Architectural Noise Barriers

Victoria, Australia

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keeping victorians connected

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Introduction

- Victoria is regarded (at least in Australia) as a leader in the architectural design of noise barriers.
- This presentation will be more ‘show’ and less ‘tell’
- I’ll describe the local context, describe our approach, then show what our noise barriers look like.
- Most photos are labelled with latitude and longitude, so you can find them on Google Earth street view.

Our State

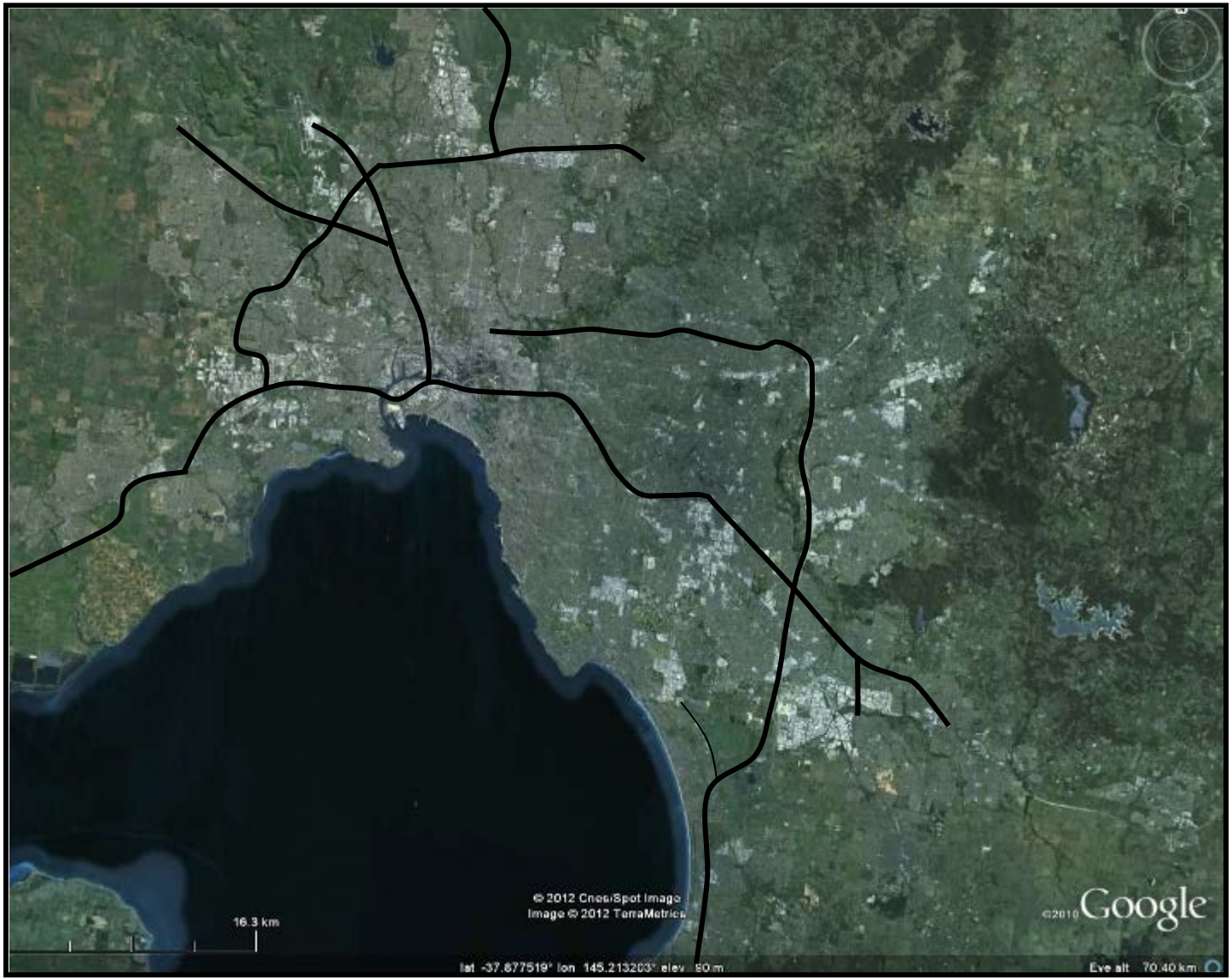
Victoria –

- Located in south eastern Australia
- Area 237,000 km^2 (about the area of Minnesota)
- Population 5,500,000 (about the same as Minnesota)

Melbourne -

- Capital and largest city in Victoria
- Population 3,999,982 (a bit bigger than Minneapolis – St Paul, but not as cold)
- Urban freeway network is still under construction
- Railway construction recently resumed (post 1930)
- Noise barriers on most urban freeways but not railways

Melbourne


© 2012 CnesiSpot Image
Image © 2012 TerraMetrics
16.3 km
©2010 Google
lat -37.877519° lon 145.213203° elev 50 m
Eye alt 70.40 km

Why bother

Good architectural design:

- Enhances urban design
- Responds to site context
- Can function as wayfinding
- Discourages vandalism

- Results in reflective rather than absorptive barriers
- Can result in additional upfront capital costs

Our approach

- Noise barriers are constructed for new freeways and certain arterial roads
  - Mandatory design objective 63 dB(A) $L_{A10\ (18\ hour)}$ after 10 years
  - No limit to reasonable barrier height => up to 14 m
- Noise barriers are constructed along existing freeways where noise levels exceed 68 dB(A) $L_{A10\ (18\ hour)}$
  - Constrained by funding
- Property developers are required to provide noise barriers when they develop beside existing freeways.

Our approach

- Noise modelling using CoRTN algorithm
- Acoustic consultant defines barrier height and location
- Engage architect to develop concept and detailed design, in consultation with project engineers, ecologists, hydrologists and in-house urban designers
- Engage architect to develop concept and design development prior to award of contract
- Architect collaborates with project engineers, ecologists and landscape architects

Materials

Generally use reflective materials with sufficient mass to ensure noise transmission is insignificant relative to diffraction

- Plywood (inexpensive, mostly used for retrofitting)
- Precast concrete
- Transparent acrylic
- Steel – Corten and bridge decking
- Stone gabions
- High Density Polyethylene
- Photo Voltaic Panels
- Integrated housing as noise wall
- New Jersey Barriers
- Earth mounds

Ringwood Bypass

Lat -37.81º Long 145.23º

Victoria's first architecturally initiated noise barrier

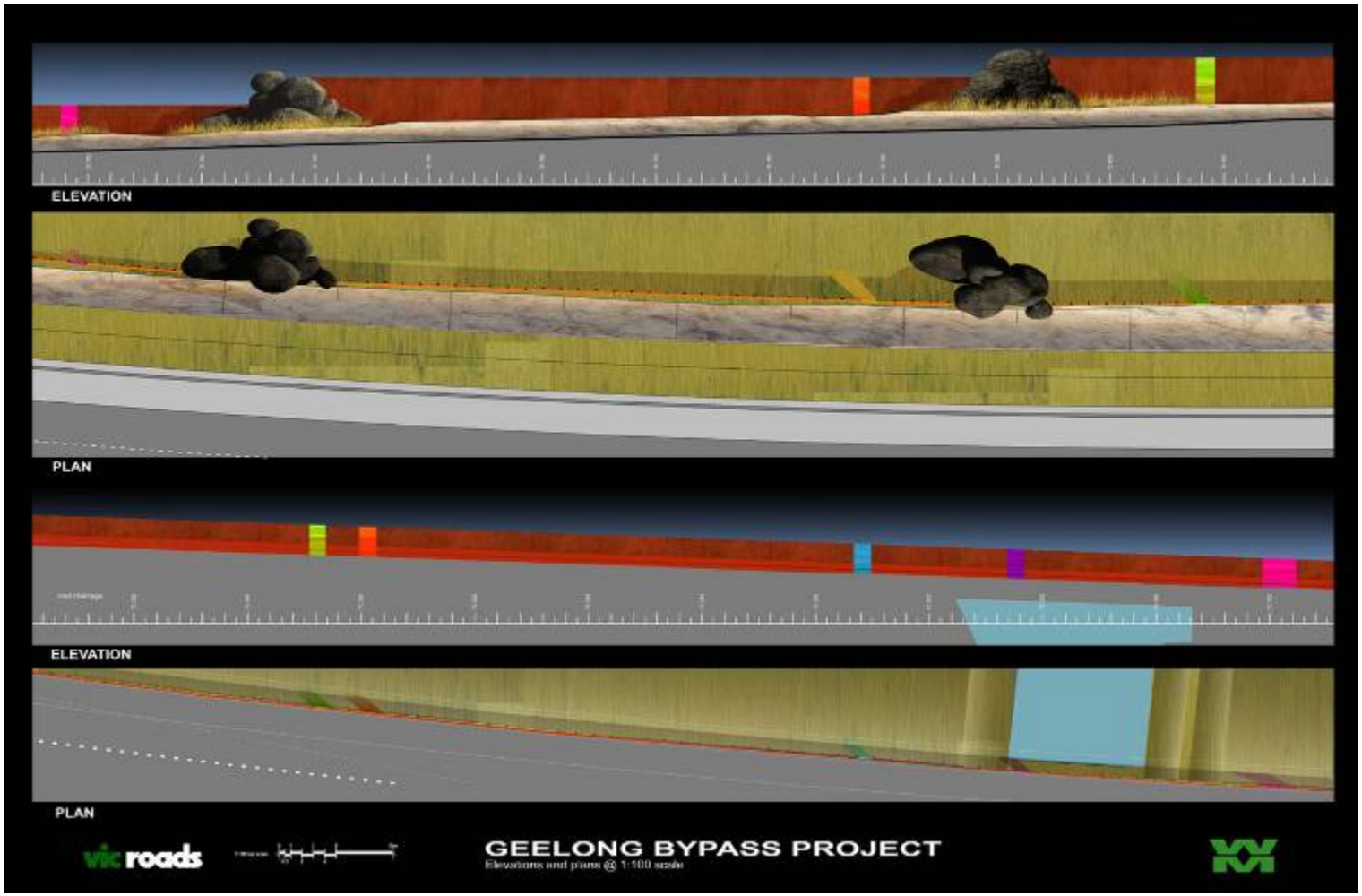
Pre cast concrete

Approx 20 years old. Created some controversy when installed due to strong colour (since faded somewhat).

Geelong Ring Road

Corten Steel and Acrylic

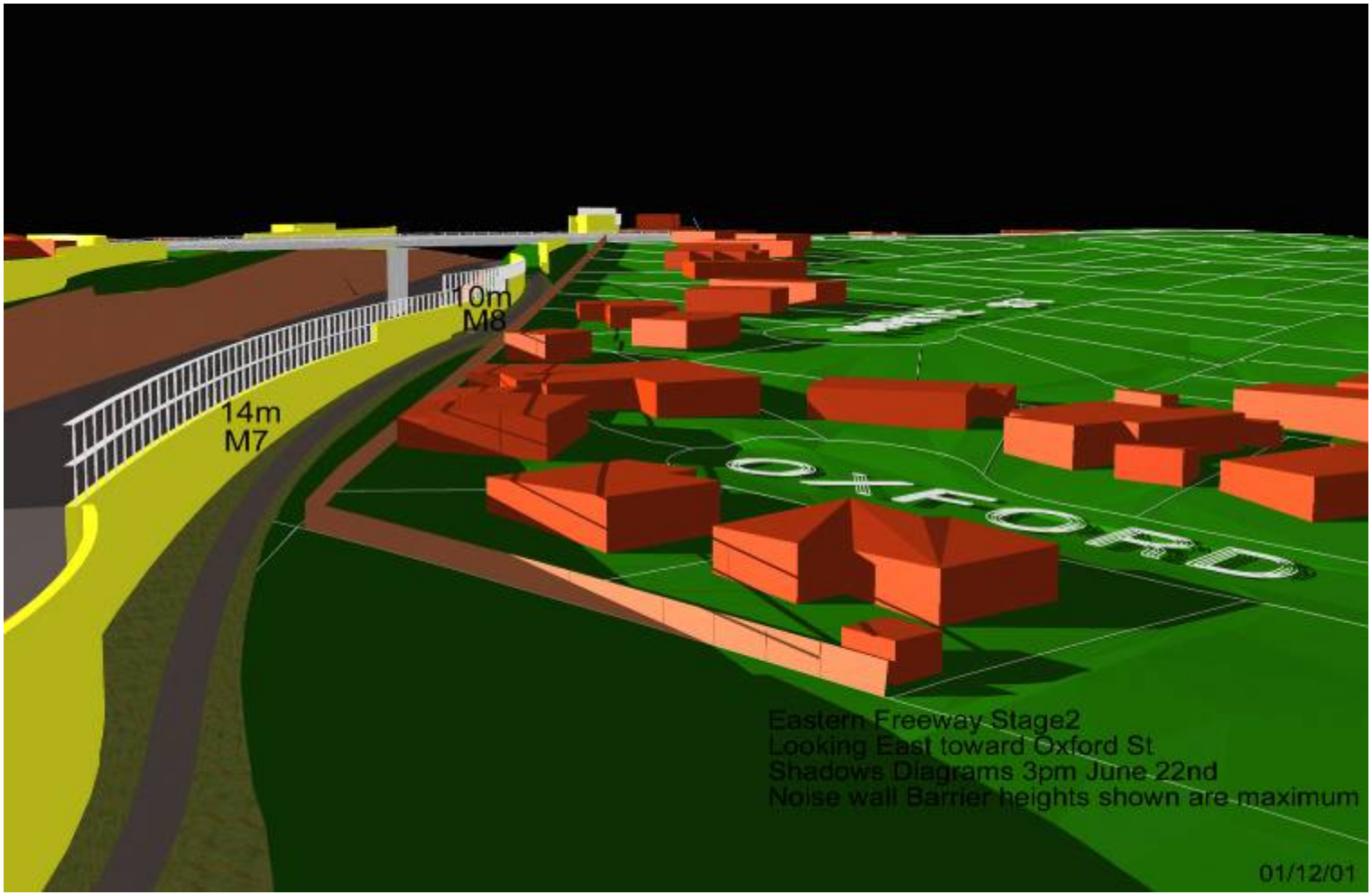
Geelong Ring Road



Geelong Ring Road

Lat -38.1^{o} Long 144.30^{o}

Overshadowing study



Ribbon concept

Ribbon execution

Lat -37.7º Long 145.0º

Corten steel

Pedestrian bridge & Noise Barrier

Embossed acrylic with LED lighting

Lat -37.68º, Long 145.0º

Embossed acrylic with sculptural feature

Lat -37.7º, Long 145.0º

Precast Concrete

Lat -37.8º, Long145.1º

Transparent acrylic top to reduce visual bulk

Precast Concrete

Lat -37.8º, Long145.1º approx

Plywood

Lat -38.0º Long 145.3º approx

More recent plywood barriers have panels clamped inside H section steel columns.

Plywood Noise Barrier & Bike Path

Lat -38.0º, Long 145.3º

Precast Concrete with Acrylic

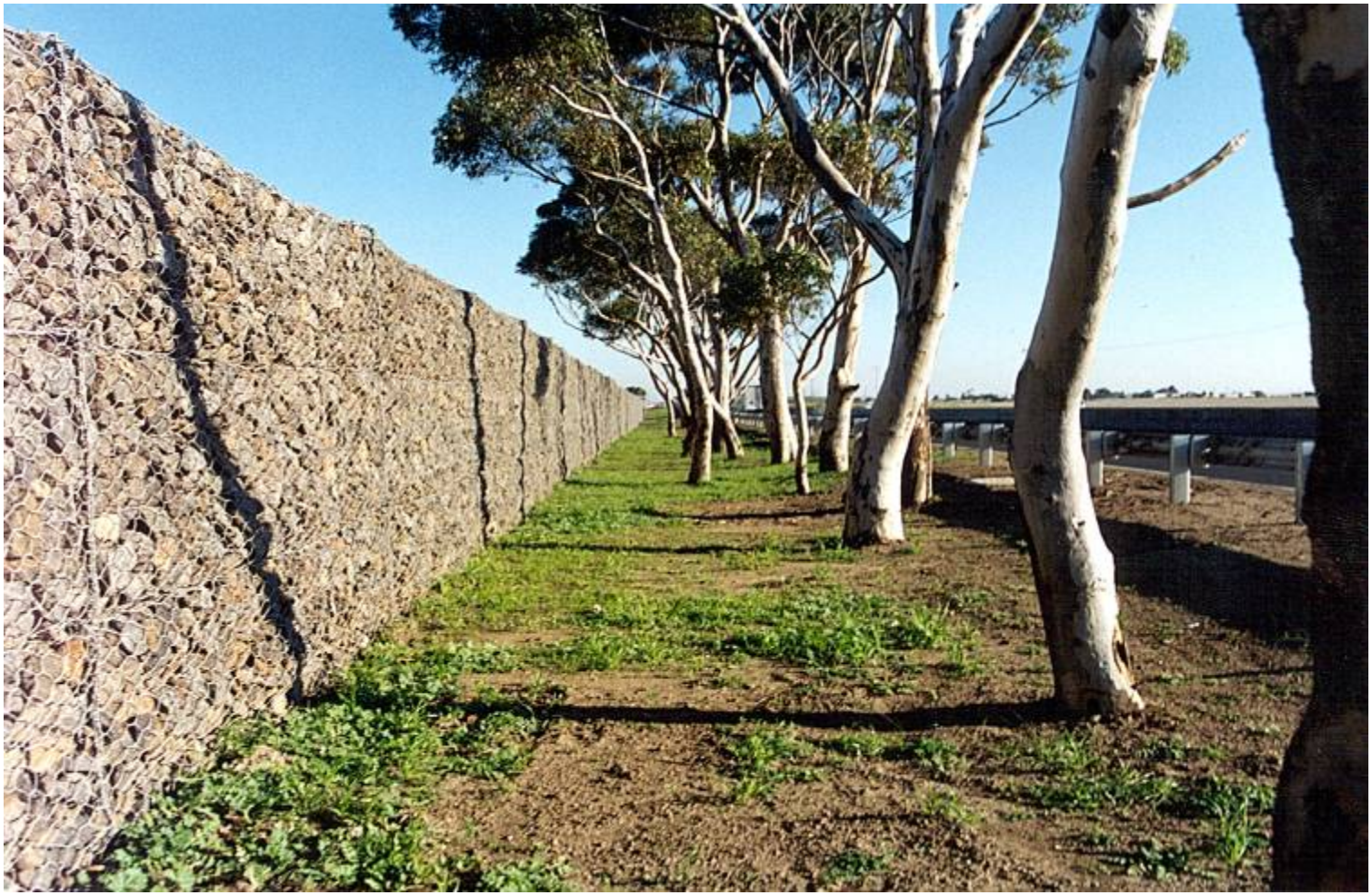
Lat -37.9^{o}, Long 145.2^{o} approx

Painted Precast Concrete

Lat -37.7º, Long 144.8º

Rock Gabion Noise Barrier

Lat -38.0º Long 144.4º



Zinc noise wall attached to concrete barrier

Lat -37.4^{o}, Long 144.5^{o}

Two Layer Roofing Steel with Planting

PV Panels Above Precast Concrete

Lat -37.7º, Long 144.9º

Barrier Integrated Housing

Lat -37.8º, Long 144.8º

City Link Noise Barrier

Lat -37.8º, Long 144.9º

Parkland behind City Link Barrier

Lat -37.8^{o}, Long 144.9^{o}

Painted Concrete & Other Features

Lat -37.8º, Long 144.9º

Bird and Worm

Lat -37.9º, Long 145.2º