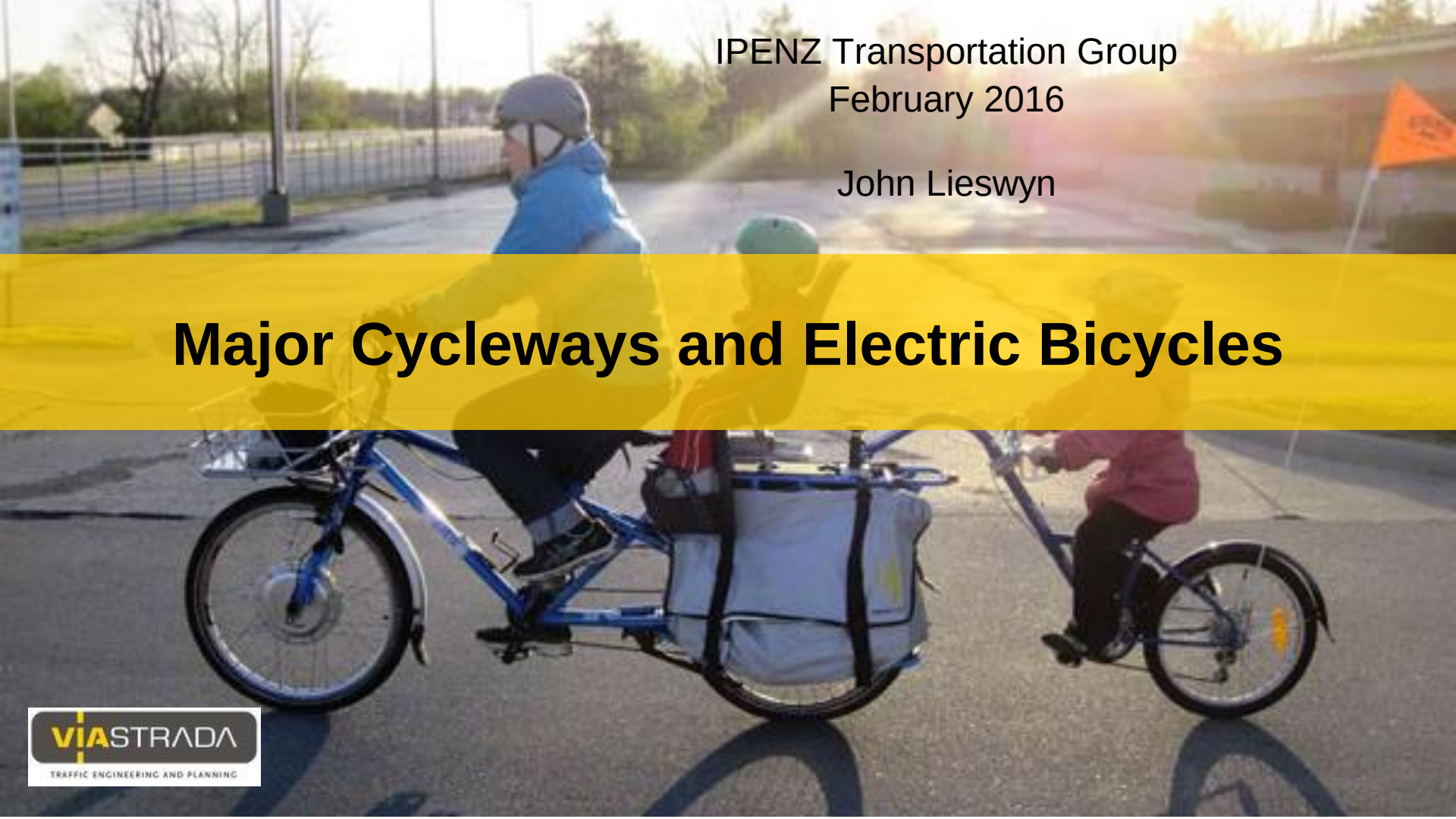


IPENZ Transportation Group
February 2016

John Lieswyn

Major Cycleways and Electric Bicycles

VIASTRADA
TRAFFIC ENGINEERING AND PLANNING

Agenda

- Introduction
- A new paradigm in trail design – CV Link
  - Background
  - Concept
  - Funding
  - New design
- Electric bikes
  - Defined
  - Legislation
  - Design considerations

John Lieswyn

- Professional road cyclist, 1992–2005
  - US National TT Champion 1991, 2004
  - 2,000 races worldwide
- Education & qualifications
  - University of Florida, BSc 1990
  - University of Canterbury, MET 2011
  - ITE Professional Transportation Planner
- Specialist areas:
  - Policy, legislation, standards
  - Walking & cycling facility design
  - Demand modelling, economic evaluation
  - Project prioritisation
- N. American experience:
  - Vancouver, Columbus, Florida DOT, Orange County, San Francisco, Central Valley cities, Coachella Valley
- NZ experience:
  - Auckland, Hamilton, New Plymouth, Hastings, Palmerston North, Upper Hutt, Wellington
  - Nelson, Greymouth, Christchurch, Queenstown, Invercargill

CV LINK

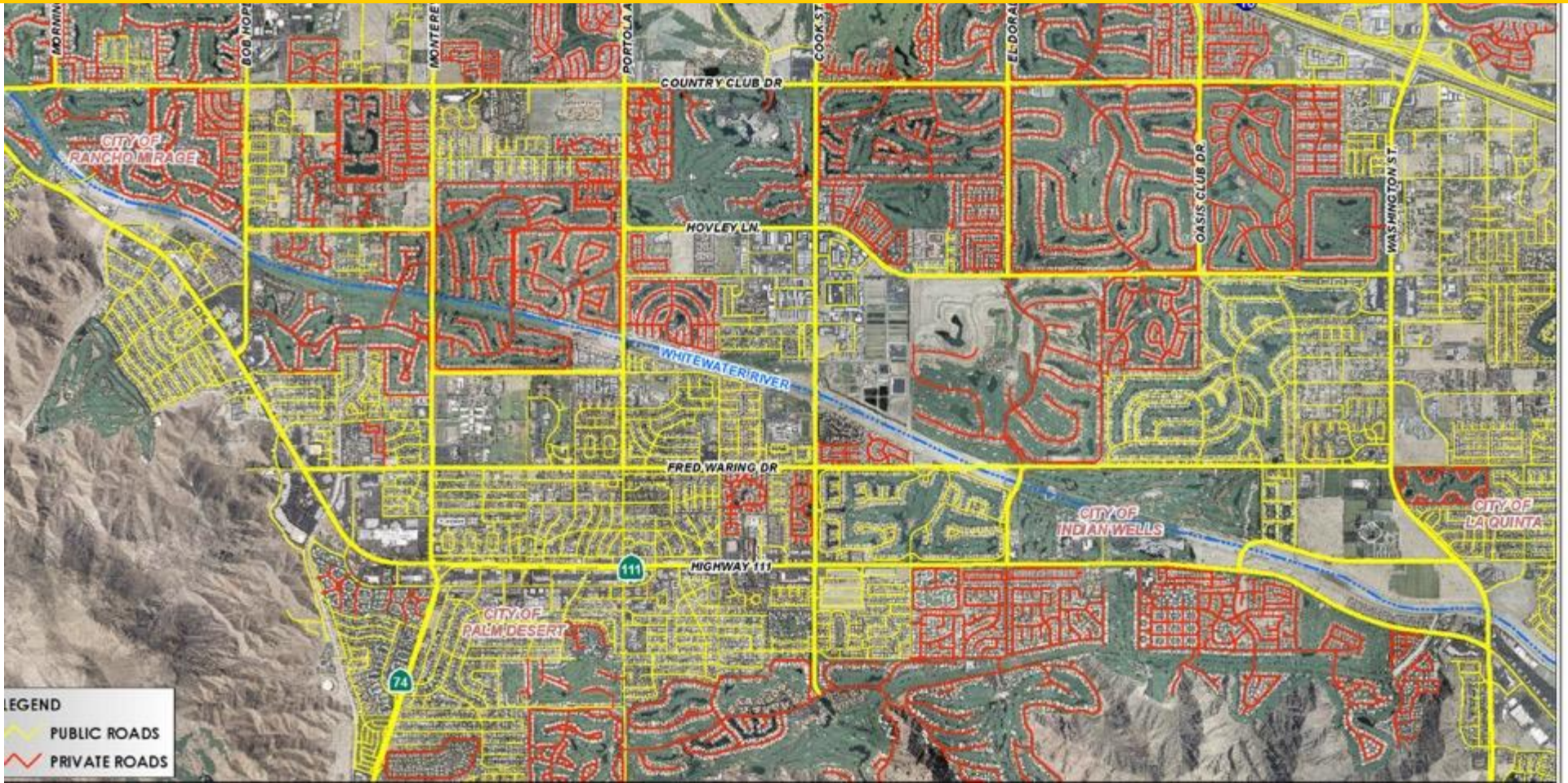
CONNECTING THE COACHELLA VALLEY

CV Link will be an innovative, multi-modal facility of national importance that connects communities in the Coachella Valley and provides significant environmental, health, wellness, and economic benefits

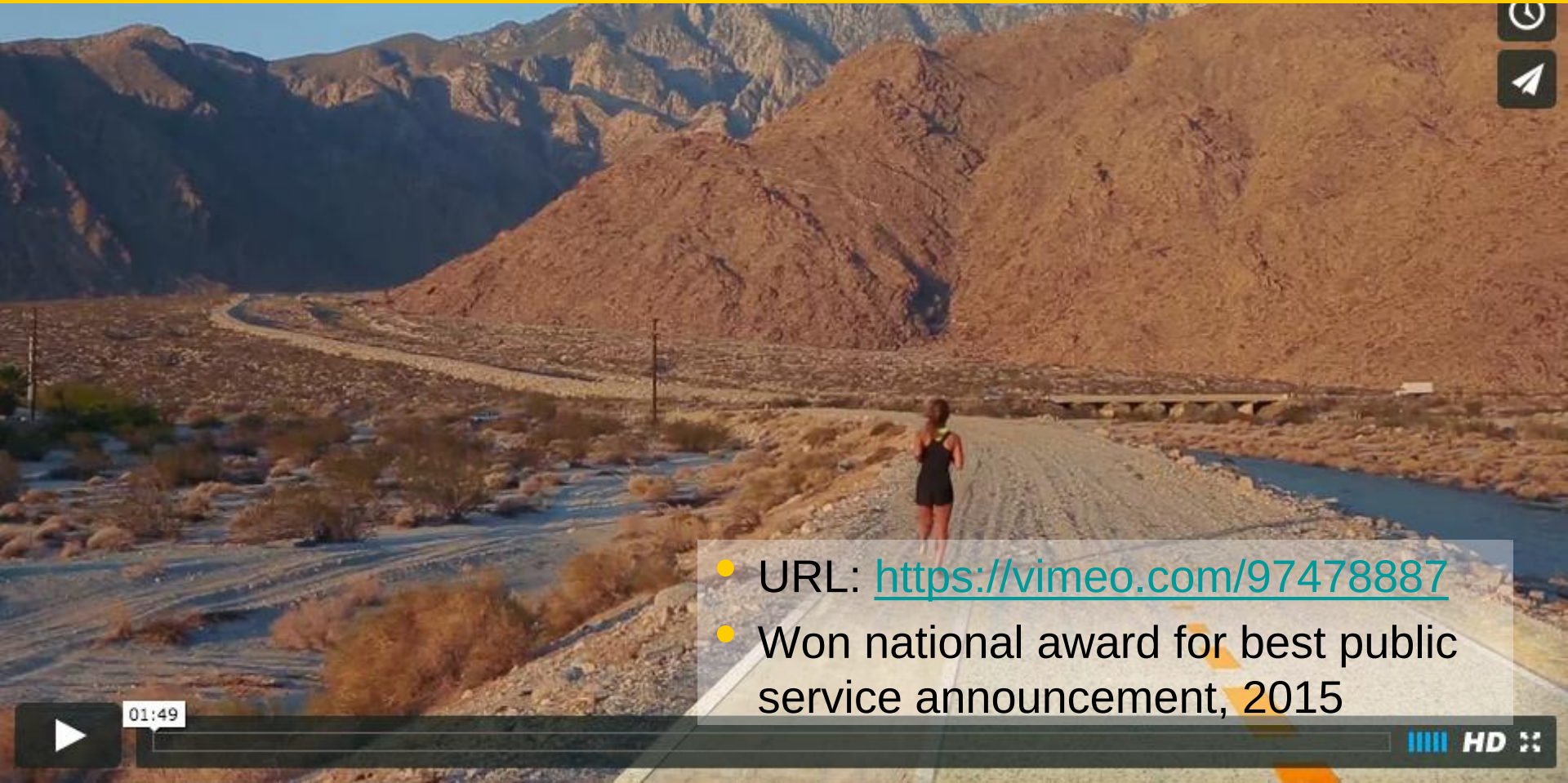
Context – natural environment

Context – transportation

Context – land use



Getting the message out…



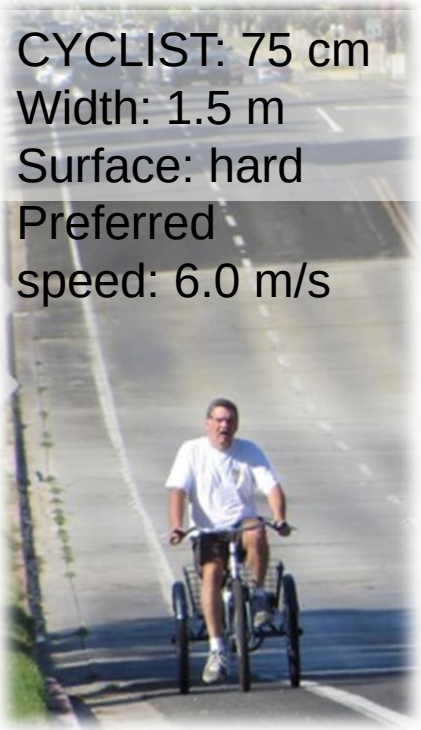
- URL: https://vimeo.com/97478887
- Won national award for best public service announcement, 2015

Design vehicle

Pedestrian: 60 cm
Width: 90 cm
Surface: soft
Preferred speed: 1.5 m/s

Pedestrian

CYCLIST: 75 cm
Width: 1.5 m
Surface: hard
Preferred speed: 6.0 m/s



Cyclist

LSEV: 137 cm
Width: 2.2 m
Surface: soft or hard
Speed: 10 m/s

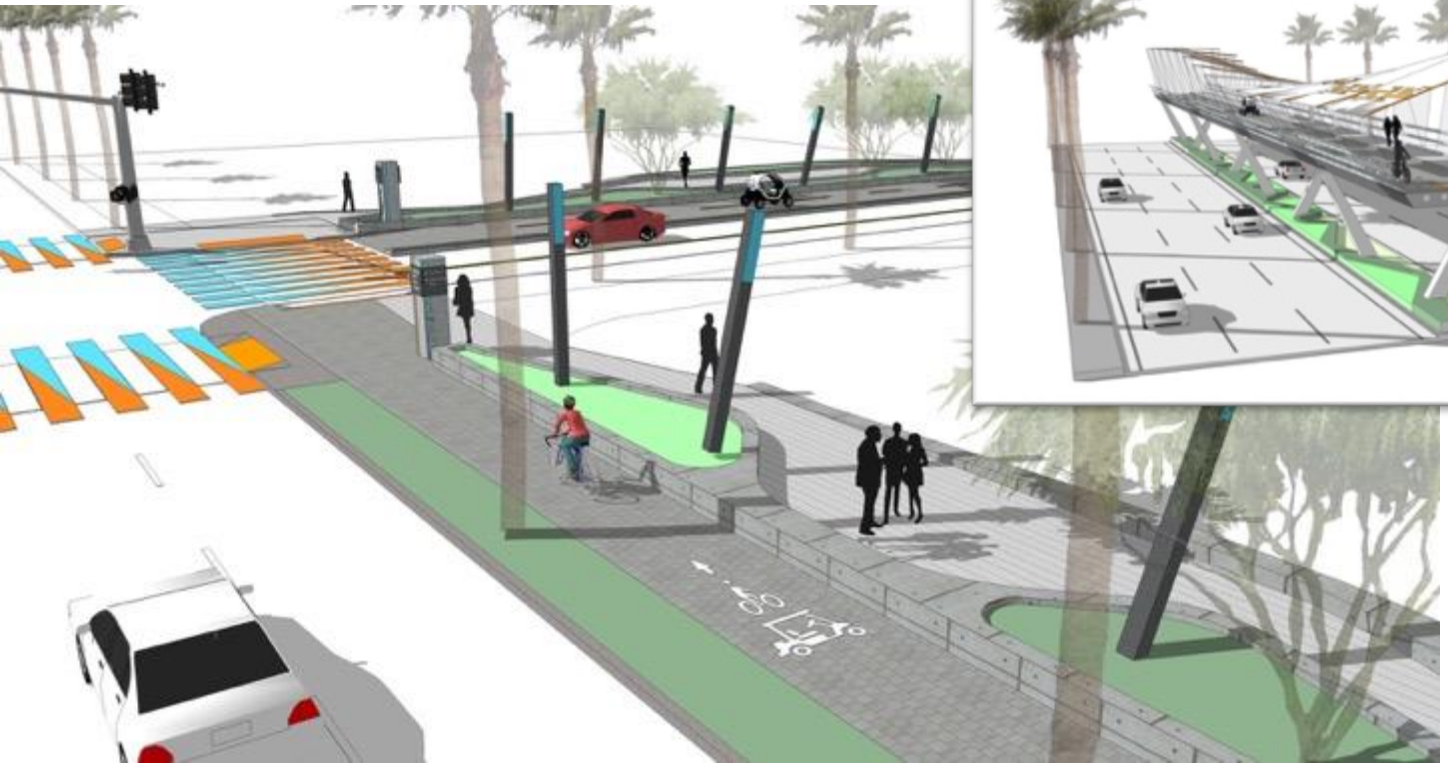
Not in NZ law

LSEV

Field confirmation

Concept

On-street



Undercrossings

CV Link summary

- Rationale similar to NZ Cycle Trail – momentum is key
  - Build big to engage the imagination
  - Build fast so that people can see themselves using it soon
  - Secure political support to break down institutional barriers
- Striking design elements similar to Nelson St Cycleway
- Set desirable dimensions rather than minimums

ELECTRIC BIKES

Why?

With an e-bike, bicyclists can ride more often, farther, and for more trips. Electric bicycles are designed to be as safe as traditional bicycles, do not compromise consumer safety, and benefit new bicyclists who may be discouraged from riding a traditional bicycle due to limited physical fitness, age, disability or convenience

- People for Bikes

What is an e-bike?

Bicycle Style (BSEB)

- Pedelec (pedal assist)
- Powered bike (throttle)
- S-Pedelec (pedal assist)

Scooter Style (SSEB)

- Moped
- Geometry
- Weight

Other

- LSEV
- Closer to BSEB
- Weight

Regulations: NZ

cycle –

(a) means a vehicle that has at least 2 wheels and that is designed primarily to be propelled by the muscular energy of the rider; and

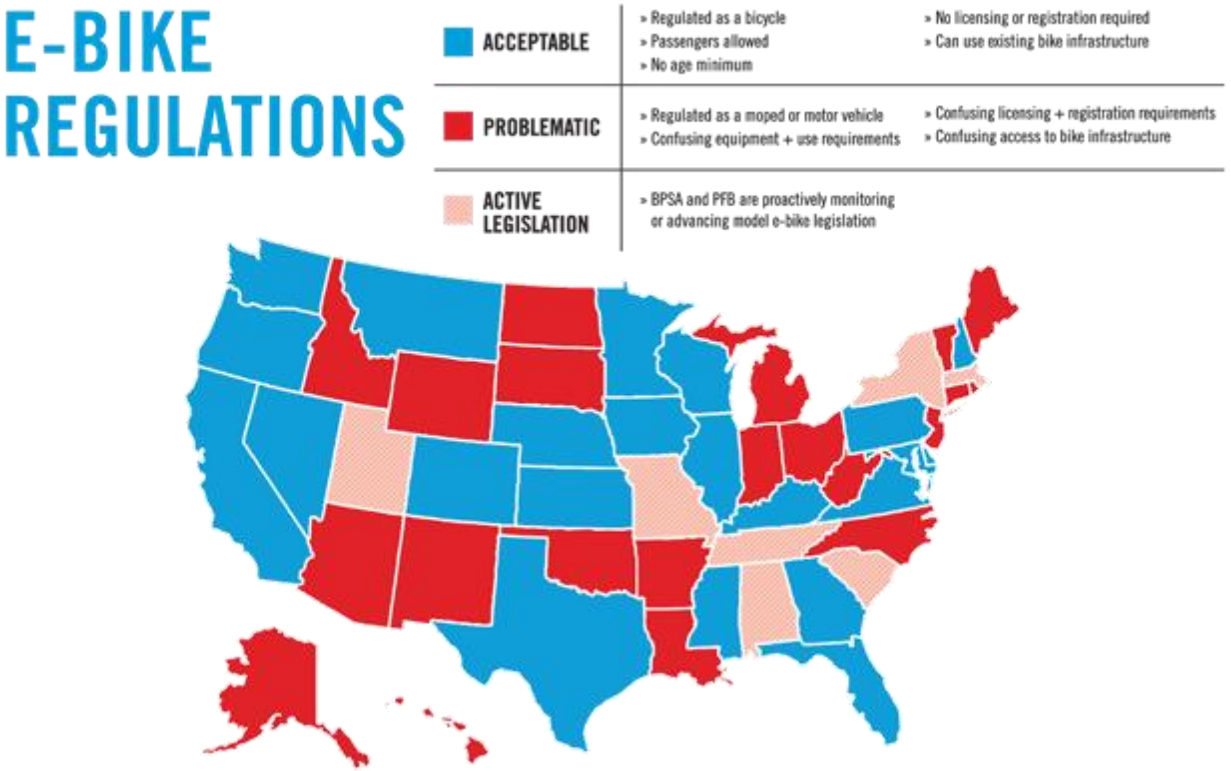
(b) includes a power-assisted cycle *(RUR 2014 §1.6)*

power-assisted cycle means a cycle more auxiliary propulsion motors that power output not exceeding 300 W

NOTE!
Motors are typically rated at input power, and are usually 80% efficient.

Mobility device – …is powered solely by a motor that has a maximum power output not exceeding 1500 W…

Regulations: US



VEHICLE TYPE	VEHICLE		USER				BIKEWAY ACCESS			
	PEDAL OPERATED	MAXIMUM MOTOR-ASSISTED SPEED Km/h	MINIMUM AGE (YEARS)	DRIVER'S LICENSE	LICENSE PLATE	HELMET	CLASS I BIKE PATH	CLASS II BIKE LANE	CLASS III BIKE ROUTE	CLASS IV PROTECTED LANE
BICYCLE	YES	N/A	N/A	NO	NO	17 AND UNDER	YES	YES	YES	YES
TYPE 1 E-BIKE*	YES	32	N/A	NO	NO	17 AND UNDER	YES	YES	YES	YES
TYPE 2 E-BIKE*	NO	32	N/A	NO	NO	17 AND UNDER	YES	YES	YES	YES
TYPE 3 E-BIKE*	YES	45	16	NO	NO	YES	NO	YES	YES	YES
MOPED	NO	N/A	16	YES	YES	YES	NO	YES	YES	NO

California AB 1096 (2015) – infographic: People for Bikes

Locale	Terms / Notes	Label	Throt.	Km/h	Watts	Kg	Age
USA	Low speed vehicle (CPSC, CFR)	-	-	32	750	-	-
CA	Type 1	Yes	No	32	-	-	-
	Type 2	Yes	Yes	32	-	-	-
	Type 3	Yes	No	45	-	-	16
Canada	Type label required	Yes	-	32	500	-	-
Australia	Class AB Power Assisted Bicycle	-	Yes	-	200	-	-
	Pedelec		No	25	250	-	-
NZ	Class AB	-	-	-	300	-	-
EU	Pedelec (EN15194), kits exempt	Yes	No	25	250	40	14
Germany	Pedelec (as per EU)	Yes	No	25	250	-	-
Switz.	S-Pedelec	Yes	No	45	400	-	-
UK	Bicycle	Yes	-	24	200	40	14
	Tricycle, tandem	Yes	-	24	250	60	
Israel		-	-	25	250	30	14
Japan	Max. assist ratio 2:1	-	-	-	-	-	-
China		-	-	20	-	40	-

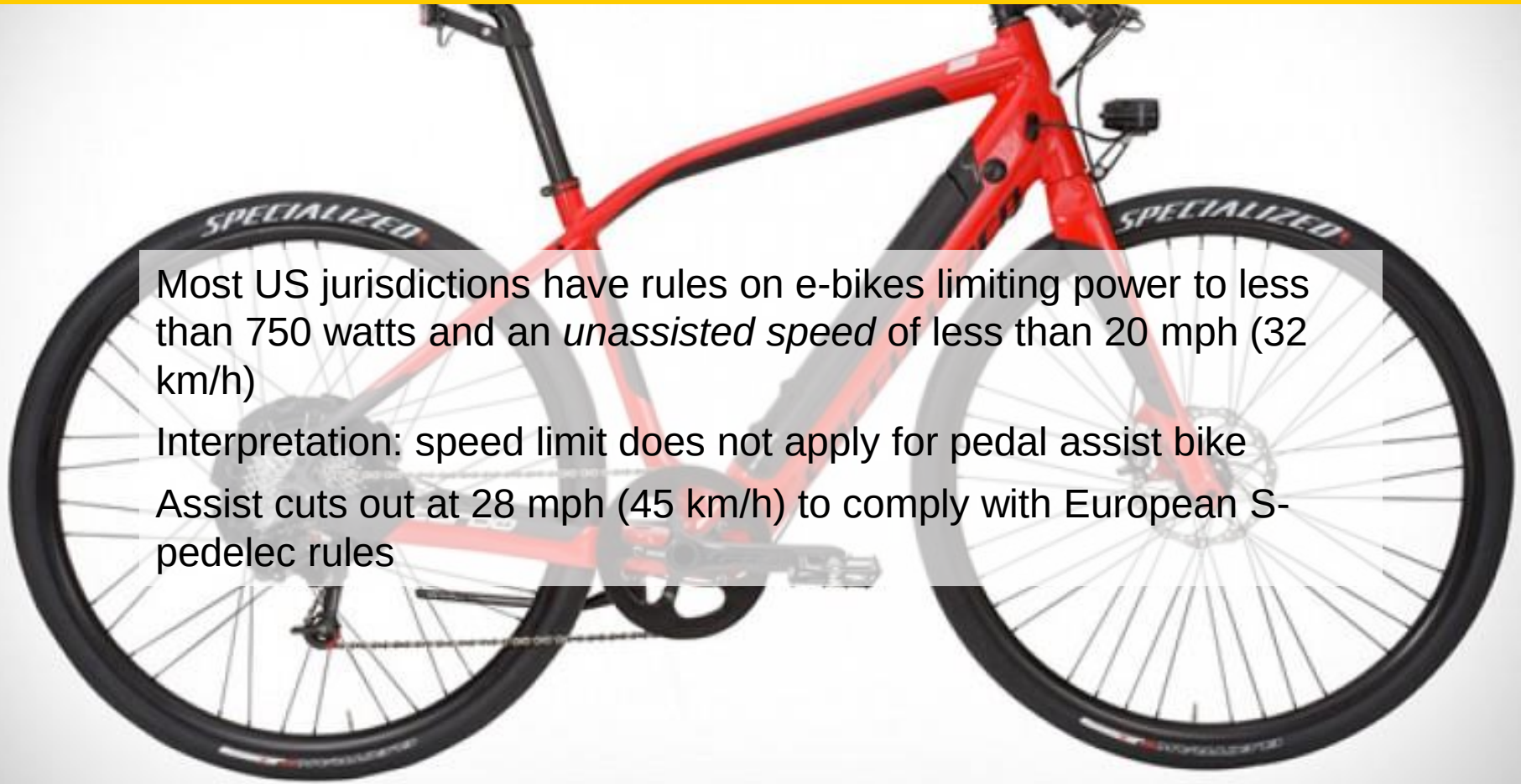
Regulatory Criteria

- Power
  - 200 W: limits bicycle choice as it is below EU standard
  - 250 W: widest range of bikes, but insufficient for hilly areas / heavy bikes
- Weight
  - Limits cargo / family bikes

Sources (L): John Lieswyn *(R): Societa Piemontese Automobili (SPA)*

- Speed
  - 85th percentile normal bike = 22 km/h, e-bikes not that different
  - We match our speed to the environment; most cars can go 150 km/h, but we don’t require governors on them

Rules need to be carefully written



Most US jurisdictions have rules on e-bikes limiting power to less than 750 watts and an *unassisted speed* of less than 20 mph (32 km/h)

Interpretation: speed limit does not apply for pedal assist bike

Assist cuts out at 28 mph (45 km/h) to comply with European S-pedelec rules

Can you regulate behaviour?

- *“I was riding my e-bike on a bike path the other day, only using the pedal-assist to get up the hills, when these two guys on regular bikes came zooming by like idiots. The bike is not the problem, it's the rider.”*
  - e-bike user in California commenting on People for Bikes article

3600 W kit motor. Source: https://www.electricbike.com/12-kit-power-levels-360w-to-8000w/

Source: https://www.electricbike.com/illegal-ebike-riding/

A HIGHER LEVEL OF SERVICE

Geometrics: design speed

	Speed (km/h)	
	Parkin & Rotherham (2010)	AASHTO Bike Guide (2012)
85th %	22	29
Design, Flat (<3%)	25	30
Design, Hilly	29	48

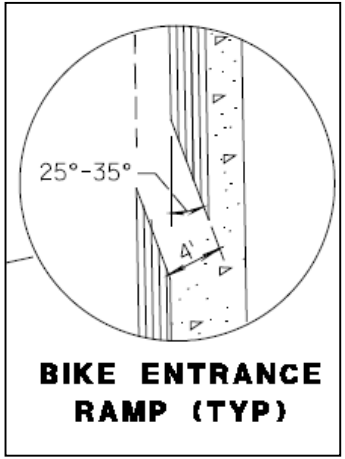
Speed (km/h)	Curve radius (m)
25	15
30	19
40	35
50	52

$$R = \frac{0.0079V^2}{\tan\theta}$$

where:

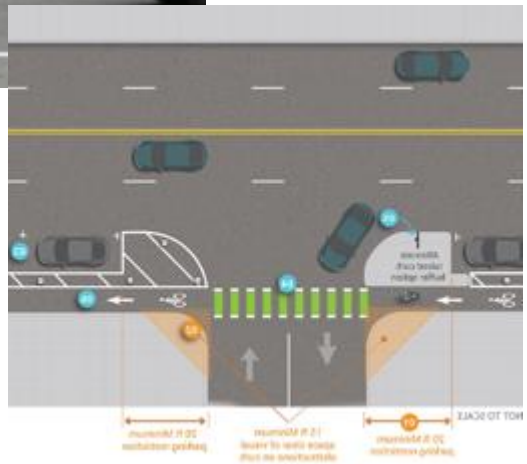
R	=	minimum radius of curvature (m)
V	=	design speed (km/h)
θ	=	lean angle from the vertical (degrees)

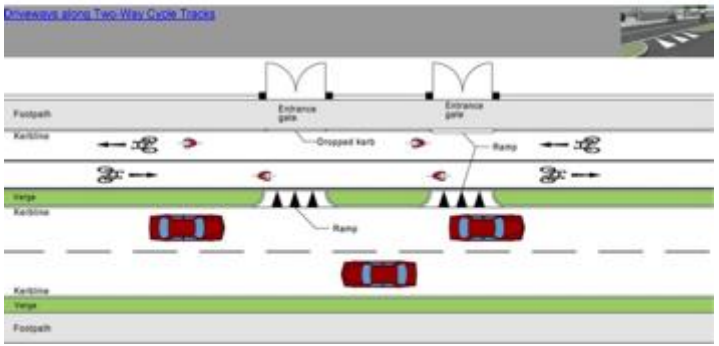
- Greater use of e-bikes may lift 85th percentile
- Avoid right angles on protected bike lanes!
  - Minimise cognitive load on cyclists
  - Consider controls on conflicting movement instead
- 12 m taper for 25 km/h design speed
- 17–35º ramps; shallower is better



Surfaces

Sight lines and driveways





- FHWA Separated Bike Lane Planning & Design Guide
- Irish Cycle Design Guide: https://www.cyclemanual.ie/manual/detailsright/entrances-and-driveways/

Facility width

SUPLOS tool / VicRoads Cycle Note 21 – QLD Main Roads & Transport tool

Intersection details

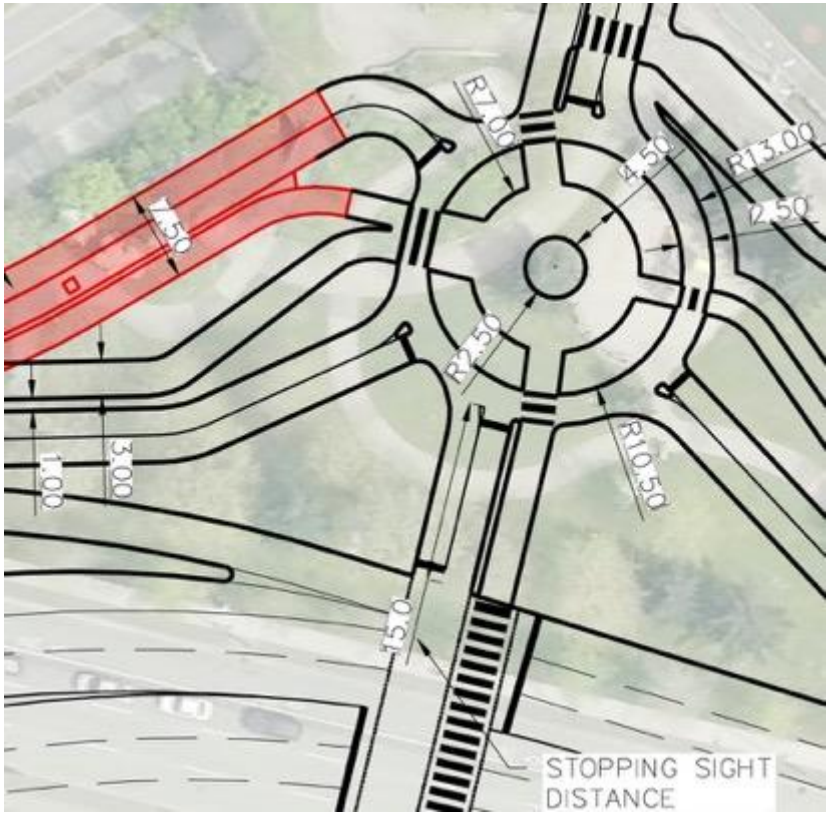
Indented hook turns

Traditional

Indented

Highway 7, York Region, Canada

Queuing space



Any questions?

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