An Urban Challenge: Calgary's Elevated Green Line

June 2025

Design led solutions to complex concerns

RSI ALLIANCE

METAFOR

Context

Reactions to the decision to elevate the downtown section of the Calgary Green Line LRT have been a mix of support and reservations. While the need for the Green Line and the importance of public transit have been acknowledged, concerns are being raised about the potential negative impacts of an elevated guideway on downtown businesses, accessibility, and the overall urban environment.

To address the concerns in a way that promotes a vibrant city centre, RSI Alliance and Metafor Studio have come together to consider the elevated guideway and put forward opportunities.

Considerations

- **Noise & Vibration** - An elevated guideway could generate long-term impacts at nuisance levels for residents and businesses
- **Pedestrian Safety** - Shadowing below the structure could result in increased crime and reduced public safety
- **Accessibility** - Piers blocking local businesses could reduce footfall and impact the local economy
- **Visual Impacts** - The elevated guideway will influence the streetscape and urban fabric, potentially leading to a less appealing visual aesthetic
- **Traffic, Safety & Snow Removal** - Center-running piers could impact traffic safety and capacity, and hinder snow removal efforts
- **Construction Impacts** - Works above ground will impact traffic and business access, as well as create noise, dust, and vibrations

Opportunities

- **Elevated Guideway Deck Design** - Implement two separate decks, providing an efficient structural form which is shaped to improve natural light
- **Pier Design and Placement** - Develop a pier design to significantly reduce visual impact and arrange them to limit impacts to local businesses
- **Modern Methods of Construction** – Implement modularized, off-site construction to significantly reduce traffic disruption, as well as noise, dust and vibration impacts to local businesses and residents
- **Simulated Day Lighting** - Provide a lighting arrangement under the elevated guideway which is designed to replicate daylight levels and explore options for sustainable energy integration
- **Integrating Stations with Surroundings** - Integrate the station with the surroundings to create opportunities to renew the urban space and provide more attractive spaces

2nd ST SW - Looking South

Setting the Stage - Tunnel vs Elevated Guideway

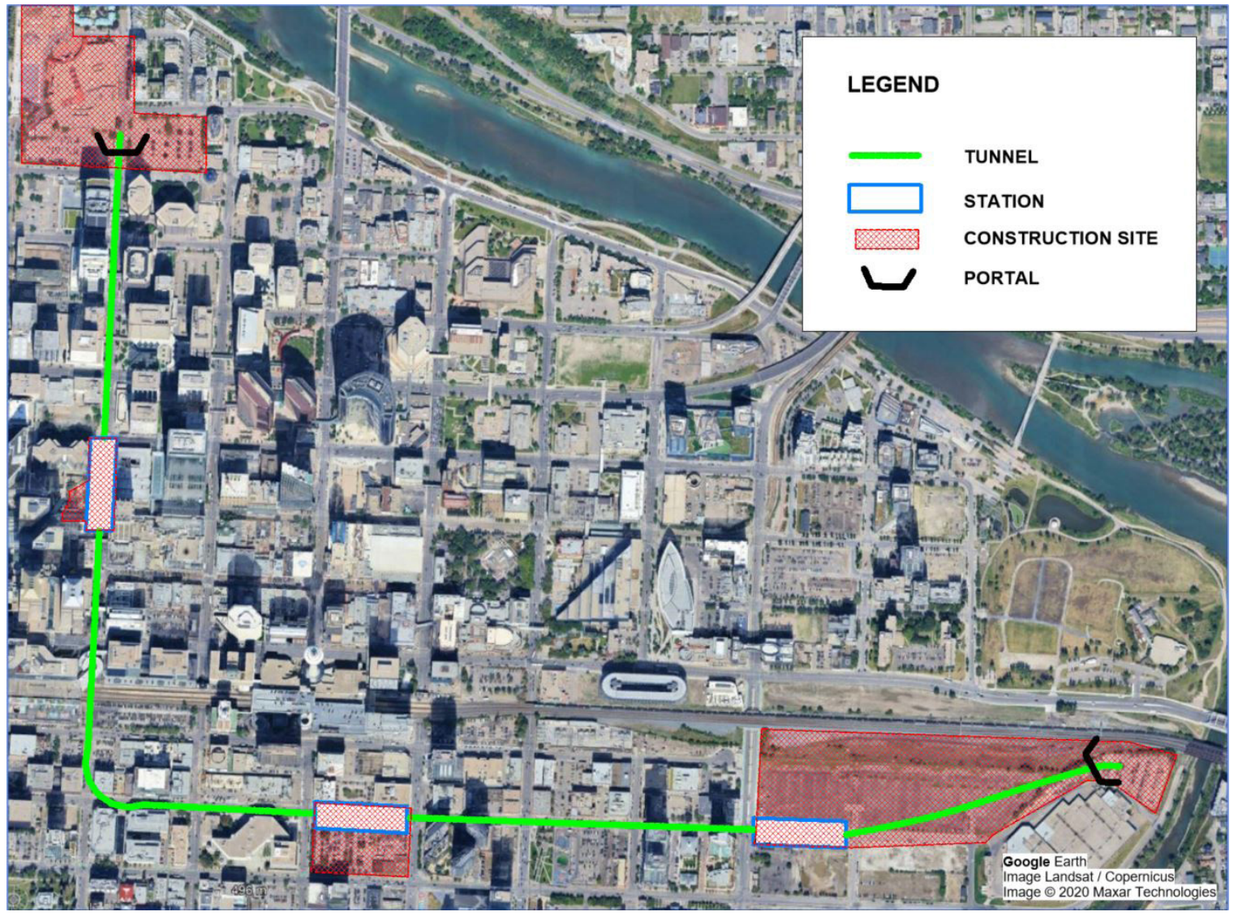
While the focus of our effort is on addressing concerns associated with an elevated guideway and identifying opportunities to make improvements, it is worthwhile to recall that a tunnel is not without impact. While the tunnel solution offers compelling long-term benefits, particularly in terms of aesthetics and integration with the surrounding environment, it also presents several challenges on top of cost.

At high-level, the impacts can be categorised as follows:

Category	Tunnel	Elevated Guideway
Construction Duration	Longer	Shorter (2-3 years)
Material Handing inbound/outbound	High	Moderate
Traffic & Community Impacts	Moderate (localized)	High (surface work)
Construction: Noise/ Dust/Vibration	Moderate	Moderate
Operation: Noise/Dust/ Vibration	Low	Moderate
Weather vulnerability during construction	Low	High
Utility Relocations	Moderate (Stations)	High (Stations and Piers)

In addition, the tunnel creates an on-going systems maintenance and public safety liability – there are no other transit tunnels of this length or below grade stations in Alberta. It will require skills and equipment not currently in place for both maintenance and rescue operations.

There is also a potential for ground movement during (and after) construction which cannot be directly compared to an elevated guideway.

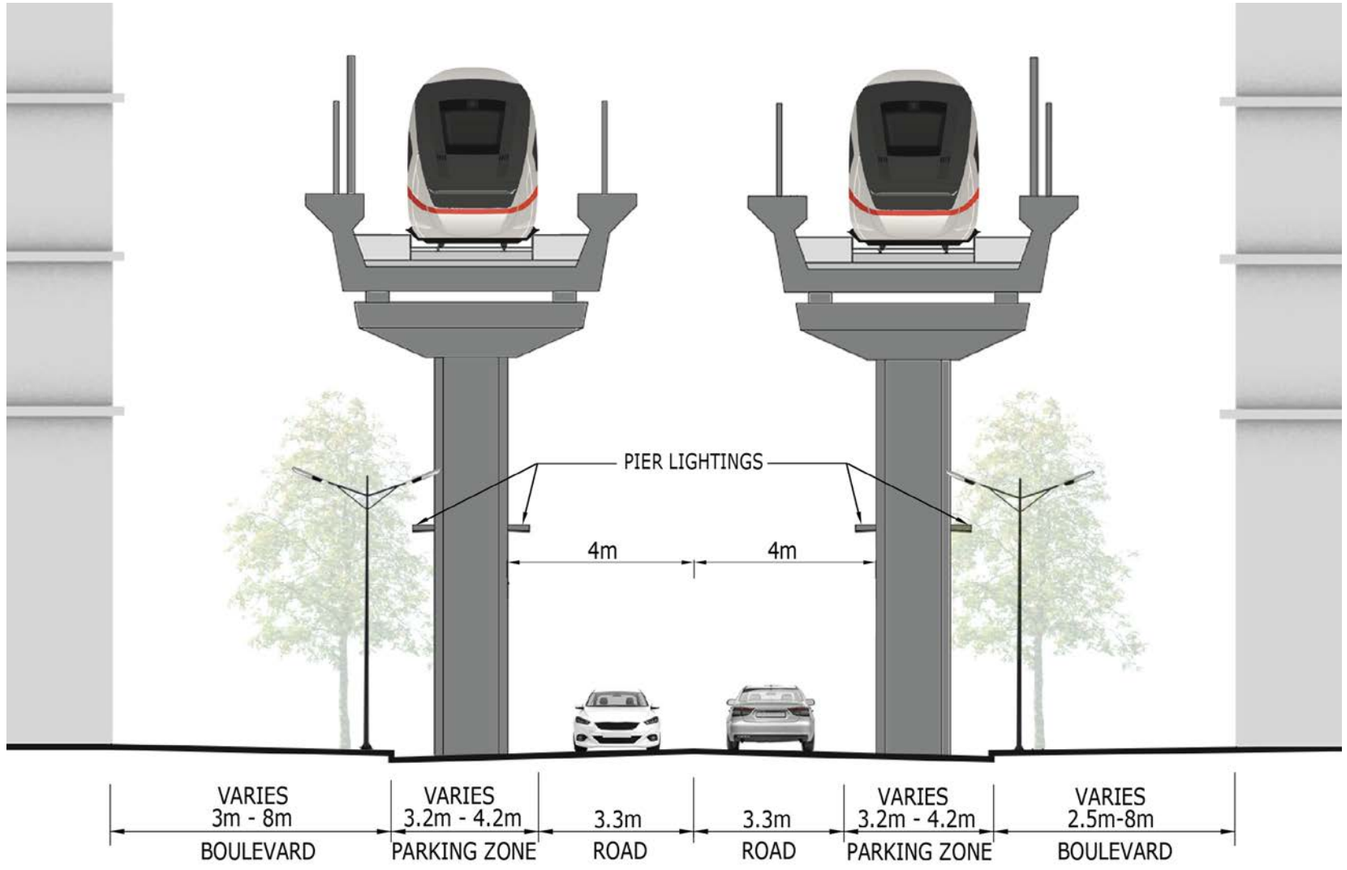


Elevated Guideway Deck

Two separate elevated guideway decks for the two tracks, could each be supported by an architecturally interesting pier, rather than a single, central-running pier. Without the need for straddle bents, this will provide an efficient structural form which is shaped to improve natural lighting and promote security. This deck configuration can accommodate spans ranging from 25 to 35 meters, providing flexibility in placing the piers – potentially reducing the impact on business access.

Benefits

- Reduces the deck profile and width to improve natural light and sight lines
- Decreases weight compared to a central pier, allowing longer spans
- Allows flexible and efficient pier placement, enabling better integration around existing buildings and minimizing disruption to existing businesses
- Decks can be installed at high-level, using lifting gantries to minimize construction impacts
- Reduces the risk of vehicle collisions to a central pier
- Accommodates snow removal and storage to the sides
- Incorporates bearings to isolate structural vibrations transmitted through structures and air



Further opportunities to explore

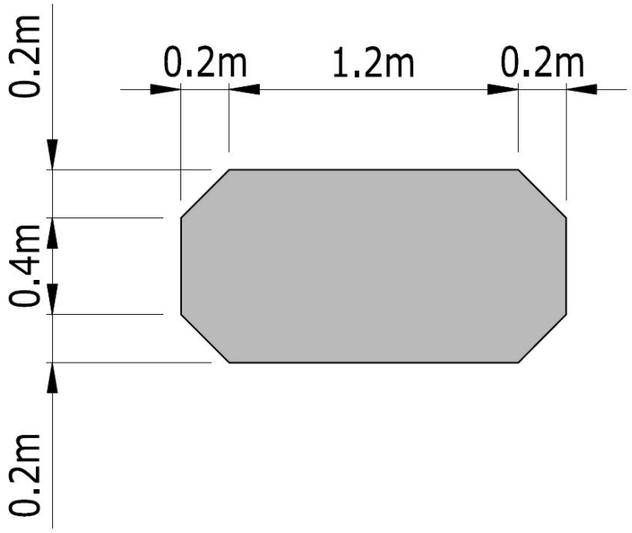
Ballasted Track - While not currently used in Alberta, implementation in Scandinavia has shown a reduction in noise and vibration when compared to slab track and reduces the need for bearings and number of expansion joints to provide a positive influence on maintenance costs

Noise Barriers - Explore options for creating a solid color barrier, provide a platform for linear public art or a glass barrier to optimize light transmission

Elevated Guideway Deck - Public art underneath the elevated guideway may enhance aesthetics and create a distinct identity of place

Elevated Guideway Pier

Orient slender, rectangular piers transversely to the traffic direction. This ensures an efficient structural arrangement while also minimizing the visual blockage between street and businesses.

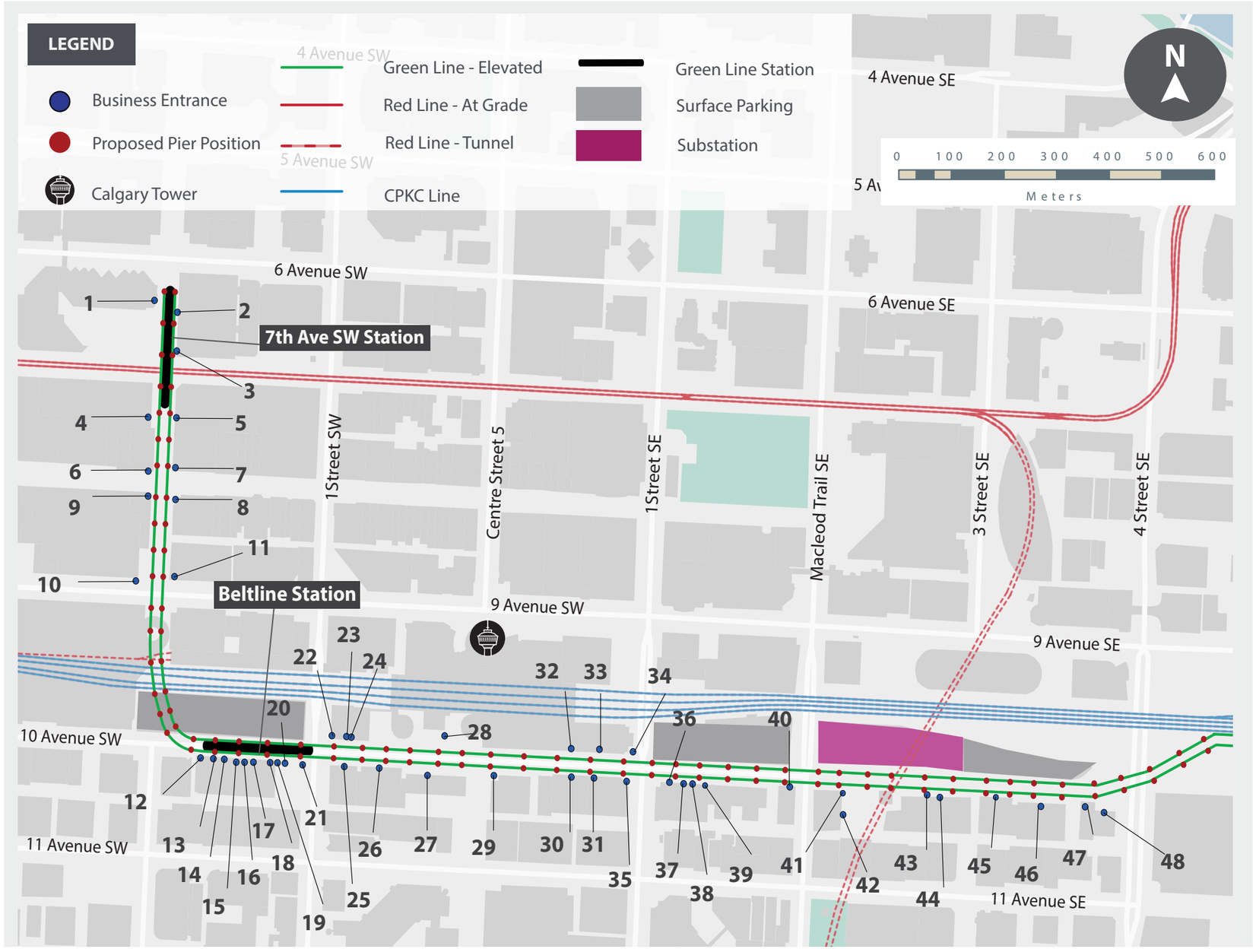


Benefits

- Increased offset from existing buildings to the piers
- Straddle bents avoided - the column layout allows pier location to better respond to site constraints
- A more efficient structure will improve natural light and reduce impacts for installation of pier foundations
- Ensures reduced impact to parking zones and sidewalks, and provides opportunity to enhance the public space adjacent to local businesses

Pier Placement – Minimizing Impact During and After Construction

The longer spans between elevated guideway piers and the transverse orientation both serve to reduce impacts to businesses along the route. Having flexibility in the placement of the piers allows for some adjustment to the pattern to respond to location of entrances. No door will have an elevated guideway pier immediately in front, blocking sight to the business.



The location and orientation of the piers, away from business entrances, will substantially reduce impact and disruption to local businesses during and after construction.

ID	Business Name	Business Type
1	National Bank	Office Space
2	Parking Garage	Parking Garage
3	Bow Parkade	Parking Garage
4	Simons	Department Store
5	Stephen Avenue Place	Office Space
6	Simons	Department Store
7	Barbarella	Restaurant
8	National Bank	Bank
9	CIBC Banking Centre	Bank
10	Office Space	Office Space
11	Office Space	Office Space
12	Rochebobois	Department Store
13	Luxuries of Europe	Department Store
14	Spanky's Saloon	Restaurant
15	The Ginger Group Salon	Hair Care - Personal Care
16	MacCoshamPlace	Residential Apts
17	Greta	Restaurant
18	Salt & Brick	Restaurant
19	Residential Apartments	Residential Apts
20	Massage Parlor	Massage Parlor
21	Fritou	Restaurant
22	Bottlescrew Bill's Pub	Restaurant
23	Mount Royal House	Restaurant
24	Parking Garage	Parking Garage
25	BR Barber Shop	Hair Care - Personal Care
26	Michael's Restaurant	Restaurant
27	S.K Market	Hair Care - Personal Care
28	Parking Garage	Parking Garage
29	Wellness Centre	Health & Wellness
30	Alberta Boot Co.	Clothing
31	Parking Garage	Parking Garage
32	Calgary Tower Parade	Parking Garage
33	Palliser South	Office Space
34	Waves Coffee House	Restaurant
35	Calgary Business Centre	Office Space
36	Upten Wines and Spirits	Liquor Store
37	Upten	Residential Apts
38	Meshi	Restaruant
39	Parking Garage	Parking Garage
40	Kerr Wood Leidal	Engineering
41	Eco Trust	Office Space
42	Belize Consul	Consulate
43	Alberta Trade Centre	Office Space
44	Sentinel Storage	General Warehouse
45	VACANT SPACE*	Office Space
46	VACANT SPACE*	Office Space
47	Acceleware	Fitness
48	Impact Boxing & Fitness	Fitness

Modern Methods of Construction

Prefabrication off-site and modular construction could significantly reduce construction time, ensuring that the project is completed faster and with fewer disruptions to the downtown area. It also improves quality through factory-controlled environments and reduces construction waste.

Elevated Guideway Deck

The elevated guideway deck could be constructed from segments and installed using a launching girder.

Benefits

- Nearly 60% reduction in construction duration with offsite construction of segments
- Enables efficient construction logistics and traffic flow while maintaining continuous construction
- Strategic construction planning will localize access, construction impacts, and storage zones around the launching girder as it moves
- Minimizes or eliminates the need for temporary structures and foundations that impact the local area or require utility diversions
- Launching girders can be adapted to meet site constraints and be supported by the permanent substructures

Elevated Guideway Piers

Incorporating precast non-structural formwork for the piers, and preassembled reinforcement cages will reduce the time on-site.

Benefits

- Maximizes off-site fabrication and significantly reduces on-site activity
- Potentially reduces construction duration by 50% compared to conventional in-situ methods, reducing time of disruption to local business and residents
- Reduced work at height, shifting construction activities to a controlled environment - improving health and safety

Launching Girder

Simulated Day Lighting

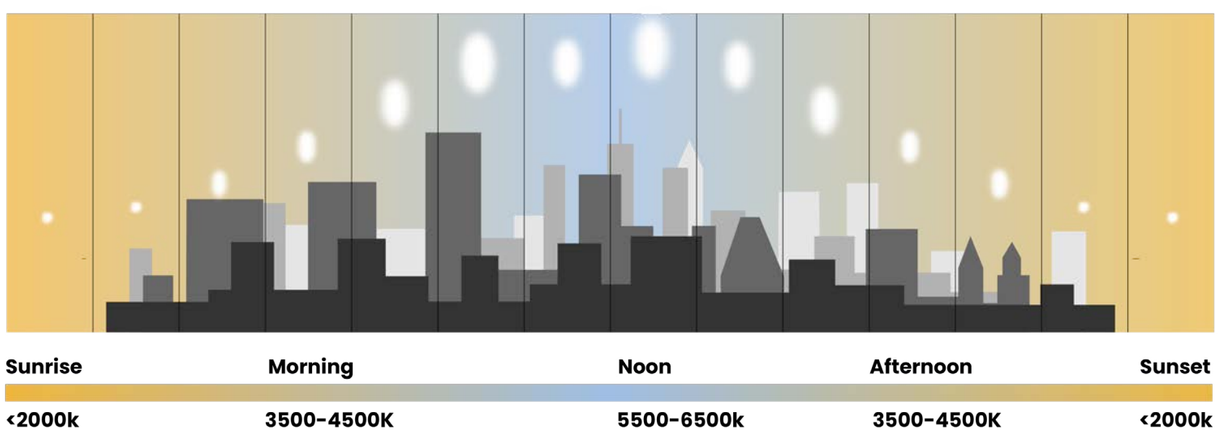
A lighting arrangement under the elevated guideway could be designed to replicate daylight levels and support options for sustainable energy integration.

Daytime and Nighttime Lighting Strategy

An innovative approach to the lighting scheme will replicate day light under the structure, thereby removing shadowing. This could be achieved by incorporating an integral control system to adjust the color temperature of the lighting to reflect the natural daylight cycle with a cooler tone during the day, gradually shifting to a warmer tone in the evening. Lighting could be automatically activated during the day when lighting levels drop below a set threshold and at night would automatically dim to recommended levels.

Benefits

- Enhanced safety and safety for all with comfortable and aesthetically pleasing atmosphere
- Improving visibility and comfort for all users by balancing the contrast between bright daylight and shadowed areas
- Supporting vibrant community life by encouraging commercial and social activities at night



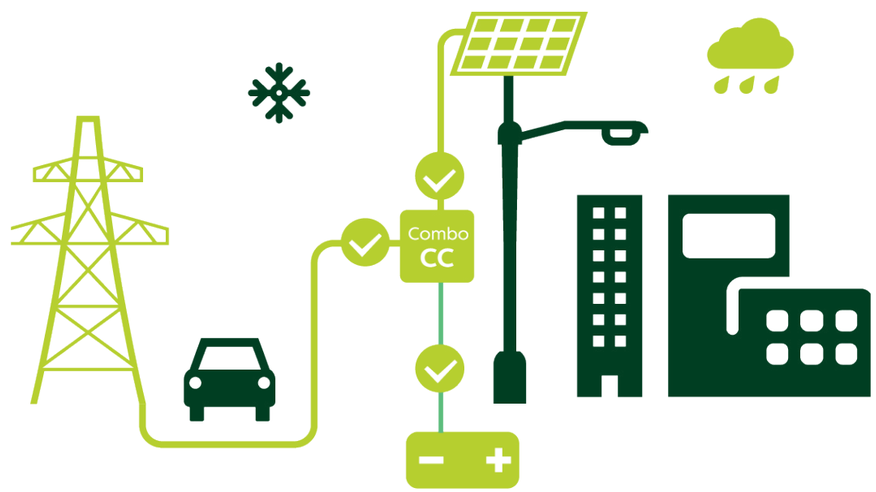
Lighting Grading throughout the day

Lighting Arrangement and Supply

LED luminaires could be used to support energy efficiency. Mounting luminaires on the elevated guideway piers and providing traditional lighting columns between the piers will ensure uniform lighting for day and night and will also reduce glare.

A hybrid solar-grid lighting system could be beneficial in the long run and will provide the following benefits:

- Reduces reliance on grid power, lowering energy costs
- Ensures continuous and reliable lighting during less sunny weather by switching seamlessly between solar and grid power
- Utilizes renewable solar energy, reducing carbon footprint to meet sustainability goals
- Initial installation costs may be high, but long-term savings could offset the expense



Hybrid Solar Grid System

Simulated Day Lighting Illustration

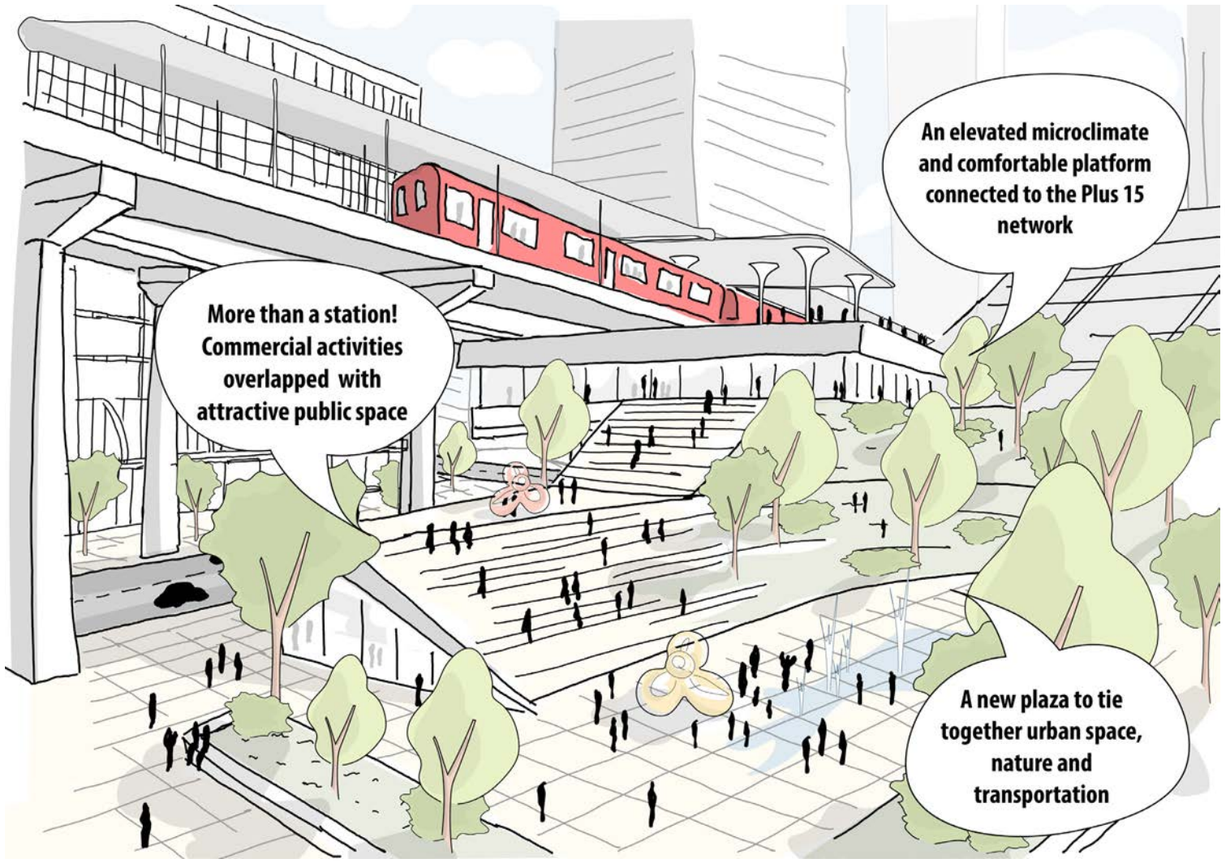
The picture below illustrates the benefits of a simulated day lighting scheme. The scheme will not only improve any shadowing from the elevated guideway, but also will improve any existing shadowing such as those from the Plus 15 network, as shown here on the 2nd Street. The simulated day lighting will minimize the shadow with a temperature reflecting natural daylight.

Elevated Viaduct with Simulated Lighting

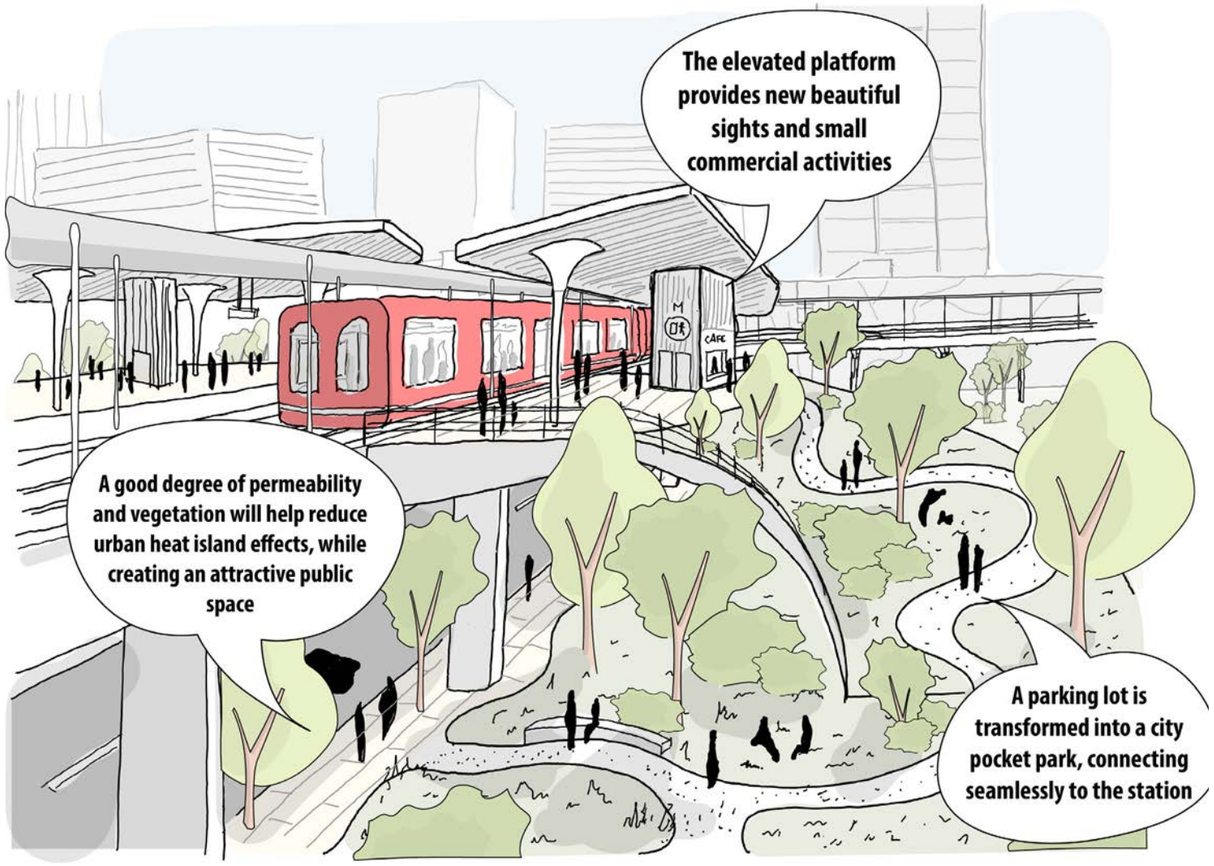
Existing Shadowing on 2nd Street

Integrating Stations with Surrounding

Integrating the new elevated light rail stations within the city fabric will create opportunities to renew the urban space and provide more attractive spaces for the city. Each station can seemingly connect to the public space below, whether it will be a plaza, a pocket park or a streetscape. Commercial activation can be introduced to further create comfortable areas of stay. With the help of vegetation and permeable surfaces, these station areas can further support the city challenges of reducing urban heat island and stormwater management, while sensitively increasing city biodiversity.



7th Avenue SW Station – Illustrated view (looking southeast)



Beltline Station – Illustrated view (looking west)

Thank You

Contact Us

Rahul Bagchi — rahul.bagchi@ramboll.co.uk
Mike Woodland — mikew@metafor.studio

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