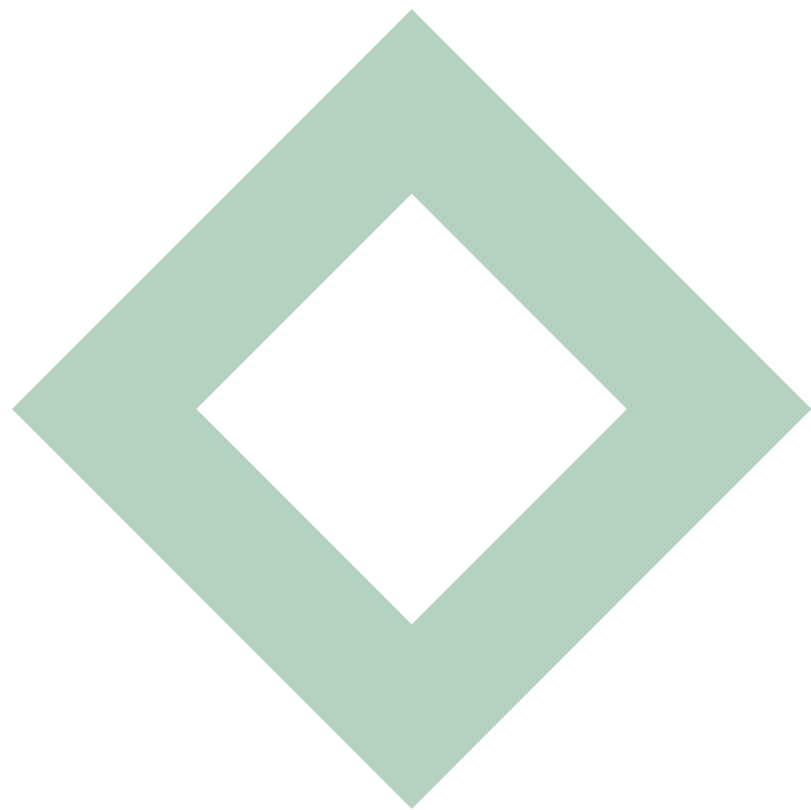


Barnsley Pedestrian Bridge. Barnsley MBC IBI Group.

LIGHTING DESIGN
BGW2-HLE-PB-XX-RP-LE-C385-0001
REVISION: 03
TECHNICAL LIGHTING DESIGN
28 NOVEMBER 2019



STAGE 4

Audit sheet.

Rev	Date	Description	Prepared	Verified
01	31/10/18	Stage 4 Issue	DLB	BP
02	16/01/19	Revised to Network Rail requirements	DLB	BP
03	28/11/19	Revised to new architecural design	DLB	BP

This Technical Lighting Design Document has been prepared for the IBI Group as stated within our appointment only and expressly for the purposes set out in an appointment and we owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

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Introduction.

This document details the lighting design for the new Barnsley Pedestrian bridge. The design incorporates lighting to the structure of the bridge to define the form, visibility and prominence in the night time scene and provides functional lighting to the pedestrian spaces including the funicular lift, steps and bridge deck.

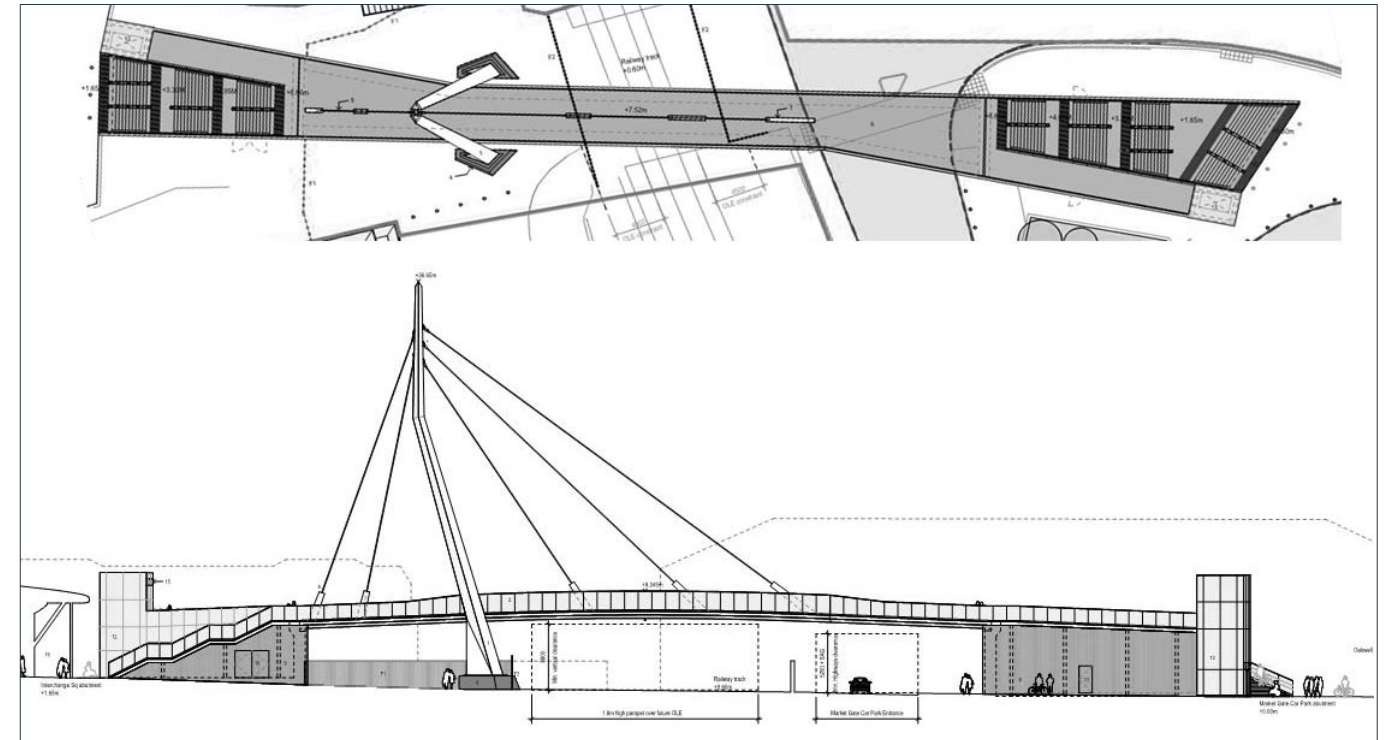
There are a number of different aspects that need to be considered with regards to lighting the bridge and these can be broken down as follows;

- Pylon
- Tensile Cables
- Undercroft
- Steps
- Lift
- Bridge Deck

All lighting is intended to be installed at accessible height for maintenance purposes and positioned to avoid interface issues with the railway lines and roads.

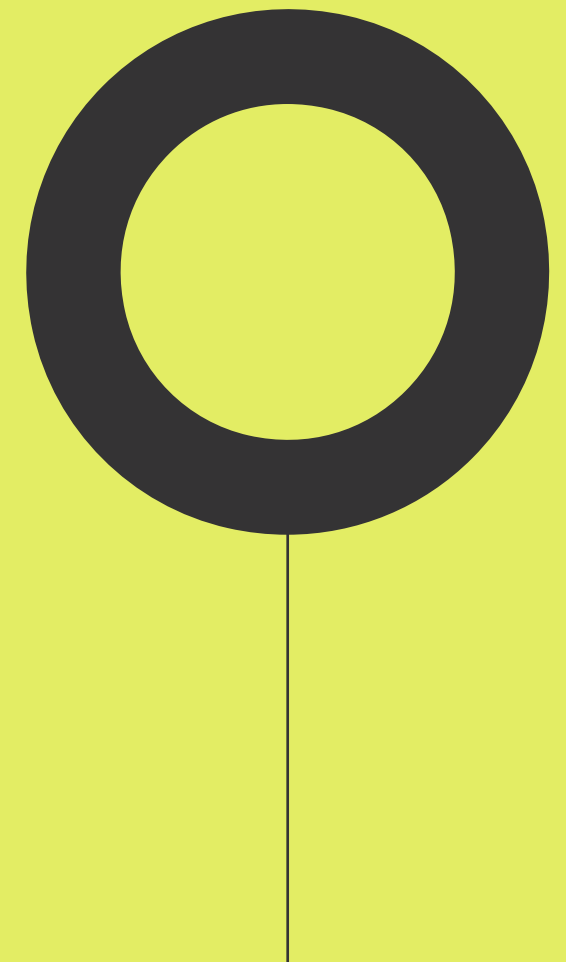
The bridge is lit entirely in white light. The white light is to have a high light quality and have a nominal colour temperature of 4000K to accentuate the palette of the bridge finishes.

All lighting is proposed to be LED.



Plan & Elevation
IBI Group

The Lighting Elements.

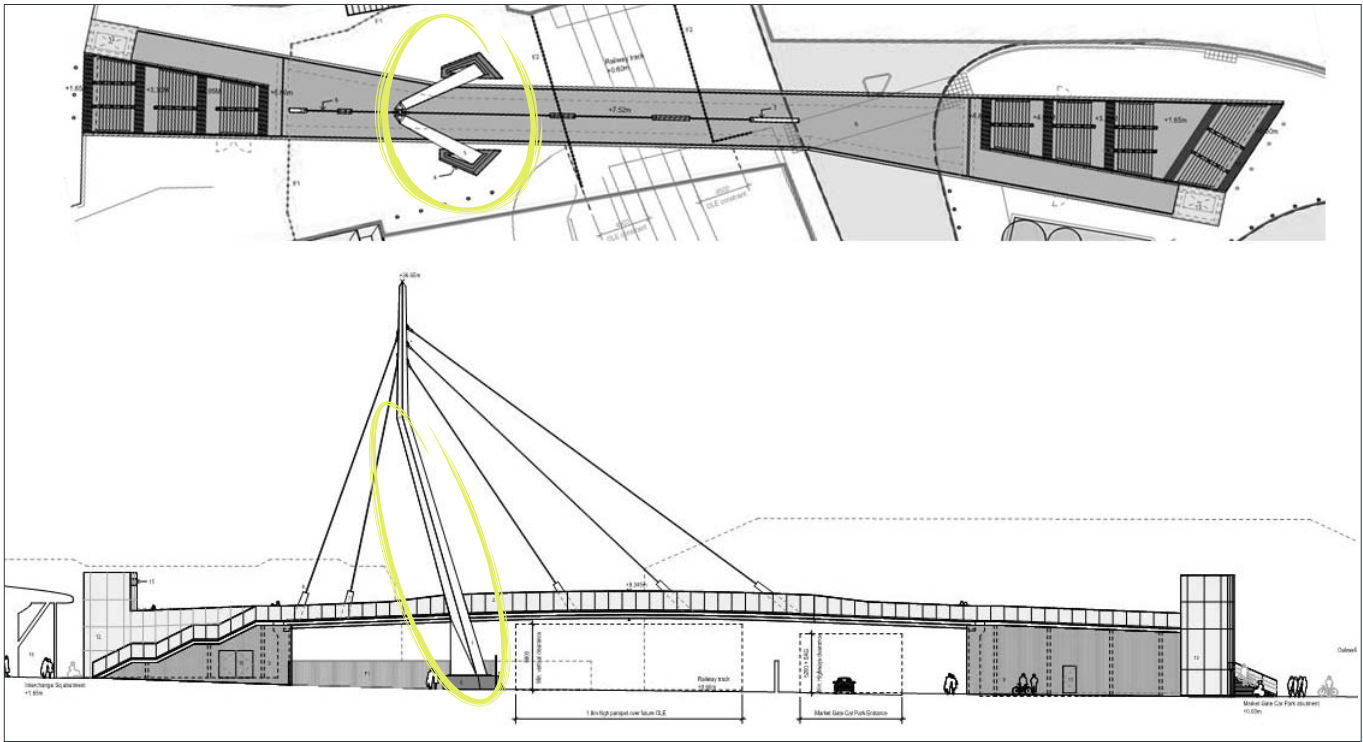


1. Pylon.

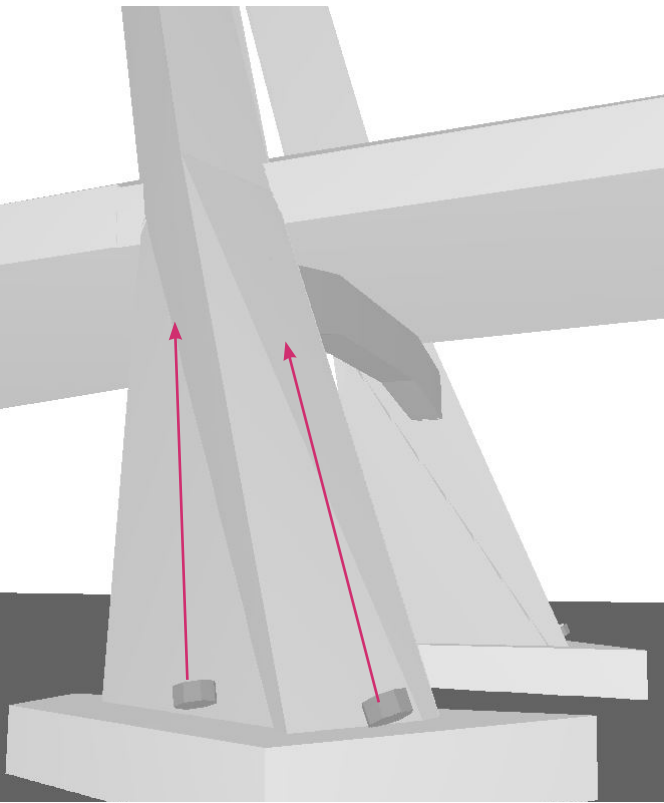
The Pylon is a key element to the appearance of the bridge and is significant in long, medium and short distance views.

Upper section.

The outer sections of the upper portion are to be lit with very narrow beam high power projectors with a 4000K colour temperature positioned on the pylon base at ground level. The narrow beam light distribution ensures the light is aimed at the facets of the pylon.



Area of lighting treatment

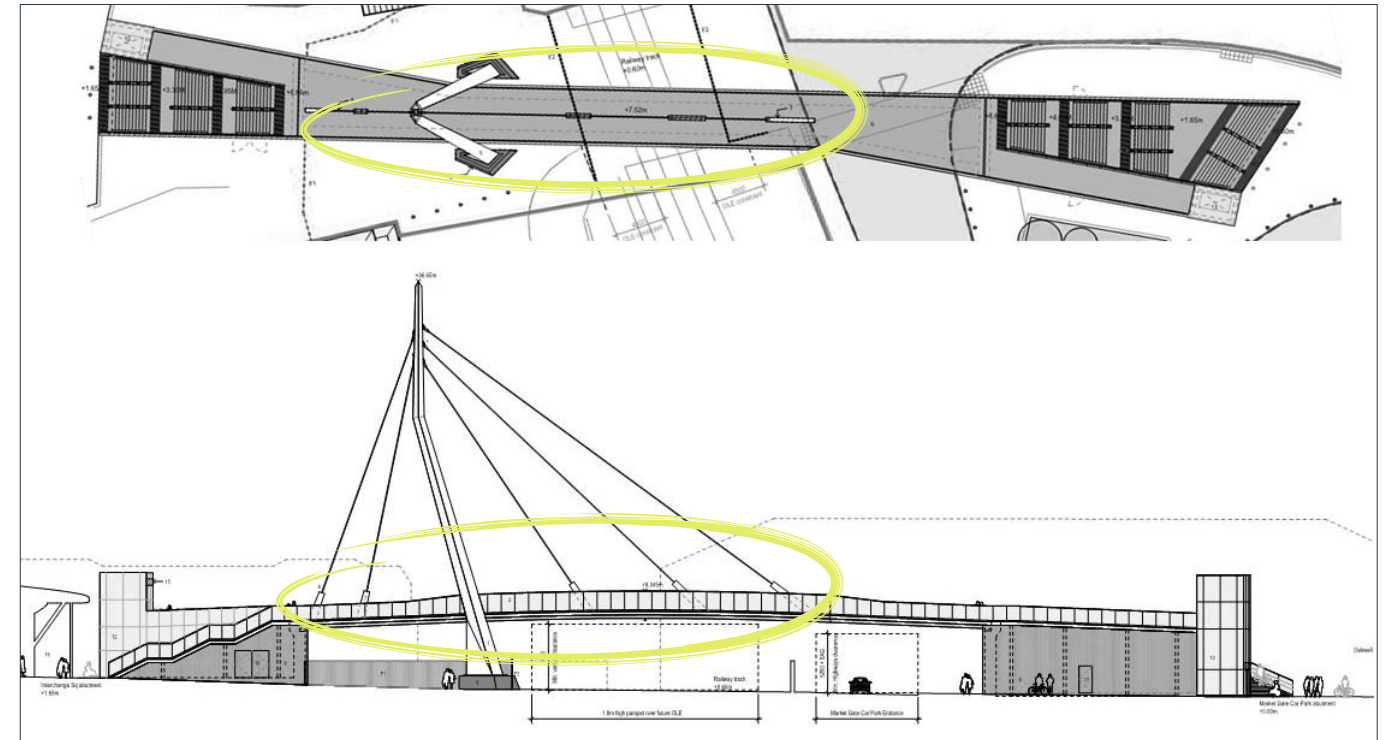


Luminaire locations

2. Tensile Cables.

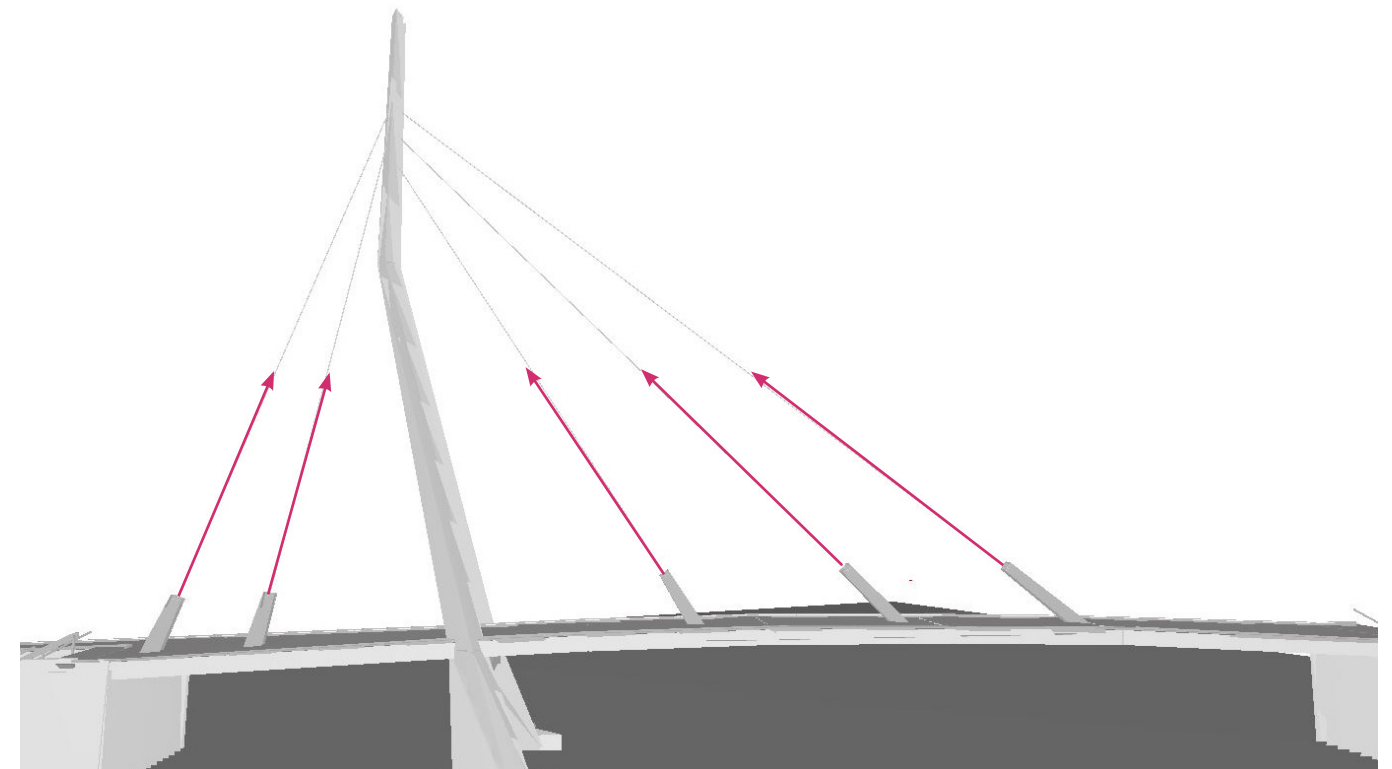
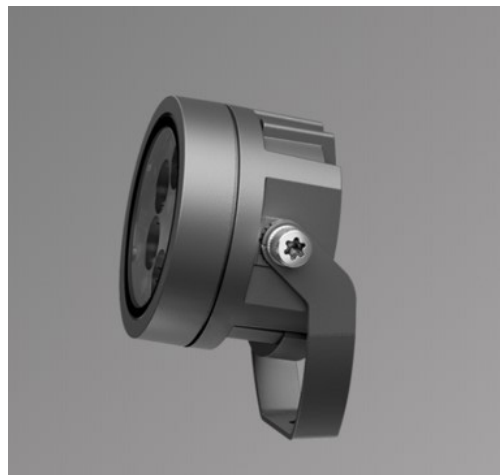
The tensile cables visually fan across the bridge and each is proposed to be lit using four small projectors with a very narrow beam to aim the light along the cable. The projectors are to be installed above a pedestrian accessible height to eliminate glare and prevent potential damage. The shroud detail covering the clevis extends to a height to cover the projectors to make them invisible light sources.

The light pattern from the projectors converges on the top of the pylon and lights this as a beacon without the need to lighting to be installed at high level. Light is to be white 4000K colour temperature.



Area of lighting treatment

Tensile cable luminaire.

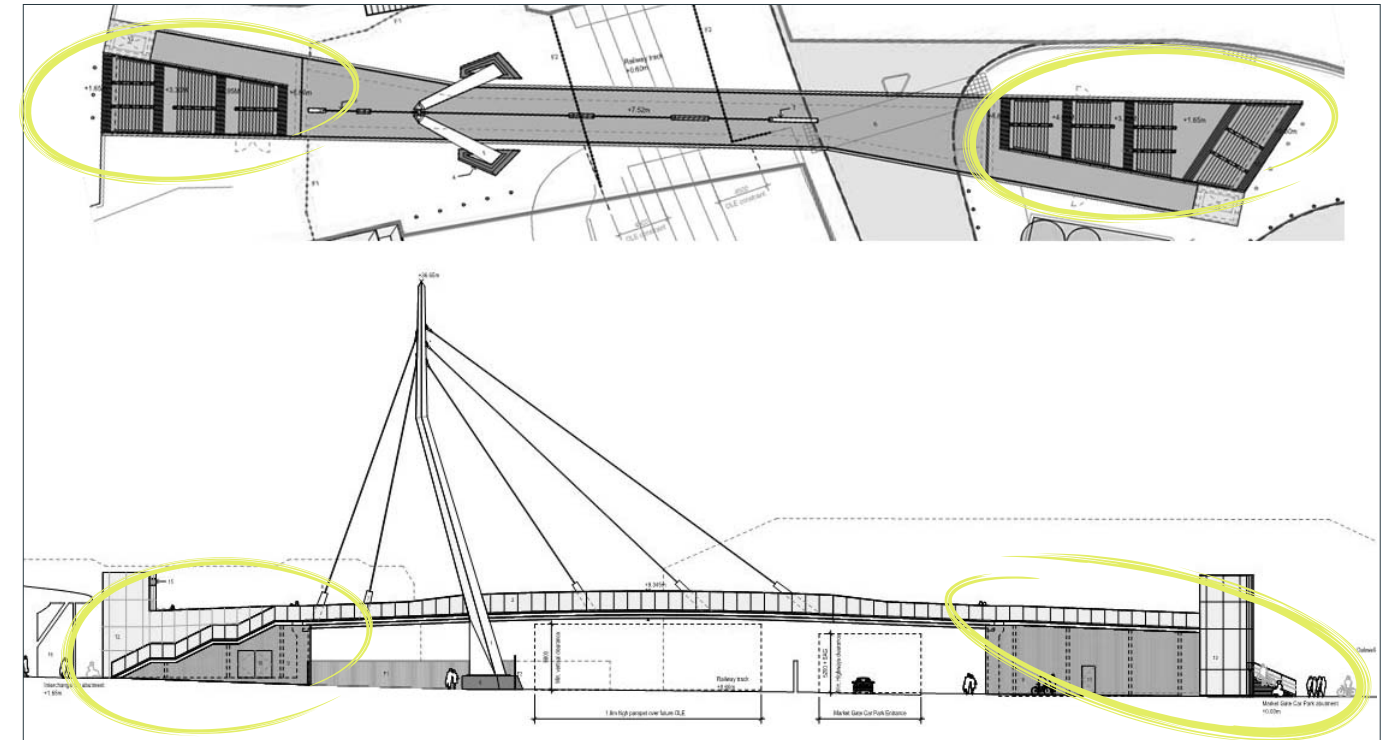


Luminaire locations

3. Steps.

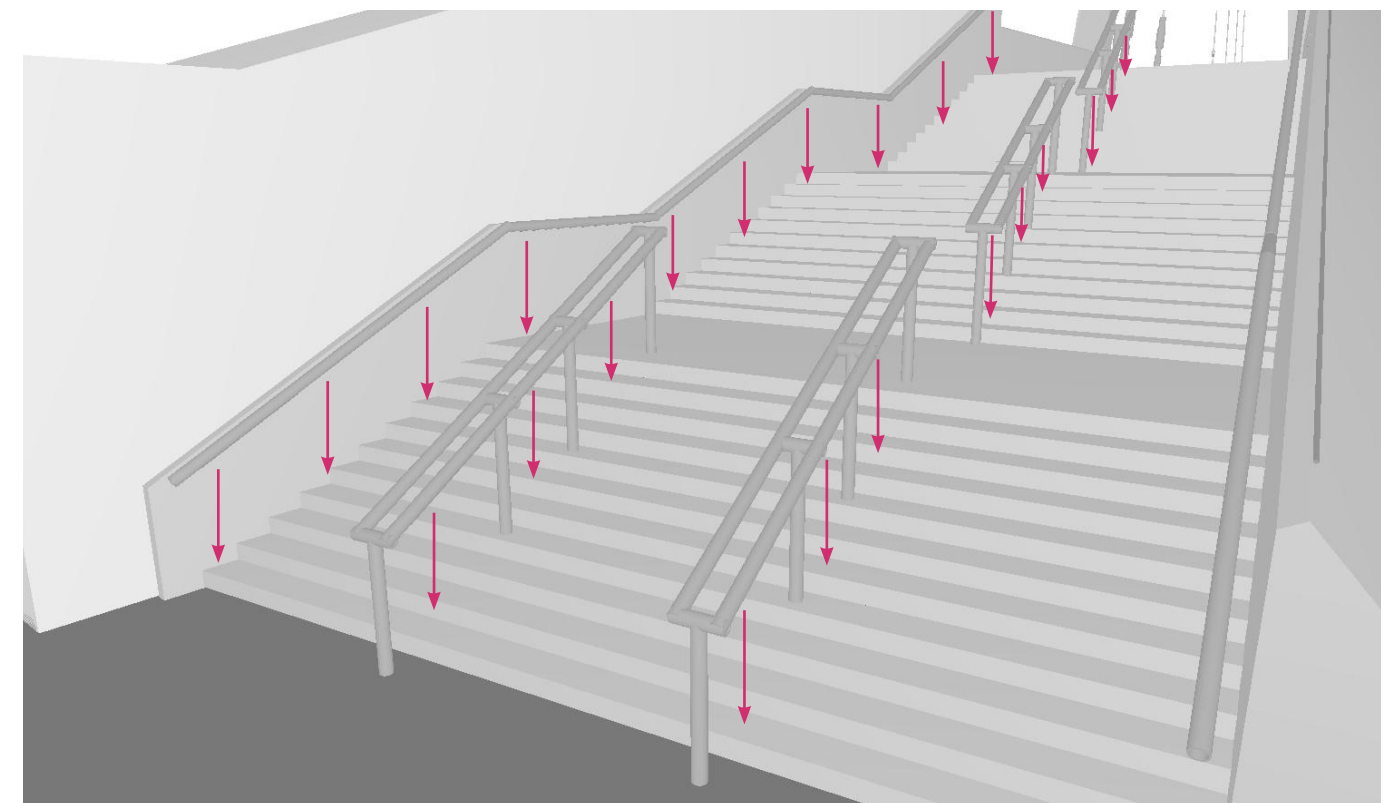
The stairs are to be lit to ensure a safe environment for pedestrians. To keep the lighting products invisible, the products are to be incorporated into the handrail. The full width of the steps can effectively be lit with good uniformity to create an inviting introduction to the bridge for users. Light is to be white 4000K colour temperature.

The area is to be lit to light levels recommended by the British Standard for steps.



Area of lighting treatment

Handrail luminaire.

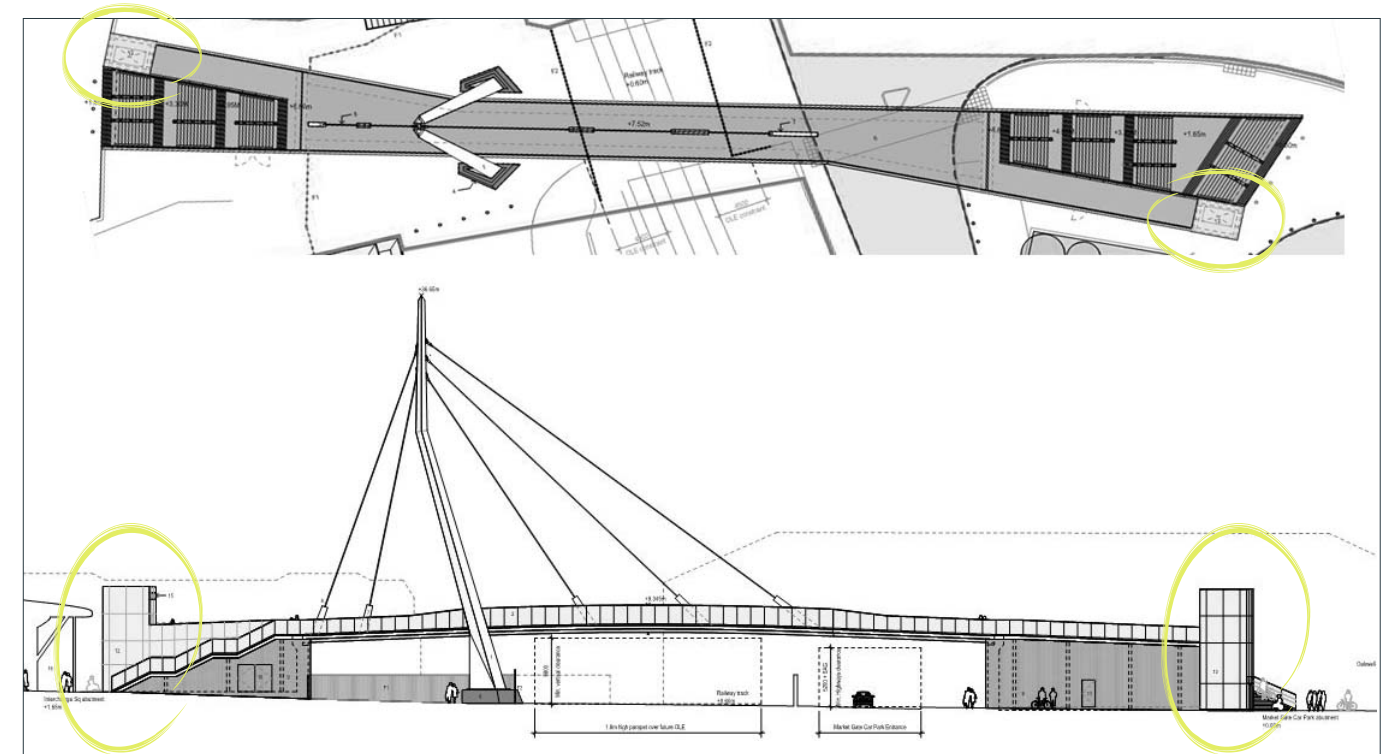


Luminaire locations

4. Lift.

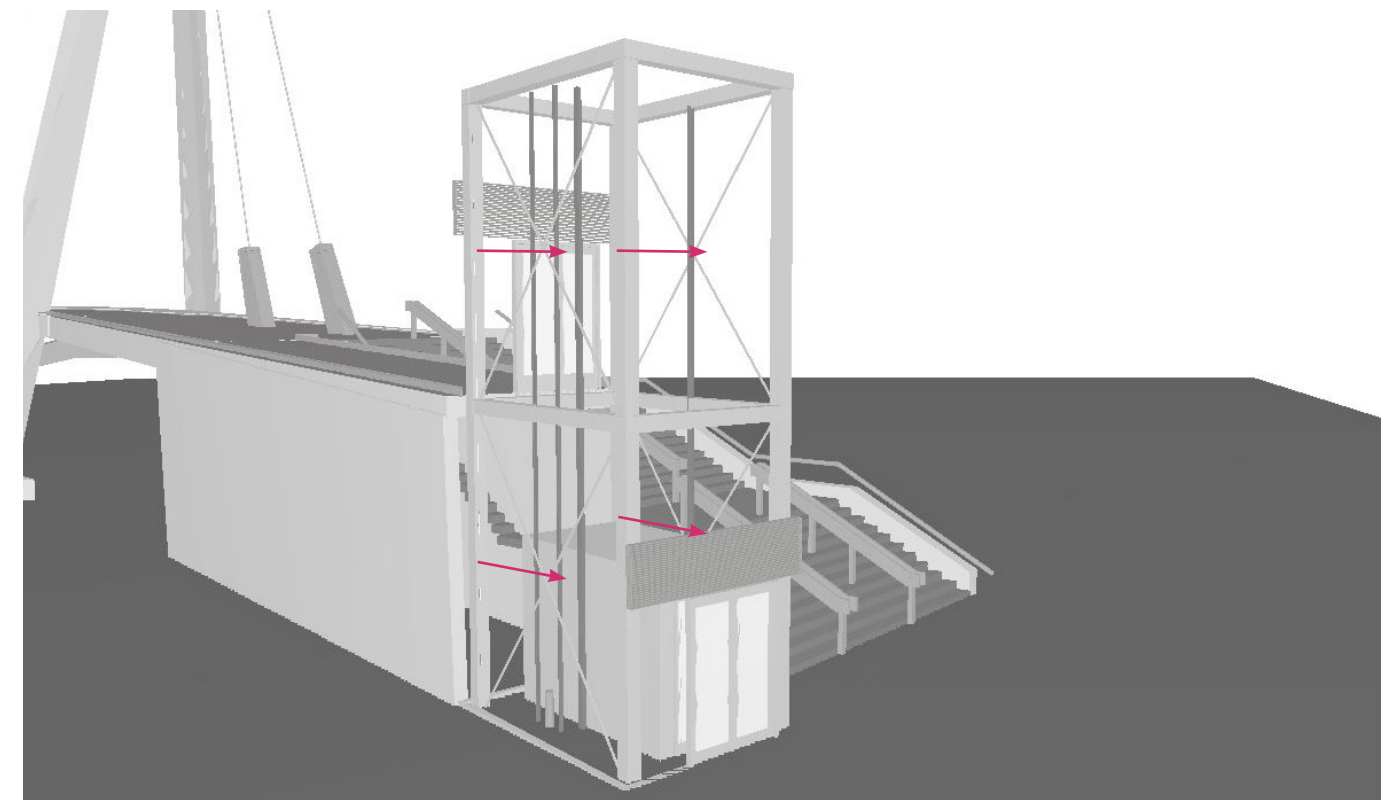
The functional lighting to the lift is to be provided and incorporated into the lift car by the manufacturer. The specification of this lighting is to be signed off by the design team to ensure coordination with all other lighting (it should have a white 4000K colour temperature).

These proposals light the structure of the glass box around the lift using a 4000K colour temperature white light – it is intended the supporting structure, rather than the glass is illuminated which will allow the glass to be clear for views in and out.



Area of lighting treatment

Lift structure luminaire.



Luminaire locations

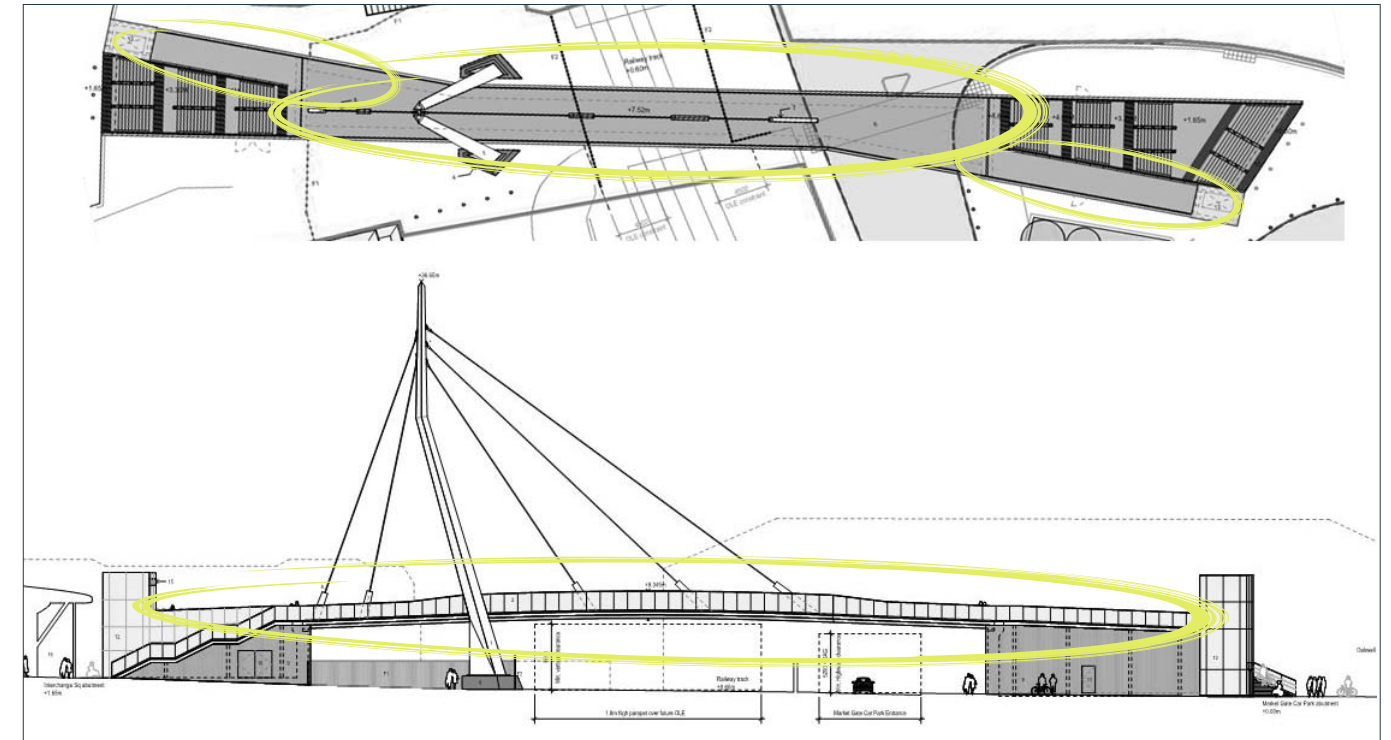
5. Bridge Deck.

The method for lighting to the bridge deck is highly important – it needs to provide functional lighting and a feature appearance without distracting from the architecture of the bridge.

The linear fittings are incorporated into the base clamp structure of the glazed balustrade positioned at low level. These fittings will provide horizontal illuminance on the bridge deck whilst projecting vertical illuminance to the pedestrians across the deck.

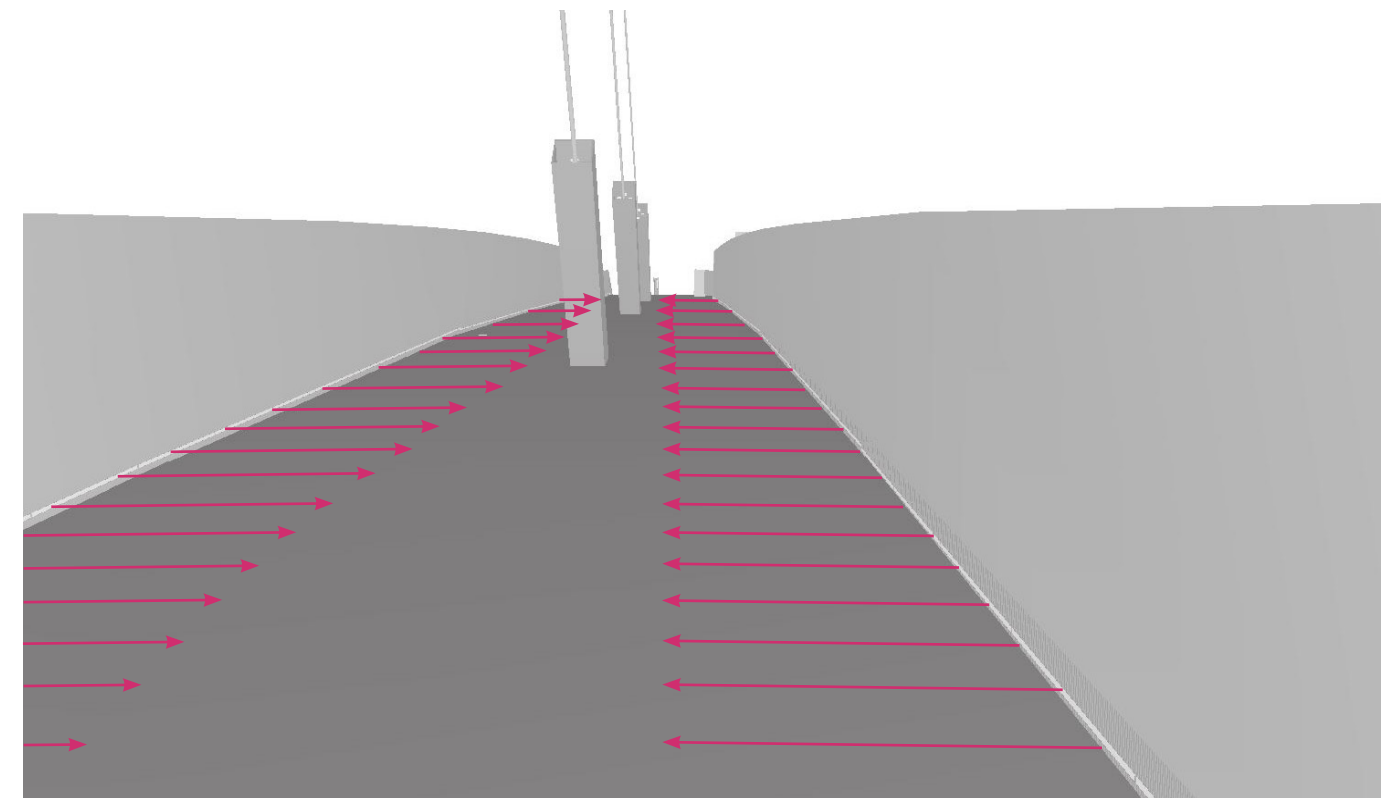
The area is to be lit to light levels recommended by the British Standard for pedestrian bridges.

The low installation height reduces glare and the continuous spacing along the length of the bridge provides an effect to draw the eye along the structure and inspire movement. The proposals ensure the lighting is seen as integral to the bridge design.



Area of lighting treatment

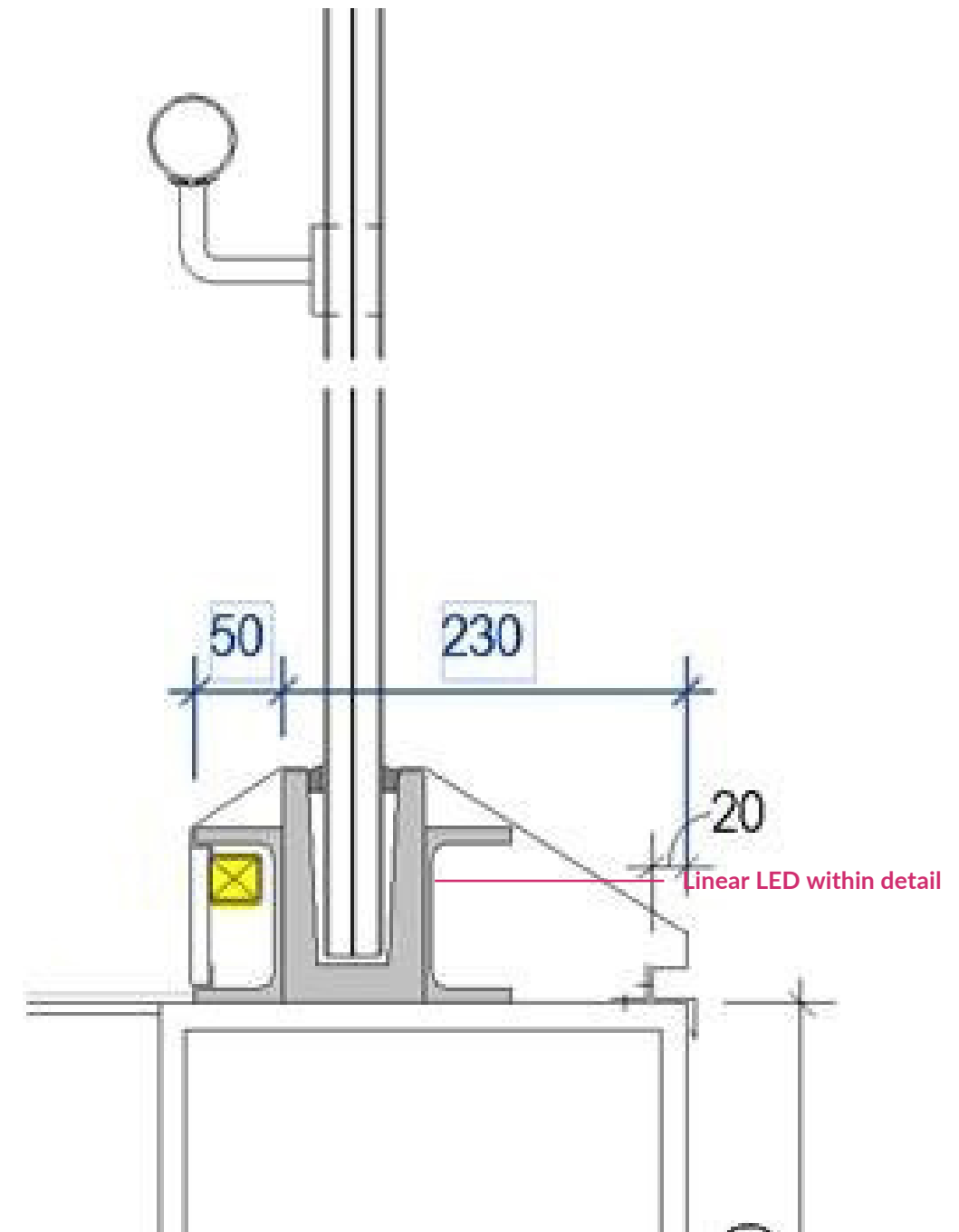
Bridge deck luminaire.



Luminaire locations

5. Bridge Deck.

Section of the bridge highlighting the linear LED location.



Bridge Section - Location of LED detail

Illuminance Calculation.

As can be seen in the adjacent calculation results the typical luminaire types can achieve the illuminance criteria previously detailed.

In this example, the illuminance results are as follows;

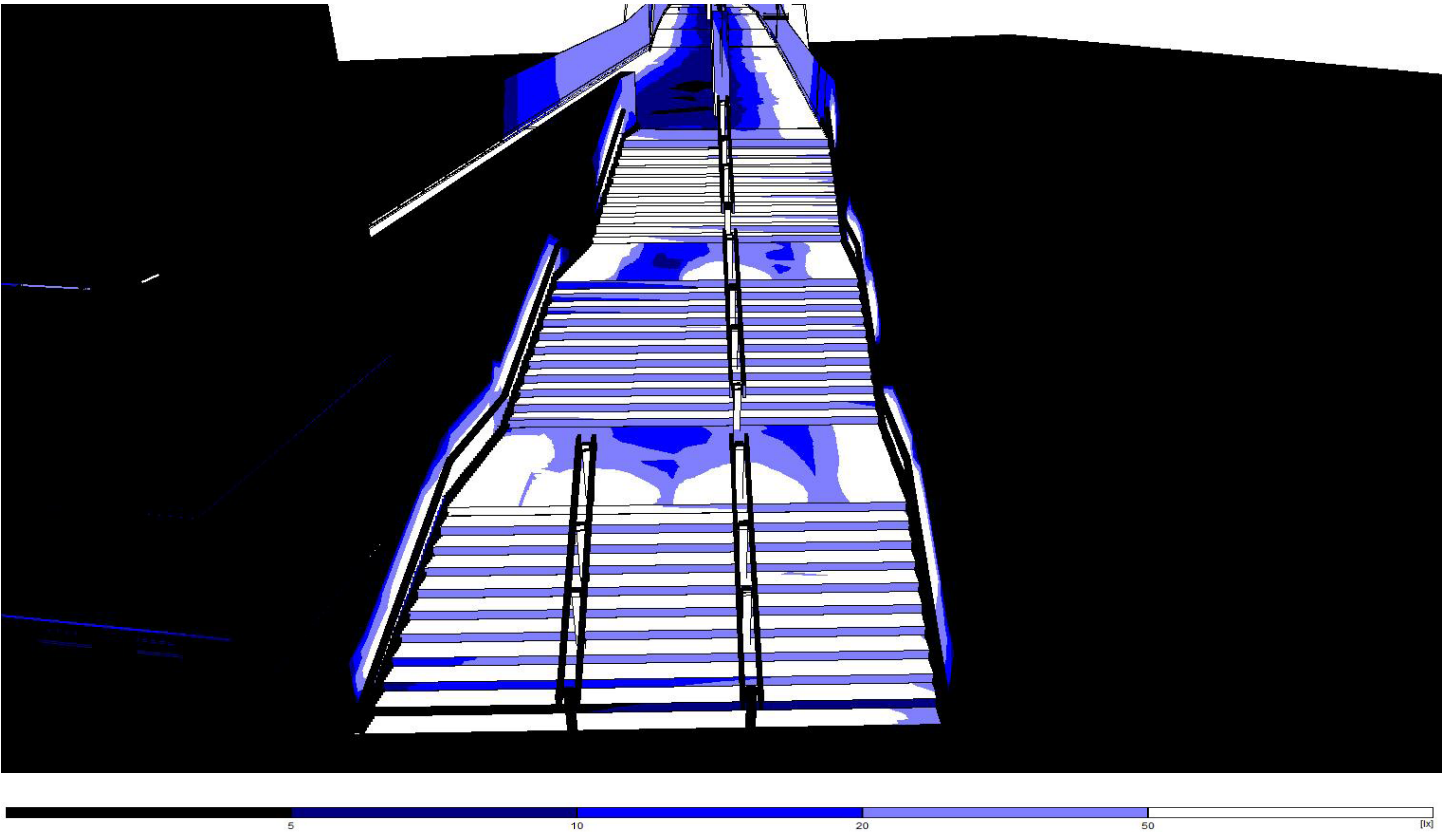
Step flight 1
41 lux average, 13 lux minimum
52 lux average, 17 lux minimum
39 lux average, 12 lux minimum

Step flight 2
47 lux average, 20 lux minimum
37 lux average, 11 lux minimum

Step flight 3
47 lux average, 21 lux minimum
42 lux average, 17 lux minimum

Landing 1
68 lux average, 8 lux minimum

Landing 2
56 lux average, 6 lux minimum



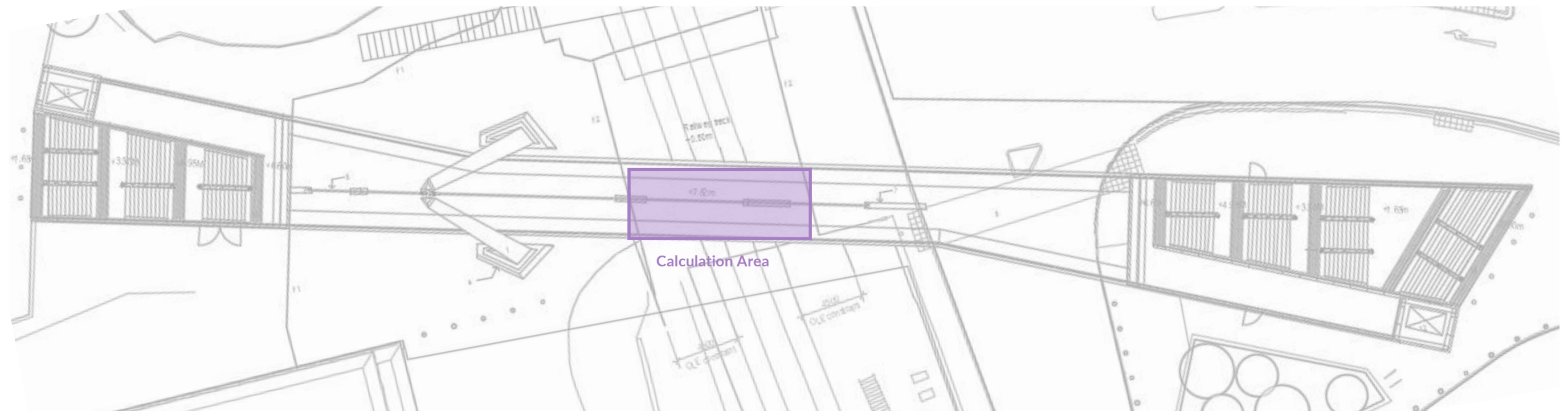
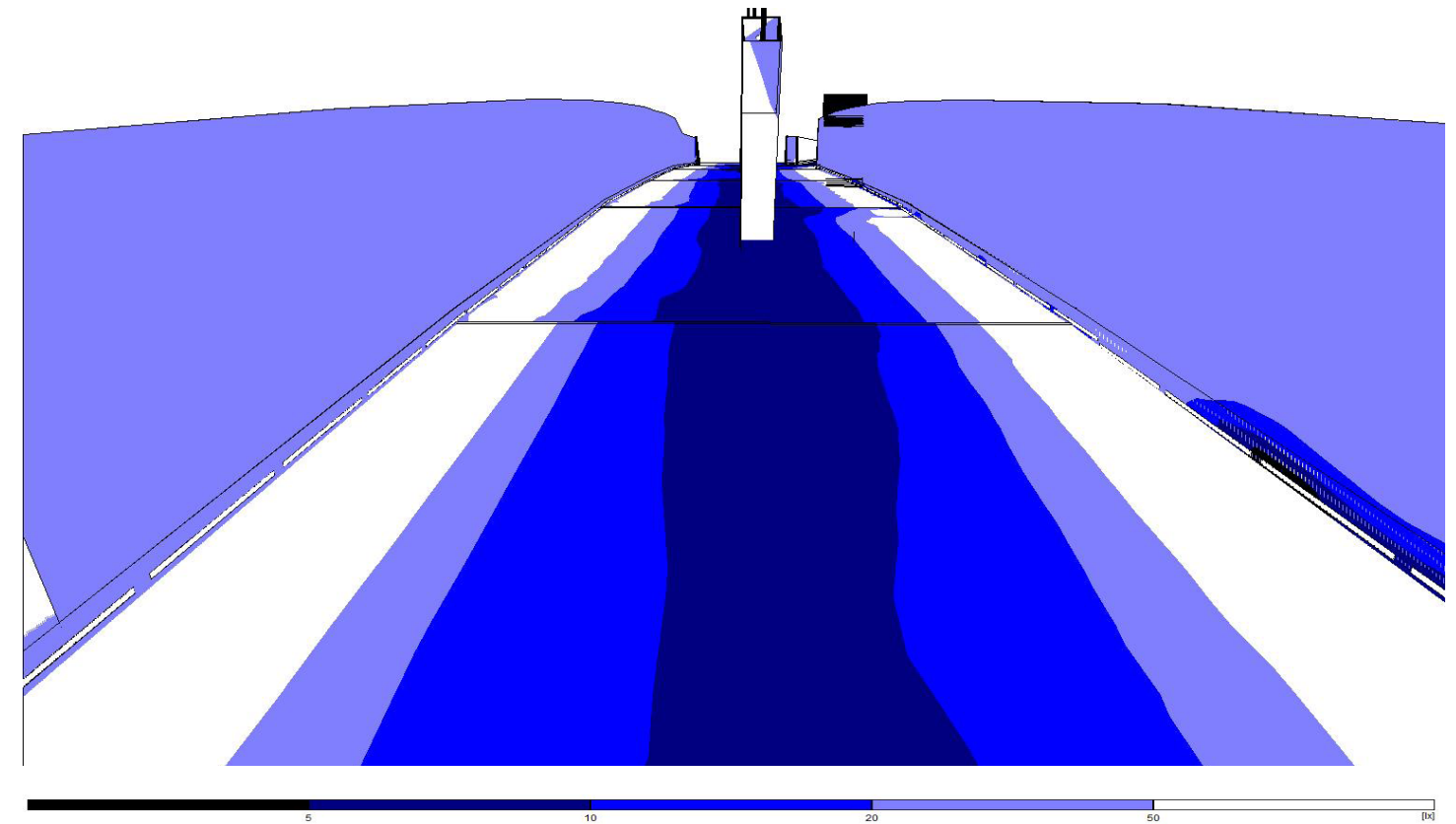
Location of calculation plane

Illuminance Calculation.

As can be seen in the adjacent calculation results the typical luminaire types can achieve the illuminance criteria previously detailed.

In this example, the illuminance results are as follows;

Sample bridge deck section - 34 lux average, 7 lux minimum



Location of calculation plane

Illuminance Calculation - Railway

Network Rail have specific requirements for lighting in the vicinity of a railway which include;

- Calculation of the lux level at 2.75 AGL - average level to be less than 20 lux
- Glare Rating (RGL) to be calculated at an eye position of 2.75m AGL - results to be 45 or less

These calculations are to be performed for a distance of 60m from the bridge face in both directions.

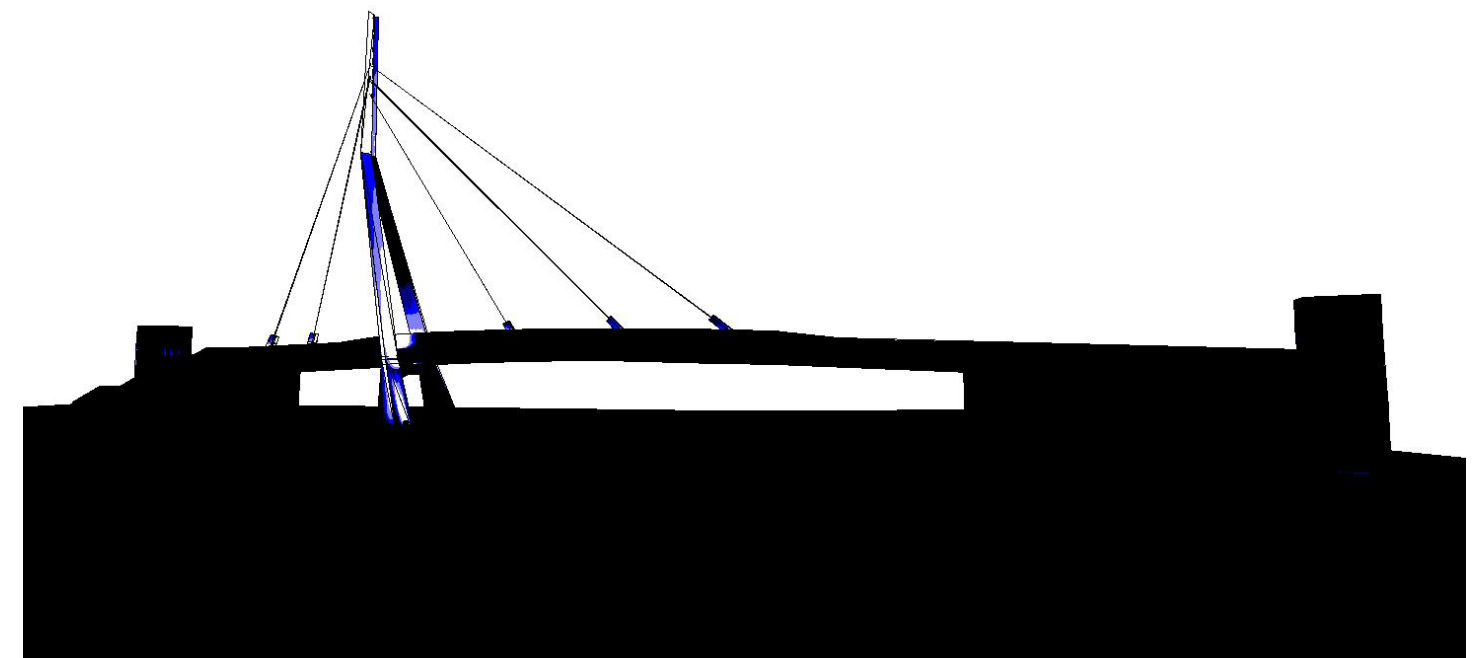
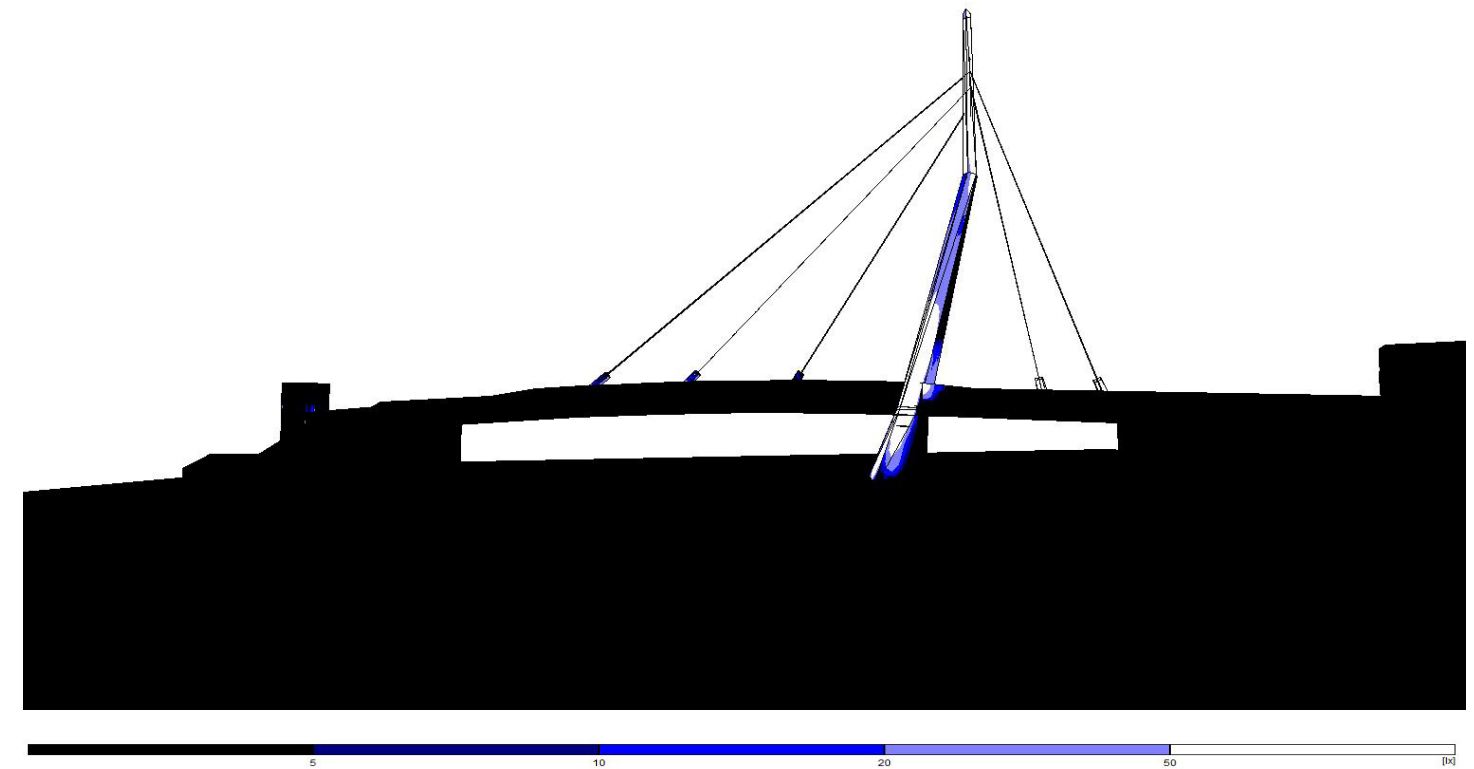
Both the illuminance and glare calculations are to be performed on a grid as defined by BS12464-2. This results in a grid spacing of 0.63m across the track and 0.6m along the track at a height of 2.75m above the track.

Illuminance Results - Railway

The illuminance calculation model for the proposals shown produces 0 (zero) lux on the calculation grid plane positioned at 2.75m above the railway for all calculation points based on the above grid spacing.

Glare Results - Railway

The glare calculation model for the proposals shown produces 0 glare (RGL) on the calculation grid plane at 2.75m above the railway for all calculation points based on the above grid spacing.

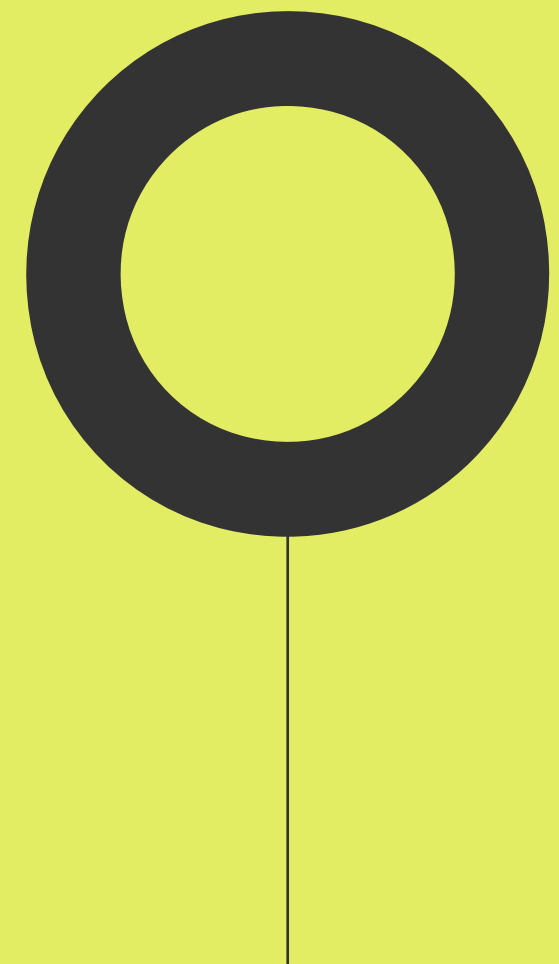


Control Methodology.

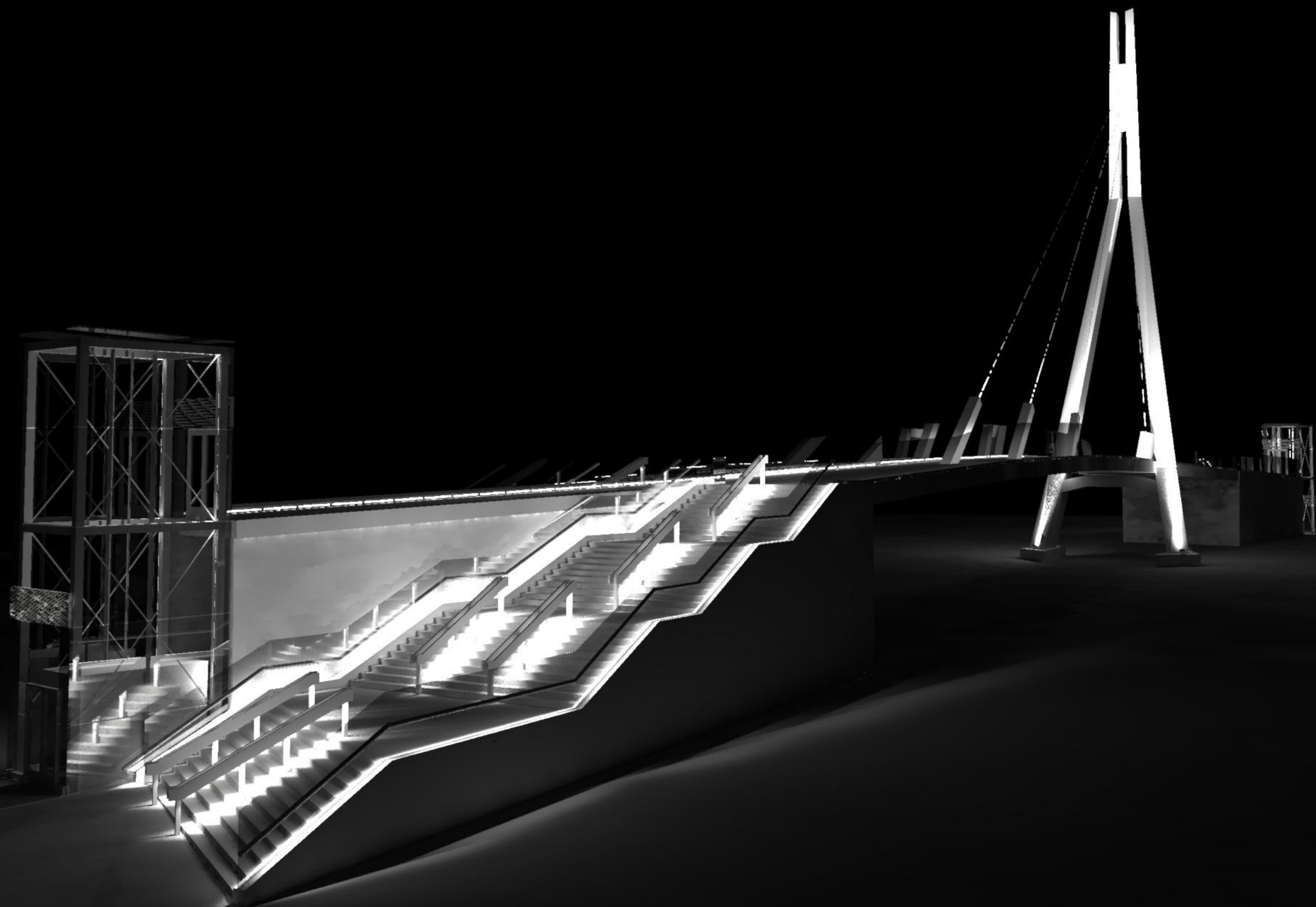
Type	Location	Manufacturer	Product	Wattage	CCT	Control	Operational Hours
EX1	Bridge Deck	Insta	il4020LH	19W/m	4000K	Switched	Dusk to dawn
EX2	Pylons (External faces)	We-ef	FLC240	81W	4000K	Switched	Dusk to dawn
EX3	Lift Structure	Insta	Aqualuc Wave	8W/m	4000K	Switched	Dusk to dawn
N/A	Inclined lift - lift car	To be supplied by lift manufacturer - specification to be agreed with design team					
EX4	Tensile Cables	We-ef	FLC220	15W	4000K	Switched	Dusk to dawn
EX5	Illuminated Handrail	Insta	LedLUX LH	10W/m	4000K	Switched	Dusk to dawn
EX6	Plant Room	Thorn	Aquaforce	34W	4000K	Switched	Manually Switched

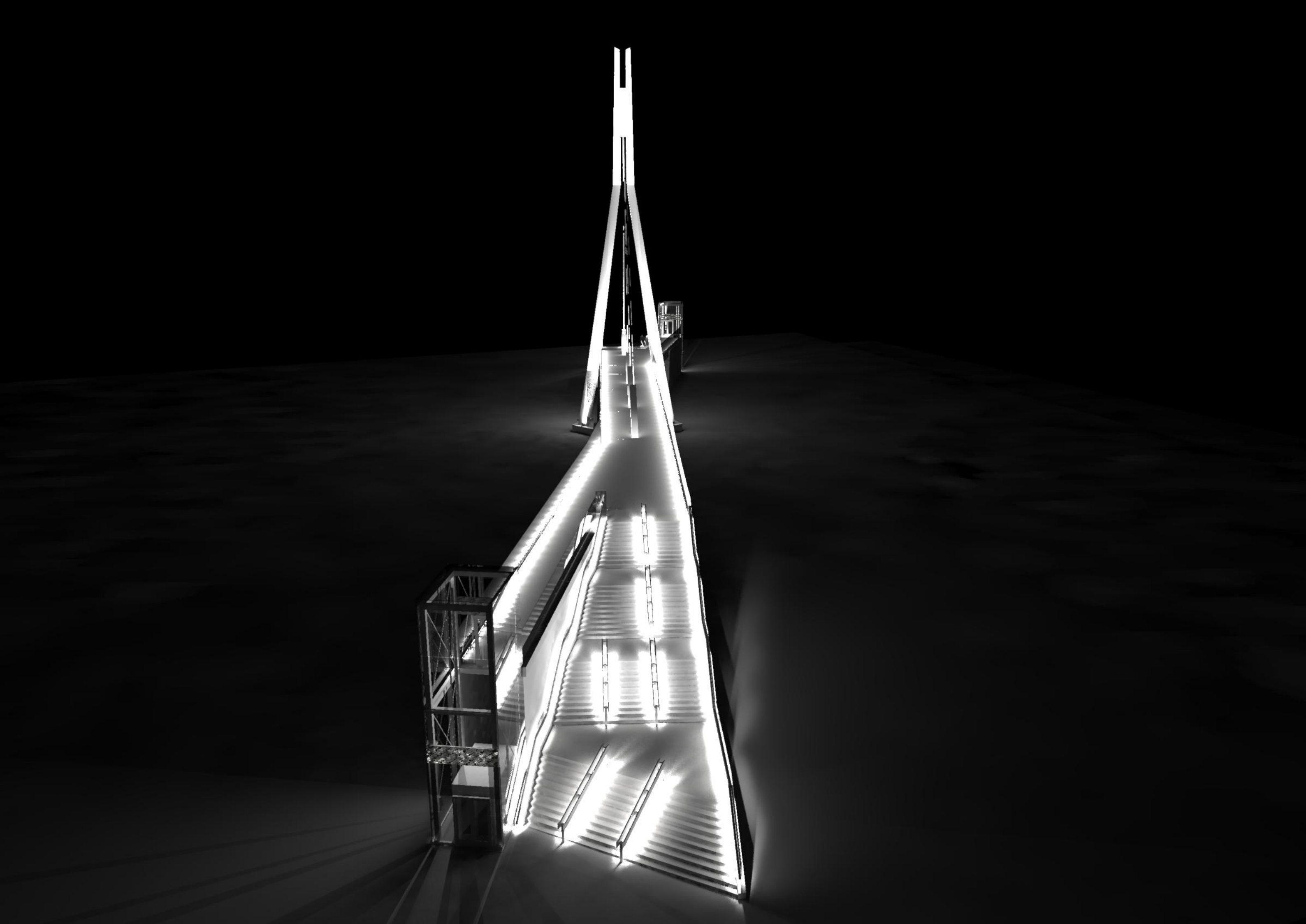
The number of light fittings and their position and operation will be dependant on the architectural and structural design, the handrail design and the lift and structure design.

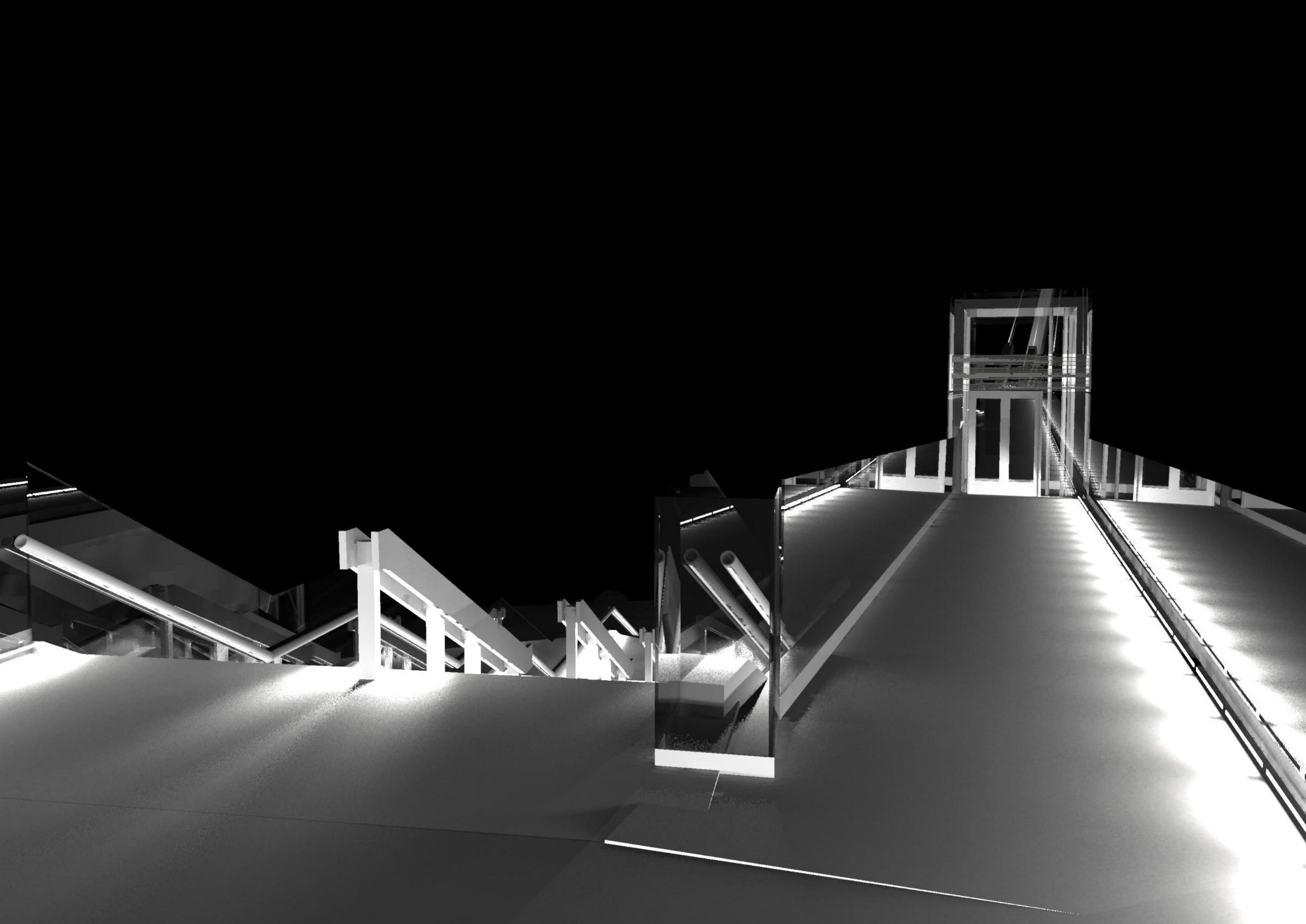
Holistic Lighting Concept.

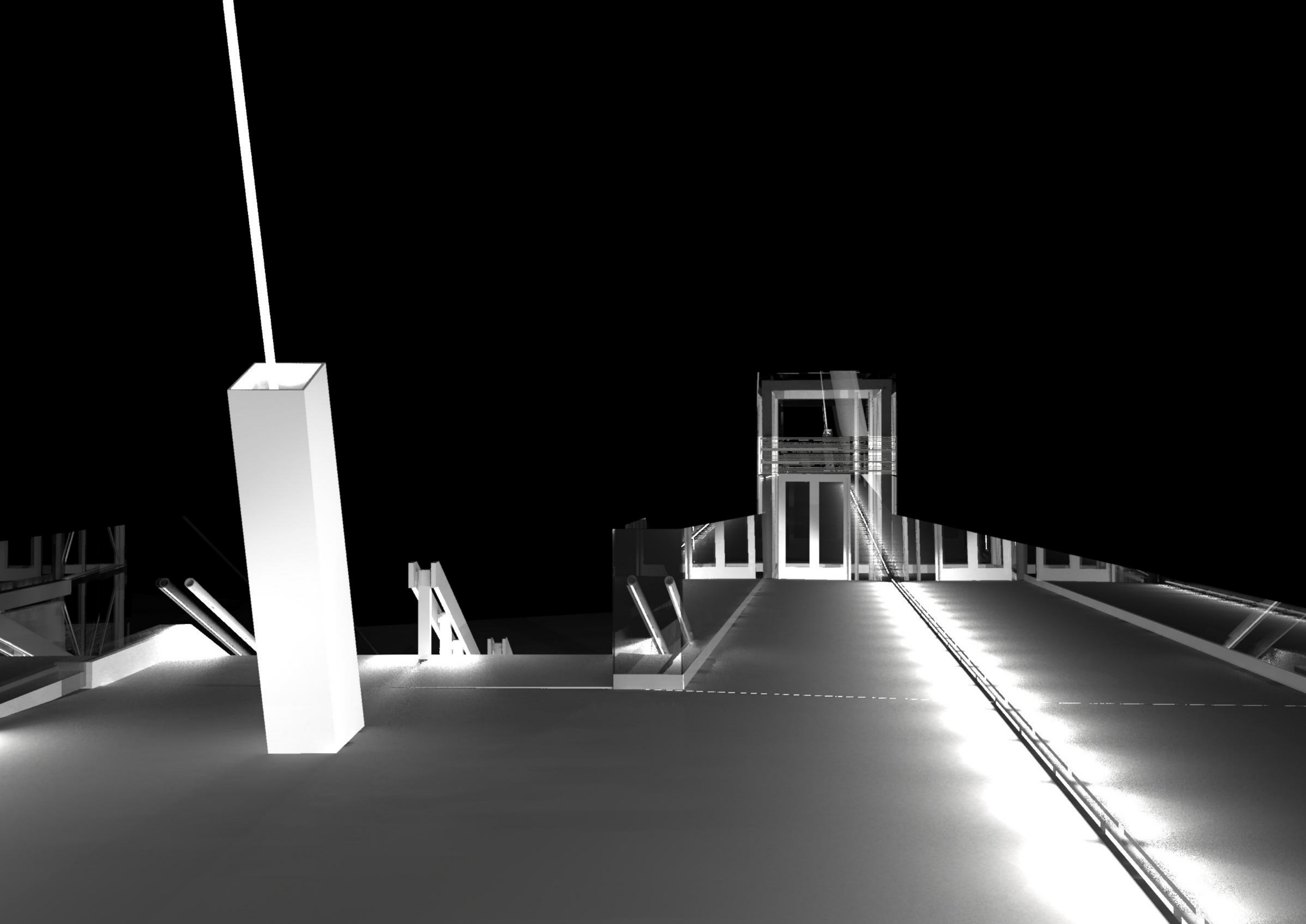


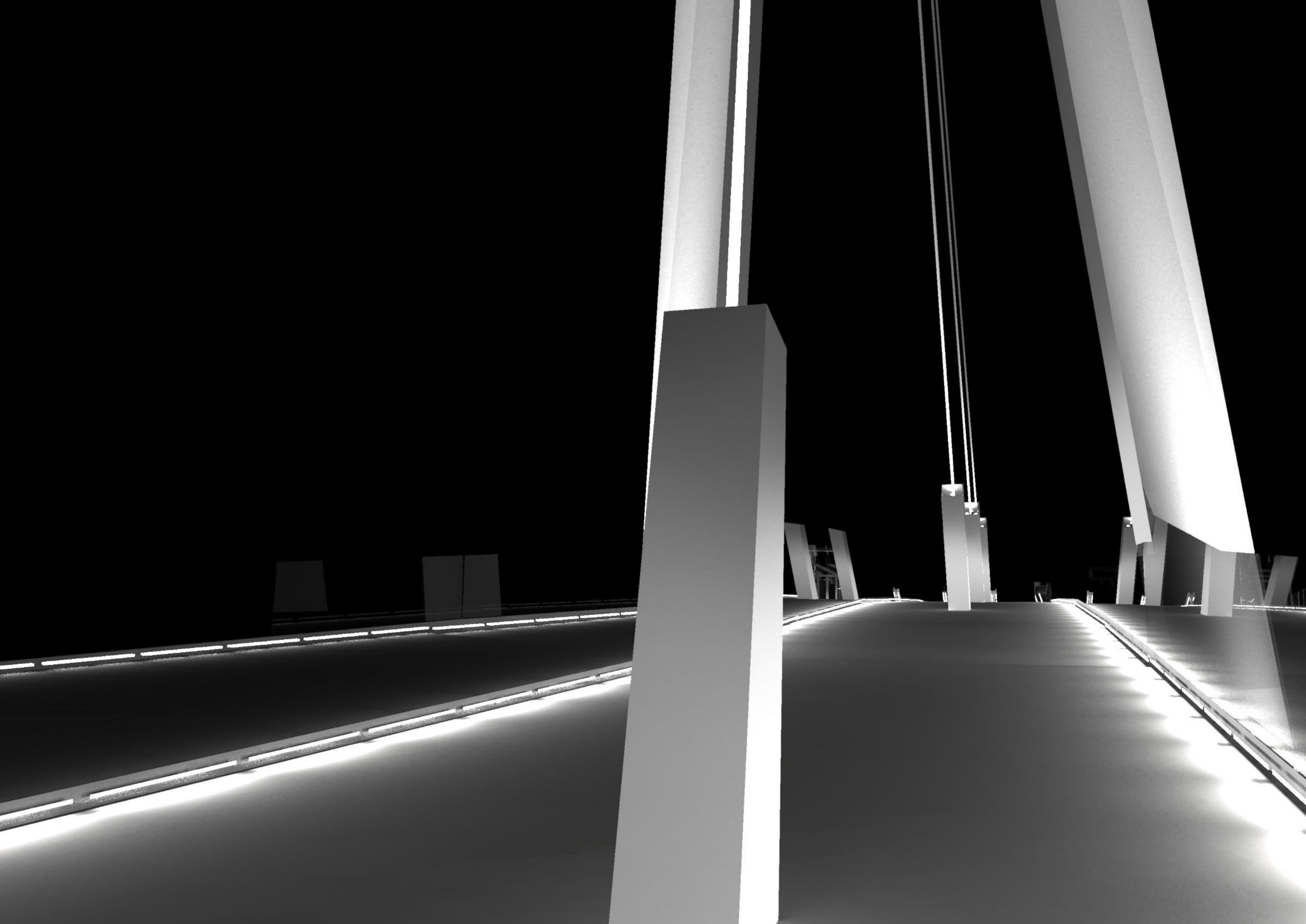














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