



Forward. Moving Penang into the Future.

Resilient Built Environment
Penang 2030

VERITAS LECTURE SERIES #13

JACOBS

Content

Penang 2030: a Resilient Built Environment

Catalysts for Change

Effective Spatial Planning

- Case study: Edinburgh

Sustainable Mobility

- Case studies: Cross River Rail, Gold Coast Light Rail, Northern Busway

Smart Cities

- Case studies: Charlotte, London, Aurangabad, Amaravati

Climate Change

- Case study: Temaiku – Kiribati

Jacobs

Key Message

Penang 2030: a Resilient Built Environment

“A family-focused green and smart state that inspires the nation.”



Key Initiatives



D1 Balance development through effective spatial planning

- Adopting a network city model for spatial development
- Upgrading industrial parks and other employment hubs with public amenities and facilities to minimise travel time
- Revitalising the Butterworth and George Town waterfronts
- Rejuvenating suburban neighbourhood centres to be more self-inclusive as places to live, work and play



D2 Strengthen mobility, connectivity and digital infrastructure

- Encouraging use of e-motorcycles to improve air quality
- Upgrading digital infrastructure to improve connectivity and establish Penang as a “gigabit state”
- Prioritising the construction of light rail and introduction of high speed ferry services and water taxis
- Upgrading the existing airport



D3 Integrate municipal services with smart technologies

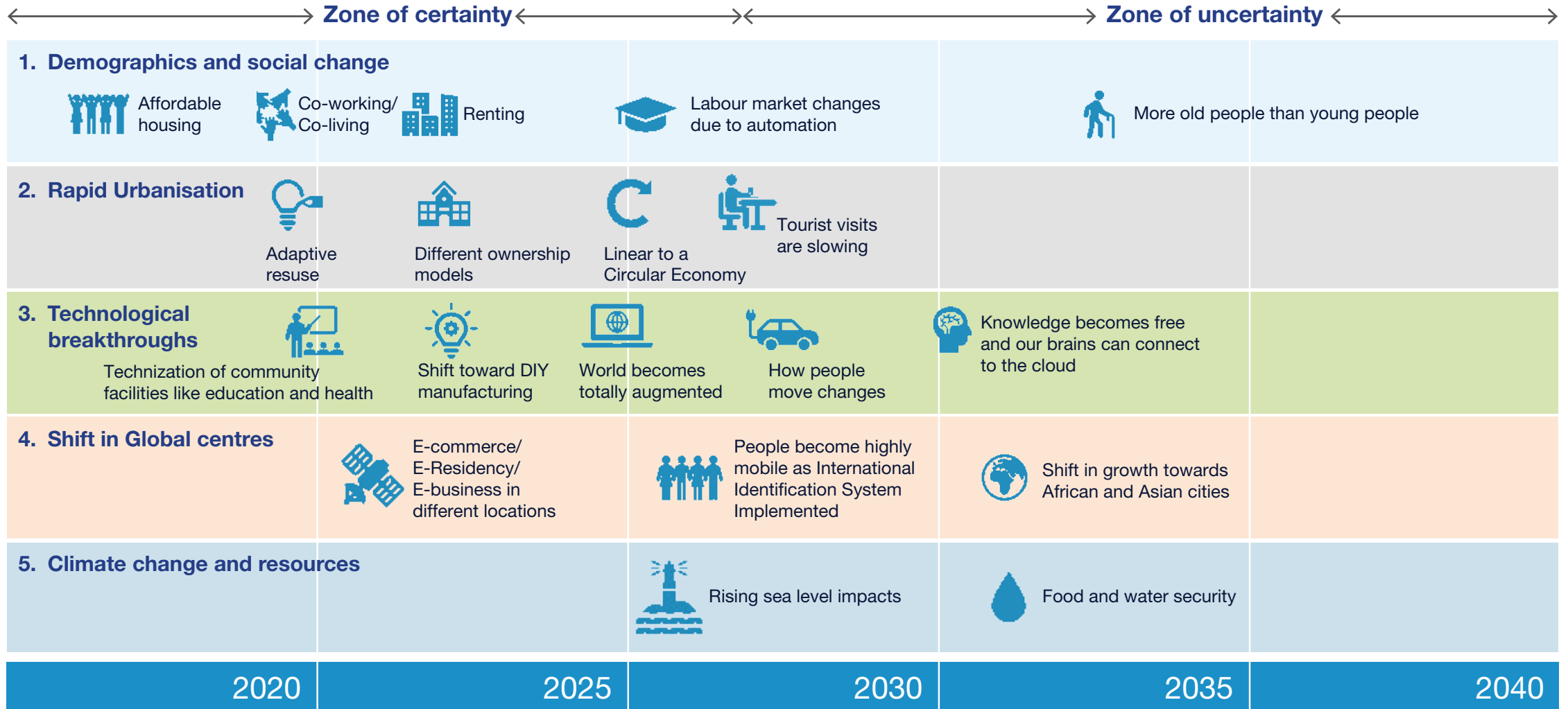
- Mandatory adoption of smart technologies for the delivery of municipal services
- Collaborating with local communities and NGOs on smart city initiatives
- Implementing a smart reporting dashboard of key indicators
- Renewable energy investment



D4 Implement climate change adaptation plans

- Partnering with international organisations to develop and implement climate adaptation plans
- Piloting nature-based urban cooling initiatives
- Adopting a sponge city approach to reduce flood risk
- Updating disaster mitigation and management strategies to incorporate weather and flood risk

Catalysts for Change



Effective Spatial Planning – Principles

D1



1. Human centric design
2. Densification of the city and use of urban growth boundaries
3. Walkability and new mobility solutions
4. Adaptive reuse and performance based, flexible land use opportunities
5. Innovation, academic and industrial clusters
6. Efficient infrastructure utilisation
7. Protecting habitat and natural resources
8. Clean and renewable energy
9. The future of urban agriculture
10. Water resiliency and future proofing

Case study: Edinburgh City Centre Transformation

1. People first
2. Liveable
3. Enhanced open spaces
4. Unique character and identity
5. Inclusive and accessible
6. Integrated policies and projects



Forward. Moving Penang into the Future.

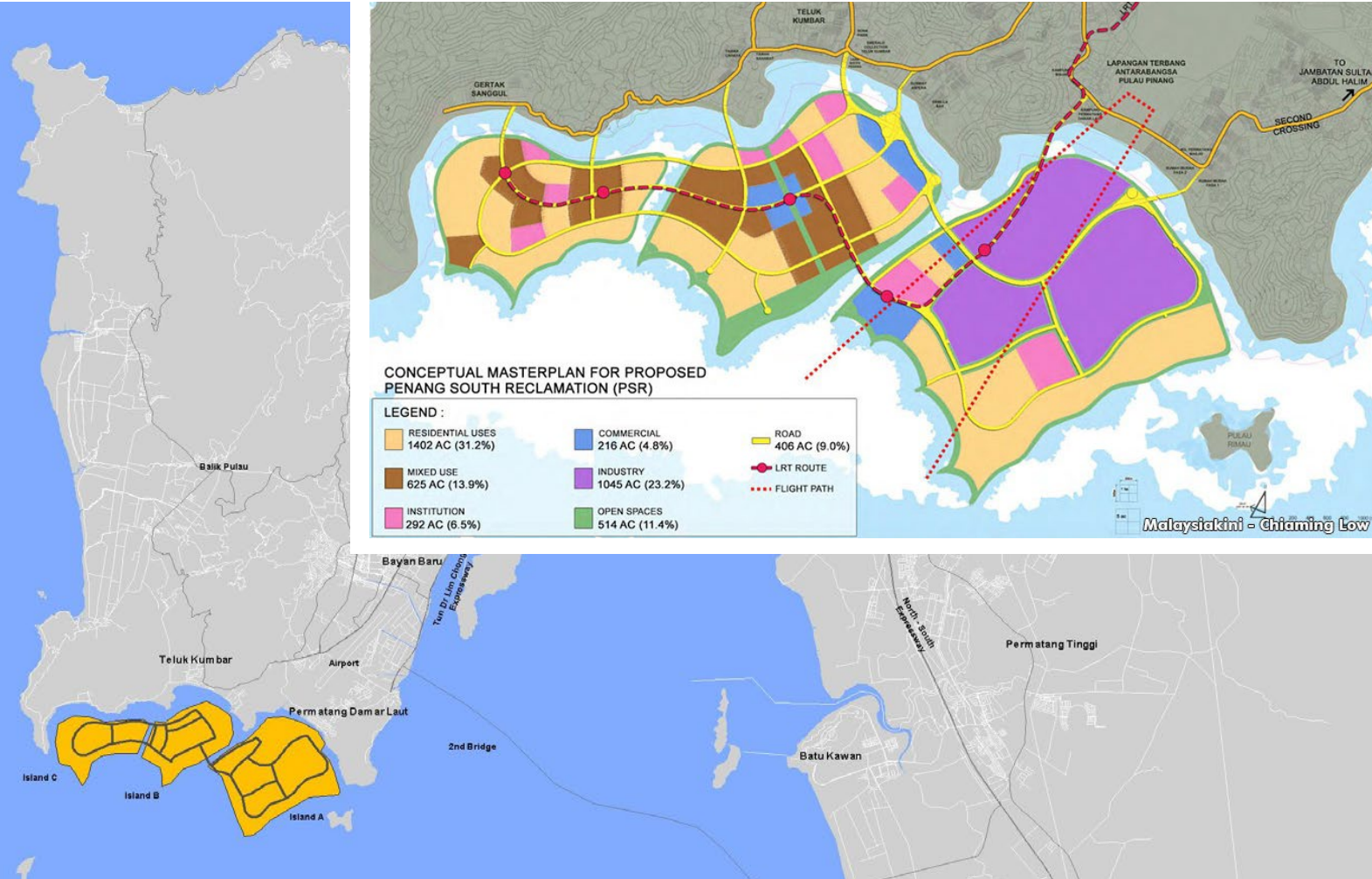
Edinburgh City Centre Transformation – Spatial Framework

1. Walkable city centre core at heart of the UNESCO World Heritage Site
2. High quality streets and public spaces
3. New segregated and safe cycle routes in city centre
4. Free city centre bus
5. Vertical connections at key points in the city
6. Reallocation of space through reduction of on-street parking

Forward. Moving Penang into the Future.

Context – Island Development Proposition

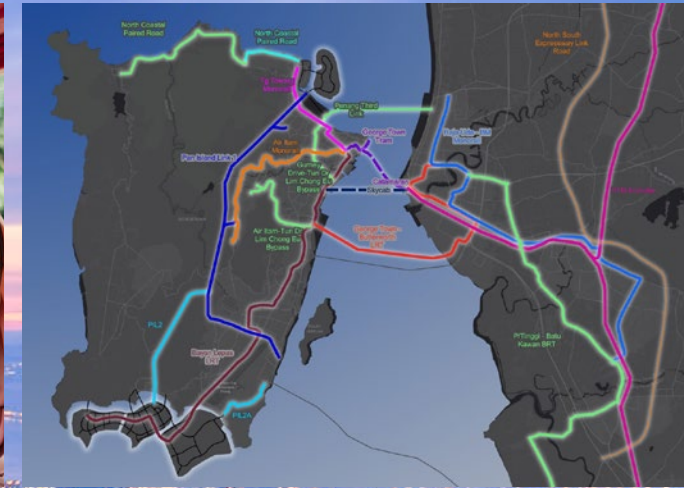
1. Urban centres as key to successful places
2. Core component of a city's structure
3. Places where people live, congregate, work, shop, visit, socialise, recreate, and worship
4. Range of land uses that shape day to day activities
5. Connected with a range of mobility options



Sustainable Mobility



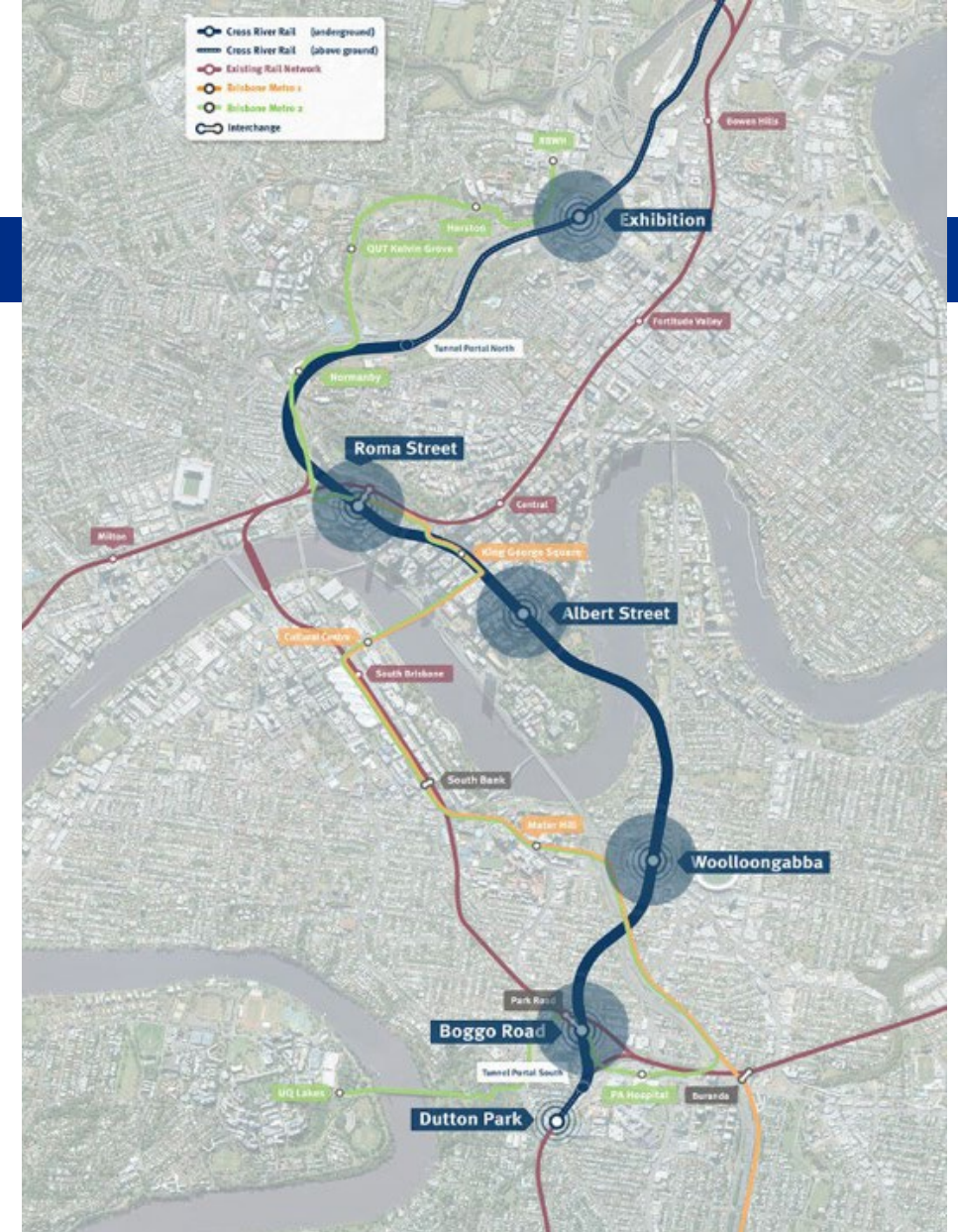
1. Walkability
2. First-class public transit
3. Autonomous vehicles
4. Shared mobility
5. Specialised transit corridors
6. Settlement patterns



Case studies – SEQ, Australia

Cross River Rail

1. Provides new cross river rail connection – 10.2km railway (4.3km elevated/at grade section)
2. 5 new stations (1 new elevated/at grade station)
3. Increases passenger rail capacity to the Brisbane CBD and inner city “health and knowledge” precincts
4. First new rail station in the City Centre for 120 years



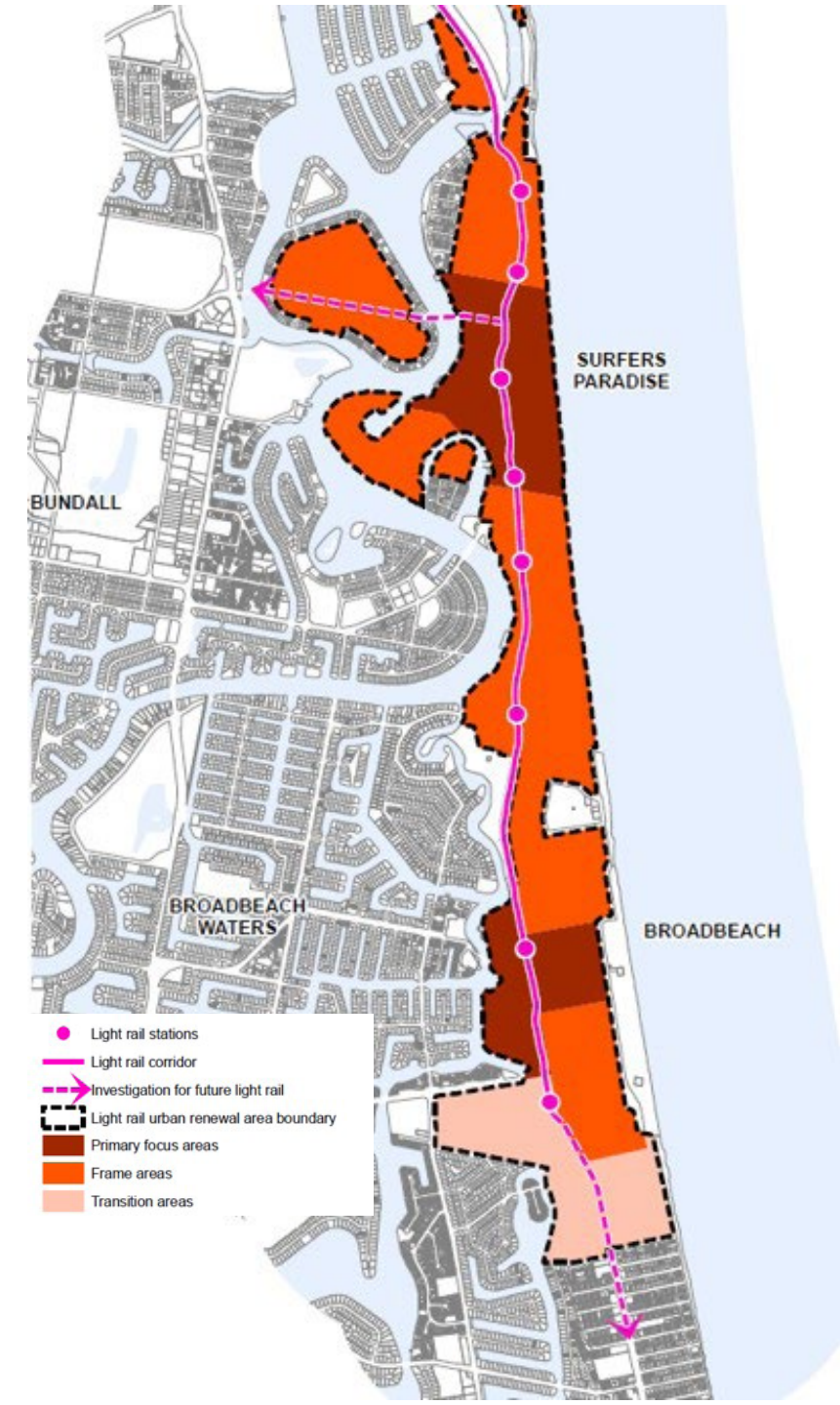
Cross River Rail

1. Will stimulate development of a 6.5 hectare site, 2km from City Centre
2. New commercial, residential and retail precinct next to major sports stadium and existing busway station
3. New public plaza/ town square
4. Will serve 18,000 passengers a day by 2036



Gold Coast Light Rail

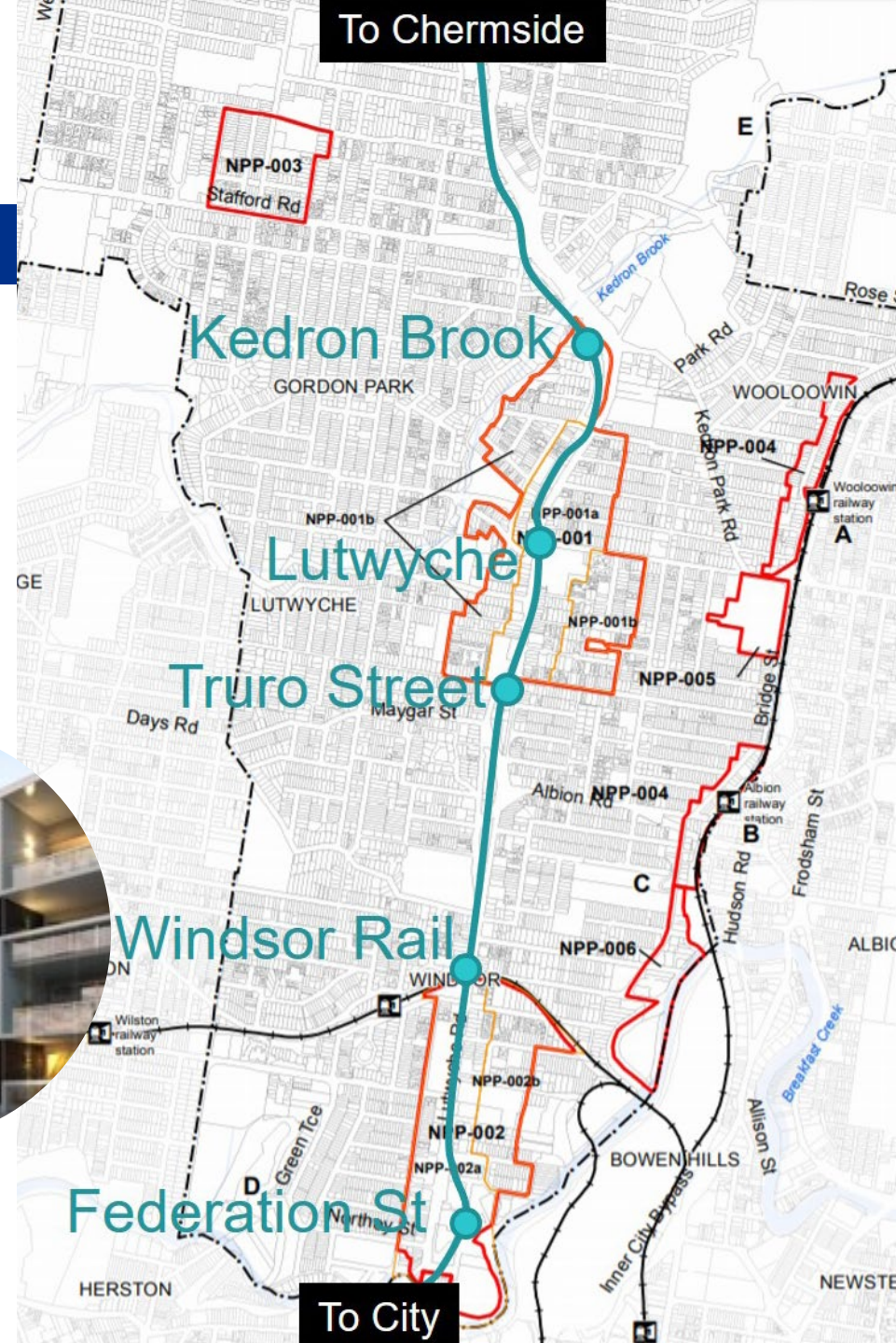
1. Connecting the City to the wider regional rail network
2. Serving the city's main hospital, university, Business Centre and key tourist/ entertainment precincts
3. City zoning supports further development intensity around stations to cater for a growing population



Forward. Moving Penang into the Future.

Northern Busway

1. Bus Rapid Transit spine to Brisbane's north following existing arterial road corridor
2. Served by 3 high frequency bus routes plus other local/ connector routes
3. Includes grade separated busway right of way and high quality stations
4. Neighbourhood Plan allows for a major change in density around new busway stations



Smart Cities – Jacobs Connected Enterprise

D3



Smart / Future Cities, Connected Corridors, Smart Grids, Smart Lighting, Pedestrian Modeling, Resiliency, Real Time Operations



Economic growth and enhance quality of life

Urban & Inter-Urban Mobility, Connected & Autonomous Vehicles, Mobility as a Service (MaaS), Intelligent Transportation Systems (ITS)



Reduce congestion, increase productivity, and facilitate the movement of people and goods



Lifecycle Extension, Predictive Maintenance, Mobile Workforce Optimisation, Asset Compliance, Field Services Optimisation



Optimize operations of assets in an efficient, safe, and effective manner (reducing OPEX)

Optimize total expenditure of existing assets in an efficient, safe, and effective manner (reducing TCO)

Virtual & Augmented Reality, Automated Design, Common Data Environment, Additive Manufacturing



Optimize delivery with increased efficiency, reduced schedules, and improved quality and consistency

Optimize investment in new and improved assets through expenditures informed through lifecycle feedback (reducing CAPEX)

Case studies – Global

Using Internet of Things (IoT) for Smart Water Solutions :: City of Charlotte :: North Carolina

1. Goal: system-wide infrastructure integration and communication solution that connects smart water grid technologies with the energy grid
2. Cloud-based aggregation and analyses of water usage to enhance water optimisation with utility and smart grid technologies
3. Smart meters capture water consumption of each building; video screens in building lobbies show real-time total water use data
4. Real-time water usage used to identify and incentivise efficiency measures
5. Program created measureable improvements in citywide sustainability



Urban Mobility :: Project Edmond London

1. Harness the power of big data to help prepare for future challenges
2. 400M multi-modal journeys over 3 months from freight, private vehicles, and taxis using mobile phones, cycling apps, smart cards, social media, and GPS
3. Previously unattainable insight into real crowd behaviour
4. Intelligent, data-driven investment decisions
5. Revolutionise the way TfL makes decisions to improve London's Network
6. Capacity to have a major impact for transport solutions in cities across the globe

Aurangabad Industrial Smart City :: India

1. First smart industrial city
2. Aligning physical and digital infrastructure to harness benefits provided by IoT enabled solutions
3. A transit-oriented and walkable township
4. Water and energy conservation
5. Renewable power sources
6. ICT and City Command and Control Center
7. First Greenfield Smart City that connects the community to the rest of the world through high-speed communications
8. New jobs for over 330,000 people
9. Improving quality of life using a work, live and play approach



Amaravati Smart City Program Management :: Amaravati, Andhra Pradesh, India

1. Develop smart city infrastructure that will integrate critical systems such as water, power, security, waste, transportation, city command and control centre
2. Evaluate smart city technologies and utilise Internet of Things (IoT) to facilitate communication among vital city functions.
Develop Smart Amaravati App to enable communication between these systems and the citizens.
3. When completed, will improve quality of life for all citizens and enhance economic growth by leveraging digital solutions



Climate Change

D4



1. Sea level rise
2. Temperature increases
3. Flooding and precipitation
4. Extreme weather events

Forward. Moving Penang into the Future.

Resilient Built Environment
Penang 2030

VERNAS LECTURE SERIES #13

19

JACOBS

Case study: Temaiku, Kiribati



LEGEND
Project extents

Forward. Moving Penang into the Future.

Resilient Built Environment
Penang 2030

VERNAS LECTURE SERIES #13

20

JACOBS

Temaiku Planning Process



Figure 1. The Temaiku site today

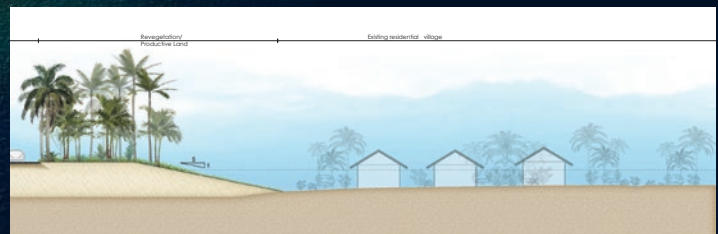
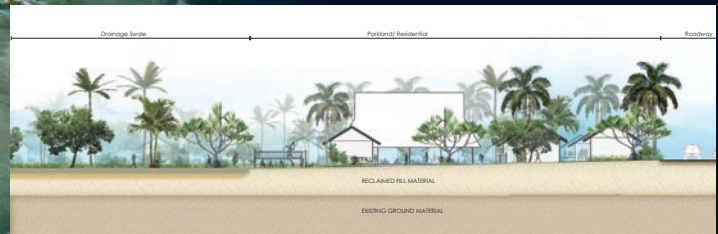


The proposed reclamation



Looking to the future

Preferred Option



Forward. Moving Penang into the Future.

Resilient Built Environment
Penang 2030

VERNAS LECTURE SERIES #13

Jacobs

1947

Founded by
Dr. Joseph Jacobs

 80,000

Employees

\$15B

FY2018 Revenues

\$3B

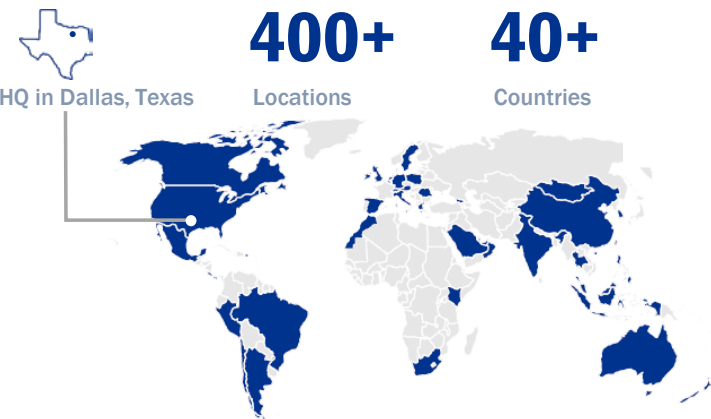
In documented
Client Savings

 1.2

Million Metric Tons of CO2
Saved for Clients in FY2017

#1

A/E DESIGN FIRM IN THE WORLD
Engineering News Record



FORTUNE

2019

MOST ADMIRABLE
COMPANIES
IN THE WORLD

Ranked by Fortune magazine as the #1 Most Admired Company in the World among engineering and construction companies.
It marks **20 consecutive years (1999-2019)** that we have held a top-5 spot.



Ranked by Ethisphere as one of the World's Most Ethical Companies for **9 consecutive years (2009-2017)** recognizing Jacobs advancement of best practices in business ethics, compliance practices, and corporate social responsibility

INDUSTRY SECTORS



Buildings



Advanced
Facilities



Aviation



Power &
Utilities



Consumer Goods
& Manufacturing



Water &
Wastewater



Transportation



Industrial



Aerospace



Nuclear



Automotive



Pulp & Paper



Defense



Telecommunications



Environmental



jacobs.com



[jacobs](https://www.linkedin.com/company/jacobs)

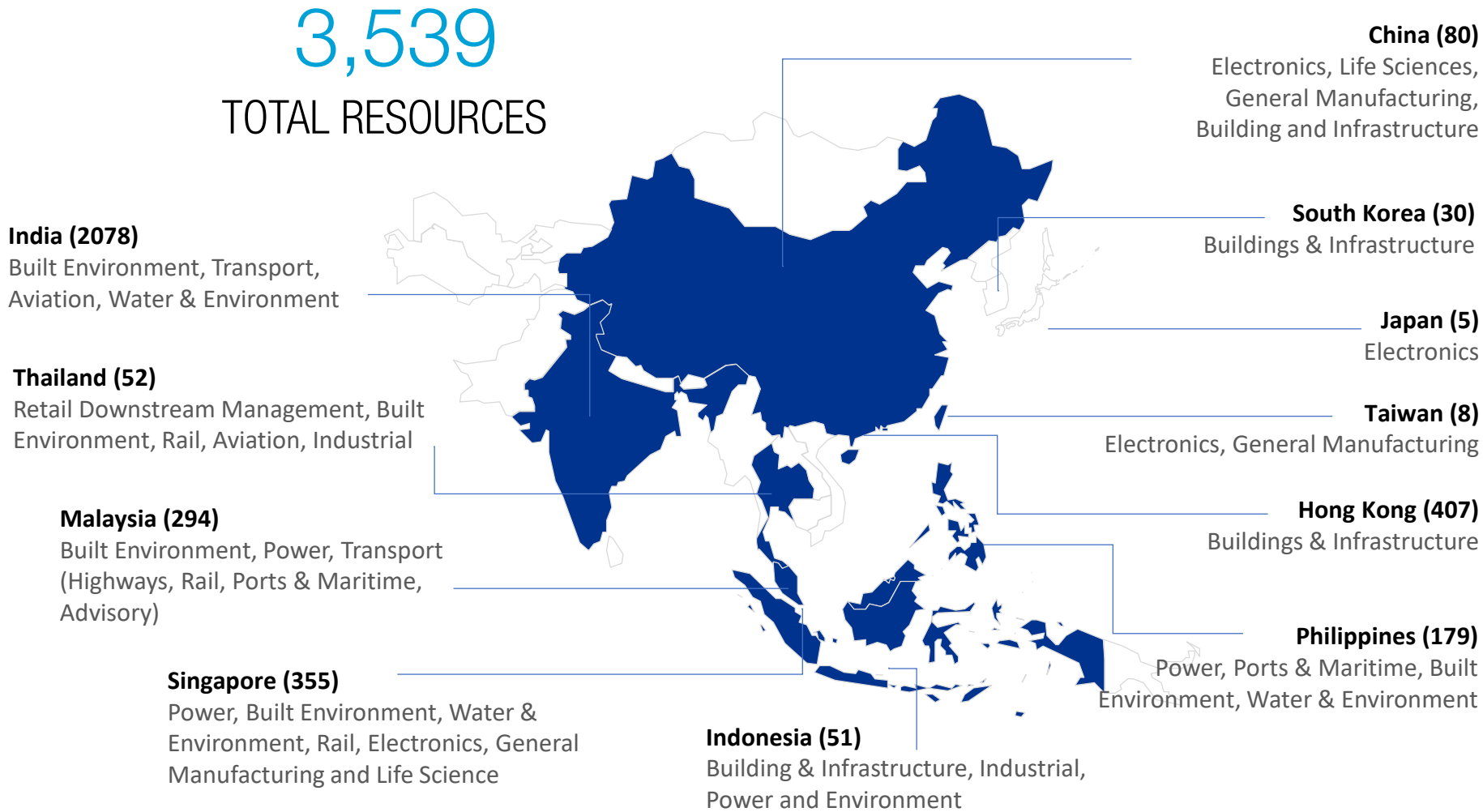


[jacobsworldwide](https://www.youtube.com/jacobsworldwide)

Forward. Moving Penang into the Future.

Resilient Built Environment
Penang 2030

VERITAS LECTURE SERIES #13



Key Message

“The World and its Cities will see more change within the next thirty years than has ever occurred before in the history of the planet.

We all need to respond both sustainably and resiliently in the way we plan and design our Urban Centres as a legacy for future life”.

Dennis Eiszele

Dennis Eiszele

Technical Director of Cities & Places (Asia Pacific Middle East)

Wesley Wong

Country Director for Malaysia

JACOBS®

Thank you