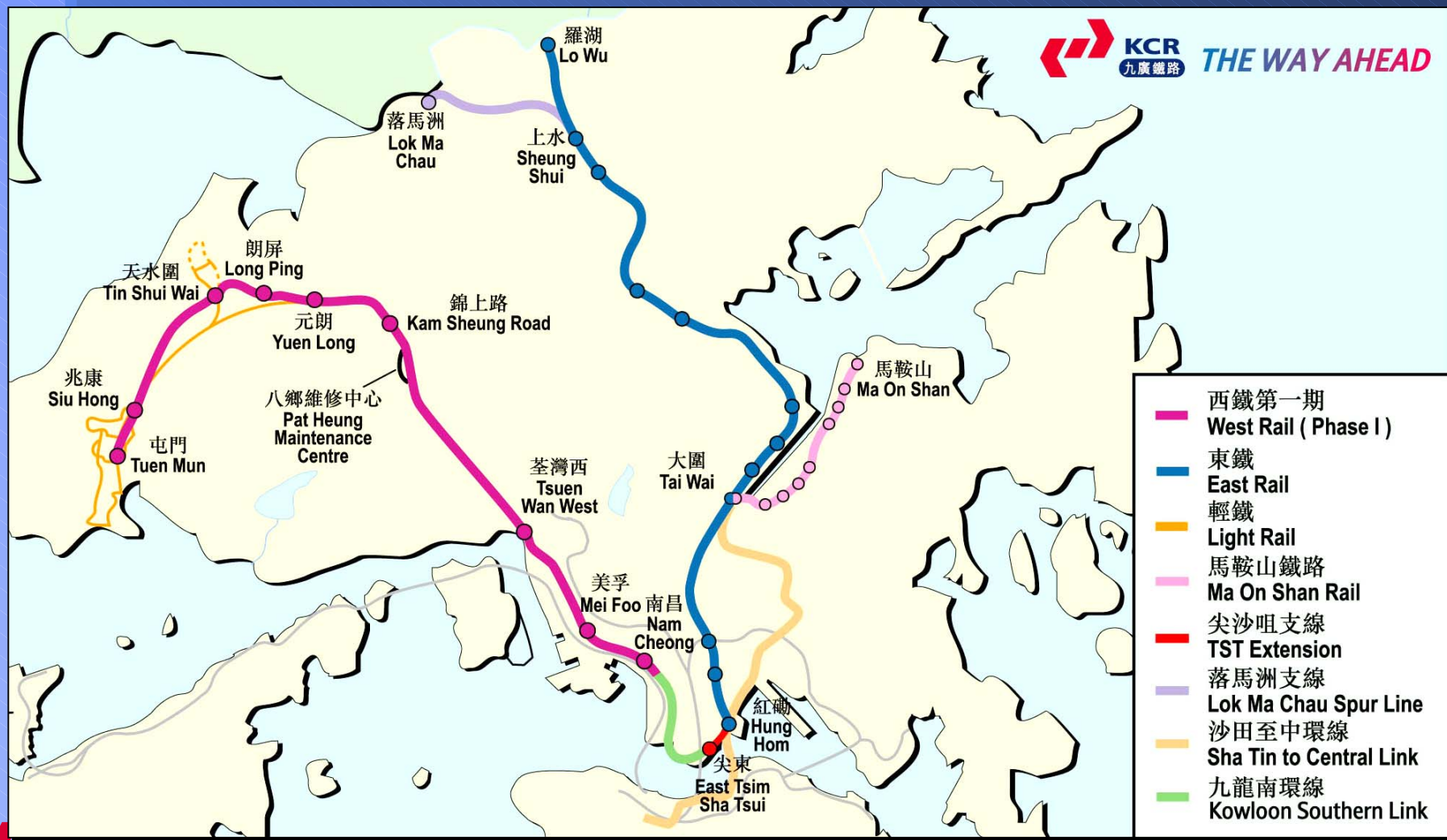


Railway Systems for West Rail Project

Route Map



Rolling Stock and Infrastructure



Control and Comm. Systems



Automatic Revenue Collection



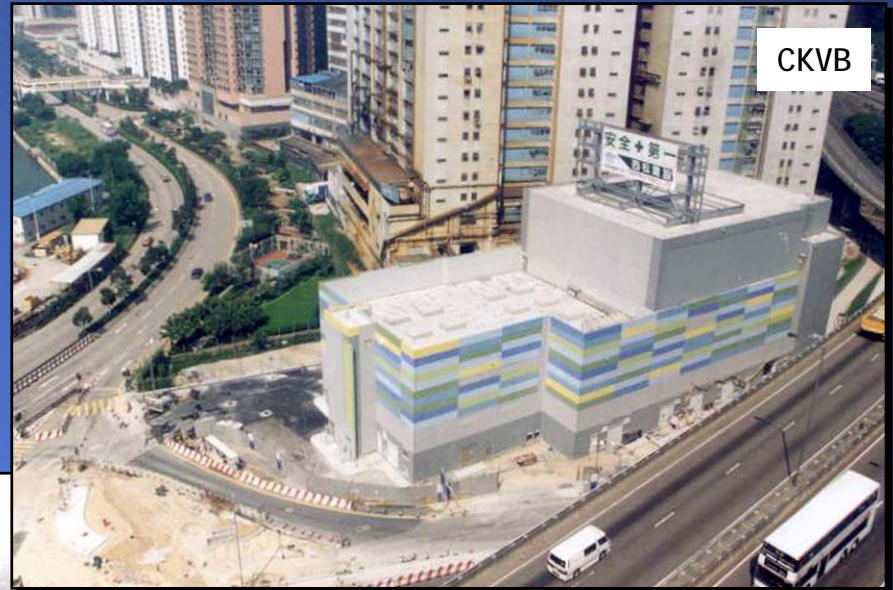
Elect & Mech. Systems



Key Challenges – the Market



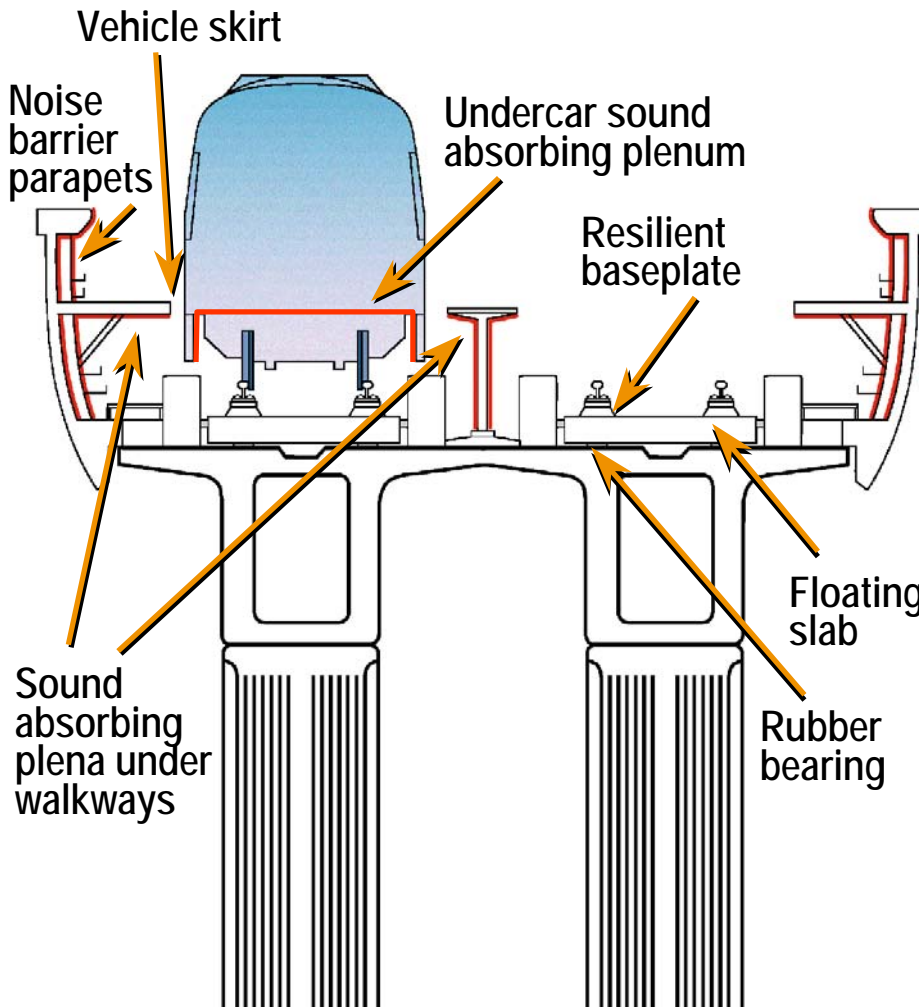
Key Challenges – 5.5km Tunnel



Longest Viaduct



Key Challenge - Radiated and Re-radiated Noise from Viaduct



Viaducts

- Stiff structure with short spans (35m) and deep deck section
- Dense concrete parapets
- Side & central walkways creating noise plena
- Noise absorptive material applied to surfaces

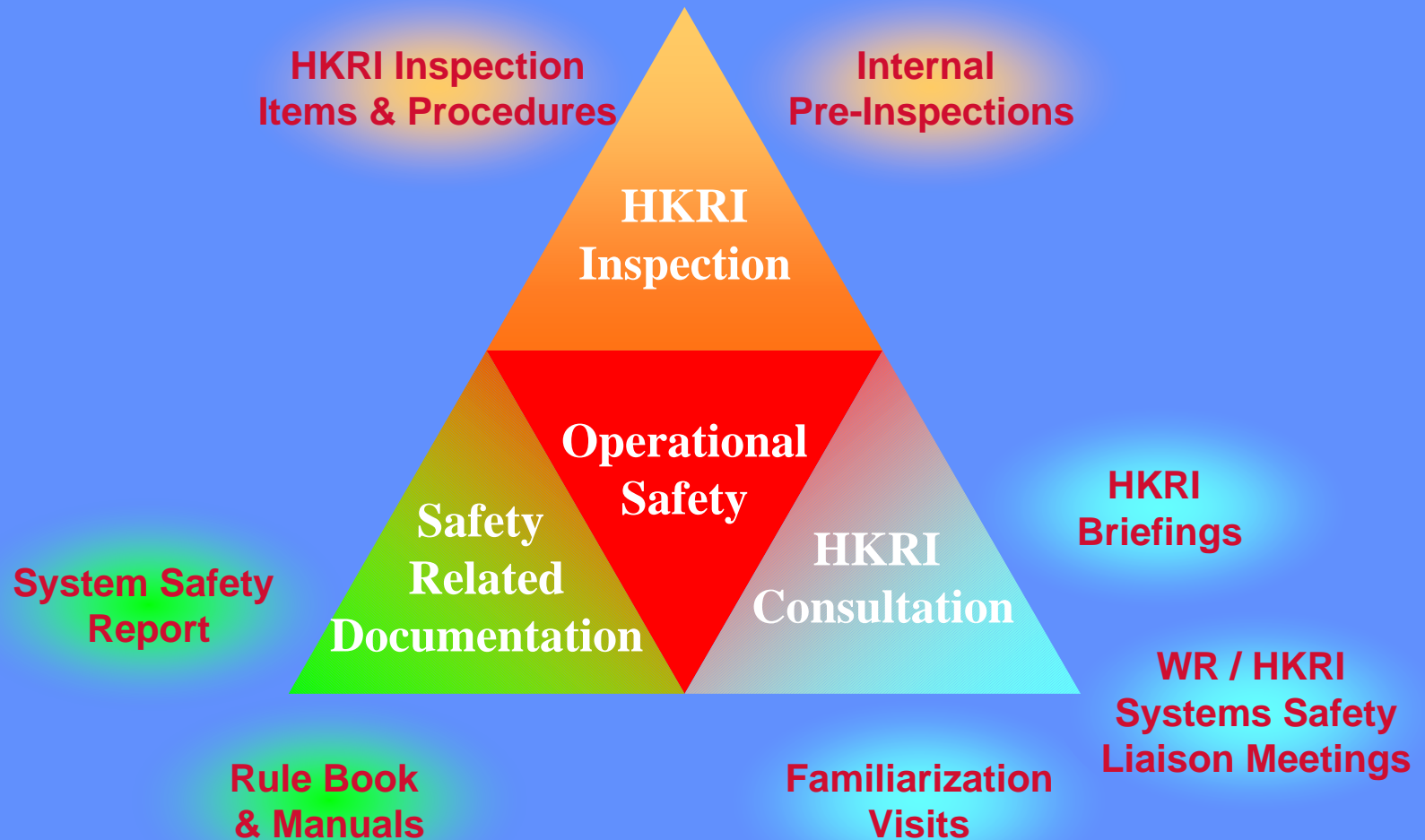
Trackform

- Floating track slab on resilient rubber bearings
- Resilient rail fastenings

Trains

- Long skirts to cover wheels
- Low noise traction motors, air-condition units and transformer blowers

Key Challenge – Demanding Safety & Reliability Standards



Design Strategies

- Value Engineering for Optimal Solution
- Early Involvement of Stake Holders
- Computerized Requirements Management
- Computer Simulation Techniques
- Adopt Latest but Proven Technologies
- Simple and Fault Tolerant Design

Procurement Strategies

- Minimum Interface yet Competitive Contract Packaging
- WTO GPA Compliant Procedures
- Industry Survey for Best Practicable Solutions
- Participative Funnel PQ Process for Critical Systems Requiring Great Certainty
- Technical:Price Rated for Sophisticated Sys

Contract Management System

- A Strong In-house PM & Engineer Team
- Ad hoc Specialist Consultant
- Partnering with Contractor For Early and Effective Problem Solving
- Independent Dedicated Teams for
 - System Safety Assurance
 - Software Assurance
 - Programme, Cost and Quality Control

Installation & Integration Strategies

- Active Co-ordination and Control by the Engineer's System Integration Team
- Interface Management Plan
- Detailed Interface Document
- Close Monitoring on Sub-contractors Also
- Monthly Staff Award Promoting
"Zero Defect & Perfect Performance"

Testing & Commissioning Strategies

- Factory Acceptance Test
- Partial Acceptance Test on Site
- System Acceptance Test on Site
- Test On Completion Checking Out
Inter-operation Functionality Across Multiple
Systems
- Tare / Full Load and Abnormal Operation

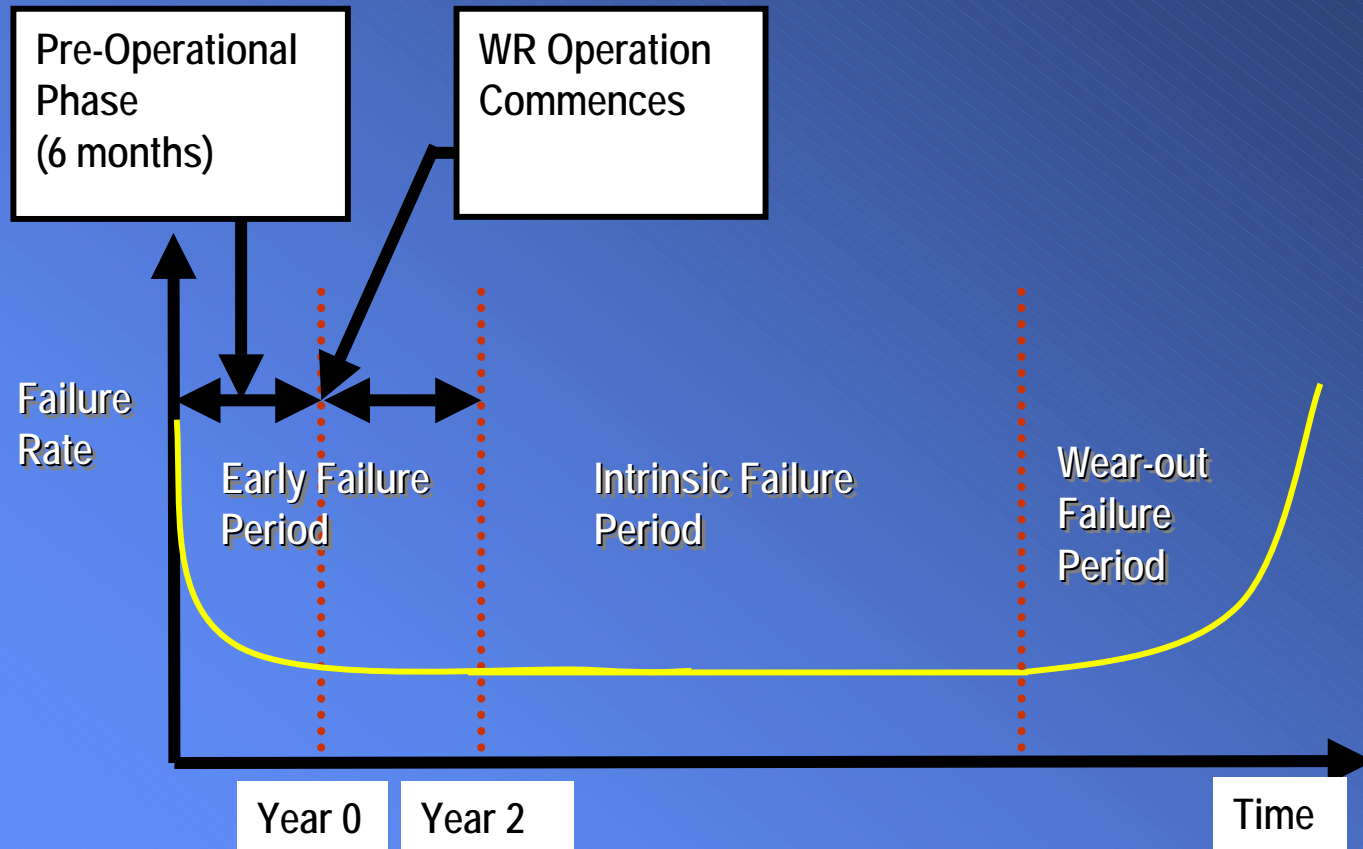
Load Test



Trial Operation Strategies

- Useful Hands-on Experience for O & M
- Collect Feedback Actively for Fine Tuning
- Allow Enough Time for Burning-in
- Contractors' Specialists and Spares on Site
- Achieve 6 Weeks of 95 - 100% Punctuality as Proof of Passing the First Phase of Bath Tub Curve

The Bath Tub Reliability Curve



The Result

