Incorporating Climate Risk into Performance-Based Contracting

Risk Assessment Framework
ADB Workshop: August 16th 2017

ARUP

Agenda

1.	Introduction and Objectives	30min
2.	Assessment Framework Overview	30min
3.	Risk Assessment Example/Exercise	30min
	Coffee Break	10min
4.	Performance Based Contracting	20min
5.	Contracting Case Study/Exercise	30min
6.	Q & A Discussion	30min
	Lunch	60min
7.	Risk Allocation Exercise (Optional)	90min

Project Overview

Team

World Bank
- Fiona Collin – Project Manager
- Chris Bennett – Co. Project Manager

Asian Development Bank
- Jay Roop – Project Lead
- Karma Yangzom – Project Coordinator

Arup
- Lisa Dickson – Project Director/ Climate Change Specialist
- Yana Waldman – Project Manager/ Contracting Specialist
- Samantha Stratton-Short – Local Context/ Resilience Specialist

Contributing Arup Team Members from:
- Hong Kong
- Australia
- South Africa
- Colombia
- Peru
- Spain
- United Kingdom
- United States

Project Overview

Project Objective

The World Bank is conducting this research with the objective of:

1. Developing guidelines to assess, assign, and price the risk of climate change in PBCs for roadways

2. Developing performance standards for PBC projects that address climate change impacts

3. Understanding global barriers to implementing climate adaptation methodologies in roadway projects

Development of Scalable Assessment Tool

- Future application may expand to other transportation asset types beyond roadways

- Beta version of tool to focus on Roadways due to breadth of data, global applicability and design complexity

Project Overview

Strategy

The Challenge

- Climate risk is difficult to identify, quantify and project since historic data does not reliably represent future climate
- Climate change presents serious challenges to maintenance and operations and long-term viability of roadway assets
- By not sufficiently accounting for climate change, the economic and social benefits of a project will not be fully realized

The Proposed Solution

- Determine how climate risk can be integrated into PBC to minimize this risk taking into consideration the criticality of the facility and overall exposure
- Determine how transparent that risk is from a contractual perspective and who owns that risk during and after the execution of the contract

Project Overview

Study Process

Background Research

- Literature Review to understand current best practices for climate impact assessment
- Evaluation of global roadway Design Standards and Guidelines to determine current climate consideration
- Interviews with assorted industry stakeholders
- Project Case Studies
  1. Enhancing the Climate Resilience of Africa's Infrastructure: The Roads and Bridges Sector
  2. Climate Change & Extreme Weather Vulnerability Assessment Framework: US Federal Highway Administration
  3. The 2012 Guideline for transportation agencies interested Plan of Adaptation for the Primary Road Network: Colombia
  4. Climate Change and Infrastructure Impacts: Comparing the Impact on Roads in Ten Countries through 2100

Industry Stakeholders		
Asian Development Bank	David Ling	Asia
Ministry of Transport	Cristian Chaparro	Colombia
National Roads Administration	Irene Simoes	Mozambique
Opus - Developer	Rowan Kyle	New Zealand
Cintra - Developer	Confidential	Spain
Laing - Developer	Mark Westbrook	UK
ReFocus – Investment Strategist	Shalani Vajjhala	US
Willis Towers Watson – Insurance	Rhys Newland	UK
Resilient Analytics	Paul Chinowsky	US
German Development Agency	Jeanine Corvetto	Peru

Workshop Objectives

- **Simplify inputs for risk-based decision-making tool**
  - Characterize the sensitivity drivers leading to failure
  - Distinguish the criticality drivers for roadway assets
  - Establish future climate scenarios and time horizons

Risk Identification

- **Discuss roles and responsibilities for best incorporating climate risk into PBC**
  - How much risk should the contractor absorb
  - How to measure risk and structure KPIs
  - How to balance risk assignment and ownership
  - Over what time horizons should risk be assigned

Risk Allocation

- **Explore how climate risk is integrated into contracting**
  - How will project logic and decision-making tool outputs be applied to real world projects
  - Feedback to be collected regarding strengths and weaknesses of this approach in relation to ADB contracts

Contract Augmentation

Effect of Climate on Roadway Contracts

Theory behind the Assessment Tool

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Contextualization of Climate Risk

Geopolitical Risks

- War
- Trade disruption
- Energy security

Market Risks

- Prices
- Exchange rates
- Interest rates

Institutional Risks

- Political
- Financial
- Regulatory

Industry Risks

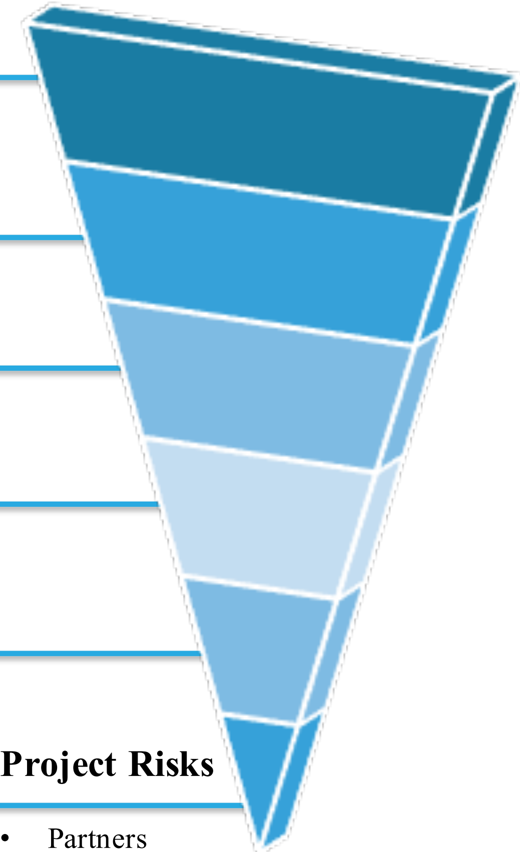
- Demand
- Supply
- Competition

Natural Risks

- Geology
- Climate
- Weather

Project Risks

- Partners
- Contractors
- Execution



Indirect Influence ↔ **Direct Influence**

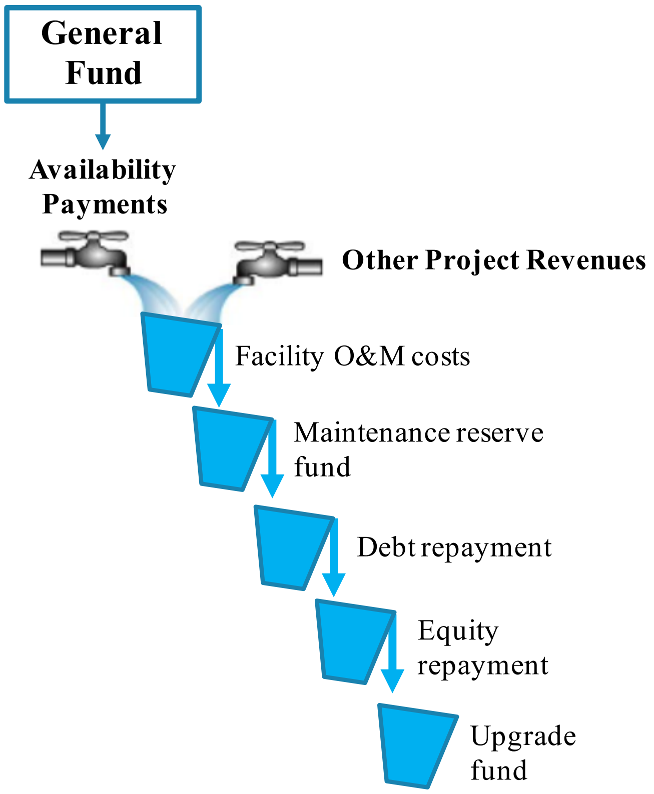
Contextualization of Performance Standards

Availability Payment Deductions

Availability Payments pay back initial investment and ongoing O&M needs

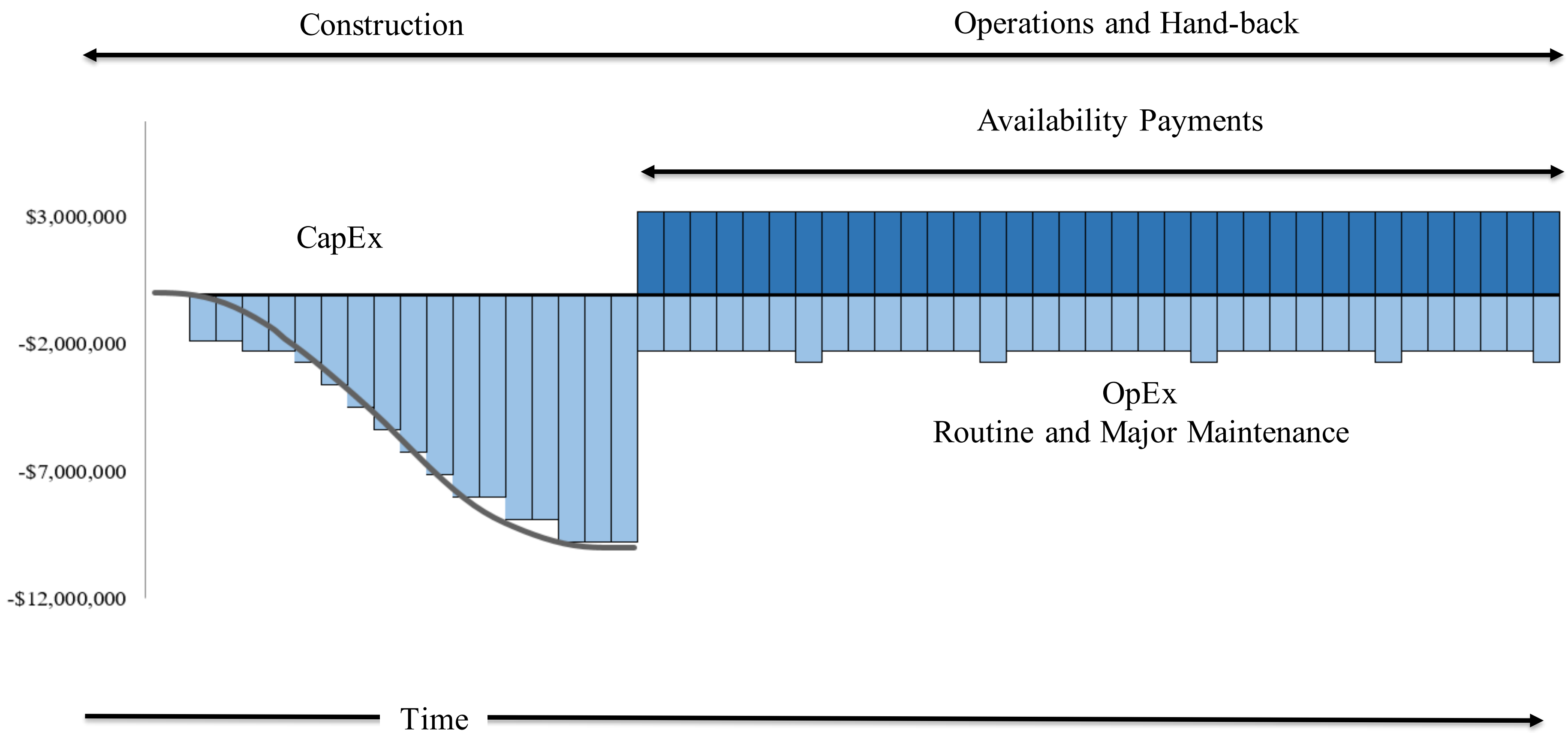
- Sequence of payments prioritizes ensuring the asset is **available for use** and kept in **good repair**
- Subject to **deductions** for shortfalls in performance
- Costs associated O&M and major repairs directly impact reserves for **debt repayment**

Reduced Availability Payments will directly impact Financial Performance and long term viability of an Asset



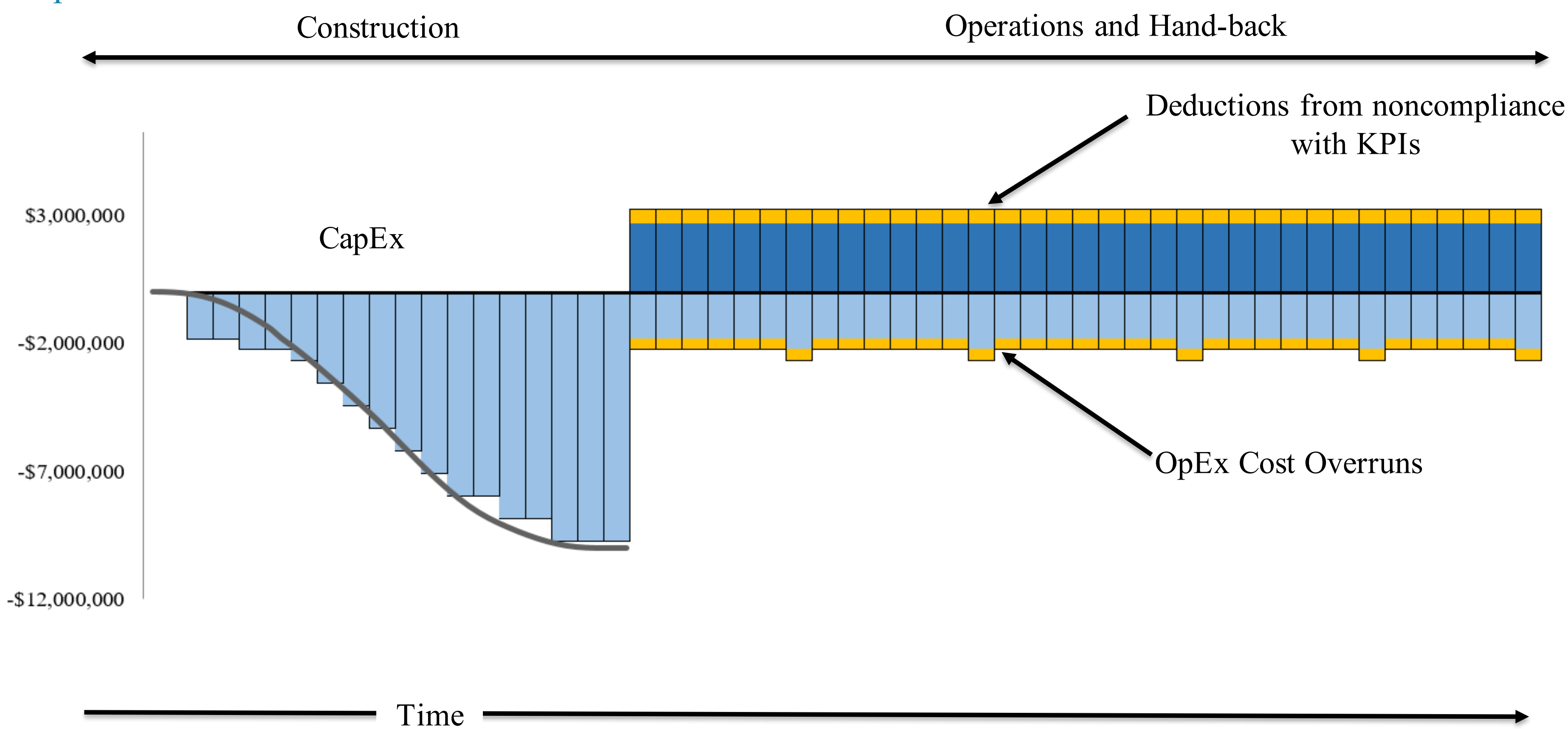
Performance Based Contracting Model

Traditional Cash Flow



Performance Based Contracting Model

Impacted Cash Flow



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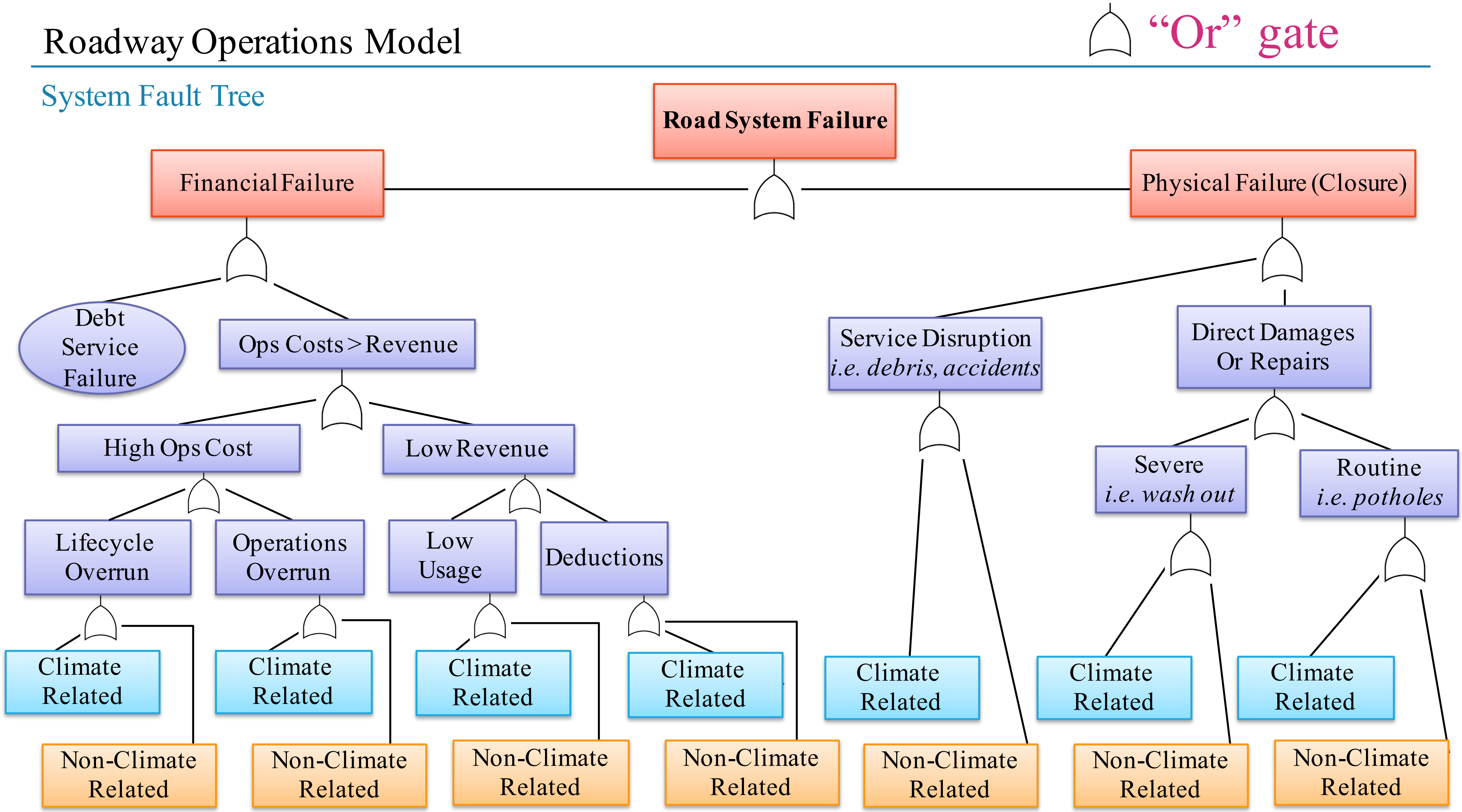
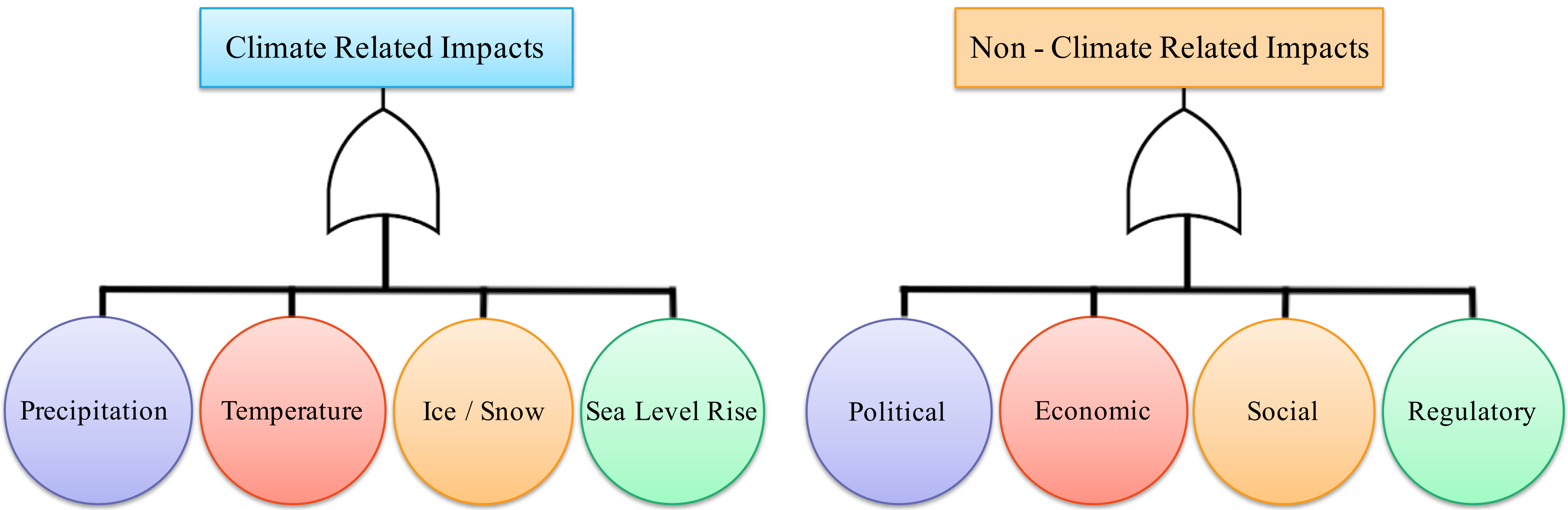
Roadway Operations Model

System Fault Tree



Roadway Operations Model

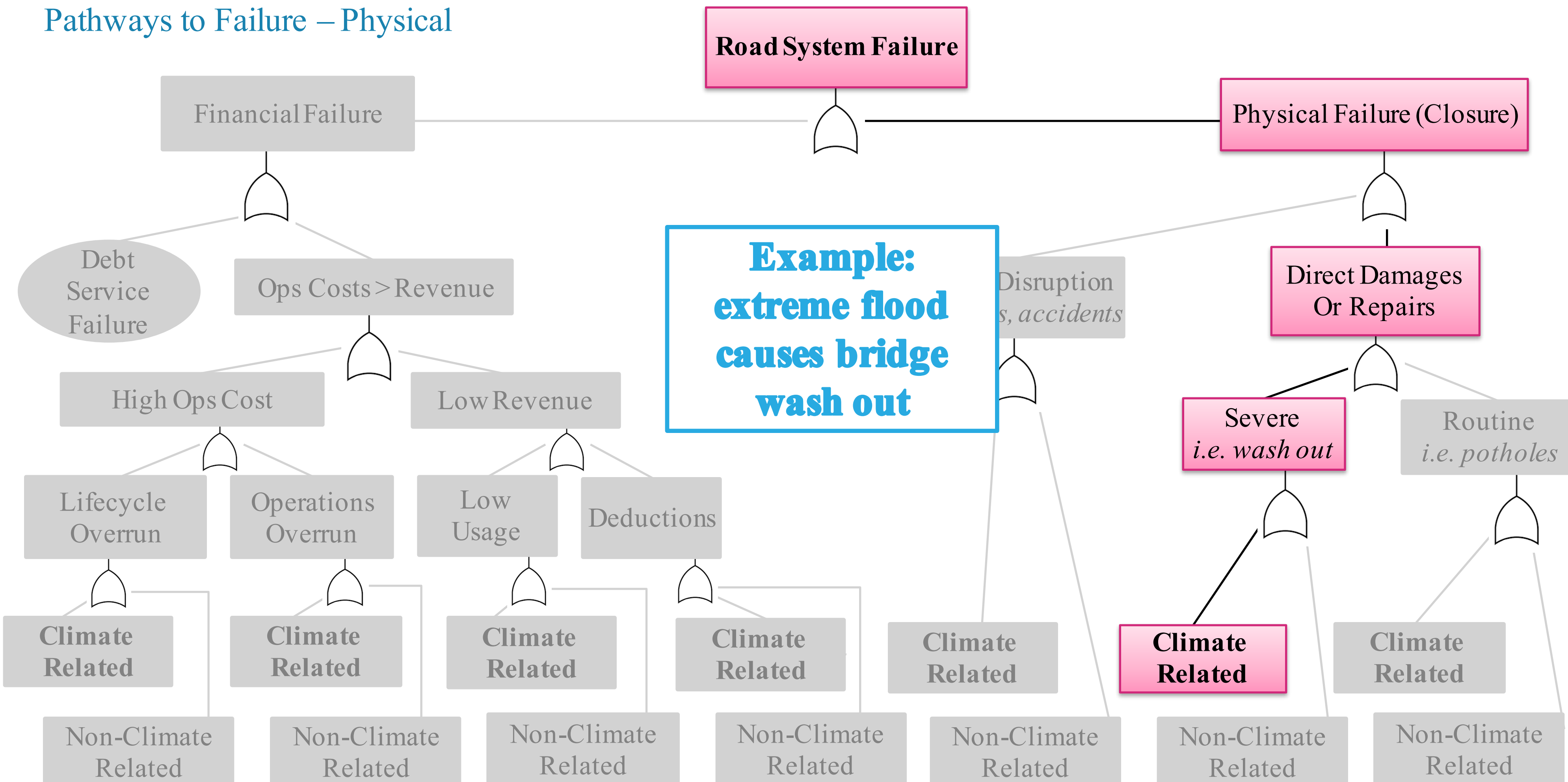
Failure Drivers



Roadway Operations Model

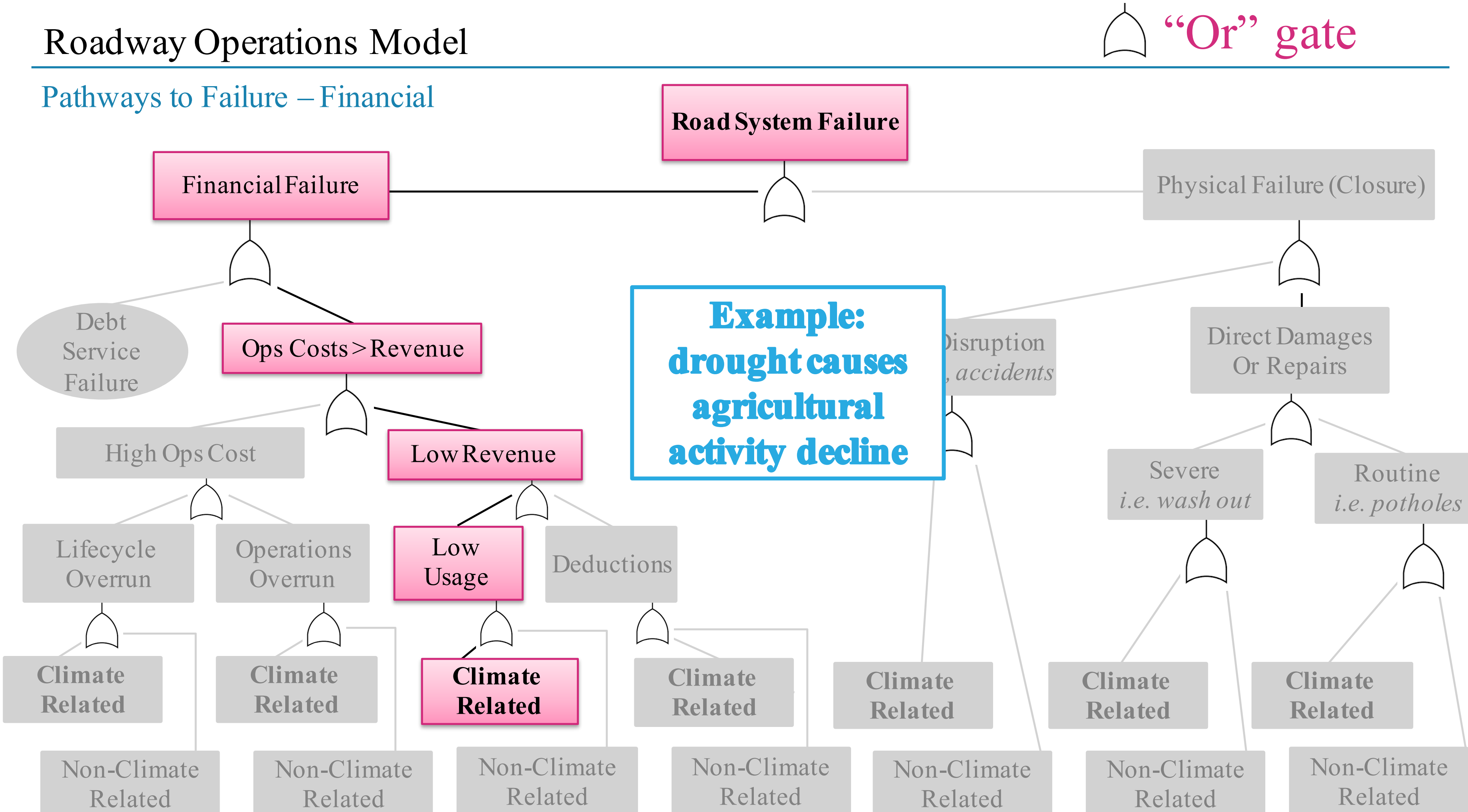
“Or” gate

Pathways to Failure – Physical



Roadway Operations Model

Pathways to Failure – Financial



Objective 1: Risk Identification

Assessment Framework Strategy

Understand "Levers" available for Risk Mitigation

1. **Design Guidelines**

Determining which **design parameters** best measure the ability of an asset to perform with greater resilience to variable climate patterns through an extended contracting period.

Example: roadway shoulder exceedance

2. **Key Performance Indicators (KPIs)**

Determining which **indicators** best measure the ability of an asset to perform with greater resilience to variable climate patterns through an extended contracting period.

Example: lane closures from flooding

Define Climate-Related Failure Drivers

- **Precipitation**
  - Roadway runoff
  - Riverine flooding

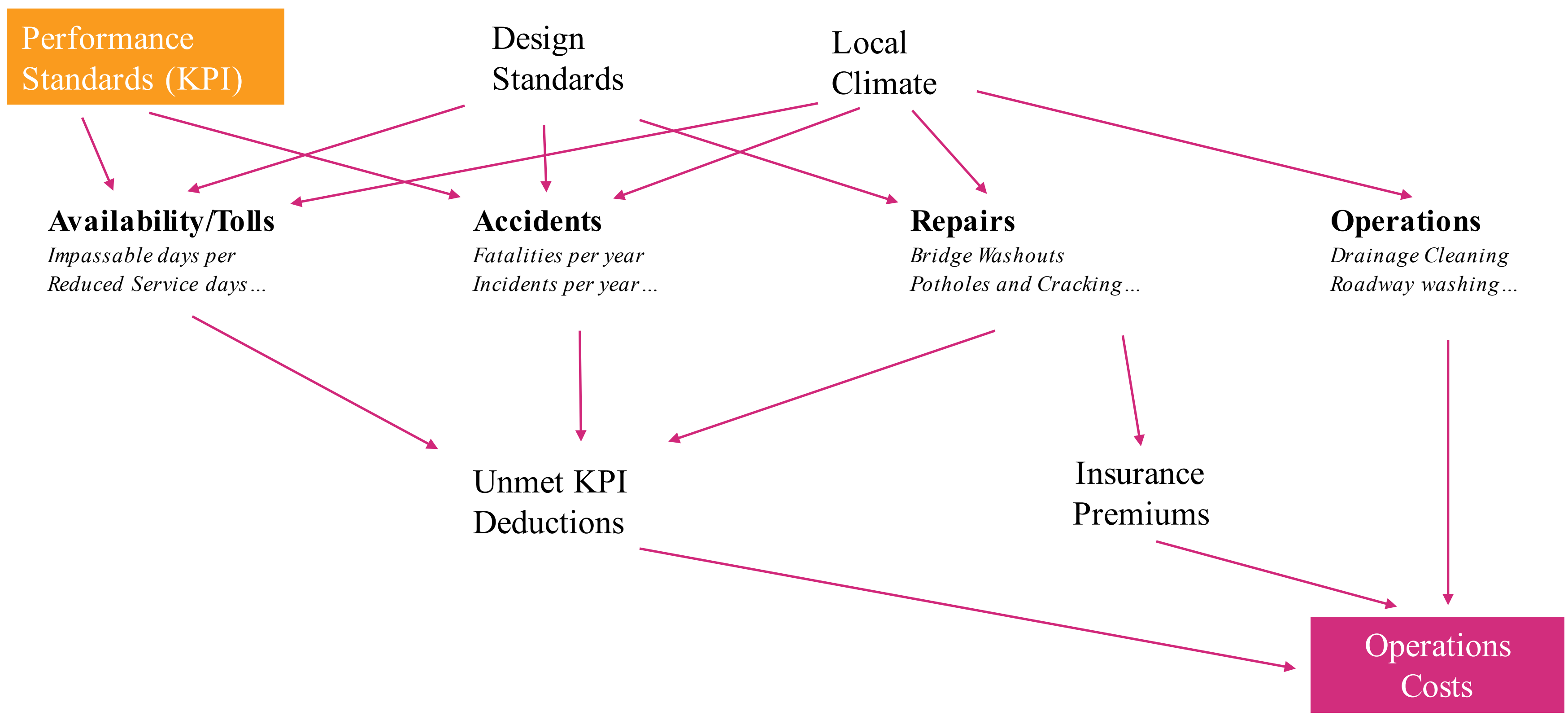
- **Temperature**
  - Extreme heat
  - Extreme cold

- **Ice / Snow**
  - Deterioration

- **Sea level rise**
  - Coastal Flooding

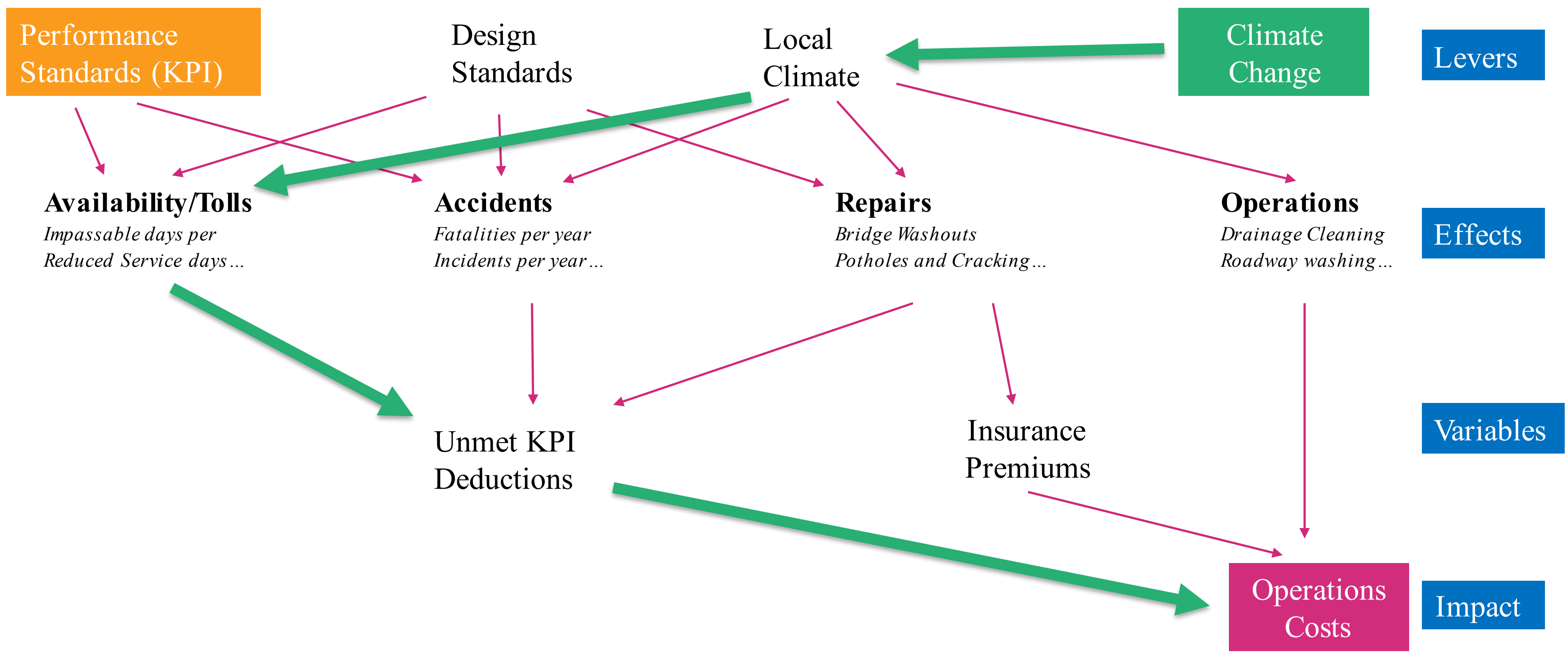
Failure Drivers

Roadway Operations Model (conceptual)



Failure Drivers

Roadway Operations Model with Climate



Overview of Assessment Tool

Stress Test Model

Sensitivity → Criticality → Exposure → Consequences → Mitigations

Step 1

Roadway segment

Identify location, materials and other relevant parameters

- Sensitive
- Not Sensitive

Step 2

Assess Front-end criticality

Economic
Social
Accessibility
Reliability
Predictability

- Critical
- Important
- Not Critical

Step 3

Climate Parameters

Planning Horizon (pre-determined)
GCM Emission Scenario

- Effected
- Not Effected

Step 4

Potential Impacts

Availability
Accidents
Repairs
Operations Costs

- High Impact
- Moderate Impact
- Low Impact

Step 5

Output

This would inform the standards that would be stipulated in the PBC

- KPIs
- Contract Language
- Design Standards

1. Asset Sensitivity

Physical Definition

Location
- GPS Location (for climate data)
- Country (for design standards)

Components
- At Grade
- Bridge
- Cut
- Fill
- Tunnel
- Viaduct

Design
- One lane, no shoulders
- One lane, dirt shoulders
- One lane, paved shoulders
- Two lanes, no shoulders
- Two lanes, dirt shoulders
- Two lanes, paved shoulders
- (continue for up to 4 lanes)

Material
- Paved
  - Bituminous
  - Concrete
  - Other
- Unpaved
  - Dirt
  - Stone

Terrain

Per standard design guidelines:
- Flat
- Rolling
- Mountainous

Proximity

Distance to water bodies:
- Coastal
- Riverine
- Flood Plains
- Channels

Geology

Soil condition
- Rock
- Silt
- Sand
- Clay

Drainage
- No ditches
- Ditches – dirt
- Ditches – treated
- Culverts

2. Asset Criticality

Usage Definition

Economic
Does this road
- Connect commercial hubs?
- Serve as a route for goods?
- Provide access to employment?

Redundancy
- Is there another road/alternative route nearby?
- Will any community or resource be isolated by road loss?

Volume
- Revenues
- Average Daily Trips
- Level Of Service

Class
- Local only
- Collector road
- Regional
- National

Social
Does this road provide direct access to
- schools?
- hospitals?
- daycares, eldercare or related facilities?
- police or fire stations?

Infrastructure
Does this road provide direct access to significant
- energy utilities (e.g., substations)?
- telecomm utilities?
- water utilities?
- wastewater utilities?

Significance
Is this roadway of regional or national significance?
Does this road provide direct access to significant
- community or cultural resources?
- parks or recreational areas?

2. Asset Criticality

Case Study: Bangkok Floods

Transport Infrastructure as a System

Integrated approaches to planning transportation infrastructure will take into account impacts of infrastructure on the wider urban catchment – including drainage and surrounding land uses.

- City transport networks that are sufficiently flexible, diverse and supported by comprehensive contingency planning can experience better function and continuity during a major shock or stress event.
- Most cities are made up of many municipal authorities who control various local aspects of disaster response. Effective, integrated planning, coordination and management across municipal boundaries (for example, decisions to open or close local flood gates) is critical to ensure decision-making considers the collective interests of the wider urban catchment.
- In some cases, there is a need to weigh decisions to protect one city system or location (for example – stringent flood protection of the international city airport and central business district) against the potential for negative consequences elsewhere (in this case – damage and disruption to vulnerable communities within flood plains). Disaster scenario planning and modelling can help to better inform these choices ahead of time.

3. Asset Exposure

Climate Stress Definition

Planning Horizon

- Categories will be automated based on criticality score (and potential consequences)
- Will need to prioritize based on how they are weighted with respect to criticality score (and potential consequences)

Determine horizon with WB based on PBC

(1) what horizon makes sense – 20, 30 years out?

(2) is this a static or flexible horizion?

Impact Type

- Precipitation (rainfall, runoff, flooding)
- Temperature (extreme heat, extreme cold)
- Ice / Snow (winter storms)
- Coastal Flooding (SLR / Storm Surge)

Determine absolute vs. relative values

Emission Scenarios

- GCMs and Emission Scenario (RCP) – Determine which to use for each alternative.
- Tailor RCPs for their sensitivity with respect to country and impact type (i.e., some are better at predicting precip than temp, work better in southern hemisphere vs. North Atlantic, etc.)

Highest Risk - RCP 8.5 – 5^{th}, 50^{th}, 95^{th} Percentiles

Moderate Risk – RCP 6.0 – 5^{th}, 50^{th}, 95^{th} Percentiles

Lowest Risk – RCP 4.5 – 5^{th}, 50^{th}, 95^{th} Percentiles

WeatherShift Model

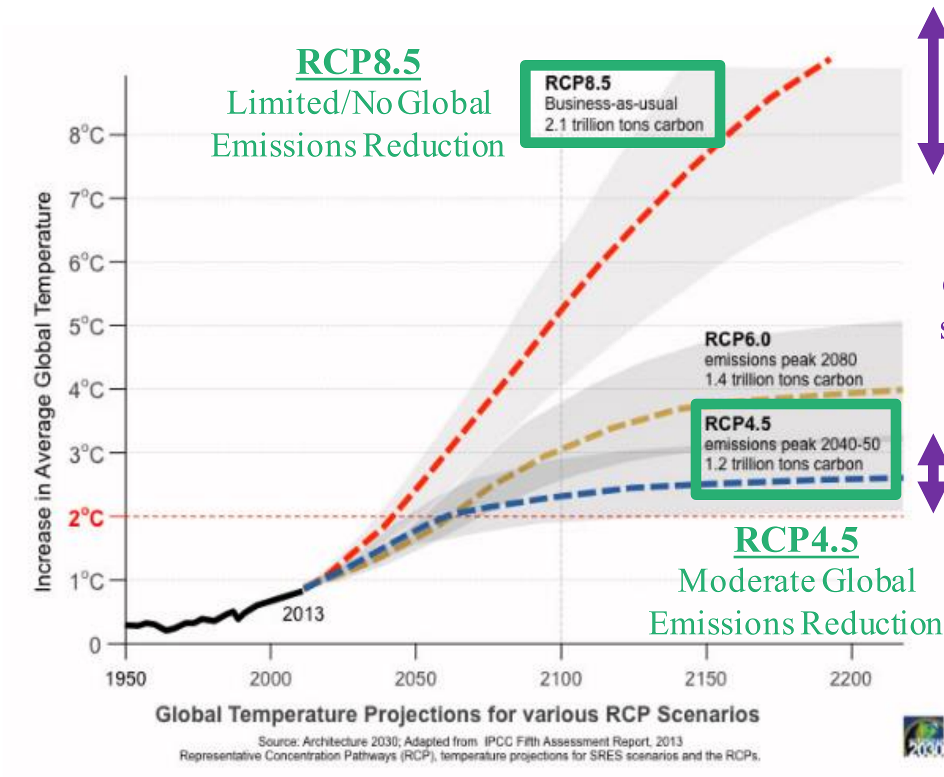
- High – use RCP 8.5 (peaks after 2100; average 3.7 C increase by 2080)
- Medium – use RCP 6 (peaks in 2080, then declines; average 2.2 C increase by 2080)
- Low – use RCP 4.5 (peaks by 2020; most closely aligns with Paris Accord – average 2 C increase by 2080)

3. Asset Exposure

Climate Stress Test: Define Future Climatology

Future Intensity-Duration-Frequency (FIDF) Curves

- WeatherShift uses 21 downscaled global climate change models (GCM)
- Global climate change models from the Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report (AR5)
- Representative concentration pathways (RCPs): 8.5 & 4.5



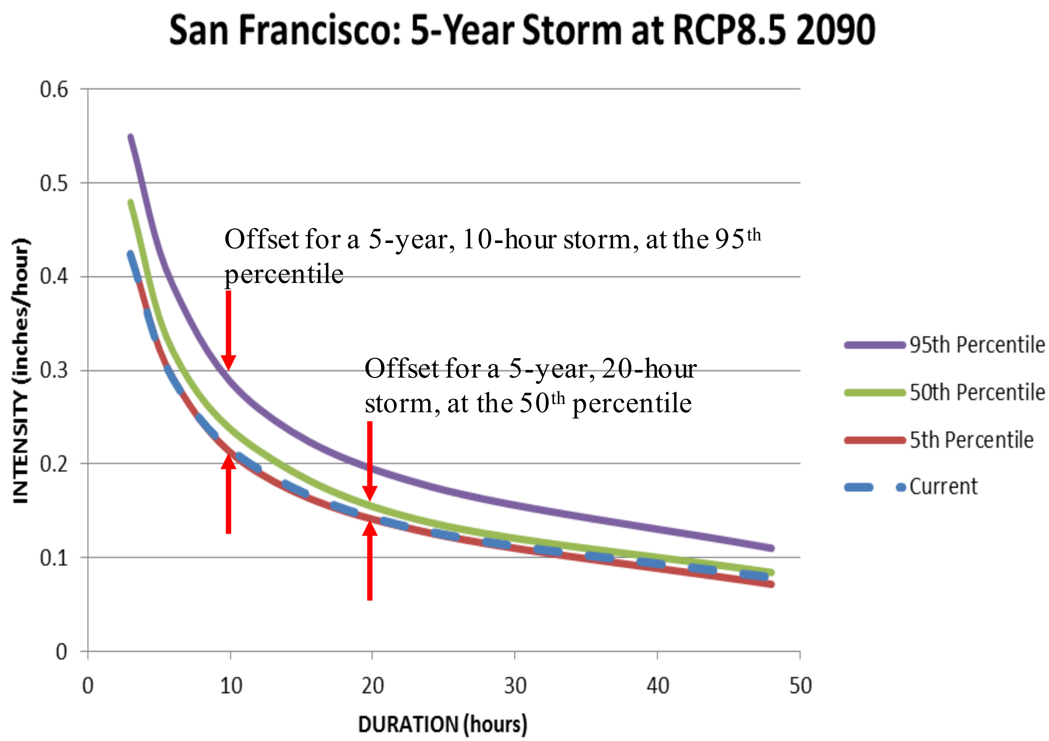
Outcomes from different climate simulations vary

3. Asset Exposure

Climate Stress Test: Define Future Hydrology

Rainfall intensity offsets

- Derived for a variety of combinations of duration and return period
- Cumulative distribution functions (CDFs) are constructed from the offset values
- Risk scenarios are represented by values extracted from the CDFs for 7 standard percentiles (5th, 10th, 25th, 50th, 75th, 90th, 95th)
- Future IDF curves are generated by adding these offset values to historical IDF values
- WeatherShift Rainfall hydraulic modeling analysis utilizes these Future IDF Curves for climate-ready risk management



WEATHERSHIFT™ v2.0

4. Consequences

Potential Impacts: Deductions vs Cost Increases

Availability Deduction
- Increased number of impassable days per year (per flood modelling)
- Reduced Service days per year (per hydraulic modelling)
- Reduced revenues

Based on:
- Traffic mix
- Passenger vehicles, trucks
- Values of the trips
- Delays for that road segment

Accident Deduction
(measure if existing or operational)
- Fatalities per year
- Incidents per year

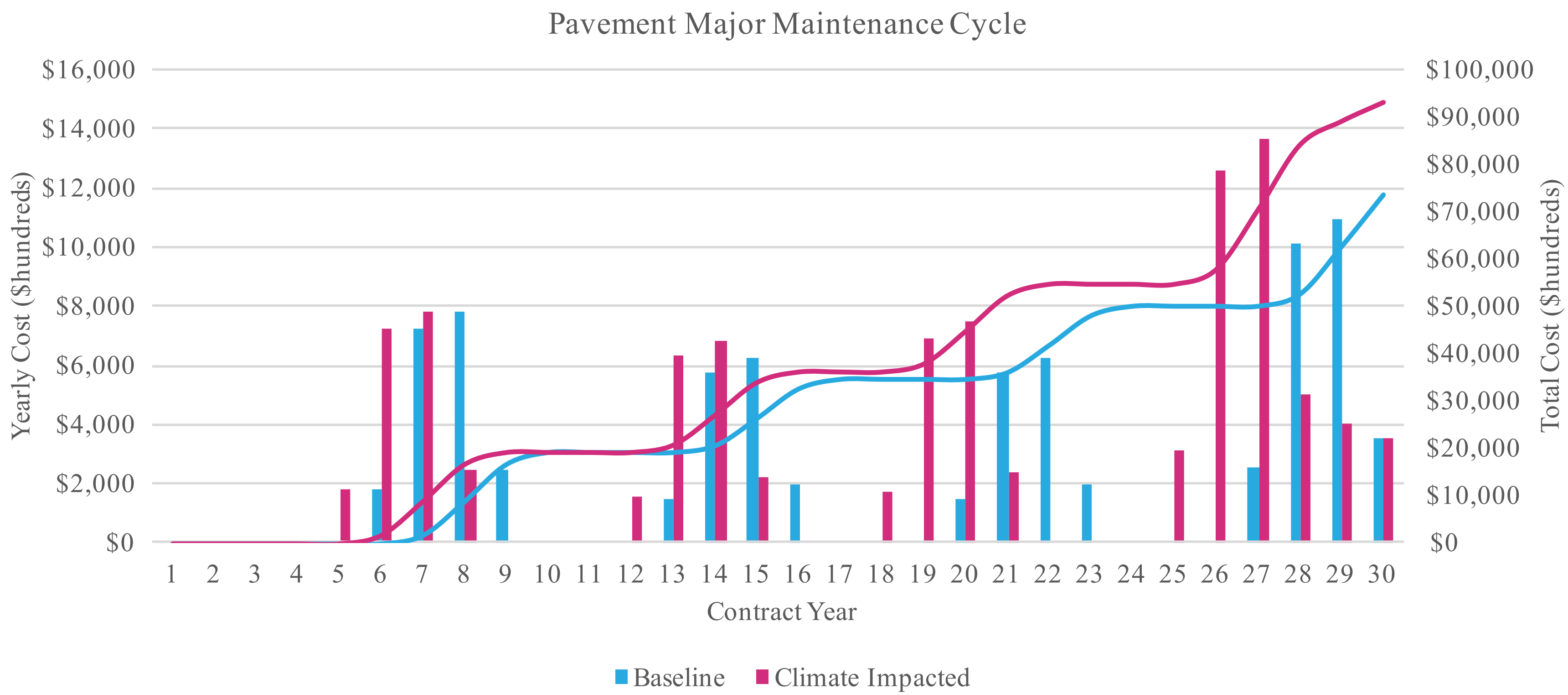
Maintenance Costs
- Bridge Washouts
- Potholes and Cracking
- Base Erosion
- Fire Damage
- Pump Replacement
- Retaining Wall failures

We assume there is additional detail that can be added here, like weightings, assumptions when proxies are used, general availability and quality of data for particular countries/continents, etc.

Operation Costs
- Drainage Cleaning
- Roadway washing
- Vegetation Removal
- Lighting Replacements
- Patrol Cars
- Communications Technology
- Repainting
- Pump power costs
- Equipment Fuel Costs

4. Consequences

Climate Impact on Lifecycle Costs



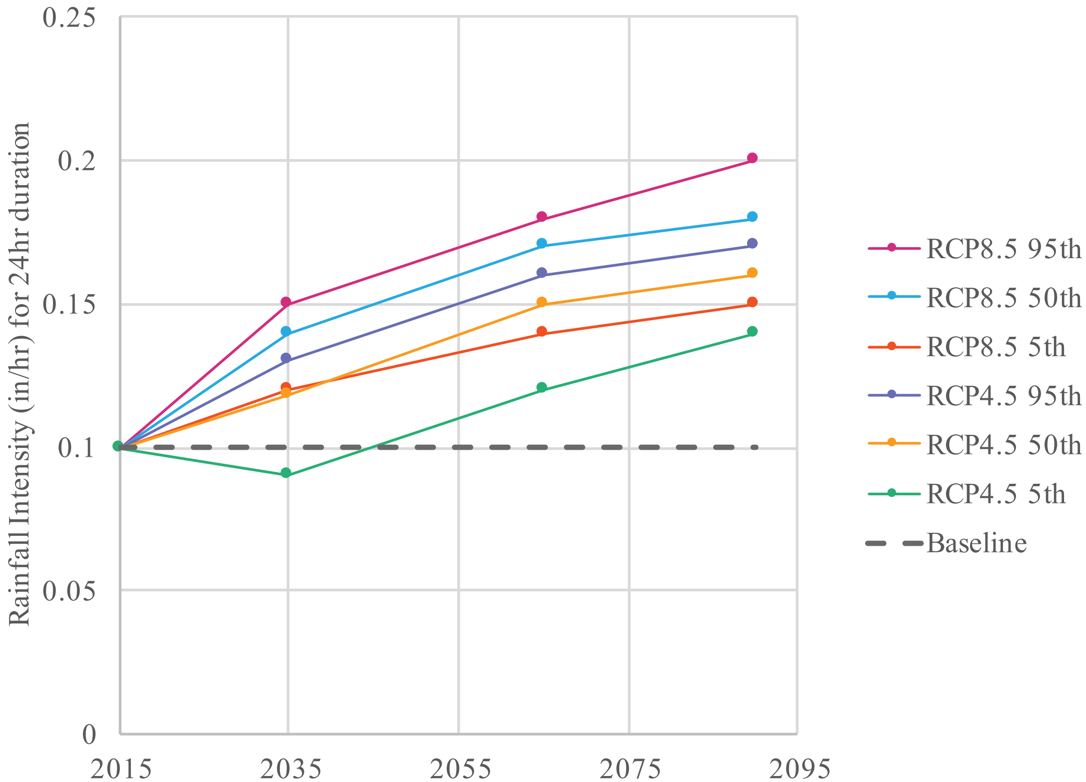
4. Consequences

Climate Impact on Availability Performance

Availability Criteria
- Impassable days per year
- Reduced Service days per year
- Accidents per year
- Cracking / Potholes per square meter

Climate Impacts
- Inundated roadway – flood depth
- Inundated roadway – flood duration
- **Inundated roadway – rainfall intensity**
- Visibility impaired – rainfall intensity
- Ponding on roadway – rainfall intensity
- Ice on roadway – freezing temperatures
- Snow on roadway – winter storms

Identify Correlations with Design Specs
- Intensity vs. Runoff Rate
- Minimum temp vs. Freeze Index
- Maximum temp vs. Heat Index



5. Mitigation

Cap Ex vs Op Ex: Design Standards vs Performance Indicators

Modify Design Specifications

- Include provisions for Climate Change driven data in design calculations
- Require future flood mapping to determine project footprints
- Preclude development within flood zone without proper flood mitigation
- Deter projected flood spreading into travel lanes
- Require pavement designs to meet projected temperature demands

Increase Safety Factors

- Increase Design storms to 200 or 500 year events
- Increased required freeboard on bridges and abutments
- Include consideration of levee overtopping in risk assessments
- Require flood insurance for all exposed assets
- Plan for decreased rehabilitation schedules for material Life Cycles

Safety KPIs

- Drainage off roadway is functional (no standing water in travel way)
- Roadway is free of Debris (Trash, sand, dead vegetation) per contract
- Roughness coefficient meets contractual requirements
- Skid resistance meets safety criteria
- Cracking and vegetation in travel lanes is controlled

Visibility KPIs

- Lighting levels meet standards and contract specifications
- Signage and striping meets contract specifications
- Technology is functional
- Roadside vegetation does not impair designed sight distance
- Possible to link this back to rehabilitation cycles, there are calculated changes for CC impact

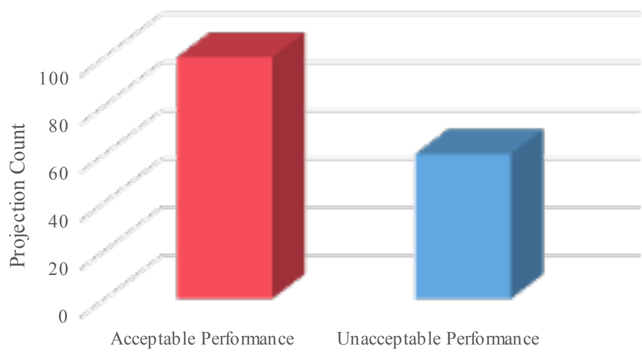
5. Mitigation

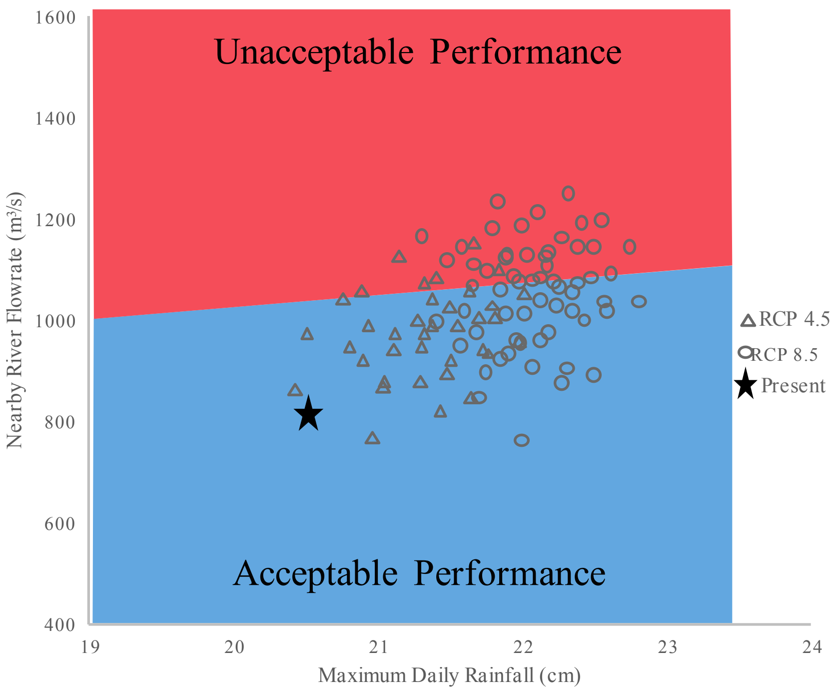
Climate Map

Thresholds – Availability KPI
Downscaled GCMs can produce relative increase or decrease percentages for climate parameters over set planning periods, for example 2020 to 2050.

- Climate Maps indicate the climate general sensitivity of a roadway project
- Climate response functions can be used to identify changes in performance with varying climate conditions
- Example (right) shows a hypothetical performance threshold mapped to climatic parameters

Climate Sensitivity





Source: Ray, Patrick A., and Casey M. Brown. 2015. *Confronting Climate Uncertainty in Water Resources Planning and Project Design: The Decision Tree Framework.* Washington, DC: World Bank. doi:10.1596/978-1-4648-0477-9. License: Creative Commons Attribution CC BY 3.0 IGO

5. Mitigation

Climate Design Map

Thresholds – Availability KPI
Downscaled GCMs can produce average values for climate parameters over set planning periods, for example 2020 to 2050.

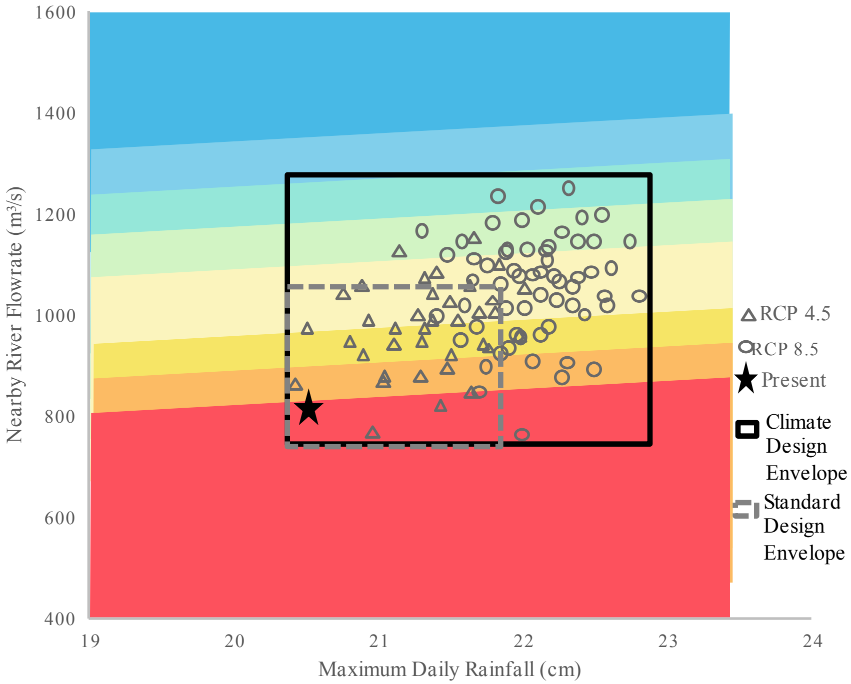
- Climate Response Map indicates the climate sensitivity of a roadway project
- Climate response functions can be used to identify changes in performance with varying climate conditions
- Example (right) shows a hypothetical performance threshold mapped to climatic parameters

Roadway Design Standards

Less Robust → Poor *Future* Performance

Standard Practice

More Robust → Good *Future* Performance



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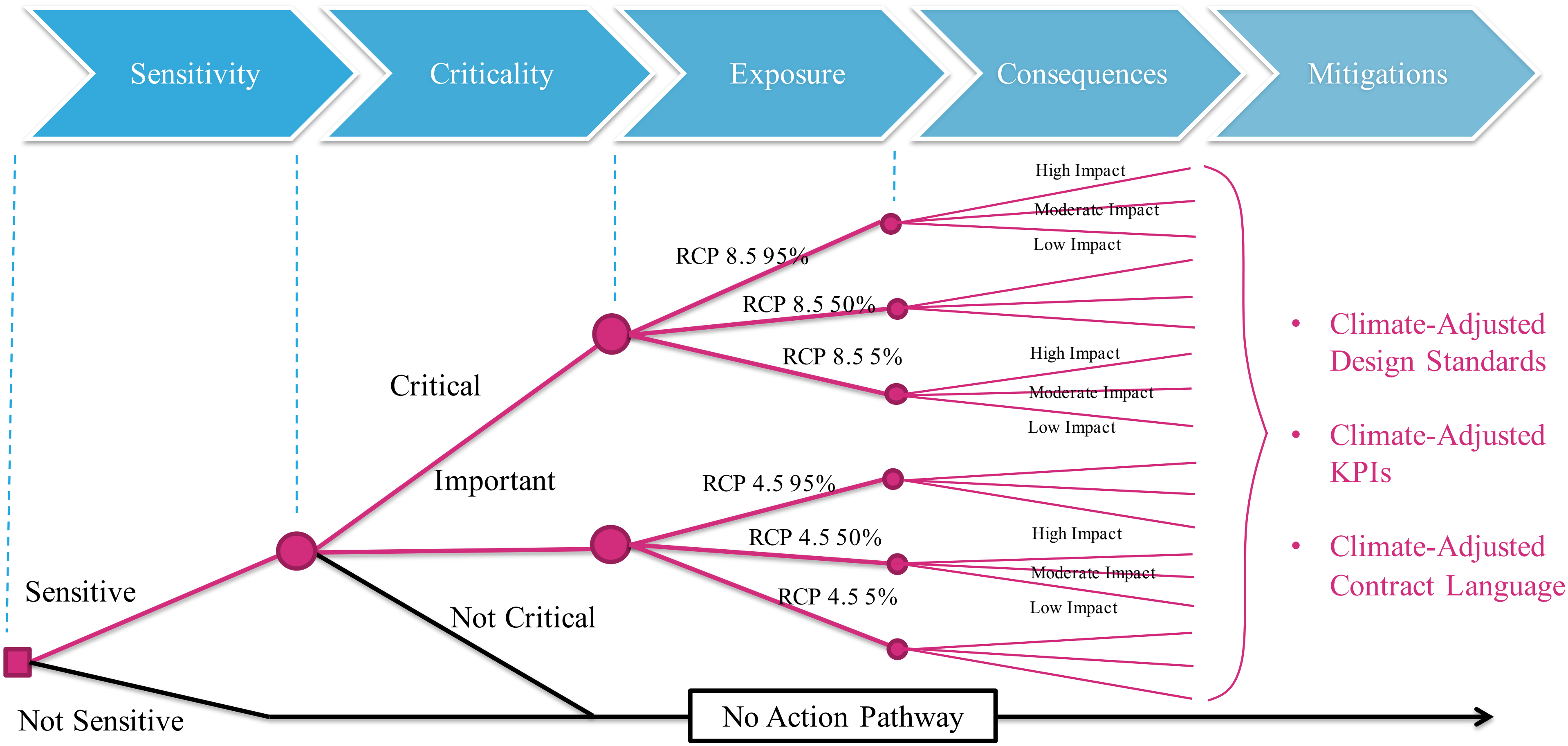
Objective 1: Tool Output Overview



Risk Assessment Example

Assessment Tool Testing

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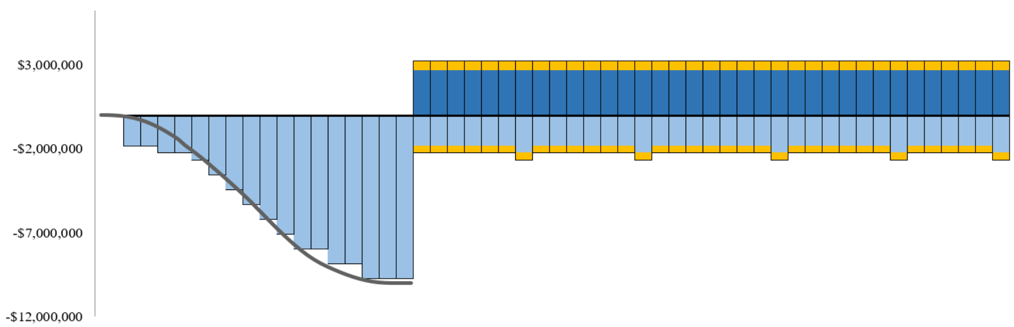
Assessment Example

50km Roadway in Sichuan China

- 30-year concession (2020 – 2050)
- Availability payment procurement scheme



Assessment Example

50km Roadway in Sichuan China

Location
- Songlinzhen, China
- 4.694857, 13.153311

Components
- At Grade, Bridges

Terrain
- Rolling

Class
- Regional road

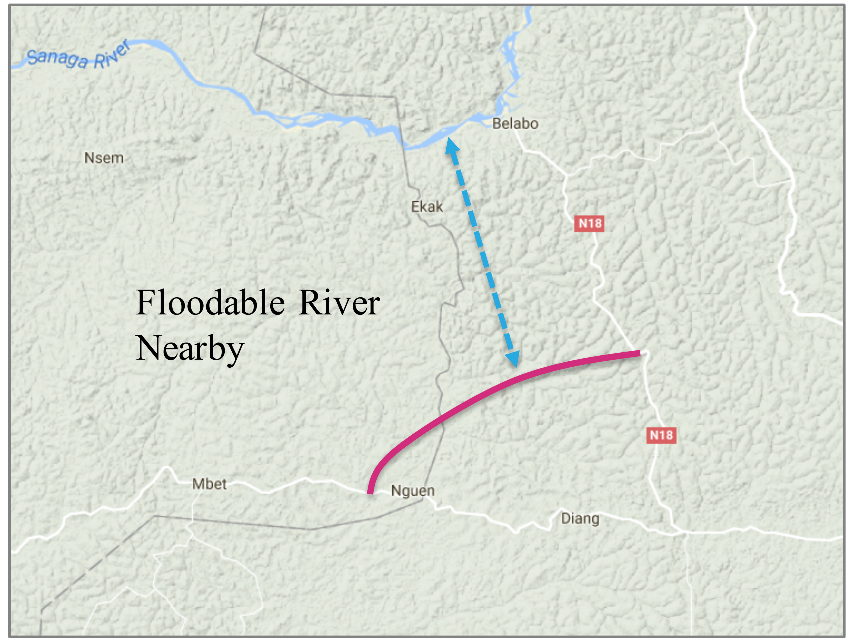
Design
- Two lanes, dirt shoulders

Proximity
Distance to water bodies
- Riverine
- Flood Plains

Material
Pavement
- Bituminous

Drainage
- Ditches – treated
- Culverts

Asset Deemed Sensitive to Climate Impact



Sensitivity → Criticality → Exposure → Consequences → Mitigation

Assessment Example

50km Roadway in Sichuan China

Economic
- Does this road connect commercial hubs, serve as a route for goods or provide access to employment?
- Yes

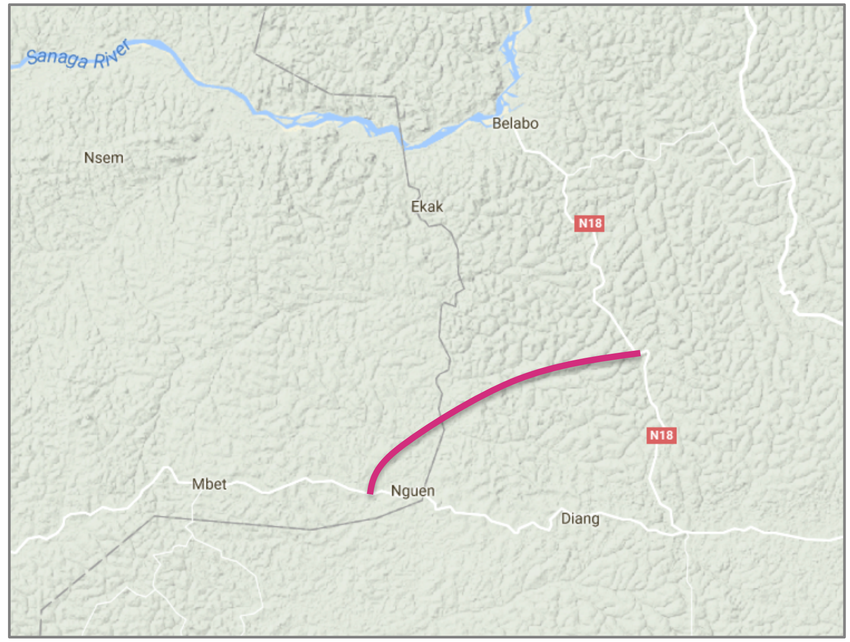
Redundancy
- Does loss of this road lead to isolation of any communities?
- No
- Is there another road/alternative route nearby? Yes

Significance
- Is this roadway of regional or national significance?
- Yes
- Does this road provide direct access to significant recreational resources?
- No

Volume
- Average Daily Trips?
- 400 ADT

Social
- Does this road provide direct access to social infrastructure?
- Yes, one school and one hospital
- Does this road provide direct access to significant utility infrastructure?
- Yes, access provided to wastewater treatment plant

Asset Deemed Critical



Sensitivity → Criticality → Exposure → Consequences → Mitigation

Assessment Example

50km Roadway in Sichuan China

Emission Scenarios
Representative Concentration Pathways RCP 8.5

Type
Precipitation and Temperature

2050 90th Percentile Offsets
50mm/hr baseline → 70mm/hr rainfall intensity
40% intensity increase from baseline
50% increase in runoff rate from baseline

37°C → 39°C daily maximum
+2.0°C increase from baseline

Sensitivity → Criticality → **Exposure** → Consequences → Mitigation

Assessment Example

50km Roadway in Sichuan China

Availability
- Increased runoff rate → additional days of closure

Accidents
- Increased rainfall intensity → increase in accidents

Maintenance Costs
- Increase in runoff rates → Increased Bridge repairs
- Increase in extreme heat days → Increase cracking

Operations Costs
- Increase in runoff rate → Increased Silt removal
- Increase in runoff rate → Increased Pumping

Sensitivity → Criticality → Exposure → **Consequences** → Mitigation

Assessment Example

50km Roadway in Sichuan China

KPIs

Funding Partner to set expectations with Developer that certain KPIs will be increasingly difficult to meet given expected impacts from climate change

Developers to bid accordingly

Contracting

Funding Partner to require Developer to update flood modeling with RCP 8.5 future climate scenarios

Developers to update flood modeling and adjust O&M planning accordingly

Design Standards

Funding Partner to require increased drainage design standards to accommodate 50% increase in surface runoff rate

Developers to bid and implement design specifications accordingly

Sensitivity → Criticality → Exposure → Consequences → Mitigation

Assessment Tool
Input Exercise

What sensitivity drivers lead to asset failure?

What criticality drivers set the importance of roadway assets?

What future climate scenarios and time horizons should be use in assessment?

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Performance Based Contracting

What each party has at stake

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Objective 2: Risk Allocation

Stakeholder Roles and Responsibilities

Understand reasonable "Transfer" of Risk Ownership

1. Design and Construction

Determining how much risk the contractor should carry and over what time horizon this risk should be assigned. Are Warranty Periods appropriate for the PBC structure?

Example: 10 year warranty of tunnel waterproofing system

2. Operations and Maintenance

Determining how to best incorporating climate risk ownership into the PBC structure. How to effectively measure climate performance through KPIs and how to best balance risk assignment and ownership.

Example: Tunnel systems is free of water at all times

Delineate Driving Stakeholders

- **Funding Partners**
  - The World Bank
  - The Asian Development Bank
  - Private Banks

- **Asset Owners**
  - National Ministries
  - Local Governments

- **Developers**
  - Special Purpose Vehicles (SPVs)
  - Construction Contractors
  - Operations Contractors

- **Insurers**
  - Private Insurers
  - National Disaster Funds

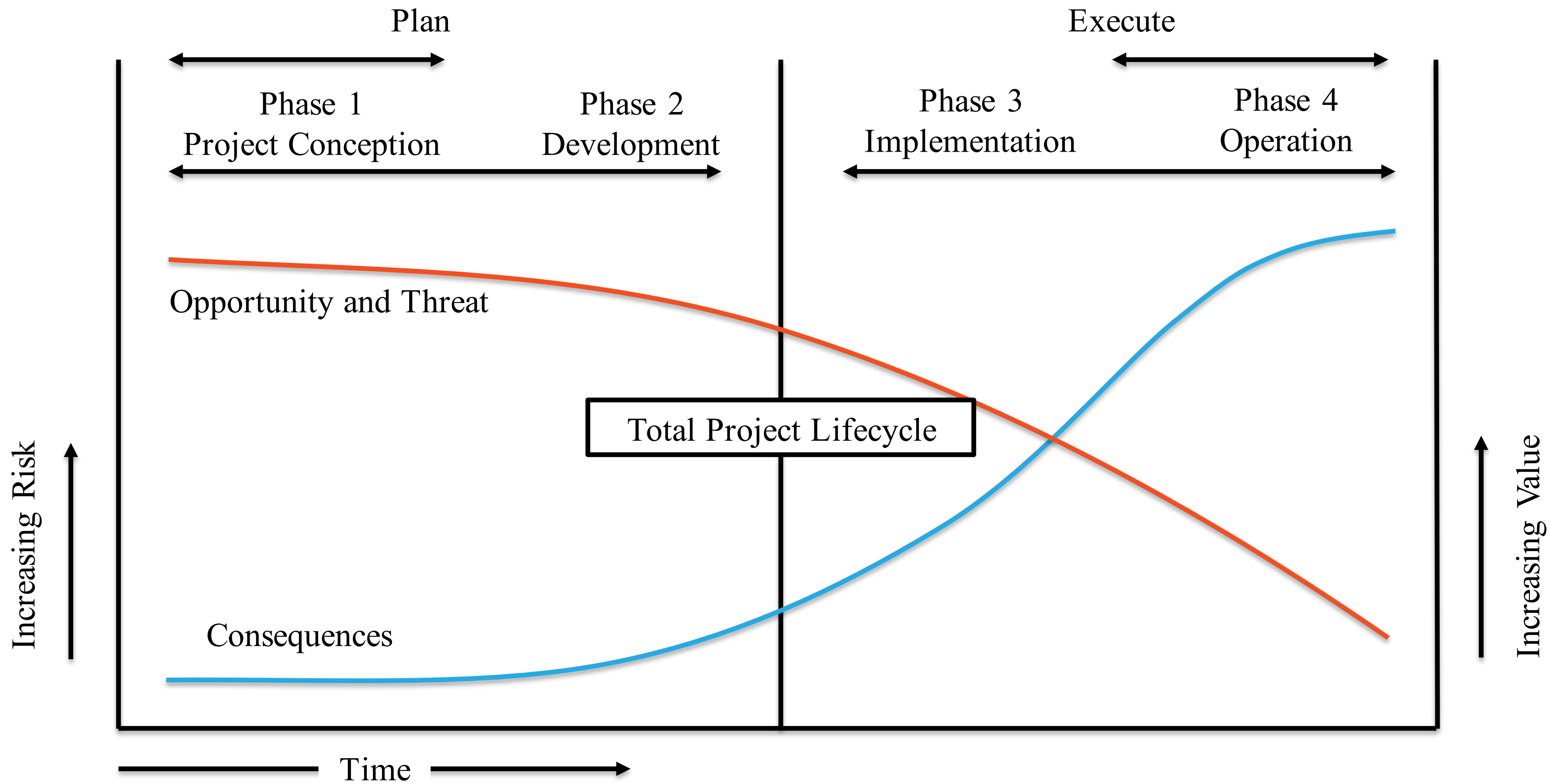
Risk Ownership Overview

Responsible Party

Stakeholder	Asset Owner/ Executing Agency	Funding Partner/ ADB	Developer/ Construction Contractor	PMU/ O&M Contractor	Private Insurer	Disaster Fund/ National Government
Loss Driver	Service	Interest and Principle	Rework/Repairs	Tolls or Availability	Payouts	Liquidity
Fiscal Risks	Equity	Investment	Equity	Revenue	Profit	**Purchasing Power**
Impact Assessment	Social/ Economic	Financial	Business	Business	Physical	Economic/ Environmental
Traditional Risk Mitigation	Issue Design Standards	Require Loan Repayment	Contractual Transfer	Purchase Insurance	Set Liability Limitation	Accept / Locally Funded
Expanded Risk Mitigation	Offer Performance Incentives	Reduce Interest Rates	Require Business continuity management plan	Harden Assets	Offer Premium Discounts	Offer Hazard Mitigation incentives
Value Capture Methodology	Set stringent Availability based payments	Offer Improved Credit Rating for Protected Assets		Increase Asset Robustness		Expand Incentives for Regional Protection

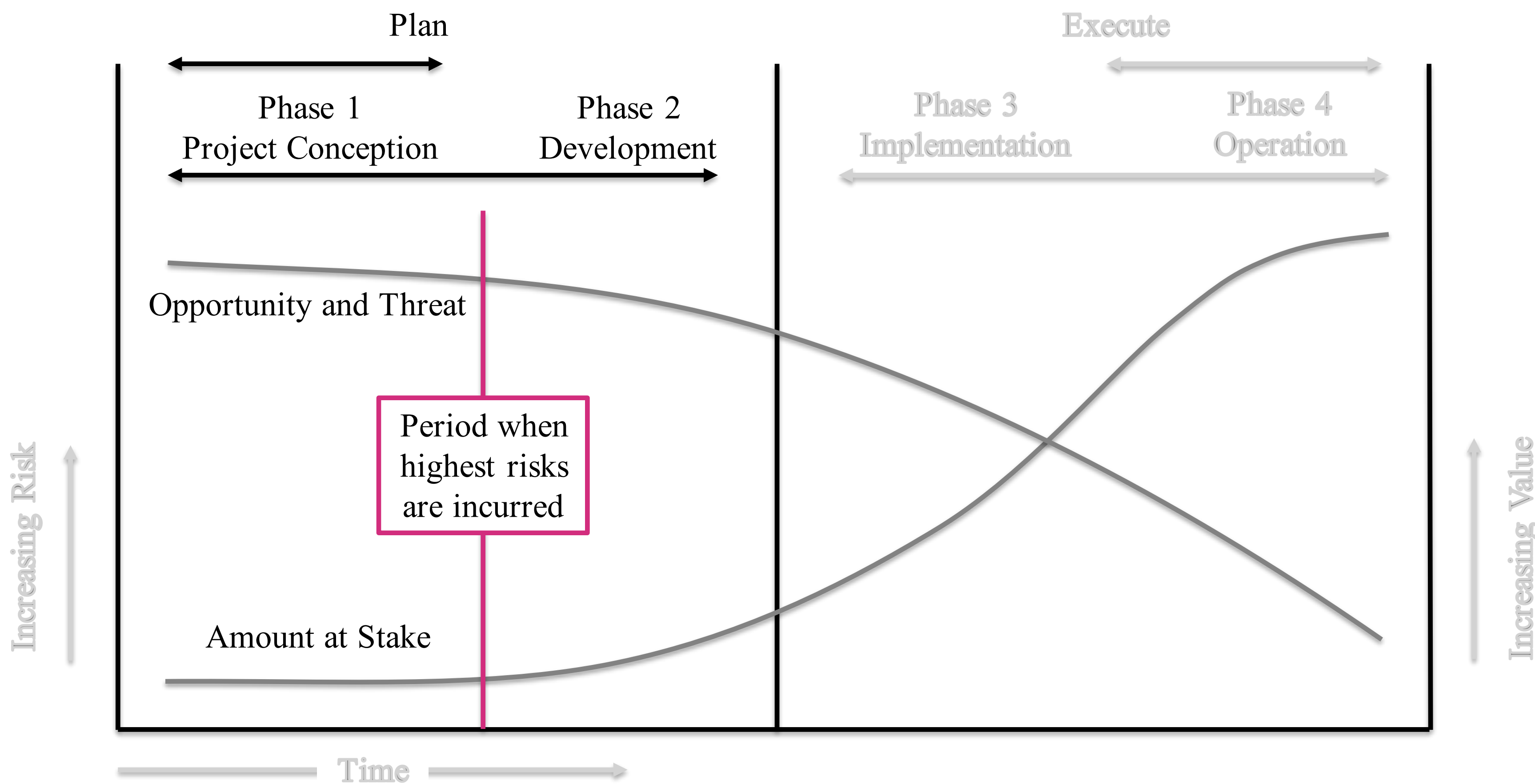
Risk Transfer, Reduction, and Commitments

"…all risks must be transferred to the parties best able to manage those risks." - Donald Lessard, MIT



Risk Transfer, Reduction, and Commitments

"…all risks must be transferred to the parties best able to manage those risks." - Donald Lessard, MIT



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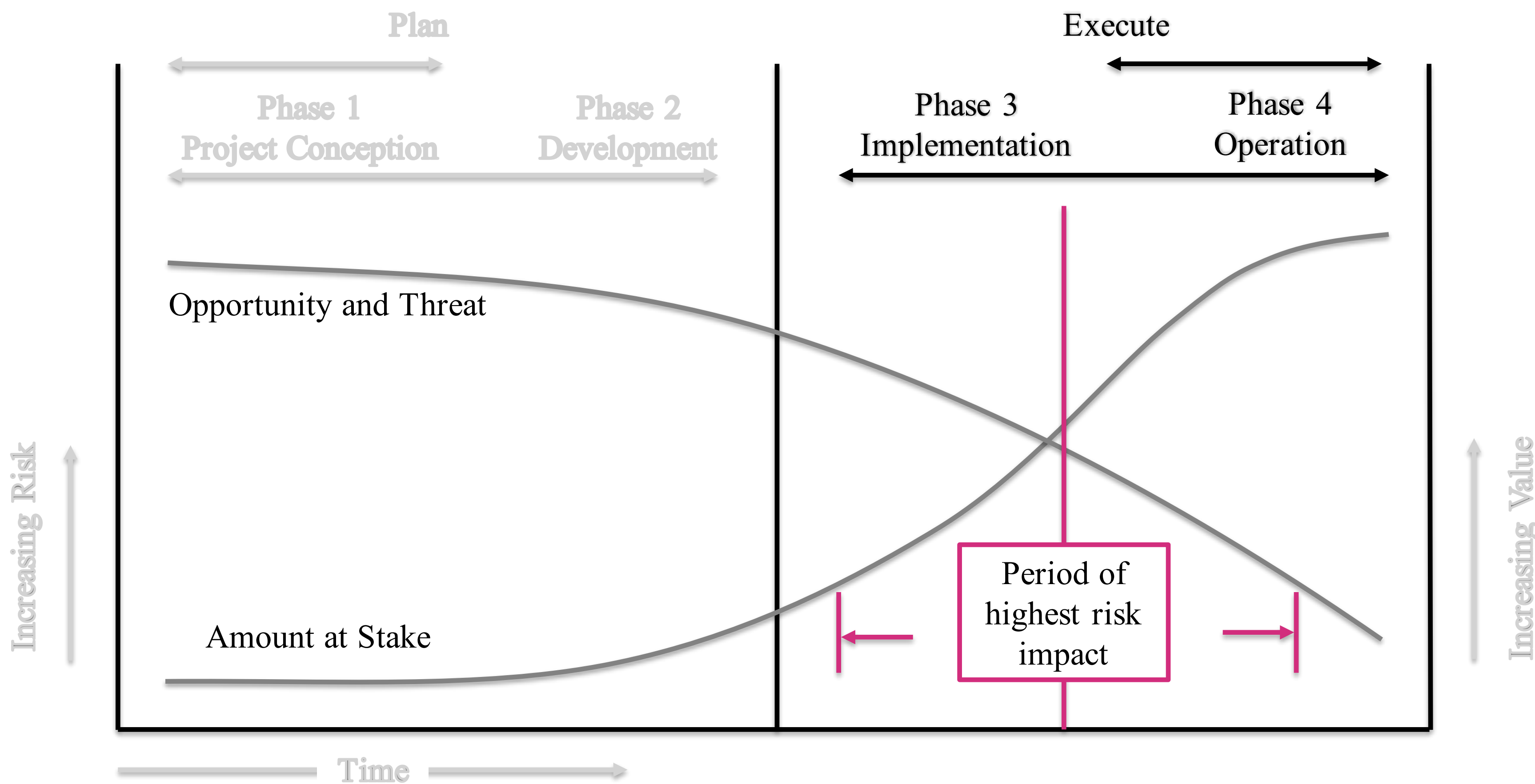
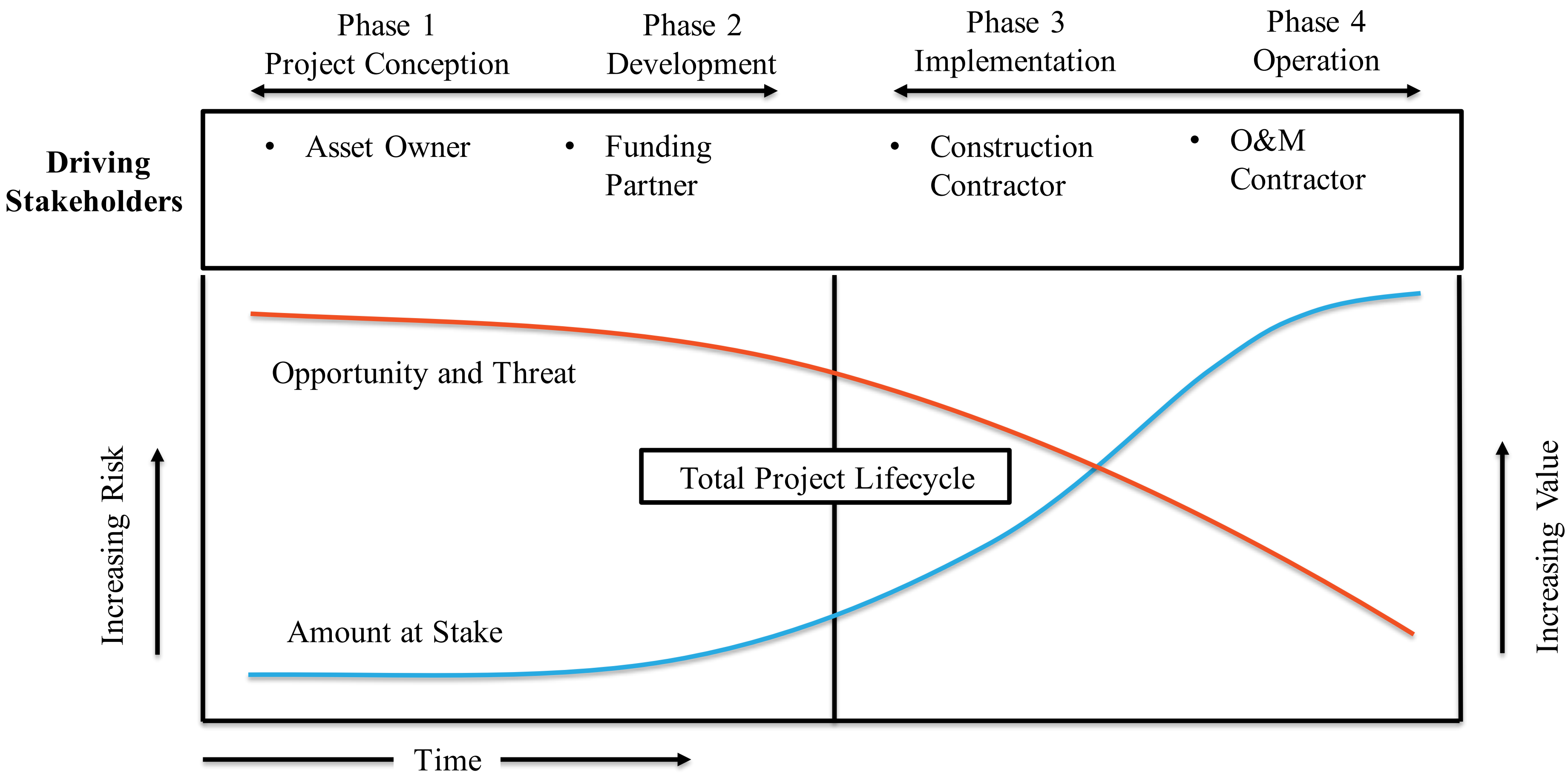


Risk Transfer, Reduction, and Commitments



Objective 2: Output Overview

Climate Adapted Roles & Responsibilities

Phase 1	Phase 2	Phase 3	Phase 4
Project Conception	Development	Implementation	Operation
Asset Owners	**Funding Partners**	**Construction Contractors**	**O&M Contractors**
Identify and Present Recommendations	Incorporate Climate Recs into Project Development	Execute Contract Per Specifications	Execute O&M Per Specifications
• Climate-Adjusted Design Standards • Climate-Adjusted KPIs • Climate-Adjusted Contract Language	• Project Structuring • Bid Submittal • Contract Negotiation	• Design • Construction • Capital Expenditure	• Ensure Compliance with KPIs • Operations Expenditures

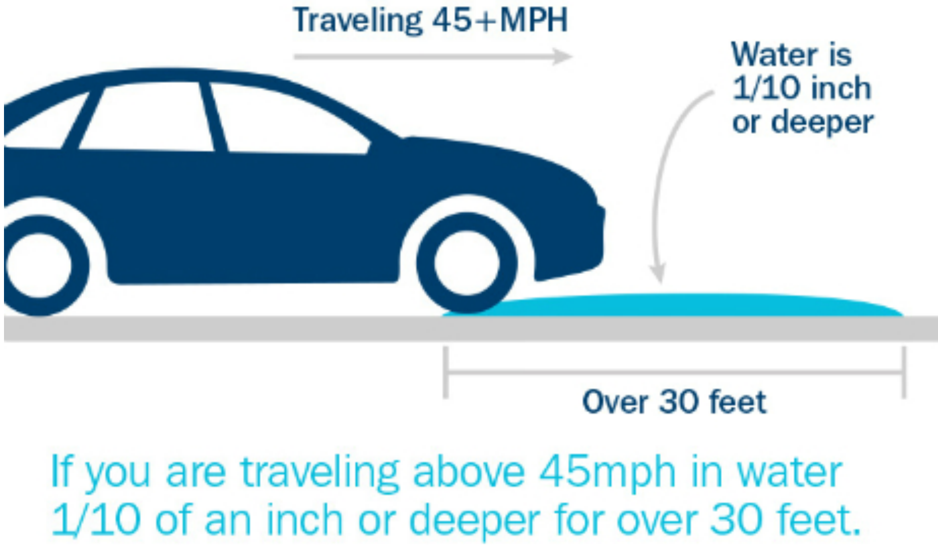
Risk Ownership
Case Study

Stakeholders and Methodologies best positioned for Climate Risk Mitigation

ARUP

Case Study: Hydroplaning Analysis

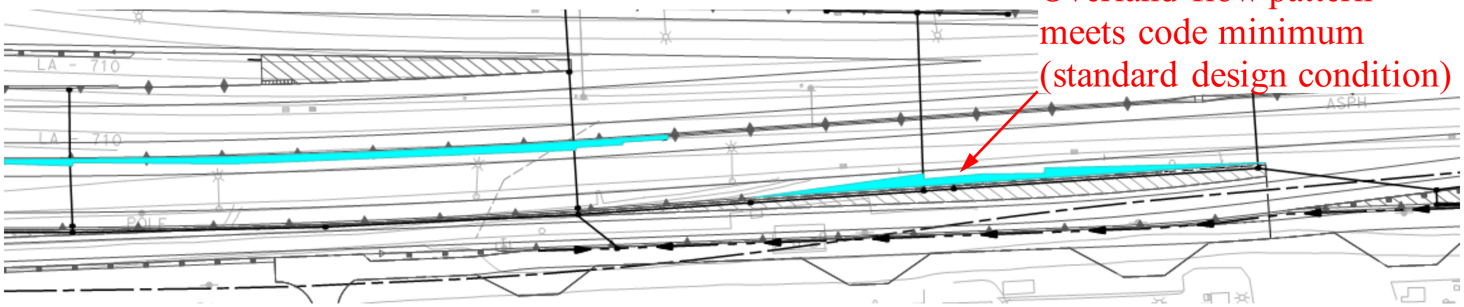
Design Standard vs. Insignificant Surface Water within Travel Way



Case Study: Hydroplaning Analysis

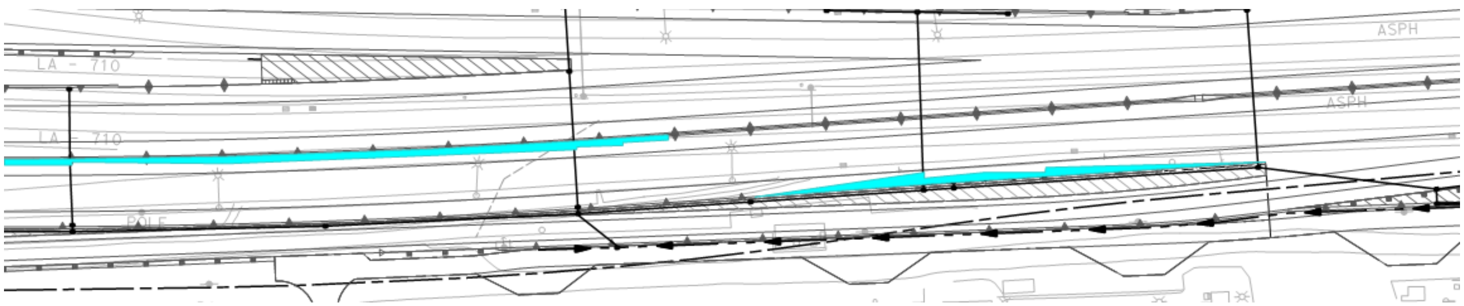
Standard California Highway Project

25-year Return Period:



Overland flow pattern meets code minimum (standard design condition)

50-year Return Period:

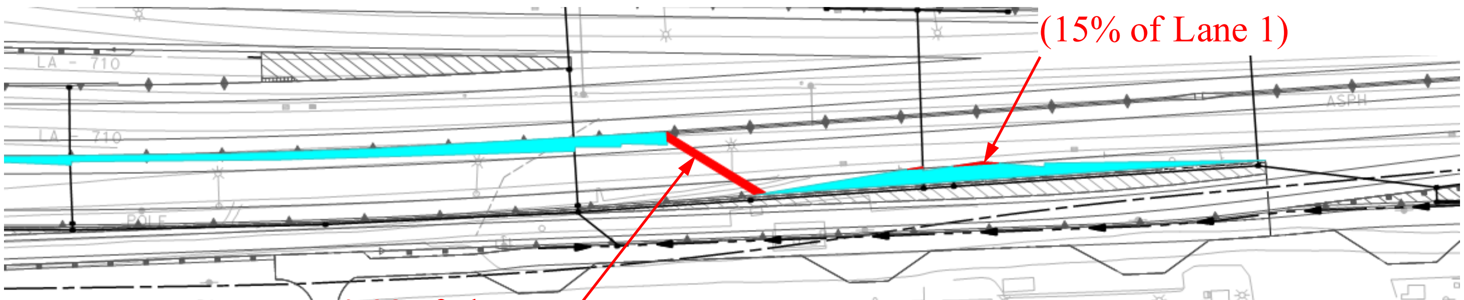


Case Study: Hydroplaning Analysis

RCP 8.5 2081-2099 (**50th Percentile**)

25-year Return Period:

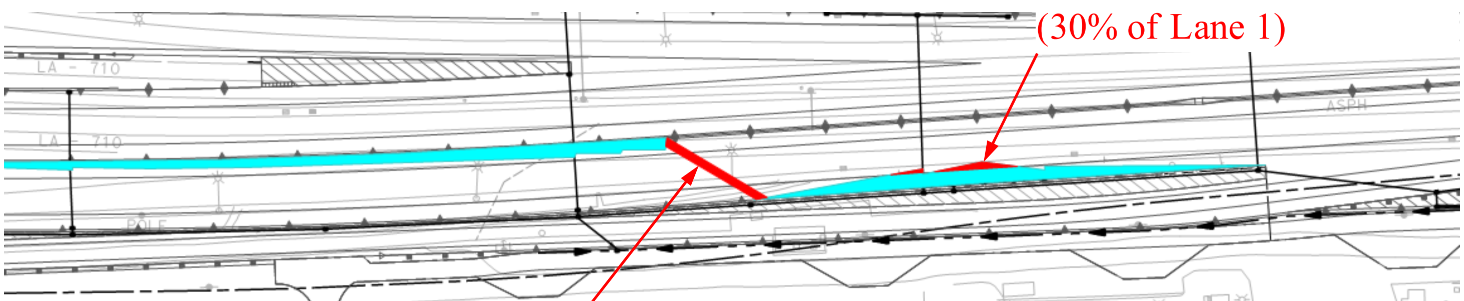
1.8-ft shoulder exceedance (15% of Lane 1)



0.22 cfs bypass (120% exceedance)

50-year Return Period:

3.6-ft shoulder exceedance (30% of Lane 1)



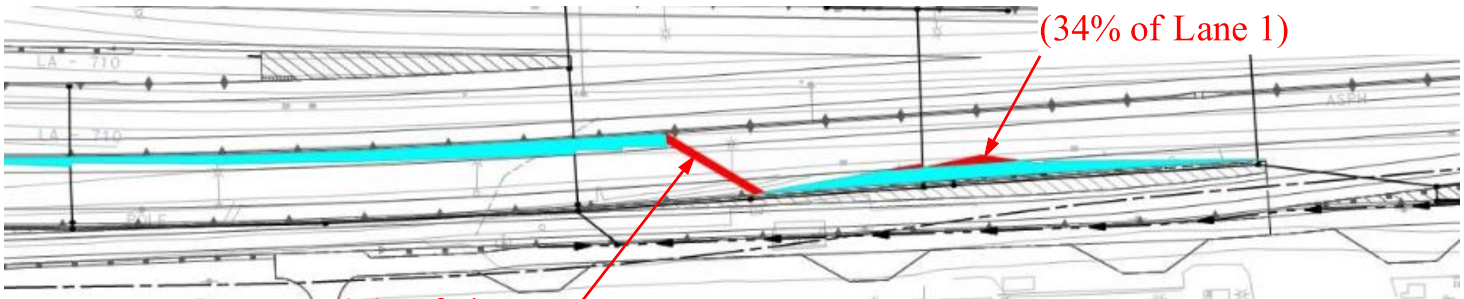
0.33 cfs bypass (230% exceedance)

Case Study: Hydroplaning Analysis

RCP 8.5 2081-2099 (**90th Percentile**)

25-year Return Period:

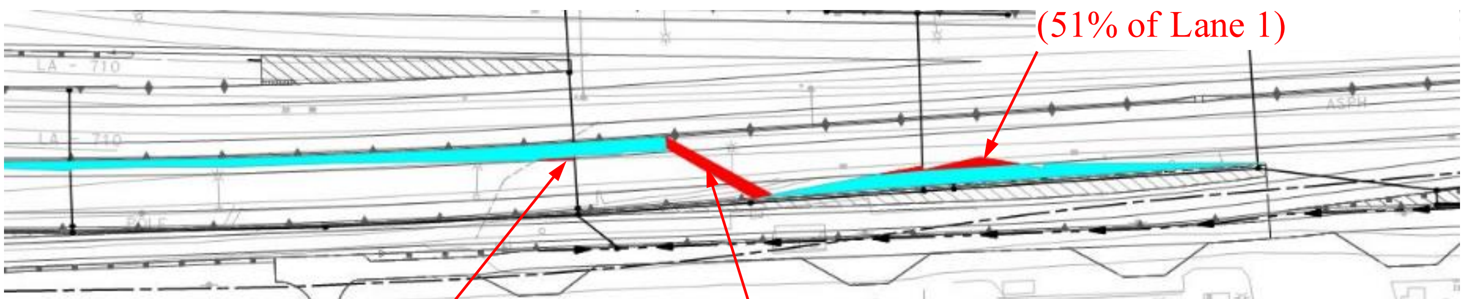
4.1-ft shoulder exceedance
(34% of Lane 1)



0.37 cfs bypass
(270% exceedance)

50-year Return Period:

6.1-ft shoulder exceedance
(51% of Lane 1)

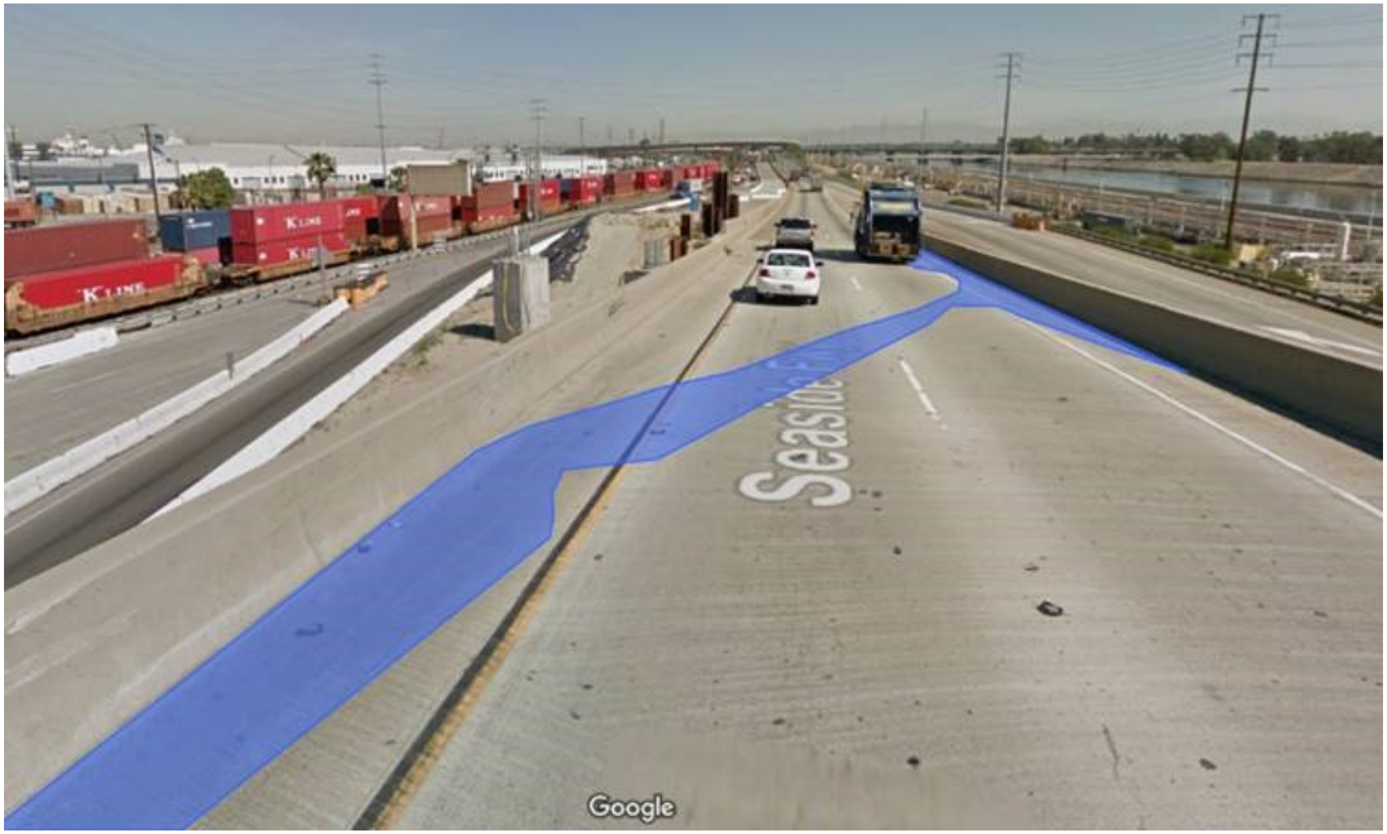


0.4-ft shoulder exceedance
(3% of Lane 2)

0.51 cfs bypass
(410% exceedance)

Case Study: Hydroplaning Analysis

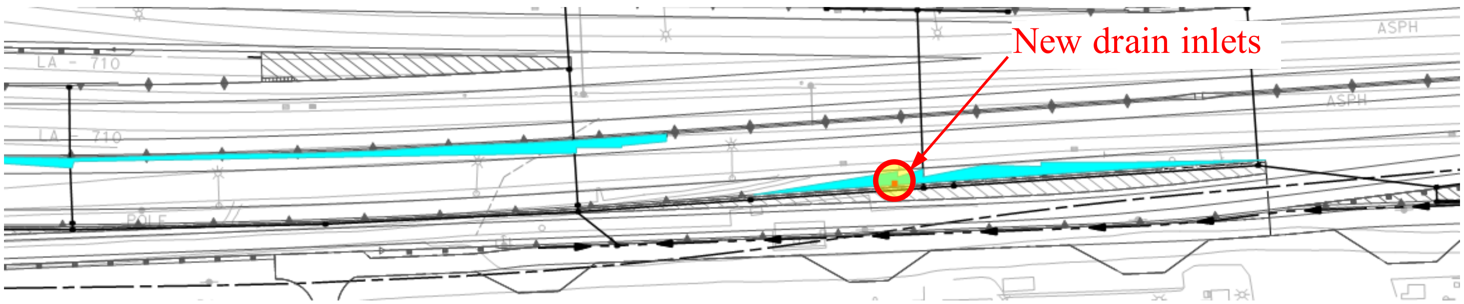
RCP 8.5 2081-2099 (**90th Percentile**)



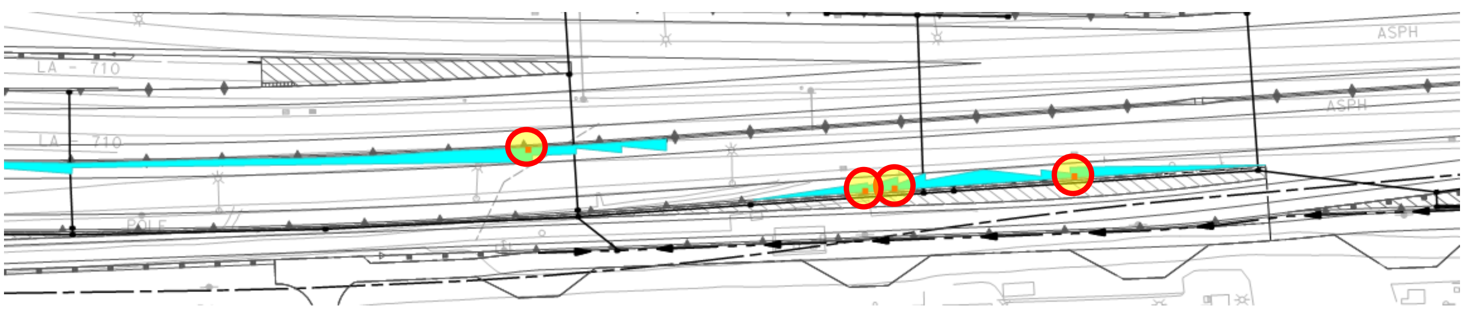
Case Study: Hydroplaning Analysis

Augment Either Design Specification or Performance Requirement

RCP8.5 2081-2099 (**50th Percentile**) – 50-year Return Period:



RCP8.5 2081-2099 (**90th Percentile**) – 50-year Return Period:



Risk Allocation Exercise

(Skip and come back after lunch)

Who is best positioned to manage climate risks?

How much risk should the contractor absorb?

How to measure risk and structure KPIs?

Over what time horizons should risk be assigned?

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Objective 3: Contract Augmentation

ADB Documents

Revise language to influence Risk Mitigation

1. **Bidding Documents**

Setting evaluation criteria to require climate risk consideration. "SBD Works Following Prequalification - to be used when the bidding is preceded by a prequalification exercise."

Example: Require climate aware designs for loan prequalification.

2. **Contracting Documents**

Determining what measurable drivers can be introduced into the PBC structure. Are these thresholds enforceable as part of the contract and payment structure and reasonable in regards to success of the developer or contractor?

Example: Specify factors of safety in risk mitigation

Explore Contracting Drivers

- **Incentives**
  - Fiscal
  - Insurance
- **Policy**
  - National
  - Institutional
- **Terms**
  - Trade - offs
  - Entitlements
- **Mandates**
  - Performance
  - Availability




PBC at the ADB

Case Study: Proposed Loan to the Kingdom of Nepal

Consulting Services Language

International and domestic consulting services will be required (about 170 person-months of international and 1,700 person-months of domestic) to

(i) prepare detailed design for civil works, **performance-based maintenance program**, and associated bid documents and draft contract documents;
(ii) help procure the civil works;
(iii) supervise implementation; and
(iv) monitor implementation of land acquisition and resettlement, environmental management, and poverty reduction impacts.

The consultants will be recruited in accordance with ADB's Guidelines on the Use of Consultants and other arrangements satisfactory to ADB on the engagement of domestic consultants.

Objective and Scope

The principal objective of the Project is to help the Government improve transport efficiency and thereby enable the country to stimulate economic growth and job creation, leading to poverty reduction. The Project will maintain about 140 kilometers (km) of the EWH, improve approximately 165 km of roads to all-weather paved surface, construct a district headquarters access road of about 96 km using environment-friendly, labor-based construction methods, develop and **implement performance-based maintenance** on about 200-300 km of the network, and improve about 10 km of a cross border access road. The Project will induce more efficient movement of goods and passengers, provide better access to income and employment opportunities and to education and health centers; improve public sector implementation and maintenance capacity in the road sector; support development of private sector capabilities to carry out road improvement and maintenance by contract; improve road safety and axle-load control; and provide community access and complementary facilities through a participatory approach leading to poverty reduction.

Contract Augmentation Exercise

What will be the barriers to implementation of Contract Augmentation?

What are possible alignment points or other synergies with ongoing ADB programs?

Who will be the key stakeholders to engage in terms of new policies and implementation?

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Q & A Discussion

Review of Workshop Objectives

- **Simplify inputs for risk-based decision-making tool**
  - Characterize the sensitivity drivers leading to failure
  - Distinguish the criticality drivers for roadway assets
  - Establish future climate scenarios and time horizons

Risk Identification

- **Discuss roles and responsibilities for best incorporating climate risk into PBC**
  - How much risk should the contractor absorb
  - How to measure risk and structure KPIs
  - How to balance risk assignment and ownership
  - Over what time horizons should risk be assigned

Risk Allocation

- **Explore how climate risk is integrated into contracting**
  - How will project logic and decision-making tool outputs be applied to real world projects
  - Feedback to be collected regarding strengths and weaknesses of this approach in relation to ADB contracts

Contract Augmentation