The views in this document are those of the authors and they do not necessarily reflect the views of the Research for Community Access Partnership (ReCAP), or Cardno Emerging Markets (UK) Ltd for whom the document was prepared.

Cover Photo: Kabale – Kisoro Road in Uganda.  
(Source: Mott MacDonald)

<table>
<thead>
<tr>
<th>Version</th>
<th>Author(s)</th>
<th>Reviewer(s)</th>
<th>Date</th>
</tr>
</thead>
</table>
| 1.0     | K. Kelly  
M. Zuidegeest 
M. Vanderschuren 
O. Nnene  
D. Hughes | L. Sampson 
J. Cook | 31/05/2017 |
| 2.0     | K. Kelly  
D. Hughes  
O. Nnene | L. Sampson 
J. Cook | 27/06/2017 |

Acronyms: MM: Mott MacDonald; UCT: University of Cape Town; QUB: Queens University Belfast

Mott MacDonald,  
Mott MacDonald House,  
8-10 Sydenham Road,  
Croydon CR0 2EE,  
United Kingdom  
T +44 (0)20 8774 2000  
F +44 (0)20 8681 5706  
W www.mottmac.com

University of Cape Town  
Rondebosch,  
Cape Town, 7700,  
South Africa  
T +27 21 650 9111  
W www.uct.ac.za

ReCAP Project Management Unit  
Cardno Emerging Market (UK) Ltd  
Oxford House, Oxford Road  
Thame  
OX9 2AH  
United Kingdom
Abstract

The Transport Sector Leadership Development Programme (TSLDP) is being created to develop the technical and managerial capacity of mid-career African transportation professionals and assist them to effectively deliver Africa’s transportation infrastructure. This Programme Development Report, which is considered the equivalent of the Interim Report listed in the Terms of Reference, forms the third deliverable on the project and is intended to provide a summary of the findings of the needs assessment and the preferred structure and content of the programme to meet the learning objectives.

This report, in fulfilment of the requirements of the Interim Report, discusses the findings from the needs assessment and development of the course structure and content. The programme will likely need to be offered as modular Continuous Professional Development (CDP) course initially to fit within the necessary implementation timelines.

The more desirable option for course structure and delivery in the longer-term is a 2 year Professional Masters degree. The proposed degree would be a Joint Degree offered by two or more Universities and delivered modularly. There would be approximately 7 modules, split between technical and managerial/leadership content, with the final module being a research project and dissertation. There would be an estimated two weeks contact time at university and six weeks working from home country for each module.

Key words

Transport Sector Leadership Development Programme, capacity building, training, leadership, transport infrastructure, gender balance

RESEARCH FOR COMMUNITY ACCESS PARTNERSHIP (ReCAP)

Safe and sustainable transport for rural communities

ReCAP is a research programme, funded by UK Aid, with the aim of promoting safe and sustainable transport for rural communities in Africa and Asia. ReCAP comprises the Africa Community Access Partnership (AfCAP) and the Asia Community Access Partnership (AsCAP). These partnerships support knowledge sharing between participating countries in order to enhance the uptake of low cost, proven solutions for rural access that maximise the use of local resources. The ReCAP programme is managed by Cardno Emerging Markets (UK) Ltd.

See www.afcap.org
Acknowledgements

Acronyms, Units and Currencies

ADB  Asian Development Bank  
AfDB  African Development Bank  
AfCAP  Africa Community Access Partnership  
ARMFA  African Road Maintenance Funds Association  
ASANRA  Association of Southern African National Road Authorities  
AsCAP  Asia Community Access Partnership  
BEng  Bachelor of Engineering  
BSc  Bachelor of Science  
BTECH  Bachelor of Technology  
CIHT  Chartered Institution of Highways and Transportation  
CPD  Continuous Professional Development  
DFID  Department of International Development  
ECSA  Engineering Council of South Africa  
EU  European Union  
GIS  Geographic Information System  
HVT  High Volume Transport (DFID funded Programme)  
ICE  Institution of Civil Engineers  
IELTS  International English Language Testing System  
IRF  International Roads Federation  
IS4DP  Infrastructure Skills for Development Programme (DFAT funded Programme)  
JBM  Joint Board of Moderators  
L&D  Learning and Development (Mott MacDonald)  
MBA  Master of Business Administration  
MEng  Master of Engineering  
MPfE  Managing People for Excellence  
MSc  Master of Science  
ReCAP  Research for Community Access Partnership  
SAICE  South African Institution of Civil Engineers  
SSA  Sub-Saharan Africa  
TSLDP  Transport Sector Leadership Development Programme  
TPP  Transport Planning Professional  
UCT  University of Cape Town  
UK  United Kingdom (of Great Britain and Northern Ireland)  
QUB  Queens University Belfast
Contents

Abstract 3
Key words 3
Acknowledgements 4
Acronyms, Units and Currencies 4

Executive Summary 8
Optioneering 8
Option Selection 12
Programme Content and Delivery Structure 12
Costs 13
Candidate Selection 14
Stakeholder Workshop 14

1 Introduction 15
1.1 Project Background 15
1.2 Aims 15
1.3 Objectives 16
1.4 Summary of Previous Phases and Report Purpose 16

2 Needs Assessment 17
2.1 Background 17
2.2 Objective 17
2.3 Scope of the assessment 17
   2.3.1 Assessment Findings 18
   2.3.2 Analysis 22
   2.3.3 Graduate Profile and Curricular Requirements 22
2.4 Conclusion 23

3 Current Sub-Saharan Africa Curricula Review 24
3.1 Introduction 24
3.2 Methodology 24
3.3 Country Summaries 27
   3.3.1 Ethiopia 27
   3.3.2 Kenya 30
   3.3.3 Uganda 33
   3.3.4 Zambia 36
   3.3.5 Sierra Leone 40
   3.3.6 Cameroon 40
   3.3.7 Malawi 42
   3.3.8 Tanzania 43
   3.3.9 South Sudan 46
   3.3.10 South Africa 47
   3.3.11 Democratic Republic of Congo 51
   3.3.12 Ghana 53
   3.3.13 Liberia 55
   3.3.14 Nigeria 57
   3.3.15 Mozambique 59
3.4 Country Comparison 62
   3.4.1 Collaborations/Partnerships 62
   3.4.2 Existence of CPD programmes 63
   3.4.3 Ranking of Institutions at the Regional Level 63
   3.4.4 Transport Curriculum Content 64
3.5 Conclusion 65

4 Gap Analysis 66
4.1 Introduction
4.2 Institution of Civil Engineers

5 Course Optioneering

5.1 Overview
5.2 Review of Educational / Qualification Options
5.1 Review of Options Considering Delivery and Implementation
5.1.1 Option 1 – Do minimum (use existing MSc courses)
5.1.2 Option 2 – CDP courses (use existing CPD courses, both technical and leadership)
5.1.3 Option 3 – Bespoke CDP courses (both technical and leadership)
5.1.4 Option 4 – Modular Masters Degree
5.1.5 Option 5 – Masters Degree in Transport Leadership

6 Proposed Options for TSLDP

6.1 Overview
6.2 Option 1: CPD
6.3 Option 2: Professional Masters delivered as a Joint Degree

7 Programme Content

8 Indicative Costs

8.1 Option 1: CPD Programme
8.2 Option 2: Professional Masters Degree

9 Candidate Selection

9.1 Basic Entry Requirements
9.2 Motivated Candidates
9.3 Gender Balance and Diversity
9.4 Preliminary Scoring Matrix

10 Additional Components

10.1 Gender Balance
10.2 Mentoring
10.3 On-the-Job Training
10.4 Sustainability

11 Stakeholder Engagement Update

11.1 General
11.2 Stakeholder Workshop

12 Programme for Next Phase

13 Summary

13.1 Optioneering
13.2 Option Selection
13.3 Programme Content and Delivery Structure
13.4 Costs
13.5 Candidate Selection
13.6 Stakeholder Workshop

Appendix A: Exemplar Course Summary

Tables

Table 0-1: Review of TSLDP Options
Table 0-2: TSLDP Implementation and Cost Chart
Table 0-3: Topic/Module Content
Table 3-1: Surveyed institutions in Ethiopia
Table 3-2: Surveyed institutions in Kenya
Table 3-3: Surveyed institutions in Uganda
Table 3-4: Surveyed institutions in Zambia
Table 3-5: Surveyed institutions in Sierra Leone ................................................................. 40
Table 3-6: Surveyed institutions in Cameroon................................................................. 41
Table 3-7: Surveyed institutions in Malawi................................................................. 43
Table 3-8: Surveyed institutions in Tanzania ................................................................. 44
Table 3-9: Surveyed institutions in South Sudan ........................................................... 47
Table 3-10: Surveyed institutions in South Africa ......................................................... 48
Table 3-11: Surveyed institutions in the Democratic Republic of Congo .............. 52
Table 3-12: Surveyed institutions in Ghana ................................................................. 54
Table 3-13: Surveyed institutions in Liberia ................................................................. 56
Table 3-14: Surveyed institutions in Nigeria ................................................................. 58
Table 3-15: Surveyed institutions in Mozambique ..................................................... 60
Table 4-1: Respondents from the UK (based on ICE survey) .................................. 69
Table 4-2: Respondents from outside the UK (based on ICE survey) .................. 69
Table 5-1: Summary of TSLDP Qualification Options ................................................... 71
Table 7-1: TSLDP Course Modules .............................................................................. 79
Table 8-1: International fee per 180 Credits degree (in GBP) .................................. 82
Table 9-1: Draft Scoring Matrix for Candidate Selection ......................................... 84

Figures

Figure 3-1: Software and laboratories availability at the 5 out of the 31 surveyed Ethiopian universities ................................................................. 29
Figure 3-2: Software and laboratories availability at 4 out of the 6 surveyed Kenyan universities ...... 33
Figure 3-3: Software and laboratory Availability in surveyed Ugandan universities ..................... 36
Figure 3-4: Software and laboratories availability in surveyed Zambian universities ..................... 39
Figure 3-5: Software and laboratories access in institutions of Cameroon ......................... 42
Figure 3-6: Software and laboratories availability in surveyed universities in Tanzania ..................... 46
Figure 3-7: Software & laboratories availability in surveyed universities in South Africa .................. 50
Figure 3-8: Industry/academic collaborations in higher education institutions across Selected SSA Countries ................................................................. 62
Figure 3-9: CPD Programme offering .............................................................................. 63
Figure 3-10: Country ranking of institutions ........................................................................ 64
Figure 3-11: Country Comparison of Transport curriculum content ..................................... 65
Figure 4-1: Gap in existing courses required for a balance transportation leadership curriculum ...... 67
Figure 5-1: Review of Options and Corresponding Implementation Timelines ................................ 74
Figure 6-1: CDP Course Content/Structure ...................................................................... 77
Figure 7-1: Bloom’s Taxonomy of Learning Progression ............................................... 80
Figure 12-1: Project Programme Updated to Reflect Stakeholder Workshop at IRF Conference Namibia ........................................................................................................ 88
Figure 13-1: TSLDP Implementation and Cost Chart ....................................................... 90
Executive Summary

The Transport Sector Leadership Development Programme (TSLDP) aims to develop an educational programme which supports the development of future transport industry leaders in Sub-Saharan Africa. In November 2016, Mott MacDonald and the University of Cape Town were contracted by the Research for Community Access Partnership (ReCAP) to undertake Phase 1 of the TSLDP.

The project concept was developed between ReCAP and the Association of Southern African Road Agencies (ASANRA). During concept phase, the programme aims and objectives were defined and the key components established. These included a balance between road infrastructure and transport services content, in addition to gender balance and ensuring the project catered for all sub-Saharan Africa, rather than just the Southern Africa region.

So far, Phase 1 has concluded that there is a need to develop mid-level transportation professionals and support them in becoming the next generation of industry leaders. Research undertaken in the inception stage, and reported in the Inception Report and Status Report, identified that there is a prevalence amongst tertiary institutions for delivery of transport engineering courses, often with lesser focus on transport services. From a technical perspective, future leaders within the transport profession should have a broad understanding of the various components which make up the highway transport network and delivery of highway infrastructure. This requires an understanding of the contributions made by different disciplines and professions.

Management and leadership content is often not included in the existing course content, at least not to a significant extent, and would require the completion of a separate course. Interestingly, a survey undertaken as part of the development of this report identified that almost 60% of respondents (out of 75 total) identified the need to improve their managerial and leadership skills as key to their development.

At this stage, no similar course to that proposed for the TSLDP has been identified elsewhere. Future leaders need a broad skillset which crosses technical knowledge and management and leadership skills, with the ability to lead teams and effectively communicate ideas. Currently, there appears to be a lack of courses which offer these together.

The information discussed in this document will be taken forward to the Stakeholder Workshop, which is being held as part of the IRF 2nd Africa Regional Conference in Windhoek, Namibia on 13th July 2017. The purpose of the workshop is to present these findings and the ideas for the TSLDP moving forward. The aim is to generate an interactive discussion and receive important feedback from industry and potential future candidates about the suitability and feasibility of the proposed programme options.

Optioneering

Several options for addressing skills and knowledge gaps have been reviewed. These include Research Masters degrees, full and part-time Masters degrees, double degrees and CPD courses. A qualitative assessment of which options are likely to satisfy the learning needs, provide a meaningful output and not be excessively onerous in terms of time or cost input for the candidate or other sponsors has been undertaken. This information is summarised in Table 0-1 overleaf.
<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Summary and Conclusion</th>
</tr>
</thead>
</table>
| 1   | Continuing Professional Development (CPD) courses | Key topics delivered as CPD courses and could be at various locations       | • Fits within the preferred timescales identified by candidates (e.g. 1-2 weeks travel at a time).  
• Fits within the preferred timescales identified by ReCAP for implementation.  
• Could be done remotely through online courses.  
• Lowest cost option.                                                                                                     | • Unlikely to achieve the required learning outcomes as candidates will only get an overview of each topic.  
• Many CPD courses do not include assessments, so potential for lack of motivation to learn the course content — i.e. no risk of failure.  
• Creates a risk of the course not being taken seriously by candidates and becomes considered 'a perk' and an opportunity to travel.  
• No qualification at the end of the process so limited value.  
• Unlikely to be able convert or contribute credits towards a degree retrospectively.  
• Unlikely to offer value for money — i.e. Degree option maybe more expensive but gives a recognised qualification.                                                                 | • Fits within the timeframes available both from a candidate and ReCAP perspective.  
• However, it lacks on the quality of its learning outcomes and candidates are unlikely to benefit from it to the same extent as a formal degree course.  
• No qualification on offer, just CPD hours.  Unlike to benefit candidates in the long-term and course risks becoming seen as a perk and opportunity to travel, rather than a career-improving programme.  
• Whilst it would be the lowest cost option, its value for money is considered poor given the limited benefits and lack of a recognised qualification. |
| 2   | Full-time Masters degree                     | Full-time Masters degree course delivered and accredited by one University    | • Meets learning requirements (may only be partially achieved depending on degree; see disadvantages)                                                                                                     | • Expensive.  
• Onerous in terms of time input from candidates as it requires full-time attendance at University (also adds to expensive if payment of accommodation costs etc. is required).  
• No existing degrees offer the breadth of content required so would need more than one course or a new degree to be developed.                                                                                                              | • Expensive and onerous on candidates who would have to combine it with full-time jobs.  
• Employers may be unlikely to release candidates of mid-level seniority for the time required.  
• No existing degrees cover all the learning needs, so more than one course or a new degree would be required. |
| 3   | Part-time Masters degree                     | Part-time Masters degree course delivered and accredited by one University    | • Meets learning requirements (may only be partially achieved depending on degree; see disadvantages)                                                                                                     | • Expensive.  
• Lacks flexibility in its delivery (i.e. unlikely to be modular) so candidates may need to attend University 1 or 2 days per week, adding significant travel costs.                                                                 | • Expensive, particularly if a lot of travel is required, but less onerous on candidates than the full-time option.  
• Lack of modularity may mean candidates need to attend University regularly (i.e. once or twice per week). |
<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Summary and Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Research Masters degree</td>
<td>Research-based degree course delivered and accredited by one University</td>
<td>• n/a</td>
<td>• No skills transfer.</td>
<td>• Focusses in detail on a small topic, so will not cover the breadth required by this programme.</td>
</tr>
<tr>
<td>5</td>
<td>Two-thirds Research degree</td>
<td>Variant on the above delivered and accredited by one University</td>
<td>• n/a</td>
<td>• No skills transfer.</td>
<td>• Focusses in detail on a small topic, so will not cover the breadth required by this programme.</td>
</tr>
</tbody>
</table>
| 6   | Joint Degree                  | Module based Masters degree delivered by two or more Universities and accredited by one of them | • Meets learning requirements.  
• Provides an international perspective by including modules at international universities.  
• Takes advantage of the strengths of different universities across the various disciplines.  
• Can be delivered part-time and modularly to make participation easier for candidates.  
• Timeframe can be extended from 2 years to 3-4 years if the candidate requires for personal or financial reasons.  
• Networking opportunity for candidates at each module. | • Expensive, but less than a full-time degree where permanent university presence would be required.  
• Some administrative work required at the outset to setup the agreements between the universities involved. For this reason, there is a benefit in keeping the number of university partners low to simplify this process, at least to begin with. | • Offers a recognised qualification which can benefit from the strengths of various Universities, including those outside SA and SSA.  
• Flexible delivery which is module based and can be adapted to suit candidates needs.  
• Costly but less than a full-time or part-time Masters.  
• Better value than spending money on CPD hours for high-level training and no qualification. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Summary and Conclusion</th>
</tr>
</thead>
</table>
| 7   | Double Degree | Module based Masters degree – two degrees delivered by two Universities (i.e. degree obtained from both) | • Meets learning requirements.  
• Provides an international perspective – i.e. can include modules at international universities.  
• Takes advantage of the strengths of different universities across the various disciplines.  
• Can be delivered part-time and modularly to make participation less onerous.  
• Timeframe can be extended from 2 years, to 3 or 4 years if the candidate requires due to personal or financial circumstances. | • Expensive, but less than a full-time degree where permanent university presence would be required.  
• Increases administration difficulty as two universities involved in awarding degrees, rather than just one awarding university under the Joint Degree option.  
• Not an option in some countries, e.g. South Africa. | • Offers similar benefits to the Joint Degrees above.  
• Administration input is greater as two Universities each give a degree for the course.  
• Not available in all countries. |
Option Selection

A major constraint on the implementation of the programme is time availability. As shown in the chart below, developing and implementing programmes of this nature, in particular when they are accredited and/or qualification-giving, can take at least 2 years. This time is required to develop the programme and take it through the necessary accreditation processes within tertiary institutions for the setting up of new courses.

However, there is a need to have a programme in place before the end of ReCAP in 2020. The option that fits this timescale involves running TSLDP as a CPD programme. In the longer-term, for sustainability and benefit to candidates, it is likely that the programme should continue development into a Masters degree giving programme – whether it is a bespoke or a modular part-time MSc.

Programme Content and Delivery Structure

Initially the programme will need to be delivered through a series of CPD courses, which will need to be run through existing tertiary institutions, private training organisations or professional institutions. The proposed topics are shown in the table below and these mirror those required under the Degree option. The difference between the CPD and Degree option is the topics will be covered in less detail and there is usually no requirement for coursework, projects or a final dissertation under the CPD programme.

For the Degree course, this can be delivered over a two year period with approximately 4 modules in each academic year. Given the modular set-up of the programme, this could potentially be extended.
to 3-4 years, if candidates required this timeframe. It is anticipated that each module would require approximately 2 weeks contact time at the University and 6 weeks working from the candidate’s home country on projects and other coursework. Several key disciplines have been identified to form the TSLDP module structure, which are summarised in the table below.

<table>
<thead>
<tr>
<th>Module</th>
<th>Module Content Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electives</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Transport/Technical | Route selection; geometric design; junction design; pavement and materials engineering; drainage design; equitable road space design (i.e. considering all road users); importance of design coordination between disciplines; low-volume rural roads; safe road design; public space design.  
*Project: CAD-based design project. |
| Road Engineering | Whole system design (i.e. complexity of running a transport system); non-motorised transport and operations; public transport design and operations; traffic engineering; traffic management and control; traffic safety (i.e. accident rates, reporting and education); road user behaviour.  
*Project: traffic simulation modelling problem-based project. |
| Transport Systems | Transport policy and legislation; transport institutions; drivers for change (i.e. national policy, finance availability etc.); gender bias/hidden agendas/corruption; urban and rural planning; land use planning; demand/supply analysis (i.e. travel demand modelling).  
*Project: GIS problem-based project based on travel demand modelling. |
| Transport Policy | Road asset management; road maintenance strategies; road maintenance funding mechanisms; HDM 4 (and others).  
*Project: road asset management systems problem-based project (e.g. HDM 4). |
| Asset Management | Sustainable development; sustainable development goals (SDG); New Urban Agenda; environmental impact assessment including climate change; social impacts; economic impacts.  
*Project: Transport impact assessment. |
| Project Assessment | Project funding (IFI’s etc.); project appraisal; cost-benefit analysis; multi-criteria analysis; sustainable livelihood approach; appropriate technology (e.g. labour-based construction); GIS/visualisation.  
*Project: Problem-based project around project appraisal. |
| Project Procurement | Introduction outlining what being a transportation leader is about; best practice; critical thinking; systems thinking; ethical behaviour; complexity and uncertainty around large projects; sustainable development goals (SDG) and governance.  
*Project: case study on the above linking development with transport. |
| Effective Leadership | Talent management; situational leadership; coaching skills; skilful and effective communication and collaboration; mapping motivation; gender awareness and diversity training; performance management.  
*Project: event based around team-working. |
| Management and Mentoring | Risk and uncertainty analysis; project programming; financial accounting/budgeting/costing; project lifecycle assessment; contracts and change control; quality control; resource management; health and safety; project administration and reporting.  
*Project: Problem-based project around programming, resourcing and costing. |
| **Leadership/Managerial** | |
| Leadership/Managerial | Introduction course on research methods and knowledge management, including evidence-based decision making; summary course on statistics.  
*Project: Topic to be confirmed by candidates but to be based on a subject from TSLDP |
| Research Project | |

* Not required as part of a CPD programme.

**Costs**

For the CPD programme, the cost is expected to be in the region of GBP 29,000 per candidate, which covers an estimated GBP 14,000 in course fees and GBP 15,000 in travel costs.

For the Degree course option, it is recommended that TSLDP be offered on an ‘Executive’ basis given the target candidates the course aims to capture. Running a course on this basis, and charging Executive fees, means the cost will be higher. However, the higher fees permit the Universities to
offer a better experience, which can include engaging external industry experts as guest lecturers and the costs of accommodation, meals and stationary etc. This will likely make the course more attractive to prospective candidates, particularly given they are mid-level/senior professionals, rather than the conventional student base.

Given the nature of the joint degree in TSLDP, the final course fees may be an average of the fees charged by the different institutions - if based in UK/international and South Africa, a preliminary estimate would be GBP21,000 in tuition fees. Given the modular and international nature of the proposed programme it is expected that, on top of the tuition fees, about GBP 15,000 in travel, accommodation and subsistence will be needed for each participant, with a total investment of GBP 36,000 for the degree delivered on an ‘Executive’ basis. This is compared to GBP 30,500 for a standard offering.

**Candidate Selection**

A draft scoring matrix has been developed and is shown in the main report. The purpose of this is to define criteria against which candidates can be evaluated and help ensure the best candidates, who are likely to become future leaders, are selected. This will be tested in the next stages of the project before being finalised, to ensure it provides logical results in candidate selection.

**Stakeholder Workshop**

The Stakeholder Workshop has been confirmed to take place at the IRF 2nd African Congress in Windhoek, Namibia on the 13th July 2017. The proposals outlined above will be put forward to the stakeholders for feedback, with a view towards this finalising the recommendations to go into the Final Report, currently scheduled for submission in September 2017.
1 Introduction

1.1 Project Background

Transport infrastructure is a vital driver of national economic development, facilitating the movement of goods, services and people both nationally and internationally. However, as highlighted by the World Bank\(^1\), Africa remains the least connected region in the world.

Decision makers, professional service providers and contractors across sub-Saharan Africa (SSA) face the growing challenge of reducing this connectivity deficit on a local, national and international scale. These challenges require innovative, motivated and technically capable leaders who can effectively manage and deliver infrastructure projects within this environment.

Industry leaders understand the broader picture when it comes to coordinating the concept, planning, design and construction of infrastructure projects. However, it is being observed that often this technical and managerial capacity is lacking, particularly when it comes to experience and ability to deliver large and complex projects.

This project was originally conceived in association with the Association of Southern Africa National Road Authorities (ASANRA). ASANRA recognised the leadership issues within the industry and promoted this project as a means of developing professionals within the sector. The initial concept was developed to:

- Focus on both transport services and transport infrastructure;
- Include East and West Africa, as recognising the importance of this opportunity, these regions requested that they were included.

These concerns were bought on board for the development of the Transport Sector Leadership Development Programme (TSLDP). It is expected that the programme will encompass both transport infrastructure and transport services and should be deliverable across sub-Saharan Africa.

Whilst it is recognised that ReCAP generally focuses on rural road infrastructure, technical and managerial leaders are required across the transport profession, and requiring co-ordination with the wider transport sector for sub-Saharan Africa. With this in mind, it is anticipated that this programme will also co-ordinate with the proposed UK Department for International Development’s (DFID) High Volume Transport research programme once it commences.

1.2 Aims

The aim of the TSLDP is to provide a sustainable leadership development educational programme that can be expanded into the whole of sub-Saharan Africa. The project will be implemented in three phases:

1. **Phase 1 Planning and Scoping (i.e. current phase):** includes a review of options, development of appropriate programmes and preparation of an implementation plan including a candidate selection procedure and budget.

2. **Phase 2 Selection of Participants:** call for applications and screening through a series of aptitude tests and other selection criteria.

3. **Phase 3 Implementation:** implementation and management of customised development programmes for each participant, including project administration, monitoring and evaluation.

The specific aims of Phase 1 are as follows:

Transport Sector Leadership Development Programme

- Development of a business plan and budget for implementation that should include:
  - An appropriate management structure
  - Competency streams and curricula for the programme
  - Development of an application and selection process for participants
  - Monitoring and evaluation criteria
  - Action plan for implementation
- Identification of appropriate professional bodies and tertiary institutions for accreditation
- Identification of regional structures that will drive and sustain the TSLDP in the future

1.3 Objectives
There are five core objectives outlined in the Terms of Reference (ToR). These are as follows:

1. Research: whilst not a specific research project in itself, research projects may be included as part of the curricula to develop skills.

2. Capacity building: important to ensure sustainable continuation of this project and ReCAP overall aims and objectives once the ReCAP programme ends.

3. Knowledge exchange: develop the ability to communicate knowledge and ideas effectively through interventions like technical reporting and paper writing, giving presentations, managing and presenting at stakeholder workshops, developing and presenting training courses and how to review and assess technical papers.

4. Uptake and embedment: monitoring and evaluating the uptake and embedment of skills throughout the programme. The output from the TSLDP should be a group of forward thinking, confident and competent early career professionals for the roads and transport sector in sub-Saharan Africa (SSA). They will become role models to other young professionals and be able to influence the development of future generations.

5. Gender Balance: this is a key element of the project, with a focus on trying to address the issue of gender balance and the increased participation of female professionals in the technical leadership of the transport sector in SSA.

1.4 Summary of Previous Phases and Report Purpose
The project commenced in November 2016 with an Inception Meeting at the University of Cape Town. Since then, the Inception Report and Status Report have been submitted in January and February 2017 respectively. These documents identified the needs basis for the project and set out the methodology for how the project would proceed.

Work undertaken so far indicates that there is a need for this programme and it appears that there is no similar educational programme currently on offer elsewhere in Africa or the UK. Research done in the initial stages has identified that many courses in Sub-Saharan Africa tend to focus on the engineering elements of transport infrastructure provision, with transport services, policy and governance getting less coverage. This is a key gap which will need to be addressed in TSLDP.

Similarly, there are few leadership and managerial programmes available to candidates within SSA. A survey undertaken as part of this phase of the project has shown that 60% of respondents identify this stream of TSLDP as the key area for their development (rather than strengthening of their technical knowledge base).

This has informed development of the programme to this point, and as will be seen in this report, the design of the programme structure and content for delivery.
2 Needs Assessment

2.1 Background
Following on from the literature review undertaken during the inception period, it is found that most Sub-Saharan African countries itemise capacity building and knowledge transfer as one of the strategic needs of the transport sector in their local context. However, documentary evidence shows that in the face of overwhelming transport infrastructural deficit and limited economic resources, these governments often prioritise direct investment in infrastructure over capacity building of the personnel that are responsible for the planning, management, design and maintenance of the same infrastructure.

While, both infrastructure and personnel play very crucial roles, the latter should be given equal priority. It is often the case that transport sector policies in SSA are developed and implemented by professionals who for the most part, are well-grounded in their technical (read: engineering) disciplines, but often lack the requisite leadership and managerial skills to drive the vision and strategic goals of the sector. This has consequently led to the poor implementation levels of transport policies/projects and the attendant wastage of enormous funds that are budgeted for these projects.

Obviously, there are other factors that limit the development of the SSA transport sector, ranging from corruption; to a lack of understanding outside the sector of the need for activities such as land-use integration, transport planning and service delivery; operations policy and planning; and other relevant and related topics that transcend the direct provision of infrastructure.

However, it is paradoxical that the most important issue is given the least attention, since it is obvious that the future development of the transportation sector in Africa, squarely depends on the competence and aptitude of the younger generation of professionals in the sector. Therefore, the status quo needs to be re-thought, and more time and resources dedicated to the continuous professional development and capacity building of these professionals, with a particular focus on leadership skills.

This section presents a needs assessment of the demand for technical, leadership and managerial skills in the transport infrastructure and services sector within sub-Saharan Africa. The gaps between existing and desired conditions are determined following a systematic process involving questionnaires, interviews, online surveys and a literature review - in this case the discrepancy between desired knowledge and skills of mid-career, mid-level, professionals in the sub-Saharan African transport sector; and actual knowledge and skills (as offered in national tertiary education).

2.2 Objective
The specific objective of this needs assessment is to provide a way to understand the current programmes and training available, and what gaps exist relating to the deficiency in technical, managerial and leadership knowledge in the transport sector in sub-Saharan Africa. The knowledge acquired from the exercise will then be leveraged to design a sustainable transport leadership development programme, which will equip early career and mid-level managers in the sector, with requisite skills beyond their technical expertise, that will enable them to successfully manage the sector in the coming decades.

2.3 Scope of the assessment
The assessment was carried out across all the countries participating in the ReCAP TSLDP within the SSA region. It involved internationally acceptable research methods, and a literature review of existing policy documents on capacity building in sub-Saharan African transportation sector. The following activities were carried out:
Transport Sector Leadership Development Programme

- Literature review
- Online survey of experts drawn from both civil engineering and the transportation sector.
- Identification of curricular requirements for the ideal leader
- Gap Analysis
- Survey of relevant academic curricula in Africa

The literature review is presented in this chapter, with the other activities reported in chapters 3 through 7 of this programme development report.

2.3.1 Assessment Findings

Transportation plays a crucial role in the development and socio-economic growth of a nation. As an agency of economic integration, transport infrastructure and services constitute a basic condition for enabling trade and the movement of people, goods and services. To this end, the transport sector remains a powerful means of accessing national and regional trade in a radically changing global environment, with a view to fast-tracking growth and lowering poverty in SSA.

The detailed literature review conducted under this project reveals that the continent is clearly lagging in the development of regional trade, particularly because of the poor state of its transport infrastructure.

The points discussed below are summarised from the reviewed documents such as: UN, ECA Committee on Trade, Regional Co-operation and Integration (6th Session; 2009, Oct. 13-15, Addis Ababa, Ethiopia); ASANRA Strategic plan 2014-2019 and United Nations, Economic Commission for Africa (2005-04-16), African review report on transport, Addis Ababa Ethiopia. Further inputs were also received from experts at the International Road Federation (IRF), and the Association of Southern Africa National Road Authorities (ASANRA). These issues describe the broader needs in the transport sector of SSA, and they are highlighted as follows:

- **Poor transport network connectivity and state of infrastructure**: In SSA, transport networks are known to have several missing network links within each country and between countries, which compels a significant percentage of the rural population to live without access to essential economic and social services. Along, with the problem associated with the various modes of transport, a large proportion of the existing infrastructure is aging and in a poor state.

- **Lack of full appreciation for the connection between transport infrastructure design and service planning**: The transportation specialisation in Africa is still highly skewed towards the design and construction of infrastructure that supports private car ownership, without giving due attention to the complexities and intricacies of the planning and management of multi-modal transport systems, and the impact transport has on people, communities and the environment. This problem is evident both in the academia and practice, as university undergraduate civil engineering curricula are drawn up with little or no recourse to for example public transport or non-motorised transport policy and planning, without even discussing the design and construction principles of the same. On the other hand, transportation experts in both the public and private sectors again focus on infrastructure rather than transport system operational planning and design. This lack of appreciation for transport planning and operations, means that transport services have often been considered a self–managed system which happens only after infrastructure has been provided. However, with the growth problems like traffic congestion in large urban centres and road safety, it has become evident that a complete awareness of these often-neglected disciplines are critical...
to the provision and operation of viable and sustainable multi-modal transport both in an urban and rural context.

- **Insufficient human and institutional capacity:** Although the number of workers in African public transport enterprises and agencies is relatively high, the availability of skilled leaders is limited. In addition to the lack of adequate skilled human resources, institutions are also lacking appropriate powers and technical capacity to formulate, plan, and manage infrastructure development and services and to regulate and enforce policies and regulations.

- **Lack of mentorship and training for mid-level engineers:** The cadre of senior professionals, both national and international, in the roads sector is nearing (or has reached) retirement in many countries in the region. This includes international consultants who have devoted much of their lives to working in Africa. The next generation of SSA technical experts and managers is not emerging in sufficient strength to take their place and to cope with the increasing challenges of managing the sector, and there are no formal machineries in place for young professionals and future leaders in roads and transport to benefit from the experience of their senior colleagues. Hence, as part of ASANRA’s strategic plan 2014-2019 to develop human capital through structured programmes, the association endorsed this project as a medium for young professionals and future leaders to learn from the experiences of their older colleagues, thereby, emerging as capable leaders and professionals within the sector.

- **Disconnect between the industry and academia:** Civil engineering syllabuses in universities are strong in civil engineering theory, but pay very little attention to entrepreneurship and leadership which are often the skills required to succeed in the industry. In this way, they produce graduates / young professionals that are ill prepared to respond to the challenges of the transportation sector and to positively influence the sector. This issue is also exacerbated by the lack of adequate internship opportunities, through which young professionals can experience the work environment before graduation.

- **Limited opportunities for continuing professional development in the work environment:** Generally, there is a lack of sufficient well-defined mentorship programmes to assist the young professional’s transition into the job when they are first hired. Furthermore, with a heavy focus on design and construction of transportation infrastructure, there remains very few avenues for capacity building opportunities such as workshops, webinars and training for agency staff. Lastly the current work environment makes it difficult for primary stakeholders involved in transportation to interact and network outside of specific projects. These primary stakeholders are basically agency staff, consultants, contractors and staff of multilateral development partners. The status quo where interaction between groups of professionals is limited, means that a window of opportunity is lost for these primary stakeholders to engage early in their careers and keep this relationship strong as their careers progress. Finally, compounding this hurdle is the perception that careers of agency staff stagnate while private sector transportation professionals quickly move up the ranks, making long term bonding even much harder.

- **Insufficient funding:** The availability of funds also play a very crucial role as stakeholders admit they cannot take advantage of leadership training opportunities when agencies have insufficient funds to support these opportunities.

- **Insufficient regional interaction:** When considered in a regional context, barriers due to geographical and language constraints inhibit African transport professionals from reaching out to other groups on the continent that could assist in leadership development schemes.

---

2 ASANRA Strategic plan 2014-2019
These groups could be the lead transport national or regional transport bodies that are already well acquainted with leadership development

- **Lack of support of transport related policies and programmes by key stakeholders outside the transport sector:** The inability to effectively communicate with stakeholders outside the transport sector, such as community leaders; decision-makers; other professionals; and members of the community who directly interact with transportation systems and the effects of policies, means that transport professionals are not able to get the maximum buy-in and necessary political support from these stakeholders for programmes in the sector.

In addition to the highlighted needs above, the preliminary results obtained from an ongoing online survey conducted among experts drawn from the civil engineering and transport sectors in sub-Saharan Africa, reveal that there is a need for a capacity building programme, specifically designed for transport experts on the continent, especially one focused around leadership and management, but which also has a solid grounding in such disciplines with obvious knowledge deficiencies, such as transport policy and planning; transport systems analysis; transport operations planning; land use planning; road safety and others that are critical to the effective management of the sector in Africa. A summary of the initial results collated from the responses of about 71 participants surveyed (by May 2017) shows that:

- 62 percent of the participants agree that leadership skills are more relevant to prepare a transport professional for effective management of the sector.
- 51 percent think that leadership and managerial components are the most important aspects of the proposed Transport Sector Leadership Development Programme.
- 85 percent have little or no skill in transport planning, urban and regional planning, land use planning, and transport modelling.
- 82 percent have little or no skills in transport policy planning and governance.
- 75 percent have little or no skills in project impact assessment.

In response to the issues highlighted above, especially those that affect capacity building, knowledge acquisition and professional career development of transport experts in SSA, there has been some attempt by different national, regional and international stakeholders to address the challenges. These efforts are discussed in the following paragraphs.

With regards to African countries, the United Nations embarked on two transport and communication decades in Africa 1978-1988 and 1991-2000 (United Nations Economic Commission for Africa). These included the United Nations Transport and Communications Decade in Africa (UNTACDA-I), which was launched in 1978. The second decade programme, UNTACDA-II, was launched in 1991 with the long-term objective of establishing an efficient and integrated transport and communications system as the basis for the physical integration of Africa. Out of the 708 projects approved, 466 projects had been fully or partly implemented by 2000.

Still in the United Nations Economic Commission for Africa, another programme along these lines is the sub-Saharan Africa Transport Policy Programme (SSATP) Poverty Reduction and Transport Strategy Review (PRTSR) underway in many countries, which is helping to integrate transport planning within poverty reduction strategies, and has the potential to serve as a tool for policy development in all aspects of the transport sector. Eighteen member countries of the SSATP, including Burkina Faso, Central African Republic, Ethiopia, and Gambia, that were added in 2007, had completed their PRTS reviews and started work on implementing the recommendations of the reviews by the end of 2007.

---

3 UN, ECA Committee on Trade, Regional Cooperation and Integration (6th Session; 2009, Oct. 13-15, Addis Ababa, Ethiopia)
Some SSA countries have also taken steps to develop their transport sectors. In Central Africa, the Democratic Republic of Congo (DRC), Mali, Malawi, Rwanda and Senegal, the review proposals shaped the way transport was perceived as part of poverty reduction strategies. While in other countries, the sensitisation process initiated the demand for updating transport strategies in response to the changing development environment that currently feature the millennium development goal objectives. DRC, Ethiopia, Lesotho, Malawi, Mali and Zimbabwe completed preparation of their transport sector policy documents and master and investment plans by 2007, while Benin, Burkina Faso, Cameroon, Central Africa, the Niger, Senegal, Tanzania and Uganda, started to draft their policy documents in the same year. However, a review of these efforts devoted to improving the transport sector, shows that the existing transport infrastructure and services are still far from enabling Africa to achieve socio-economic development and integration. Clearly, one important item that is missing in the above mentioned developmental efforts is the aspect of developing holistic human capacity building programmes to facilitate the training, mentorship and adequate equipping of young engineers to take over the enormous responsibility of managing SSA’s transport sector from their senior colleagues. Despite the fact some work has been done in this regard, such as establishment and restructuring of road agencies through enhancing the capacity of local governments to co-ordinate rural transport infrastructure and services effectively, these efforts have barely been adequate and have mostly lacked continuity. With this realisation and that of the crucial role capable leaders will play in successfully piloting the affairs of the transport sector, both in terms of infrastructure and services, there seems to be a shift in policy by key stakeholders such as country government transport agencies, regional transport bodies and international development agencies, towards developing well rounded programmes designed to equip young engineers with managerial, leadership and technical skills needed to successfully take the sector forward. Instances of such efforts are ASANRA that has captured human capacity development as one of their strategic goals in their 2014-2019 strategic plan and are aggressively driving this goal in collaboration with the ReCACP programme. Another case of such investment in training and mentoring potential leaders is the Infrastructure Skills for Development programme (IS4D). The IS4D programme by Australia Africa Partnerships Facility (AAPF), in collaboration with New Partnership for African Development (NEPAD) adopted a short, work-based, action learning programme designed to equip professionals working in public sector agencies with the project management competencies required to initiate and oversee key infrastructure projects, especially the Priority Action Projects [PAPs] that form part of the Programme for Infrastructure Development in Africa [PIDA]. The action learning model, which is the foundation of the IS4D programme, involves the participants in a process of activity and reflection that requires them to analyse the project, identify obstacles or bottlenecks, and develop strategies to ensure the successful completion of the project or project stage. Participants are supported in this process by being provided with access to:

- Individualised support from an experienced technical mentor
- A peer-to-peer support group or learning set
- Online, accredited project management training delivered by an Australian provider
- Short-term training on specialised topics, such as negotiation skills, infrastructure financing and leadership skills

---

5 Australia Africa Partnerships Facility, Activity Progress Report, Infrastructure Skills for Development, Q1, January-March 2015.
**Transport Sector Leadership Development Programme**

- Experiential work placements with, and shorter term visits to, organisations undertaking tasks related to the participants’ work based projects

To date, IS4D has been supported by the Australia-Africa Partnerships Facility [AAPF] through donor funding supplied by the Australian Government.

### 2.3.2 Analysis

Despite the consensus about the need to ramp up human capacity development efforts and programme formulation in the transport sector, it is not entirely clear what the content of such courses should be or which is the best way to deliver them. With the obvious limitation of a scheme, such as IS4D being its restriction to project management and project delivery, there is an obvious need to conceptualise the components of a programme which is designed to equip a transport professional with the necessary skills to lead the whole spectrum of transport infrastructure and services. Such an exercise will create a profile or picture of the desired leader and the curricular requirements that can transform them from just mid-level managers to world class, innovative and highly competent leaders who will drive the growth of the transport sector in the coming decades.

To answer some of the questions raised about the profile of the ideal transport leader and the curricular requirements of the programme that will equip him/her, with a transport leadership profile and curriculum requirements are postulated in the next section. The transport leadership profile is based on the documents and programmes review, expert opinions of the project team and an international curriculum review.

### 2.3.3 Graduate Profile and Curricular Requirements

The profile of the desired professional or ideal leader for the future of the transport sector in SSA is one who:

- Is technically sound in various facets of transport engineering across all land-based modes and users;
- Understands the complexities of planning transport infrastructure and services within the built environment;
- Appreciates the impacts of transport decision-making and is able to assess them;
- Is capable of managing complex projects throughout the project life cycle;
- Is able to envision a future for the transport sector in Africa, and lead, inspire and mentor others towards this vision.

For this to be possible, the potential leader must have an appreciation of many of the following knowledge areas or disciplines:

- Transportation engineering in the civil engineering curriculum (geometric design, drainage design, pavement and materials engineering, Safe road design, Computer Aided Design etc.)
- Transportation systems and operations in the civil engineering curriculum (such as, traffic safety, traffic simulation, whole system design and traffic management and control)
- Transport policy and planning in the civil engineering curriculum (for example, land use planning, road user behaviour, gender issues, as well as urban and rural planning)
- Asset management in the civil engineering curriculum (road maintenance strategies, road asset management systems, geotechnical asset management and pavement asset management, among others)
Transport Sector Leadership Development Programme

- Impact assessment in the civil engineering curriculum (sustainable development, as well as social, economic and environmental impacts)
- Project management components in the civil engineering curriculum (such as, risk and uncertainty analysis, financial accounting, project life cycle assessment and quality control)
- Project assessment in the civil engineering curriculum (project appraisal and project funding), project procurement in the civil engineering curriculum (tendering, procurement and forms of contract (BOT, PPP, design and construct)
- Leadership components in the civil engineering curriculum (technical communication, effective leadership in transport, critical and systems thinking, as well as governance) and management and mentoring in the civil engineering curriculum (talent management, situational leadership, coaching and performance management)

2.4 Conclusion

This section has described the status quo of the transport sector in sub-Saharan Africa, highlighting some trends in the sector today, including efforts by country governments, international development organisations and other stakeholders to improve the sector. A clear need emerges to focus more on human capacity building, as a significant factor in the success of investment in the sector. The success of any programme is only guaranteed by the quality of personnel driving it, and the level of knowledge at their disposal. This has been developed into a transport leader profile for comparison against the following surveys of academic and professional institutions in sub-Saharan Africa, forming a gap analysis of areas that needs to be addressed in the development of the TSLDP curriculum.
3 Current Sub-Saharan Africa Curricula Review

3.1 Introduction
In this section, a review of Civil Engineering and Transport leadership programmes in Africa was carried out by surveying existing Civil Engineering / Transport courses offered in institutions of higher education across Sub-Saharan Africa. For the purposes of this assessment universities in 15 countries were selected to provide a suitable representation of across the wider sub-continent. This section of the report presents the methodology of the survey as well as the key findings.

3.2 Methodology
To make an inventory of existing relevant courses in transport and/or leadership, UCT recruited 12 students / researchers to survey existing courses in the ReCAP partner and supported countries by means of a web and phone-based survey. The students / researchers were either nationals of the various countries or have worked extensively in these countries to ensure:

- They are familiar with key tertiary education institutes in the countries
- They have relevant contacts
- They speak the local language

Data from the following countries is presented:

- Ethiopia
- Kenya
- Uganda
- Zambia
- Sierra Leone
- Cameroon
- Malawi
- Tanzania
- South Sudan
- South Africa
- Democratic Republic of Congo
- Liberia
- Ghana
- Nigeria
- Mozambique

The inventory for each country was conducted based on the following checklist:

1. Programme:
   - Civil engineering
   - Transport studies
   - Urban and regional planning/town planning
• MBA
• Other relevant programmes

2. Degree options per programme

3. Continuous Professional Development (CPD)
• Exists for the profession
  o Yes
  o No

4. Accreditation
• National
• International

5. Collaboration (programme level)
• National
• Regional
• International

6. Laboratory facilities
• Pavement
• Traffic
• Geotechnical
• GIS

7. Computer facilities (department level)
• Proprietary software
  o ArcGIS
  o AutoCAD
  o HDM4
  o SPSS
• Blended learning facilities (faculty/university level)
  o Video-conferencing
  o Broadband internet (reliability)

8. Library facilities
• Online access to major civil engineering journals
• Libraries
  o Engineering
  o Planning
  o Business

9. Student population
Transport Sector Leadership Development Programme

• Total
• Local
• African
• Non-African

10. Curriculum details

• Curriculum roadmap
• Courses
  o Electives (free or list)
• Course content
• Course credits

11. Staff (in relevant programme)

• Number
• Number of PhD holding staff
• Number of PhD students
• International staff

12. Ranking (university)

• QS ranking
  o Africa
  o Global
• Times Higher Education
  o Africa
  o Global
• Shanghai Ranking
  o Africa
  o Global

13. Ranking (programme)

• QS ranking
  o Africa
  o Global
• Times Higher Education
  o Africa
  o Global
• Shanghai Ranking
14. Transport expertise in other programmes

- As claimed by staff of relevant programmes.

The outcome of this desktop study enables us to give an overview of the relevant courses in the partner countries and allow the identification of gaps in tertiary education.

3.3 Country Summaries

3.3.1 Ethiopia

Data regarding civil engineering/transport programmes in Ethiopian higher institutions was collected from the Higher Education Office at the country’s Federal Ministry of Education and the Educational Management Information System Office. The data relates to the last academic year (2015/2016 G.C). Additional data was collected from the universities website.

Ethiopian public universities are all nationally accredited for all their available programmes. Hence, universities can start a new programme only after getting approval from Ministry of Education (MOE). Higher Education Curriculum Quality Assurance Office (Quality inspecting office in MOE) perform several assessments on the programme to be started with respect to the national demand of the programme graduates so as to minimise risk of unemployment. Besides, the minimum expectation of laboratory equipment, library resources and other student support materials will be inspected before the office approves the programme of any requesting public university. But private universities request accreditation to a new programme after running the programme for some time.

Ethiopian universities share the same harmonised curriculum for each of the programmes, which are accredited by MOE Curriculum Quality Assurance Office. For example, Highway Engineering I and II are taken by all undergraduate civil engineering students in all universities with a civil engineering programme. The International accreditation issue is not yet dealt by MOE. Hence, it is difficult to say programmes of any Ethiopian university are internationally accredited. (High emphasis is given to accreditation of programmes at national level but the international accreditation issue is out of the scope/concern of MOE).

Table 3-1 below presents some institutions in Ethiopia and their respective civil engineering/transport programmes offered while, Figure 3-1 shows the availability of necessary software and other learning at the institutions.
<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia</td>
<td>Ethiopia Civil Service University</td>
<td>Urban Development &amp; Engineering</td>
<td>BSc. (Urban Planning); MSc. (Urban Transport Planning &amp; Management); PhD. (Urban Mobility, Infrastructure Planning &amp; Management)</td>
<td>Higher Education Relevance and Quality Agency</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leadership &amp; Governance</td>
<td>MSc Leadership and good governance</td>
<td>Higher Education Relevance and Quality Agency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>International Leadership Institute</td>
<td>MTLC</td>
<td>MSc. Transformational Leadership and Change</td>
<td>Higher Education Relevance and Quality Agency</td>
<td>University of Greenwich of London</td>
</tr>
<tr>
<td>Addis Ababa</td>
<td>Addis Ababa Institute of Technology</td>
<td>Addis Ababa Institute of Technology</td>
<td>BSc. Civil Engineering; MSc Roads &amp; Transportation Engineering</td>
<td>Higher Education Relevance and Quality Agency</td>
<td>Ethiopia Roads Authority; Ministry of Transport; New Mexico state, University of Cape Town</td>
</tr>
<tr>
<td></td>
<td></td>
<td>College of Business and Economics</td>
<td>Executive MBA</td>
<td>Higher Education Relevance and Quality Agency</td>
<td></td>
</tr>
<tr>
<td>Mekelle University</td>
<td>Ethiopian Institute of Technology, Mekelle</td>
<td>Ethiopian Institute of Technology, Mekelle</td>
<td>BSc. Civil Engr, MSc, Roads &amp; Transport Engr.</td>
<td>Higher Education Relevance and Quality Agency</td>
<td>Ethiopian Road Fund; Ethiopian Road Authority; Korea International Cooperation Agency (KOICA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>College of Business and Economics</td>
<td>MA in Community development and leadership Master of Business Administration</td>
<td>Higher Education Relevance and Quality Agency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hawassa University</td>
<td>BSc, MSc, Civil Engr</td>
<td>Higher Education Relevance and Quality Agency</td>
<td>Ministry of Urban Devt. &amp; Construction</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-1: Software and laboratories availability at the 5 out of the 31 surveyed Ethiopian universities

From the sample of 31 universities offering programmes in Civil Engineering with the highway / transport component, this chart shows the proportion of the schools that have GIS, Geotechnical, Pavement and Traffic studies labs. While over 90% of the institutions reportedly have GIS lab and facilities, less than 10% of the institutions have dedicated labs for traffic studies and pavement. Also, from the figure, almost all
the institutions reportedly have AutoCAD and SPSS software available for students and staff. However, less than 15% of these institutions have HDM4 software.

3.3.2 Kenya

Data collection was carried out at the various institutions of higher learning in Kenya using internet searches, email queries and phone interviews. Engineering programmes in the country are mainly offered in public universities and four out of the six institutions offering civil engineering and transport related programmes were surveyed (See table 3-2 below). Figure 3-2 shows the availability of necessary software and other learning at in the institutions.
<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya</td>
<td>University of Nairobi</td>
<td>Engineering</td>
<td>BSc, MSc, PhD Civil Engr With highway and transportation engr components Associate Degree</td>
<td>Engineers Board of Kenya; Commission for University Education</td>
<td>Jomo Kenyata University; John Hopkins University, USA; National Taiwan Technical University, Taiwan; Technical University of Applied Sciences - Wildau, Germany.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>School of Business</td>
<td>Engineering</td>
<td>BSc, MSc, PhD Civil Engr With highway and transportation components Diploma &amp; Associate Degree in Civil Engr</td>
<td>Engineers Board of Kenya; Commission for University Education</td>
<td>Makerere University, Uganda; University of Dar-es-Salaam, Tanzania; Delft University of Technology, The Netherlands; Free University of Brussels, Belgium; Universitatet fuer Bodenkultur Vienna, Austria; University of Paris 6, France.</td>
</tr>
<tr>
<td>Moi University</td>
<td>School of Engineering</td>
<td>Engineering</td>
<td>BSc, MSc, PhD Civil Engr With highway and transportation components Diploma &amp; Associate Degree in Civil Engr</td>
<td>Engineers Board of Kenya; Commission for University Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School of Business</td>
<td>Engineering</td>
<td>BSc, MSc, PhD Civil Engr With highway and transportation components Diploma &amp; Associate Degree in Civil Engr</td>
<td>Engineers Board of Kenya; Commission for University Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kenyatta University</td>
<td>School of Engineering and Technology</td>
<td>BSc Civil Engr Diploma, Civil Engr</td>
<td>Commission for University Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School of Business</td>
<td>Engineering</td>
<td>BSc Civil Engr Diploma, Civil Engr</td>
<td>Commission for University Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kenya University</td>
<td>School of Business MBA (Entrepreneurship) Executive MBA</td>
<td>Commission for University Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Institution</td>
<td>College/Faculty</td>
<td>Programme &amp; Qualifications</td>
<td>Accreditation</td>
<td>Existing Collaboration(s)</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------</td>
<td>--------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Jomo Kenyatta University of Agriculture &amp; Technology</td>
<td></td>
<td>BSc, MSc, PhD Civil Engineering With highway and transportation components BSc Land Resource planning Master of Business Administration</td>
<td>Engineers Board of Kenya; Commission for University Education</td>
<td>Masinde Muliro University of Science and Technology, Kenya; Athi River Mining Company.</td>
<td>Pennsylvannia State University, USA; K.S. Rangasamy, College of Technology, India.</td>
</tr>
</tbody>
</table>
From the data collected, about 80% of the institutions reportedly have pavement, geotechnical and GIS laboratories, while 67% have laboratories for traffic studies. The survey also showed availability of AutoCAD and GIS software in all the institutions but none of the institutions have access to HDM4 package.

3.3.3 Uganda

Uganda has 11 public universities with Makerere University as the oldest (since 1922) and largest institution in the country. The other public universities are relatively new, mostly opening after the
education sector was liberalised in 2000. Further, over 30 private universities in various regions of the country were opened. With regard to data collection, information was initially accessed from the internet to develop a list of candidate universities and other basic data e.g. contacts of individual at the universities, courses offered and number of students. The contact details specified on the websites were for key individuals in universities e.g. vice chancellors, university registrars and deans of faculties. The initial form of contact was by email, with subsequent follow up interviews by telephone.

Most of the universities in Uganda are study-area specific, mainly offering courses in humanities, business and health sectors. In the determination of universities to include in this survey, the study mainly targeted public universities, i.e. eight universities (70%) and three other private universities with the civil engineering course were selected. It was confirmed that Makerere had the largest number of students (about 40,000), Kyambogo (about 25,000) and Uganda Christian University (about 10,000). The other universities are relatively small with student populations less than 5000. Only two public universities i.e. Makerere and Kyambogo have civil engineering and transport related courses offered in the 4th year (civil engineering is a four-year course). Mbarara University of Science and Technology mostly a health science and information technology university, will begin the civil engineering and transport related courses in August 2017. The three selected private universities have civil engineering and Transport related courses offered in the 4th year except Muteesa 1 Royal University which is yet to include transport courses in the civil engineering programme. Makerere University is also the highest-ranking university in Kenya at 11 (Africa) and 1037 (World) according to webometrics global ranking. Besides Mbarara University of Science and Technology at 77 (Africa) and 3057 (World), all the other universities are above the 100 (Africa) and 5000 (World) mark.

Table 3-3 below, shows the three key universities with civil engineering and transport programmes in Uganda, while Figure 3-3 shows the availability of necessary software and other learning at in the institutions. The survey also revealed that quite a good number of industry collaborations exist at the department at the local level.
<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uganda</td>
<td>Makerere University</td>
<td>College of Engineering, Design, Art &amp; Technology</td>
<td>BSc Civil Engineering</td>
<td>Uganda National Council for Higher Education; Uganda Institution of Professional Engineers.</td>
<td>-Ministry of Works -Innovation systems &amp; Clusters Programme Swedish government (SIDA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>College of Business and Management Sciences</td>
<td>Master of Business Administration</td>
<td>Uganda National Council for Higher Education</td>
<td></td>
</tr>
<tr>
<td>Kyambogo</td>
<td>Engineering</td>
<td></td>
<td>BSc Civil engineering MSc Civil Engr. (Transportation &amp; Highway Engineering)</td>
<td>Uganda National Council for Higher Education; Uganda Institution of Professional Engineers.</td>
<td>-Ministry of works.</td>
</tr>
<tr>
<td></td>
<td>School of Management</td>
<td></td>
<td>Master of Business Administration</td>
<td>Uganda National Council for Higher Education</td>
<td></td>
</tr>
<tr>
<td>Uganda</td>
<td>Christian University</td>
<td>Science &amp; Technology</td>
<td>BSc Civil &amp; Environmental Engineering.</td>
<td>Uganda National Council for Higher Education;</td>
<td>-Ministry of Works and Transport. -Uganda National Road Authority</td>
</tr>
<tr>
<td></td>
<td>Faculty of Business &amp; Administration</td>
<td></td>
<td>Master of Arts in Organisational Leadership and Management</td>
<td>Uganda National Council for Higher Education</td>
<td></td>
</tr>
</tbody>
</table>
3.3.4 Zambia
Currently there are about thirty Zambian universities split between public and private institutions, of which two are listed on the top 200 Universities in Africa: University of Zambia, ranked at number 76; and the Copperbelt University, ranked at number 188. The desk study was carried out to identify institutions offering civil engineering and transport related programmes.
From all these universities, only the University of Lusaka is understood to have a transport course (Bachelor of Logistics and Transport). Only six out of the total Universities offer an MBA programme. These are University of Zambia, Copperbelt University, University of Lusaka, Copperstone University, Cavendish University and Mulungushi University. Civil Engineering is only offered at three of the universities listed above. These are University of Zambia, Copperbelt University and Mulungushi University. From the research, no universities were found to offer Urban or National Planning courses. Table 3-4 below shows the surveyed institutions, while Figure 3-4 shows the availability of necessary software and other learning aids in the same.
## Table 3-4: Surveyed institutions in Zambia

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zambia</td>
<td>Mulungushi University</td>
<td>School of Science, Engineering &amp; Technology</td>
<td>BSc, Civil Engineering</td>
<td>Higher Education Authority of Zambia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>School of Business Studies</td>
<td>Master in Business Administration</td>
<td>Higher Education Authority of Zambia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Zambia</td>
<td>School of Engineering</td>
<td>BEng, Civil Engr. With highway and transportation components at 4th &amp; 5th years MEng, Civil Engr.</td>
<td>Higher Education Authority of Zambia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduate School of Business</td>
<td>MBA organisational leadership MSc Innovation Management &amp; Entrepreneurship</td>
<td>Higher Education Authority of Zambia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Copperbelt University</td>
<td>Engineering</td>
<td>BSc. Civil Engr. Diploma, Civil Engr. &amp; Construction</td>
<td>Higher Education Authority of Zambia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>School of Business</td>
<td>MBA Finance MA Human Resource Management</td>
<td>Higher Education Authority of Zambia</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-4: Software and laboratories availability in surveyed Zambian universities
3.3.5 **Sierra Leone**

The University of Sierra Leone has its origin in the Fourah Bay College which happens to be the main institution offering a degree in civil engineering at the bachelor’s level in the country. The survey of this institution revealed a general lack of access to facilities and learning resources like broadband internet, online academic journals and software, with most of the staff and students relying on private sourcing of these resources. The result of the survey is presented in Table 3-5 below.

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/ Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>University of Sierra Leone, Fourah Bay College</td>
<td>Engineering &amp; Architecture</td>
<td>BSc. Civil Engr.</td>
<td>National</td>
<td></td>
</tr>
</tbody>
</table>

In terms of availability of laboratories and software, the survey showed that the institution only has access to a geotechnical lab among the four kinds of laboratories investigated in the survey.

3.3.6 **Cameroon**

Cameroon has around 132 higher education institutions. Among these, only four offer programmes in Civil Engineering with a transport component:

- University of Douala
- The National Advanced School of Engineering in Yaoundé (ENSP), which is linked to University of Yaoundé I
- National Graduate School of Public Works (ENSTP) in Yaoundé
- Saint Jerome Catholic University in Douala

While the first three universities are public institutions, the last is privately owned. The result of the survey is presented in Table 3-6 below, while the availability of laboratories and software are can be seen in Figure 3-5 below.
### Table 3-6: Surveyed institutions in Cameroon

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameroon</td>
<td>Teacher training college- University of Douala</td>
<td>Engineering</td>
<td>BSc, Msc, PhD Civil Engineering</td>
<td>Ministry of Higher Education of Cameroun</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saint Jerome Catholic University</td>
<td>Engineering Sciences</td>
<td>BSc Building &amp; Public Works</td>
<td>Ministry of Higher Education of Cameroun</td>
<td>The EU Erasmus programme</td>
</tr>
<tr>
<td></td>
<td>University of Yaounde I - National advanced school of engineering - ENSP</td>
<td>Civil Engineering</td>
<td>BSc Civil Engineering</td>
<td>Ministry of Higher Education of Cameroun</td>
<td>-Ministry of the Economy, Planning and Regional Development - Ministry of Defense -University of Cape Town; -University of Pretoria.</td>
</tr>
<tr>
<td></td>
<td>ENSTP - National Advanced School of Public Works- Yaounde</td>
<td>Civil Engineering</td>
<td>MSc. Railway Engr.</td>
<td>Ministry of Higher Education of Cameroun</td>
<td>Ministry of Public Works - Arab Contractors Ltd.; SATOM-SOGEA; University of Padua</td>
</tr>
<tr>
<td></td>
<td>Catholic University of Cameroon, CATUC, Bamenda</td>
<td>Faculty of Business and management sciences</td>
<td>MBA Human Resource Management and Development</td>
<td>Ministry of Higher Education of Cameroun</td>
<td></td>
</tr>
</tbody>
</table>
3.3.7 Malawi

The University of Malawi Polytechnic is the only institution offering a programme in Civil Engineering. The programme is offered at the undergraduate level and is one of the three engineering programmes offered within the faculty of engineering. An advanced diploma in transport operations management (TOM) is offered at the postgraduate level. Master of Science programmes in sustainable engineering management and infrastructure development and management are also offered in the institution. Transport systems is
one of the optional course modules in the infrastructure development and management programme (see details in Table 3-7 below).

### Table 3-7: Surveyed institutions in Malawi

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malawi</td>
<td>University of Malawi (The Polytechnic)</td>
<td>Engineering</td>
<td>BSc (Hons) Civil Engineering</td>
<td>National Council for Higher Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Faculty of Commerce</td>
<td>Executive MBA</td>
<td></td>
<td>National Council for Higher Education</td>
<td></td>
</tr>
</tbody>
</table>

#### 3.3.8 Tanzania

Seven Higher Learning Institutions were involved in the survey, mainly University of Dar es Salaam, Ardhi University, National Institute of Transport, Mount Meru University, Open University of Tanzania, University of Dodoma and Saint Augustine University of Tanzania. A Civil Engineering programme is currently offered at the University of Dar es Salaam, Ardhi University and Saint Augustine University of Tanzania. The Civil Engineering programme offered at the above-mentioned universities has been accredited by Tanzania Commission for Universities (TCU) which is the national accrediting body. It was learnt that all the seven Higher Learning Institutions (HLIs) reported in this survey, offer transport studies programmes at different levels from Bachelor to Postgraduate levels. Three HLIs have been found to offer associate programmes. Urban and Regional Planning has been found to be offered only at Ardhi University, and associated degree programmes are being offered at other institutions, with the exception of the National Institute of Transport. Master of Business Administration is offered at five Universities except for Ardhi University. However, the Open University of Tanzania offers an MBA programme in collaboration with the National Institute of Transport.

Table 3-8 below shows some of the civil engineering / transport programmes offered in some of the higher institutions in Tanzania, while the availability of laboratories and software are can be seen in Figure 3-6 below.
<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania</td>
<td>University of Dar es Salaam</td>
<td>Engineering &amp; Technology</td>
<td>BSc (Hons) Civil Engineering</td>
<td>Tanzania commission for Universities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dept. of Transportation &amp; Geotechnical engineering</td>
<td>Postgraduate Diploma in Transport Operations Management.</td>
<td>Postgraduate Diploma in Civil Engineering with specialisation in Transportation Engineering. MSc. In Highway Engineering</td>
<td>Tanzania commission for Universities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business School</td>
<td>Master of Business administration</td>
<td></td>
<td>Tanzania commission for Universities</td>
<td></td>
</tr>
<tr>
<td>Ardi University</td>
<td>School of construction economics</td>
<td>BSc. Civil Engineering</td>
<td>Postgraduate Diploma in Construction Economics &amp; Mgt. MSc. Construction Economics &amp; Mgt.</td>
<td>Tanzania commission for Universities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School of Urban &amp; Regional planning</td>
<td>BSc. Urban and Regional Planning</td>
<td>BSc. Regional Development Planning MSc. Urban &amp; Regional Planning and Mgt.</td>
<td>Tanzania commission for Universities</td>
<td></td>
</tr>
</tbody>
</table>
| National Institute of Transport | BSc. Logistics & Transport Management  
| BSc. Accounting & Transport Finance.  
| Postgrad Diploma in Transport Engineering Management.  
| Postgraduate Diploma in Transport Economics.  
| Postgraduate Diploma in Logistics & Transport Management.  
| MBA in Logistics & Transport Management | National Council for Technical Education (NACTE)  
| National Transport Corporation.  
| Open University of Tanzania | International Purchasing and Supply Chain Management Consult (IPSCMC) |
3.3.9 South Sudan

Limited information is available for the institutions in South Sudan. However, Civil Engineering and Urban Planning are offered at the University of Juba (see details in Table 3-9 below).
Table 3-9: Surveyed institutions in South Sudan

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Sudan</td>
<td>University of Juba</td>
<td>College of Engineering &amp; Architecture</td>
<td>BSc PhD Civil Engr</td>
<td>National</td>
<td>Local</td>
</tr>
</tbody>
</table>

3.3.10 South Africa

Civil and Transport engineering programmes offered at Universities in South Africa are accredited by the Engineering Council of South Africa (ECSA). Among the surveyed African countries, South Africa is the only country that has its engineering degree programmes recognised internationally under the Washington Accord. A total of ten universities were surveyed, out of which eight offered programmes in civil engineering and transportation.

A survey of curriculum content in some of the institutions revealed a more balanced transportation curriculum, offering the core transportation/highway engineering topics in combination with aspects such as transport planning, public transportation, transport policy and management. In terms of access to learning facilities, most of the institutions of South Africa have better access to such facilities when compared to institutions in most of the Africa countries surveyed. Table 3-10 below shows some of the institutions of South Africa and the civil engineering / transport programmes offered, while the availability of laboratories and software are can be seen in Figure 3-7 below.
### Table 3-10: Surveyed institutions in South Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>University of Cape Town</td>
<td>Engineering &amp; Built Environment</td>
<td>BSc. Civil Engineering, MSc, MPhil, PhD Transport Studies</td>
<td>Engineering Council of South Africa (ECSA), The Washington Accord</td>
<td>SAICE; ACET, University of Dar es Salaam, Volv Research and Education Foundation (VREF).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduate School of business</td>
<td>Master of Business Administration, Master of Philosophy in Inclusive Innovation</td>
<td>Council of Higher Educatin</td>
<td></td>
</tr>
<tr>
<td>WITS University</td>
<td>Engineering &amp; Built Environment</td>
<td>BScEng Civil Engineering</td>
<td>ECSA The Washington Accord</td>
<td>NRF, LTA Construction, ESKOM (TESP) &amp; THRIP</td>
<td></td>
</tr>
<tr>
<td>WITS University</td>
<td>Business School</td>
<td>Master of Business Administration</td>
<td>Council of Higher Educatin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cape Peninsular</td>
<td>Engineering</td>
<td>BTech, Civil Engineering</td>
<td>Engineering Council of South Africa (ECSA), The Washington Accord</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of</td>
<td></td>
<td>(Transportation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td>BTech. Civil Engineering (Urban Engineering)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MTech, DTech Civil Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DTech. Civil Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business and Management Sciences</td>
<td>MTech Business Administration</td>
<td>Council of Higher Educatin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td></td>
<td>PgDip; MEng; PhD Civil Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Technology</td>
<td>Business School</td>
<td>Master of Business Administration</td>
<td>Council of Higher Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------</td>
<td>-----------------------------------</td>
<td>-----------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durban University of Technology</td>
<td>Engineering &amp; The Built environment</td>
<td>BTech, Civil Engineering BTech, Town &amp; Regional planning MEng Civil Engineering DEng Civil Engineering</td>
<td>ECSA, The Washington Accord</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Study Unit</td>
<td>MTech Business Administration</td>
<td>Council of Higher Education</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>University of Pretoria</th>
<th>School of Engineering</th>
<th>BEng, MEng, PhD in Civil Engineering</th>
<th>ECSA, The Washington Accord</th>
</tr>
</thead>
<tbody>
<tr>
<td>GiBS Business School</td>
<td>Master of Business Administration</td>
<td>Council of Higher Education</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>University of Kwazulu-Natal</th>
<th>Engineering</th>
<th>BScEng Civil Engineering (with focus area on Transportation Engineering)</th>
<th>ECSA, The Washington Accord</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate School of Business and Leadership</td>
<td>Master of Business Administration</td>
<td>Council of Higher Education</td>
<td>CSIR, eThekwini Roads and Traffic Authority, SANRAL</td>
</tr>
</tbody>
</table>
Figure 3-7: Software & laboratories availability in surveyed universities in South Africa
3.3.11 Democratic Republic of Congo

Programmes of study offered at the universities in the DR Congo are accredited by the Ministere de l’Enseignement Superieur et Universitaire (Ministry of Higher Education) which is the national body overseeing the accreditation of institutions of higher learning. Among the surveyed institutions, three offer a programme in Civil Engineering; one offers a programme in Urban & Regional Planning / Town planning, whereas, there are no available offerings for transportation studies in the country. All the universities that offer a programme in engineering or construction have laboratory facilities, however, the available labs are only those of pavement and geotechnical engineering. Furthermore, most of the institutions do not avail of proprietary software such as ArcGIS, AutoCAD, HDM4, SPSS, and MS project for their students. Particularly, only the University of Kinshasa reported ownership of most of the software, while University of Bandundu, University of Lubumbashi and Universite Libre des Pays des Grands lacs reported access to only ArcGIS and AutoCAD software, whereas, Academie des Beaux Arts has access to only AutoCAD. Six out of the nine institutions that responded to the survey are equipped with broadband internet, while five are equipped with facilities for video conferencing. Even though every institution is reported to have general libraries, and an engineering library (where engineering programmes are offered), only the Universite Libre des Pays des Grands lacs has online access to Civil Engineering journals. Table 3-11 below shows the three major institutions that offer civil engineering programmes offered and are equipped with the necessary learning aids.
<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRC</td>
<td>Université de Kinshasa</td>
<td>Faculté de Polytechnique</td>
<td>BSc. Civil Engineering</td>
<td>Ministère de l'enseignement supérieur et universitaire</td>
<td>Local industry partners</td>
</tr>
<tr>
<td></td>
<td>Université de Lubumbashi</td>
<td>Faculté de Polytechnique</td>
<td>BSc. Civil Engineering</td>
<td>Ministère de l'enseignement supérieur et universitaire</td>
<td>Local industry partners</td>
</tr>
<tr>
<td></td>
<td>Université libre des pays des grands lacs</td>
<td>Faculté de Polytechnique</td>
<td>BSc. Civil Engineering</td>
<td>Ministère de l'enseignement supérieur et universitaire</td>
<td>Local industry partners</td>
</tr>
</tbody>
</table>
3.3.12 Ghana

Four institutions of higher learning were surveyed, namely: University of Ghana, Central University, Kwame Nkrumah University of Technology and Webster University Ghana Campus. Most of the data were collected through the web search and reports/documents of the respective institutions due to the difficulties encountered in conducting a phone-based interview. As such, only general information on the programme offerings was collected. Detailed information on available educational resources and facilities at the institutions could not be retrieved. The survey revealed that civil engineering programmes are offered at the Central University and Kwame Nkrumah University of Science and Technology, and the programmes are accredited by Ghana National Accreditation Board which is the national accreditation body. Only Kwame Nkrumah University of Science and Technology is reported to have transportation specialisations at postgraduate levels of study, i.e. Masters and PhD. The University of Ghana recently opened a Centre for Urban Management Studies (CUMS) in June 2016, which was inspired by the need to confront the numerous and ever-growing challenges of urbanisation in the developing world. The centre seeks to provide a platform for multi-disciplinary research cutting across several aspects of the built environment, while also bringing together, academics, policy-makers and practitioners in this field. Some of the focus areas of the centre include urban policy, planning and governance, urban transport, urban economy and informality, urban infrastructure financing strategies, amongst others. Masters of Business Administration programme is offered in all four Higher learning Institutions. In addition to the MBA programme, Webster University Ghana Campus also offers a Master of Art in Management and Leadership. The Table below shows some of the programmes offered at the higher learning institutions in Ghana. Table 3-12 below shows the programmes offered by the four Ghanaian institutions.
<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana</td>
<td>University of Ghana</td>
<td>Business School</td>
<td>Executive MBA Finance</td>
<td>National Accreditation Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Centre for Urban Management Studies (CUMS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Multi-disciplinary research and teaching in Urban transport; Urban policy, planning &amp; governance; Urban infrastructure financing strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central University</td>
<td>School of Applied Science</td>
<td></td>
<td>BSc, Civil Engineering</td>
<td>National Accreditation Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Central Business School</td>
<td></td>
<td>MBA (Finance)</td>
<td>National Accreditation Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MBA (Human Resource Management)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kwame Nkrumah University of Science and Technology</td>
<td>College of Engineering</td>
<td></td>
<td>BSc Civil Engineering, MSc Road and Transportation Engineering, PhD Transportation Engineering</td>
<td>National Accreditation Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School of Business</td>
<td></td>
<td>Master of Business Administration</td>
<td>National Accreditation Board</td>
<td></td>
</tr>
<tr>
<td>Webster University Ghana Campus</td>
<td>School of Business and Technology</td>
<td></td>
<td>MA in Management and Leadership, Master of Business Administration</td>
<td>National Accreditation Board</td>
<td></td>
</tr>
</tbody>
</table>
3.3.13 Liberia

Four institutions namely University of Liberia, United Methodist University, Stella Maris Polytechnic and William V.S. Tubman University were surveyed. Most of the data were gathered using the web search and from reports/ documents of the respective institutions. The survey revealed that programmes in Civil Engineering are offered at Stella Maris Polytechnic, University of Liberia and William V.S. Tubman University. The qualification of BSc. in Civil Engineering issued by these institutions are accredited by the National Commission on High Education which is Liberia’s national accreditation body. Masters of Business administration is offered at the United Methodist University and the University of Liberia. MBA programmes are accredited by the Accreditation Council for Business School and programmes. The Table below shows the civil engineering and MBA programmes offered at the Higher Learning Institutions in Liberia. Table 3-13 below shows the programmes offered by the four Liberian institutions.
Table 3-13: Surveyed institutions in Liberia

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberia</td>
<td>United Methodist University</td>
<td>Reeves School of Business</td>
<td>MBA (Organisational Management and leadership)</td>
<td>National Commission on High Education / Accreditation Council for Business School and Programmes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stella Maris Polytechnic</td>
<td>Monsignor Stephen Kyne Technical College</td>
<td>BSc. Civil Engineering</td>
<td>National Commission on High Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Liberia</td>
<td>College of Science &amp; Technology</td>
<td>BSc. Civil Engineering</td>
<td>National Commission on High Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>School of Business and Public Administration</td>
<td>Master of Business Administration</td>
<td>National Commission on High Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>William V.S. Tubman University</td>
<td>College of Engineering and Technology</td>
<td>BSc. Civil Engineering</td>
<td>National Commission on High Education</td>
<td></td>
</tr>
</tbody>
</table>
3.3.14 Nigeria

Data collection for Nigeria was carried out using a combination of phone interviews and web search. Among the seven institutions that were surveyed in this study, six of them were found to offer a 5-year undergraduate degree programme in Civil Engineering with transport and highway engineering options. The transport and highway component of the programme are introduced to students at the third or fourth year of study, and normally taken till the final year. In-depth exposure to transport and highway design as well as components of transportation planning are usually achieved at the postgraduate masters or PhD level. All programmes are accredited at the national level by the National Universities Commission (NUC), and the Council for the Regulation of Engineering in Nigeria (COREN). A few of the institutions also offer continuous professional development programmes in various fields of study. On the aspect of leadership related programmes, most of the institutions offer various MBA programmes within their management sciences / social sciences faculties, with specialty in fields such as finance, human resources, leadership and innovation, etc. Table 3-14 below shows the programmes offered by Nigerian institutions.
<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>Ahmadu Bello University</td>
<td>Engineering</td>
<td>BEng, PgDip, MSc, PhD Civil Engineering</td>
<td>National Universities Commission (NUC), Council for Regulation of Engineering in Nigeria (COREN)</td>
<td>Nigerian Institute of Transport Technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social Sciences</td>
<td>BEng, MSc, PhD Urban and Regional Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Lagos</td>
<td>Engineering</td>
<td>BEng, MSc, PhD Civil engineering</td>
<td>National Universities Commission (NUC); Council for Regulation of Engineering in Nigeria</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administration</td>
<td>Master in Business Administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obafemi Awolowo University</td>
<td>Technology</td>
<td>BEng, MSc, PhD Civil Engineering, (Transportation/Highway Engineering)</td>
<td>National Universities Commission (NUC); Council for Regulation of Engineering in Nigeria</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Management and Accounting</td>
<td>Master of Business Administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Benin</td>
<td>Engineering</td>
<td>BEng, MSc, PhD Civil Engineering (Highway Engineering option)</td>
<td>National Universities Commission</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social Sciences</td>
<td>B.Eng, MSc, PhD Urban and Regional Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Management Science</td>
<td>Master in Business Administration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3.15 Mozambique

Five institutions of higher learning were surveyed, namely: Eduardo Mondlane University; Catholic University of Mozambique; Polytechnic University; Higher Institute of Science and Technology of Mozambique (ISCTEM); and Higher Institute of Transport and Communications (ISUTC). Most of the data was collected through an internet search and reading reports / documents from the respective institutions.

The survey revealed that Civil Engineering programmes are offered at all the above-mentioned universities except ISCTEM and they are accredited by the Ministry of Education and Culture of Mozambique, which is the national accreditation body. Only the Higher Institute of Transport and Communications (ISUTC) and the Polytechnic University were reported to have transportation specialisations at Postgraduate levels of study, i.e. Railway Engineering and Masters in Roadways and Transport.

Masters of Business Administration (MBA) are offered at two higher learning institutions namely: Catholic University of Mozambique and ISCTEM. Table 3-15 below shows the Civil Engineering and MBA programmes offered at the higher learning institutions in Mozambique.
### Table 3-15: Surveyed institutions in Mozambique

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>College/Faculty</th>
<th>Programme &amp; Qualifications</th>
<th>Accreditation</th>
<th>Existing Collaboration(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mozambique</td>
<td>Eduardo Mondlane University</td>
<td>Engineering Faculty</td>
<td>BSc. Civil Engineering</td>
<td>National Accreditation Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Catholic University of Mozambique</td>
<td>Engineering Faculty</td>
<td>BSc. Civil Engineering</td>
<td>National Accreditation Board</td>
<td>Universidade Nova de Lisboa, Universidade Católica de Portugal, University of Pretoria, University of Johannesburg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economics and Management Faculty</td>
<td>Masters of Business Administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MA in Business Management and Economics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polytechnic University</td>
<td>Management, Science and Technology School (ESGCT)</td>
<td>BSc. Civil Engineering</td>
<td>National Accreditation Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Higher School of Advanced Studies and Business (ESAEN)</td>
<td>Masters in Roadways and Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Higher School of University Studies – Nampula</td>
<td>BSc. Civil Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ESEUNA)</td>
<td>Masters in Roadways and Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Higher Institute of Humanities and Technologies (ISHT)</td>
<td>BSc Civil Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institution</td>
<td>Program/Qualification</td>
<td>Accreditation/Institute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nacala Polytechnic Higher Institute (ISPUNA)</td>
<td>BSc. Civil Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tete University Institute (ISUTE)</td>
<td>BSc. Civil Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISCTEM</td>
<td>MBA (Project Management)</td>
<td>National Accreditation Board Aga Khan Foundation - Maputo (Mozambique) University</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISUTC</td>
<td>BSc. Civil Engineering and Transport (LECT)</td>
<td>Engineering Laboratory of Mozambique (LEM) PRIMAVER Academy University &quot;Marta Abreu&quot; of Las Villas – Cuba Instituto Superior Técnico – IST – Lisboa - Portugal Critical Software, SA – Taveiro – Portugal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.4 **Country Comparison**

From the summary data of the institutions in the surveyed countries, four key indicators are selected to reflect the level of robustness of the civil engineering / transport programme offered among the various countries. The indicators are hinged on:

- Level of industry collaborations that exists among these countries
- Curriculum content in terms of planning versus engineering aspect
- Availability / access to learning tools (labs and software)
- Existence of CPD content

### 3.4.1 Collaborations/Partnerships

Figure 3-8 presents an outlook of the amount of industry / academic collaborations that exist in higher institutions in some of the countries surveyed. Information was only available in the countries represented in the figure. The size of the bubble is an indicator of the summation of both the local and international collaborations existing in institutions of the various countries, as reflected in the survey. Industry collaborations / partnerships were found to be highest in South Africa, Ethiopia, Kenya and Tanzania, when compared to the rest of the surveyed countries.

*Figure 3-8: Industry/academic collaborations in higher education institutions across Selected SSA Countries*
3.4.2 Existence of CPD programmes

Among the collected information regarding the institutions and programmes is the existence/availability of continuous professional development programmes targeted at industry professionals in the civil engineering and transport sector. From the data collected, it was found that only a few of the surveyed higher institutions offer continuous professional development (CPD) programmes. A comparison of the surveyed countries was also made in terms of the availability of such programmes. Figure 3-9 below represents a comparison of CPD programmes offering among the various countries. Most of the information on the CPD programme offerings were extracted from the institutions’ websites. The highest level indicates the countries with the most number of CPD programmes for the sampled higher institutions. From the survey information, South African, Tanzanian and Kenyan higher institutions reportedly offer more CPD programmes when compared to other countries. At this stage of the project, only higher institutions were surveyed, other organisations that offer CPD courses will be covered in subsequent stages of the project.

![Figure 3-9: CPD Programme offering](image)

3.4.3 Ranking of Institutions at the Regional Level

Using web-based ranking information, a comparison has been made among the surveyed countries in terms of the ranking of their higher institutions. As the majority of higher institutions in the various African countries do not feature on popular global ranking scales, a regional (continent) level comparison was adopted. Figure 3-10 below shows the various countries and the number of higher institutions featuring among the top fifty institutions across the continent. The ranking reflects the relative strength of higher institutions in these countries measured in terms of their academic impacts, presence and openness. From the chart, it is seen that South Africa has majority of the number of higher institutions featuring among the top 50 across Africa.
3.4.4 **Transport Curriculum Content**

Figure 3-12 below presents an overall outlook of the curriculum content of programmes in transport in the 15 SSA countries surveyed. This has been broken down to a planning related component and the engineering / technical design components, with a score for each component based on a summation of programmes offered at both the undergraduate and postgraduate levels of study. The planning component relates to areas such as transport demand / supply analyses and forecasting, travel demand management, multimodal systems planning, land use planning, service and operations planning. The engineering component, on the other hand relates to aspects focusing on design of physical infrastructure, such as highway engineering and railway engineering.

From Figure 3-12 it can be seen that for the majority of countries, more attention is given to the engineering design aspect of transport infrastructure over planning-focussed components. The transport curriculum in institutions in the East African countries, such as Ethiopia, Tanzania and Kenya, as well as South Africa, tend to be more balanced, in terms of these two components, when compared with the other countries.
3.5 Conclusion

The survey results provide a clear basis on which to understand the current status of transport education in the focus countries: firstly understanding the current level and focus of existing graduates and potential sectoral leaders / TSLDP candidates; and secondly in understanding the knowledge and resources that are available for potential utilisation in the design and implementation of local components of the TSLDP course. This information has been used to inform the Gap Analysis in the next section and will facilitate the development of a course that is tertiary institution based.
4 Gap Analysis

4.1 Introduction

Following the detailed investigations in Chapter 2 and 3 of the needs in the transport sector capacity building in Sub-Saharan Africa, and the existing status of available courses and curricula, this chapter develops an analysis of the curriculum gaps to inform the curriculum development of the Transport Sector Leadership Development Programme.

The survey results from transport curricula in the ReCAP countries clearly demonstrate that transport education (typically embedded in Civil Engineering programmes) tends to focus on a traditional engineering content of highway engineering and design, including geometric design, pavement design, highway capacity analysis and some elementary traffic engineering. Besides foundational courses in transport engineering, most programmes also teach construction management and civil engineering design (related and relevant to transport engineering as well). Some courses offer project management, and to a lesser extend professional practice and/or reporting skills.

Chapter 3 paints a picture of the knowledge base available in the academic institutions across Sub-Saharan Africa. It is evident that transport professionals on the sub-continent are more like to get a solid academic foundation in civil/transport engineering, design and operations; land use and transport planning.

Clearly, there is a need for a more broad-based transport professional, capable of planning, designing, managing and leading complex transport projects in a complex environment of diminishing natural resources, lacking financial resources, enormous social challenges and often complicated governance and tertiary education structures and status quo. Whilst there is diversity in course offerings, especially in South Africa, the findings of this study have led to the identification of a list of course topics that would need to be included in a balanced transport leadership curriculum.

This analysis is summarised in the Figure 4-1 below, where courses in green are covered in-depth in all countries, typically in existing civil engineering curricula; courses in purple are the topics that are mostly offered; and gaps that have been found in current Civil Engineering undergraduate courses are indicated in yellow (only available in a few countries and the content is not in-depth) or red (generally no offerings).
### Figure 4.1: Gap in existing courses required for a balanced transportation leadership curriculum

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometric design</td>
<td>Traffic simulation</td>
<td>Demand &amp; supply analysis</td>
<td>Asset management</td>
<td>Social impacts</td>
<td>Environment impacts</td>
<td>Project programming</td>
<td>Project funding</td>
<td>Planning &amp; legal framework</td>
<td>Effective leadership</td>
</tr>
<tr>
<td>Junction design</td>
<td>NMT design &amp; operations</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Engineering</td>
</tr>
<tr>
<td>Drainage</td>
<td>PT design &amp; operations</td>
<td>Transport modelling</td>
<td>Geotechnical management</td>
<td>Economic impacts</td>
<td>Project lifecycle</td>
<td>Multi-criteria analysis</td>
<td>Preparation of tenders</td>
<td>Critical thinking</td>
<td>Skilled communication</td>
</tr>
<tr>
<td>Pavement materials</td>
<td>System design</td>
<td>GIS</td>
<td>Pavement asset management</td>
<td>Transport impact assessment</td>
<td>Contracts &amp; change control</td>
<td>Sustainable livelihoods</td>
<td>Stakeholders engagement</td>
<td>Systems thinking</td>
<td>Motivation skills</td>
</tr>
<tr>
<td>Appropriate technology</td>
<td>Traffic engineering</td>
<td>Land use planning</td>
<td>Bridge/structure asset management</td>
<td>Quality control</td>
<td>Contract negotiation</td>
<td>Ethical &amp; compliance</td>
<td>Gender awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low volume rural roads</td>
<td>Traffic management</td>
<td>Road user analysis</td>
<td>Drainage asset management</td>
<td>Resource management</td>
<td>Resource management</td>
<td>Complicity of projects</td>
<td>Diversity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction mgmt.</td>
<td>Road user behaviour</td>
<td>Transport institutions</td>
<td>Street furniture management</td>
<td>Health &amp; safety</td>
<td>Sustainable development</td>
<td>Performance</td>
<td>Perform</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe road design</td>
<td>Gender issues</td>
<td>Project admin</td>
<td>Governance</td>
<td>Governance</td>
<td>Governance</td>
<td>Governance</td>
<td>Governance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAD</td>
<td>Urban &amp; rural planning</td>
<td>Technical reporting</td>
<td>Technical reporting</td>
<td>Technical reporting</td>
<td>Technical reporting</td>
<td>Technical reporting</td>
<td>Technical reporting</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Design coordination | Equitable road space | Design public spaces | Universal design | Typically offered | Mostly offered | Sometimes offered | Generally not offering |}
The above listing will contribute to the following project stage of designing a curriculum to fill these gaps and acknowledges the technical and managerial content of a post-graduate transport course.

4.2 Institution of Civil Engineers

To further supplement the needs assessment and gap analysis undertaken under this project, information was also provided by the Institution of Civil Engineers (ICE) in the UK (Table 4-1 below), based on research they have recently carried out regarding members interest in non-technical training.

The ICE also recognises the need for additional non-technical training, as findings from their surveys show that their UK and overseas membership both rated “leadership and team motivation” training as highest in their area of interest. As shown in Table 4-2, for respondents from outside the UK, the next most popular categories were:

- Decision making skills
- Personal effectiveness skills
- Conflict management and interpersonal communications

Each of these are elements which have been outlined for development in the leadership and managerial element of the TSLDP – as discussed in the Inception Report and identified in the “Managing People for Excellence” exemplar documentation shown in Appendix A.

Furthermore, the research also puts perspective on what respondents preferred learning route would be. In each instance, the preferred option is online or distance learning, with subsequent methods varying slightly between UK and overseas respondents. This information will be incorporated into the next stage of the TSLDP development.
## Table 4-1: Respondents from the UK (based on ICE survey)

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Area</th>
<th>Strength of Interest - Top 10 Topics</th>
<th>Face to face class/workshop/seminar/event</th>
<th>Video conference</th>
<th>On-line distance course</th>
<th>Text books, publications, newsletters, magazine</th>
<th>Any Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>People training</td>
<td>Leadership and team motivation</td>
<td>55</td>
<td>55%</td>
<td>29%</td>
<td>45%</td>
<td>36%</td>
<td>25%</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Construction Design Management</td>
<td>54</td>
<td>49%</td>
<td>30%</td>
<td>45%</td>
<td>38%</td>
<td>25%</td>
</tr>
<tr>
<td>Personal development</td>
<td>Decision making skills</td>
<td>50</td>
<td>45%</td>
<td>30%</td>
<td>40%</td>
<td>30%</td>
<td>31%</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Designing out Occupational health risk to construction workers</td>
<td>50</td>
<td>43%</td>
<td>26%</td>
<td>40%</td>
<td>27%</td>
<td>32%</td>
</tr>
<tr>
<td>Personal development</td>
<td>Personal effectiveness skills</td>
<td>49</td>
<td>52%</td>
<td>29%</td>
<td>43%</td>
<td>29%</td>
<td>31%</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Proactive safety management system</td>
<td>49</td>
<td>40%</td>
<td>34%</td>
<td>47%</td>
<td>38%</td>
<td>34%</td>
</tr>
<tr>
<td>Personal development</td>
<td>Conflict management and interpersonal communication</td>
<td>49</td>
<td>47%</td>
<td>26%</td>
<td>41%</td>
<td>26%</td>
<td>29%</td>
</tr>
<tr>
<td>People training</td>
<td>Managing interdependent teams/talent</td>
<td>48</td>
<td>53%</td>
<td>32%</td>
<td>47%</td>
<td>38%</td>
<td>24%</td>
</tr>
<tr>
<td>Project management</td>
<td>Resource Planning and Financial Management</td>
<td>48</td>
<td>45%</td>
<td>25%</td>
<td>47%</td>
<td>26%</td>
<td>33%</td>
</tr>
<tr>
<td>Personal development</td>
<td>Negotiation Skills</td>
<td>48</td>
<td>52%</td>
<td>30%</td>
<td>38%</td>
<td>26%</td>
<td>26%</td>
</tr>
</tbody>
</table>

## Table 4-2: Respondents from outside the UK (based on ICE survey)

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Area</th>
<th>Strength of Interest - Top 10 Topics</th>
<th>Face to face class/workshop/seminar/event</th>
<th>Video conference</th>
<th>On-line distance course</th>
<th>Text books, publications, newsletters, magazine</th>
<th>Any Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>People training</td>
<td>Leadership and team motivation</td>
<td>61</td>
<td>30%</td>
<td>37%</td>
<td>60%</td>
<td>49%</td>
<td>19%</td>
</tr>
<tr>
<td>Personal development</td>
<td>Decision making skills</td>
<td>59</td>
<td>25%</td>
<td>31%</td>
<td>58%</td>
<td>49%</td>
<td>25%</td>
</tr>
<tr>
<td>Personal development</td>
<td>Personal effectiveness skills</td>
<td>58</td>
<td>24%</td>
<td>32%</td>
<td>55%</td>
<td>42%</td>
<td>27%</td>
</tr>
<tr>
<td>Personal development</td>
<td>Conflict management and interpersonal communication</td>
<td>58</td>
<td>29%</td>
<td>35%</td>
<td>55%</td>
<td>49%</td>
<td>22%</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Sustainability in construction process</td>
<td>57</td>
<td>20%</td>
<td>46%</td>
<td>56%</td>
<td>51%</td>
<td>24%</td>
</tr>
<tr>
<td>Personal development</td>
<td>Negotiation Skills</td>
<td>57</td>
<td>32%</td>
<td>37%</td>
<td>56%</td>
<td>41%</td>
<td>23%</td>
</tr>
<tr>
<td>Project management</td>
<td>Resource Planning and Financial Management</td>
<td>55</td>
<td>24%</td>
<td>37%</td>
<td>65%</td>
<td>57%</td>
<td>17%</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Construction Design Management</td>
<td>55</td>
<td>18%</td>
<td>32%</td>
<td>53%</td>
<td>53%</td>
<td>28%</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Quality implementation</td>
<td>55</td>
<td>21%</td>
<td>39%</td>
<td>61%</td>
<td>56%</td>
<td>24%</td>
</tr>
<tr>
<td>Project management</td>
<td>Types of Contract, Contractual arrangements, Non-adversarial</td>
<td>54</td>
<td>22%</td>
<td>31%</td>
<td>63%</td>
<td>52%</td>
<td>19%</td>
</tr>
</tbody>
</table>
5 Course Optioneering

5.1 Overview

Building on the findings of the needs assessment and gap analysis, the next stage of programme development is in defining the options for the form, delivery format and structure of a programme to achieve the defined learning objectives. This section summarises the potential methods for structuring the course and its content to deliver the competencies highlighted in the gap analysis.

The format the TSLDP takes is key to ensuring long-term success of the programme. The programme is required to achieve both its learning outcomes and appeal to professionals in the industry, whilst also achieving long-term self-sustainability into the future.

Development of the programme structure will benefit significantly from the input of key stakeholders, such as the ReCAP partners, ReCAP technical management and groups like ASANRA, ARMFA and professional bodies. This is the key objective of the Stakeholder Workshop, taking place on 13th July 2017, at which the information provided in the upcoming sections will be presented.

Whilst the TSLDP content will cater for both the technical and managerial / leadership needs of the candidates, it needs to be accessible and achievable for candidates across SSA. Creating a programme that is too complex in terms of its content or onerous in terms of time-input is likely to have an adverse impact on uptake. Furthermore, the TSLDP programme will need to be both cost-effective, implementable, and manageable for both ReCAP and subsequent funding organisations.

5.2 Review of Educational / Qualification Options

Several course formats were considered for TSLDP, looking at the different options available leading to CPD or academic qualifications. The options that were considered are discussed in Table 5-1 below and are summarised as follows:

1. Continuing Professional Development (CPD) courses
2. Full-time Masters degree (awarded by 1 University)
3. Part-time Masters degree (awarded by 1 University)
4. Research Masters degree (awarded by 1 University)
5. Two-thirds Research Masters degree (awarded by 1 University)
6. Masters degree run by two or more Universities, delivered modularly, with degree awarded by one of the partners (i.e. Joint Degree)
7. Masters degree run by two Universities and delivered modularly, with two degrees awarded, one by each of the partner Universities (i.e. Double Degree)
## Table 5-1: Summary of TSLDP Qualification Options

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Summary and Conclusion</th>
</tr>
</thead>
</table>
| 1   | Continuing Professional Development (CPD) courses | Key topics delivered as CPD courses and could be at various locations | • Fits within the preferred timescales identified by candidates (e.g. 1-2 weeks travel at a time).  
• Fits within the preferred timescales identified by ReCAP for implementation.  
• Could be done remotely through online courses.  
• Lowest cost option. | • Unlikely to achieve the required learning outcomes as candidates will only get an overview of each topic.  
• Many CPD courses do not include assessments, so potential for lack of motivation to learn the course content – i.e. no risk of failure.  
• Creates a risk of the course not being taken seriously by candidates and becomes considered ‘a perk’ and an opportunity to travel.  
• No qualification at the end of the process so limited value.  
• Unlikely to offer value for money – i.e. Degree option maybe more expensive but gives a recognised qualification. | • Fits within the timeframes available both from a candidate and ReCAP perspective.  
• However, it lacks on the quality of its learning outcomes and candidates are unlikely to benefit from it to the same extent as a formal degree course.  
• No qualification on offer, just CPD hours. Unlike to benefit candidates in the long-term and course risks becoming seen as a perk and opportunity to travel, rather than a career-improving programme.  
• Whilst it would be the lowest cost option, its value for money is considered poor given the limited benefits and lack of a recognised qualification. |
| 2   | Full-time Masters degree | Full-time Masters degree course delivered and accredited by one University | • Meets learning requirements (may only be partially achieved depending on degree; see disadvantages) | • Expensive.  
• Onerous in terms of time input from candidates as it requires full-time attendance at University (also adds to expensive if payment of accommodation costs etc. is required).  
• No existing degrees offer the breadth of content required so would need more than one course or a new degree to be developed. | • Expensive and onerous on candidates who would have to combine it with full-time jobs.  
• Employers may be unlikely to release candidates of mid-level seniority for the time required.  
• No existing degrees cover all the learning needs, so more than one course or a new degree would be required. |
| 3   | Part-time Masters degree | Part-time Masters degree course delivered and accredited by one University | • Meets learning requirements (may only be partially achieved depending on degree; see disadvantages) | • Expensive.  
• Lacks flexibility in its delivery (i.e. unlikely to be modular) so candidates may need to attend University 1 or 2 days per week, adding significant travel costs. | • Expensive, particularly if a lot of travel is required, but less onerous on candidates than the full-time option.  
• Lack of modularity may mean candidates need to attend University regularly (i.e. once or twice per week). |
<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Summary and Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Research Masters degree</td>
<td>Research-based degree course delivered and accredited by one University</td>
<td>• n/a</td>
<td>• No skills transfer.</td>
<td>Focusses in detail on a small topic, so will not cover the breadth required by this programme.</td>
</tr>
<tr>
<td>5</td>
<td>Two-thirds Research degree</td>
<td>Variant on the above delivered and accredited by one University</td>
<td>• n/a</td>
<td>• No skills transfer.</td>
<td>Focusses in detail on a small topic, so will not cover the breadth required by this programme.</td>
</tr>
<tr>
<td>6</td>
<td>Joint Degree</td>
<td>Module based Masters degree delivered by two or more Universities and accredited by one of them</td>
<td>• Meets learning requirements.</td>
<td>• Expensive, but less than a full-time degree where permanent university presence would be required.</td>
<td>Offers a recognised qualification which can benefit from the strengths of various Universities, including those outside SA and SSA.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Provides an international perspective by including modules at international universities.</td>
<td>• Some administrative work required at the outset to setup the agreements between the universities involved. For this reason, there is a benefit in keeping the number of university partners low to simplify this process, at least to begin with.</td>
<td>Flexible delivery which is module based and can be adapted to suit candidates needs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Takes advantage of the strengths of different universities across the various disciplines.</td>
<td>• Costly but less than a full-time or part-time Masters.</td>
<td>Better value than spending money on CPD hours for high-level training and no qualification.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Can be delivered part-time and modularly to make participation easier for candidates.</td>
<td>• Better value than spending money on CPD hours for high-level training and no qualification.</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Option</td>
<td>Description</td>
<td>Advantages</td>
<td>Disadvantages</td>
<td>Summary and Conclusion</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 7   | Double Degree     | Module based Masters degree – two degrees delivered by two Universities (i.e. degree obtained from both) | • Meets learning requirements.  
• Provides an international perspective – i.e. can include modules at international universities.  
• Takes advantage of the strengths of different universities across the various disciplines.  
• Can be delivered part-time and modularly to make participation less onerous.  
• Timeframe can be extended from 2 years, to 3 or 4 years if the candidate requires due to personal or financial circumstances. | • Expensive, but less than a full-time degree where permanent university presence would be required.  
• Increases administration difficulty as two universities involved in awarding degrees, rather than just one awarding university under the Joint Degree option.  
• Not an option in some countries, e.g. South Africa. | • Offers similar benefits to the Joint Degrees above.  
• Administration input is greater as two Universities each give a degree for the course.  
• Not available in all countries. |
5.1 Review of Options Considering Delivery and Implementation

The ultimate goal of ReCAP and the TSLDP programme is to provide a self-sustaining, bespoke, internationally recognised, training programme in transport and leadership leading to a recognised qualification. However, it is recognised that it would be costly to develop the programme, would take a minimum of 3 years to set up and would also be relatively expensive and time consuming for the candidates.

With this in mind, a number of options of increasing cost and time commitment have been suggested and are shown in summary in Figure 5-1. The options vary from a ‘do minimum’ option using extant courses, to CPD programmes and finally a bespoke MSc in Transportation Leadership.

Figure 5-1: Review of Options and Corresponding Implementation Timelines

5.1.1 Option 1 – Do minimum (use existing MSc courses)

The least costly option with the minimum lead-in time is to set up a programme which takes advantage of the many existing approved technical and leadership MSc courses across the UK and Africa. This would require a secretariat to select candidates, to signpost approved courses and to record the achievements of the candidates. The section and appointment of the organisation to host the secretariat would incur costs as would the funding of course fees and travel and subsistence for the candidates. It may be possible to persuade the ICE or CIHT to record the achievements of the candidates. Candidates would graduate with an approved MSc qualification.

The disadvantages are that the approach could be rather fragmented with different candidates having different educational experiences and it would be more difficult to maintain adhesion and a professional network between cohorts of candidates, lessening the effect of a future support network.
Also, from the research carried out on existing MSc courses, it will not be possible to find a programme with the desired blend of technical and leadership modules.

5.1.2 **Option 2 – CDP courses (use existing CPD courses, both technical and leadership)**

The next option would be to use existing approved CDP courses available in the UK or Africa. CDP courses tend to be more expensive per ‘module’ than taught MSc modules and although there are many CDP courses available through professional organisations such as the ICE, SAICE or CIHT the quality can be variable. The lead-in time will depend on the availability of CDP courses and the duration of the training will be dependant of the availability of the candidates and the academic level candidates would be expected to achieve.

This option would also require a secretariat to select and appoint candidates and would require a greater input to signpost suitable CDP courses. This syllabus would also be quite fragmented for candidates and be less attractive in terms of a final qualification. Different candidates may accrue very different CDP modules. The networking opportunities would also be minimal.

5.1.3 **Option 3 – Bespoke CDP courses (both technical and leadership)**

Rather than develop a full MSc in Transport Leadership, an option would be to provide standalone bespoke CDP courses. The courses would be provided by approved higher education institutions in the UK or Africa and the syllabus could reflect more closely the aims of the TSLDP in terms of critical thinking at a strategic level in the transport sector and include leadership and management modules.

The risk in choosing this option is in persuading an institution to develop bespoke CDP courses that will remain commercially viable over a sustained period. However, the advantage in this approach is that there would be no requirement to seek technical approval of the course from an accrediting body or to seek approval from a university administration for an approved MSc.

5.1.4 **Option 4 – Modular Masters Degree**

A further option would be to develop a Masters using existing MSc modules from a selected and collaborating group of approved Universities. This could be undertaken on a part-time basis and a greater range of modules could be selected to more closely align with the educational aims of TSLDP.

The difficulty with this model is in seeking approval for a joint MSc delivered between institutions. Memorandums of Understanding would need to be signed between institutions and arrangements made to share course fees. This process would be administratively challenging.

5.1.5 **Option 5 – Masters Degree in Transport Leadership**

This is the only option which satisfies all the aims of the TSLDP. The modules could be developed so that the syllabus matches the learning outcomes of ReCAP and both technical and leadership aspects could be fully explored. The cohort of candidates would be more likely to form a viable support network. Once the MSc programme was in place, approved by the university, and technically accredited it would provide a recognised and desirable qualification for high achieving candidates.

The disadvantages are the length of time required to get approval for the course, the risk to a university that the course would not be profitable and self-sustaining, and the cost to the candidates in course fees and travel and subsistence.
6 Proposed Options for TSLDP

6.1 Overview

Based on the options discussed in the previous section, a reduced number of options are proposed to be taken forward to the next stages of the project. It is likely that a two-staged approach will need to be adopted to meet the initial implementation needs of ReCAP and the long-term sustainability and learning needs of the programme and candidates respectively.

As shown in the previous section, the implementation period for the desirable option of a Masters degree precludes the completion of a pilot course before ReCAP ends in 2020. It would be preferable if a pilot could be run which would enable a cohort of students to complete a programme before this end date. To achieve this, a two-stage approach may need to be considered. This would consist of:

1. Stage 1: implementation of a CPD programme, either using existing or bespoke courses offered by tertiary institutions, private training organisations or professional institutions.
2. Stage 2: development of a Masters degree course and associated accreditation. This would be continuing in the background whilst the CPD programme is running.

The benefit of this approach is that it permits candidates to undertake a training programme before the end of ReCAP in 2020. However, candidates on the CPD programme will not receive a formal qualification and there is limited means of enabling it to contribute towards a degree retrospectively. This is because:

1. There are no means by which the CPD content can accrue the necessary credits.
2. Candidates on CPD programmes generally do not have to undertake assessments, and;
3. Courses are not necessarily run by trainers who are part of a higher institution with a charter to award degrees.

Therefore, in terms of implementation and transitioning between programmes, the CPD programme and Masters would need to be two separate offerings. There are very limited, if any, practical means of retrospectively awarding candidates on the CPD programme any ‘Transport Leadership’ qualification, which would be envisaged to be developed in the longer-term.

6.2 Option 1: CPD

The CPD courses could be run through existing institutions, such as Universities and professional bodies like the ICE, SAICE or CIHT, with candidates completing selected modules in order to complete the programme.

The proposed modules are shown in Figure 6-1 and cover the same technical and managerial/leadership topics as the Degree option. The primary difference is that the references to credits awarded for each module and the necessity to complete a dissertation are no longer required.

Courses could be offered through multiple institutions, however, overall delivery would need to be managed through a single organisation. This service providers role would be to manage the candidates progression through the module content below and issue an overall completion certificate once the candidate has successfully attended all necessary components of the course.

Given the programme could take advantage of existing CPD courses, and there is no requirement to complete accreditation or other course set-up processes, the CPD programme could potentially be implemented next year by the Phase 2 & 3 Service Provider – as shown in Figure 6-1.

The CPD programme is considered a temporary measure whilst accreditation is sought for the Professional Masters. It is not considered that a CPD programme will offer the same learning outcomes or benefits to candidates as undertaking a recognised degree and receipt of a qualification.
Therefore, it is recommended that for sustainability of the programme and the candidates learning outcomes, the Professional Degree is considered as the option to be developed in the longer-term.

**Figure 6-1: CDP Course Content/Structure**

<table>
<thead>
<tr>
<th>Elective Transport CPD Modules</th>
<th>Mandatory Leadership and Management CPD Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Engineering</td>
<td>Effective Leadership</td>
</tr>
<tr>
<td>Transport Systems</td>
<td>Management and Mentoring</td>
</tr>
<tr>
<td>Transport Policy</td>
<td>Project Management</td>
</tr>
<tr>
<td>Asset Management</td>
<td></td>
</tr>
<tr>
<td>Project Assessment</td>
<td></td>
</tr>
<tr>
<td>Project Procurement</td>
<td></td>
</tr>
</tbody>
</table>

**6.3 Option 2: Professional Masters delivered as a Joint Degree**

As highlighted in Table 6-1 below, a Professional Masters delivered as a Joint Degree is proposed as the long-term option at this stage. This format and level of qualification achieves the necessary learning outcomes to develop the next transportation sector leaders, whilst also offering flexibility in its delivery to accommodate candidate needs and make best use of the strengths across a range of Universities. Alternatives like a Research Masters or full-time / part-time Masters, either do not fully achieve the necessary learning outcomes or will be too onerous on candidates due to inflexibility in delivery.

It is proposed that the Degree would be delivered modularly over a two-year period, although this could be extended to three or four years if required by candidates for financial or logistical reasons. As shown in Figure 6-2, a total of seven modules are proposed with an approximate 50/50 split between technical and managerial/leadership content.

The candidates can choose from a set of elective technical transport modules, the choice of which would be determined by their background experience – i.e. if a Highway Engineer is participating on the course, they would be encouraged to select modules other than Road Engineering. The leadership and management modules are mandatory for all candidates, as is the final research project. Candidates must achieve a minimum of 180 credits through a combination of mandatory and elective modules to be awarded a **Professional Masters in Leadership in Transportation**.

A Professional Masters has been chosen rather than a Master of Science (MSc) as it allows flexibility in the elective transport modules that can be taken. An MSc would require a minimum of 60 credits to be allocated to the Dissertation. This leaves fewer credits for the elective transport modules, meaning candidates can choose fewer of these modules. It is considered that each of these elective transport modules are important, therefore to enable more of them to be taken by the candidates, it is recommended that the Professional Masters option is adopted. This permits a reduction to 45 credits for the Dissertation, meaning an additional Transport Module can be taken.
Table 6-2: TSLDP Course Structure. Values in brackets are current indicative credits, with finalised credit breakdown between electives and mandatory modules still to be confirmed.

<table>
<thead>
<tr>
<th>Elective Transport Modules</th>
<th>Mandatory Leadership and Management Modules</th>
<th>Mandatory Dissertation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Engineering (20)</td>
<td>Effective Leadership (20)</td>
<td>Research Project (45)</td>
</tr>
<tr>
<td>Transport Systems (20)</td>
<td>Management and Mentoring (20)</td>
<td></td>
</tr>
<tr>
<td>Transport Policy (20)</td>
<td>Project Management (20)</td>
<td></td>
</tr>
<tr>
<td>Asset Management (20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Assessment (20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Procurement (20)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Professional Masters Degree in Leadership in Transportation
(Requires min. 180 Credits)
7 Programme Content

As identified previously and in the Needs Assessment, several key disciplines have been identified for the TSLDP course, which are summarised in Table 7-1. These disciplines are necessary regardless of whether the programme is run as CPD or as a Degree.

The main differences are that the content will likely be covered in less detail as CPD and there is also no requirement for a final dissertation. The project/coursework components of each module are also not applicable for a CPD programme.

Table 7-1: TSLDP Course Modules

<table>
<thead>
<tr>
<th>Module</th>
<th>Module Content Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transport/Technical</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Road Engineering    | Route selection; geometric design; junction design; pavement and materials engineering; drainage design; equitable road space design (i.e. considering all road users); importance of design co-ordination between disciplines; low-volume rural roads; safe road design; public space design.  
*Project: CAD-based design project. |
| Transport Systems   | Whole system design (i.e. complexity of running a transport system); non-motorised transport and operations; public transport design and operations; traffic engineering; traffic management and control; traffic safety (i.e. accident rates, reporting and education); road user behaviour.  
*Project: traffic simulation modelling problem-based project. |
| Transport Policy    | Transport policy and legislation; transport institutions; drivers for change (i.e. national policy, finance availability etc.); gender bias / hidden agendas/corruption; urban and rural planning; land use planning; demand / supply analysis (i.e. travel demand modelling).  
*Project: GIS problem-based project based on travel demand modelling. |
| Asset Management    | Road asset management; road maintenance strategies; road maintenance funding mechanisms; HDM 4 (and others).  
*Project: road asset management systems problem-based project (e.g. HDM 4). |
| Project Assessment  | Sustainable development; sustainable development goals (SDG); New Urban Agenda; environmental impact assessment including climate change; social impacts; economic impacts.  
*Project: Transport impact assessment. |
| Project Procurement | Project funding (IFI's etc.); project appraisal; cost-benefit analysis; multi-criteria analysis; sustainable livelihood approach; appropriate technology (e.g. labour-based construction); GIS/visualisation.  
*Project: problem-based project around project appraisal. |
| **Mandatory**        |                                                                                                                                                                                                                            |
| Effective Leadership | Introduction outlining what being a transportation leader is about; best practice; critical thinking; systems thinking; ethical behaviour; complexity and uncertainty around large projects; sustainable development goals (SDG) and governance.  
*Project: case study on the above linking development with transport. |
| Management and Mentoring | Talent management; situational leadership; coaching skills; skilful and effective communication and collaboration; mapping motivation; gender awareness and diversity training; performance management.  
*Project: event based around team-working. |
| Project Management   | Risk and uncertainty analysis; project programming; financial accounting / budgeting / costing; project lifecycle assessment; contracts and change control; quality control; resource management; health and safety; project administration and reporting.  
*Project: Problem-based project around programming, resourcing and costing. |
| **Research Project** | Introduction course on research methods and knowledge management, including evidence-based decision making; summary course on statistics.  
Project: topic to be confirmed by candidates but to be based on a subject from TSLDP. |

*Projects, coursework and dissertation not required as part of CPD programme.*

This table gives a high-level summary of the module content for each of the key themes. These will be expanded upon in the Curriculum Development Report, due on 30th June 2017. This report will
consist of a course outline plus additional module descriptive. An example of a course outline form from UCT is shown in Appendix A.

The curriculum content will be designed using Bloom’s classification system distinguishing (see Figure 7-1 below) different levels of human cognition, i.e. thinking, learning and understanding, in the progression of a teaching programme, like TSLDP. Designing the curriculum this way also allows for distinguishing onsite and online parts of the curriculum, individual work versus group work and helps to define the kind of assessment that is required.

Figure 7-1: Bloom’s Taxonomy of Learning Progression

(https://www.fractuslearning.com/2016/01/25/blooms-taxonomy-verbs-free-chart/)
8 Indicative Costs

8.1 Option 1: CPD Programme

Based on the existing known examples shown in Table 8-1 below, a CPD offering through a tertiary institution is likely to cost in the region of GBP 14,000 in fees. Other offerings will be investigated further as this project progresses. There would likely be a similar amount of travel required to the degree-giving option, which adds a further GBP 15,000 in travel costs. This would mean a total investment per candidate in the region of GBP 29,000 to complete the CPD programme.

8.2 Option 2: Professional Masters Degree

A degree course like the one proposed for TSLDP does not currently exist. Therefore, an assessment of cost structures for existing programmes and the level of offering (i.e. executive and non-executive programmes) had to be undertaken to get an indication of the course fees and other costs.

It is proposed that this course be delivered on an ‘Executive’ basis. This means the fees will be higher than a standard Masters course, however, it enables a higher quality offering from the University. This is important to appeal to the professional candidates the TSLDP is trying to capture. The higher fees generally enable the Universities to engage guest lecturers and experts from industry, in addition to better facilities versus what the conventional student base are offered. Extras like meals, stationary and accommodation could also be included, however, as shown below, travel and accommodation is estimated separately for now.

Table 8-1 below summarises a rudimental overview of typical course fees one can expect to pay for Masters’ degree giving courses in USA, Europe (UK, Netherlands) and South Africa (Stellenbosch University and University of Cape Town). A variety of MSc and MBA fees are shown below and they are indicated per degree, irrespective of whether the course takes 1 or 2 years.

Given the nature of the joint degree in TSLDP, the final course fees will likely be an average of the fees charged by the SA and UK based institutions. Again, taking Queens University Belfast (QUB) and UCT as an example for costing purposes at this stage, an executive offering would cost around GBP 21,000 in tuition fees. This appears reasonable given its Executive fee basis and when compared to other Masters degree courses, such as those offered by the UCT Business School (GSB) and European Universities.

Given the modular and international nature of the proposed programme, with extensive travel to South Africa and the UK, it is expected that there will be approximately GBP 15,000 in travel, accommodation and subsistence costs in addition to tuition fees. This is based on attending 10 modules that require travel to UK or SA institutions, plus on average 11 days accommodation and subsistence per module. This will be required for each participant and will also likely need to be funded by the supporting organisation.
This equates to a total investment of GBP 36,000 for the TSLDP Degree delivered on an Executive basis. This is compared to GBP 30,500 for a standard offering, of which GBP 15,500 is the average fees between QUB and UCT.

A final element worth considering is what the course will provide to the candidates. At present, no single course has been located which offers the breadth of content being proposed under TSLDP. To gain a qualification covering transport provision, transport services and management / leadership skills would currently require a candidate to take a minimum of two separate Masters degree courses.

Table 8-1: International fee per 180 Credits degree (in GBP)

<table>
<thead>
<tr>
<th>Institution</th>
<th>Country</th>
<th>Degree (min)</th>
<th>Degree (max)</th>
<th>Average per credit</th>
<th>Type of degree</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hult (Business School)</td>
<td>US</td>
<td>31,000</td>
<td>35,000</td>
<td>183</td>
<td>Master of International Business</td>
<td>1 year</td>
</tr>
<tr>
<td>Oxford</td>
<td>UK</td>
<td>52,000</td>
<td>289</td>
<td>MBA</td>
<td>1 year</td>
<td></td>
</tr>
<tr>
<td>UCL - Civil Eng PT</td>
<td>UK</td>
<td>25,000</td>
<td>139</td>
<td>MSc</td>
<td>1 year</td>
<td></td>
</tr>
<tr>
<td>Queens University Belfast MSc</td>
<td>UK</td>
<td>15,000</td>
<td>19,500</td>
<td>96</td>
<td>MSc/MBA</td>
<td>1 year</td>
</tr>
<tr>
<td>Uni Twente - ITC</td>
<td>NL</td>
<td>37,500</td>
<td>208</td>
<td>MSc</td>
<td>2 years</td>
<td></td>
</tr>
<tr>
<td>SUN - USB</td>
<td>RSA</td>
<td>17,000</td>
<td>94</td>
<td>MBA</td>
<td>1 year</td>
<td></td>
</tr>
<tr>
<td>UCT - GSB</td>
<td>RSA</td>
<td>15,000</td>
<td>36,500</td>
<td>143</td>
<td>MBA</td>
<td>1 or 2 years (executive)</td>
</tr>
<tr>
<td>UCT - EBE (via CPD Office)</td>
<td>RSA</td>
<td>14,000</td>
<td>78</td>
<td>MSc</td>
<td>2 years</td>
<td></td>
</tr>
<tr>
<td>UCT - Standard Civil Full Time</td>
<td>RSA</td>
<td>8,000</td>
<td>44</td>
<td>MSc</td>
<td>2 years</td>
<td></td>
</tr>
<tr>
<td>UCT - CfTS Executive Offering</td>
<td>RSA</td>
<td>23,000</td>
<td>128</td>
<td>MSc</td>
<td>2 years</td>
<td></td>
</tr>
</tbody>
</table>
9 Candidate Selection

9.1 Basic Entry Requirements
Candidate selection procedures are necessary to get the correct calibre of professional onto the course. The proposed selection procedures are outlined below and are aimed towards getting the ‘high flier’ candidates onto the programme – i.e. those people most likely to become the transport leaders of the future.

There are several basic selection criteria which apply to most Masters and educational courses generally. The purpose of these criteria is to ensure the candidates have the necessary base level education and language requirements to participate on the course. To capture the professionals this programme aims to develop, the education requirements have been supplemented by an experience requirement. These criteria can be summarised as follows:

1. A recognised degree level qualification in a relevant discipline. This can include a Bachelors Degree + 10 years experience or a Masters Degree + 5 years experience.
2. English language – IELTS score of 6.5 minimum.

9.2 Motivated Candidates
It is important to ensure candidates demonstrate motivation in wanting to participate on the course. Completion of the TSLDP Masters will not be an easy process and will require time and effort from the candidate to balance course requirements (e.g. time at University and time at home doing coursework) with their work and personal lives. It is important that candidates realise this before committing to the programme, but it is also important that funding, that will be spent by ReCAP, or other partners in future, is not used on candidates who do not intend to take the course seriously or who the operators believe do not have a reasonable chance of successfully completing it.

For this reason, the following criteria need to be considered:

1. Candidates will need to go through an interview process so selectors can determine the best candidates within a cohort.
2. Motivation Letter, portfolio with examples of work and CV is required from the candidate.
3. Approval letter from their Employer to participate and confirmation that study leave will be granted. The letter must also demonstrate their value to the business and their potential to become leaders in future.
4. The education contract will require that fees are repaid by the candidate in the event they fail the programme. Any repeats will also be paid for by the candidate. This is to ensure that candidates take the process seriously and should consider this before applying.

9.3 Gender Balance and Diversity
An additional set of criteria have been added to ensure the best candidates are selected for the programme. They also include elements to enhance diversity and demonstrate the candidate has their employers support to participate. In future versions of this set of selection criteria, means of providing gender balance will be incorporated as further assessment is requirement on the appropriateness of scoring candidates based on gender or applying additional weightings in this regard.

For the initial pilot, a cohort of up to 20 candidates will be selected, with priority given to those from ReCAP partner countries. After this point, it will be opened up to candidates from across sub-Saharan Africa and both public and private sector industry.
9.4 Preliminary Scoring Matrix

Based on the previous section a draft scoring matrix has been developed against which candidates can be assessed, as shown in Table 9-1. This will be tested and refined in the next stages of the project before being finalised, to ensure it provides logical results in candidate selection.

Table 9-1: Draft Scoring Matrix for Candidate Selection

<table>
<thead>
<tr>
<th>No.</th>
<th>Selection Criteria</th>
<th>Assessment Criteria</th>
<th>Scoring Criteria</th>
<th>Candidate Assessment</th>
<th>Candidate Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Education Level</td>
<td>Bachelors Degree + 10 Years Relevant Experience</td>
<td>5</td>
<td>Masters Degree + 5 Years Relevant Experience</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Has a Degree or Relevant Experience (but not both), but considered suitable for the programme</td>
<td>2.5</td>
<td>Ineligible</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>subject to interview, space availability and the other assessment criteria.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lacks Degree and Experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Masters Degree + 5 Years Relevant Experience</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>English Language Skills</td>
<td>IELTS Score of 6.5 - 7.5</td>
<td>5</td>
<td>IELTS Score of less than 6.5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IELTS Score of 7.5 - 9.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Approval Letter from Employer</td>
<td>No, but candidate is self-funded and does not require employer support</td>
<td>2.5</td>
<td>Ineligible</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No, no self-funding or proof of employer support</td>
<td></td>
<td>Yes, shows future potential and employer agrees to provide study leave etc.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, does not show future potential but does agree to study leave etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, shows future potential and employer agrees to provide study leave etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Interview Scoring</td>
<td>Candidate demonstrates potential to be ‘high flier’ in industry</td>
<td>6</td>
<td>Candidate demonstrates potential to be ‘high flier’ in industry (Exceptional Candidates Only)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Candidate demonstrates some knowledge and ambition but does not differentiate themselves from other candidates</td>
<td>2.5</td>
<td>Ineligible</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Candidate is uninterested or lacks the knowledge to make them suitable for this programme</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Candidate is shows excellent knowledge and ambition in the transport area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Motivation Letter</td>
<td>Excellent - criteria TBC</td>
<td>5</td>
<td>Excellent - criteria TBC</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fair - criteria TBC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Good - criteria TBC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor - criteria TBC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Portfolio</td>
<td>Excellent - wide range of technical content across TSLDP spectrum, excellent competence, well presented</td>
<td>5</td>
<td>Good - good range of technical content across TSLDP spectrum, good competence, good presentation</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fair - fair range of technical content across TSLDP spectrum, fair competence, adequately presented</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Good - good range of technical content across TSLDP spectrum, good competence, good presentation</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor - poor range of technical content across TSLDP spectrum, demonstrates poor competence, poorly presented</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Contract Agreement</td>
<td>Candidate agrees to Education Contract Terms i.e. candidate is provided funding, agrees to participate on the programme and apply themselves to ensure they are successful. Aware that they will have to repay fees/funding to ReCAP if they fail modules.</td>
<td>5</td>
<td>Agrees to contract terms i.e. repayment of fees and/or repeat exams etc. not being paid for by ReCAP or other funding agency.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Candidate is self-funded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Candidate agrees to Education Contract Terms i.e. candidate is provided funding, agrees to participate on the programme and apply themselves to ensure they are successful. Aware that they will have to repay fees/funding to ReCAP if they fail modules.</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Candidate is self-funded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contract terms are not applicable i.e. if the candidate is self-funded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not agree to contract terms i.e. candidate does not agree to repay fees to ReCAP in event they fail programme, or does not agree to other terms of the Education Contract.</td>
<td>5</td>
<td>Ineligible</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sector</td>
<td>Academia</td>
<td>3</td>
<td>Public Sector Employee</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>International Funding Agency</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private Sector Employee</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public Sector Employee</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Processes surrounding candidate selection will be further developed by the scope of works related to personnel sub-consultancy prior to submission of the Draft Final Report.
10 Additional Components

10.1 Gender Balance
The general conclusions from the gender balance work undertaken so far are summarised in the previous Status Report, and have indicated that it needs to be addressed in two ways under the programme. These are:

1. Incorporating it into the candidate selection procedures to try establish gender balance on the programme – yet to be finalised
2. Incorporating components into the training modules which teach candidates about the importance of diversity and women in the workplace – see Management and Mentoring in Error! Reference source not found.e 7-1.

10.2 Mentoring
All candidates on the programme will benefit from being assigned a mentor. It is proposed that this will be a component of the CPD programme and any future development into a Masters degree course. It is considered that the most practical means of addressing this within the programme will be for candidates to choose their own mentors, ideally from within their employer organisations.

As part of the development of this programme, it is proposed that a brief guideline is developed to help candidates choose an appropriate mentor and to also advise mentors on their commitments to the candidates. It is expected that this guideline will form part of the Draft Final Report, due in early September 2017.

10.3 On-the-Job Training
On-the-job training forms one of the components that has to be investigated as part of the programmes development in this phase. It is appreciated that this training may be beneficial to some candidates, however, there are some concerns surrounding its practicality to implement and its appeal to both candidates and employers.

At this stage, it is considered that external on-the-job training in different organisations should not form part of this programme. It is understandable that this would be unlikely to appeal to employers who would be reluctant to lose relatively senior staff for extended periods of time to other organisations, with no benefit to themselves. Furthermore, candidates may also be reluctant to move around and spend additional time away from home in addition to the time spent travelling for the university components of the course.

However, candidates and employers could be encouraged to provide internal on-the-job training within their organisations which would involve candidates taking on more responsibility, particularly on the leadership and managerial aspects of the job. This would enable them to put into practice many of the skills they will learn as part of the programme. This is likely to be more appealing to candidates and employers and could form part of the education support contract signed between the employer and candidate.

10.4 Sustainability
Work on sustainability is still ongoing and will be continuing in greater detail once the structure and content of the programme has been agreed. At this point, most stakeholders want to see information pertaining to the structure and content of the programme and what it is they will be funding or supporting. Once this is in place, there will be greater value in having detailed conversations with partners earmarked for greater involvement in the future of this programme.
11 Stakeholder Engagement Update

11.1 General
Updates were provided in the Status Report regarding communications with stakeholders such as ASANRA, ARMFA, The Institutions of Civil Engineers, The Chartered Institution of Highways and Transportation and the University of Birmingham. Further discussions are planned with these stakeholders once agreement on the proposed TSLDP structure and content has been reached after approval of this report.

11.2 Stakeholder Workshop
Following consultation with ReCAP and partner countries, along with the IRF, the Stakeholder Workshop will be held at the 2nd IRF African Congress in Namibia in July 2017
12 Programme for Next Phase

The next stage of the project will focus on developing the curriculum for the TSLDP. This will be outlined in the Curriculum Development Report due at the end of June 2017. After this, preparation will commence in detail for the Stakeholder Workshop, which will take place on the 13th July at the 2nd IRF African Congress in Namibia. The content of this workshop will be based on the information collated up to this point and will be a presentation and feedback session based around the programme structure and content that is being proposed. Once this has been received, the data will inform the finalisation of the scoping stage of the TSLDP, with the outcomes and recommendations summarised in the Final Report. An updated programme is provided in Figure 12-1.
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
<th>Week Ending</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>PROJECT LAUNCH</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Initial Meeting</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>INCEPTION REPORT</strong></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Literature Review</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Initial Desktop Study</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Draft Inception Report</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Issue Inception Report</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>STATUS REPORT</strong></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Needs Assessment/Gap Analysis - Field Review of Available Literature</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Needs Assessment - Review of Existing Asian and NEAD Literature</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Needs Assessment/Gap Analysis - Survey of Countries Sub-Saharan Africa</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Needs Assessment/Gap Analysis - Survey of Countries International</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Needs Assessment/Gap Analysis - Review of Existing International Literature</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>INTERIM REPORT</strong></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Final Optioneering for Programme/Curriculum Development Options</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Analysis of Options for Training Options</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Analysis of Options for Job Functions</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Analysis of Options for Mentoring Options</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Options for Options for Gender Balance Options</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Summary of Progress on Accreditation Options</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Curriculum Development Workshop</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Summary of Options for Programme/Curriculum Development Options</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Issue Interim Report</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>STAKEHOLDER WORKSHOP</strong></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Prepare and present at workshop</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>CURRICULUM DEVELOPMENT REPORT</strong></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Review of Options for Programme/Curriculum Development Options</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Scoping &amp; Planning of Curriculum Development Workshop</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Curriculum Development Workshop</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Final Curriculum Development Report</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Final Report</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>FINAL PHASE 1 REPORT</strong></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Draft Report</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Amend and issue final report</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Transport Sector Leadership Development Programme - Phase 1 Programme</strong></td>
<td></td>
</tr>
</tbody>
</table>
13 Summary

The purpose of this report is to outline the findings from the needs assessment and gap analysis and outline the programmes recommended delivery format and content moving forward. So far Phase 1 has concluded that there is a need to develop mid-level transportation professionals and support them in becoming the next generation of industry leaders. Research undertaken in the inception stage, and reported in the Inception Report and Status Report, identified that there is a prevalence amongst tertiary institutions for delivery of transport engineering courses, often with lesser focus on transport services.

From a technical perspective, future leaders within the transport profession should have a broad understanding of the various components which make up the highway transport network and delivery of highway infrastructure. This requires an understanding of the contributions made by different disciplines and professions.

Management and leadership content is often not included in the existing course content, at least not to a significant extent, and would require the completion of a separate course. Interestingly, a survey undertaken as part of the development of this report identified that almost 60% of respondents (out of 75 total) identified the need to improve their managerial and leadership skills as key to their development.

At this stage, no similar course to that proposed for the TSLDP has been identified elsewhere. Future leaders need a broad skillset which crosses technical knowledge and management and leadership skills, with the ability to lead teams and effectively communicate ideas. Currently, there appears to be a lack of courses which offer these together.

This information discussed in this report will be taken forward to the Stakeholder Workshop, which is being held as part of the IRF 2nd Africa Regional Conference in Windhoek, Namibia on 13th July 2017. The purpose of the workshop is to present these findings and the ideas for the TSLDP moving forward. The aim is to generate an interactive discussion and receive important feedback from industry and potential future candidates about the suitability and feasibility of the proposed programme options.

13.1 Optioneering

Several options for addressing skills and knowledge gaps have been reviewed. These include Research Masters degrees, full and part-time Masters degrees, double degrees and CPD courses. A qualitative assessment of which options are likely to satisfy the learning needs, provide a meaningful output and not be excessively onerous in terms of time or cost input for the candidate or other sponsors has been undertaken. This information is summarised in Table 0-1 overleaf.

13.2 Option Selection

A major constraint on the implementation of the programme is time availability. As shown in the Figure 13-1 below, developing and implementing programmes of this nature, in particular when they are accredited and/or qualification-giving, can take 2 years. This time is required to develop the programme and take it through the necessary accreditation processes within tertiary institutions for the setting up of new courses.

However, there is a need to have a programme in place before the end of ReCAP in 2020. The option that fits this timescale involves running TSLDP as a CPD programme. In the longer-term, for sustainability and benefit to candidates, it is likely that the programme should continue development into a Masters Degree giving programme – whether it is a bespoke or a modular part-time MSc.
13.3 Programme Content and Delivery Structure

Initially the programme will need to be delivered through a series of CPD courses, which will need to be run through existing tertiary institutions, private training organisations or professional institutions. The proposed topics are shown in Table 7-1 previously and these mirror those required under the Degree option. The difference between the CPD and Degree option is the topics will be covered in less detail and there is no requirement for coursework, projects or a final dissertation under the CPD programme.

For the Degree course, this can be delivered over a two year period with approximately 4 modules in each academic year. Given the modular set-up of the programme, this could potentially be extended to 3-4 years, if candidates required this timeframe. It is anticipated that each module would require approximately 2 weeks contact time at the University and 6 weeks working from the candidate’s home country on projects and other coursework. Several key disciplines have been identified to form the TSLDP module structure, which are summarised in the table below.

13.4 Costs

For the CPD programme, the cost is expected to be in the region of GBP 29,000 per candidate, which covers an estimated GBP 14,000 in course fees and GBP 15,000 in travel costs.

For the Degree course option, it is recommended that TSLDP be offered on an ‘Executive’ basis given the target candidates the course aims to capture. Running a course on this basis, and charging Executive fees, means the cost will be higher. However, the higher fees permit the Universities to
offer a better experience, which can include engaging external industry experts as guest lecturers and the costs of accommodation, meals and stationary etc. This will likely make the course more attractive to prospective candidates, particularly given they are mid-level/senior professionals, rather than the conventional student base.

Given the nature of the joint degree in TSLDP, the final course fees may be an average of the fees charged by the different institutions - if based in UK/international and South Africa, a preliminary estimate would be GBP 21,000 in tuition fees. Given the modular and international nature of the proposed programme it is expected that, on top of the tuition fees, about GBP 15,000 in travel, accommodation and subsistence will be needed for each participant, with a total investment of GBP 36,000 for the degree delivered on an ‘Executive’ basis. This is compared to GBP 30,500 for a standard offering.

13.5 Candidate Selection

A draft scoring matrix has been developed and is shown in Table 9-1 previously. The purpose of this is to define criteria against which candidates can be evaluated and help ensure the best candidates, who are likely to become future leaders, are selected. This will be tested in the next stages of the project before being finalised, to ensure it provides logical results in candidate selection.

13.6 Stakeholder Workshop

The Stakeholder Workshop has been confirmed to take place at the IRF 2nd African Congress in Windhoek, Namibia on the 13th July 2017. The proposals outlined above will be put forward to the stakeholders for feedback, with a view towards this finalising the recommendations to go into the Final Report, currently scheduled for submission in September 2017.
Appendix A: Exemplar Course Summary
Transportation engineering concerns the application of technology and scientific principles to the planning, design, operation, and management of roads and highways, and their networks, of stops and terminals for any mode of transportation in order to provide for a safe, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods. This course aims to provide students with such an understanding on the fundamentals of road engineering and design as well as traffic engineering analysis by providing a grounding in techniques for the design of roads and freeways, including road drainage, intersections, pavements as well as for the analysis, control and management of traffic flows (both urban roads, rural roads and highways), also looking at public transport, pedestrian and cycling facilities. The course will have 14 credits in lectures and exercises, which are continuously assessed, and a 4 credits design project.
<table>
<thead>
<tr>
<th>ELO</th>
<th>Detailed Outcomes/Summary Levels</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Students apply road design and traffic engineering analysis principles to systematically diagnose and solve specifically-defined engineering problems, such as considering the alignment of roads, the design of pavements and intersections, the capacity of a road segment or bus stop, and the control design of a four-way intersection. Accordingly, in a 4 credits design project, the students will work on an open-ended problem transportation engineering design based on a client’s brief. This is a complex task requiring students to draw from theory, design guidelines, a fuzzy dataset and maps, as well as to exercise their own judgement.</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Students apply mathematics, scientific and engineering knowledge to solve problems in road engineering and design, as well as traffic engineering design, amongst others applying trigonometric functions, parabolic curves, matrix algebra, hydrodynamic equations, survey and engineering drawing techniques both in classroom exercises as well as in a 4 credits design project.</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>In a 4 credits design project students apply procedural design codes in road and pavement engineering, including the CSIR Guidelines for Human Settlements, SANRAL Geometric Design Guidelines and the SANRAL Pavement Engineering Manual of South Africa to the design of the re-alignment of the N7 near Clanwilliam Dam. This design problem itself is ill-defined and open-ended and concerns complex social, environmental and economic contextual considerations. The brief given to the students is not very detailed; it only informs students about the points that need to be connected, conditions of the terrain and social and environmental constraints.</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>The students are required to use design guidelines given in the codes of practice, like CSIR Guidelines for Human Settlements, SANRAL Geometric Design Guidelines and the SANRAL Pavement Engineering Manual of South Africa. The students use Microsoft Excel to do base calculations on road geometry, pavement design, traffic flows and more. They also use AutoCAD, possibly ArcGIS, to present their final road alignment, the design and pavement design solutions of the design project.</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Impacts of the road alignment and design (including intersections and traffic operations) on community, including traffic safety, environment and landscape are considered in deciding on the best road alignment and final road design. Traffic engineering aspects of sustainable transportation modes and facilities, such as for public transportation and non-motorized transportation are also considered in the course as well as design project.</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Team work is assessed. Teams are formed for the design project. Records of meetings (minutes) and decisions (logbook) are used. Every group member has to chair a meeting at least once. Sessions with the lecturer and tutors are used to identify team work problems. These meetings, as well as peer review, are used to access the involvement of each member.</td>
<td>1</td>
</tr>
</tbody>
</table>
Detailed course content

1. Recap: the role of transportation planning outcomes in the design of traffic facilities

2. Basic principles of the design of road alignments (vertical, horizontal, superelevation), including road drainage, and intersections (including for pedestrians and cyclists).

3. Basic principles of the design and analysis of pavements.

4. Basic principles of the analysis of capacity of traffic facilities (also for public transport, pedestrian and cycling infrastructure), including performing a basic shockwave analysis.

5. Basic principles of control of signalized and unsignalized intersections.

6. Basic principles of traffic management, including road pricing.

7. Apply skills on design and analysis of traffic facilities based on transportation demand predictions in an integrated project.

Knowledge areas

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Basic Sciences</th>
<th>Engineering Sciences</th>
<th>Design and Synthesis</th>
<th>Complementary Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Learning environment

The 2016 timetable has 50 lecture slots and 13 tutorial slots.

The course will be delivered largely through a problem-solving learning environment. This will take the form of various class exercises and one large design project resulting in a final report. The lectures will be used to provide an introduction to transportation engineering problems, solutions and the theoretical base to carry out the design project. The project will be handed in digitally, at a clearly communicated deadline.

Suggested time allocation

<table>
<thead>
<tr>
<th>Learning Activity</th>
<th>Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>46</td>
</tr>
<tr>
<td>Tutorials</td>
<td>39</td>
</tr>
<tr>
<td>Practicals (Laboratory)</td>
<td>-</td>
</tr>
<tr>
<td>Other contact periods</td>
<td>7</td>
</tr>
<tr>
<td>Assignments (Group projects)</td>
<td>40</td>
</tr>
<tr>
<td>Self-study</td>
<td>48</td>
</tr>
<tr>
<td>Total learning time</td>
<td><strong>180</strong></td>
</tr>
</tbody>
</table>
General assessment strategy

<table>
<thead>
<tr>
<th>Option 1:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment Task</strong></td>
<td><strong>%</strong></td>
</tr>
<tr>
<td>Design project (1)</td>
<td>25</td>
</tr>
<tr>
<td>Class Test (1)</td>
<td>25</td>
</tr>
<tr>
<td>Written Examination (1)</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Option 2:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment Task</strong></td>
<td><strong>%</strong></td>
</tr>
<tr>
<td>Design project (1)</td>
<td>25</td>
</tr>
<tr>
<td>Class Test (1)</td>
<td>0</td>
</tr>
<tr>
<td>Written Examination (1)</td>
<td>75</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The maximum of the two will be chosen automatically.

The following DP rules apply:
- at least 66% of the class average for the class test

In addition students need a sub-minimum of 50% on the design project to pass the course.

Please note the written examination covers all topics, including those tested in Test #1.

Books/Reading Materials/Notes

Highly recommended:


Recommended:


Reference:


Geometric design guidelines SANRAL, 2002.