City Centre Streets - Stage 1.
Invercargill City Council.
Preliminary Design Report - 100% Issue.

30 April
2021

Isthmus.

Document record.

Issue	Revision	Author	QA	Date
50% Draft	/	AN	NKn	07.04.21
100%	A	AN	NKn	30.04.21

Contents.

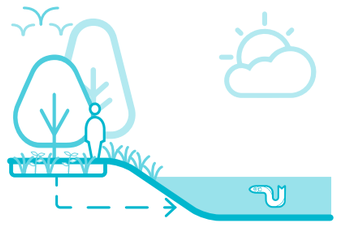
Master Plan Guiding Principles.

Six Guiding Principles have been established and endorsed for the central city.

Whakanuia ngā maha me te tuakiri.

Celebrate scale and identity.

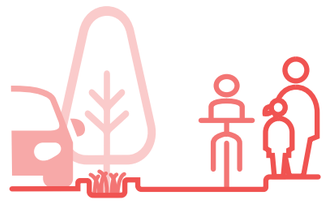
A generous approach to scale that echoes the natural and built character of Invercargill, embedding cultural values that deepen the role and purpose of Waihopai.



Whakahauoratia i te hononga taiao.

Restore a healthy connection with the environment.

Replenish, restore and 'give back' to the environment- the health of the city as part of a 'living system'.



Whakaneke mo te taurikura me te oranga tonutanga.

Move for prosperity and wellbeing.

A network of slow traffic speed streets facilitating a balance of multiple transport modes, and promoting active use and pedestrian priority.

Pōhiritia te haerēre mai ki konei.

Promote a destinational gateway.

Create an attractive destination for visitors to start their journey- a gateway to access the tourism attractions of Southland, and 'free' reasons to stop, stay and spend.

Ngā mahi tākaro pārekareka mo te katoa.

Urban play to make you stay.

A playful and playable urban environment for all ages and abilities. Bring people together with play that contributes to the vitality of the city.

He wāhi hari, hei wāhi noho.

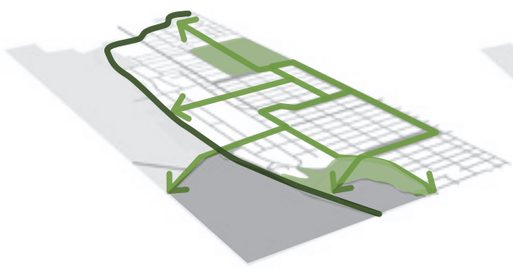
A city to inhabit and enjoy.

Supporting local businesses to create an active retail centre for all times of day and all year round. Promote inner city living with a diversity of flexible and resilient options.

Master Plan Transformational Moves.

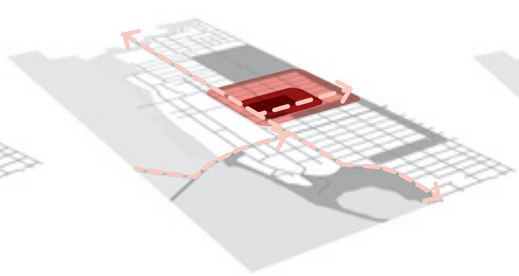
A series of Transformational Moves translate these principles into city-wide spatial moves. Stage 01 of the City Streets programme will put in place a number of initiatives which accelerate the city toward the endorsed vision.

01. **Connect to Green.**
Open space and active modes.

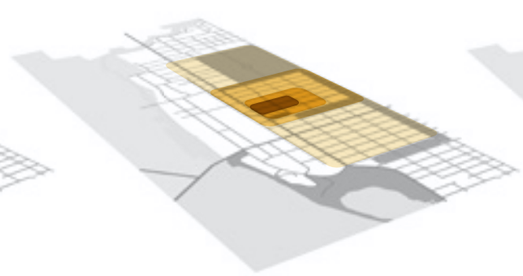


02. **Connect to Blue.**
Water and environmental.

03. **Slow the Core.**
Movement.



04. **Focus to Grow.**
Experience, play and activation.



05. **Inhabit the City.**
Built form and landuse.

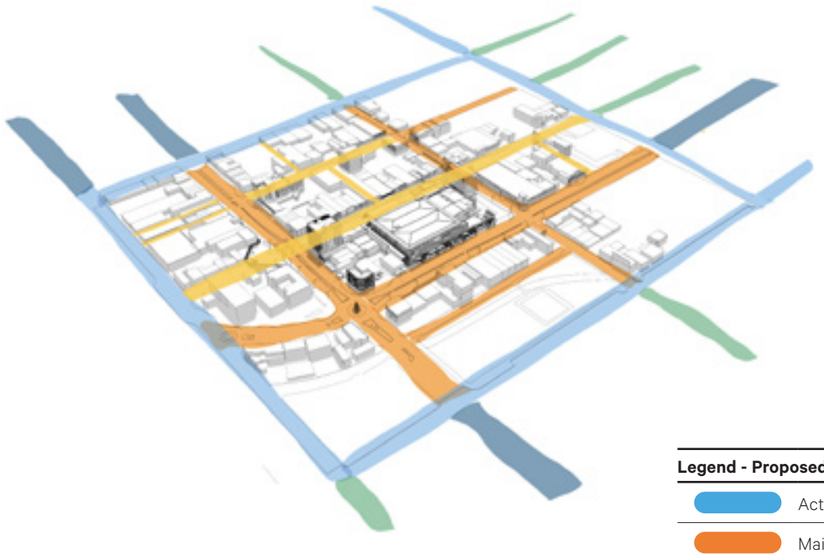
City Context.

Streets are venues for urban life. Each street serves a different function, and when designed well they work in unison, providing a street network which not only flows well but creates great places for locals and visitors alike.

Stage 01 of the City Streets programme focusses on design and delivery of Esk Street and Don Streets, between Dee and Kelvin. Both streets are identified in the Master Plan as Civic Spaces, defined as:

— streets as social spaces - people want to stay for longer periods
— vibrant streets and businesses, supporting each other
— high quality, cared for places for people
— walking, cycling, micro-mobility favoured
— drivers as visitors in the space
— service vehicle access provided
— small numbers of private vehicles making local journeys
— characteristics: slower places, less traffic noise and fumes, preferred places for events

These two streets form the heart of the central city, and connect the Invercargill Central (ICL), HWR Tower and Langlands Hotel developments with high quality streets for people. Changes to vehicle circulation and the opening of ICL's 700 spot carparking building will enable greater use of these streets by people on a daily basis, increasing footfall by parking once and filtering through the city.



Legend - Proposed Street Families.

- Activity Streets
- Main Streets
- Civic Spaces

Measures of Success.

As the City Streets programme is delivered, we will be able to measure success against the below issues and desired outcomes, in support of 'a city with heart'.

Identified Issues:

— Lack of pride
— Lack of energy & vibrancy
— Lack of places For people
— Poor connections

These need to be addressed in anything we do from now on.

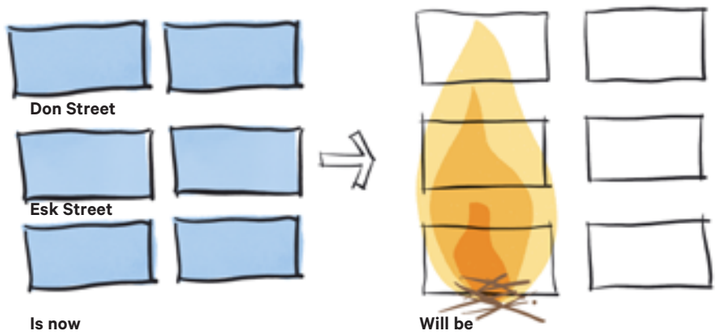
Identified Outcomes:

The City Centre Governance Group identified the following outcomes as being key measures of success:

— Delivers on the expectation of the city being the centre of the region's commercial and social activity, from which economic prosperity and a strong sense of southern identity can flourish.
— Engenders a sense of connection to the city for locals and visitors alike through a cohesive and careful balance of strong attractors and open spaces that encourage visiting the city centre for work, shopping, or play.
— Enables inner city living to be a viable and valid option for those who are attracted to living in a vibrant urban environment and interacting with the wider community in shared spaces.
— Appeals to young and old, celebrates our history with a carefully interwoven cultural influence and which the people of Invercargill can be proud of.
— Generates opportunities for private investment and encourages a concentration of commercial activity that brings people to the city centre and serves to anchor it as Invercargill's heart and the place to be.

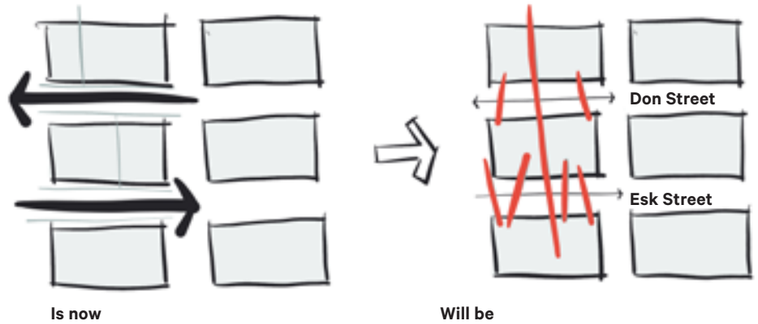
Drivers.
City core level.

Warm the heart.



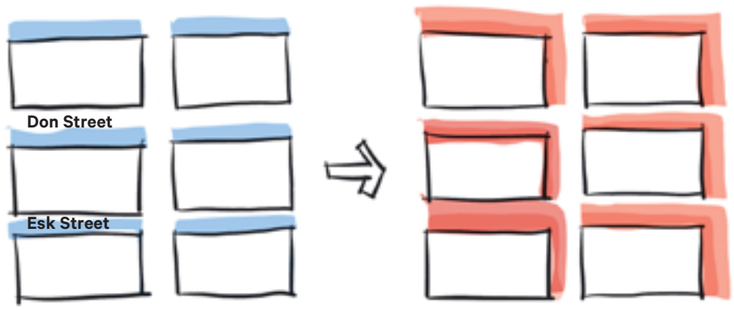
There is huge private and public investment in the central city right now, with the aim to draw people back in, warming the heart of the city.
Esk and Don Streets will deliver the biggest benefit for the wider city core.
Keeping people for longer and helping them move freely.
For the city to be successful these projects need to be successful.
We are all in this together and need to work as one.

Permeable for people.



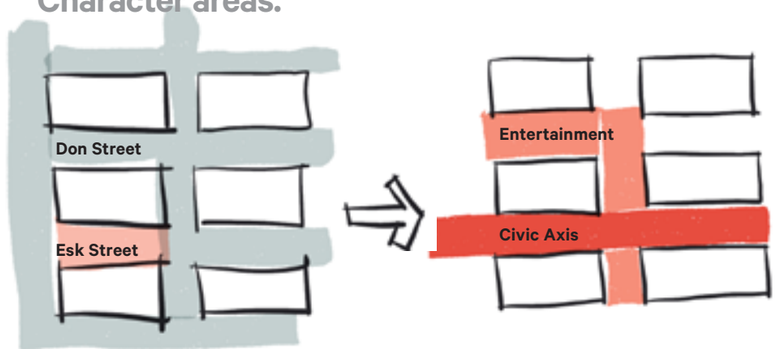
Esk Street - a shared space.
Easy movement for people across and along the street. Vehicles as visitors.
Don Street - an entertainment street.
Generous movement space for people. Regular crossing points.
Streets encourage through-block connections, letting people filter through the city using ICL internal lanes, SIT Arcade and Auction House Lane.

Comfortable for people.



Extend people's visits by making the experience comfortable.
Provide spaces for people which are sheltered from the wind.
Create places for people to linger in the sun.

Character areas.

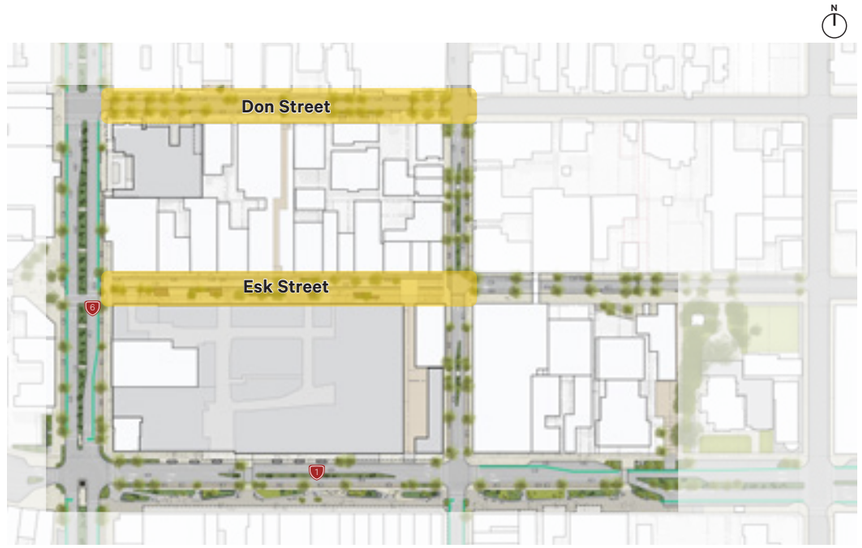


Esk Street - A Civic Axis which provides a very high level of amenity for shoppers and the community alike. A venue for urban life.
Don Street - A street where entertainment venues are supported, both day and night. Parking and amenity reinforces the commercial and shopping streets.

City Centre Streets Project - Stage 01

Stage 01 of the City Streets project sees fundamental changes to the design of Esk and Don Streets between Dee and Kelvin Streets.

These changes will result in people using and experiencing each street in a new way, and will introduce new ways of circulating around the city centre. The matrix below shows the intended shift toward streets for people, describing what people will experience in each street- compared to now.



Above_
Extent of works for the City Centre Streets - Stage 01 project

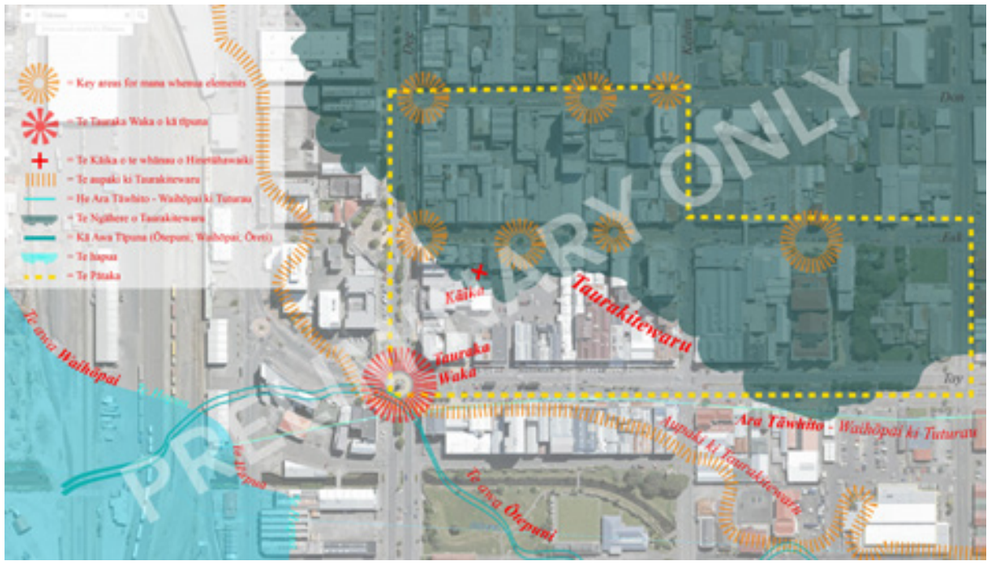
	function.		circulation.		identity.		movement.		activation.		attractor.	
	Now.	Future.	Now.	Future.	Now.	Future.	Now.	Future.	Now.	Future.	Now.	Future.
Esk Street (west). Civic Axis.	Roading classification: Primary collector	Master Plan definition: **Civic Axis** (connecting civic spaces - the pedestrianised civic street)	I can drive in one direction heading east and park on either side of the road in a metered park. Traffic movement is slow.	I can drive in one direction heading east and **drop off passengers or park on one side for a limited time.** Service vehicle access is at **limited times.**	This is recognisable as a 'people street' but not specifically to Invercargill.	I recognise this as the **social heart of the city,** where I am welcome to walk, shop, sit and congregate in sheltered places.	This is the most comfortable street to walk in at the moment with slower one-way traffic, but disrupted by construction. I make quick shop stops here.	I want to stay longer in this social space. **I can easily walk or cycle anywhere** in the street- vehicles are visitors. I can sit in the sun. It is a place to meet.	The street is sometimes closed for annual community events.	There is always something happening here- activities, playful installations and events, and **urban play trails.**	There are temporary food trucks and coffee carts while construction is happening.	**Invercargill Central** is a major attractor for shopping and eating. **Laneways** are sheltered attractors and connectors.
Don Street. Entertainment Street.	Roading classification: Secondary collector	Master Plan definition: **Entertain-ment street** (co-location of food and beverage, and entertainment)	**I can drive in one direction** heading west and park on either side of the road in a metered park**. I can loop the block using the one-way system to Esk St.**	**I can drive in both directions** turning left onto Dee. I can parallel park **for a limited time.** Circling the block on the one way loop is less appealing.	Some buildings sit back from the street and there are small existing 'pockets' to sit in the sun, laneways, and the umbrella is a recognisable feature.	This street reflects the social culture of Invercargill and its people spaces - **laneways and courtyard** spaces found along the way.	I come here to work or study. This is where I might go to eat or to a bar.	This street **continues to operate safely after hours**. It has places to sit in the sun or shelter, congregate or amble slowly through.	The street is sometimes closed for annual community events.	Small discoveries in nooks and laneways, temporary **exhibitions, lighting, music and nightlife activities,** street closure events	**The Auction House and Invercargill Club** are examples of attractors.	**Laneways** developed as sheltered attractors. **Langlands Hotel** (west end) and **temporary museum and art gallery** (east)

Landscape and Culture.
Stories of Place.

Invercargill's central city sits in a landscape rich in environmental and cultural significance, and the design of public spaces can not only reflect, but be inspired by this context.

The city sits on the edge of three waterways; the Ōtepuni Stream (previously Otārewa), the Waihōpai River and Ōreti Estuary. At their confluence lay a number of converging trails and tauraka waka (a landing point). On the high point closeby sat a kāika, then Kelly's house, and now Invercargill's city heart.

To enable the design to reflect mana whenua values and narratives, Waihōpai Runaka are developing a Cultural Design Strategy for the City Streets project. To enable City Streets Stage 1 to reflect the content of the strategy, cultural values and mapping of key sites have been generously provided, below and adjacent.



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30 April 2021.

He Kaupapa Whakatakoto.
Proposed Cultural Elements.

Don Street.
Cultural overlay: Taurakitewaru (historic bush where city stands)

Reference to the mahika kai o te ngahere, with a strong focus on key species of this place. Expand on general notions of 'mahika kai', with an emphasis on its fundamental importance within Murihiku and to Kāi Tahu.

Key sites & preferred cultural expression.

Along length of the street:
— Integrated hard landscaping: patterning, illustrations and te reo Māori to capture and reflect the species of the ngahere. Visual references to the prominence of the ngahere prior to establishment of the city.

Soft landscaping.
— Species of Taurakitewaru. Focus on plant species distinctive to this ngahere. Focus on plants that sustain manu, people eg. kai, rongoā, customary practices
— Dee Street intersection - Langlands Hotel corner (consider the visual aspect of approach from north).

— Special feature: A prominent element that reads clearly of the ngahere, Taurakitewaru e.g. tōtara forest

SIT Arcade.
— Tohu whenua or similar to mark the strong pedestrian connection thorough to Esk Street and its associated cultural overlay (Kai Hau Kai)

Law Courts.
— Special feature: Pou whenua - mahika kai. A statement of mana whenua identity. Mahika Kai as the ninth tall tree of WAI 27, the Kāi Tahu claim, a clear statement of mana whenua identity and spirit. e.g. manawa tītī

Esk Street.
Cultural overlay: Kaika & nohoaka; Kai Hau Kai

Reference to kaika and nohoaka (settlements), and also the customary practice of kai hau kai (food sharing).

Key sites & preferred cultural expression.

Along length of the street:
— Integrated hard landscaping: patterning, illustrations and te reo Māori to capture and reflect kai hau kai - specialty delicacies from Murihiku and around Te Waipounamu.
— Serial vertical elements focused on 'nohoaka' to draw people eastwards along the street, with a significant focus on 'kaika' around the Farmers entrance to the ICL development (to complement significant feature at Dee Street intersection)

Soft landscaping.
— Focus on species that support kai hau kai practices.

Intersection with Dee Street.
— Special feature that provides recognition of Murihiku Marae / mana whenua and the notion of 'kaika'.

SIT Arcade.
— Tohu whenua or similar to mark the strong pedestrian connection thorough to Don Street and its associated cultural overlay (Mahika Kai).

Spaces aligned with entrances to Invercargill Central development and streetscape between:
— Main entrance: A substantial gathering place centred around a special feature to reflect kai hau kai practices
— Secondary entrance and streetscape between: special feature(s) to reflect 'kaika' (especially tribal alliance and peace established through intermarriage; also the relationship of whānau to the establishment of the city)

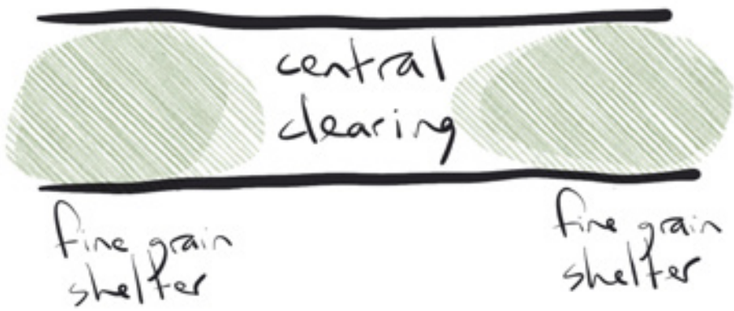
Spatial Moves.
Street level.

The design of both Esk and Don Streets follow three simple spatial moves. These address environmental comfort, providing variety and flexibility in the streets, and providing for enjoyment in everyday movement. All with the goal of streets full of people and overflowing with urban life.

Face to the sun, back to the wind.

The south side of both streets receive more sun than the north, and are more sheltered from cold southerly and westerly winds. The streets are designed to prioritise the south sides for spaces for people to sit, rest, socialise and occupy. On Esk this is a 10m wide space and 8m on Don Street. Seating is generally angled toward the north and east, often with planting wrapped around to buffer the wind.

Simple structure. Variety of spaces.



A variety of spaces are created within the streets, enabling the street to feel comfortable and welcoming when empty, while creating a clearing space mid-block which is designed to be flexible – encouraging people to move across the street between lanes and arcades. The clearing becomes the central venue for programmed events.

Playful movement.

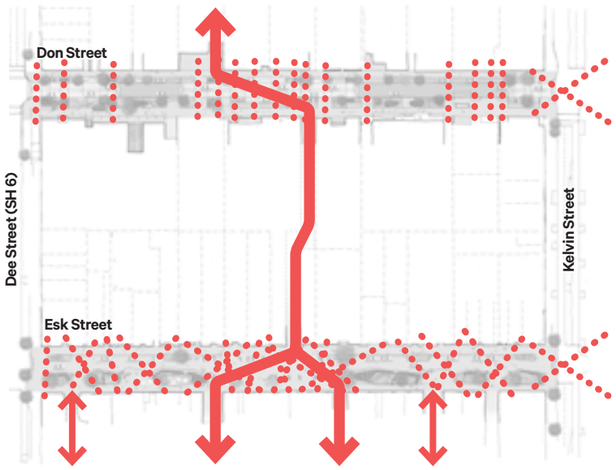
A ‘playful and playable’ approach is taken to design of spaces and elements within the streets. Moving through the streets should be an enjoyable experience, with people having a range of ways to move along, through and across streets, with options for all weathers.

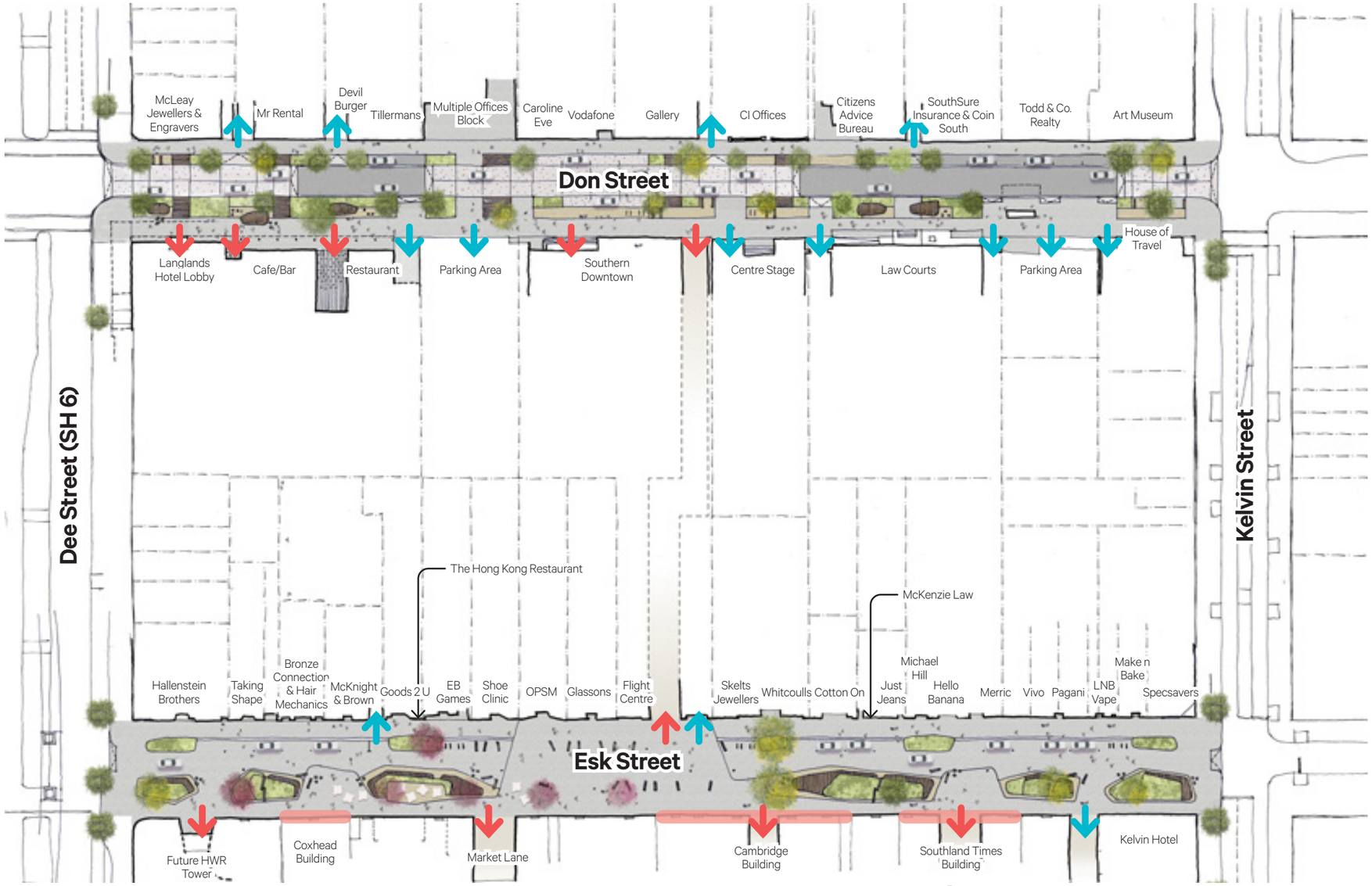
Invercargill Streetscapes Stage 1 Illustrative Plan.

Esk Street is a shared space, designed to encourage easy movement for people across and along the street. Standard roading cues (such as linemarking, signage and kerbs) are excluded. Drivers will feel they are moving through a pedestrian space. Vehicles are visitors.

Don Street is an entertainment street, designed with generous movement space for people and regular crossing points across the 2-way road. With a number of existing and planned entertainment venues, activity is expected in the street day and night, weekday and weekend.

Stage 01 of the City Streets programme focusses on Esk and Don Streets, however the proposed design also encourages use of through-block connections such as ICL internal lanes, SIT Arcade, Auction House Lane, benefitting the wider setting by encouraging people to filter slowly through the city centre.





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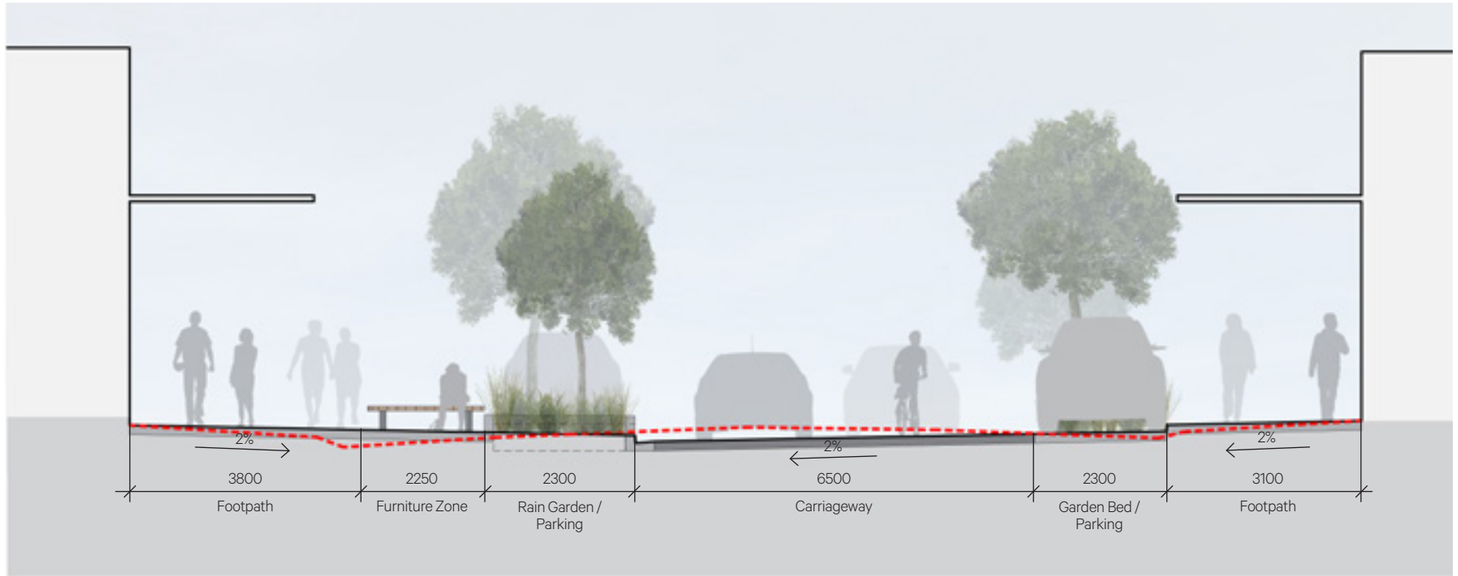
Scale 1:1,000 @ A3

0m 10m 20m 50m

Legend.

- Primary Pedestrian Entrance
- Vehicle Entrance
- Heritage Facade retained, restored & celebrated

Illustrative Cross Sections.

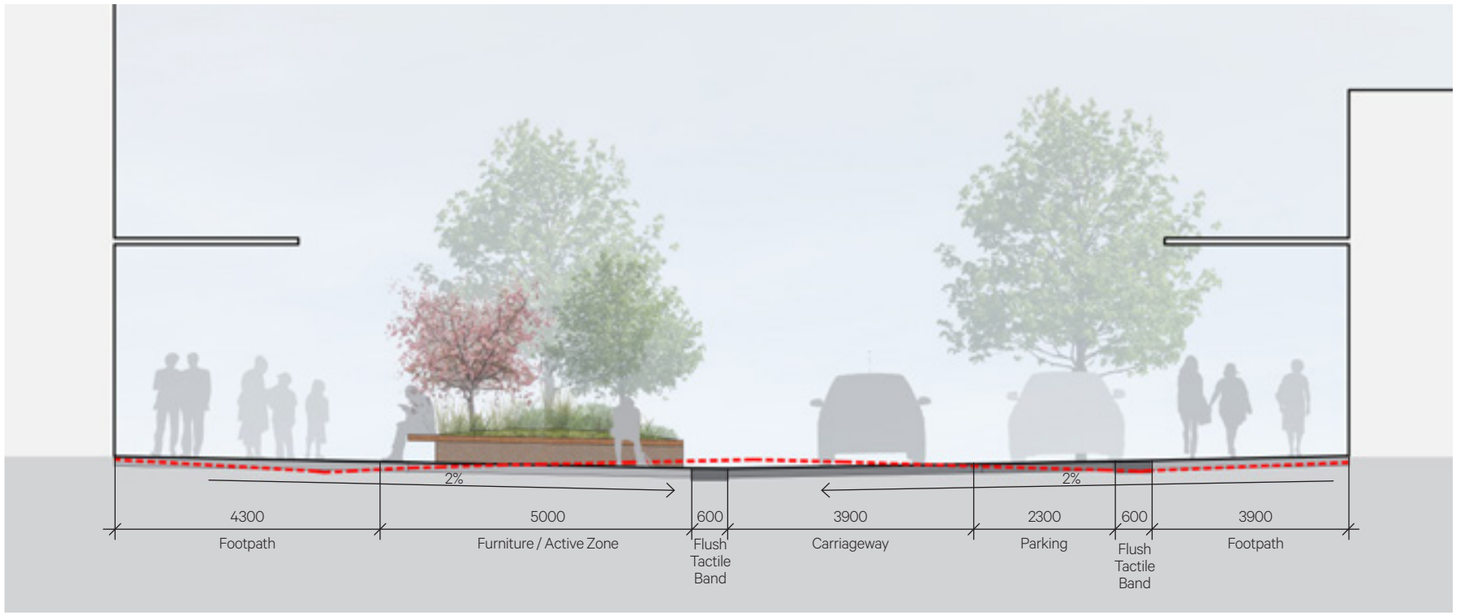


Don Street—Cross Section looking west along street.

Scale 1:100 @ A3

Existing Ground Level

Proposed Cross Section.
The proposed cross section includes a two-way road, parking bays / rain gardens on both sides of the road, and a widened footpath zone on the south side of the street. This results in a road alignment that is not central to the corridor.



Esk Street—Cross Section looking west along street.

Scale 1:100 @ A3

Existing Ground Level

Proposed Cross Section.
Based on a shared space typology where a flush surface is required the recommended cross section design is a V shape with the low point located near the centre of the road corridor. This is opposite to the current arrangement and would mean lowering the existing road.

Street Views.

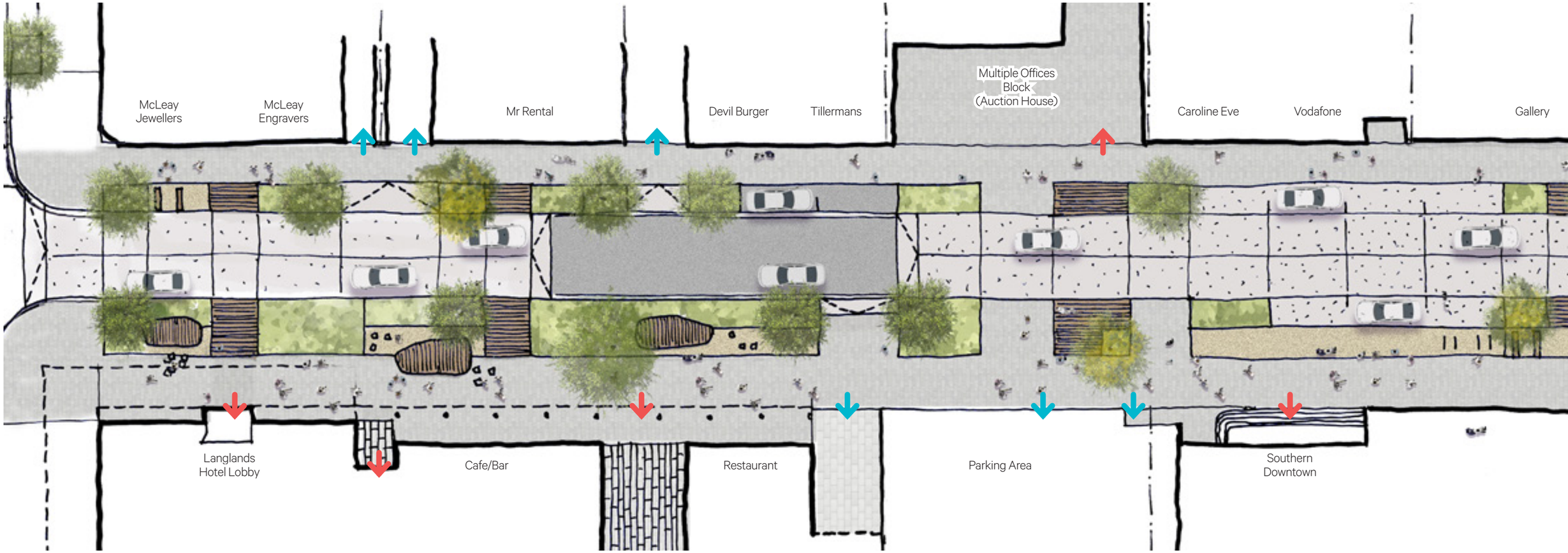
Don Street—View looking west

Don Street—View looking east

Esk Street—View looking west

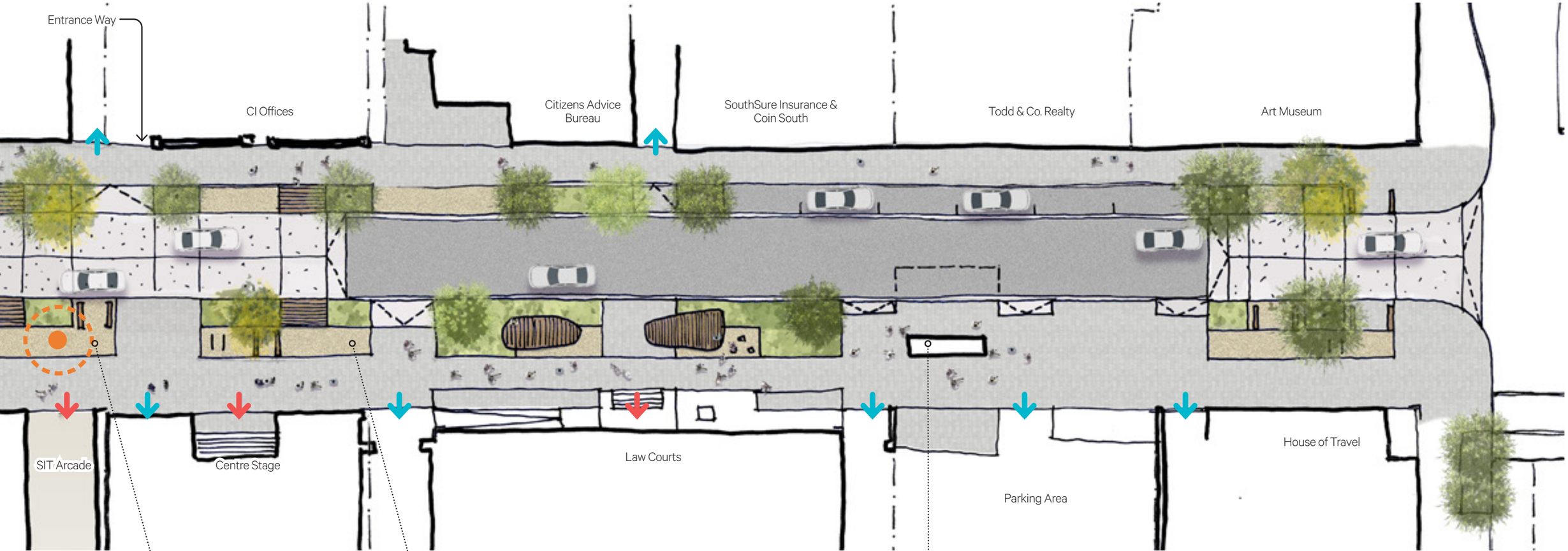
Esk Street—View looking east

Don Street Illustrative Plan.



Legend.

→	Primary Pedestrian Entrance
→	Vehicle Entrance



Scale 1:300 @ A3

0m 3m 6m 15m

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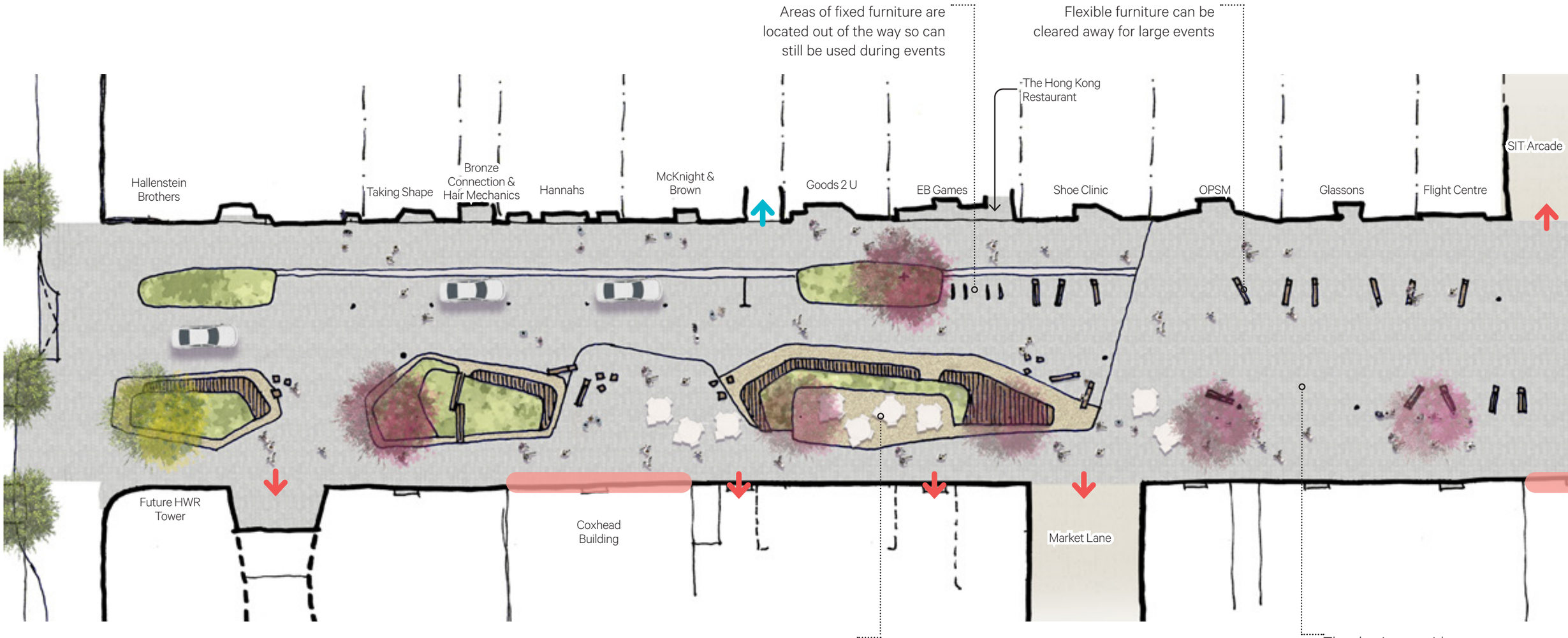
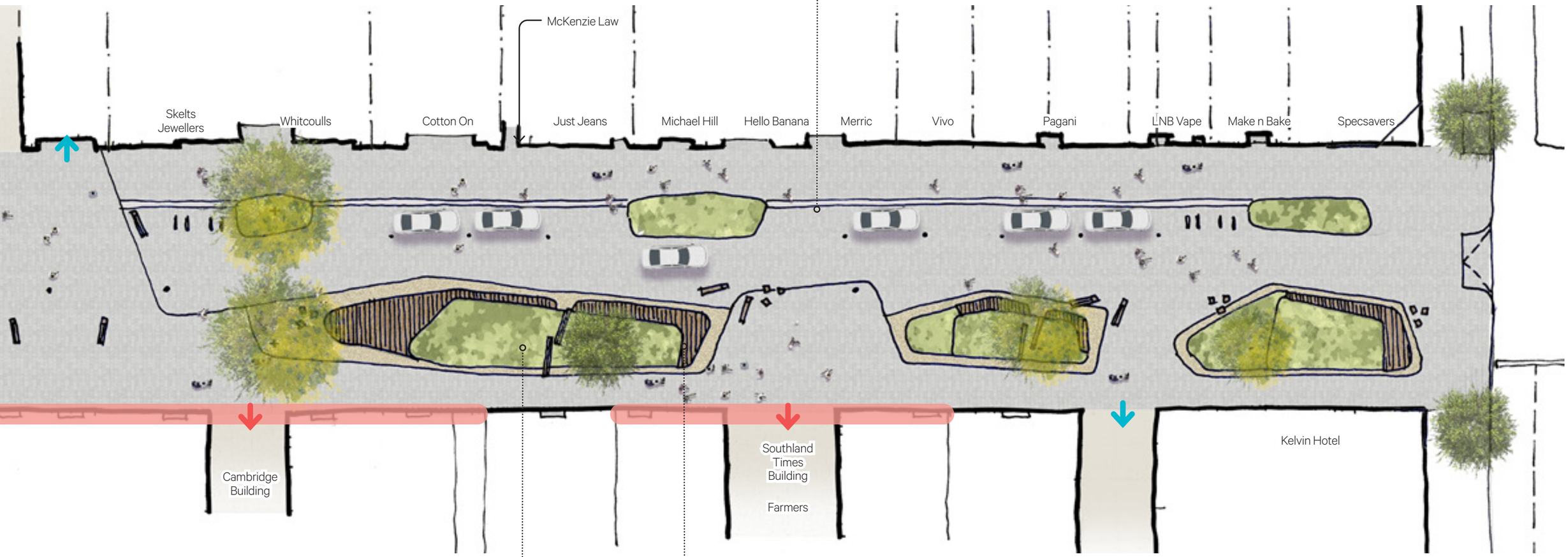
Esk Street Illustrative Plan.



Legend.

- Primary Pedestrian Entrance
- Vehicle Entrance
- Heritage Facade retained



Scale 1:300 @ A3

0m 3m 6m 15m

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Don Street Illustrative Views.

Don Street—View looking west.

Don Street—View looking east outside Langlands Hotel.

Esk Street Illustrative Views.

Esk Street—View looking east.

Esk Street—View looking east.

1. Strategies.

Parking & Movement Strategy.

To achieve Council's vision of Invercargill being a city with heart, the city centre has to be a place for people. As such there is a need to re-vision the city's streets and the behaviours they encourage. A speed reduction approach has been taken, with the city core operating with a 30kmh speed limit. Within this area, street design can encourage slower speeds again. The below changes to circulation and parking are intended to provide quick access to local businesses while leveraging the new carparking building for medium-longer stays, increasing footfall to businesses and activity in the streets by people parking once and filtering through the city.

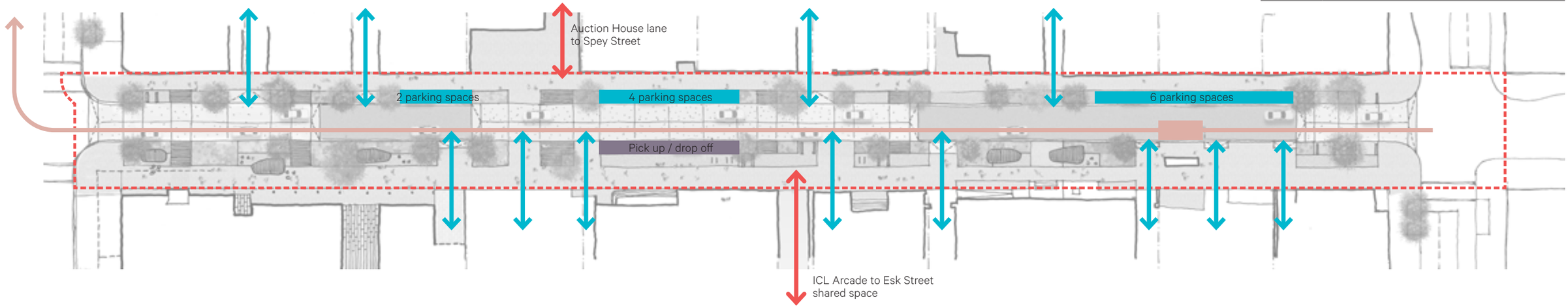
Don Street.

Don Street becomes 2-way, with capacity to cater for a future bus route. Raised tables at street entrances and mid-block slow vehicle speeds, and the mid-block chicane is removed. Allowance is made for a future bus stopping area, with the intention that when needed, the bus stops in the traffic lane, slowing vehicles and eliminating the need for dedicated bus space therefore retaining more space for people. Cyclists can travel in the traffic lane and this will be formalised through the use of sharrow markings. Cycle parking will be provided at various locations along the street.

On-street parking will be focussed on providing space for
- accessible parking (min 2 spaces)
- service / loading zones (2 spaces)
- short-medium term parking (P30-P60 metered)

Legend.

- Extent of works
- Parking space - accessible/service/short term
- Pickup/dropoff
- Bus stop
- Bus route
- Vehicle access to/from private property
- Pedestrian connection

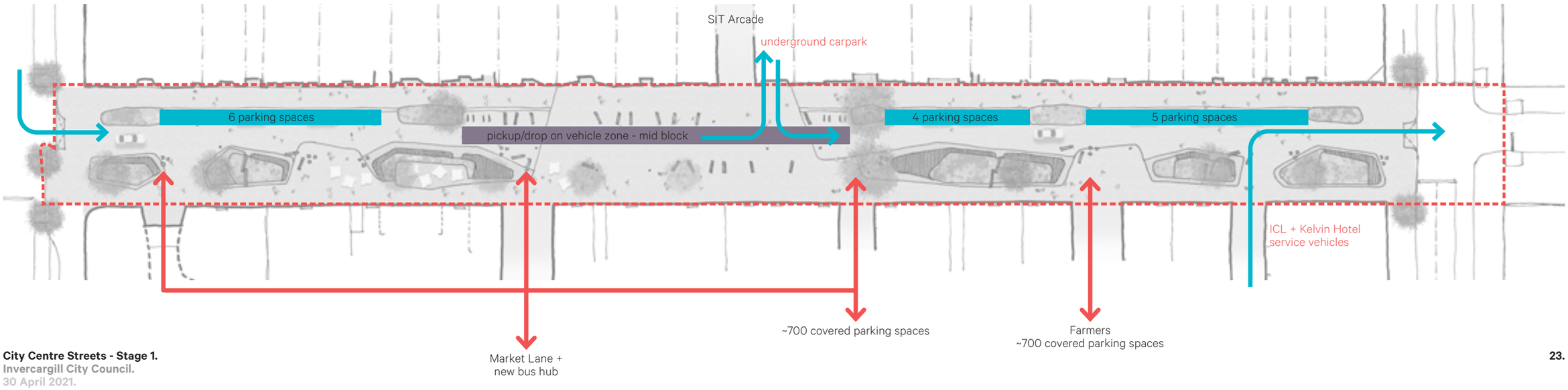


Esk Street.

Being a shared space, Esk St will benefit from slower speeds at busy times (shared spaces in NZ typically operate at 10kmh). Shared spaces are primarily places for people - vehicles are visitors and drivers need to behave appropriately. Spatial design should encourage these behaviours - 'do less and monitor' - meaning standard street design measures such as kerbs, signage and painted lines should be used sparingly, instead using an education programmes and monitoring of behaviours to inform where the design might need to be tweaked over time to address any operational issues. Movable furniture can assist with adaptation. The vehicles and cyclists will travel east bound in this one-way shared space street. Cycle parking will be provided at various locations along the street. Pedestrians will be able to easily cross the street with the low speeds and one-way vehicle flow.

On-street parking within Esk Street will be focussed on providing space for
- accessible parking (min 2 spaces)
- service / loading zones (2 spaces)
- pickup/dropoff
- short term parking (P15-P30 unmetered)

Short term parking will be time limited but un-metered. This means people needing to pop in to Esk Street shops for short visits can do so free of charge, then moving on and freeing up the parking space for the next customer. Parking for longer stays is available on surrounding streets and under cover within the ICL development.



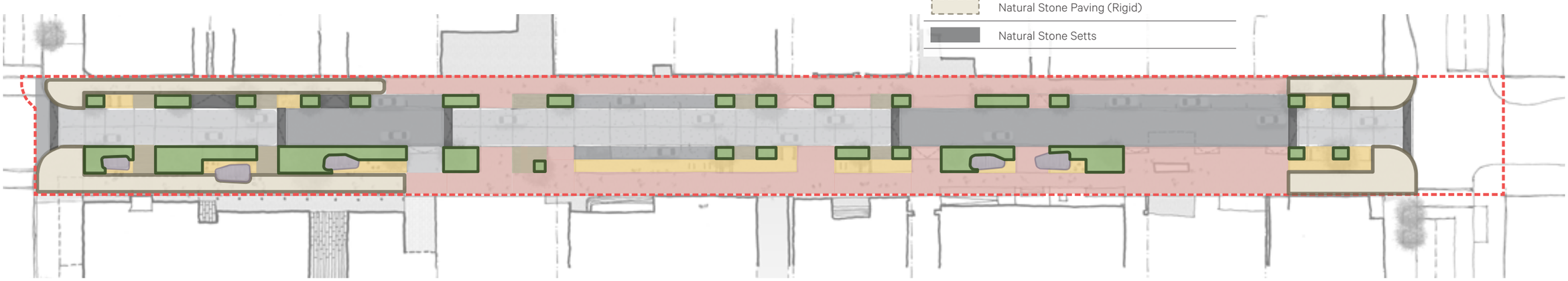
Materiality Strategy.

Don Street.

- Don St is the Entertainment Street, with higher quality paving at entrances with numerous areas for occupying outside
- Designed to balance functional strength and durability with ability to repair where digging is required over time
- Raised crossings define the pedestrian focused zones along the street
- Vehicle's come second in pedestrian zones, differentiated by material selection
- Standard insitu kerb or flush kerb and channel to length of street

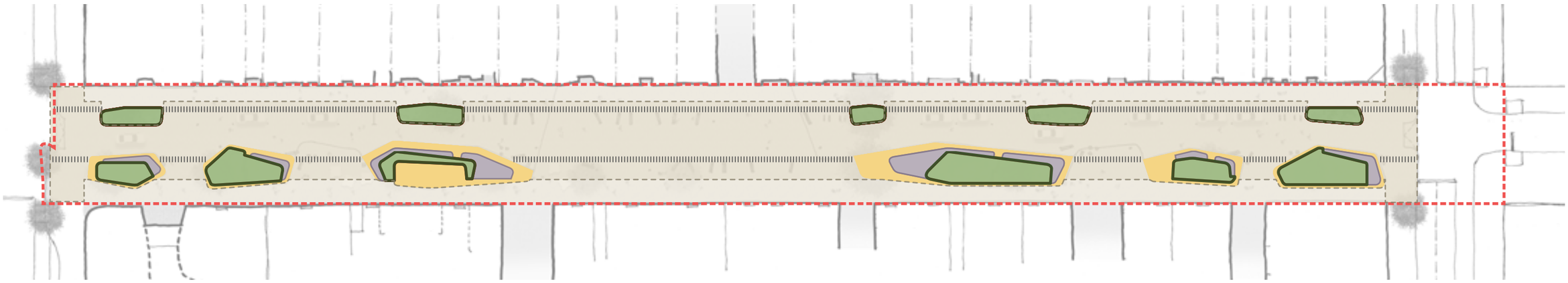
Legend.

- Extent of works
- Insitu Concrete (footpaths)
- Insitu Concrete (raised table)
- Clay Paving / Resin Bound Aggregate
- Asphalt
- Steel or Stone Boardwalk/Crossing
- Timber Seating Area
- Natural Stone Paving (Flexible)
- Natural Stone Paving (Rigid)
- Natural Stone Setts
- Planting
- Tactile Band



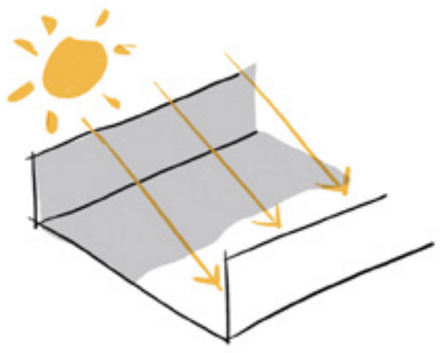
Esk Street.

- Esk St is the Civic Axis, the city's premier urban street
- Designed to balance functional strength and durability with ability to repair where digging is required over time
- Simple paving palette across full width of street, building line to building line. Construction underneath is strengthened for vehicle movement areas
- Use of texture to define thresholds to vehicle movement zone (driven by universal design best practice)

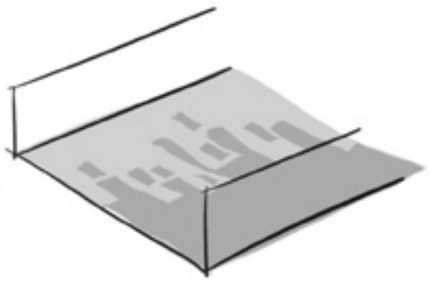


N

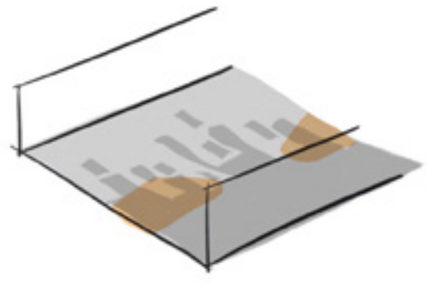
Paving Studies.



Esk and Don Streets have a sunny south side and a shady north side. This makes the north side darker and less hospitable for people. Paving design can help even out the shade effect.



Paving design will work to even this out by using lighter, brighter materials on the shady side and mid-tones on the sunny side. Given dark days and rain are a factor in Invercargill, dark materials are not recommended on mass., but may be appropriate as features.



Activity areas will be paved using warm tones and smaller unit sizes, emphasising the slow, social nature of these spaces where people will spend longer periods. In the sun, surrounded by warm materials.

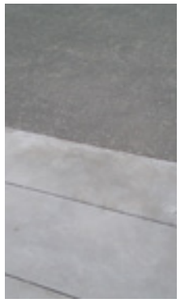
Below summarises a range of pavement construction methods for the materials above. Recommendations are outlined below.

	proposed use	vehicle load	ped load	surface finishes	colour options	maintenance needs	appearance over time	service access + surface repair	capital cost	life cost	notes
Asphalt	vehicular	yes	yes	one	one	low	degrades	easy	low	low	Common material and method. Proposed for vehicle carriageways and road tie-ins.
In-situ concrete	pedestrian & vehicular	yes	yes	many	many	medium	degrades	moderate		moderate	Access and repair can be managed through choice of concrete mix, finish and sawcut locations allowing panels to be removed.
Stone on rigid base	vehicular	yes	yes	many	some	very low	improves	difficult	high	low	Joints are grouted and stone is fixed to concrete base. Access to underground services will likely damage the stone units, requiring partial replacement.
Stone on flexible base	pedestrian	yes	yes	many	some	medium	improves	easy		moderate	Natural stone units are laid on a sand bed, over basecourse. Stone units need to be small in width and length, and deep. Units can be uplifted, turned over and relaid extending their lifecycle. May require spacers between units to avoid spalling of edges in the event of base layer deformation.
Clay unit pavers	pedestrian	yes	yes	some	some	medium	degrades	easy		moderate	Material is well-known, hard wearing and available for re-use. Use in an unexpected way to bring warmth and finegrain texture to areas where people will gather and spend time.

Material Palette.

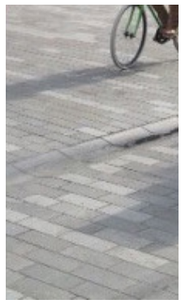
Don Street.

Asphalt Paving.
To carriageway.



Insitu Concrete.
Multiple finishes to help define spaces. Used on raised crossings.

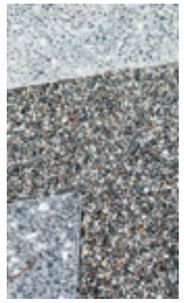
Raised steel edged garden beds.
Folded steel combined with seating edges.



Natural Stone.
Medium format stone paving. (Engineered to take vehicle loading.)

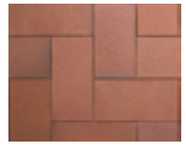
Stone setts.
To define vehicle crossings on raised tables. (Potential to use existing setts in Council yard in pedestrian areas)

Rain Garden crossings.
Slip resistant steel grating crossing over rain gardens.



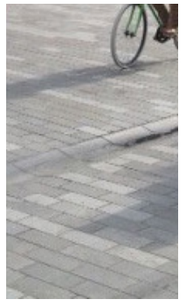
Resin Bound Aggregate.
Under some trees. Look to use local aggregate and possibly recycled brick.

Clay Paving
200 x 100mm pavers laid on their sides, three colour variations used.



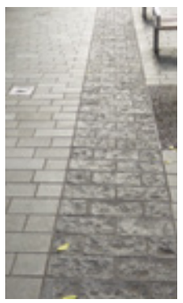
Three tones,
60% Cream
20% Mid Red
20% Dark Red

Esk Street.



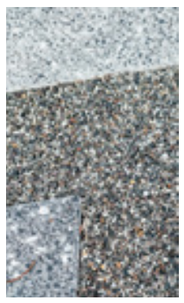
Natural Stone.
Medium format stone paving. (Engineered to take vehicle loading.)

Raised steel edged garden beds.
Folded steel combined with seating edges.



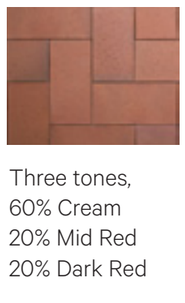
Tactile Band.
600mm tactile bands to define vehicle movement zone and for universal design purposes.

Surface Drainage.
Drainage with removable grating for ease of maintenance.



Resin Bound Aggregate.
Under some existing trees.

Clay Paving
200 x 100mm pavers laid on their sides, three colour variations used.



Three tones,
60% Cream
20% Mid Red
20% Dark Red

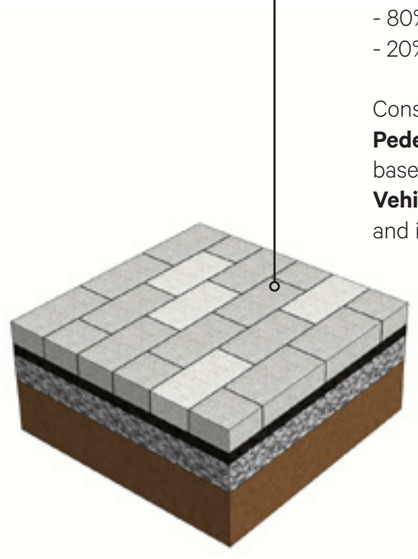
Natural Stone Options.

Mid Grey Granite
80% of selection, 300 x 150 x 80mm thick in pedestrian areas, thickness TBC on vehicular areas

Light Grey
20% of selection, 300 x 150 x 80mm thick in pedestrian areas, thickness TBC on vehicular areas

Pitched Face for Tactile Bands
300 x 150mm, thickness TBC

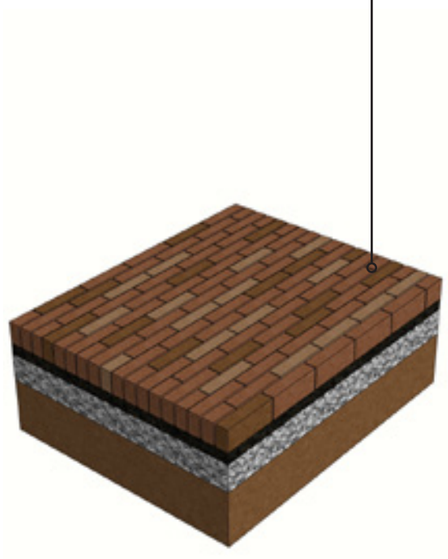
Natural Stone.



Natural Stone Paving
(two colours, potentially granite)
300 x 150mm x 80mm thick
- 80% mid grey
- 20% light grey

Construction Methodology:
Pedestrian: on sand & basecourse
Vehicle zone: on steintec base and insitu concrete slab

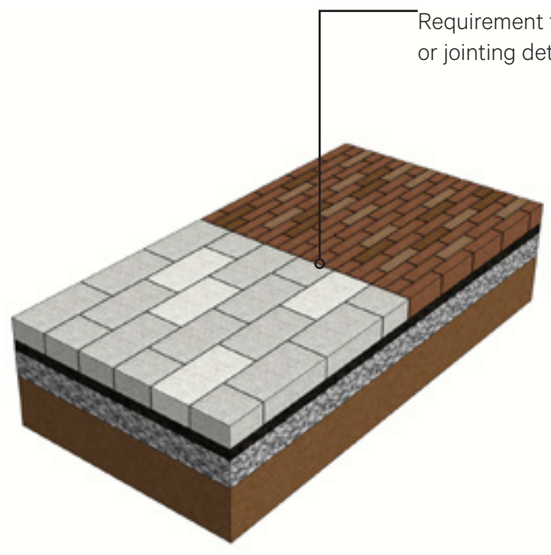
Clay Paving.



Clay Paving
200 x 100mm x 40mm thick
laid on side (three colours)
- 30% tbc
- 30% tbc
- 30% tbc

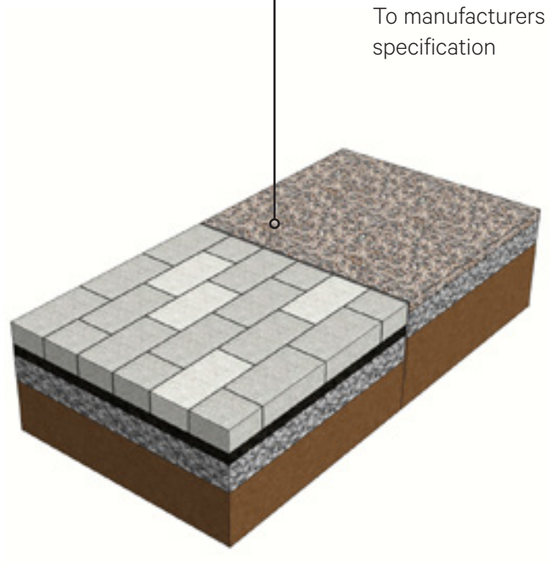
Construction Methodology:
Pedestrian: on sand
Vehicle zone: TBC

Natural Stone & Clay Paving.



Requirement for steel edging or jointing detail

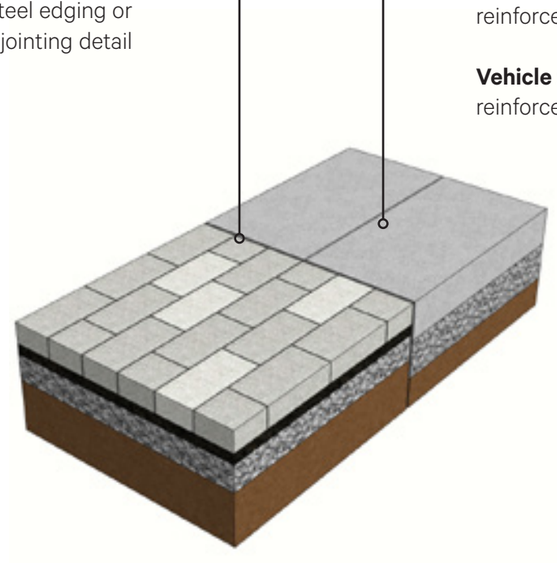
Natural Stone & Resin Bound Aggregate.



Resin Bound Aggregate
(colour TBC)
30mm thick

Construction Methodology:
To manufacturers specification

Natural Stone & Insitu Concrete.



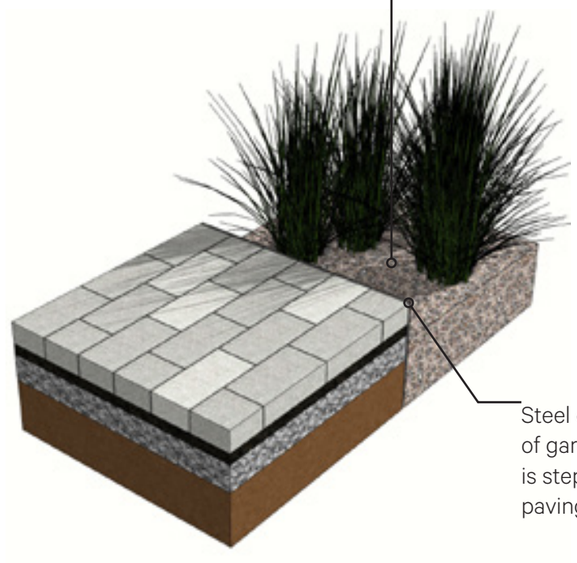
Requirement for steel edging or jointing detail

Insitu Concrete Paving
(thickness varies)

Construction Methodology:
Pedestrian: 125mm thick, reinforced, on basecourse

Vehicle zone: 150mm thick, reinforced, on basecourse

Natural Stone & Garden.



Rain Garden/Garden Bed media
(pea gravel mulch to be the same across both)

Steel edging to edging of garden beds (garden is stepped down from paving level)

Environmental and Social Impact.

Construction, operation and ultimately demolition of streetscapes come with an environmental cost. This is front of mind throughout the design process, and the following initiatives are being explored now, including potential for environmental benefit:

Hard surfacing

— Use of waste materials from other civic projects
— Recycling of quality materials currently on site.
— Detailing of pavements to balance longevity with maintenance requirements throughout their life. The design intent is to look to lay unit pavers on a flexible (sand) base in pedestrian areas where vehicle loads are low and infrequent. Vehicle areas, where shown in unit paving, will be constructed on a rigid (concrete) base. While there is up-front cost, the operational cost is low and the risk of pavement failure is also low.
— Balancing impervious hard surfaces with permeable surfaces, looking to minimise peak water flows into drainage system
— Using local material wherever possible, minimising transport costs and maximising local spend

Carbon sequestration + oxygen production

— Tree planting to improve environmental quality over the long term
— Thinking carefully about tree removal
— Where new trees are planted, invest in a quality environment for them to ensure they thrive in the long term.

Water treatment and reducing peak flows

— Tree canopies moderate extremes of environmental temperature and slow the rate at which water reaches the ground.
— Use of rain gardens to treat surface water, provide biomass and oxygen production in the streets
— Use of permeable paving options
— Reduce peak flows into the Otepuni and estuary through holding of first flush water in raingardens

Environmental comfort

— Shade during summer, solar access during winter
— Reducing the heat island effect through tree planting
— Reduce wind effects through tree and mid-height planting
— locate seating and social spaces to face the sun, with shelter from the predominant wind.
— Provide clear movement routes along building frontages to allow people to move along covered edges during inclement weather.

Urban Ecology

— Ecological corridor and habitats for our indigenous and exotic fauna
— Use of ecosourced native plant species – ecological approach using varieties suited to the environment and minimizing need for transport and irrigation.
— Acknowledging that the presence of street trees is shown to increase property values.

Low impact materials

— Reduce need for painting and other environmentally harmful processes such as galvanising. Look to materials such as raw aluminium, weathering steel and other naturally stabilised materials.
— Detailing to minimize resources required to maintain elements.
— Use of recyclable/recycled materials such as steel and aluminium, minimizing waste when elements are disestablished.

Local procurement

— Ecosourcing local native species, and propagating/growing on locally.
— Locally sourced specimen trees – reduced transport costs and good social procurement story.
— Use local labour whenever possible.
— Where local skillsets are not available, look to us external experts to raise the experience levels locally. Eg: an external paving crew using local labour, transferring knowledge to benefit the community in the longer term.

Energy required to operate

— Reduced temperature and energy use in surrounding buildings, by shading and wind impact reduction.
— Healthy nature, healthy people, healthy community = reduction in health care costs.
— Reduce impact of the city's drainage on downstream water quality, erosion and flooding impacts.
— Planting design for the conditions, eliminating need for ongoing irrigation. Use species which thrive here.
— Selective use of feature lighting, and a blanket use of low energy LED lighting. Look at further options for power-saving such as dimming and motion sensors to elevate area lighting on routes when required only.

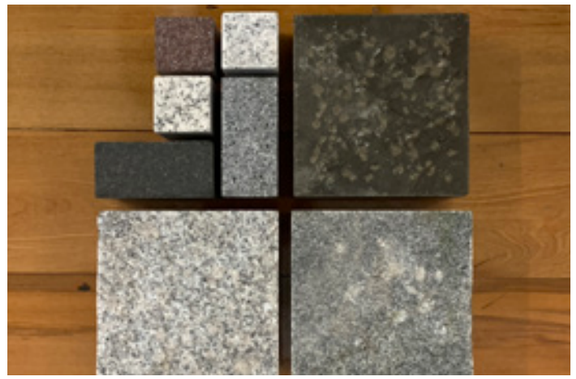
Recycled/salvaged materials.

Reuse/repurpose existing materials

Minimise wastage and the requirement to order new materials by using what we have. This might be through simply uplifting, cleaning and re-laying materials currently used in the streets, or by creatively reimagining how the material can be used. This may include crushing and using as concrete aggregate, integrating into low walls in the streets, or crushing and binding in resin to create a permeable paving surface. Materials suitable are:

— Natural stone wall cladding
— Natural stone paving
— Natural stone kerb stones and mass blocks
— Clay pavers

Also available are ICC's stockpile of surplus materials from previous streetscape projects. These are palletised and locally available.



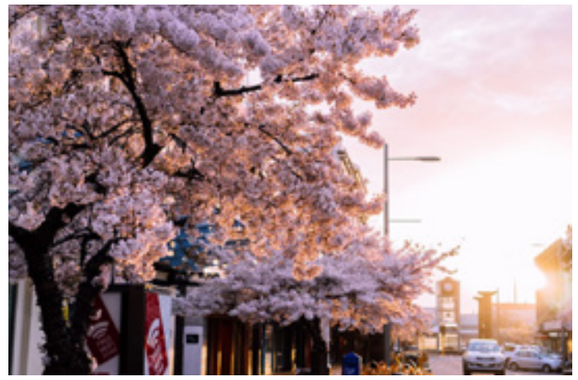
Use surplus materials from other urban projects

With the significant scale of urban projects within Christchurch's city centre post-earthquake, there is a sizable stockpile of surplus material which Ōtākaro Ltd (central government's delivery agency) are looking to on-sell. At this stage, this includes natural stone in 3 grey tones, suitable for :

— paving - primarily in a 150 x 300mm format
— kerb stones - limited quantities

It is worth noting that while there is not sufficient material to deliver both Esk and Don completely, the available material could assist in alleviating time pressures associated with long lead-time materials.

A commercial agreement would need to be put in place between ICC and Ōtākaro to secure required materials.



Use of quality tree stock

Where possible, the design looks to retain and protect existing trees, both Pin Oaks and Flowering Cherries.

A number of trees currently within Esk Street are also proposed to be relocated within the street, where possible. While there is cost associated with this, there are multiple benefits for the street:

— instant scale and presence in the street. This in comparison to the planting of a new tree, with little presence, growing slowly in this challenging environment and likely to be subject to vandalism.
— provision of dappled shade in sunnier areas during the summer months
— seasonal colour
— retention of familiar elements in the street.

Use Council's existing resources

ICC have set aside a stockpile of Macrocarpa slabs at Donovan Park, which are to be put to good use in the streets. Sizes and lengths vary, but include

— 100 x 200mm
— 150 x 200mm
— 200 x 200mm
— 200 x 400mm
— 400 x 400mm

Lengths vary from 3.3m to 6.1m.

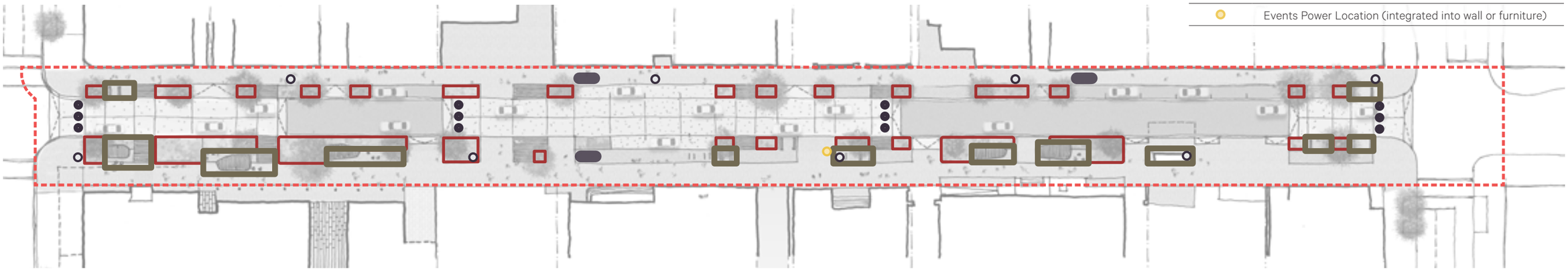
Furniture Strategy.

Don Street.

- Defined to furniture zone areas along street
- Outdoor dining zones with robust seating elements
- Consistent location of vertical elements, consolidated where possible i.e. columns with rubbish bin mounts, road/parking signage, etc. to minimise clutter
- Pockets of outdoor areas for people to inhabit and get shelter
- Timber surfaces - warm, comfortable and quick drying

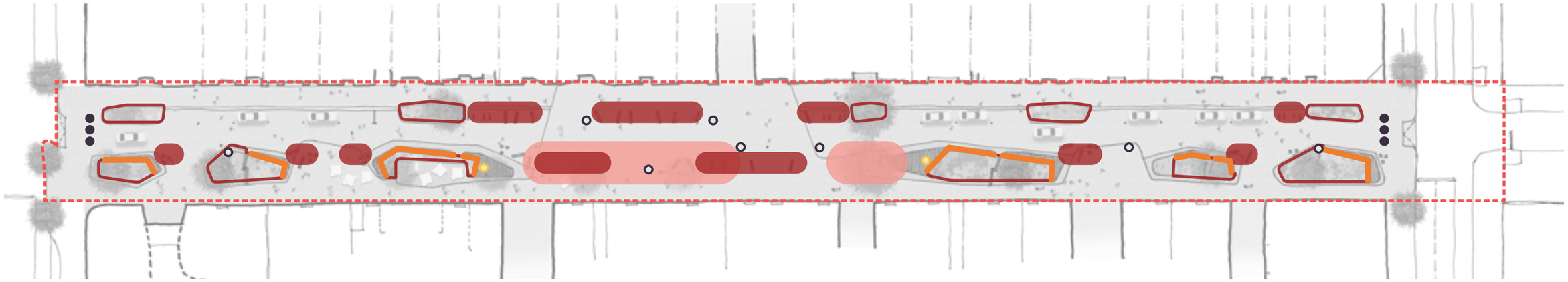
Legend.

- Extent of works
- Garden Bed / Rain Garden
- Planter Bed Seating / Outdoor Bleachers
- Areas for Fixed Furniture on Esk Street (benches, rubbish bins, cycle racks etc)
- Areas for Movable Furniture on Esk Street
- Outdoor Seating Areas
- Parking Meters
- Retractable Bollards
- Light Columns (rubbish bins mounted to some poles)
- Events Power Location (integrated into wall or furniture)



Esk Street.

- Fixed and movable furniture
- Flexibility for occupation day to day, and event space as required
- Integrated events power
- Timber surfaces - warm, comfortable and quick drying
- Playable furniture elements along the street



N

Don Street.

Don Street is the Entertainment Street for Invercargill, it should encourage places for people to be outside, whether it be dining or enjoying an event.

Robust Seating.

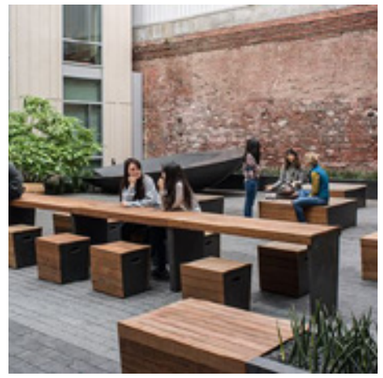
Seating provided within strong planted garden beds/rain gardens so people can find shelter on the street.

Larger Platforms.

Open up the opportunity for the use of seating elements for activation, events and play.

Civic Spaces.

Opportunity to reconfigure entrance to courts to provide presence to courts building. Provide spaces for people to occupy including steps, walls and planted beds.



Seating that supports dining.

Allow for areas that can have outdoor dining plugged in.

Multi-sided furniture.

Seating that can be used in different ways to respond to the climate.

Esk Street.

Esk Street is a place for people, where comfort is key encouraging people to linger longer. Places for eating, watching a performance, people watching, or bringing the kids.

Raised Garden Bed Forms.

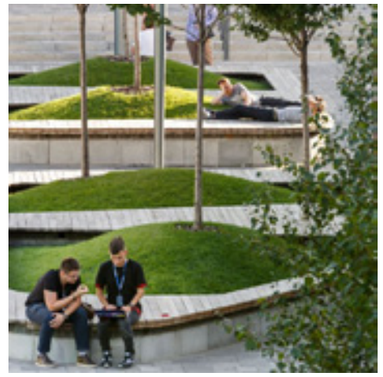
Shaped in a way that provides and encourages for outdoor occupation and shelter from the elements.

Larger Platforms.

Open up the opportunity for the use of seating elements for activation, events and play.

Seating with Shelter.

Provide shelter through landform and planting mass.



Seating with Shelter.

Provide shelter through landform and planting mass.

Moveable Seating.

Robust, large scale and stackable bench seating that can be moved around for events.

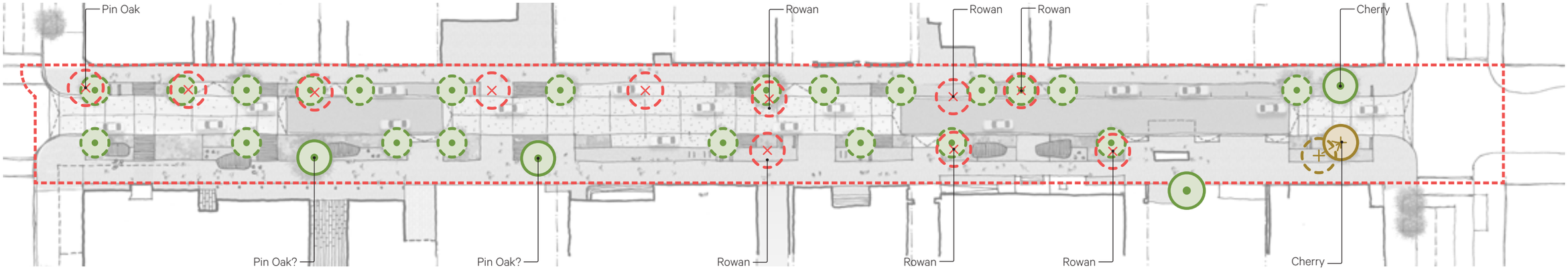
Tree Strategy.

Don Street.

- Poor specimen trees to be removed
- Rowan trees to be removed entirely
- Tree planting in layers along street to provide visual and climatic buffers
- Trees within garden bed or resin bound aggregate surface
- Rain gardens to feature appropriate tree species

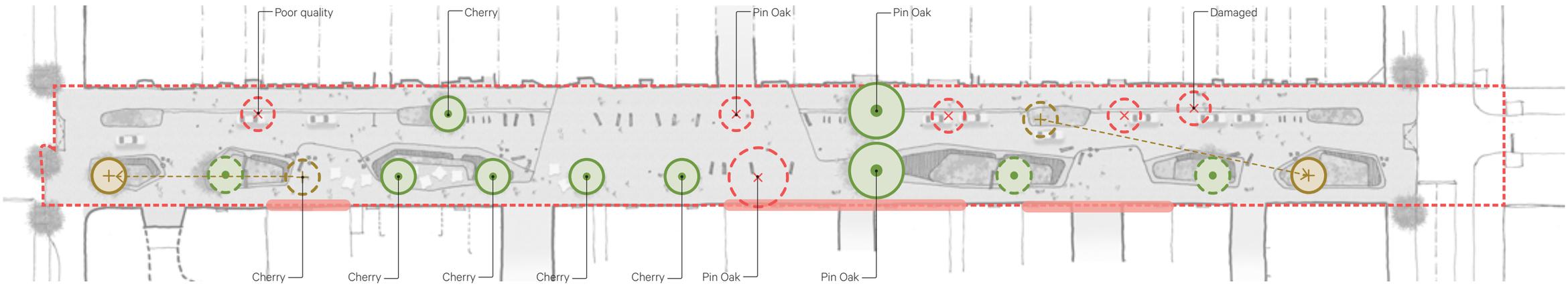
Legend.

- Extent of works
- Existing tree to be removed
- Existing tree to be relocated
- Proposed new tree
- Existing tree to be retained
- Heritage Facades retained



Esk Street.

- Clear views to heritage facades
- Use to help shelter gathering spaces from predominant winds
- Seasonality
- Native vs exotic
- Relocation of key trees
- Solar access during winter, dappled shade during summer
- Tough environment - species selection using ICC's working Knowledge
- Canopies reduce heat island effect
- Relocate/remove all trees from north of street apart from Pin Oak



N

Tree & Planting Palette.

Tree Species.

Juniperus chinensis 'Kaizuka'.
Hollywood Juniper.

Plagianthus regius.
Ribbonwood.

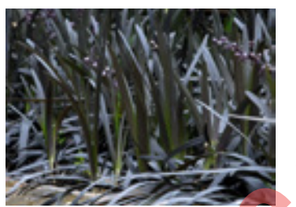
Osmanthus burkwoodii 'Silver Sheen'.
Burkwood Osmanthus.

Metrosideros umbellata.
Southern Rata.

Pseudopanax crassifolius.
Horoeka/Lancewood.

Ulmus hollandica 'Lobel'.
Upright Dutch Elm.

Shrubs and Ground Covers.



Ophiopogon planiscapus.
Black Mondo Grass.

Botanical name.
Common name.

Botanical name.
Common name.

Botanical name.
Common name.

Botanical name.
Common name.

Botanical name.
Common name.

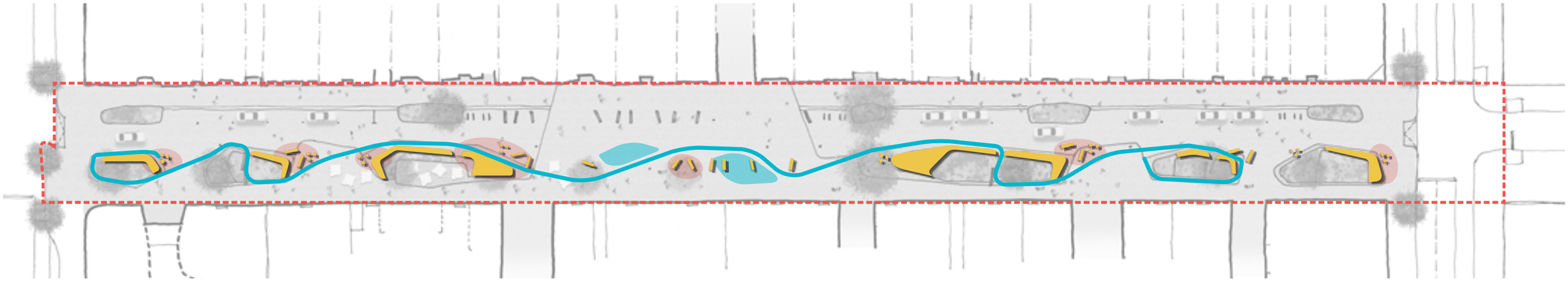
Taurakitewaru was Te Rakitauneke's village but was also the name of the bush here. (DW)

INDIGENOUS PLANTING LIST

NOTE: This is placeholder information only - to be amended

Tōtara	*Podocarpus totara*	F I	TREE
Kaikōmako	*Pennantia corymbosa*	F N I	TREE
Kōtukutuku	*Fuchsia excorticata* (deciduous)	F N B	TREE
Horoeka	*Pseudopanax crassifolius*	F N B I	TREE
Makomako	*Aristotelia serrata* (semi-dec)	F I B	TREE
Tī kouka	*Cordyline australis*	F N I	TREE
Whauwhaupaku	*Pseudopanax arboreus*	F N I	TREE
Harakeke (muka)	*Phormium tenax*	N L	TREE
Kōhuhu	*Pittosporum tenuifolium*	F I	TREE
Hīnau	*Elaeocarpus dentatus*	F I	TREE
Tarata	*Pittosporum eugenoides*	F I	TREE
Kōwhai	*Sophora microphylla*	F I	TREE
Whauwhaupaku	*Pseudopanax laetus*	F	TREE
Kahikatea	*Dacrycarpus dacrydiodes*	F	TREE
Horopito	*Pseudowintera colorata*	F N I	SHRUB
Pohuehue	*Muehlenbeckia astonii*	F L I	SHRUB
Pohuehue (scrambling)	*Muehlenbeckia complexa*	F L I	SHRUB
Mikimiki, mingimingi	*Coprosma propinqua*	F L	SHRUB
Pātotōtara	*Leucopogon fraseri*	F L I	GROUND
Tūrutu	*Dianella nigra*	F I	GROUND
Mīkoikoi	*Libertia ixioides*	F I	GROUND
Pirita	*Ileostylus micranthus*	F N B	CLIMBER
Kohia	*Passiflora tetranda*	I	CLIMBER
Puawhananga	*Clematis Paniculata*	I	CLIMBER
Pōānanga	*Clematis forsteri*	I	CLIMBER
Kaiwhiria	*Parsonsia capsularis*	I	CLIMBER
Kaiwhiria	*Parsonsia heterophylla*	I	CLIMBER

Playful and playable.



Trails.
along edges - over obstacles - balancing through gardens - around poles + trees - rollable routes

Social + passive play.
social seating - multi-use platforms - edge spots for observing - small scale details for small people

Water + light.
mist - reflection - moving water - pools of light - seasonal change

Streetscape elements encourage users to interact and ‘play along the way’.

Using texture, colour to guide people through and along the street. Something that reveals itself in different forms able to be joined at multiple points.

Being able to ‘hunker down’ and get shelter from an element within the street.

Playing on the theme of ‘rollable routes’, all modes of travel are allowed, and for all ages.

Use Invercargill’s unique setting to amplify the seasons through water play, enhanced by light.

Within each street, opportunities for all types of people to stop and pause, observe, engage with, and play with elements of all scales .

Street programming.
Event modes.

Legend.

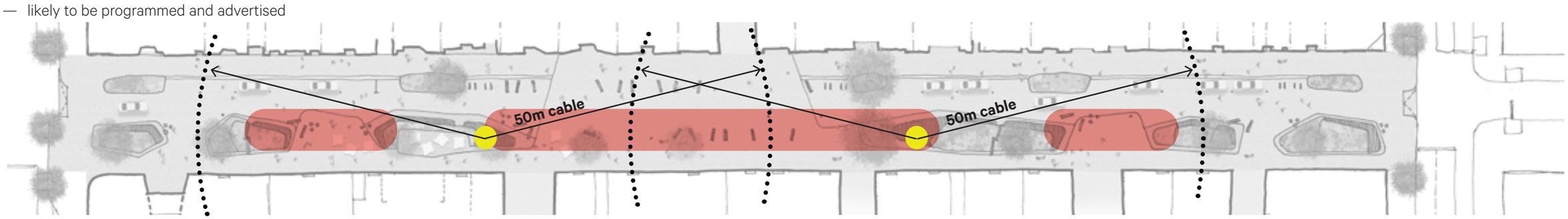
- Events power location based on 50m cable run
- Event space

Small / spontaneous / opportunistic events.

— no permission needed - anyone welcome at any time
— no power requirements

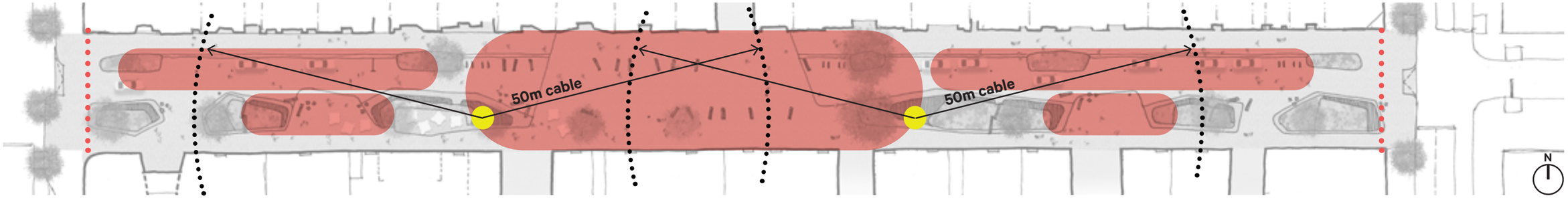
Mid-sized / programmed events.

— power source(s) may be required
— likely to be programmed and advertised



Large events.

— road closure required
— power source(s) required
— likely to be programmed and advertised



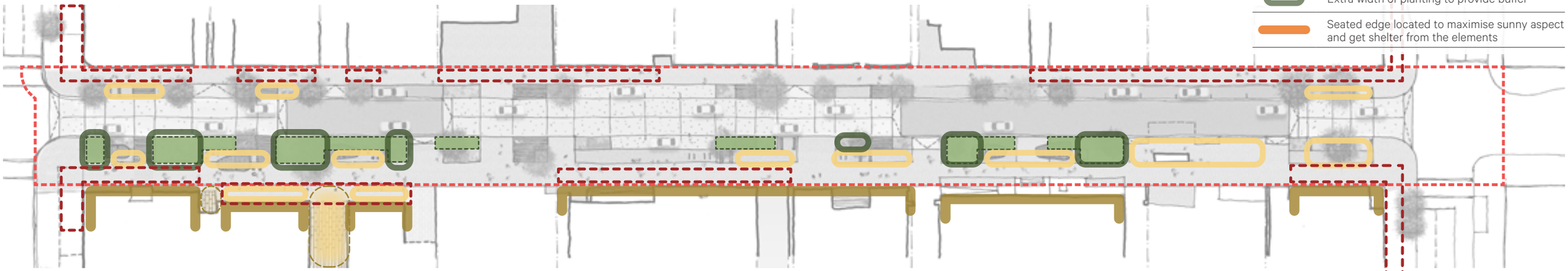
Weather Protection Strategy.

Don Street.

— Extra width of planting to provide buffers to outdoor seating areas
— Pockets of outdoor space created by strong planting
— Layered landscape leading in from the west to provide shelter along the full street.

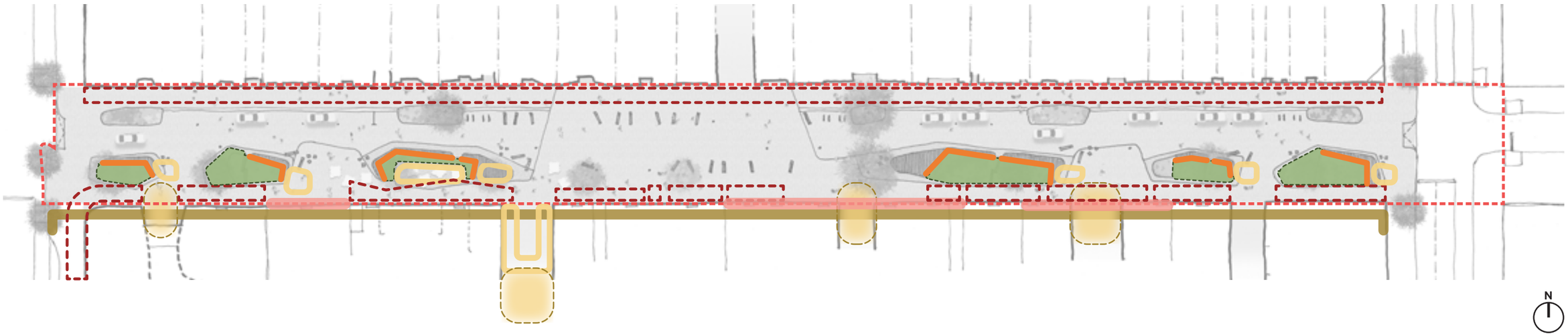
Legend.

- Extent of works
- Sunny edges (north facing)
- Sheltered edges/zones (shelter from westerly wind)
- Verandahs
- Building thresholds (wind lobbies)
- Planting to provide shelter
- Extra width of planting to provide buffer
- Seated edge located to maximise sunny aspect and get shelter from the elements



Esk Street.

— Capitalises on shelter provide by ICL development to provide spaces for people externally
— Pockets of outdoor space created by strong planting and raised forms
— Layered landscape leading in from the west to provide shelter along the full street.



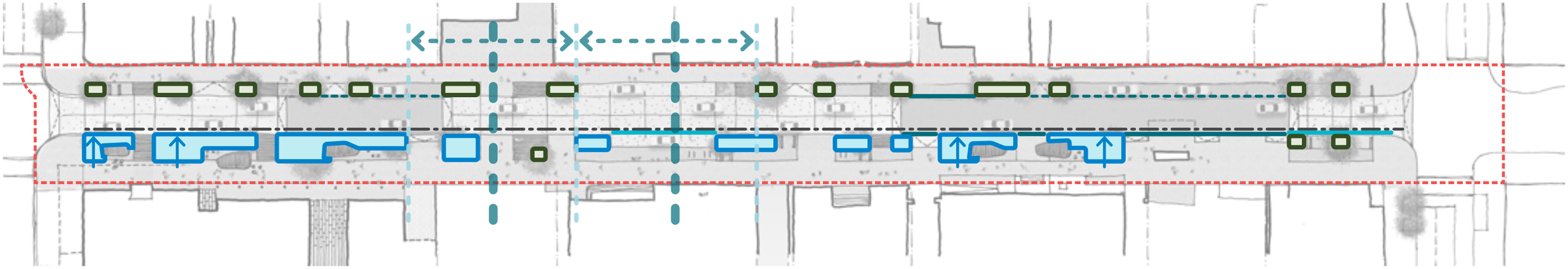
Drainage Strategy.

Legend.

- Extent of works
- Crown of Road
- Invert of Road
- Rain garden
- Garden bed (passive irrigation)
- Nib Kerb & Channel
- Kerb & Channel (with driveway crossings)
- Surface slot drain (if required)
- High Point on Street
- Low Point on Street

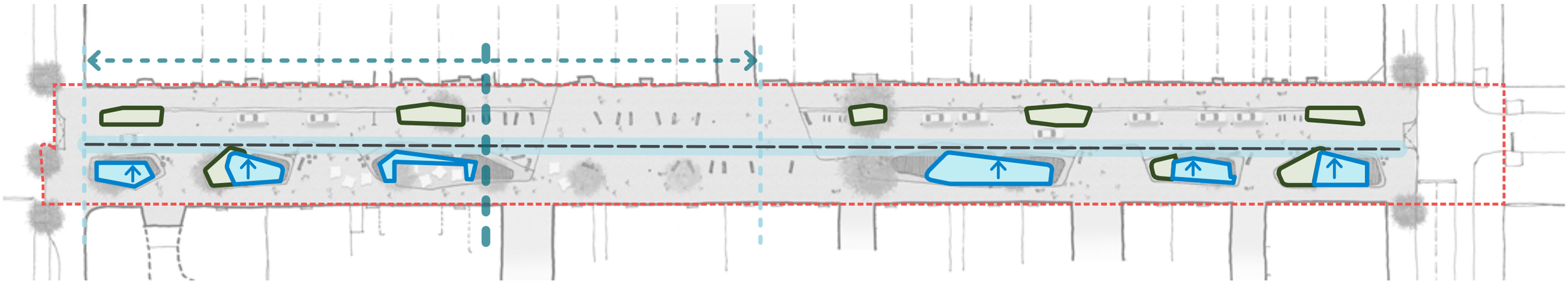
Don Street.

— Rain gardens to south of street
— Garden bed / tree pits primarily to north
— Central crown to carriageway continued into car park bays
— Carriageway defined by kerb and channel to length of street
— Varying grade to footpaths (2% max)



Esk Street.

— Central SW line, central invert to street along tactile linear band
— Large, linear rain gardens bridged to allow pedestrian movement / passive irrigation
— Secondary flow path in flat spots



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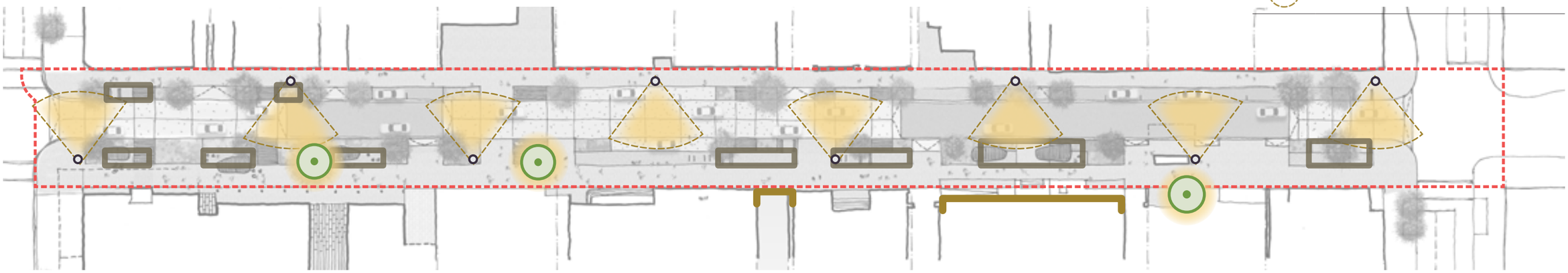
Lighting Strategy.

Legend.

- Extent of works
- Light Columns
- Heritage facades retained on Esk St
- Significant Building Facades to illuminate
- Outdoor seating areas (passively lit)
- Mature trees for feature lighting
- Feature lighting in 'The Clearing'

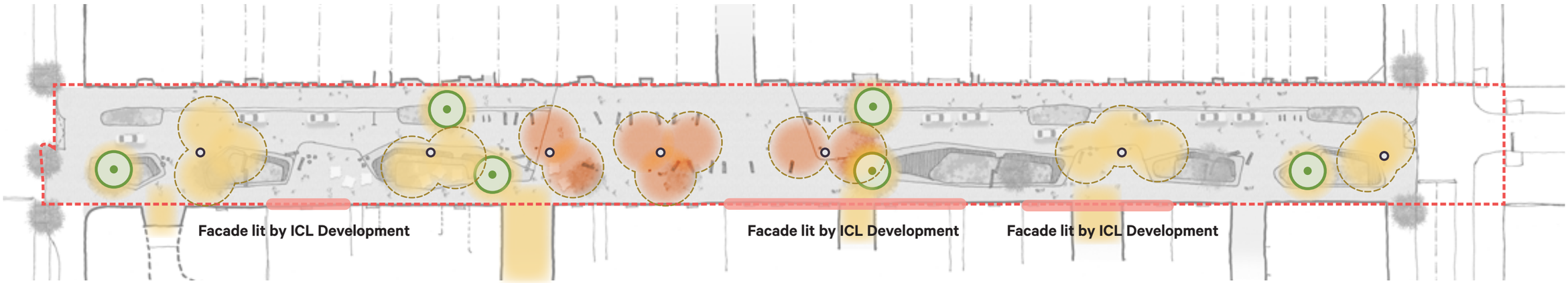
Don Street.

- Light arcade entrances and heritage facades
- Light significant trees where possible (avoid up-lighting)
- Linear lighting approach along street to give streetscape structure
- Passive lighting from adjacent bars and restaurants to outdoor dining areas
- Use light columns as opportunity to light in different direction i.e. to light pedestrian space or tree



Esk Street.

- ICL have significant facade lighting planned
- Create a simple foreground to this - complementary not competing
- Shared space approach extends into lighting approach - street feels like a pedestrian space
- Avoid linear lighting approach along vehicle access zone
- Potential for narrative to be told through lighting eg: patterns on surfaces/pavements using gobos.



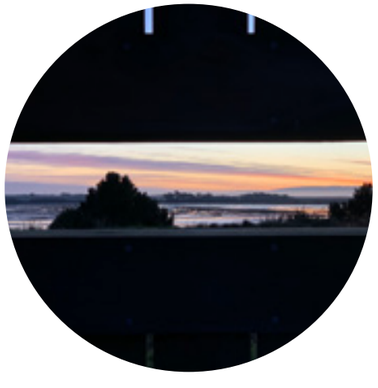
Light, Colour & Reflection.

Invercargill's environment provides a rich palette from which to draw inspiration. From the forms, textures, reflections and movement seen in the estuary, to the natural light show at dawn and dusk.

Landscape Inspiration.







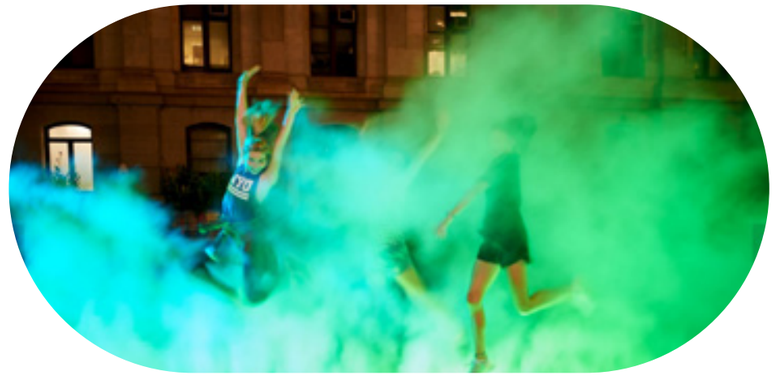

Colour Palette.



Precedents.







2. Appendices.

PRELIMINARY

N

SHADED AREA HAS NO LONGITUDINAL FALL. DRAINAGE RELIES ON CROSSFALL AND DIRECT DISCHARGE TO RAINGARDENS ON THE SOUTHERN EDGE OF THE CARRIAGEWAY

CENTRAL LOW POINT ON THE SOUTHERN SIDE OF THE VEHICLE CARRIAGEWAY. HIGH AND LOW POINTS GRADED AT 0.5% WITH FLAT ZONES WHERE LONG GARDENS ARE PROPOSED. SINGLE CROSSFALL ON BOTH SIDES OF THIS LOW POINT TO TIE INTO BOUNDARY HEIGHTS.

POTENTIAL REQUIREMENT FOR RAINGARDENS IN THIS LOCATION TO ALLOW FOR TIE IN TO KELVIN ST

LONGITUDINAL LOW POINT

LONGITUDINAL HIGH POINTS

SHADED AREA HAS NO LONGITUDINAL FALL. DRAINAGE RELIES ON CROSSFALL AND DIRECT DISCHARGE TO RAINGARDENS ON THE SOUTHERN EDGE OF THE CARRIAGEWAY

OVERLAND FLOW PATH FOR SECONDARY EVENTS WILL FOLLOW RAINGARDEN ALIGNMENT. CATCHMENT IS SUFFICIENTLY SMALL TO PREVENT HIGH VELOCITY FLOW TO DAMAGE GARDENS. FLOW WILL GENERATE BY PONDING AND THEN NATURAL HYDRAULIC GRADE TO EXIT THE RAINGARDEN AS WEIR FLOW AT DEE STREET. RAINGARDENS MAY REQUIRE ADDITIONAL BUBBLE-UP CULVERTS TO CONVEY FLOW DEPENDING ON ATTENUATION FACTOR OF RAINGARDEN STORAGE AND CAPACITY OF PRIMARY NETWORK TO ACT IN A BUBBLE UP FASHION

SINGLE LONGITUDINAL HIGH POINT

CENTRAL LOW POINT IN THE CENTRE OF ESK ST, GRADED AT 0.3% ACCO DRAIN OR SIMILAR SLOT DRAIN. FLOW CAPTURED AND DIRECTED TO RAINGARDENS AS IT PROGRESSES ALONG THE STREET TO PROVIDE MULTIPLE INLET POINTS INTO THE PIPED NETWORK. KEY DESIGN CONSIDERATION IS THE INTERFACE BETWEEN THIS LOW POINT AND RAINGARDENS TO THE SOUTH AS THE CURRENT DESIGN DOES NOT HAVE A CLEAN INTERFACE BETWEEN DEVICES

POTENTIAL REQUIREMENT FOR RAINGARDENS IN THIS LOCATION TO ALLOW FOR TIE IN TO KELVIN ST

OVERLAND FLOW PATH FOR SECONDARY EVENTS WILL REQUIRE PONDING TO THE EAST OF THE HIGHPOINT. FLOW PATH WILL BE TO THE WEST AND WILL THEN PROGRESS SOUTH ON DEE ST

LOW POINT LOCATED WITHIN PROPOSED OPEN ZONE. THIS WILL LIKELY REQUIRE THE PLACEMENT OF A RAINGARDEN IN THIS LOCATION OR ACCEPTANCE OF DIRECT CONNECTION TO THE PIPED NETWORK AS UNLIKELY TO BE ABLE TO PIPE FLOW TO ADJACENT RAINGARDENS

PRELIMINARY

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A	100% PRELIMINARY DESIGN	SJC		SJC	30/04/2021

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CLIENT: Invercargill City Council

PROJECT: ICC CITY CENTRE STREETS

SHEET TITLE: HIGH AND LOW POINTS

SURVEYED:		
DESIGNED:	SJC	
DRAWN:	SJC	
DRAWING CHECK:		
DESIGN CHECK:		
APPROVED:	SJC	

SCALE (ORIGINAL SIZE A1) 1:400

DATE ISSUED 30/04/2021

JOB NO 7509 | SHEET 1 of 10 | REV. A

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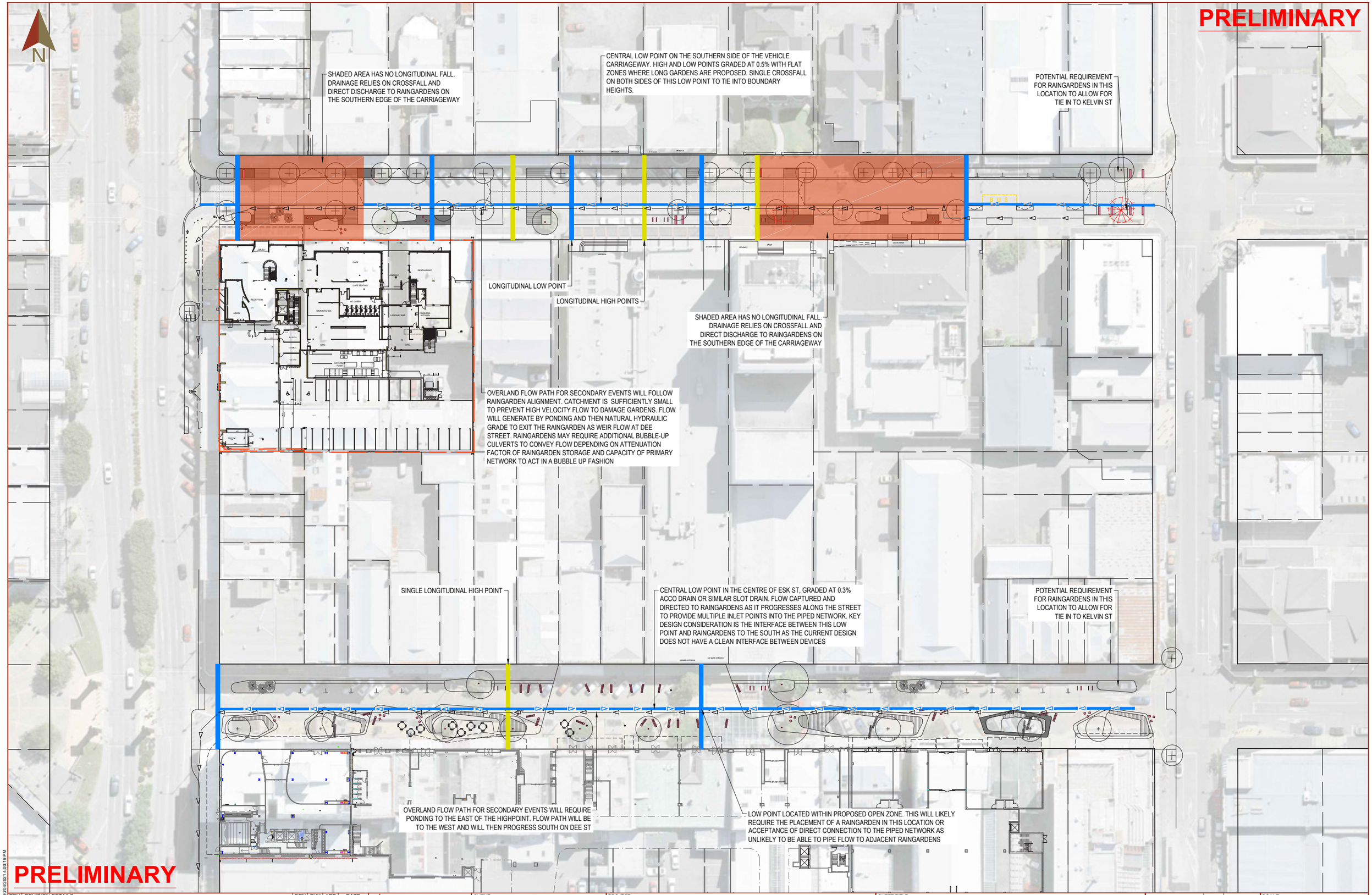

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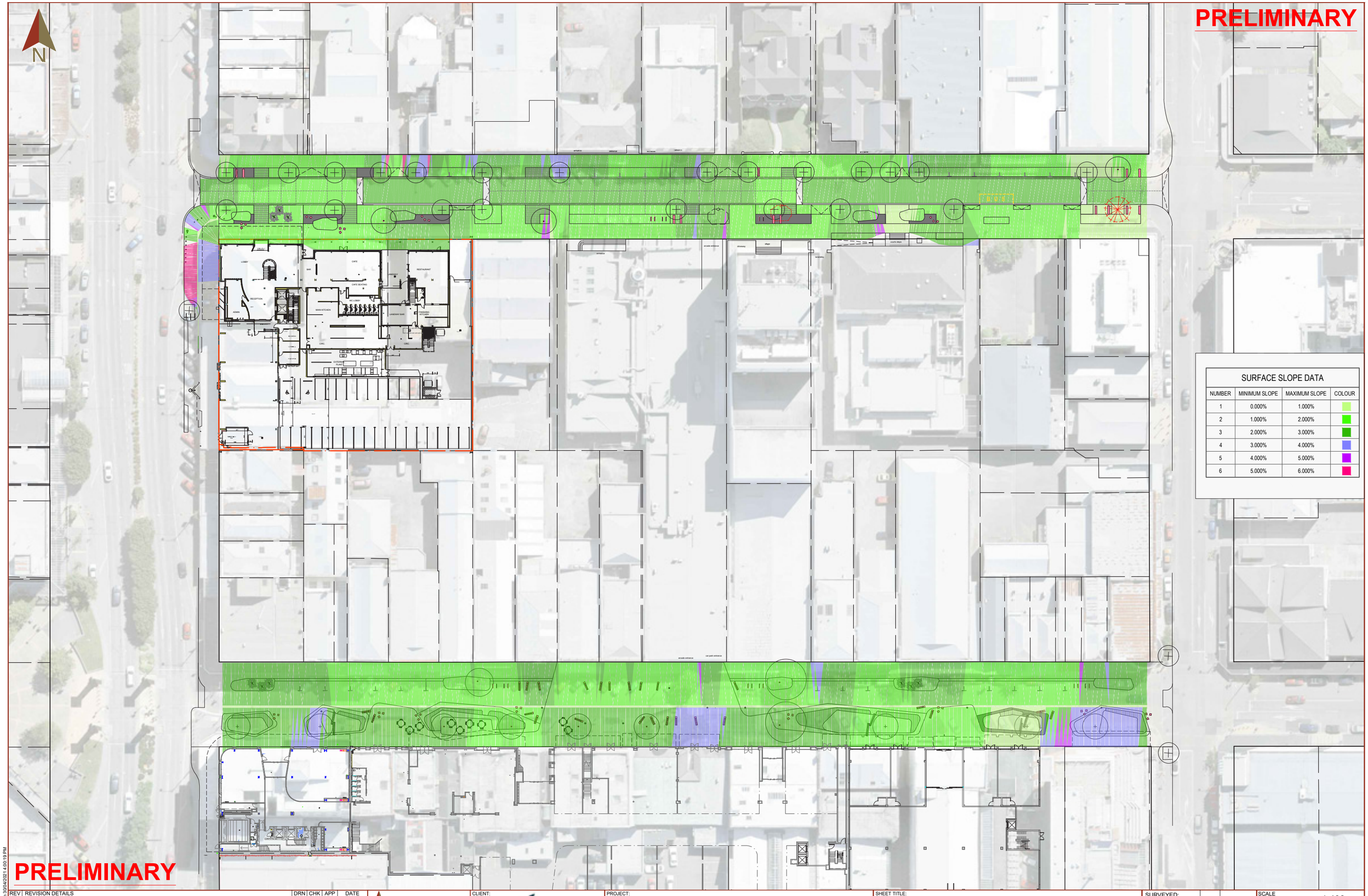

SURFACE SLOPE DATA			
NUMBER	MINIMUM SLOPE	MAXIMUM SLOPE	COLOUR
1	0.000%	1.000%	
2	1.000%	2.000%	
3	2.000%	3.000%	
4	3.000%	4.000%	
5	4.000%	5.000%	
6	5.000%	6.000%	

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SHEET TITLE: DESIGN SLOPES

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INVESTIGATION NOTES:
- PURPLE COLOURED LOCATIONS ARE CONSIDERED MINIMUM TO ALLOW FOR DESIGN. GREEN COLOURED LOCATIONS ARE CONSIDERED SUPPLEMENTARY TO PROVIDE FURTHER CLARITY ON KEY SERVICES
- EXPOSE FULL WIDTH OF SERVICES (GROUP OF SERVICES)
- WHERE MAIN SERVICES ARE CROSSING (WHERE VODAFONE CROSSES POWER EXPOSE BOTH SERVICES TO ALLOW ACCURATE HEIGHT RECORDING TO BE COMPLETED)
- TAKE PHOTOS OF TRENCH MATERIAL AND SURROUNDING SUBGRADE WHERE POSSIBLE

WATER AND GAS MAIN

VODAFONE CABLE / DUCTS

VARIOUS POWER, TELE, WATER

VARIOUS POWER, TELE

WATER (PIPE BURST ASBESTOS, PE MAIN) AND GAS CI REDUNDANT

VARIOUS POWER AND DUCTS. ALSO PICK UP VODAFONE CABLE CROSSING

WATER (ASBESTOS WITH SLEAVED PE MAIN)

VARIOUS POWER, TELE, WATER

VARIOUS POWER, TELE

WATER (PIPE BURST ASBESTOS, PE MAIN) AND GAS CI REDUNDANT

POWER AND FIBRE (HIGH VOLTAGE)

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SHEET TITLE: INVESTIGATIONS PLAN

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DRAWING CHECK:		
DESIGN CHECK:		
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SCALE (ORIGINAL SIZE A1): 1:400

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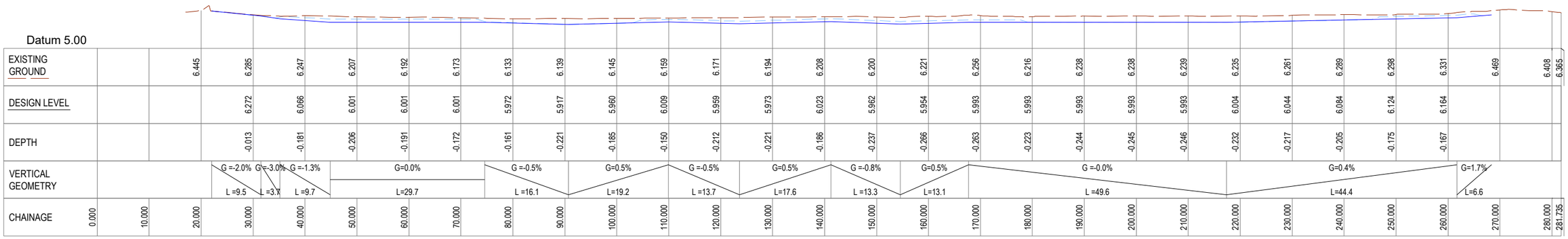

DON - DESIGN LOW POINT (SOUTH SIDE LOC) LONGSECTION
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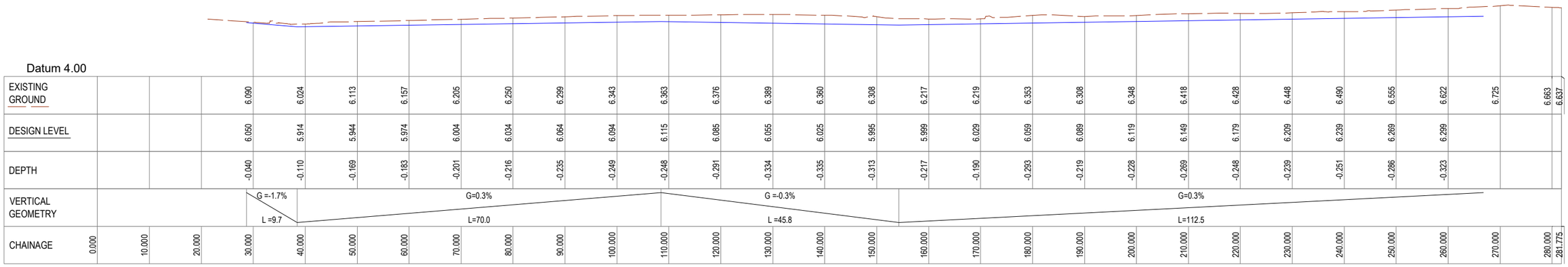

ESK - DESIGN LOW POINT (APPROX CENTRE OF ROAD) LONGSECTION
SCALE: H 1:400, V 1:80

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CLIENT: Invercargill CITY COUNCIL

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SHEET TITLE: DESIGN LONGSECTIONS

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DESIGN CHECK:		
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SCALE (ORIGINAL SIZE A1): AS SHOWN
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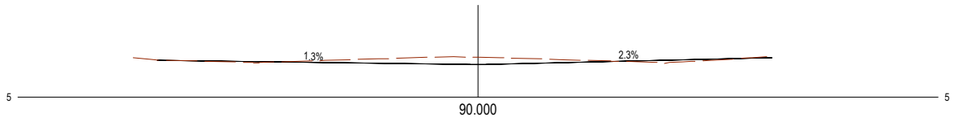

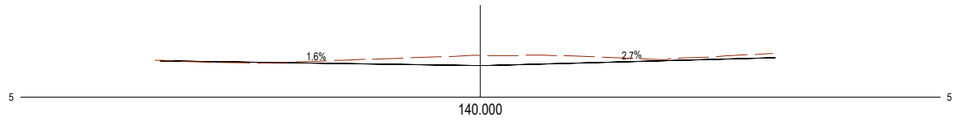

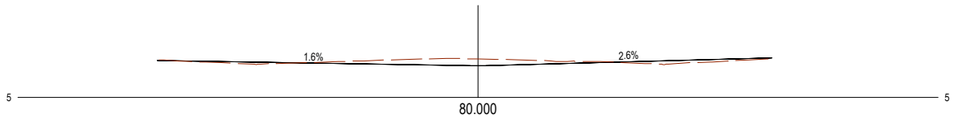

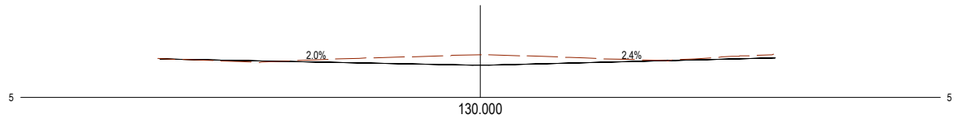

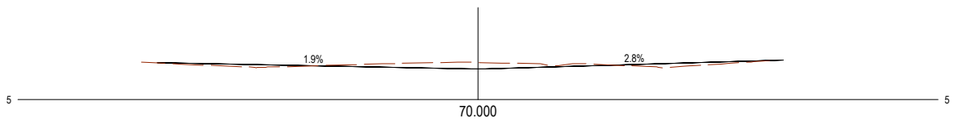

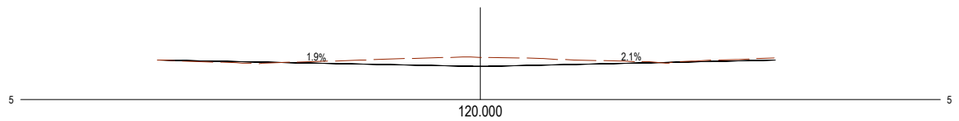

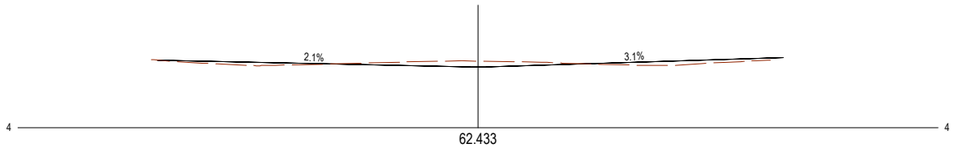

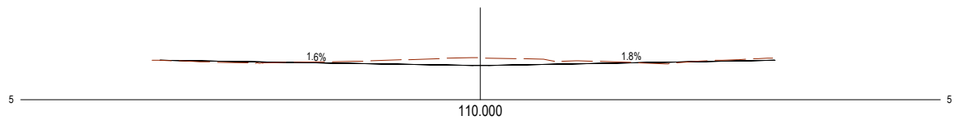

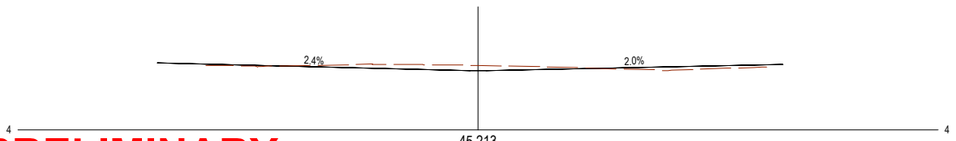

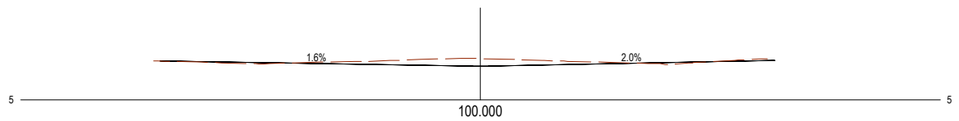

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CLIENT: Invercargill City Council

PROJECT: ICC CITY CENTRE STREETS

SHEET TITLE: ESK ST CROSS SECTIONS 01

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DRAWN:	SJC	
DRAWING CHECK:		
DESIGN CHECK:		
APPROVED:	SJC	

SCALE (ORIGINAL SIZE A1): 1:100

DATE ISSUED: 30/04/2021

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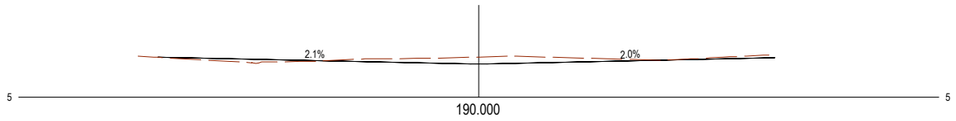

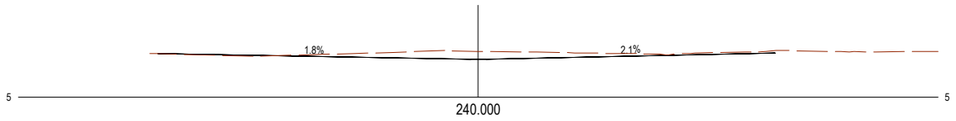

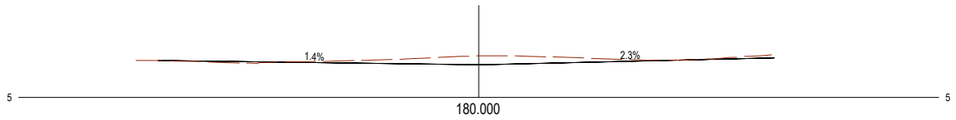

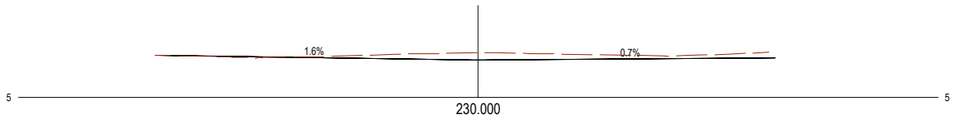

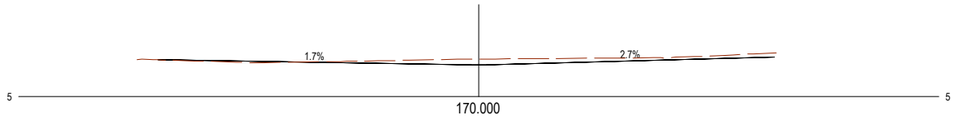

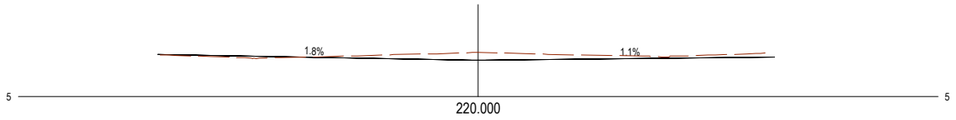

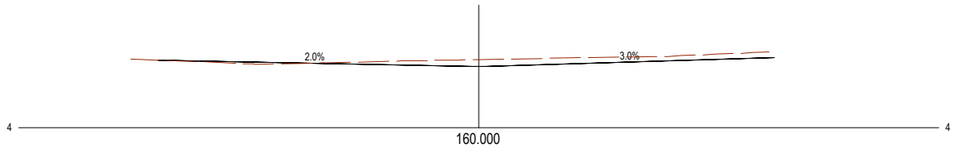

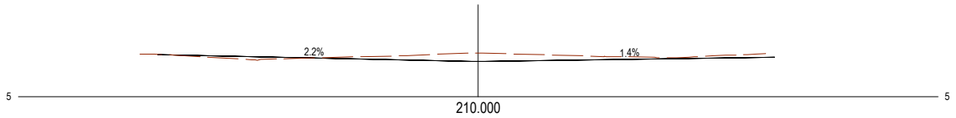

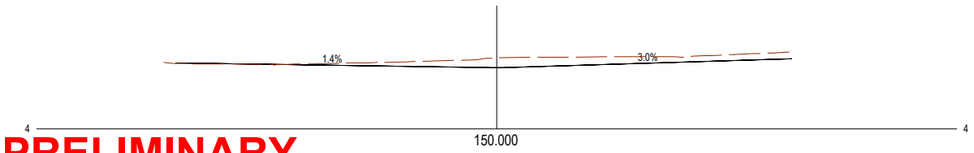

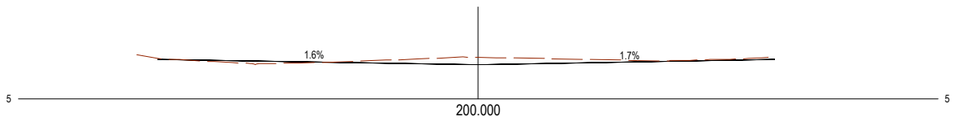

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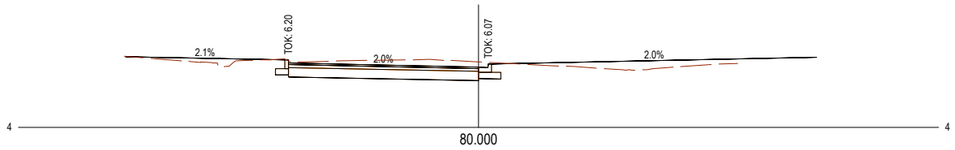

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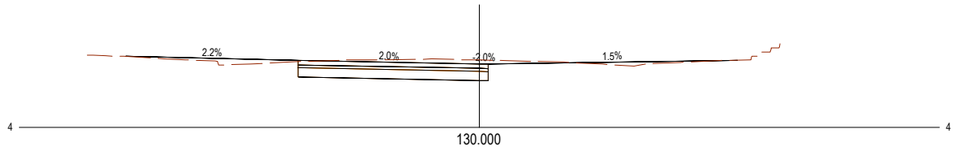

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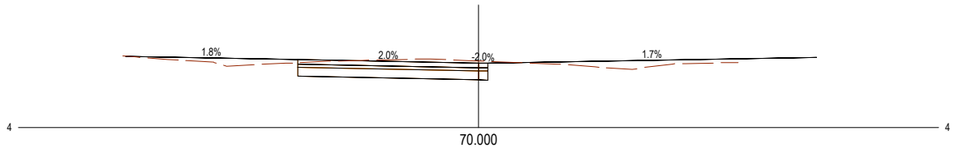

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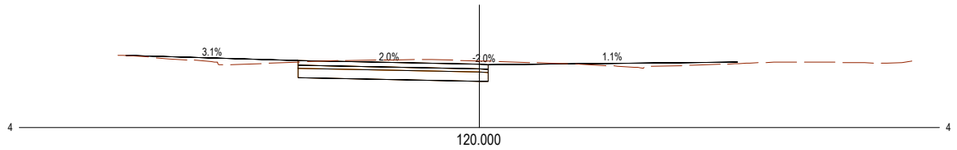

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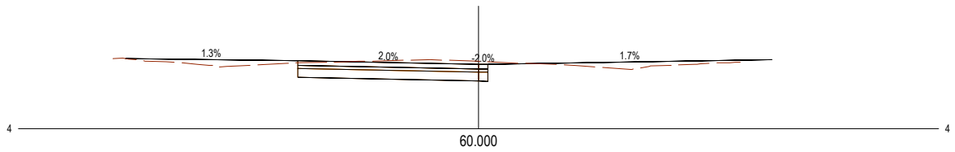

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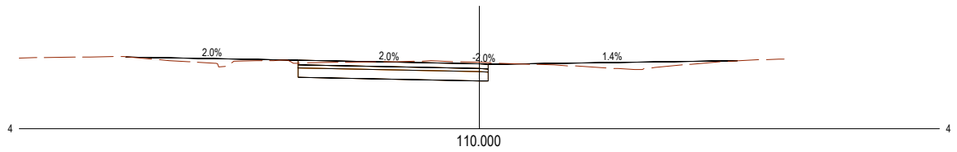

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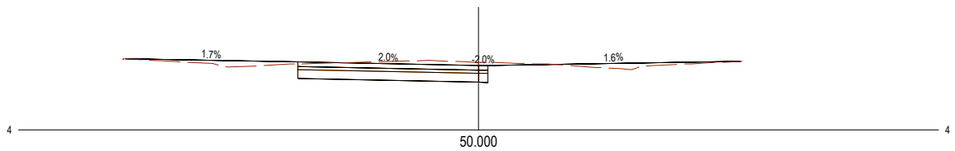

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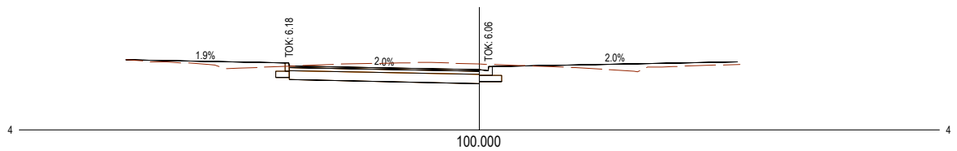

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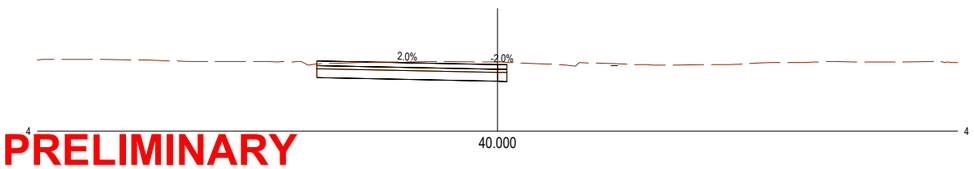

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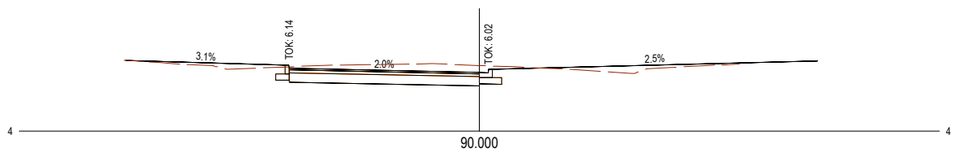

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PROJECT: ICC CITY CENTRE STREETS

SHEET TITLE: DON ST CROSS SECTIONS 01

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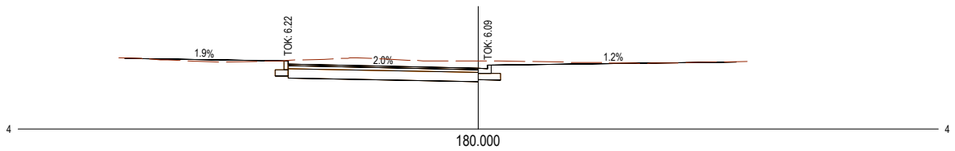

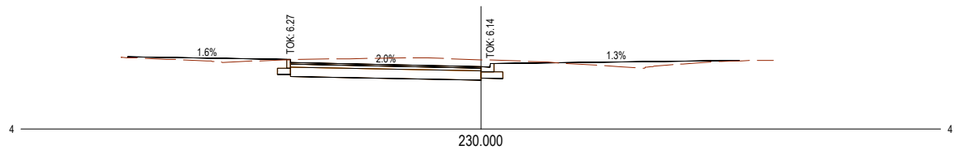

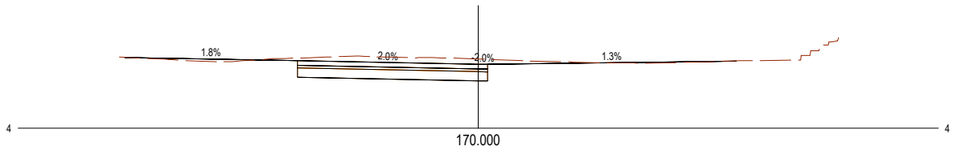

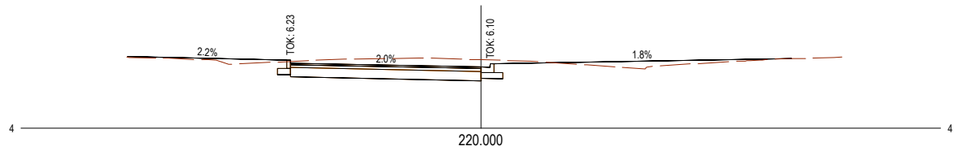

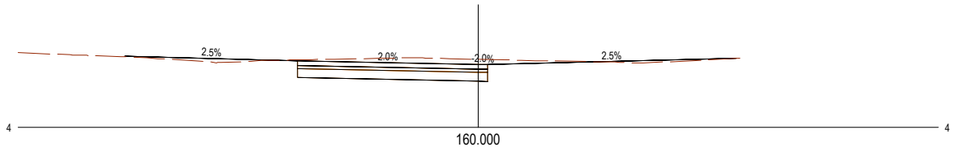

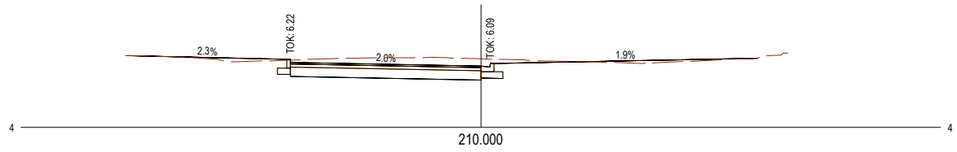

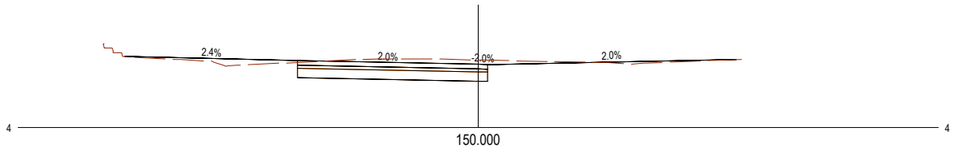

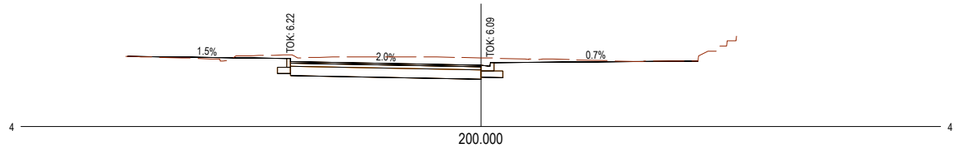

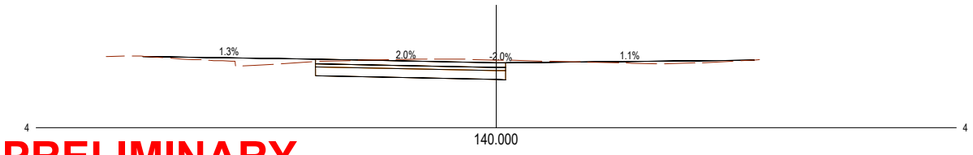

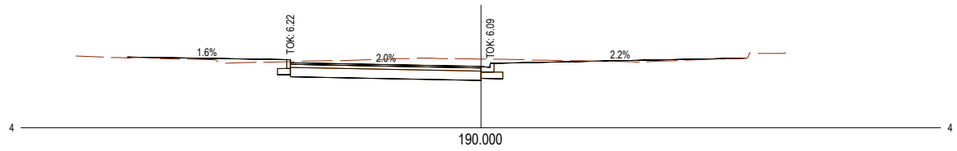

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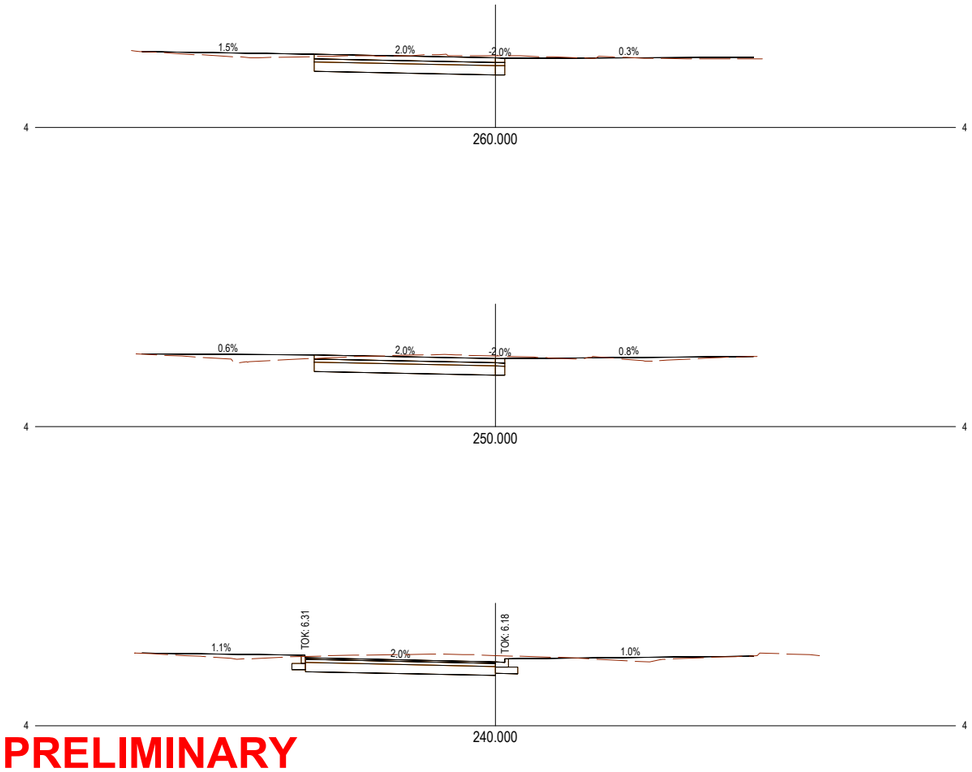

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PRELIMINARY

WM VALVE CLASH WITH GARDEN. RELOCATE OR AMEND GARDEN LOCATION

WM, SW AND TELE BELOW ALL NORTH SIDE GARDENS. CONSIDERATION OF APPROPRIATE PLANTING AND ROOT PROTECTION NEEDED FOR SERVICES

WM FH, SWMH UNDER PROPOSED BOARDWALK. RELOCATE TO THE WEST.

VODAFONE FIBRE DUCTS 1M APPROX COVER. FURTHER INVESTIGATION NEEDED

WM FH INSIDE GARDEN. RELOCATE TO THE EAST

WM VALVE CLASH WITH EDGE OF GARDEN. RELOCATE OR AMEND GARDEN LOCATION

WM AND ABANDONED GAS BELOW GARDEN. MAINTAIN SERVICES BELOW GARDEN AND LOCATE PLANTS TO AVOID ISSUES

VODAFONE FIBRE DEVIATES INTO GARDEN ZONE. FURTHER INVESTIGATE ONCE UMBRELLA REMOVED, MAY DICTATE PLANTING SELECTION

NOTE:
1. SERVICES SHOWN HAVE BEEN COMPILED FROM ICC GIS AND BEFOREUDIG PLANS, AND AMENDED FOR POSITION WHERE TOPOGRAPHICAL SURVEY HIGHLIGHTED INACCURACIES. PRESENCE OF SERVICES AND LOCATIONS SHOWN ARE INDICATIVE ONLY
2. DETAILED INVESTIGATION OF CROSSING AND LATERAL SERVICES HAS NOT BEEN COMPLETED AT PRELIMINARY DESIGN PHASE. LATERAL CONNECTIONS ARE NOT SHOWN
3. AS DETAILED LEVEL INVESTIGATION HAS NOT BEEN COMPLETED CLASHES NOTED RELATE TO 2D CLASH BASED ON UNDERSTANDING OF TYPICAL DEPTH. INTRUSIVE INVESTIGATIONS ARE REQUIRED TO FURTHER CLARIFY POTENTIAL CLASHES
4. SERVICES NOT SHOWN MAY INCLUDE TRAFFIC SIGNAL DUCTING AND CABLING, PRIVATE DUCTING, LATERAL CONNECTIONS, SUMP CONNECTIONS

PWR PILLAR BOX ON EDGE OF GARDEN

PHONE CABLE UNDER GARDEN (AS PER EXISTING). NO ACTION REQUIRED

WM FH INSIDE GARDEN. RELOCATE TO CLEAR ZONES

PWR PILLAR BOX IN GARDEN / SEATING AREA

PILLAR BOX

VERANDAH PILLARS WITHIN GARDEN ZONE. AMEND GARDEN TO ACCOMMODATE

PWR PILLAR BOX IN GARDEN

ICL WW CONNECTION IN GARDEN. NO ACTION REQUIRED OTHER THAN POTENTIAL ROOT BARRIER

ICL WW CONNECTION CLOSE TO GARDEN. NO ACTION REQUIRED OTHER THAN POTENTIAL ROOT BARRIER

PHONE BOOTH. RELOCATE OR REMOVE FROM STREET?

PILLAR BOX

SWMH CLASH WITH PAVING TRANSITION. AMEND GARDEN SHAPE

ICL WW CONNECTION CUTS THROUGH GARDEN. NO ACTION REQUIRED OTHER THAN POTENTIAL ROOT BARRIER

WM FH INSIDE GARDEN. RELOCATE TO CLEAR ZONE

ICL WW CONECCTION THROUGH GARDEN. NO ACTION REQUIRED OTHER THAN POTENTIAL ROOT BARRIER

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Invercargill City Centre Streetscape Intersection Design Assessments

Prepared for: Nik Kneal

Job Number: BNCL-J002

Revision: A

Issue Date: 30 April 2021

Prepared by: Jeanette Ward, Technical Director / Jared White, Principal Transport Planner

1. Introduction

This technical note discusses the design of the four intersections surrounding the town centre with the changes proposed to Don Street and Esk Street between Dee Street and Kelvin Street. This note builds on the previous note prepared to discuss the design inputs for the intersection of Don Street and Dee Street. This technical note provides technical transportation support and documentation for the preliminary scheme and designs.

For context, the intent of the master plan is to create *"a pathway to creating vibrant city centre streets for people, expressive of local place and community and designed to support social, cultural, economic and environmental health and wellbeing".* The master plan includes the conversion of Don Street to two-way flow with sufficient traffic calming to create a very low speed environment that discourages its use for through movement. Esk Street will remain one-way in the east bound direction.

Also, Don and Esk streets will be Civic Spaces under the One Network Framework. Civic Spaces have a high Place function and low Movement function as shown in **Figure 1.1.** Kelvin Street is considered a Main Street and Dee Street an Activity Street.

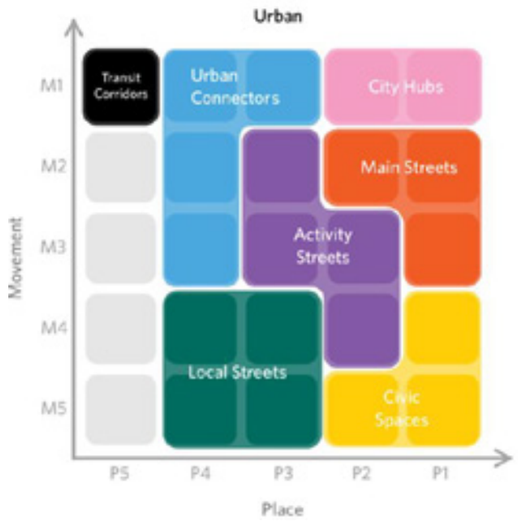

Figure 1.1 One Network Framework Movement and Place

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Transport + Location Intelligence

The final form of the intersections along Kelvin Street will be guided by the Masterplan layouts however the designs that are being considered in this stage of the project will be an interim design (Stage 1) where the infrastructure on the upgraded parts of Don Street and Esk Street to the west will largely be tied into the existing intersection infrastructure. The interim intersection operation may differ from the final operation.

2. Existing intersections

2.1 Dee Street / Don Street

Don Street between Dee Street and Kelvin Street is currently a one-way street west bound. The daily volume is approximately 2,100 vehicles. At the intersection with Dee Street (SH6) there is a left turn and right turn lane as shown below. In the evening peak the left and right are reasonably equal (about 150 vehicles/hour turning in each direction). The street currently has 44 on-street car park spaces (33 angle parks on the north side and 11 parallel on the south).

This lane configuration and the wide carriageway means queuing is minimised when the left turn is held back for the Dee Street pedestrian phase, as right turners can move past the waiting left turners.

Figure 2.1 Existing Don Street intersection with Dee Street

2.2 Dee Street / Esk Street

Esk Street between Dee Street and Kelvin Street is currently a one-way street east bound. The daily volume is approximately 1,750 vehicles. At the intersection with Dee Street (SH6), Esk Street forms a one way exit on the eastern side and there is a left turn lane as shown below. In the evening peak there is 177veh/hr entering Esk Street and less in the morning peak at around 95veh/hr. The street currently has 48 on-street car park spaces (30 on the north side and 18 on the south side).

A major feature of the intersection is a pedestrian crossing over Dee Street at around 20m in length which is called as required when a pedestrian pushes one of the call buttons. As such the intersection operates a simple two-phase operation with traffic on Dee Street in Phase A and the crossing in Phase B. There is also a signalised crosswalk over Esk Street which can be called at any time once the left turn from the north receives a red arrow. The Esk Street crossing can operate independently or with the main crossing over Dee Street.

Figure 2.2 Esk Street Dee Street intersection

2.3 Kelvin Street / Don Street

The Kelvin Street / Don Street intersection is a signalised crossroads with Don Street forming a one way exit to the west but two-way approach on the east. The daily volume on Kelvin Street is approximately 6,150 vehicles south of Don Street.

Figure 2.3 Kelvin Street Don Street existing intersection

The signals currently operate a simple two-phase operation and pedestrians walk with traffic having pedestrian protection via late starts of the traffic signal groups.

2.4 Kelvin Street / Esk Street

The Kelvin Street / Esk Street intersection a signalised crossroads. While the western approach is two way it mostly operates as an eastbound one way entry as driving westbound on this approach is restricted to access only to the service lane behind the building on the SE corner. The existing layout is shown in **Figure 2.4**.

Figure 2.4 Kelvin Street Esk Street existing intersection

The signals currently operate a three-phase operation with the Kelvin Street approaches operating in one phase and the Esk Street approaches operating in separate phases. Pedestrians walk with traffic having pedestrian protection via late starts of the traffic signal groups.

3. Proposed intersections

3.1 Dee Street / Don Street

The proposed design of the intersection includes a shared left and right turn lane to minimise the pedestrian crossing distance, maximise the public space and discourage through traffic as intended in the master plan. This has been assessed and discussed below.

As Don Street is being converted to two-way the flows will change. There is no estimation of the likely traffic using Don Street in the Stantec Transport Networks report. However, the report states that "*In practice, changes to Esk Street cannot be considered in isolation and in particular, need to consider changes to Don Street. Conversion of Don Street to allow for two-way vehicle movement, as proposed in the Pocock report, would also create an opportunity to reduce general traffic movements on Esk Street but is likely to increase traffic volumes on Don Street.*" The report also acknowledges that the "*Conversion of Don Street to a two-way road is likely to increase traffic volumes if no action is taken to discourage its use for through movement*."

Esk Street currently carries 1,700 vehicles per day (sourced from SCATs data) and has 48 on-street car park spaces. It is likely that much of the current traffic on Esk Street is searching for parking spaces. The conversion to a shared space street and reduction of on-street car parking will reduce traffic volumes significantly. Much of this traffic is likely to relocate to Tee Street to access the ICL car park building. Some traffic are also likely to use Don Street given that there will be east bound flow. It is expected that the traffic volume on Esk Street will reduce to around 1,000 vehicles per day comprising loading, some car parking and access to driveways.

The east bound traffic that would have previously used Esk Street and Kelvin Street to access the driveways off Don Street and the on-street parking, is most likely to less than 1,000 per day.

The following points were considered in estimating the likely west bound traffic to enable modelling of the Dee Street intersection to be undertaken:

- There will be some traffic needing to access the driveways off Don Street, this is not considered through traffic.
- The reduction in on-street car park spaces will help to decrease traffic volumes on Don Street.
- The low speed design will also support the reduction of through traffic.

The west bound traffic is estimated to the range of 1,000 to 1,500 per day. Using the upper value of 1,500 vpd this equates to 150 vehicles existing Don Street in the evening peak. If the same 50/50 spilt of left and right turners are assumed, then there are approximately 75 vehicles turning left.

Opening up eastbound flow on Don Street also enables the right turn from Dee Street south to be included in the intersection operation. Some vehicles may wish to perform a U-turn (giving it is a conversion from the current U-turn facility) from this right turn lane and the recommendation is to monitor this behaviour post construction to ensure there are no safety implications.

Modelling

Data has been received from the SCATS signal system to determine the existing traffic flows by lane at the nearby intersections including the Dee St / Don Street intersection. This data also shows the average traffic signal phasing over the peak periods of the day. In peak periods the Dee Street corridor appears to operate with a 80 second cycle time.

A transport model was set up for the intersection in Sidra based on the current traffic volumes at the Dee St / Don Street intersection with some estimates for the left and right turns from Dee Street and likely signal phasing to suit the proposed layout described above. This includes a single lane on Don Street, a shared left through lane on Dee Street north and phasing has an additional phase for a green right turn phase for the northbound right turn. The layout of the intersection from Sidra and the initial phasing is shown in **Figure 3.1**.

Figure 3.1 Dee St / Don St Traffic Signal layout and phasing

To enable the pedestrian crossing over Dee Street to operate safely there will need to be red arrow protection to hold back the left turn out of Don Street during Phase C. The length of the crossing (approximately 23.5m) means the red arrow will display for 15 seconds after which the left turn will be able to proceed.

The current volumes Don Street left and right turns into Dee Street were modelled in SIDRA and if there is a shared lane a queue of 10 vehicle results on Don Street. The cycle time required is around 90 to 100 seconds to achieve a satisfactory operation which is understandable given an additional phase has been included.

As described in the previous section one of the intents of the masterplan scheme is to reduce through traffic and the queuing from the existing traffic demand scenario modelled would induce this effect. As the likely traffic flow on Don Street westbound will be reduced the above the modelling with the estimated volumes with the changes to Esk and Don Streets, with a shared lane reduces the queue to six vehicles. The cycle time required is around 90 seconds.

An option for the signals is not have the additional phase for the right turn into Don Street and instead have this as a filter turn. A green arrow phase could encourage traffic to undertake this movement as a through trip which would be undesirable. If the right turning phase was removed the Don Street queue would reduce to 5 vehicles in the single shared lane and the cycle time would also reduce to the current Dee Street operational time of 80 seconds. This was discussed at one of the team meetings with ICC and this was the preferred option.

3.2 Dee Street / Esk Street

Originally this intersection was intended to retain the existing operation but include the proposed shared space elements of Esk Street. Following team discussions, it was agreed that signalising the crossing of Esk Street, given it is a shared space street did not support the pedestrian environment appropriately. A review how the Auckland shared space street intersections functioned was undertaken. An intersection was found at Wellesley St / Federal St which is very similar to the Dee/Esk proposal in that it has a shared space one way link leaving the intersection (Federal St). When the intersection was upgraded to include the pedestrian crossing over Wellesley Street and shared space on Federal Street there was no crosswalk provided across the shared space instead relying on vehicles and pedestrians to mix in the slow speed environment. There is a bus lane that vehicles can wait in when turning left into the street while yielding to pedestrians and a right turn from the other approach. This bus lane serves the same function as the left turn lane from Dee Street.

Figure 3.2 Example Auckland intersection with shared space link and no signalised crosswalk (Source: Google Street view)

This has influenced the proposed design for the Dee Street / Esk Street intersection with no signalised crosswalk proposed of Esk Street. Removing the signalled crosswalk also means the left turn arrow signal aspects will be removed from the signal operation which helps to shift the priority to pedestrians in the shared space as an arrow would imply absolute priority to vehicles. There is also an example of this arrangement in Christchurch at the Durham Street/Cambridge Street intersection where drivers turn into a shared space street.

Although legally drivers have priority at the intersection the nature of the design will make this function more as an accessway. Proposed law changes (Accessible Streets Package) are proposed to give pedestrians priority at side roads.

While modelling has been done of this intersection it is not reported as the main Dee Street through movements and signalled pedestrian crossing over Dee Street is not proposed to change in form or operation.

3.3 Kelvin Street / Esk Street

The proposed form of this intersection with the Masterplan kerb line work is shown in **Figure 3.3**. On the north approach the current two lanes are combined into one which also occurs on the east approach.

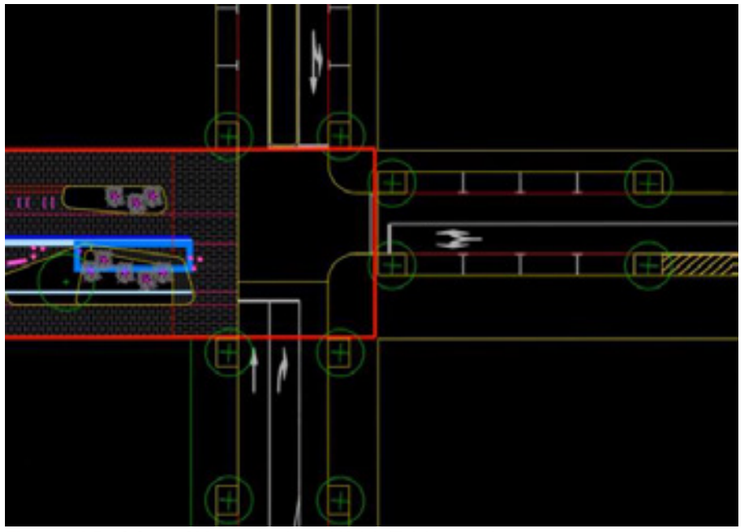

Figure 3.3 Draft form of Masterplan based Kelvin/Esk intersection

In the Stage 1 works the two-lane approaches on the north and east will be retained and the draft layout is as shown in **Figure 3.4,** including a potential Barnes Dance. A key change from the existing is the single lane approach from Esk Street west which will now only cater for eastbound flow from the shared space.

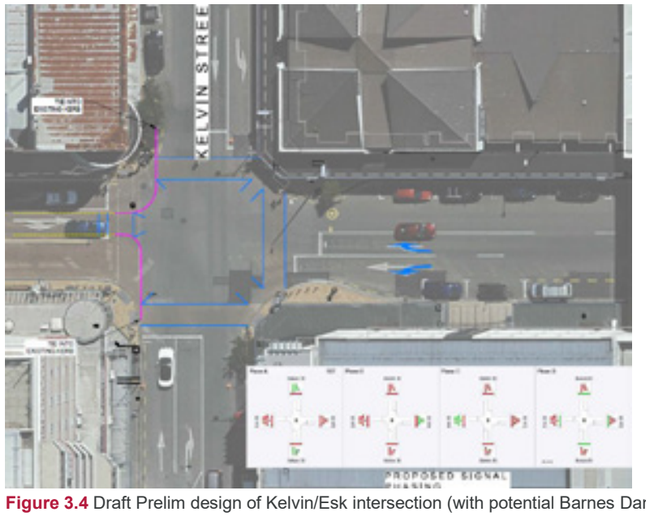

Figure 3.4 Draft Prelim design of Kelvin/Esk intersection (with potential Barnes Dance)

The operation of the signals with a Barnes Dance phase for the signals has been investigated. This is indicated by the short diagonal crosswalk lines which is not symmetrical due to the narrow eastbound only lane on the west approach. The practicalities of providing the Barnes Dance phase will be addressed in the following detailed design stage including

how to incorporate the shared space into the signalled environment. The Stage 2 design is likely to be more symmetrical so it may lend itself to being more suitable for a Barnes Dance phase. Regardless of this the modelling of the intersection has been checked with and without the Barnes Dance phase so that either option can be viable..

Modelling

The SCATS data that was received indicates that the Kelvin Street / Esk Street intersection operates with an approximate cycle time of 60 seconds presently. The Esk Street approaches are not called in every cycle as they are demand dependent and some of the phase calls could be due to pedestrian demands.

For modelling purposes the existing traffic volumes in the SCATS detection counts have been used. Some adjustments are made to the movements out of the Shared space on Esk street in response to the reduced parking supply on Esk Street and the likely reduction in traffic in general. The volumes out of Esk have been reduced to 33% of existing demands equating to 55veh/hr down from 163 veh/hr currently (in the PM peak).

With the Barnes Dance an extra phase is required of approximately 23 seconds in length bringing the total phases to four. The optimal cycle time with the Barnes Dance is 60sec in line with existing. The overall intersection Delay is 27.2 seconds at Level of Service (LOS) C and queue lengths are greatest on the Kelvin Street through movements at 5veh to the south and 4veh to the north.

Without the Barnes Dance at 60sec cycle time and the existing three phases the overall intersection Delay is 20.2 seconds at LOS C and queue lengths are still greatest on the Kelvin Street through movements at 4veh to the south and 3veh to the north.

If the two Esk Street phases are combined into one with the Barnes Dance the total number of phases could be kept at three. The optimal cycle time with the Barnes Dance is 60sec in line with existing. The overall intersection Delay is 20.0 seconds at Level of Service (LOS) C and queue lengths are greatest on the Kelvin Street through movements at 4veh to the south and 3veh to the north so comparable to the three phase without Barnes Dance.

Without the Barnes Dance at 60sec cycle time and two-phase operation the overall intersection Delay is 13.6 seconds at LOS B and queue lengths are still greatest on the Kelvin Street through movements at 3veh to the south and 2veh to the north.

When the masterplan is fully realised in Stage 2 on Kelvin Street the effect of combining the lanes on the north and east approaches simple combines the queue lengths of these lanes from Stage 1 with no other adverse effects noted. The worst-case performance would be the three-phase operation plus a Barnes Dance phase where the overall intersection Delay is 28.3 seconds at LOS C. The queue lengths for the Kelvin Street through movements at 5veh to the south and 6veh to the north and a 3veh queue on Esk St East.

At the optimal 60 second cycle time the average delay to pedestrians is the same in all scenarios whether there a Barnes Dance or not or if the Esk Street phases are combined.

It is understood that the Esk Street approaches were put in separate phases recently to manage the queuing on the two approaches. With an expected decrease in traffic exiting Esk Street from the Shared Space this issue will likely be less prevalent. An advantage of combining the Esk St phases is both the north and south crosswalks can be called in the one phase instead of separately as the currently do so would simplify the intersection for pedestrians if the Barnes Dance cannot be implemented for any reason.

3.4 Kelvin Street / Don Street

The proposed form of this intersection with the Masterplan kerb line is shown in **Figure 3.3**. Advice has been given that the southern kerb on the Don Street east approach is likely to be shifted north as indicated by the red line and arrows. This generally lines up with the southern kerb on the opposite approach and means the east approach may be reduced to a single lane for all turning movements as a result.

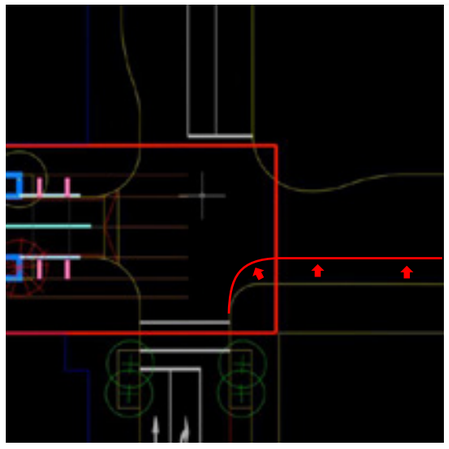

Figure 3.5 Draft form of Masterplan based Kelvin/Don intersection

In the interim the draft layout is likely to be as shown in **Figure 3.6** which has the Don Street west approach as a two-way street. The alignment of the proposed new carriageway on the west means that the kerb on the south side aligns with the middle of the two approach lanes on the east approach. As such the lane turning movement allocations will be changed to an exclusive left turn lane and a shared through and right turn lane. Like the Esk Street intersection to the south there is also the possibility of introducing a Barnes Dance phase to the operation of the Kelvin/Don intersection. Again, the practicalities of this will be sorted out in the Detailed Design stage which could involve delaying the Barnes Dance implementation until Stage 2 when the Kelvin Street masterplan works are established.

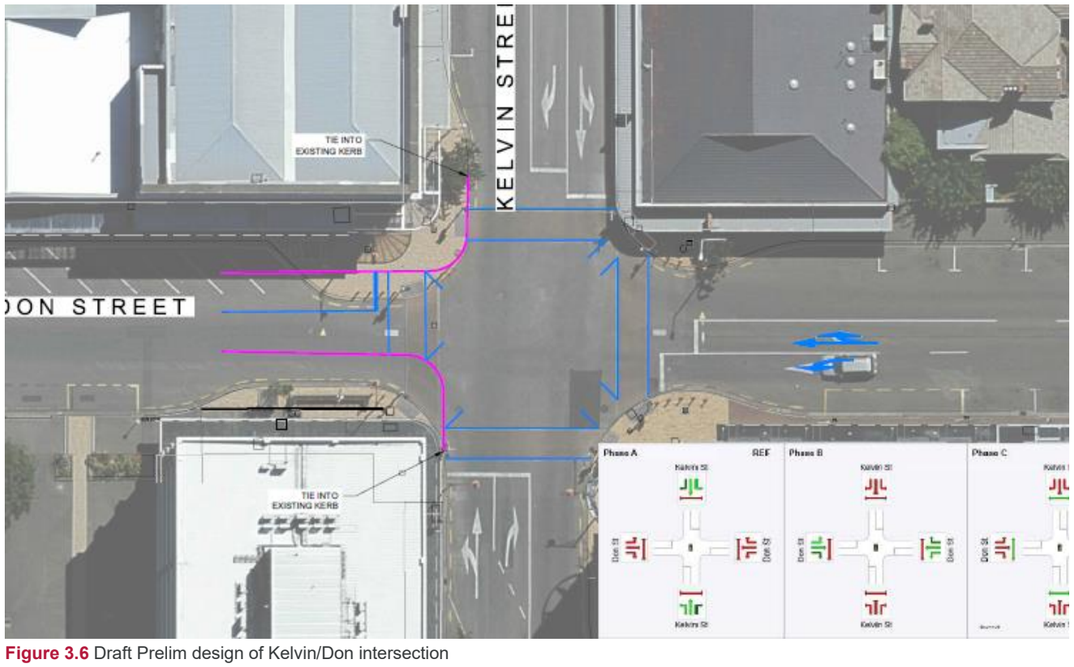

Figure 3.6 Draft Prelim design of Kelvin/Don intersection

Modelling

The SCATS data that was received indicates that the Kelvin Street / Don Street intersection operates with an approximate cycle time of 42 seconds presently. The Don Street phase is called regularly throughout the peak hours of the day.

For modelling purposes, the existing traffic volumes in the SCATS detection counts have been used. Some adjustments are made to the movements in and out of the Don Street west approach to reflect the reduced parking supply on Don Street and the likely reduction in traffic in general as described previously. The volumes into Don Street west were halved which give a volume of 122veh/h in the evening peak which is generally in line with the expected peak demands once the works have been completed. The flow exiting Don Street are in the order of 100veh per hour evenly split between the movements.

With the Barnes Dance an extra phase is required of approximately 23 seconds in length bringing the total phases to three. This boosts the optimal cycle time to 50sec which is 10 seconds lower than the cycle time of the Kelvin/Esk intersection to the south. It would be advisable to align the cycle times to allow similar phases to overlap at each intersection. For example, the main Kelvin Street phases called together and then the side road phases together and finally the Barnes Dance phases could be called at the same time. For the modelling, the Kelvin Street / Don Street intersection has been set at a 60sec cycle time for this to be enabled.

With the Barnes Dance the overall intersection Delay is 22.2 seconds at Level of Service (LOS) C and queue lengths are greatest on the Kelvin Street through movements at 5veh to the south and north. The queues on Don Street approaches are up to 3 vehicles per lane.

Without the Barnes Dance the overall intersection Delay is 15.0 seconds at LOS B and queue lengths are still greatest on the Kelvin Street through movements at 3-4veh to the south and north. The queues on Don Street approaches are 2 to 3 vehicles per lane.

In Stage 2 assuming a single lane to the east the performance is similar to Stage 1 but with a 4veh queue on Don Street east with the Barnes Dance and 3-4veh queue on Don Street east without the Barnes Dance.

At the adopted 60 second cycle time the average delay to pedestrians is the same in all scenarios whether there a Barnes Dance or not however with the Barnes Dance pedestrians will only have to wait once if wishing to cross on the diagonal reducing their overall delay by half.

4. Vehicle Tracking

Dee Street / Don Street intersection

A bus can turn left out of Don Street into the Dee Street. If a 10.3m rubbish truck needs to access Don Street from the north they will need to straddle the Dee Street lanes to then make left turn in, given this is likely to be undertaken early in the day this should be acceptable. A 10.3m rubbish truck can turn right into Don Street. An 8m truck turning left requires the limit line on Don Street to be set back another metre or so.

Dee Street / Esk Street intersection

If a 10.3m rubbish truck needs to access Esk Street from the north they will need to straddle the Dee Street lanes to then make left turn in, given this is likely to be undertaken early in the day this should be acceptable. If an 8m truck is required to turn left it will require some space within the amenity zone of the shared space so will be recorded through strategic placement of street furniture.

Kelvin Street / Esk Street intersection

Tracking of the 11.5m truck servicing the ICL development can turn right out of Esk Street, a left turn will not be feasible but is assumed that the truck will be travelling southbound to Tay Street.

Kelvin Street / Don Street intersection

The left turn into Don Street from Kelvin Street will not be feasible for trucks as this will require a kerb alignment that will be inappropriate for the pedestrian focused environment. This will need to be communicated through signage and notification to businesses on Don Street that require truck access.

5. Recommendations

Dee Street / Don Street intersection

It is recommended that the intersection design with no left turn lane on Don Street is implemented as it supports the master plan intent and also reflects Don Street being a Civic Space street. The estimated volumes could result in some queuing in the evening peak however this is short lived and is a small inconvenience compared to how the street operates throughout the day with shorter pedestrian crossing distances and more space for people.

Dee Street / Esk Street intersection

It is recommended that the intersection design without a signalised crosswalk over Esk Street is implemented as it reflects the changing priority of movement to pedestrians as per the intent of a Shared Space.

Kelvin Street / Esk Street intersection

It is recommended that if the Barnes Dance is introduced the Esk Street phases are combined to maintain the total number of phases at three and reduce the lost time at the intersection overall. In the absence of a Barnes Dance phase we recommend that the Esk Street phases are combined with the expectation that Esk Street west traffic volumes will reduce considerably and the intersection operation can be simplified and be more efficient for pedestrians.

Kelvin Street / Don Street intersection

It is recommended that, if practical in Stage 1, the Barnes Dance is introduced to the operation of the Kelvin Street / Don Street intersection.

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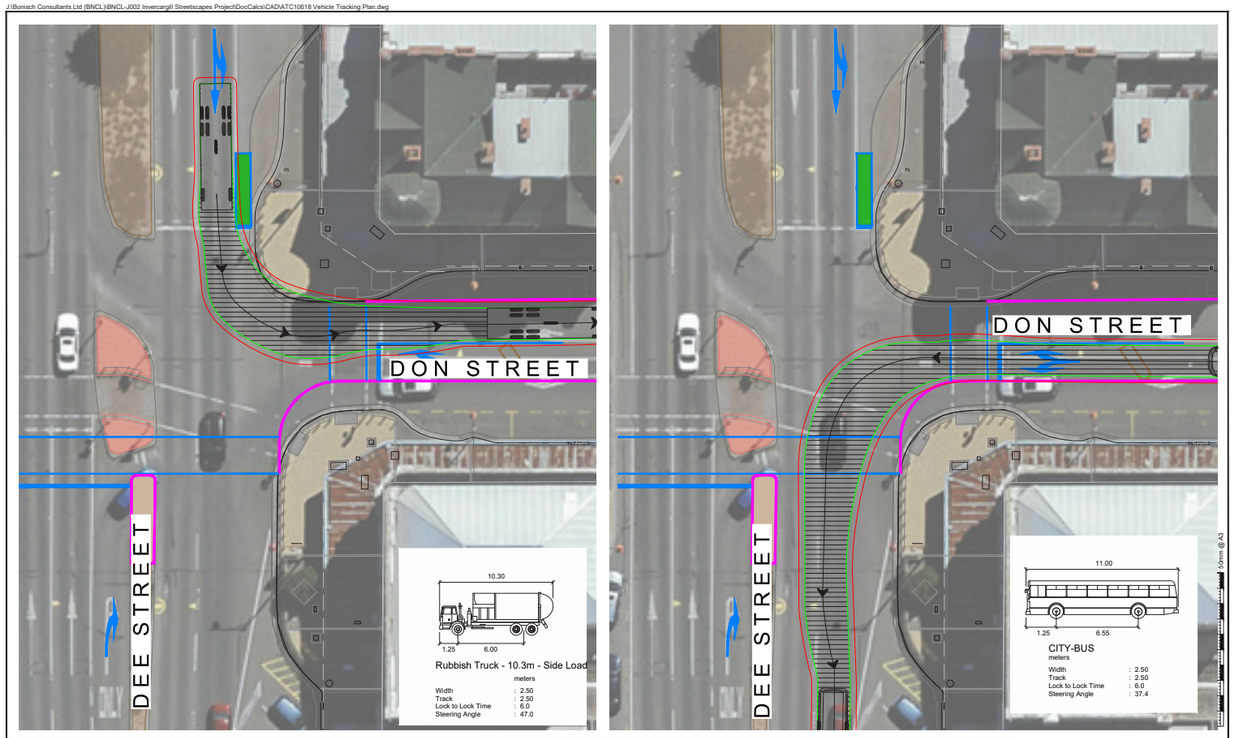

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Vehicle Tracking Plans

Dee Street and Don Street

Project No.	DMS
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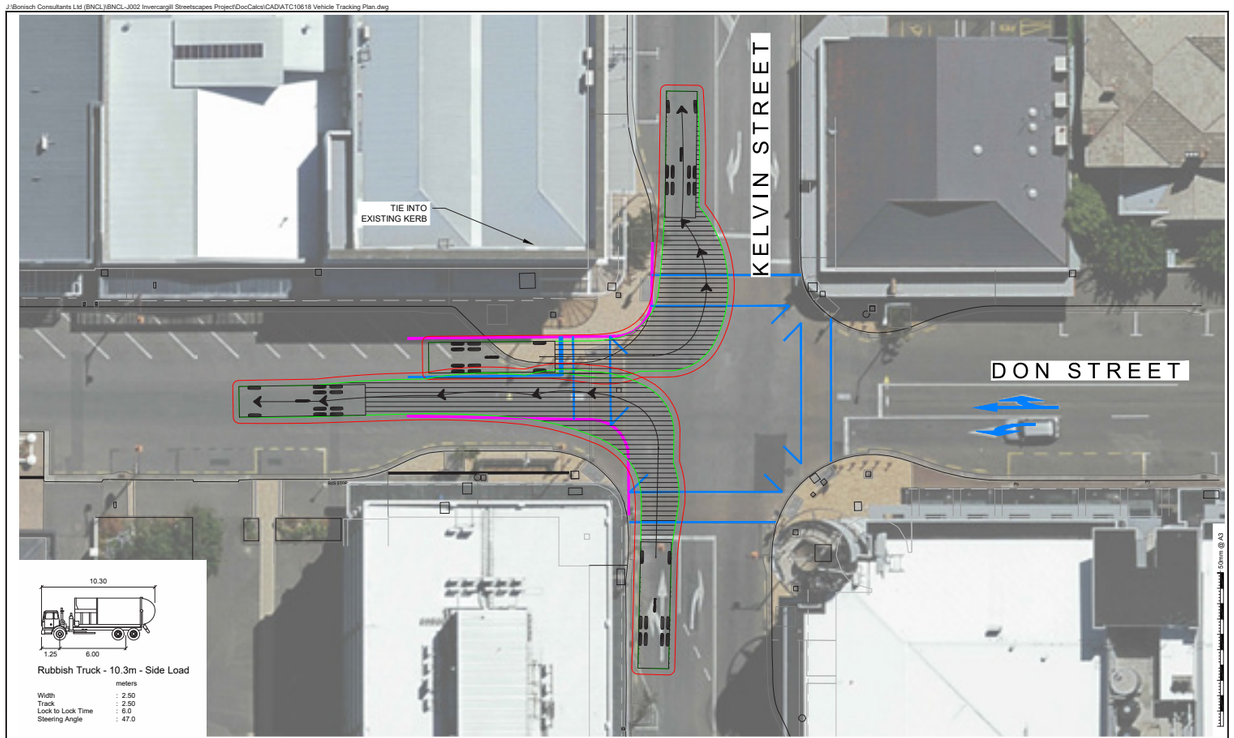

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Vehicle Tracking Plans

Kelvin Street and Don Street

Project No.	DMS
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Sheet	2 of 4
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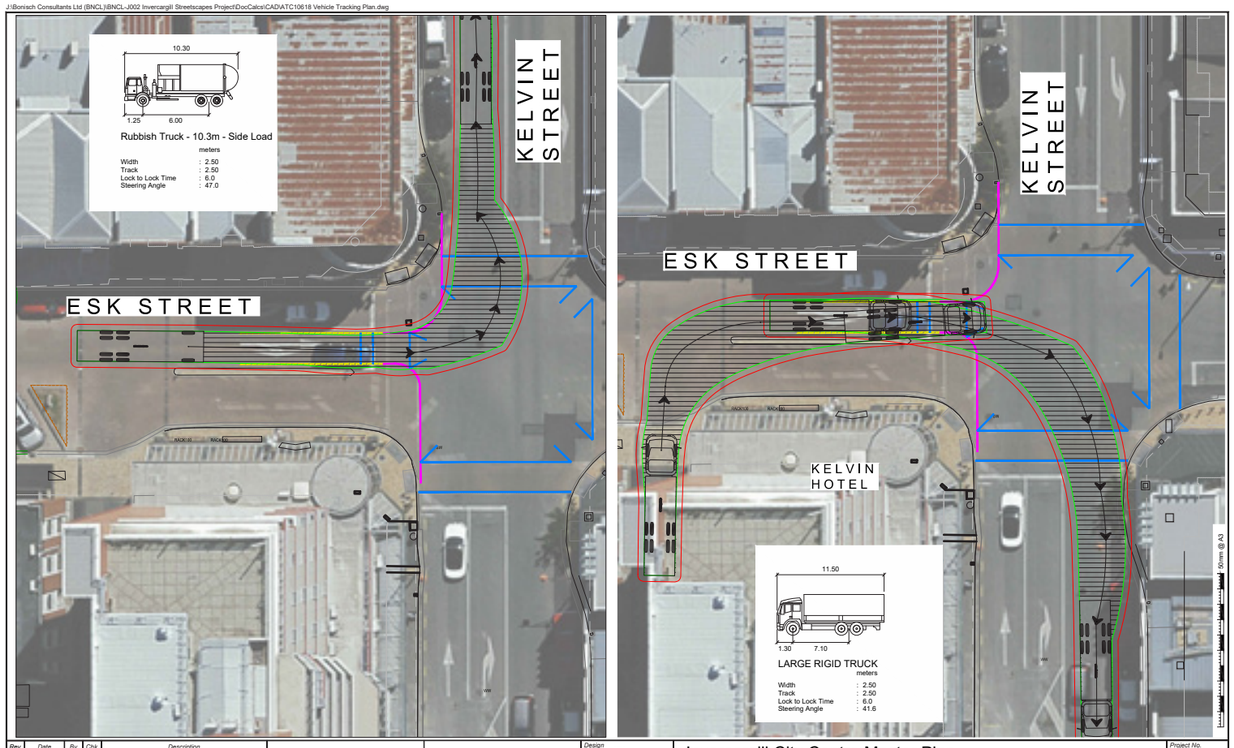

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Vehicle Tracking Plan

Kelvin Street and Esk Street

Project No.	DMS
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Sheet	3 of 4
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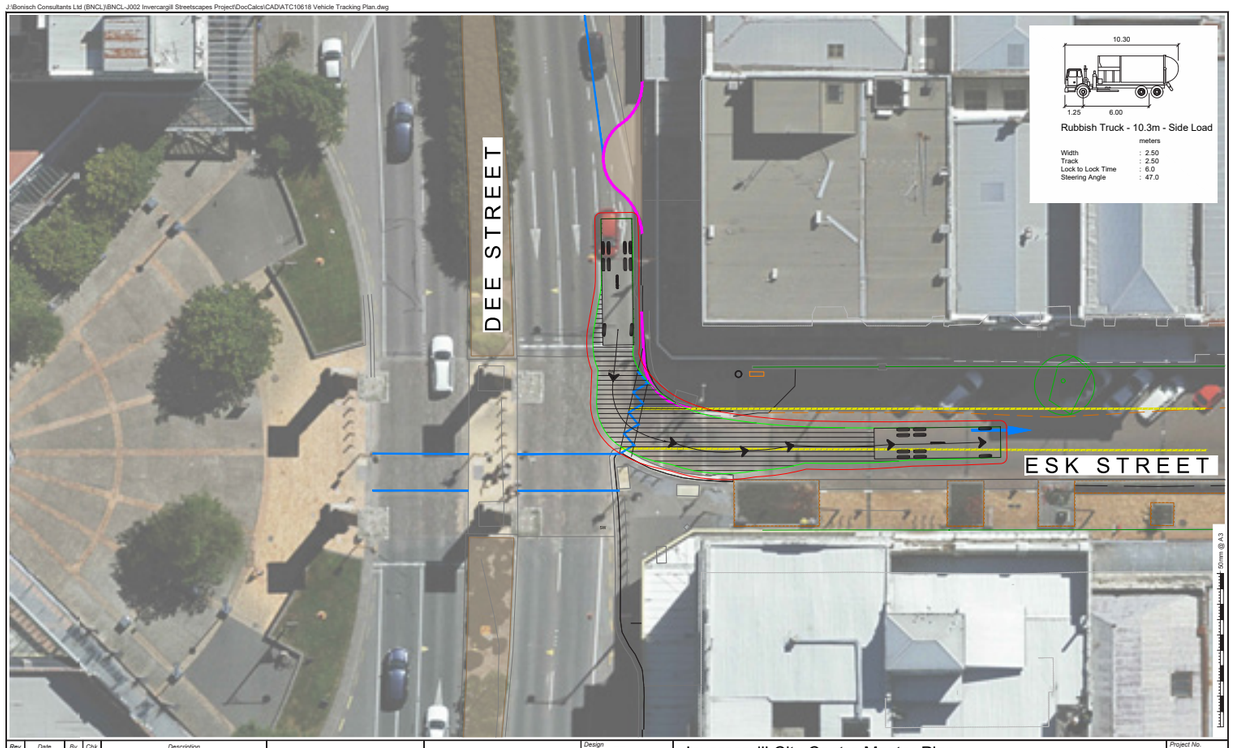

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Vehicle Tracking Plans

Dee Street and Esk Street

Project No.	DMS
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