

# BETTER ROADS WITHOUT ENDANGERING LIVES

Using Road Safety Audits to Maximize Development Impact



**WORLD BANK GROUP**

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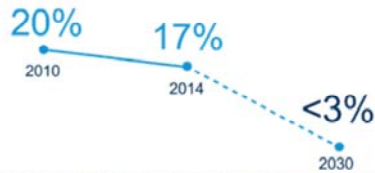
## Better Roads Without Endangering Lives

- Who are the World Bank?
- Why is Road Safety important?
- How do we use auditing?
- Case Study: Kiribati Road
- Feasibility Stage Audit
- Detailed Design Stage audit
- Post-Construction Audit
- Other Road Safety Efforts
- Conclusion



## Who are the World Bank?

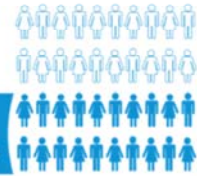
### Goal 1: Reduce extreme poverty



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### Goal 2: Improve equality



- Multilateral development bank (188 members)
- Founded in 1944 by victors of WW2
- Initially reconstruction but now poverty reduction
- Twin goals:**
  - End **extreme poverty** (<3% on \$1.25 per day by 2030)
  - **Shared equality:** Improve income growth of bottom 40% in each country
- Address these through **grants and concessional loans** for **infrastructure** investment and technical assistance
- Roads a big part** as **access** is an **important** enabler of economic development

## Why is Road Safety Important?



(Bose, 2015)

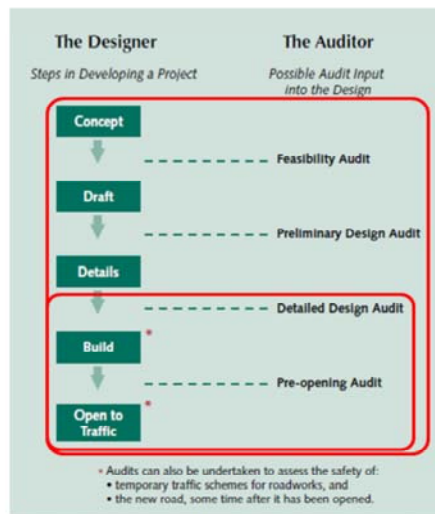
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- Road safety** is a significant **barrier** to the Bank's **poverty reduction** goals
- 5% of GDP** (US\$1 trillion globally) **for developing countries** (damage, injuries, death and lost productivity)
- Disproportionate** effect on poor, **vulnerable road users** in developing countries (people walking to school)
- Rapid motorisation** increases impact (1980 – 2010, 75% increase in fatalities in East Asia, 66% in South Asia)
- Investments** can make **worse** (e.g. smooth road increases speeds)
- Fortunately there are **tools available** – e.g. **iRAP, road safety audits, black spot programmes**

## How do we use Road Safety Auditing?



(AUSTROADS, 2009)

### Multi-Stage Approach

- Feasibility Audit and
- Detailed Design Audit and
- Post-Construction Audit

### Traditional Approach

- Detailed Design Audit or
- Post-Construction Audit

A tool **widely (but not universally used)** in Bank projects is road safety auditing

**Traditional** – just detailed design phase. **Simple** but can face ‘**design inertia**’. Designer’s unwilling to revisit design as it requires rework. Implementation of **safety recommendations** can also be **constrained** by cost/scope limits.

**Multi-stage approach** – **feasibility, detailed design, post-construction**. **Early involvement of audits** has a **big impact** in focussing project on safety. Trialled with support of GRSF on project in Kiribati.

## Case Study: Kiribati Road Rehabilitation Project



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**Multi-stage audit approach** resulted in great safety outcomes. Some of the **safest road infrastructure** in the **region**.

**Protecting the 60,000 pedestrians** using the road **per day**

Historic **poor pavement** condition **limited speeds**

**Improved surface** was identified as key **risk**

## Where is Kiribati?



- Population 103,000 – South Tarawa 60,000
- GDP per capita USD\$1,650 per year (173<sup>rd</sup>)
- Human Development Index 0.607 (133<sup>rd</sup>)

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- Kiribati has a **small population** of about 100 thousand, with 60 thousand on tiny South Tarawa which is less than <500m wide.
- It is one of the most **densely populated** areas in the Pacific
- **Geographically isolated**, 3600 km from Australia, 4100 km from New Zealand
- **Low-lying** at only 3m above sea level – exposed to sea level rise
- **Under developed** – ranked at bottom of global indices
- Income from fishing, remittances and Donors (70%)



## Project Need

- 60,000 pedestrians, 6000 vehicles/day
- Poor road conditions
- Road is central to life



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- Vehicle mix: 50% buses, 20% cars, 20% trucks, 10% motorcycles
- **Pedestrians** are **largest** road user group
- **Public buses** which are **overcrowded** and **incentivized to speed**
- **Lack of maintenance** led to **poor road conditions** which **slowed traffic**, made road safer
- Huge **economic losses** due to **vehicle operating costs**
- Given narrow nature of Tarawa the **road is central to life** (school, work and recreation)
- Full **road rehabilitation** for ~1980 era road
- **Main** road and **feeder** roads
- Mostly low maintenance **asphalt** and **concrete** surfacing
- ADB, Australia and World Bank **jointly financed** (mostly grant)



## Road Safety Issues in Kiribati

- Speeding
- Drink driving
- Bus safety
- Pedestrian safety



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- Major **speed** risk partially **addressed through poor road condition**
- Key issues of **drunk driving** and **speed remain** (the latter especially on causeways)
- Speed limits 60km/h causeways, 40km/h villages
- **Information** very **limited**, deaths 4.5 per 10,000 vehicles very high
- **Weak legislation** (no DUI legislation, dated Road Code)
- **Poor enforcement due to** limited resources and slow court system

## Feasibility Stage Audit

- Recommendations: footpaths, bus stops, pedestrian crossings, speed humps, signage, pavement markings, improved intersections, street lighting, speed limits.
- *Example – roadside hazards*

No.	SAFETY CONCERN	RISK	RECOMMENDATION
3.2	There are numerous trees and houses shops, and other fixed objects within the clear zone along this road. There are too many to individually highlight, and it is expected that removal of the trees will not be a favoured option. The installation of crash barriers is not recommended – such barriers will not fit in some parts because of inadequate widths for offsets and deflection. They will also cause "innocent hits" when buses/cars pull too close.	HIGH	<ul style="list-style-type: none"> <li>• Design the road with suitable line marking and associated delineation to minimise the risk of a vehicle leaving the road.</li> <li>• Take into account especially the locations at each end of the causeways (where speeds will be highest) and ensure that delineation of the curves is excellent.</li> <li>• At selected locations install 2-3 chevron alignment markers (CAMs) to delineate a sharp curve.</li> <li>• Consider developing a program of tree removal to remove only those trees that are closest to the road in the high risk locations (blackspots) at the end of the causeways.</li> </ul>
			
	The bridge on the (left) causeway is narrower than the road cross section. The footpath and the bridge railing are road side hazards that present a risk to any vehicle that is a metre or less off path.		The (left) road runs beside the sea – it requires crash barrier to prevent a vehicle from dropping 4m into the sea.

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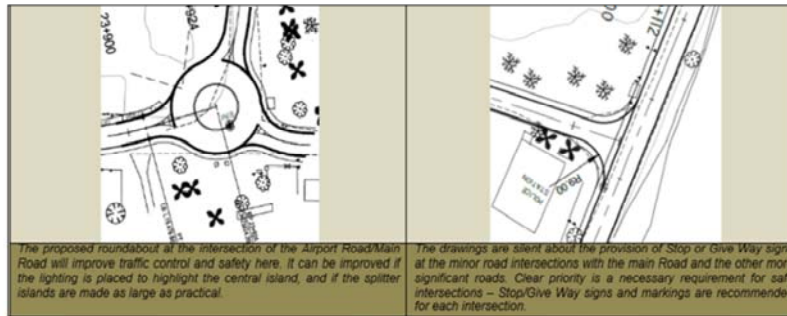
-**Integrated** in Government and Donor project preparation.

-Auditor Phil Jordan visited the **existing road**, provided a **comprehensive safety review**.

-**Recommended safety features** in design which were **provided to designer**: footpaths, bus stops, pedestrian crossings, speed humps, signage, pavement markings, improved intersections, street lighting, speed limits.

## Detailed Design Stage Audit

- Recommendations on details for signage, crash barriers, street lighting, intersections, kerbs and shoulders, bus stops, junctions, gateway treatments.
- *Example – Intersection recommendations*



- Same auditor reviewed design by consultant Roughton's International
- Good relationship between designers and auditor** so **fine tuning** with **minimal tension over rework**.
- Much **broad adoption of recommendations** given early feasibility audit.
- Less 'design inertia' apparent

## Post-Construction Stage Audit

- 215 issues identified – most low to medium risk
- *Examples: bypassing of rumble strips*



- *Obscured signage*



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- Undertaken by Bank staff (me!)
- Day and night audits (drought so no rainy weather)
- Checking **where details had been correctly constructed**
- 215 issues identified across signage, roadside hazards, intersections, sightlines, lighting and other.
- 74% low risk, 18% medium, 8% high
- Majority low risk indicates successful impact of previous audits.
- Majority addressed by contractor, some were ongoing maintenance issues (obscured signage)
- Raised issues about driver and pedestrian behavior – need for education and enforcement

## Other Road Safety Efforts

- Road Safety Strategy and Action Plan
- Regulatory and legislative reforms
- Government progress
  - Enforcement
  - Vehicle inspections
  - Single licensing authority



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-Thanks to audits, a forgiving road safety environment. But this is only **part of the picture**

-Road Safety Strategy and **action plan** prepared under the project

-Priority actions for other **pillars** including **establishment of a Office of Road Safety** within the office of the president

-Data collection also important to inform efforts-Government progress on **enforcement (Queensland Police), vehicle inspection, single authority for licensing**

-Regulatory and legislative reforms

## Conclusion

- Multi-stage auditing approach resulted in very safe infrastructure
- Maximized positive impact of project by reducing road trauma
- Infrastructure protects needs of vulnerable pedestrians
- More work required across enforcement, education, health, management



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-**Strongly recommend multi-stage audit approach** where there are a majority of vulnerable users

-**Development impact** of project **significantly enhanced**