Low Volume Roads Design Manuals for Ethiopia and the Universal Rural Roads Access Programme

Yetimgeta Asrat and Les Sampson

ARRB Low Volume Roads Symposium
November 2013
Cairns, Queensland, Australia
Agenda

1. Background
   • Country Profile
   • The RSDP
   • URRAP

2. LVRs and LVR Manuals in Ethiopia
   • Definition
   • Rationale
   • Approach and Methodology
   • Outputs and achievements
   • Potential for wider use

3. Concluding Remark
Background

1.1 COUNTRY PROFILE

Name – Ethiopia (FDRE)
Location - East Africa (SSA)
Area – 1.1 mil sq.km
Population Size - > 85 mil
Gov’t Structure – Federal State

Economy

• GDP - > USD 43 bil
• Predominantly agricultural
• Last 11 yrs av. growth rate – 11%

Road Network

• Classified road network - 85,966 k.m
# The RSDP

<table>
<thead>
<tr>
<th>Program</th>
<th>Physical Plan Vs. Accomplishment, km</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Plan</td>
<td>Actual</td>
</tr>
<tr>
<td>RSDP I</td>
<td></td>
<td>8908</td>
<td>8709</td>
</tr>
<tr>
<td>RSDP II</td>
<td></td>
<td>8486</td>
<td>12006</td>
</tr>
<tr>
<td>RSDP III</td>
<td></td>
<td>20686</td>
<td>19250</td>
</tr>
<tr>
<td>RSDP IV (three years)</td>
<td></td>
<td>54747</td>
<td>41664</td>
</tr>
<tr>
<td>Total RSDP (16 yrs)</td>
<td></td>
<td>92828</td>
<td>81629</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[in Km] – 2010/11</td>
<td>(URRAP) Roads</td>
<td>Roads</td>
</tr>
<tr>
<td></td>
<td>Regional Roads</td>
<td>Roads</td>
</tr>
<tr>
<td></td>
<td>Federal Roads</td>
<td>Roads</td>
</tr>
<tr>
<td></td>
<td>Total Five Year Plan</td>
<td>Roads</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[in Km]</td>
</tr>
<tr>
<td>48,793</td>
<td>71,523</td>
<td>11,212.00</td>
</tr>
<tr>
<td></td>
<td>4,332.00</td>
<td>87,067</td>
</tr>
<tr>
<td></td>
<td></td>
<td>135,861</td>
</tr>
</tbody>
</table>
Trigger for URRAP

- Only 48,793 km of all weather roads
- Limited Rural Accessibility, RAI value was only 27%
- 64.2% of areas further than 5km of all-weather roads
- Average distance to all-weather road - 11.3 km (>3.5 hrs)
- Only 42% of kebeles (villages) connected by all weather roads
- Rural communities were often left isolated and without access
- Limited/no Technical Capacity among Weredas/Districts and lack of Design Standards, Lack of Ownership of Community roads
- Inadequacy of capital and maintenance budget for rural roads.
Targets of URRAP

5 years implementation, the program targets:

• Construction of 71,523 Km of all weather access roads,

• Introduction of sustainable road maintenance regimes on improved road networks,

• Developing and strengthening small and medium scale private enterprises working in support of the sector,

• Creating massive employment opportunities for community and middle-level professionals, and

• Instituting and strengthening an appropriate and affordable institutional set-up at Wereda level that can administer and manage roads under its jurisdiction.
Why LVR Manuals in Ethiopia?

- Majority of the total road network are LVRs
- The Standard Approach remain overly conservative, inappropriate and far too costly for application on much of the country’s rural road network.
- Design manuals only appropriate for HVRs
- Opportunities that would provide better and lower cost engineering solutions were missed:
  - Application of appropriate design standards
  - Better understanding and use of locally available materials
  - Alternative options for road surfacing
  - Application of innovative construction techniques
  - Greater use of local labour
3.3 Approach and Methodology

Knowledge Development and Transfer Model

- The manuals were based on 30 years of LVR experience from Africa and other relevant source, especially the SADC LVR manual and SEACAP
- This is the first manual that actually defined design standards for LVRs. Others were generally guidelines.
- Joint funding between AFCAP and ERA
Project Outputs

Design Manual for Low Volume Roads

- **Part A**: Introduction to Low Volume Road Design
- **Part B**: Design Standards for Low Volume Roads
- **Part C**: Complementary Interventions
- **Part D**: Explanatory Notes for Low Volume Roads Design
- **Part E**: Explanatory Notes and Design Standards for Small Structures
- **Part F**: Trail Bridge Manual
- **Part G**: Road maintenance Booklet

- Standard specification and method of measurement
- Standard Bidding Documents & their respective guidelines for works contracts &;
- RFPs for design and supervision services
Achievements so far

In the last three years of implementation well over 27,600 km of all weather roads are constructed. The impact of this is:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2010/11</th>
<th>2013 Without URRAP</th>
<th>2013 With URRAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Classified road network</td>
<td>48,793</td>
<td>58,338</td>
<td>85,966</td>
</tr>
<tr>
<td>Areas farther than 5 km from all weather road (%)</td>
<td>64</td>
<td>59</td>
<td>46</td>
</tr>
<tr>
<td>Areas farther than 2 km from all weather road (%)</td>
<td>84</td>
<td>81</td>
<td>73</td>
</tr>
<tr>
<td>Average distance to all-weather road (in km)</td>
<td>11.3</td>
<td>9.4</td>
<td>6.4</td>
</tr>
<tr>
<td>Average distance to all-weather road (in hrs)</td>
<td>3.8</td>
<td>3.1</td>
<td>2.1</td>
</tr>
<tr>
<td>RAI</td>
<td>25</td>
<td>35</td>
<td>43</td>
</tr>
</tbody>
</table>
Achievements...continued

More than:

- 7,000 copies of LVR Design Manuals are distributed to all Regions, Woredas, and consultants involving in URRAP.
- 4,400 technicians and middle level professionals are trained in ERA training centers on material quality, labour based construction, surveying, equipment operator, etc.
- 1,200 medium enterprises, consultants and contractors, are developed, trained, and are involving in the program.
- 500 Woreda (District) Road Offices capacity is built.
- 300 000 permanent and temporary job opportunities have been created every year
Achievements...continued

Enhancing local manufacturing capacity

More than 8 000 small and medium capacity equipments; including tractors, trailers, towed rollers, towed graders, water tankers, fuel tankers, and pick-ups, are manufactured/assembled locally.
Achievements...continued

Community involvement + sample roads
Potential for wider use

• The LVR manuals are currently used:
  - **Widely** by
    - URRAP, and
  - **In limited scope** on:
    - Small towns paving projects
    - Demonstration projects for Otta seals

**BUT**

• The Manuals are applicable to all roads carrying less than 300 vehicles per day (roads in classes DC1 to DC4)
Concluding Remark

- URRAP is significantly improving rural accessibility in Ethiopia.
- Strengthen the technical assistance and capacity building to wereda /district/ road offices.
- Partnership between AFCAP nd ERA critical
- The Process and Methodology for LVR manual development can be used as successful framework for other similar projects
- The LVR Manuals are having a major impact:
  - Established **uniform standards** based on sound technical principles.
  - contributed to capacity building and **knowledge transfer**.
  - Maintained **sustainability**.
- Use needs to be extended to all LVRs
Thank you!