the use of unsealed gravel

- Sustainable roads essential – budget and social implications if not
- Unsealed gravel problem – refer to SEACAP 4
- Often poor quality with no available alternatives
  - Unsuitable in high rainfall, steep slopes, etc
  - Low construction - high maintenance cost
  - Burden on local people- poverty implication
- Alternative to unsealed gravel – refer to Trials Programme

1.4 An appropriate approach to LVRR design

- Pragmatic approach based on road task
- Roads must be fit for purpose and sustainable
- The traffic- non traffic influences (figure)
- Approach must be suited application at OCTPC level
- The Road Environment concept -outline

1.5 LVRR Standards and Specifications

- Lao Road Design Manual –not aimed at LVRR- need something specific
- Outline Standards
- Outline Specifications- basic pavement options
- Accompanying guideline will supply background and advice

T

Module 2 Designing for the LVRR environments in Lao PDR

2.1 Road environment - uncontrollable and controllable factors

- Controllable factors; materials; climate; hydrology; terrain; sub-grade
- Controllable factors: Traffic; construction and maintenance regimes
- Discussion of the above impacts on sustainable LVRRs

2.2 Socio-economic issues and budget constraints

- Road safety issues in design of LVRR
- "Green Environment" issues
- Health – dust impacts
- Budget constraints – pavement costs plus other alignment costs

2.3 Design tools to suit the road environment

- Implications of low axle load –low traffic on LVRR design approach
- Standard vehicles
- Design tools available for Lao – pavement type and layer thickness
- Shoulders – key points
- Some other key issues : Sub-grade in soaked condition
  Crown height
  Tyre pressures

2.4 The simplified option approach for Lao LVRRs

- Simplified pavement design procedure required
- Five main options – describe
- Other options being trialled – discussion of likely candidates
- The sub-grade division – standard matrix sheets

2.5 Environmentally Optimised Design (EOD)

- The principle of variable road design
- Environmentally Optimised Design approach
- Examples of EOD in practice
- How EOD can be applied in Lao survey requirements

2.6 The Spot Improvement approach

- The principles of Spot Improvement
- The Spot Improvement approach
- Examples of Spot Improvement in practice
- How Spot Improvement can be applied in Lao –survey requirements

2.7 Whole Life Costs and Asset Management – the maintenance issue

- Definition of Whole Life Costs and Whole Life Asset Costs
- Implication for LVRRs and their management
- The cost of maintenance to the community
- Examples of Whole Life Asset Costing for Lao

Module 3 The LVRR design process

3.1 Introduction to a simplified decision based LVRR design process

- Present the overall decision tree and its aim
- Delivering sustainable access
- Need for simplified approach
- Importance of key information sets

3.2 Initial decisions on LVRR criteria and road geometry

- Does the proposed road fit into the LVRR envelope?
- Advice on decision making
- Actions if yes, qualified yes or no

3.3 Environmentally Optimised Design or a Spot Improvement

- Budget considerations
- Traffic or road environment decision
- Key information required
- Worked examples;

3.4 Construction materials assessment

- Importance of local material use
- General summary of materials likely to be available
- Advice on assessment of sources
- Options for use – modification of material – modification of design

3.5 Impact assessment of other Road Environment factors

- Refer to unsealed gravel flow chart (SEACAP 4)
- Examples of variation in Lao
- Summary of impacts
- Modification of controllable factors –construction training; maintenance

3.6 Option selection and pavement design

- The final option decision and its implications
- Use of the simplified pavement design charts
- The “Occasional Heavy Truck” option
- What to do if outside the norms
- Shoulder design

3.7 Earthworks

- Improved sub-grade
- Heightened embankment options
- Earthwork materials
- Link to slope design

3.8 Drainage and structures

- Principles of effective road drainage
- Necessity for effective drainage
- Refer to Low Cost Structures Manual
- Strong links to Spot Improvement

Module 4 Practical work

(to be detailed as Modules 1-3 developed)

4.1 Walkover surveys and visual assessment

4.2 Assessing sub-grade: the DCP

4.3 Construction materials – field assessment

4.4 Practical exercise

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APPENDIX C

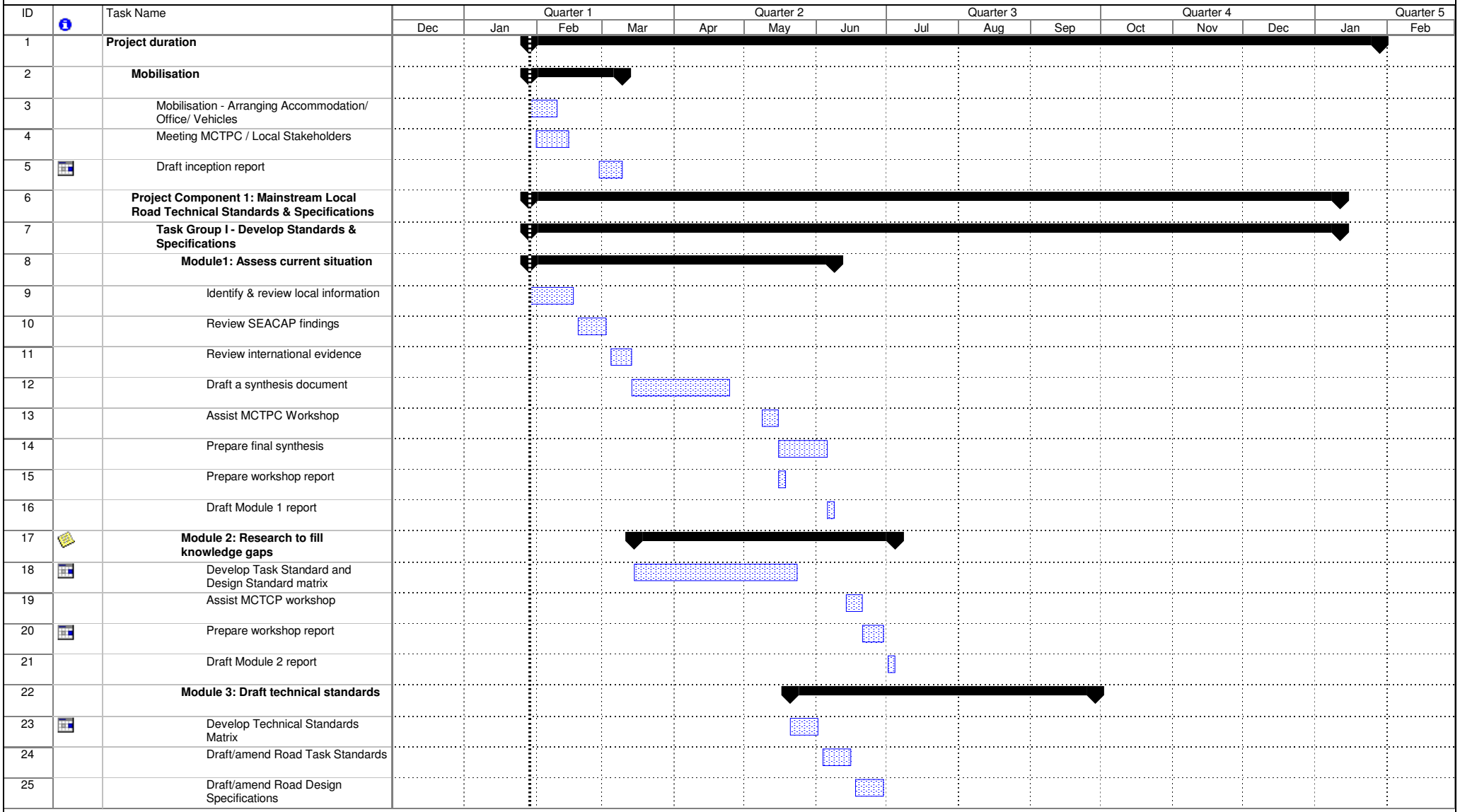
Programme

Schedule of Staff Inputs

		Project Months			
		Oct	Nov	Dec	Jan
J Cook	Team Leader				
M O'Connell	Deputy Team Leader				
S Done	Training Specialist				
R C Petts	Quality Review				
A Beusch	Training Specialist				
Akram Ahmedi	Research Capacity				
Bounta Meksavanh	Local Team Leader				
Saysongkham Manodham	Road Engineer				
Somphit B	Training				
Keithiphan S	IT Engineer				
Bounhom K.	Translation				
Chanthida Ph	Office Manager				
Thipdavanh V.	Project Coordinator				

SEACAP - 3

Mainstreaming appropriate local road standards and specifications & developing strategy for MCTPC research capacity

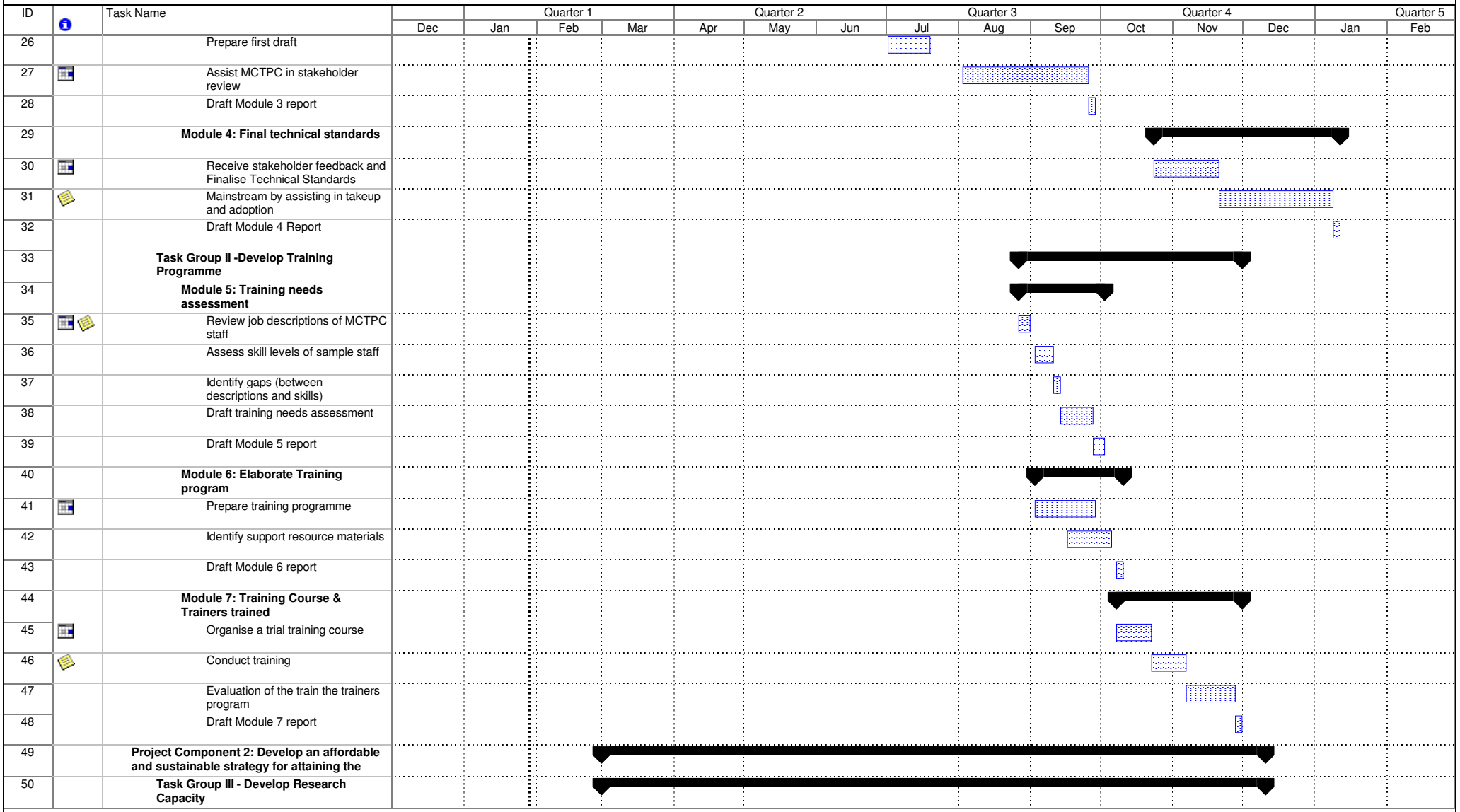


Project: SEACAP 03 - Lao PDR

Task	Summary	Rolled Up Progress	Project Summary
Progress	Rolled Up Task	Split	Group By Summary
Milestone	Rolled Up Milestone	External Tasks	

SEACAP - 3

Mainstreaming appropriate local road standards and specifications & developing strategy for MCTPC research capacity



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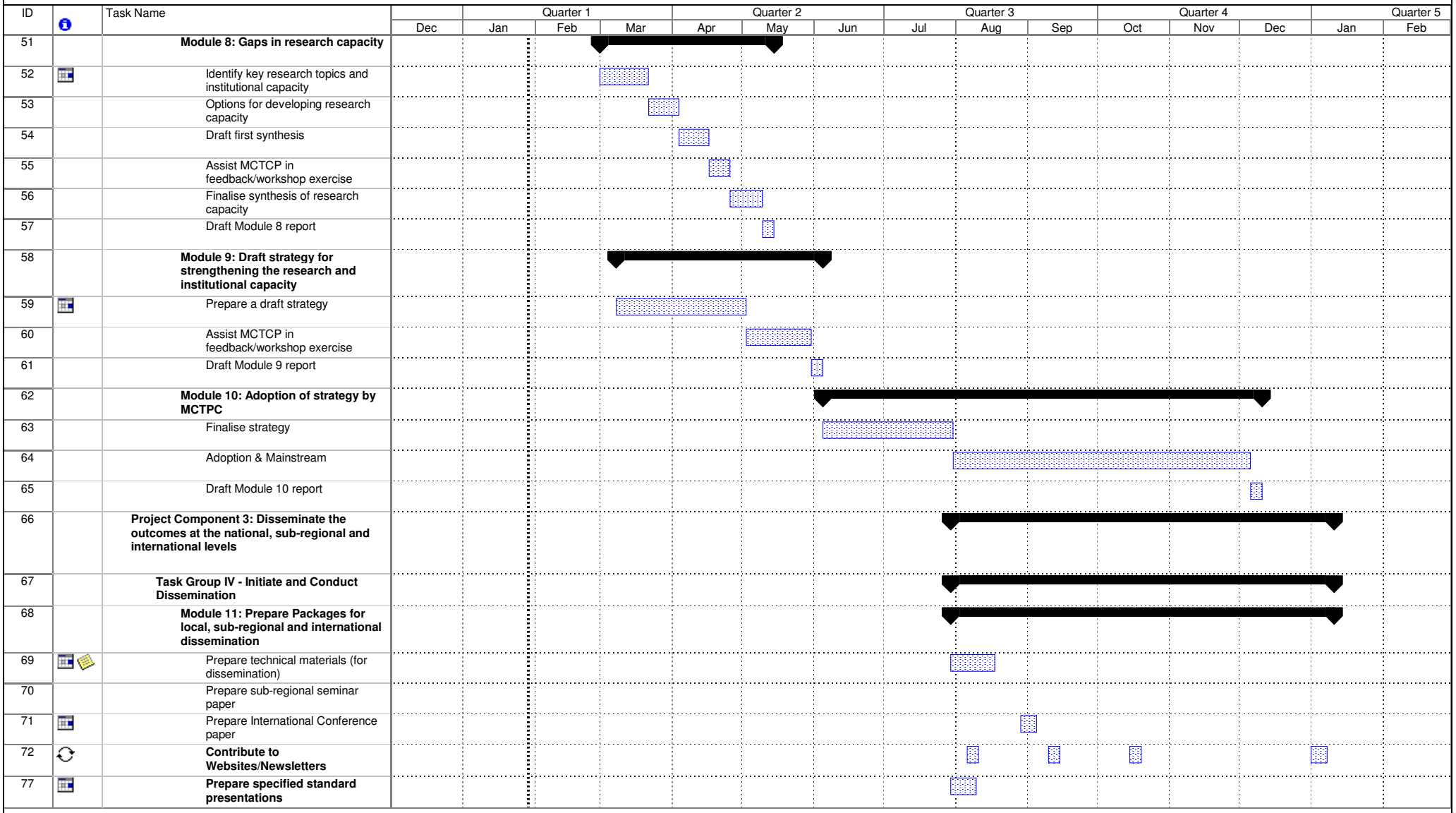
SEACAP - 3

Mainstreaming appropriate local road standards and specifications & developing strategy for MCTPC research capacity



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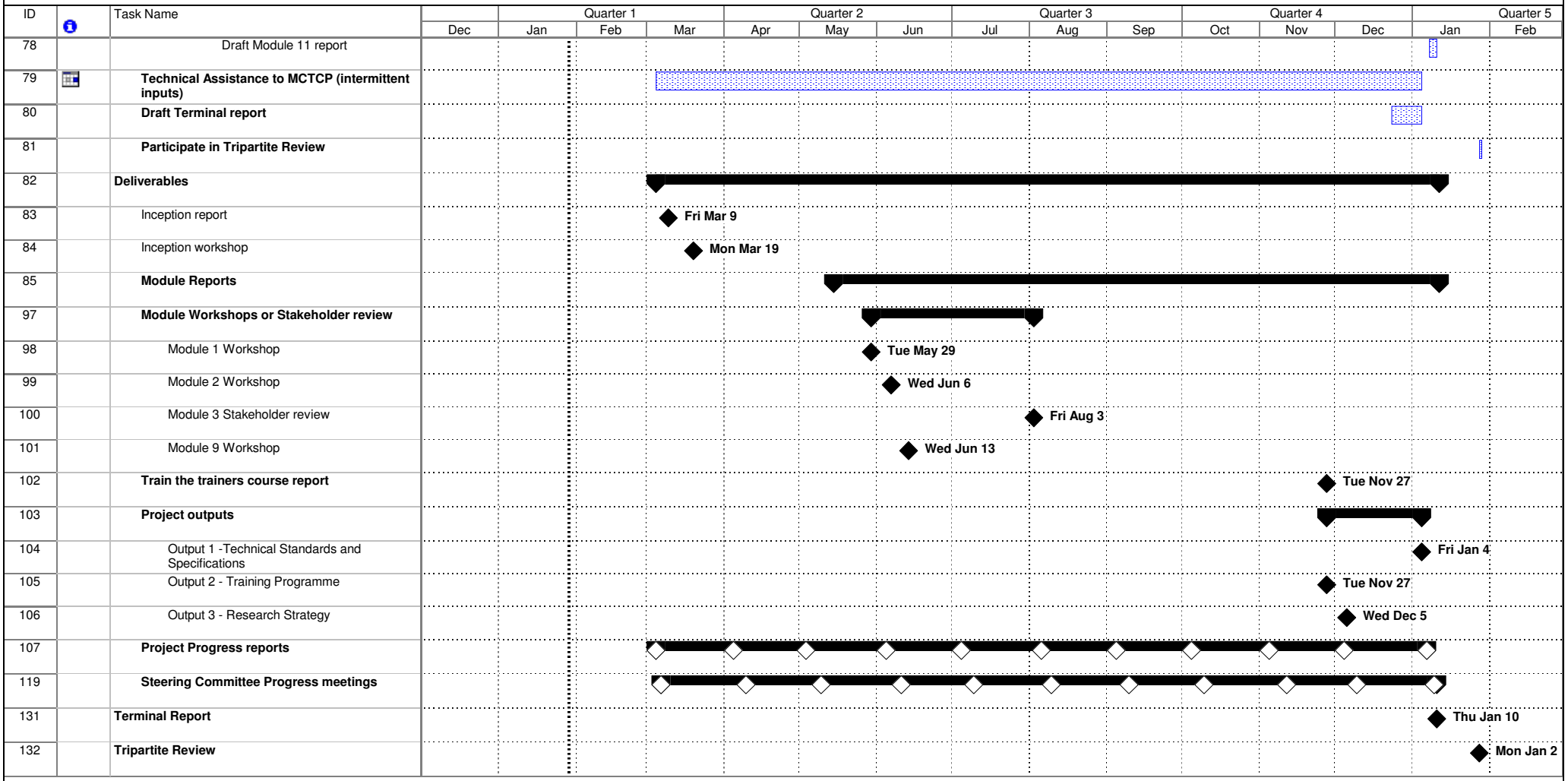
SEACAP - 3

Mainstreaming appropriate local road standards and specifications & developing strategy for MCTPC research capacity



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