Facilities Engineering Seminar & Expo

Using PPP for asset management of transport infrastructure

7- 9th November 2007

San Diego

Forbes Johnston

Divisional Technical Director

AAPA American Association of Port Authorities

Alliance of the Ports of Canada, the Caribbean, Latin America and the United States

Today's presentation

- The ability of Transport Networks and infrastructure to meet the needs for access
- The importance of maintaining assets
- The consequences of not investing
- Case Study : Portsmouth City Highway Maintenance PPP

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The Importance of Transport Infrastructure

- Platform for transport infrastructure
- Corridor for utilities
- Safe & efficient movement of people and freight
- Essential for economic growth and yield high rates of return
  - private sector productivity gains of 0.04 - 0.25% for 1% increase in road infrastructure investments have been observed
- Trade facilitation, export growth and globalization
- Increase in agricultural productivity
- Improve living standards / Poverty reduction
- Just-in-time inventory systems, express package delivery, e-commerce etc
- Meet the needs and aspirations of our and future generations

Consequences of not investing

- Frustration of policy objectives
- Environment
  - congestion and associated air quality problems
  - fragmenting network
- Economy
  - reduced road space affecting levels of economic activity
  - poor access
  - loss of business confidence
  - impact on tourism & freight
  - increasing cost of delivering a declining service
  - increased costs to businesses resulting from delays
  - cost resulting from the diversion of traffic on to secondary routes

Consequences of not investing

- Safety
  - accidents due to poor quality highways
  - dangerous structures
  - accidents to pedestrians due to trips etc
  - structural integrity of structures results in weight restrictions
  - structural integrity of pavements results in diversions / weight restrictions
  - increased risk of accidents on secondary route diversions
  - crime and fear of crime

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Consequences of not investing

- Integration
  - fragmentation resulting from load restrictions, lane closures and diversions on to secondary network
  - restrictions on public transport routes
  - reduced integration with other forms of transport
- Accessibility
  - poor access for freight movements in and out of markets
  - fragmentation of network
  - social exclusion

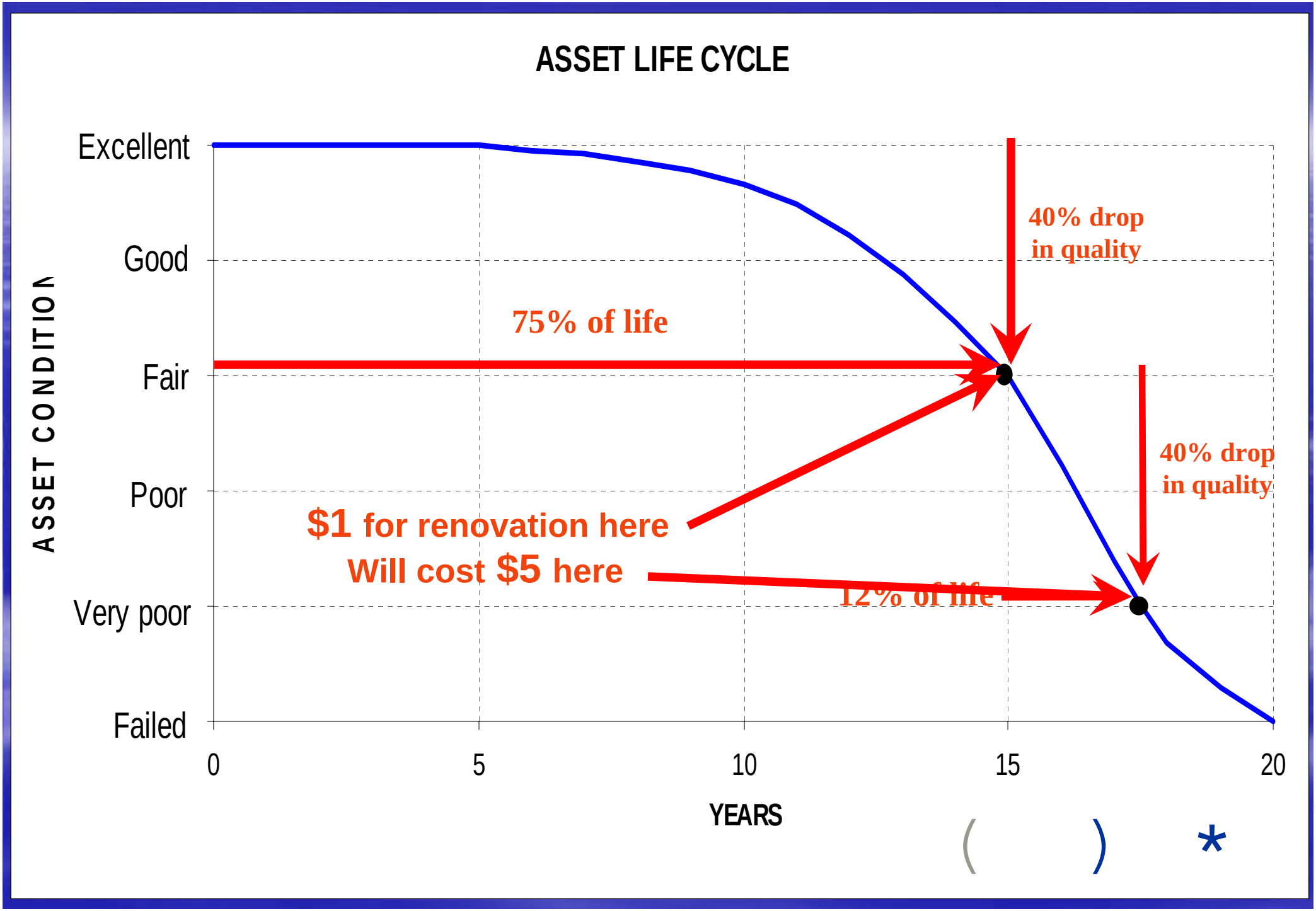
Proposal name	***Sustainable Highway Maintenance and Management for Birmingham City Council***	**Option Description**	*Preferred **Option 7** comprising all services on the City's complete Road Network.*

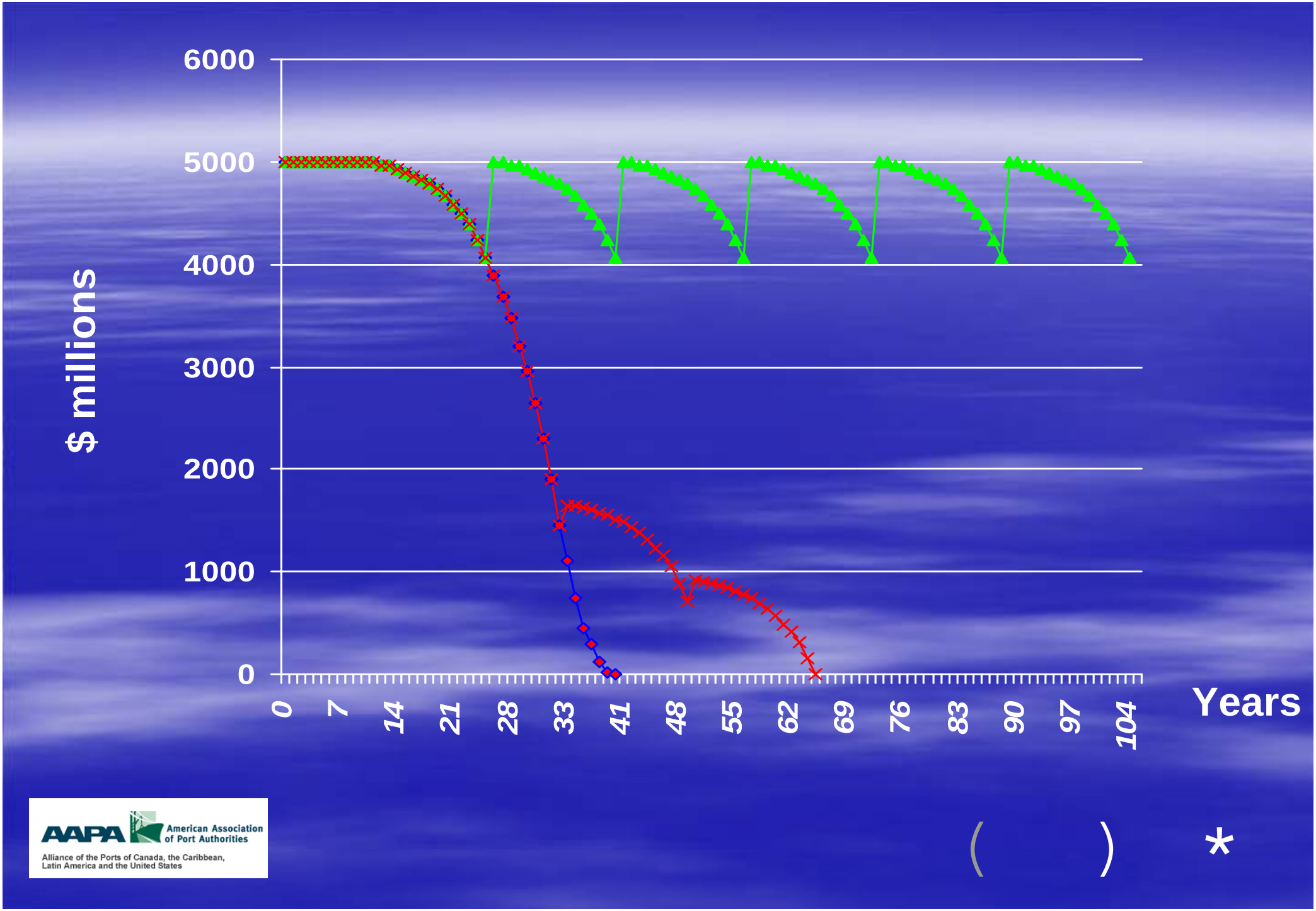
PROBLEMS	*The condition of Birmingham City Council's Road Network has deteriorated to the extent that substantial investment is required in the short term to return the network to an acceptable condition, which is sustainable in terms of current funding.*

OTHER OPTIONS	*Other options which could have been tested include, (1) Credible Do Minimum, (2) Current + intervention funding, (3) Additional funding through LTP & PSA, (4) Principal Road Network only (5) all services on PRN plus selected route , (6) all services on classified network and (7) all service on complete network.*

OBJECTIVES		QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	ASSESSMENT
ENVIRONMENT	**Noise**	*Increase in quality of lighting should result in decrease in crime and a decrease in related noise levels.*	Qualitative effect.	Beneficial
	Local air quality	*Decrease in the fear of crime due to improved lighting standards and footways will encourage people to walk / cycle rather than use vehicles and thus a beneficial effect on local air quality*	Qualitative effect.	Beneficial
	Landscape	*Neutral effect*	Not applicable	Neutral
	Bio-diversity	*Neutral effect*	Not applicable	Neutral
	Heritage	*Neutral effect*	Not applicable	Neutral
	Water	*Neutral effect*	Not applicable	Neutral
SAFETY	**Safety & Crime**	*Currently, there are some 4,000 accidents involving 4,505 casualties including 24 fatalities on the network. Low skid resistance and poor surface characteristics are a contributory factor in accidents and thus bringing the network back to acceptable standard will have marked effect on accident figures. Improvement in lighting standards will also contribute to lowering the accident rate. Lighting in this Option is across the whole network.* *Last year the cost to Birmingham in pubic liability claims was £500,000 and it is anticipated that by the time the project proceeds this cost will, due to deteriorating highway conditions, will have risen to £1 million. Once the scheme proceeds the PL liability passes to the PFI Contractor.* *There are currently some 55,200 night time crimes within Birmingham and assuming a 20% reduction attributable to the street lighting aspects of the scheme produces a £7,003,293 annual saving.* *The total benefit is therefore expressed as the NPV (accidents) + NPV(PL Claims) + NPV (Crime)*	Accidents Deaths Serious Slight ***1250 3 57 1190***	PVB **£185.9 million** Accidents) PVB **£9.8 million** (PL Claims) PVB **£61.8 million** (Crime) PVB **£257.5 million** (Total) **356**% of PVC
ECONOMY	**Journey times & Vehicle op costs**	*Increasing standards in the highway infra-structure would be expected to have a beneficial effect on traffic flow rates and thus journey times.*	Qualitative effect	Beneficial
	Cost	*The cost indicates the NPV of the construction and on-going maintenance costs of this option less the construction and on-going maintenance costs of the "prudent do minimum" alternative.*	Not applicable	PVC **£72.5 million**
	Journey time reliability	*With increasing standards in the highway infra-structure a beneficial effect on traffic flow rates would be expected which in turn may encourage commuters to use public transport.*	Qualitative effect	Beneficial
	Regeneration	*Not investing in the network will result in increasing decay of the network such that reduced road space due to restrictions, diversions and road works will affect levels of economic activity and discourage business to move to or remain in the city thus providing continuing employment.*	Serves regeneration priority area? Development depends on scheme?	Yes No
ACCESSIBILITY	**Pedestrians and others**	*Decrease in the fear of crime due to improved lighting standards and footways will encourage people to walk / cycle rather than use vehicles.*	Qualitative effect	Beneficial
	Access to public transport	*With increasing standards in the highway infrastructure a beneficial effect on traffic flow rates would be expected which in turn will encourage commuters to use public transport.*	Qualitative effect	Beneficial
	Community severance	*Reduction in the number of road traffic accidents crime and fear of crime and improved highway infra-structure is likely to have a beneficial effect on community integration*	Qualitative effect	Beneficial
INTEGRATION	**-**	*This option provides the maximum integration with the City Council and Central Government objectives.*	Qualitative effect	Beneficial

Version of *date* :- ***12th November 2001***	Cost benefit analysis:	PVB **£257.5 m** PVC **£72.5m** NPV **£791.25 m** BCR **3.56**


ASSET LIFE CYCLE
Excellent
Good
Fair
Poor
Very poor
Failed
ASSET CONDITION
0
5
10
15
20
YEARS
40% drop in quality
75% of life
40% drop in quality
$1 for renovation here
Will cost $5 here
12% of life



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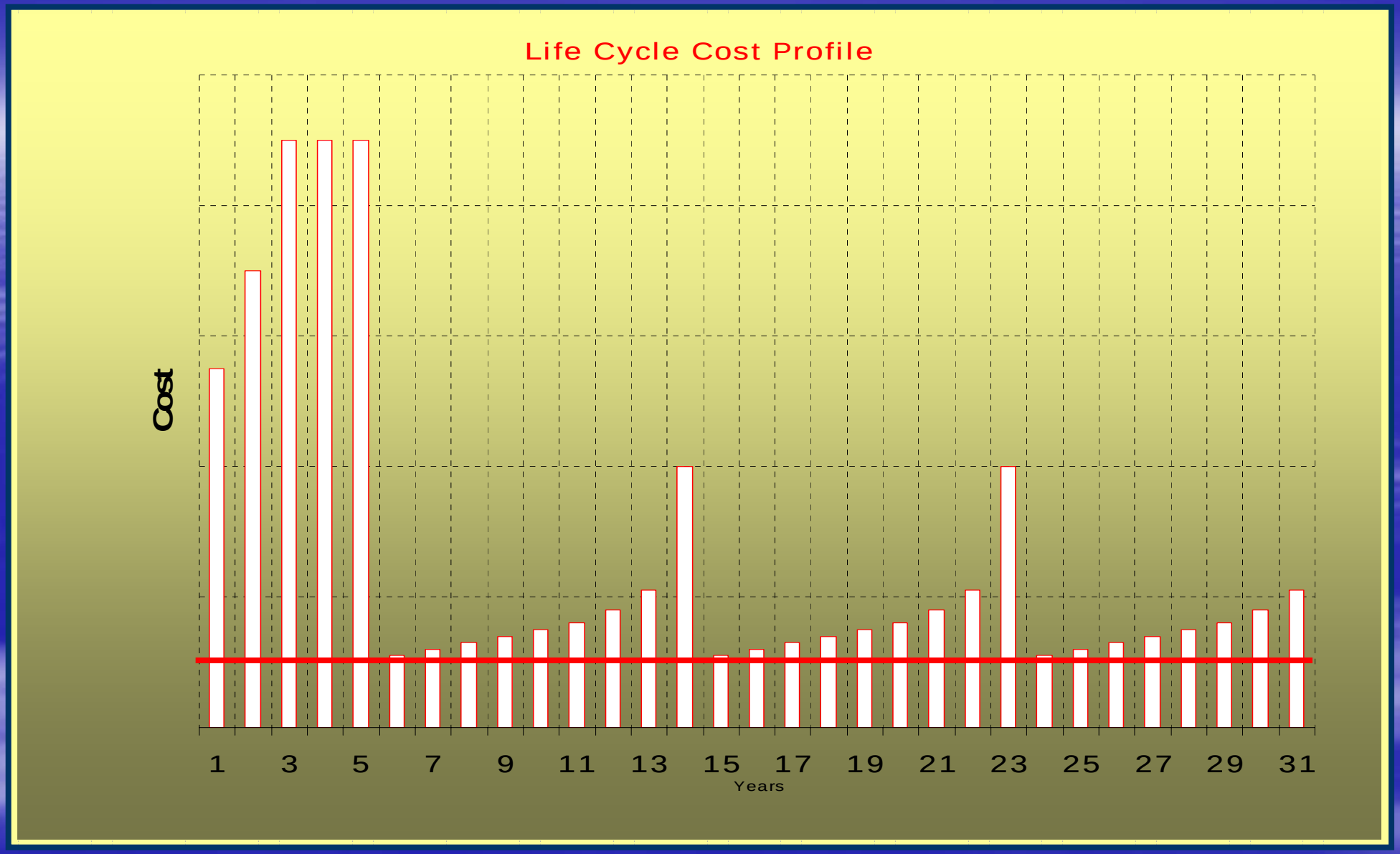

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Examples of the need for Maintenance

Sub-Saharan Africa

- $250 billion spent on new roads 1970-2000
- Maintenance was neglected
- One third of Investment ($85 billion) lost

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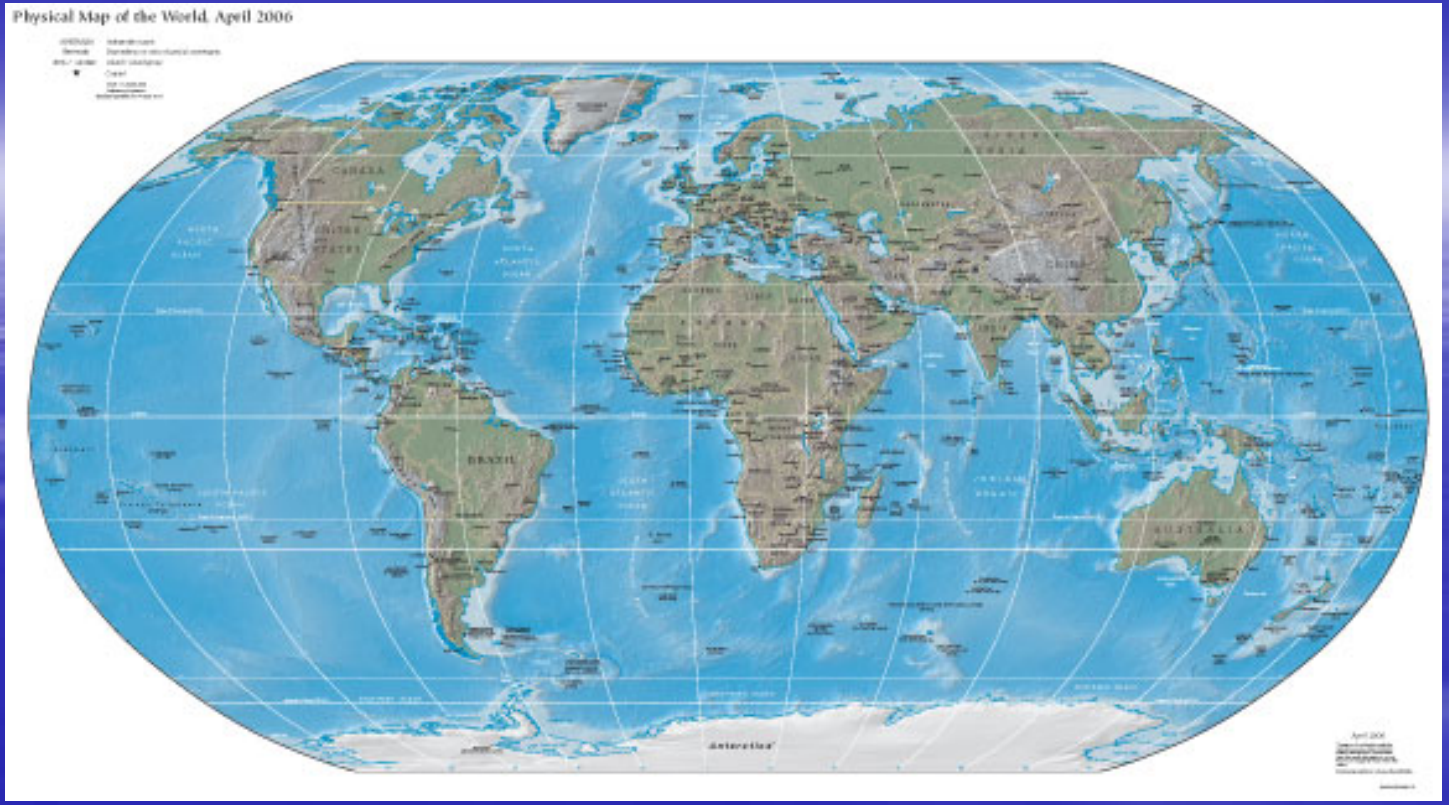

- Analysis in 1985 showed that $20 billion on preventative maintenance would have saved $600 billion on reconstruction
- On average each country wastes $1,000 million on avoidable reconstruction (1985 prices)

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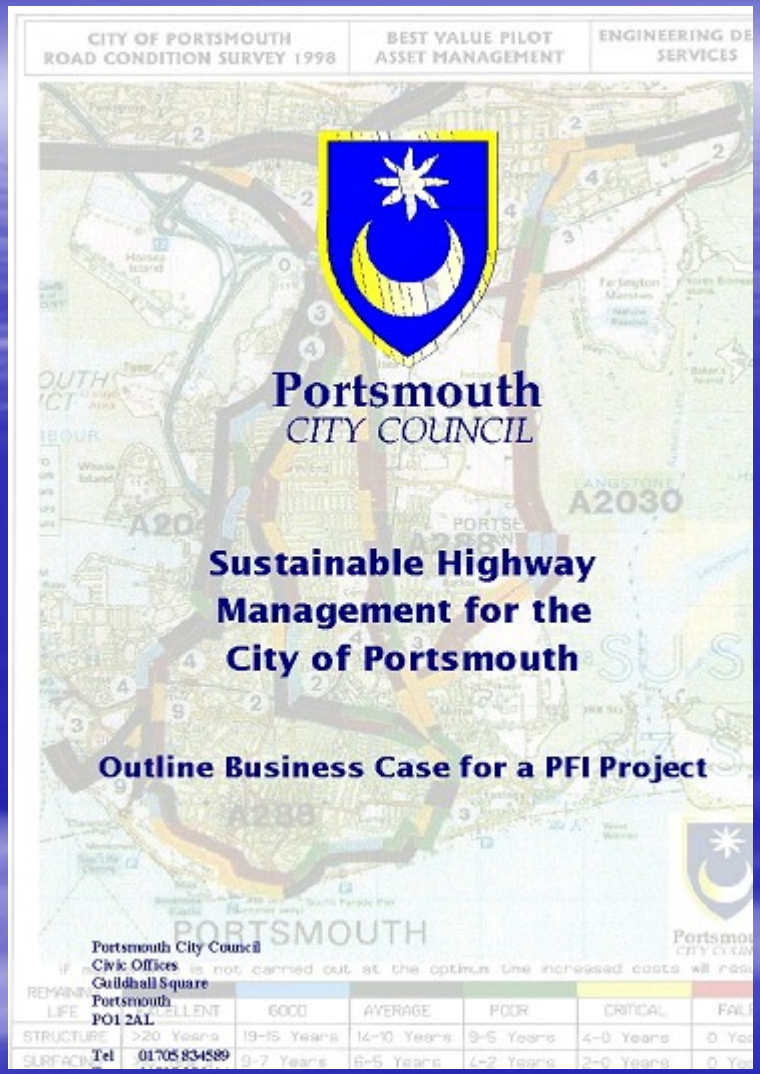

Sustainable and Affordable Highway Management and Maintenance by PSP / PPP / PFI

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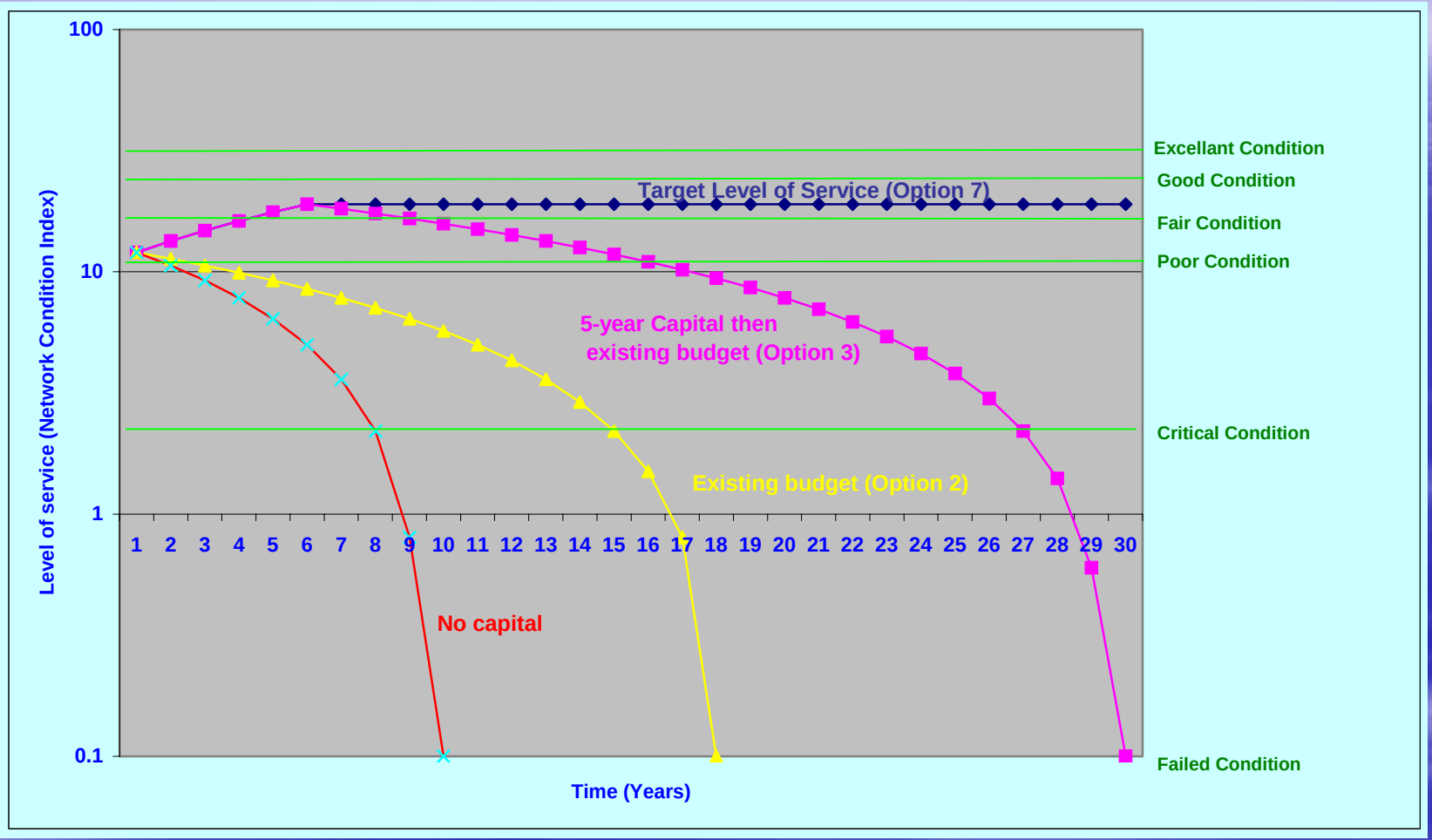
REMAINING LIFE	EXCELLENT	GOOD	AVERAGE	POOR	CRITICAL	FAILED
STRUCTURE	>20 Years	19-15 Years	14-10 Years	9-5 Years	4-0 Years	0 Years
SURFACING	>10 Years	9-7 Years	6-5 Years	4-2 Years	2-0 Years	0 Years
%	32	6	5	9	26	22

The Problem

- 470 Km road network
- 22 % of PRN failed condition
- 26% critical condition
- Local Transport Plan sets out capital investment of $50 million to recover backlog
- Capital budget $2 million

Expected levels of service



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Project Objectives

- rehabilitation of Highway Network
- implementation of an affordable and sustainable maintenance regime
- policy flexibility
- flexibility to meet changing demands of the highway asset
- implementation of “best value” regime
- optimisation of lane availability
- safe passage
- reduction in the number of third party claims

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Network Condition Index

Network Condition	Years left	SCI	Years left	SRI	Years Left	PCI	NCI	Comments
Excellent	> 10	**5.00**	> 10	**5.00**	>20	**20**	**30.0**	Network in excellent condition
Good	7 - 9	**4.00**	7 - 9	**4.00**	15 - 20	**17**	**25.0**	Network in good condition
Fair	5 - 6	**3.30**	5 - 6	**3.30**	10 - 15	**12**	**18.6**	Network in fair condition… but may need some light patching and/or surface dressing
Poor	2 - 4	**2.40**	2 - 4	**2.40**	5 - 10	**7**	**11.8**	Network in poor condition… but needs some heavy patching or an inlay and/or surface dressing
Critical	0 - 2	**1.20**	0 - 2	**1.20**	0 - 5	**2**	**4.4**	Network critical…some reconstruction required
Failed	0	**0.80**	0	**0.80**	0	**Minus 1**	**0.6**	Network failed…complete reconstruction required

Optimum level of service determination

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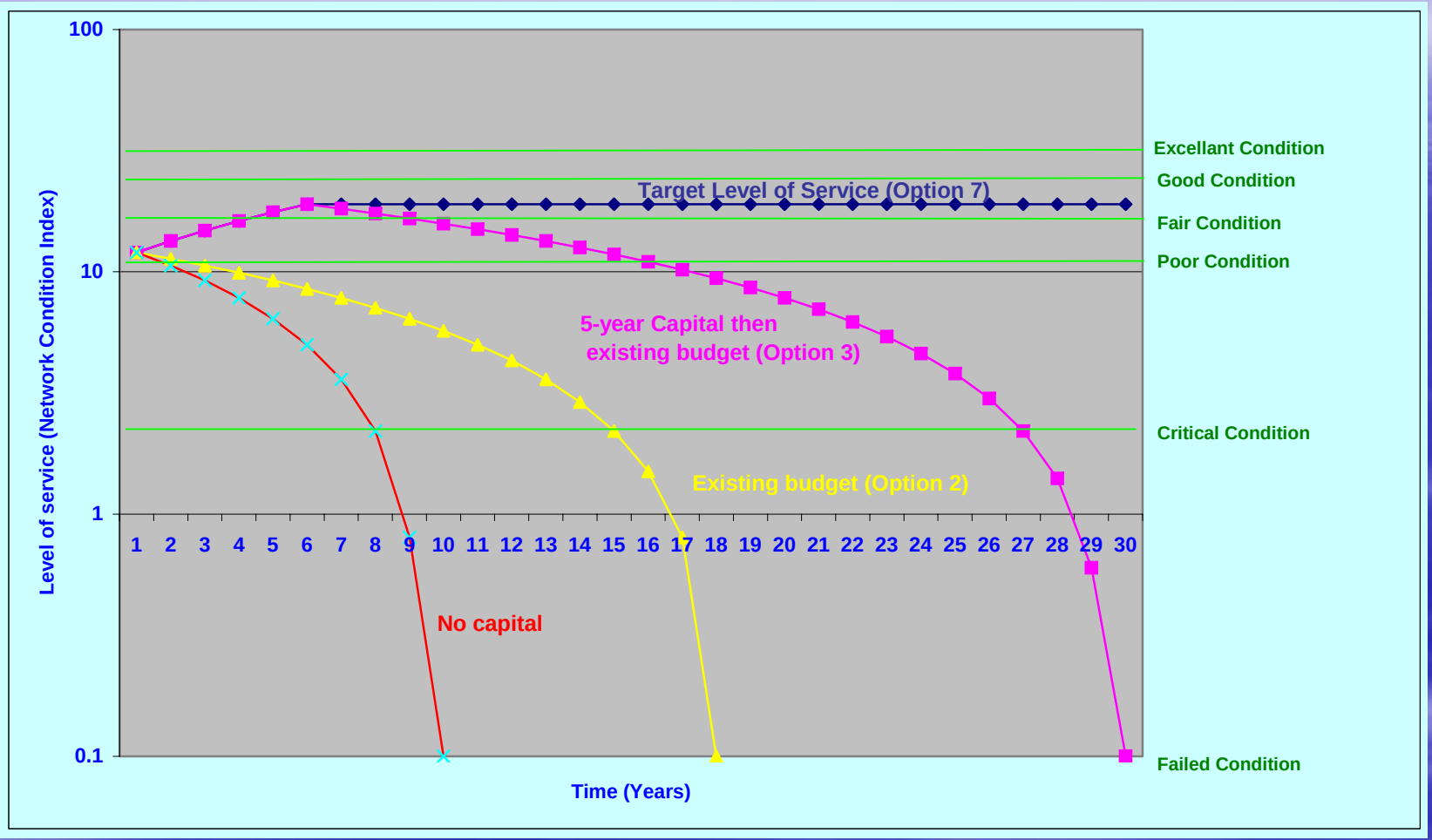
Expected levels of service



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Performance Specification

- Major :
  - Network Condition Index
  - Structures
    - no structures to fail assessment criteria after 5 year Core Investment Period
  - Street Lighting
    - No street lighting columns to have remaining life less than 8 years
- Minor
  - **no potholes**
  - **no trips**
  - **no dark lamps**
  - **puddle free**
  - **ice & snow free**
  - **accidents : road opened within 30 minutes**
  - **emergency : 1 hour response**

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Who is responsible for highway availability?

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Is there a defined street furniture location policy?

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How deep can standing water on the Highway be?

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Innovation can be surprising

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Is this a homing pigeon (novel way of remote monitoring) or just poor cleaning?

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Contract Monitoring

- Based on the principal project objectives
- Network Condition Index (six monthly/annual)
  - structural condition - deflectograph / FWD
  - road safety - SCRIM
  - asset health - CVI Surveys
- Monitoring & comparison at micro / macro levels
- Self supervision
- Random Audit (technical / quality / financial)

Tariff Mechanism

"Tariffs should be designed to give strong incentives to deliver project objectives and should be based on the level of service provision"

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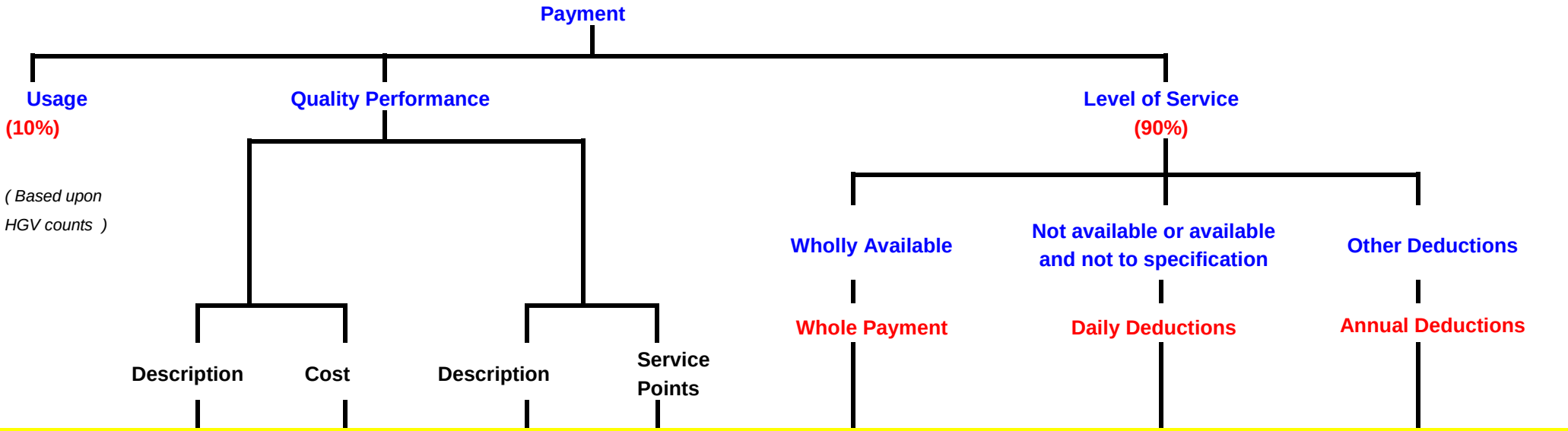
Payment Mechanism



Why long term contracts deliver better value.

- removal of annuality
- whole cycle costing
- spend to save
- output specification
- strategic procurement
- supply chain management
- budget certainty
- risk transfer
- Concession length must be greater than life of major asset element

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