Innovative policies for improving citizens' health and wellbeing addressing indoor and outdoor lighting

Deliverable D2.2 Outdoor Lighting Design Report

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Primary Author(s) (in alphabetical order) & ORCID if available	Elettra Bordonaro (LSE) Joanne Entwistle (LSE) Don Slater (LSE)
Other authors (in alphabetical order) & ORCID if available	Hans Akkerman (AMST) Yasin Aydin (AMST) Andrus Reinmann(TARTU CITY) Olja Fomena (TARTU CITY) Lucia Chaloin (FIU) Alessandro Cola (NERI)
Reviewers (in alphabetical order)	Aitziber Egusquiza Ortega (TEC) Elisa Conticelli (UNIBO) Meike Bartels (VUA)
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1. INTRODUCTION

1.1 AIMS AND OBJECTIVES

D2.2 comprises the delivery of detailed lighting designs, including specification of products and technical installation details, suitable for complete implementation on the timetable established in the project Description of Action. These designs moreover have been agreed with all the city partners and with the manufacturing partner, Neri (20 meetings held for coordination). Finally, the designs are based on qualitative research and engagement deriving from the launch of Urban Lighting Labs (ULLs) in each target district, as described in D2.2, and can form the basis for remaining tasks within WP2. As set out in the Description of Action:

> *D2.2 Outdoor lighting design (M22)*
> *Based on qualitative research from ULLs and other data, and in consultation with Neri, we will produce a lighting design for implementation in a selected public space in each target district, allowing for further research and refinement over the year-long installation period.*

In order to document this deliverable, the present report first introduces D2.2 by indicating the relationship between D2.1 and D2.2. Designs for each target district are then discussed in turn, documenting the social research basis of each design and the technical details of each design. Further technical details (on specific products to be deployed, budget and installation schedule) are presented in a technical appendix. A final appendix gives itemizes the ULL research and engagement activities carried out in each district up to 31 January 2023.

1.2 SOCIAL RESEARCH AND COMMUNITY ENGAGEMENT: THE RELATIONSHIP BETWEEN D2.1 AND D2.2

The lighting designs produced in D2.2 were based on social research, community engagement and co-design activities in each city, based on Urban Lighting Labs. The process of organizing and launching these entities, as well as details of meetings, research and co-design activities was documented in D2.1 up to 31 August 2022. The end-point of that deliverable therefore included baseline research and launch activities but did not cover the period from 1 September 2022 to 31 January 2023: during this period there were additional co-design meetings, including feedback discussions of draft lighting designs; moreover D2.2 includes the integration of ULL research and engagement activities in the process of producing and refining lighting designs for installation.
The full complement of research and engagement activities from D2.1 through 31 January 2023 are detailed in an annex to this report so that the full social and co-design basis of D2.2 can be understood. Within D2.2 the following section elaborates the methodology for connecting D2.1 and D2.2 (D2.3 will discuss methodology for applying D2.1 to indoor lighting design and guidelines). Details of specific findings for each city are detailed in their individual sections.

1.3 SOCIAL RESEARCH AND CO-DESIGN METHODOLOGY

The overarching aim of WP2 has been to design, implement and assess a public lighting installation within the context of baseline social research and community engagement, including co-design workshops. Under the banner of local Urban Lighting Labs (ULLs), the development of the lighting installations was significantly determined by detailed qualitative research to understand the diverse conditions and issues of elderly life in each community, and to involve local stakeholders — through both research and engagement workshops — in the design process (eg, identifying issues, giving feedback on design ideas, etc).
The methodology for D2.1, ULLs and co-design basis for D2.2 and D2.3 is built on qualitative social research with an ethnographic orientation. As detailed in D2.1 and the appendix to this deliverable, the main elements include:

- semi-structured interviews with stakeholders, including both extensive interviews (1-2 hours) and more brief and informal conversations, often over the course of multiple interactions with informants;
- 'walkabouts' and other in situ observation and discussion of local settings, including installation sites;
- observation and photo/video documentation of neighbourhoods and installation sites, incorporating different days of week, seasons and times of day;
- workshops in which participants engage with different stages of the design process;
- participation in meetings and activities of a range of local organizations, including activist forums, age-related activities and local meeting places.

As indicated in D2.1, the specific mix of methodologies and the manner of their deployment necessarily differed in each city because of different local conditions. For example, in Bologna, informal local networks were the crucial element so that informal conversations and participation in everyday local activities played a much larger role than in other cities. Research and engagement/co-design were structured in relation to a 'Roadmap' document (see D2.1) and through weekly meetings with the city teams and research assistants in each district. In each area the objective was to ensure that the full range of stakeholders was researched and included, reflected in both research and design outcomes. This particularly involved the mapping, for each specific district, of the range of older people in the area, looking at disparities in terms of gender, ethnicity, age range, types of disability and types of household composition.
In order to support both D2.2 design work and to develop overall research findings under such differing conditions, analytical strategies were developed to ensure that the specificity of each city was fully reflected while still allowing comparability and generalizable findings.

In relation to D2.2, integration of social research and co-design data involved an analytical strategy operating at three inter-related levels. These are reflected in the discussion of each city:

A. The social organisation of ageing:
At this level, the concern is with the overall organisation of ageing in each locality in order to develop a practical understanding of the context for age, health/well-being and light/public space. 'Social organization of ageing' was used to structure analysis of how ageing is organised and experienced in specific ways; the components of these patterns of ageing are summarised through the themes listed below. In order to deal with enormous differences between and within the target districts, an analytical framework was developed that organized data into themes shared across the cities while simultaneously allowing full expression of the differences in which each theme was manifested in each city.
Under each city, below, there is discussion of the main thematic findings that played into design strategies and decisions. The themes are as follows (headings differ slightly from D2.1 as a result of refinement):
•Being active/active ageing
•What is defined and valued as 'activity'? How do people connect ageing, well-being and activity? How do elderly people structure activities?
•Public space
    •What concepts and values make up the experience of public space?
•Social connection
    •What kinds of social contact normative at different stages/conditions of ageing? What are the drivers and costs of social isolation? What supports or limits social participation?
•Social value
    •What social status and value do older people have relative to other generations? What does social value de pend on? What cultural assumptions about the elderly impact their conditions?
•Care and citizenship
    •What are the sources and qualities of care and carers (family, neighbourhood, state, market)?
•Sharing space – identity and ownership
    •How does ageing in this place connect to narratives and histories of belonging, identity, ethnicity, safety and security? Who makes up this neighbourhood?

B. Socio-spatial analysis:
Workshops, in the context of the full mix of methodologies, allowed exploration of the relationship between the organization of ageing on the one hand and the uses and experiences of social spaces on the other hand, including the impact of lighting on use of space by older people. Central to this level of analysis was mapping which paths older people took for various routing and special activities, the meaning of different local spaces to them, their feelings about public space in general and specific local places. This analysis also aimed to place the chosen installation sites in the broader lives and activities of older people.

C. Site-specific analysis:
Workshops, walkabouts and site observation plus on-site interviews with passersby generated very detailed data about specific elements of the installation sites. Although often microscopic in focus, the preceding two analytical levels allowed interpretation of extremely granular data in relation to both overall activities within the neighbourhood and the widest issues of ageing in a particular city. For example, walkabouts and workshop material in Amsterdam generated very detailed discussion of paving stones that have been deformed by tree roots, compounded by very poor lighting, making passage difficult for older people with mobility devices. This was clearly related to people's choices of pathways from home to shopping precincts, resulting in both altered routes and often unsatisfactory choices of shops, spaces to socialise and reduction of activity. In terms of the social organization of ageing, it was equally clear that the paving issue was interpreted by people in terms of failures of local government that reflected the low value of older people and their lack of agency in reporting such issues and getting them addressed.

2. INNOVATIVE LIGHTING RESEARCH AND REFINEMENT

The Description of Action for D2.2 includes the requirement that the lighting designs for each district allow 'for further research and refinement over the year-long installation period'. Although this element of WP2 falls outside this report, it is important to indicate that design decisions included choices of products and layouts that would enable both experimentation and responsive changes to the lighting installations over the year of implementation.

Innovative lighting research:
- The specific design will enable administrtion of a questionnaire before and during the lighting installation, allowing technical research into changes in glare, facial recognition and perception of the lit scene.
- The installations will be used for three planned phases of research at the start, mid-point and end of installation period (the latter is D2.4). These will comprise workshops, guided walks and onsite interviews. These will take advantage of the site location (universally familiar and routinely used sites) and of modifiable elements of the design (detailed below) that will allow interactive and responsive changes to the installation.

Refinement and experimentation:
- The light engine developed with Neri allows adjustment of luminous flux from zero to local city location standards. Dimming can be controlled from a control system chosen in coordination with cities, and can be programmed for daily, weekly and seasonal dimming schedules. This will allow trial of different light levels, in some cases covering specific and separable zones in each installation, to assess impact and perception of changes.
- The light engine developed with Neri also allows colour temperature (CCT) adjustment from 2200 Kelvin degree to 4000 Kelvin degree (discussed below). This can also be controlled in real time, and can be programmed for daily, weekly and seasonal schedules.
- The lighting products have also been chosen to allow two different Colour Rendering Index (CRI) levels for different zones: CRI 80 and CRI 90. These will be one of the first urban public lighting installations with CRI 90, allowing assessment of marginal gains and cost/benefit of this CRI increase for older residents.

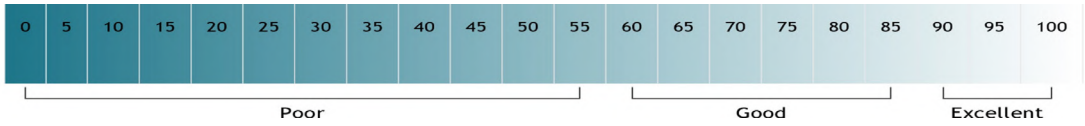
NB: although the DoA proposed a one year installation period, and ENLIGHTENme research within WP2 will end at that point, the lighting installations were designed as potentially permanent fixtures. In fact, all three cities have decided to adopt the designs on a permanent basis, allowing for continued research and refinement.

3. INNOVATIVE LIGHTING TECHNOLOGY

The LED engines used for the lighting of the project areas were chosen according to the experimentation and analysis of the visual comfort of the users.
The study intends to evaluate in particular the effects and preferences of users in different lighting scenarios. In particular, the lighting system proposed in the three cities is capable of controlling the luminous flux and the color temperature of the luminaires. In addition, the analysis intends to compare the effects of luminaires characterized by CRI 80 and luminaires with CRI 90, in particular for the elderly population.

3.1 CRI 80 VERSUS CRI 90

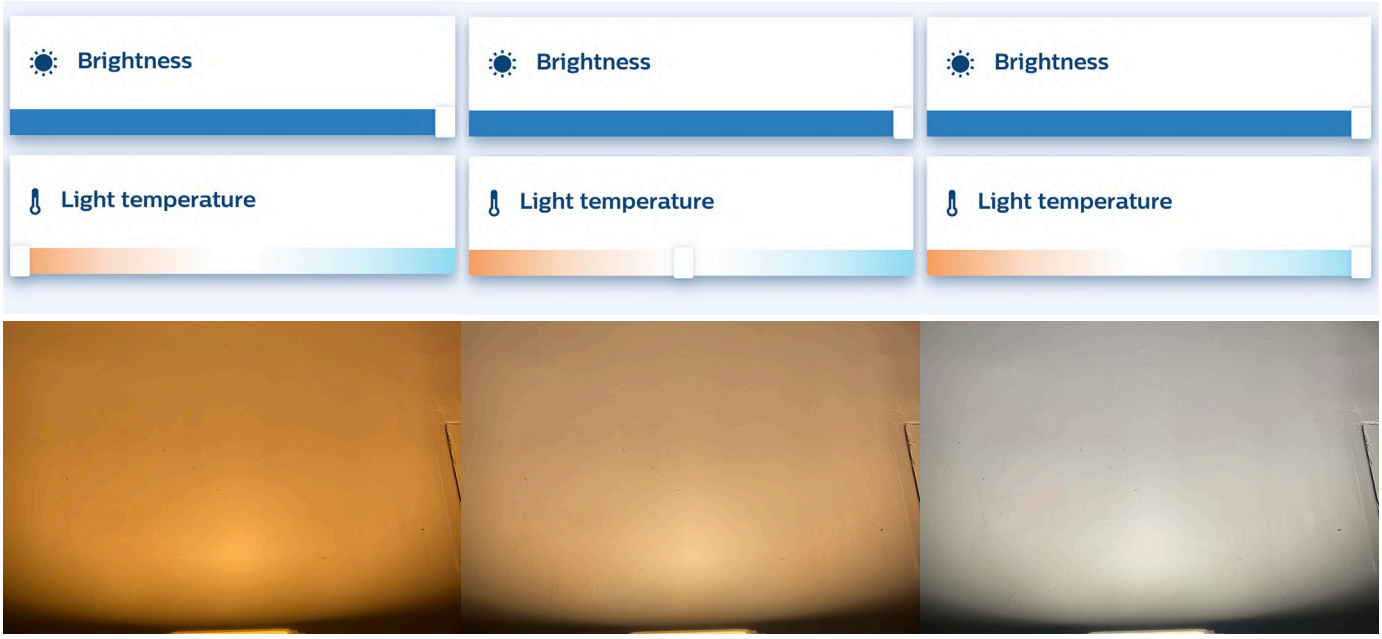
CRI is a measure of a light source's ability to show object colours "realistically" or "naturally" compared to a familiar reference source, either incandescent light or daylight. While higher CRI ratings are desireable, it has been a matter of debate whether everyday users of public spaces detect or gain advantage from the highest ratings. In the three installations, some of the luminaires proposed in the three cities are characterized by CRI 90. In specific areas, some luminaires with CRI 80 are proposed. During the experimentation phase, surveys will be conducted in order to evaluate whether users can perceive any differences in lighting.
Thereby, the study will be able to evaluate any advantages introduced by the use of luminaires characterized by CRI 90 in outdoor environments.



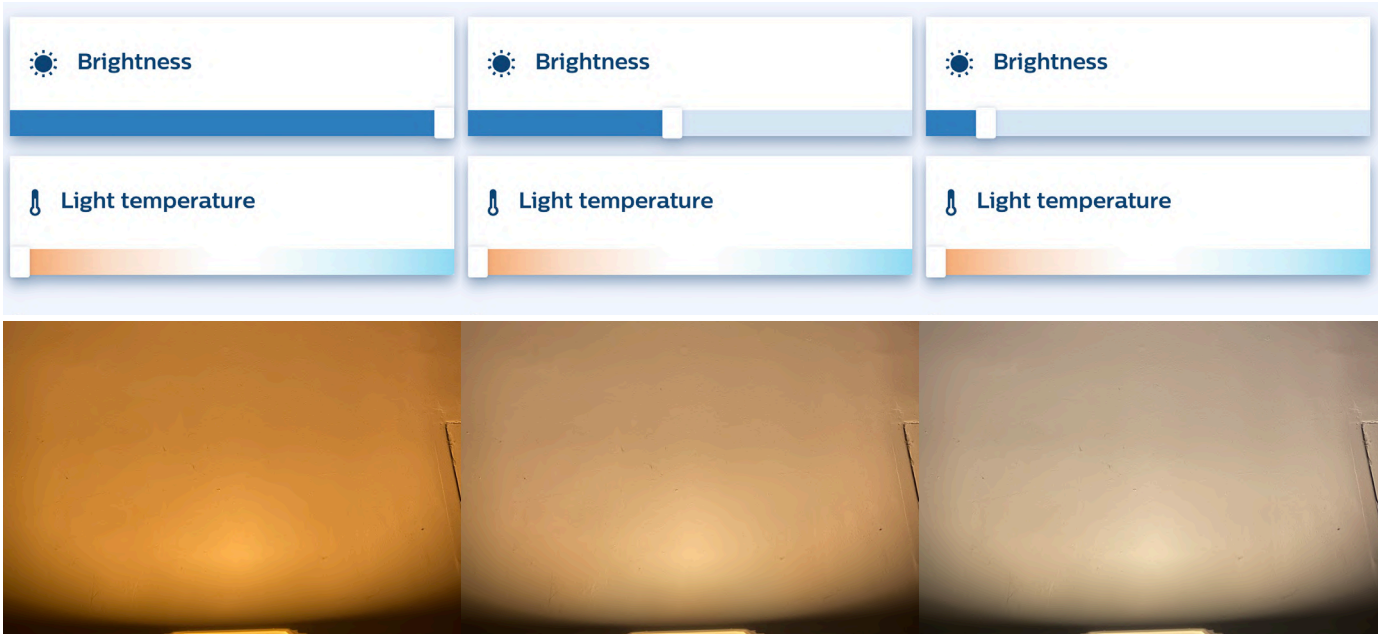
CRI chart

3.2 TUNABLE WHITE LIGHT

Tunable lighting is the ability to control a light source's color temperature output.
The lighting design proposal includes a control system capable to control both the intensity of the emitted luminous flux and the color temperature (from 2200K to 4000K). This system offers the possibility to set different lighting scenarios for the three project areas.
In addition, analyses will also be conducted on the intensity of the emitted luminous flux. Therefore it will be possible to adjust the luminous flux according to the activities envisaged in the areas, providing adequate lighting levels for the different hours of the day. Testing of different lighting scenarios for outdoor environments will provide indications regarding the visual comfort of the users. Furthermore, the possibility to control the emitted flux will reduce the light intensity when the spaces are not used, thus leading to energy savings.



Lighting chart: variation on CCT



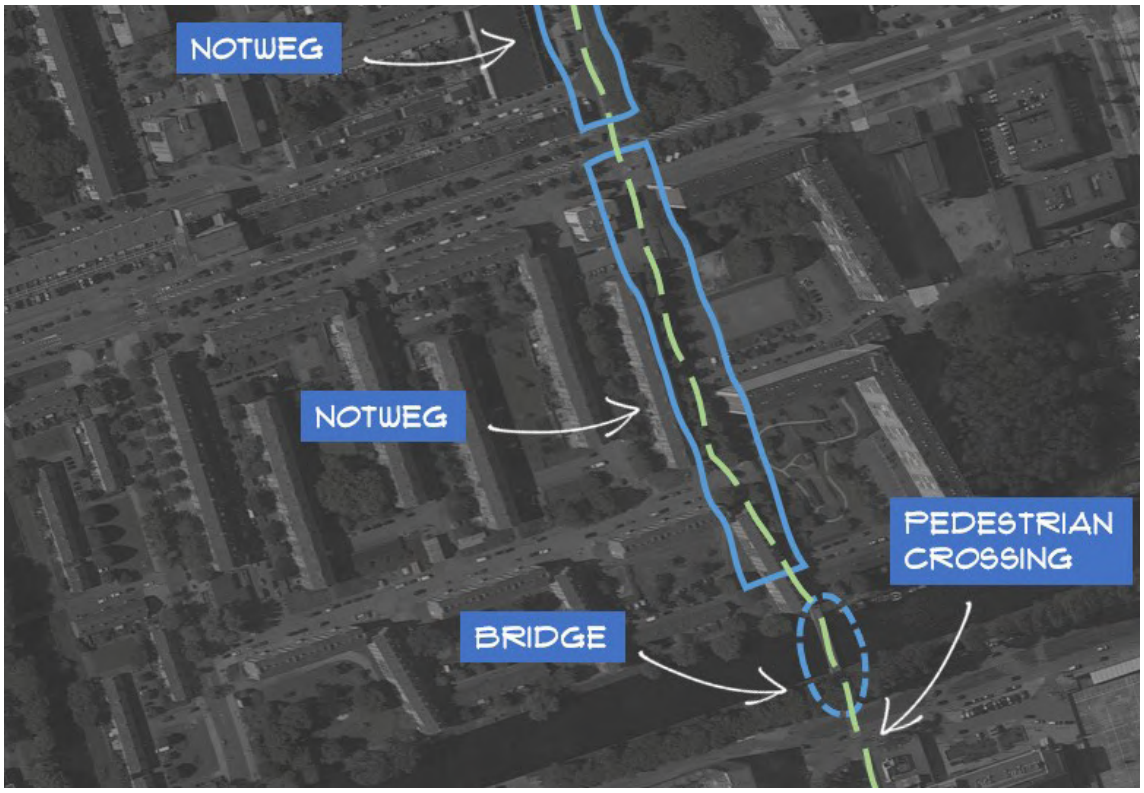
Lighting chart: variation on luminous flux (brightness)

4. AMSTERDAM

Extension of the project: 30.000 m^2
Lighting points: 84

The selected district for Amsterdam is the Wildeman neighbourhood in Nieuw-West, with a population of 160.124 inhabitants. It is a modernist postwar development constructed on the principle of garden cities, comparable to our districts in Bologna and Tartu in terms of urban morphology (5-9 storey apartment blocks surrounded by green spaces) but with more commercial and business use. It was part of the extension of the city to the west, including land reclamation involved in the building of Schiphol airport, and it lies about 9.5 km from city centre.

The district in relation to the city centre



The case study area

4.1 SOCIAL RESEARCH AND COMMUNITY ENGAGEMENT BASIS FOR AMSTERDAM LIGHTING DESIGN

Details of research and engagement activities can be found in the Appendix. The following discussion is not a comprehensive analysis of the research and engagement material, but rather focuses on the findings that were most formative for design discussions, strategies and final decisions. In the interest of brevity, most items are listed as bullet points. The discussion is organised in accord with the methodology presented in the introduction to this deliverable, comprising three levels of interconnected analysis.

4.1.1 THE SOCIAL ORGANIZATION OF AGEING IN AMSTERDAM

Wildeman is ethnically highly diverse, with a majority of ethnic Dutch amongst elderly residents (because of social housing allocation policy) and several large minorities (Turkish, Moroccan, Surinamese, Indonesian, Chinese). The ethnic mix amongst younger generations is the reverse, with ethnic Dutch constituting a minority. Moreover, the different ethnicities are not integrated, with elderly ethnic members often particularly isolated or separate. Research and engagement therefore involved studying at least five different ways in which ageing is organized, plus the overarching structuring of age through social and political ways of managing multi-culturalism.

- BEING ACTIVE/ACTIVE AGEING

Huge value placed on remaining active in older age; but activity is identified with solitary pursuits, and with simply being outdoors in nature; design needs to emphasise lone activities such as walks and sitting in the sun;

- PUBLIC SPACE

Public space' is not a central value across all ethnicities; much stronger valuation of a. gathering and meeting spaces, and b. functionality of routes and public features;

- SOCIAL CONNECTION

Radical difference by ethnicity, and gender within ethnicity, ranging from daily engagement in collective activities and volunteering (ethnic Dutch) to elderly women restricted to home and immediate family; often separate institutions for socialising (eg, carnival clubs versus mosques);

- SOCIAL VALUE

Age is valued in each ethnicity, but differently (eg, governmental social provision versus familial respect and care); age concerns eclipsed by ethnic divisions;

- CARE AND CITIZENSHIP

Ageing and other life issues dominated by long history of political tensions and distrust of government, and extremely complex mosaic of programmes and initiatives; public maintenance issues (litter, bad repair) immediately interpreted in terms of endemic failures of governance and citizenship;

- SHARING SPACE – IDENTITY AND OWNERSHIP

All ethnicities interpreted public space and strangers on the street in terms of ethnic tensions, crime, risk and failures of integration; for the elderly this involves 40-50 year histories of colonial and guest-work migration and of local shift to multi-ethnicity.

4.1.2 SOCIO-SPATIAL ANALYSIS:

- Wildeman is undergoing bewildering range of redevelopment initiatives; this sets context for lighting installation: interpretation of social space through history of confusion and distrust;
- The installation site is main and most direct route from sequence of apartment blocks for 50+ residents to main shopping precinct; universally recognized and used by elders; but issues of risk (particularly in dark), obstructions and disrepair result in elderly sometime taking extensive detours to neighbouring bridges;
- Lighting throughout the area is largely interpreted by residents in relation to a. multi-cultural risk issues (presence of ethnic strangers); and b. dangers of mixed-used pavements (eg, glare confuses already confusing proximity of cycles, mopeds and pedestrians on adjacent sidewalk lanes).

4.1.3 SITE SPECIFIC ANALYSIS:

- Design needs to address entire functional route from elderly housing through bridge to shopping precinct; lighting can support wayfinding that encourages the most energy efficient route that elderly residents can take; suggestions of additions to the installation site that need to be addressed by local government;
- Identification of large number of non-lighting impediments to good elderly use of this strategic route (cracked

paving and other obstacles to mobility aids; barriers on the bridge; problematically steep slope of bridge itself, lack of seating); lighting design can be used to route residents around these impediments and reduce visual confusion, but lighting needs to work more closely with wider design issues;

- Extremely dark approach to bridge is main spatial source of sense of risk; this darkness arises from bad lighting and from lack of any lighting in adjacent green spaces producing uncomfortable contrast.

4.2 DESIGN PHASE

Within this analysis, design work and consultation prioritized the following concerns:

- Reduction of visual confusion on bridge through more coherent approach to bridge, replacement of central lighting masts with handrail lighting;
- Better management of mixed traffic through cycle barriers by using a lighting column that both slows vehicles and encourages pedestrians;
- Improved wayfinding and visual comfort in road leading to bridge, allowing better navigation of impediments and greater sense of safety;
- Lighting of seating and approaches to bridge to promote sense of a gathering space or meeting point, as well as place for elderly to rest on long route to and from shopping.

The project area identified for Wildeman extends from the commercial center of Osdorper up to Osdorper Ban. The focal point of the itinerary is certainly the pedestrian bridge that connects the two banks of the canal, widely used both by day and by night, but with major problems in the dark hours as highlighted during the workshops. The intervention therefore aims to connect the two banks of the canal with a coordinated and coherent project, capable of creating a welcoming atmosphere and increasing the perceived sense of security, especially among the elderly population. In this way the project intends to create a path that connects the elements identified with a consistent approach, avoiding dark spots and enhancing the key elements.
Two principles coexist in this lighting design intervention. On the one hand the functional aspect aims to create adequate and safe lighting, in accordance with standards and regulations; on the other hand the aesthetic aspect and the idea that this portion of the city also deserves to be visually enhanced. In this way, the project also acts as a potential driving force for future intervention and redevelopment opportunities.

4.2.1 EXISTING CONDITION

In terms of a lighting intervention, the bridge and adjacent areas are due for upgrade and many areas fall under various redevelopment programmes. The lighting in general comprises very poor legacy technology, from fluorescent to poor colour rendering LED retrofit lamps. The lighting levels are also very low and generally obstructed by tree foliage. Wayfinding and orientation are poor, and the area is difficult to navigate by dark. The elderly have major visibility issues and the high lighting contrast and great darkness of the area do not support elderly citizens' mobility.
The lighting system on the bridge and the surrounding area is not adequate for wayfinding, multi-user presence or mobility vehicles. There are several dark spots on both ends and in the middle of the deck. The lighting poles are not adequate to properly light the bridge.

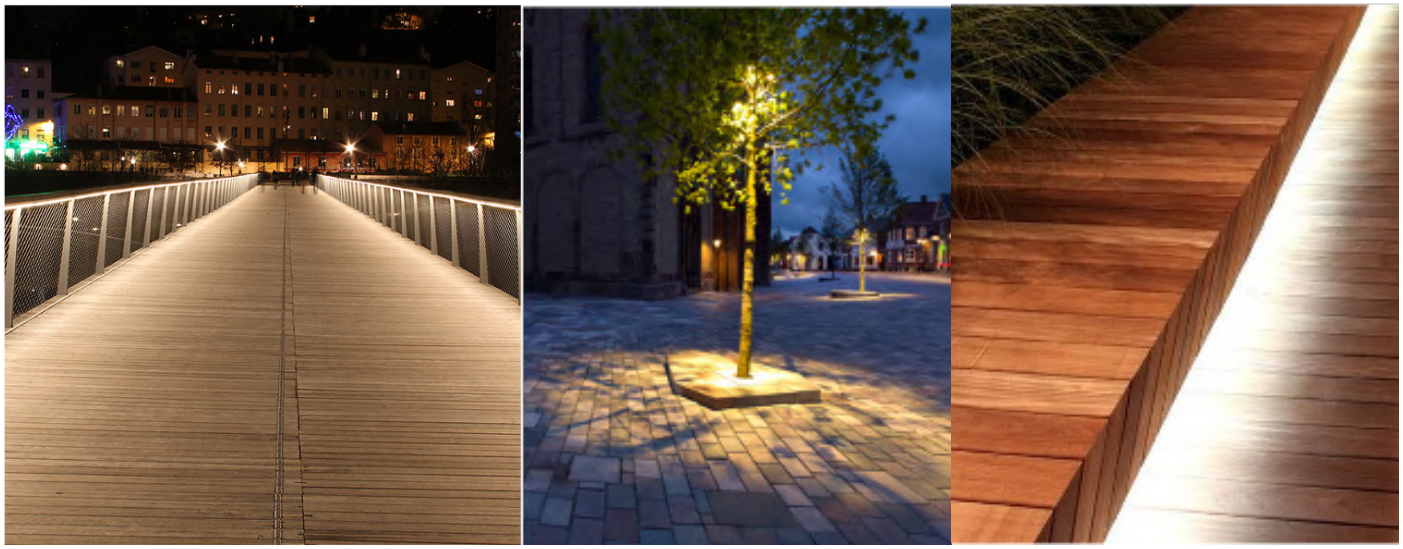
Existing lighting condition of the bridge

Notweg existing lighting condition

In Notweg, the lighting columns have great spacing and they are retrofitted with low-quality led lamps. The area is overall very dark and not uniform, due also to the tree's foliage that is blocking the light emission.
Some of the residential entrances are brightly lit, while the green edges on the opposite side are totally in darkness. This creates a very high contrast and unbalanced situation.
The green edges and the openings to some play areas create a sense of unease and unsafety for the elderly, who prefer not to walk in the dark.

4.2.2 LIGHTING PRINCIPLES

The project intends to create a warm and welcoming atmosphere for the user. The key element of the route is the pedestrian bridge, which requires a significantly different approach to the existing situation. Following both the functional and aesthetic approach, the project envisages linear and uniform lighting, improving the technical performance of the current system and making the bridge a clearly recognizable landmark at night. On both banks of the canal, it is necessary to intervene to avoid the current dark condition and therefore create an illuminated and recognizable background, to increase visibility and allow the identification of obstacles.



Reference images

Along pedestrian paths, the principle of light provides for delicate and uniform lighting, capable of adequately illuminating the paths without creating glare and favoring vertical lighting, which is essential for recognizing faces and therefore for increasing perceived safety. Finally, the introduction of unconventional lighting elements such as festoon lighting makes it possible to create an informal and interesting environment, adding character to a place that, currently, does not have recognizable elements at night.

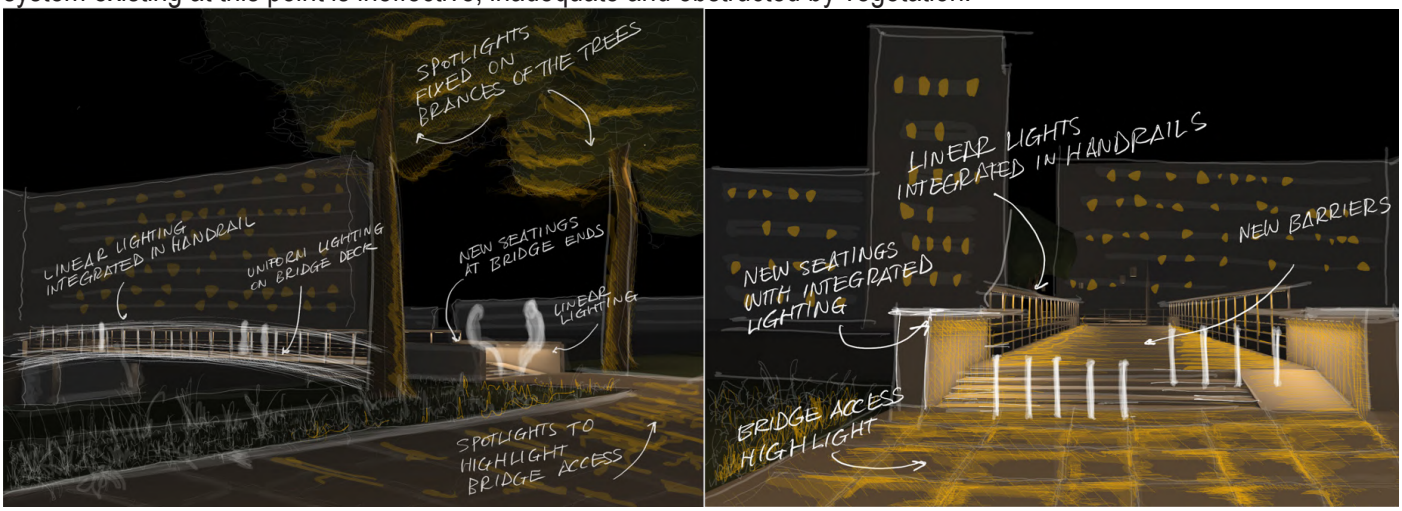
Reference images

4.2.3 PROJECT DESCRIPTION

The intervention involves the retrofitting of existing lighting fixtures in some points and the introduction of new light points in others.

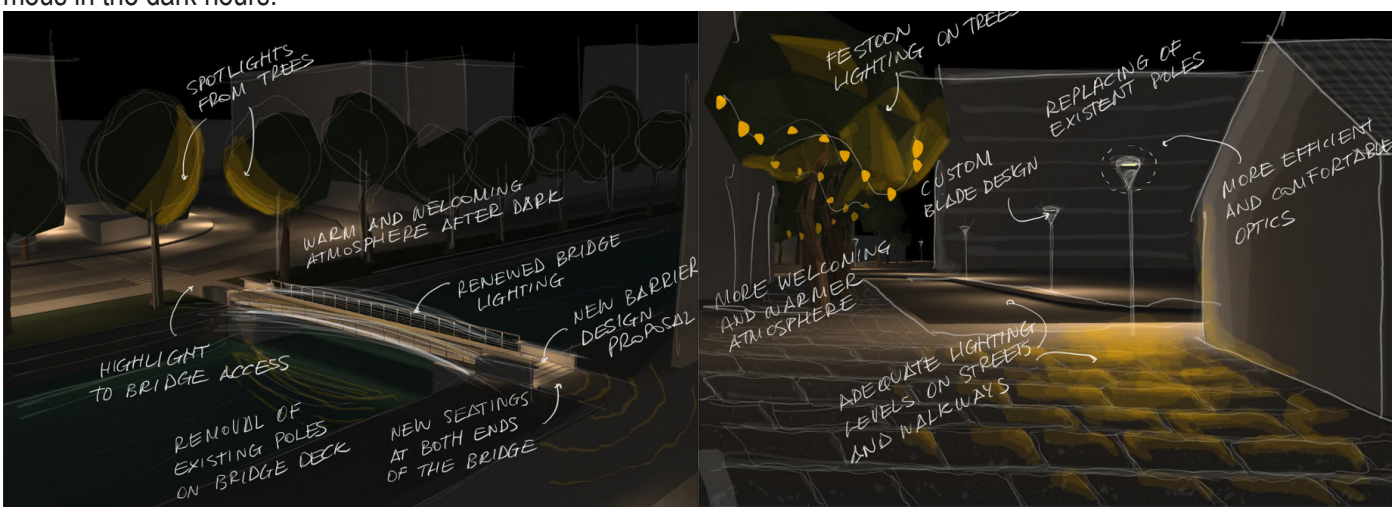
The current lighting system of the bridge is inadequate both for the quantity and the quality of light. The project involves

the removal of the two existing poles in the center of the bridge. This system turns out to be obsolete in terms of optics and luminous flux, making the bridge dark and unpleasant in the dark hours. The new intervention provides for uniform and continuous lighting along the entire extension of the bridge. There are linear LEDs integrated and hidden in the handrail capable of providing adequate lighting for users and making the bridge itself a landmark element in the nocturnal context of the neighborhood.
At the two landings of the bridge, seating is provided near the ramps and stairs leading to the bridge. The lighting in these areas is in continuity with the bridge. The linear LED of the handrails continues to integrate into the wooden seats and create a welcoming area for users crossing the bridge. On the shopping center side, floodlights attached to the tree bases in the bridge access area are also planned. This choice, in addition to increasing the lighting levels at the pedestrian crossing, is useful for giving the area a particular character. Lastly, still in correspondence with the pedestrian crossing, the introduction of a street pole on the sidewalk on the side of the shopping center is envisaged, capable of increasing the illuminance values and guaranteeing visibility to pedestrians crossing the street since the street lighting system existing at this point is ineffective, inadequate and obstructed by vegetation.



Bridge lighting concept

Between the bridge and Osdorper Ban, on the other hand, the retrofitting of the lighting fixtures is planned with new LED heads with symmetrical optics and the possibility of adjusting the color temperature and emitted flux. This intervention, in addition to significantly increasing the energy efficiency of the luminaires, allows dynamic control of the lighting, providing the possibility of creating pre-set lighting scenarios according to the needs of the residents, especially the elderly. Furthermore, these luminaires will be characterized by CRI 90, capable of providing natural color rendering, significantly higher than the performance of the existing system. The optics of these luminous bodies, in addition to guaranteeing adequate levels of illuminance on the road surface, provide high illuminances on the vertical plane, increasing the recognition of faces and, therefore, the perceived safety.
The intervention proposal is completed by the introduction of festoon lighting on the rows of trees in Notweg.This choice allows to create an informal and welcoming atmosphere, adding character and value to a place that appears anonymous in the dark hours.



Bridge lighting nd landing conceot

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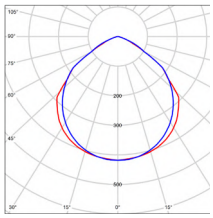
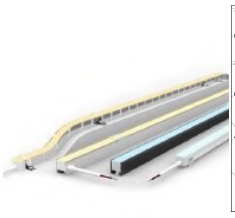
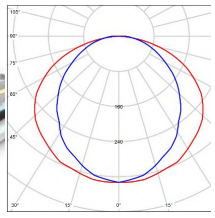
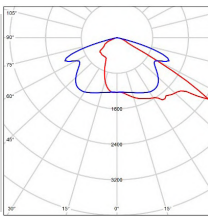
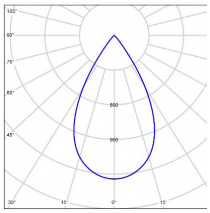
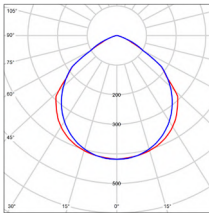
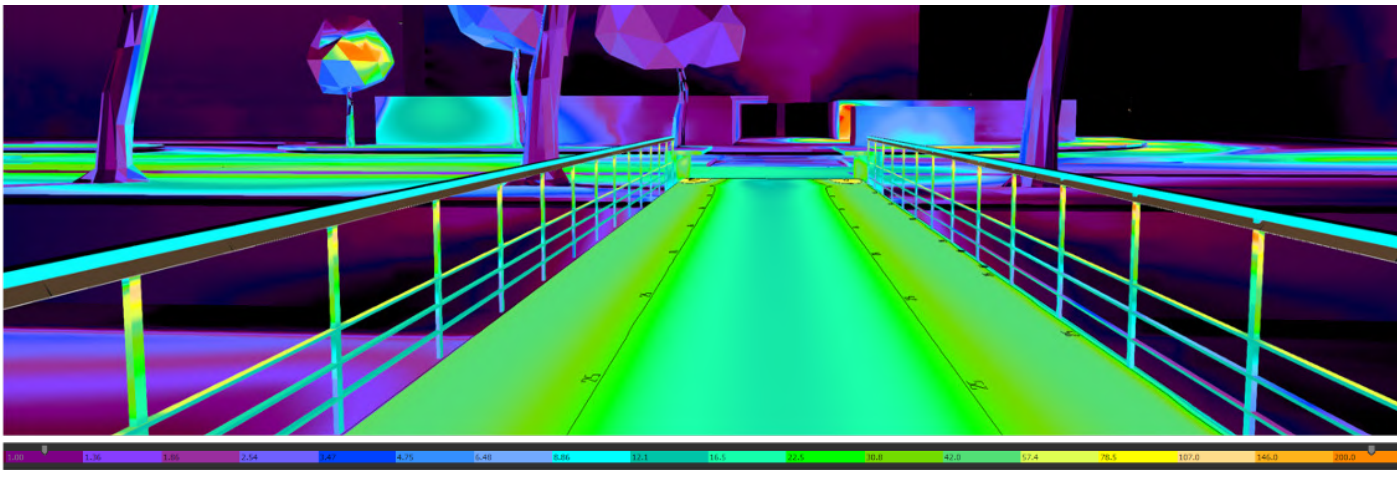
					
Optic	2x type III	*Optic*	120°	*Optic*	Type IV
Power	56 W	*Power*	15 W	*Power*	76 W
Flux	5500 lm	*Flux*	902 lm	*Flux*	9000 lm
TCC	TW (2200K - 4000K)	*TCC*	TW (2700K - 5300K)	*TCC*	3000 K
CRI	90	*CRI*	80	*CRI*	90

LUCE & LIGHT GINKO 3.0		INTEGRAL LED GOLF BALL	
			
Optic	42°	*Optic*	Clear
Power	15 W	*Power*	4.9 W
Flux	1343 lm	*Flux*	470 lm
TCC	2700 K	*TCC*	2700 K
CRI	90	*CRI*	80

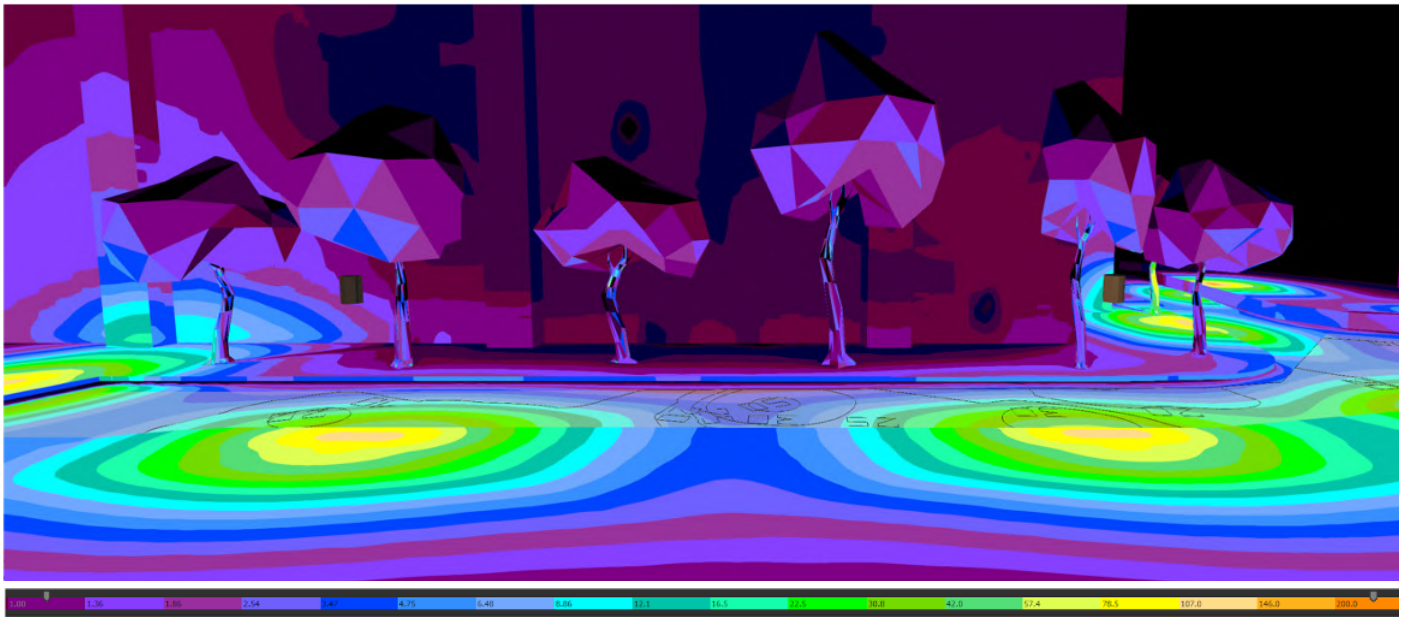
4.2.4 RESULTS

The technical performance of the lighting proposal has been analysed using a lighting simulation software (Dialux EVO version 11.2).

Software calculation shows how the new lighting proposal with luminaires integrated into the handrails and seat guarantees to light in line with the regulatory requirements and very uniform, especially at the parapets. The light fades gently towards the center of the bridge, continuing to guarantee adequate illuminance values. Furthermore, the choice of the type of luminaires and their position avoid glare phenomena for users, increasing visual comfort, especially for the elderly.



Software calculation



Software calculation

The image above illustrates the lighting with the new heads installed on the existing poles. Also in this case the simulation confirms compliance with the illuminance values established by the regulations. Furthermore, it can be seen how the optics are functional for illuminating the street level and the sidewalk, without spill-light on the facades of the buildings.

4.2.5 FUTURE OPPORTUNITIES

In addition to the intervention proposal described above, the results of the site inspections and the feedback from the workshops underlined other areas that may be the object of potential future interventions.

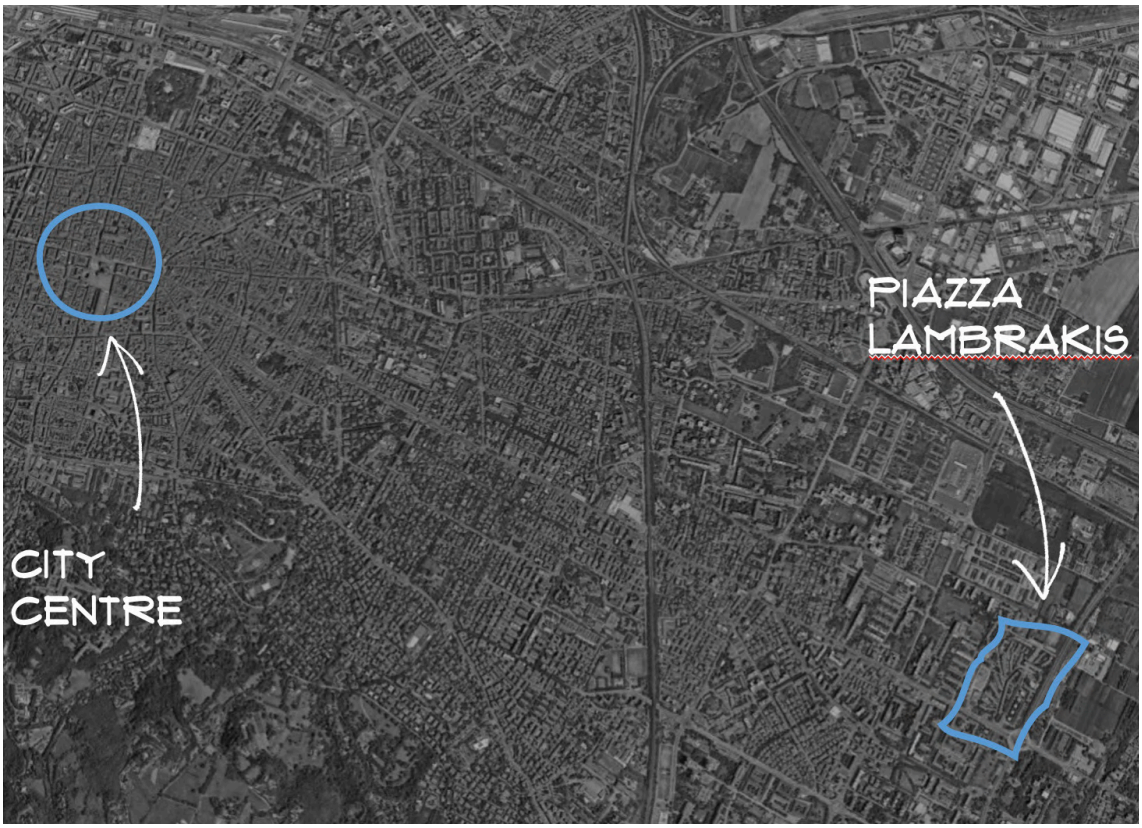
In particular, the elderly who participated in the workshop highlighted the difficulty of accessing the bridge due to the barriers on both sides. Although they have the preventive function of reducing the speed of cyclists, these barriers create access problems due to their shape and position, causing long queues, especially for the elderly in wheelchairs or with mobility aids. The redesign of these barriers with more functional elements would improve significantly the accessibility

Barrier of the bridge

5. BOLOGNA

Extension of the project: 30.000 m^2
Lighting points: 103

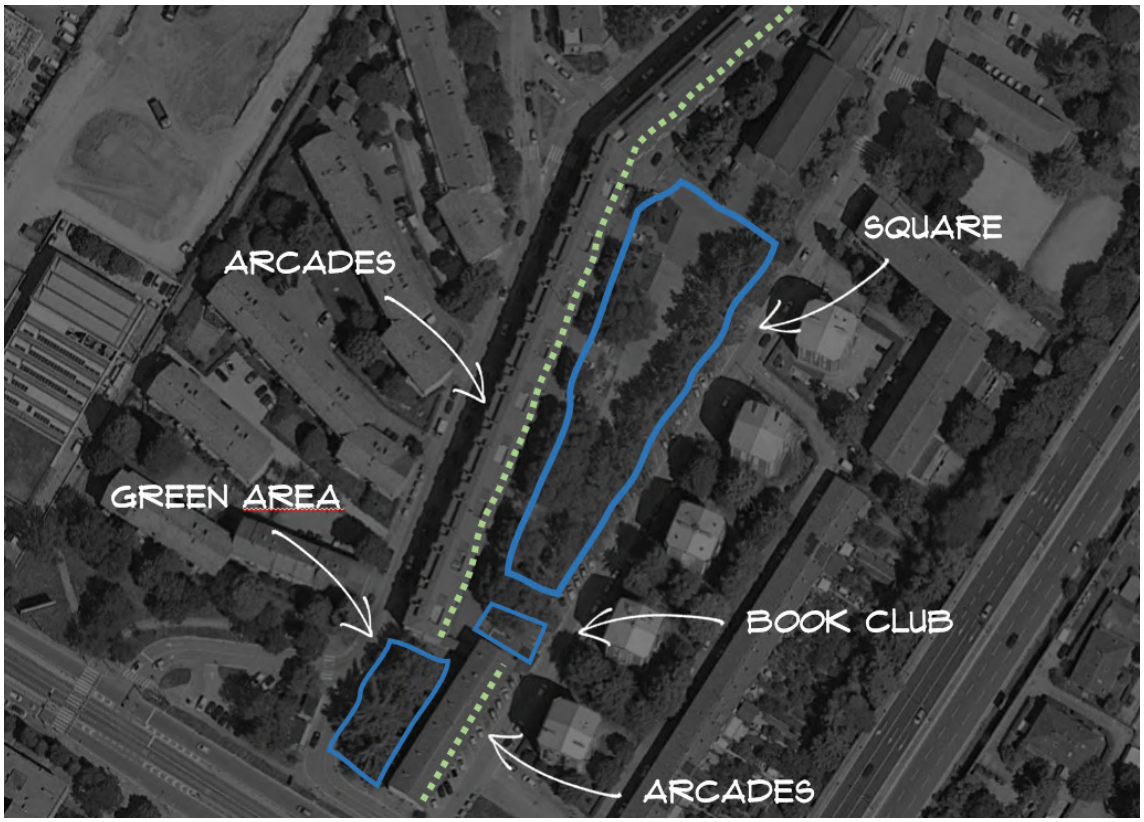
The selected district for the Bologna ULL is Savena, a suburb of the city about 14 kilometres from the centre. As with the other two sites, Savena is a modernist post-war development of 5-9 storey apartment blocks surrounded by open spaces. It is mostly residential with some commercial property around Piazza Lambrakis, the site chosen for lighting intervention.



The district in relation to the city centre

In terms of demographic, social and economic indicators, most areas in the neighbourhood score middle-high to high values on the demographic fragility index supplied by the Municipality of Bologna. The Savena neighbourhood has a population of around 60,000 people, with an age average of 48,7 (well above the city's average of 46,9). Average per-capita income is slightly below the average, as is the percentage of graduates and the employment rate. On the other hand, the percentage of families with per-capita income below threshold is lower than the city's average.

Within Savena, the area selected for the ULL and lighting intervention is Piazza Lambrakis and adjacent areas. As reported in Annex 1, the statistical area N.80 'Due Madonne', in which Lambrakis square is located, had a population of 3,100 inhabitants at the end of 2020. The rectangle-shaped area is located at the north east of the neighbourhood, clearly bounded by large roads. As for the district as a whole, the Due Madonne area has a high demographic fragility index. Social indicators show high foreign population turnover, and percentage of single-parent families and health fragility above the city's average. The remaining indicators are within or slightly below the city's average, resulting in an overall index of social fragility within average. Economic indicators are around or slightly above the city's average, resulting in an economic fragility index within or slightly below average.



The case study area

5.1 SOCIAL RESEARCH AND COMMUNITY ENGAGEMENT BASIS FOR BOLOGNA LIGHTING DESIGN

Details of research and engagement activities can be found in the Appendix. The following discussion is not a comprehensive analysis of the research and engagement material, but rather focuses on the findings that were most formative for design discussions, strategies and final decisions. In the interest of brevity, most items are listed as bullet points. The discussion is organised in accord with the methodology presented in the introduction to this deliverable, comprising three levels of interconnected analysis.

5.1.1 THE SOCIAL ORGANIZATION OF AGEING IN BOLOGNA

- BEING ACTIVE/ACTIVE AGEING
  'Being active' is largely understood by the elderly as the ability to maintain informal social connections by participating in everyday interactions in the square, taking walks and chatting;
- PUBLIC SPACE
  Enormous value accorded to public space, particularly Piazza Lambrakis as heart of the 'village'; appreciation of mixed and intergenerational use despite tensions over children in the square;
- SOCIAL CONNECTION
  Elders emphasize informal social connections through every day encounters in the square and regular meeting spots going back generations; parallel social network through parish institutions which are in some tension with informal sociability in Lambrakis;
- SOCIAL VALUE
  Much less sense of under-valuation of the old than in other cities but some resentment if too many facilities are seen to go to the children;
- CARE AND CITIZENSHIP
  Elders look to family and informal networks for support rather than social or health services;
- SHARING SPACE – IDENTITY AND OWNERSHIP
  Strong awareness that the older generation of long-time inhabitants is gradually dying out while new waves of students, gentrifiers and refugees are moving in (exemplified by new tower blocks in process of construction); considerable tolerance mixed with nostalgia and loss.

5.1.2 SOCIO-SPATIAL ANALYSIS:

- Piazza Lambrakis is highly valued aesthetically, socially and practically; elder residents are very reflexive and articulate about the complex patterns of spatial use;
- Very effective informal zoning of space and time in the piazza between different users and uses; lighting design needs to acknowledge and support this informal structuring;
- Whereas Lambrakis was once the centre of local retail and commercial activity, the centre of such activity has shifted to external supermarkets and malls; the possibilities of re-activation, and dangers of further decline are of everyday concern to older residents;

5.1.3 SITE SPECIFIC ANALYSIS:

- The current atmosphere of the square ('The little Paris') is much loved and needs to be preserved; aesthetic judgements on quality and location of light were far more explicit here than in the other target districts; this aesthetic was shared across the generations;
- Residents were aware of very specific locations that could be supported through lighting, such as sitting spots, an activity area, the arcade;

5.2 DESIGN PHASE

Within this analysis, design work and consultation prioritized the following concerns:

- Need for a design that addressed and respected elderly residents very explicit concern with lighting aesthetics, a desire to maintain a cosy, intimate, friendly and attractive atmosphere through warm and human level light;
- The design needs to respect current zoning of the space given a clear ecology of mixed and intergenerational use; design was explicit oriented to social research findings about current use, as the gathering area at the end;
- Lighting design needed to support a desire for reactivation, or at least preserving the current sense of social dynamism, particularly by providing an attractive and animating renovation to the arcade.

The intervention focuses on the square and the surrounding areas. Following the information collected during the workshops, the proposal intends to solve the problems related to poor lighting in the access areas to the square and to give the square that sense of a Parisian village, as the elderly like to define the square. Therefore, in addition to the square, the intervention extends to the buildings arcades in via Dallolio and via Tacconi, the green area in front of the newsstand and the gathering point near the statue. The current lighting is not critical in terms of the amount of light inside the square or under the arcades, but the lighting effect and the lighting fixtures do not contribute to creating a welcoming atmosphere in the square.
In particular, the new design aims to create dynamic lighting, capable of creating a well-recognizable character and encouraging the use of the spaces by the elderly population even in after dark hours, with activities that cannot be carried out with the existing lighting system.

Existing daylight site visit

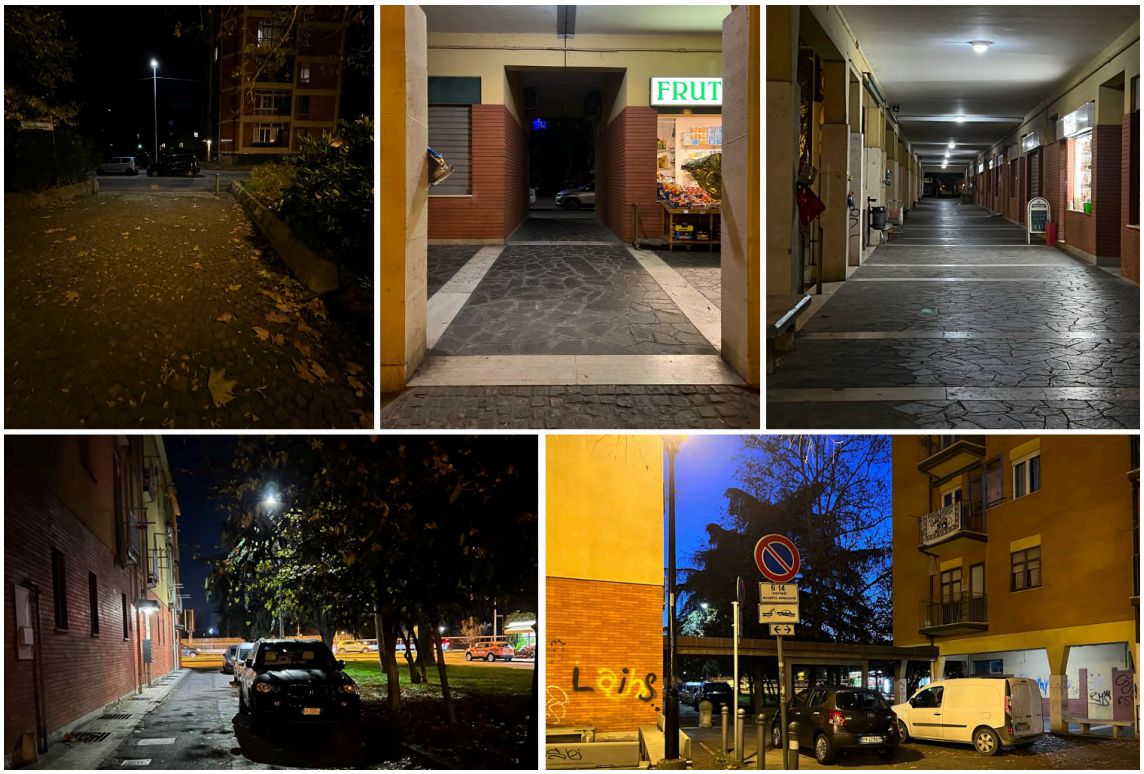
5.2.1 EXISTING CONDITION

Piazza Lambrakis is lit with pedestrian-style columns. These are still legacy technology, being low pressure sodium. The lighting level is high and generally the area feels safe, but does not support any activities the citizens are using the square for (play, book club, table games, street market, …)

Existing lighting condition in the square

The arcade ceiling-mounted lighting consists in ceiling mounted plastic bulkhead with fluorescent sources. This old technology is inadequate and not atmospheric. Citizens complain about being dark and not safe. The lack of activities and lit shopfronts is also problematic.

Via Tacconi / Via Dallolio have new street lighting. The recent retrofit with LED is one of the items citizens are complaining the most. The City of Bologna got complaints about low level lighting and very glary and cold white colour of light.



Existing lighting condition in access areas

5.2.2 LIGHTING PRINCIPLES

The project aims to give the square the character of a Parisian village at night, both through the lighting effect and the shape of the luminaires.
In the square, therefore, the focus is on warm lighting, capable of adapting to other lighting scenarios should particular activities require it. The lighting fixtures' shape recalls historic lanterns, while still guaranteeing the high technological performance typical of LEDs.
Indirect lighting is proposed for the arcades, to create a visually pleasing background for users of the square and functional for those walking along the shopfronts.

Reference images

For gathering points and green areas, the goal is to create functional lighting for the ongoing activities through multi-head poles, while maintaining a warm and welcoming character. In the currently unlit green area, these luminaires will provide functional light to increase the sense of security.

Reference images

5.2.3 PROJECT DESCRIPTION

The intervention in the square intends to maintain the existing poles and replace the head with classic-shaped lanterns equipped with a dynamic LED module, capable of regulating the flux and color temperature.

For the experimentation phase, half of the fixtures will be equipped with CRI 80 and the other half CRI 90. This distinction will help the study to evaluate whether the difference in color rendering is perceptible by users, especially the elderly. During the year of testing, people's habits will be analyzed and the most crowded areas of the square will be

studied. Furthermore, the system will be divided into separate control groups to switch off some luminaires and evaluate the impact on users.

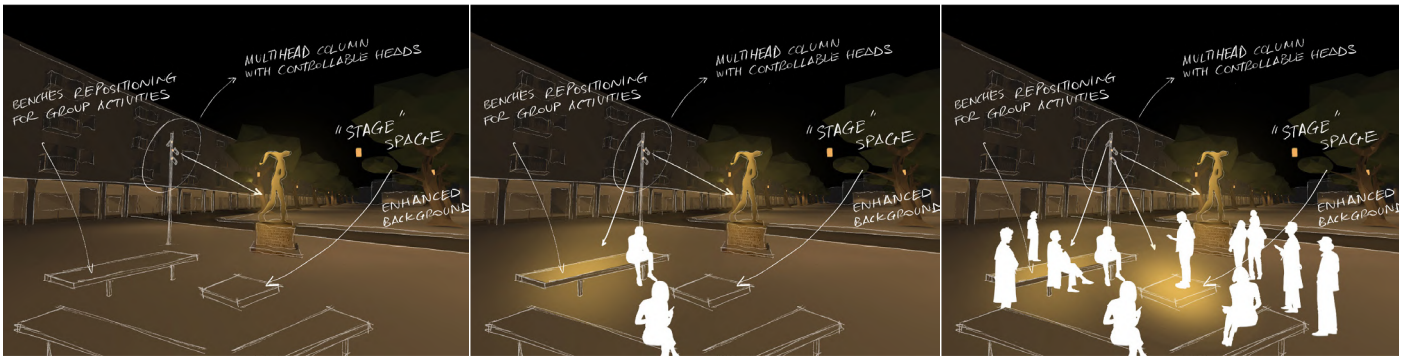
Projectors will be installed on the pillars of the arcade. The path lighting will therefore be indirect, to guarantee very high levels of uniformity on the ground and avoid glare effects (very disturbing in the evening hours for the elderly population). This solution will completely replace the existing system, which is ineffective and inadequate. Furthermore, new light points are also planned in the paths that connect the square to via Dallolio, guaranteeing a gradual adaptation time to the different lighting conditions and thus avoiding disorientation phenomena. The lighting for the arcade will thus be in line with the lighting of the square in terms of levels and color temperature. The arcade will become a scenic background in continuity with the square, giving a new feeeling of welcome and new life within it.

Square lighting concept

Arcades and access area lighting concept

For the gathering area near the statue dedicated to Lambrakis, the intervention involves the repositioning of the existing benches to be oriented towards the square, which in the evening will offer a pleasant visual background. This choice derives from a request that emerged during the workshops: the elderly community organizes meetings and public readings, especially on summer evenings. The new arrangement will ensure a more comfortable layout. Also, a multi-head pole with three LED spotlights will light this space. Each luminaire will be in separate circuit. Users will be able to adjust lighting, fluxes and color temperatures of each spot, depending on the activity in progress.

The same multi-spot poles are proposed in the green area in front of the newsstand. The area has been subject to much criticism due to the darkness and lack of security.



Book club area lighting concept

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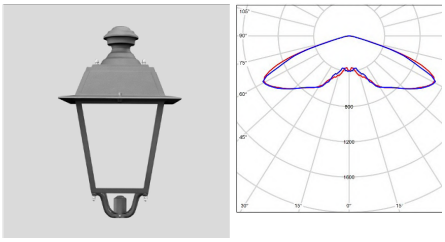
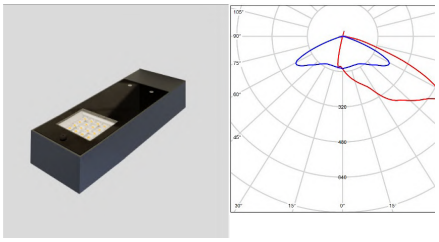
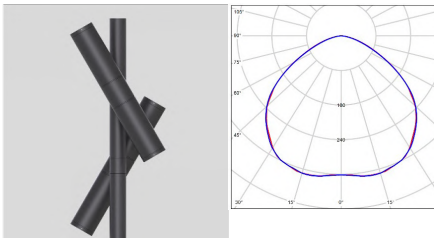
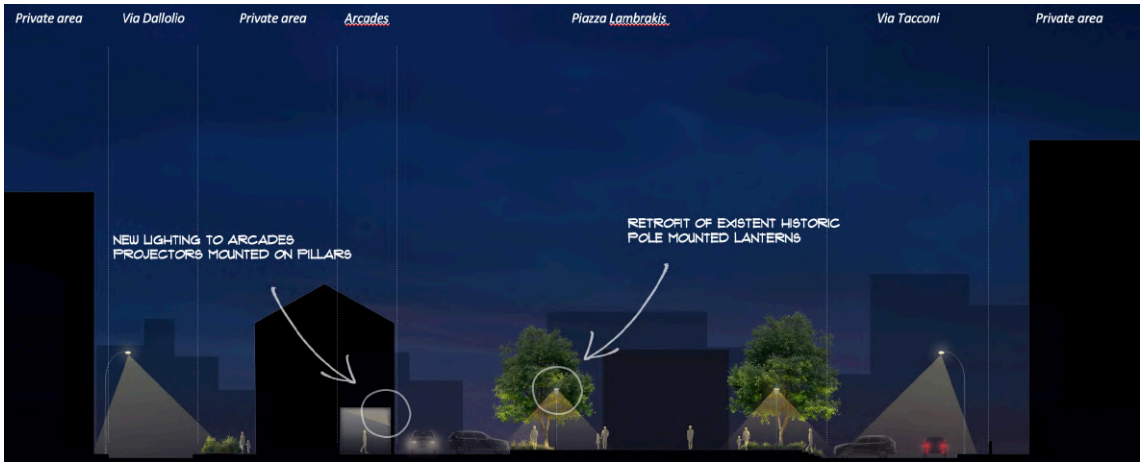
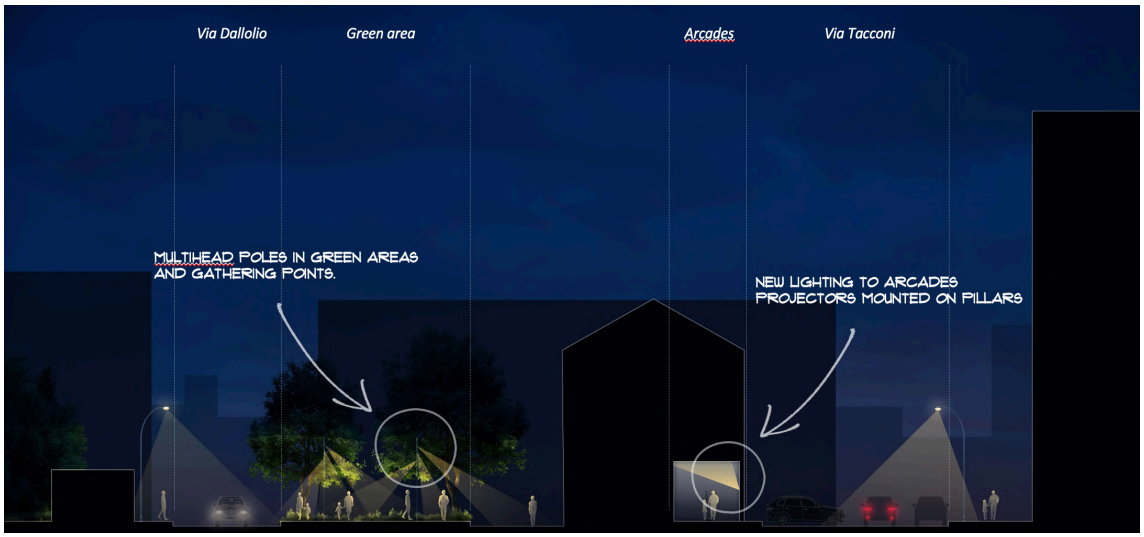
					
Optic	Type V	*Optic*	Type IV	*Optic*	Type V
Power	44 W	*Power*	15 W	*Power*	39 W
Flux	4500 lm	*Flux*	1000 lm	*Flux*	2464 lm
TCC	TW (2200K - 4000K)	*TCC*	TW (2200K - 4000K)	*TCC*	TW (2200K - 4000K)
CRI	90	*CRI*	90	*CRI*	90



Lighting concept - Section 1

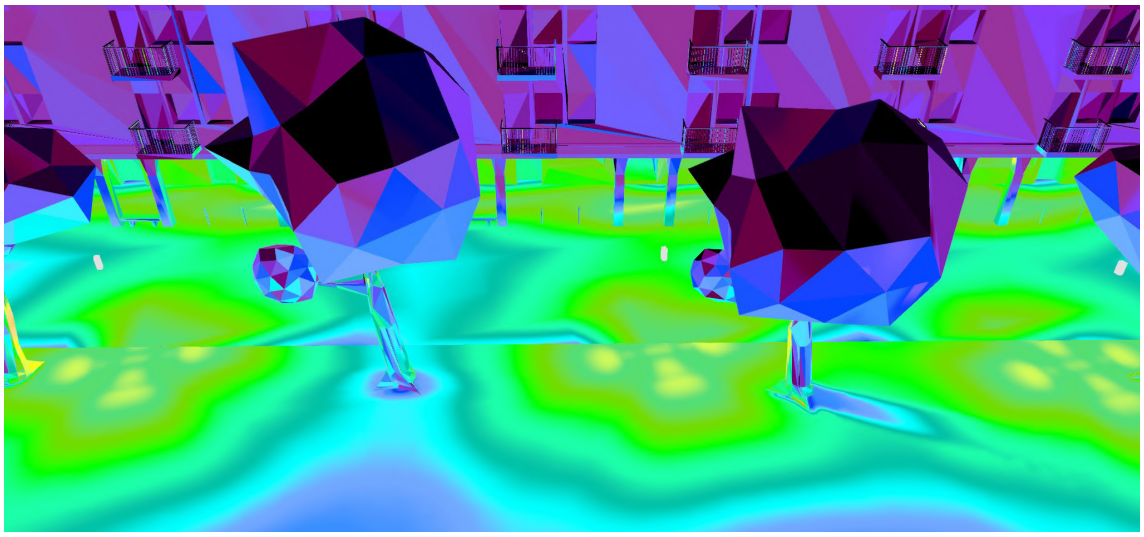


Lighting concept - Section 2

5.2.4 RESULTS

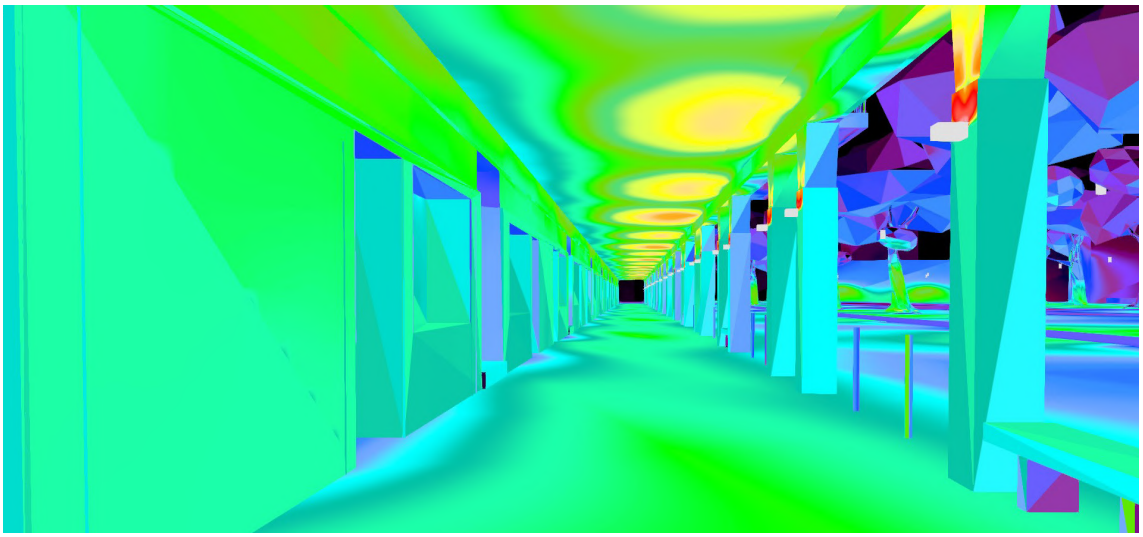
The intervention proposal was analyzed on a lighting simulation software.

The results show how the proposed lanterns in the square ensure adequate levels of horizontal and vertical illuminance. In some points the results are even higher than the indications of the regulations. This data could be investigated once installed to gradually reduce the emitted flux and evaluate the reaction of users.



Software calculation

The indirect lighting of the arcade simulated in the software shows values in accordance with the standards and a very high uniformity. The results highlight also high vertical illuminance values, useful for prompt identification of the faces of people walking under the arcades.



Software calculation

5.2.5 FUTURE OPPORTUNITIES

Both the in situ analysis and the outcomes of the workshops have highlighted the presence of some points that may be the subject of future redevelopment interventions.

In particular, the elderly population has shown a strong bond with the tree in the center of the square (the inhabitants of the neighborhood usually decorate it during the holidays). In the future, this element could be given renewed centrality by including a circular bench with integrated lighting. This solution was received positively during the workshops, the elderly believe that it can be a good solution to encourage moments of aggregation even in the evening hours.

Reference images

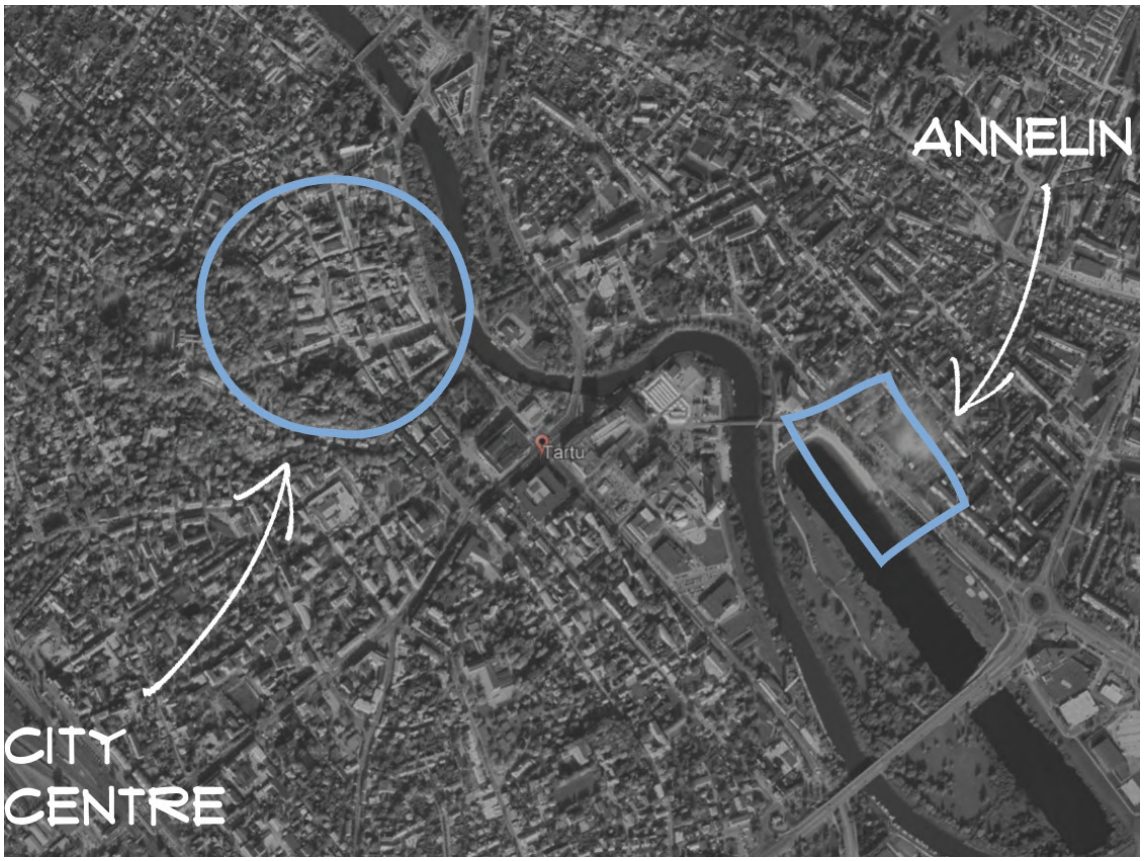
The recent retrofitting of the street poles has been highly criticized by the elderly population, who has not yet gotten used to the transition to 4000K light. An agreement has already been reached with the municipality of Bologna for the replacement of the street lights around the square with 3000K LEDs.

Streetlight in Via Tacconi

6. TARTU

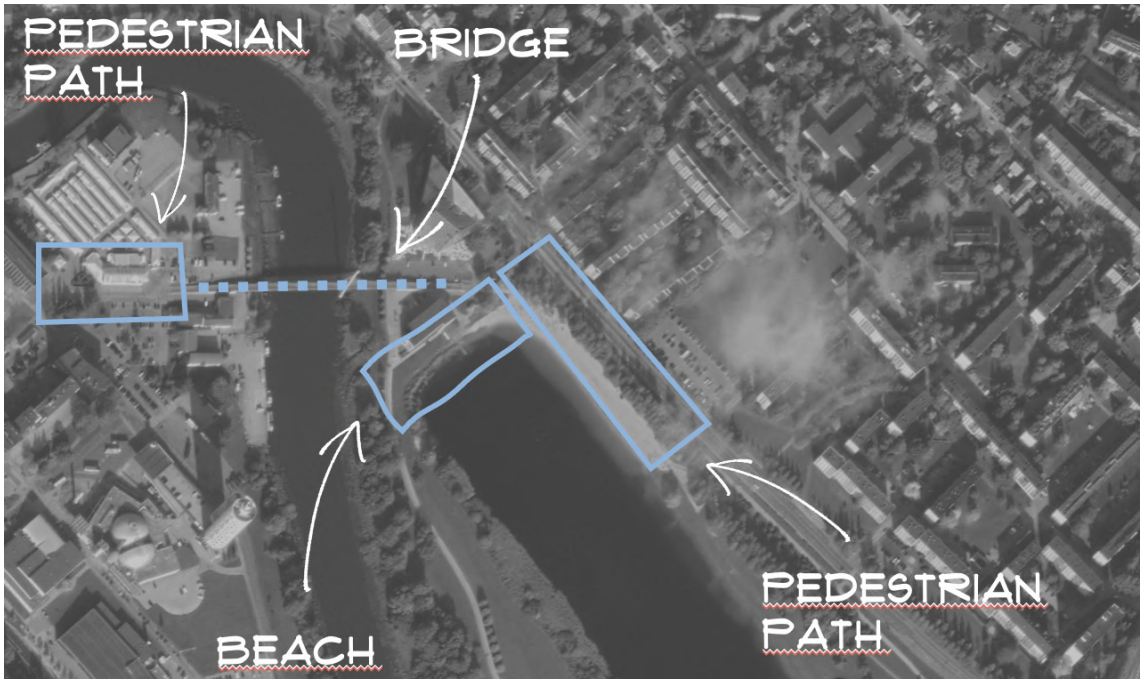
Extension of the project: 35.000 m^2
Lighting points: 96

Tartu Urban Region is the second major economic hub in Estonia but with a long-term reputation as a culture and intellectual centre of the country largely due its venerable university. The term-time influx of thousands of students has increased demand for housing, despite overall declining city population, and is also part of a generally skewed demographic distribution.



The district in relation to the city centre

Annelinn is the selected target district, with a population of 24.551 inhabitants. It typifies the majority of the housing stock in Estonia and the city in that it originates from the socialist years, having been built up in the 1970s and 1980s. The site is located along the Anne Kanal (a man-made body of water that is widely used for swimming (summer and winter) and for ice-based activities in winter. At one end, the Turusild pedestrian bridge, constructed in 2003, crosses the Emaj~ogi river to connect Annelinn first to the extensive public markets on the other side, and more generally to Karlova District, the city commercial centre and the city heritage centre. As a result, Turusild build is the main pedestrian and bicycle link between Annelinn and the city.



The case study area

Additionally, the site along the Anne Kanal was developed as a multiple usage site, known as Anne Kanal Rand ('the beach'): the main amenities are a sauna, winter swimming area, a sandy beach/lido, children's playground, exercise/ sports grounds, a river shore path that circles the canal, and a popular kiosk, as well as benches and paths.

6.1 SOCIAL RESEARCH AND COMMUNITY ENGAGEMENT BASIS FOR TARTU LIGHTING DESIGN

Details of research and engagement activities can be found in the Appendix. The following discussion is not a comprehensive analysis of the research and engagement material, but rather focuses on the findings that were most formative for design discussions, strategies and final decisions. In the interest of brevity, most items are listed as bullet points. The discussion is organised in accord with the methodology presented in the introduction to this deliverable, comprising three levels of interconnected analysis.

6.1.1 THE SOCIAL ORGANIZATION OF AGEING IN TARTU

- BEING ACTIVE/ACTIVE AGEING
  Huge value placed on remaining active in older age; but activity is identified with solitary pursuits, and with simply being outdoors in nature; design needs to emphasise lone activities such as walks and sitting in the sun;
- PUBLIC SPACE
  Not experienced by older people as collective space or space for socialising; public space is for individual routines and pathways.
- SOCIAL CONNECTION
  Often extreme social isolation after retirement, with variable support from family and social services; once activity levels decline, many people are housebound; low level of participation in social organizations such as clubs and group activities;
- SOCIAL VALUE
  Strong belief that the future lies with youth, and that investment in older people is misplaced; elders feel undervalued; design should support elders' 'right to the city';
- CARE AND CITIZENSHIP
  Annelinn in general, the intervention site in particular, have visible dilapidation which is of concern to older people and detrimental to use of public space;
- SHARING SPACE – IDENTITY AND OWNERSHIP
  Annelinn is understood to be changing (incursion of students, gentrifiers, refugees); fear of crime (with little evidence of actual risk) requiring design that is reassuring but not over-reacting to security concerns

6.1.2 SOCIO-SPATIAL ANALYSIS:

- Annelinn characterised by large, featureless open spaces between modernist housing blocks, with very dispersed shopping and few urban features allowing socialising; long pedestrian routes are increasingly difficult with increasing age and under winter conditions, thus increasing isolation;
- The site (beach and bridge) is universally familiar to and valued by older residents, and incorporated into frequent routines;
- Routine, sometimes daily, use of bridge for shopping and other visits to central Tartu, and to market across the river; connected to wide range of pedestrian and bus routes;
- The beach is valued by active elders for a range of leisure activities, seasonally varied;

6.1.3 SITE SPECIFIC ANALYSIS:

- Design needs to deal with separation of pedestrian and cycle traffic;
- Lighting is experienced as uncomfortable because confusing and unrelated to activities;
- Lighting dies out between bridge and path, and on continuation paths that residents would otherwise use; lighting needs to be coherent and continous along the path and after and before the bridge and be legible and identifiable;
- Strong appreciation of the bridge and its design; awareness of disparity between lighting of this bridge and historic bridges elsewhere in Tartu: lighting needs to deal with this reflection of lack of value given to Annelinn as compared to other districts and create a new landmark for Tartu and for Annelin

6.2 DESIGN PHASE

Within this analysis, design work and consultation prioritized the following concerns:

- a design that enhanced individual routine activities such as walking to Tartu market and centre and enjoying outdoor atmosphere around the Kanal by providing coherent lighting which reduces confusions over wayfinding and zoned uses;
- reduction of light pole heights and diffusion, and reduction of glare to support individual pedestrians;
- use of lighting to separate cycling and pedestrian lanes;
- more dramatic and aesthetic lighting of bridge to make it a valued feature in relation to other bridges in Tartu.

6.2.1 EXISTING CONDITION

The lighting varies in terms of technology, lighting levels and fixture typology. Some of the fixtures are really old and still mounted on wood or concrete columns. The area of the beach is particularly old and not maintained.
Street lighting is generally up to date with LED fixtures. The existing lighting is merely functional and lacks completely of atmosphere, sense of place and doesn't highlight the context. Furthermore, the lighting does not support all the activities that are happening in the area and does not take into considerations the conflicts between pedestrians, cyclists and car traffic.

Existing lighting condition - lake

The lighting on the bridge is brutal and the lighting level high in comparison to the context. The lighting conditions in Tartu varies sensibly from summer to winter due to the large amount of ice and snow at the ground level increasing massively the reflection and therefore the luminance of the area.

Existing lighting condition - bridge

6.2.2 LIGHTING PRINCIPLES

The project aims to create a lighting system that supports the activities that take place around the lake, especially in the winter months

.

For the functional lighting of the paths, the project intends to create a warm and welcoming atmosphere. An adaptation zone is needed at either end of the bridge to prepare the user for a change in lighting. The luminaires for lighting the pathways will also have an aesthetic-symbolic function, with customized blades in which Annelin's identity graphics can be inserted.

Around the lake, where many activities take place, dynamic lighting is needed that adapts to the needs of the community. Multi-head poles are suitable for this area due to their flexibility and ability to change the aiming. Furthermore, the optics of the projectors allow for the creation of punctual lighting capable of giving greater prominence to a specific activity in progress.

The lighting of the bridge must respond to functional and aesthetic needs. A system of luminaires integrated into the handrails will ensure adequate levels of lighting levels for users. In addition, scenographic lighting is provided to illuminate the pylon. Consequently, the bridge becomes a landmark element of the city. The lighting will be able to change color according to the calendar and become an element that characterizes the new identity of the place.

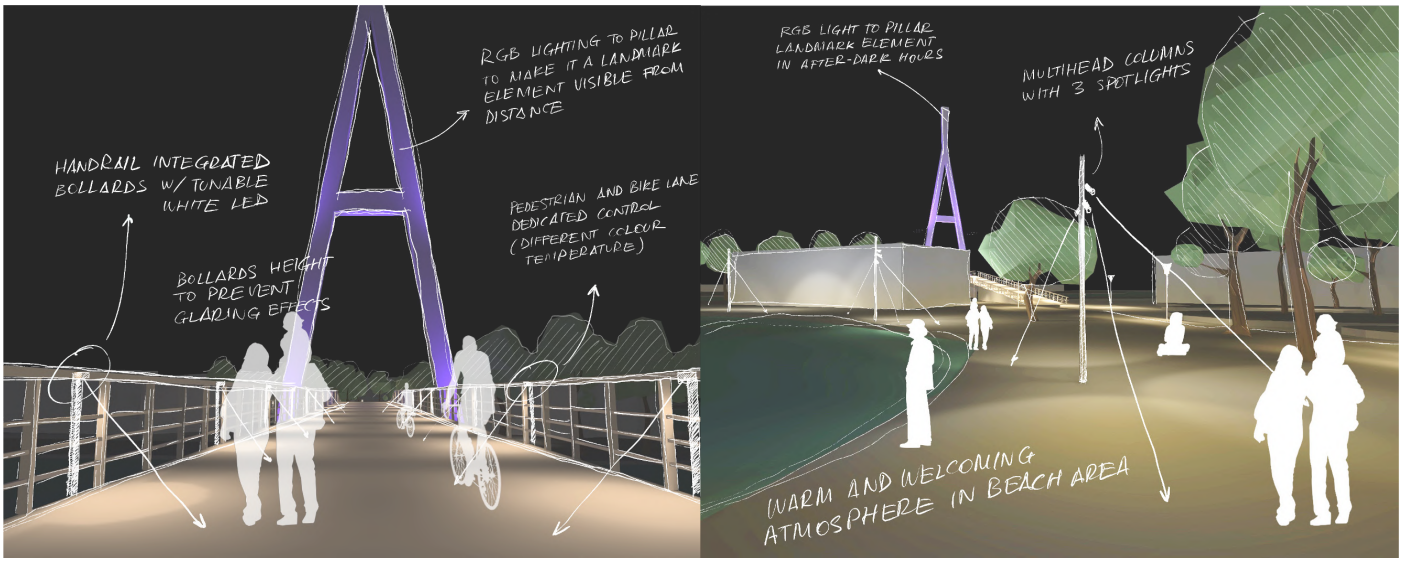
Reference images

6.2.3 PROJECT DESCRIPTION

Annelin's lighting design proposal involves new luminaires for the bridge and the beach and retrofitting of the existing poles for the pedestrian paths.

The current lighting system of the bridge is obsolete and inadequate. The proposal envisages the positioning of bollards integrated into the structure of both parapets with a 10m pitch. This solution guarantees satisfactory lighting levels for the transit of pedestrians and cyclists. Their position also prevents glare. The bollards are dynamic and can be tuned in the flux intensity and color temperature. The two lines are on separate circuits. To avoid the risk of collisions between pedestrians and cyclists and make the two lanes distinguishable, the testing phase will experiment distinct color temperatures.

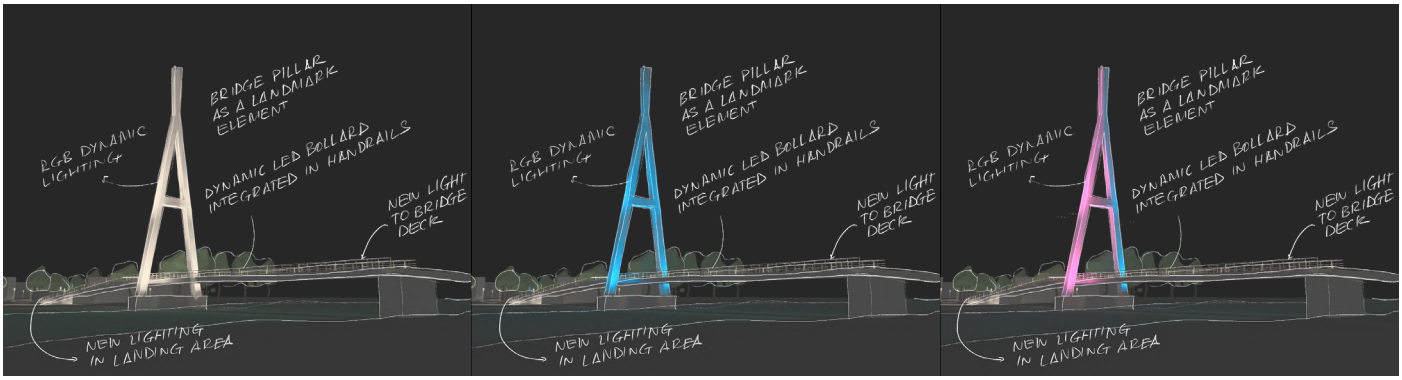
The scenographic lighting of the bridge will be ensured by RGBW projectors placed on the base of the pillar. The control of these projectors will allow to adjust the color of the light and illuminate the structure with dynamic lighting scenarios. In this way, the bridge becomes a landmark element in the urban context, clearly visible in the dark.



Bridge and beach area lighting concept

Existing post heads will be retrofitted in pedestrian paths. At the two ends of the bridge, the emitted flux will guarantee a filter zone to help the user's eye adapt to the illumination of the bridge.
In the path near the lake, on the other hand, the flow will guarantee adequate lighting values and create a warm and welcoming atmosphere. Furthermore, the possibility of customizing the blades of the heads is an opportunity to make the luminaires characteristic and show the identity symbols of the place.

Pedestrian path lighting concept



Bridge lighting scenarios concept

Finally, multi-head poles are proposed on the beach. This solution can support the many activities currently taking place by the lake. The floodlights light the area in a directional way, increasing the focus on the specific activities in progress. The control system allows to adjust the luminous flux and the color temperature, thus specific lighting scenarios can be set according to the calendar.

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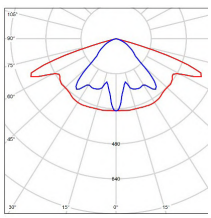
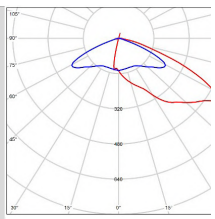
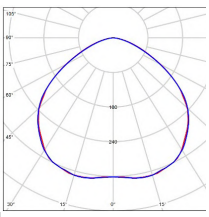
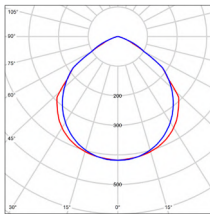
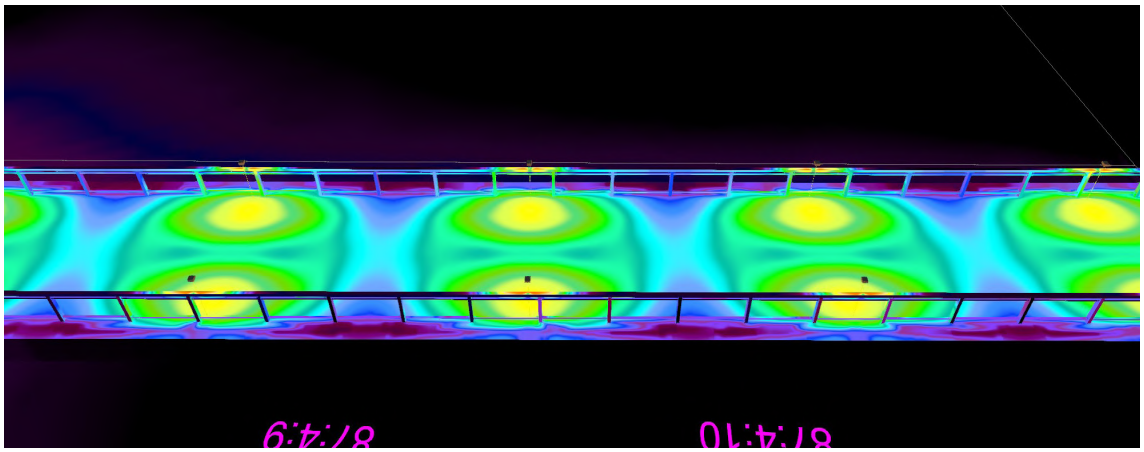
					
Optic	2 x type III	*Optic*	Optic	*Optic*	Optic
Power	56 W	*Power*	15 W	*Power*	39 W
Flux	5500 lm	*Flux*	1000 lm	*Flux*	2464 lm
TCC	TW (2200K - 4000K)	*TCC*	TW (2200K - 4000K)	*TCC*	TW (2200K - 4000K)
CRI	90	*CRI*	90	*CRI*	90

GVA FL 200	
	
Optic	20 - 40 - 60
Power	94 W
Flux	7206 lm
TCC	RGBW
CRI	N/A

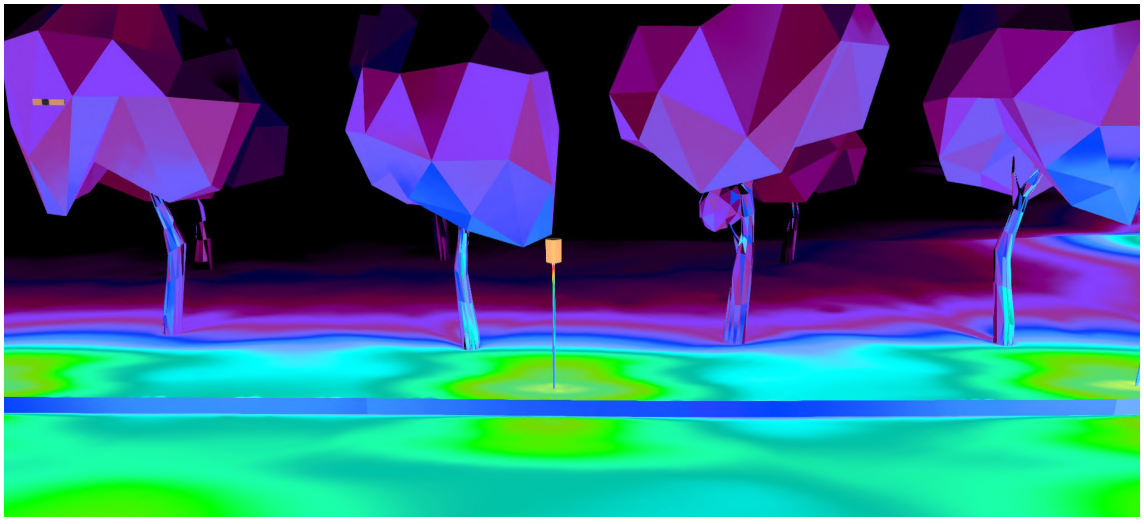
6.2.4 RESULTS

The design proposal has been analyzed on a lighting simulation software. The results show values in agreement with the standards on the bridge, both for illuminance levels and uniformity. Furthermore, there are no major contrasts between the bridge and the landings. This ensures rapid adaptation times for users crossing the bridge.



Software calculation

In pedestrian paths, the results show good levels of illuminance, both on vertical and horizontal plane. The optics of the luminaires do not emit upward, protecting the vegetation from excessive spill light.



Software calculation

6.2.5 FUTURE OPPORTUNITIES

The peculiar character of the place is suitable for future enhancement interventions.
The team proposed a light art installation to be inserted into the frozen lake during winter-time. With bundles of optical fibers it is possible to create designs and patterns integrated into the layers of ice for a scenographic effect. The positioning of the fibers in multiple layers and at different times allows to create separate levels of lines and give the installation a three-dimensional effect

Reference image

.

Furthermore, if the experiment receives favorable opinions from the community and the municipality, the luminaires for the pedestrian paths could extend, reaching the end of the lake.

7. GLOSSARY

AMBIENT LIGHT
Synonyms and alternative terms: task lighting, lighting layers
The lighting of any scene includes multiple "layers" (different light from different sources with different qualities). Ambient lighting, or what is commonly called general lighting, serves as the primary source of light for a certain space. It is the foundation of all the lighting of a scene and provides sufficient illumination for circulation within a space. Task lighting illuminates a specific area to support a particular activity.

COLOUR RENDERING INDEX (CRI)
Measure of the degree to which the chromaticities (i.e. the quality of a colour regardless of its luminance, consisting in two independent parameters specified as hue and saturation) of reference objects illuminated by a test light source are like those of the same objects illuminated by a reference light source of the same correlated colour temperature (CCT), suitable allowance having been made for the state of chromatic adaptation. CRI = 100 when the chromaticities of the reference objects are the same under the test light source as the reference light source.
Common sense:
[1] 'Colour rendering' refers to the ability of light to reveal ('render') the colours of objects faithfully; CRI measures that ability. Daylight (and incandescent bulbs), with a CRI of 100, can show all colours accurately. Low-pressure sodium (old street lights) can have a CRI of –44, under which the same object would appear a sludgy brown as it can only render orange tones.
[2] CRI is a measure of a light source's ability to show object colours "realistically" or "naturally" compared to a familiar reference source, either incandescent light or daylight.

CONTRAST
Contrast is the ratio (or relationship) between the luminance of a test object to that of its surround. Less formally, contrast can also be used to characterise light falling on one area (illuminance) to the general lighting (illuminance) in the area immediately surrounding that area.
Common sense: Contrast refers to the relationship between dark and light areas in a scene, which impacts people's perception of brightness and their ability to adapt to lighting conditions.

CORRELATED COLOUR TEMPERATURE (CCT)
CCT describes the colour appearance of the light that is produced, in terms of its warmth or coolness. The CCT relates the colour appearance of the light source to the colour appearance of a reference source when the reference source is heated to a particular temperature, measured on the Kelvin (K) temperature scale. A low colour temperature (3000 K and lower) describes a warm source, such as a typical incandescent lamp. A high colour temperature (4000 K or greater) describes a cool source, such as a cool white fluorescent.
Common sense: CCT is a measure of colour temperature, the colour or 'warmth' of white light. We perceive white light on a scale from 'warm' (orange tones found in candle-light) through 'cold' (light perceived as blue-ish). CCT is measured in degrees Kelvin: a candle is 1800K; a warm LED is 2700-3000 Kelvin; motorway lighting is often 6000K

DAYLIGHT FACTOR
A daylight factor (DF) is the ratio of the light level inside a structure to the light level outside the structure. It is defined as: DF = (Ei / Eo) x 100% where "Ei" is the average indoor illuminance (from daylight) on the working plane within a room and "Eo" is the simultaneous outdoor illuminance on a horizontal plane under an unobstructed CIE Standard Overcast Sky.

ELECTRIC LIGHTING
An electric light is a device that produces light using electric power. It is the most common form of practical light sources. Electric light includes streetlights, indoor lighting, or other human-generated light sources or flash/strobes.

LIGHT SOURCES
Synonyms and alternative terms: LED, halogen, high-pressure sodium
A light source is anything that produces illumination. Sources may be what are commonly thought of as 'naturally oc-

curring' such as sun or moonlight, or lighting produced by human practices such as candle or fire light, gas lighting and electric light sources.

LIGHT FIXTURE/FITTING
Synonyms and alternative terms: luminaire
A light fixture (US English), light fitting (UK English), or luminaire is an electrical device that contains an electric light source that provides illumination. All light fixtures have a fixture body and one or more lamps.

LIGHT POLES/MASTS, CATENARY
Structural systems for outdoor lighting, to hold light fixtures

LIGHT POLLUTION
Synonyms and alternative terms: obtrusive light, light trespass, nuisance light, spillage, sky glow, glare
Light pollution is a generic term for the adverse effects of electric light on the night-time environment. Obtrusive light is a side effect of outdoor lighting, which is caused by a disregard for the needs of users and a lack of information on presence and movement of the users. Additionally, scattering in the atmosphere contributes to the increase in sky glow especially when this is assisted by certain weather conditions. Rapid urbanisation results in increased quantity and concentration of electric light at night and is leading to more and more obtrusive light which is uncontrolled in the environment. Obtrusive light hinders astronomic observations and has significant impact on the natural environment even at distant locations.
Common sense:
[1] Light that is intrusive, misdirected, excessive or wasted. Sometimes refers to the overall excess of lighting that results in the absence of truly or naturally dark environments. Use of the term 'pollution' aims to draw parallels with other kinds of environmental contamination (e.g., from noise, chemicals or waste) which produce damaging consequences and require regulation.
[2] Distributing outdoor light in directions where it is not useful or not desired, to the annoyance of human neighbours and/or the detriment of wildlife.

GLARE
Condition of vision of persons within the illuminated area of a lighting installation in which there is discomfort and/or a reduction in the ability to see details or objects, caused by an unsuitable distribution of luminance and/or an unsuitable range of luminance values. Discomfort glare is subjective, so sensitivity to glare can vary widely. Disability glare, the reduction in visibility caused by scattered light within the eye, is more predictable. Older people are usually more sensitive to disability glare due to the aging characteristics of the eye.
Common sense:
[1] Unpleasantly bright, strong or direct light that dazzles and makes seeing more difficult.
[2] A visual sensation of excessive or uncontrolled brightness, ranging from uncomfortable to disabling.

ILLUMINANCE
The luminous flux density incident on a surface, measured in lux (lumens per square meter). It is a measure of how much light illuminates the surface, where wavelengths are weighted by the photopic luminous efficiency function.
Common sense: Illuminance refers to the amount of light that falls on a surface, measured in lux, and relates to how strongly lit an object or street is.

LIGHTING MEASUREMENT
Photometry, or the measurement of lighting quantities such as illuminance or luminance.

LUMINANCE
Luminance is defined as the intensity of light from the visible spectrum per unit area traveling in a given direction (usually expressed in candelas/square meter [cd/m²])
Common sense: Luminance refers to the amount of light from a light source and corresponds to what we normally refer to as 'brightness'. Luminance is approximately analogous to the brightness of a surface (setting aside differences in hue/colour).

OPTICAL DEVICES
Materials that control the distribution of light, such as by concentrating or spreading the light.

OUTDOOR LIGHTING
Synonyms and alternative terms: street lighting, public lighting.
Outdoor lighting is defined as the fixed electric lighting to illuminate the streets, car parking lots, pedestrian passage ways at night. The aim of outdoor lighting is to provide visibility for human activities by illuminating the area.

RGB
RGB is an acronym for “red, green, and blue” spectral absorption or emission by three light sensors or sources. RGB LED products combine these three colours to produce over 16 million hues of light.

SMART LIGHTING SYSTEM
Synonyms and alternative terms: responsive lighting, dynamic lighting, lighting control systems, dimming schedules, intelligent lighting, connected lighting, digital addressable lighting interface (DALI), adaptive lighting.
Smart lighting is a variable term that stretches from simple LED control systems to complex integration with ‘smart city’ programmes. In general, ‘smart’ refers to integration of lighting infrastructure with real-time data flows via a control system. This integration may be at the level of direct response of lights to local events (as in motion detection), or broader programming of city lights through centralised systems. ‘Smart’ is also associated with control systems that identify and test for malfunctions; with the ability to programme parameters such as dimming on an annual basis; response to motion; etc. Lighting professionals have become increasingly sceptical of this term, hence the use of words like intelligent, responsive, dynamic, or adaptive lighting.

SOCIAL LIGHTING
Synonyms and alternative terms: human centred lighting, social practices, diversity, multiculturalism, inclusion.
Approaches to lighting that frame lighting provision in terms of addressing social needs and practices rather than in terms of meeting technical or aesthetic standards. This is associated with relating urban lighting to people rather than cars, and to supporting such values as social inclusion, multiculturalism and diversity.
Common sense: Several groupings and movements of lighting professionals that have sought to connect lighting to the needs of ordinary citizens.

UNIFORMITY
Uniformity is the ratio of the minimum lighting level to the average or maximum lighting level in a specified area. It is a quality parameter for the overall illuminance distribution.

URBAN LIGHTING
Synonyms and alternative terms: outdoor lighting, street lighting, public lighting, city lights.
Urban lighting is a generic term to designate artificial lighting applied to the urban sphere. Urban lighting is the result of public policy which can be set out in a lighting masterplan or lighting strategy, bringing together stakeholders, technologies and arts for its development. Historically, urban lighting is a combination of notions of permanent and temporary lighting. A recent evolution of the term distinguishes between “public” and “urban”, the later helping to consider all sources of lighting in the urban domain, including those from private nature and vernacular light which can also be the subject of public interest.

VISUAL COMFORT
Visual comfort is usually defined through a set of criteria based on the level of light in a space, the balance of contrasts, the colour ‘temperature’ and the absence or presence of glare.
Visual comfort is defined in the European standard EN 12665 as “a subjective condition of visual wellbeing induced by the visual environment”. It depends on the physiology of the human eye, on the physical quantities describing the amount of light and its distribution in space, and on the spectral emission of the light source. Visual comfort has been commonly studied through the assessment of some factors characterising the relationship between the human needs and the light environment, such as the amount of light, the uniformity of light, the quality of light in rendering colours, and the prediction of the risk of glare for occupants.

8. TECHNICAL APPENDIX
8.1 LIGHTING LAYOUT

AMSTERDAM - Wildeman

Lighting layout
Scale 1:1000 @A0

BOLOGNA - Lambrakis

Lighting layout
Scale 1:1000 @A0

TARTU - Annelin

Lighting layout

Scale 1:500 @A0

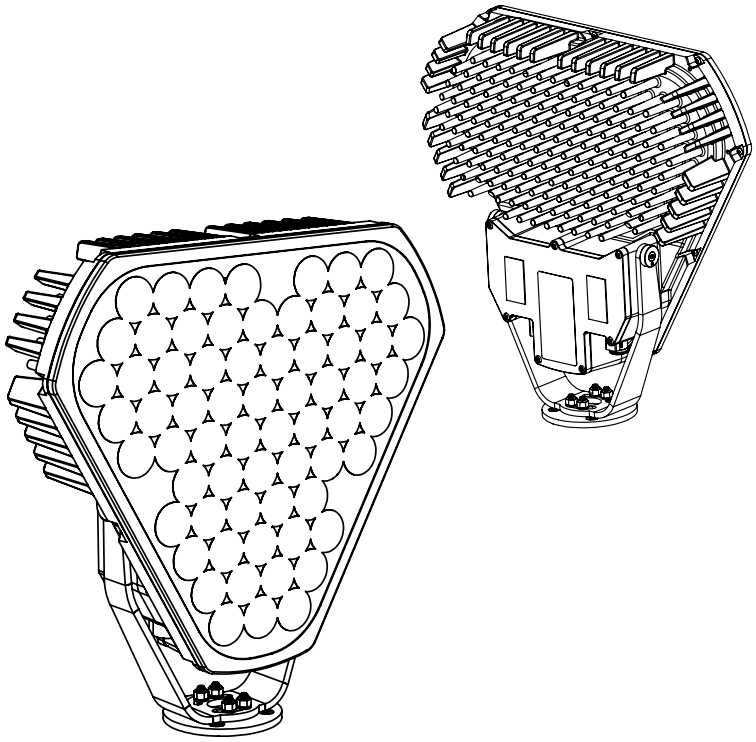
8.2 TECHINCAL SHEETS

FL200™

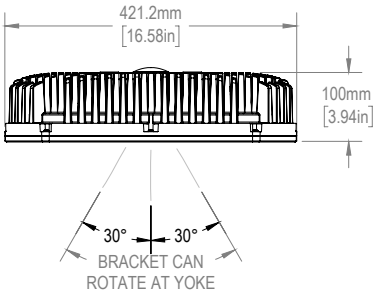
RGBW Outer-Mixing Architectural Spot and Floodlight

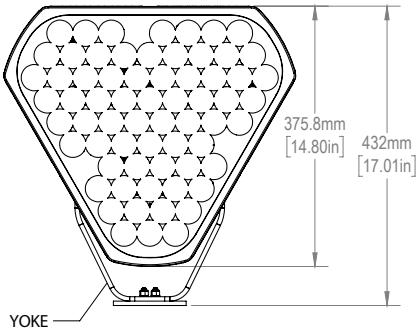
PRODUCT SPECIFICATION SHEET

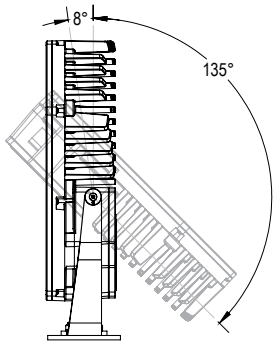
Color mixing outside of the fixture for the best performance, color mixing and highest punch.



DATE:	
TYPE:	
COMPANY:	
PROJECT:	







*SM200 bracket mounting option shown.
See page 2 for more mounting options.

FEATURES:

- Ultra narrow 4.5° beam angle
- INFINITY® Technology compatible (INF)
- Built-in high temperature universal power supply (AC)
- Plug-and-play with STR9® luminaires
- Compact size, only 100mm (3.9in) in depth
- Weight of only 10kg (22lbs)
- Powder coating tested for corrosion resistance per ASTM B 117 salt spray resistance test @3000h

OPTIONS:

- Highly adjustable with 60° horizontal rotation and 143° vertical rotation
- Beam angles ranging from 4° to 85° with elliptical distribution options
- Custom LED color combinations available
- Optical accessories for glare control
- White, silver, and black standard powder coated body colors
- Custom body colors available on demand
- ELV (48VDC), INF (380VDC) and AC (120-277VAC) input options
- Range of bracket lengths and mounting options

SPECIFICATION LOGIC: FL200 OUTER MIXING

FAMILY	BODY COLOR	LED COLOR[2]	OPTICS(FWHM)*	VOLTAGE	MOUNTING OPTION
FL200	**WH** - White Matte Powder Coated	RGBW22K-OM[1]	**4** - 4.5°x4.5°	**ELV** - 48VDC	**SM70** - Low Profile Surface Mount 70mm[1]
	SR - Silver Matte Powder Coated	**RGBW27K-OM**	**5** - 5°x5°	**INF** - 380VDC	**3G-SM120** - 3G Compliant Bracket
	BL - Black Matte Powder Coated	**RGBW30K-OM**	**7** - 7°x7°	**AC277** - 120-277VAC	**SM200** - Surface Mount 200mm
	CUST - Custom Color[1]	**RGBW35K-OM**	**8** - 8°x8°		**SM300** - Surface Mount 300mm[1]
		RGBW40K-OM	**10** - 10°x10°		**SM400** - Surface Mount 400mm[1]
		RGBW50K-OM	**20** - 20°x20°		**SM500** - Surface Mount 500mm[1]
		RGBW65K-OM	**40** - 40°x40°		**SMXXX** - Surface Mount Custom[2] (specify length)
			55 - 55°x55°		**TM200** - Tenon Mount 200mm[1]
			75 - 75°x75°		**AA-SM200** - 90 Degree Angle Adapter Bracket
			85 - 85°x85°		**PM 6**- Pole Mount (5.25-6in pole)[1]
			10x40 - 10°x40° H		**PM 6.75** - Pole Mount (6-6.75in pole)[1]
			40x10 - 40°x10° V		
			10x55 - 10°x55° H		
			55x10 - 55°x10° V		
			30x55 - 30°x55° H		
			55x30 - 55°x30° V		

PRODUCT CONFIGURATION

1. Non standard option and might require longer leadtime than usual. Contact factory for details.
2. Custom color combinations are available from the color selection of FL100 Monochromatic. Contact GVA for more information.
3. Bracket lengths longer than 500mm may not be available for some applications. Contact factory for details.

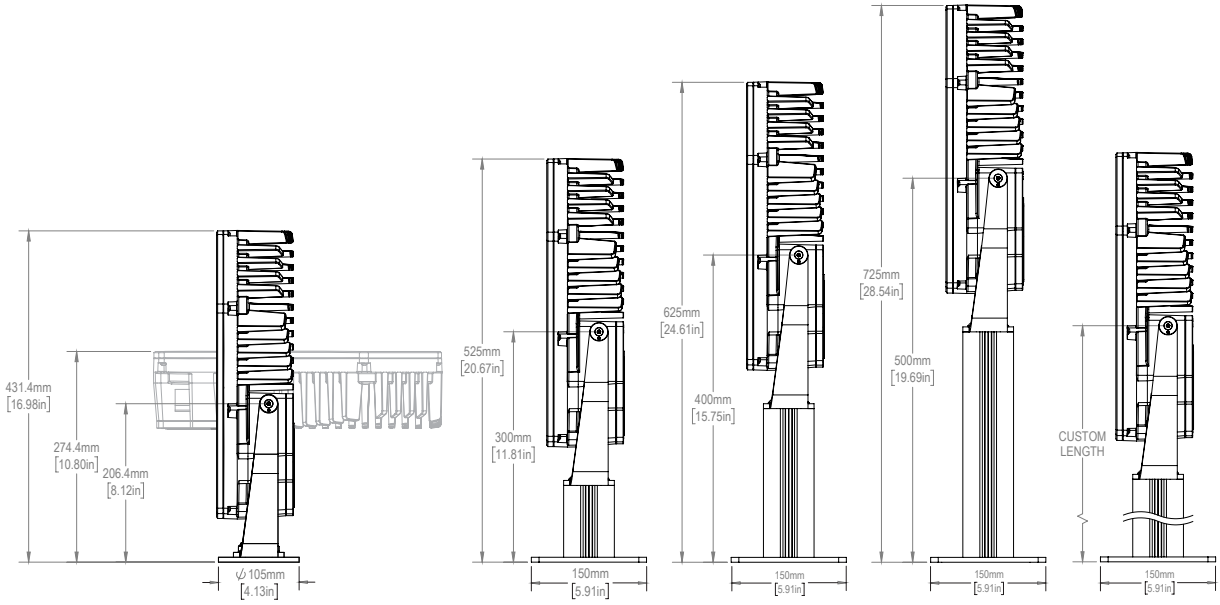
Nominal values are used. Actual measurements may differ slightly.

FL200™

RGBW Outer-Mixing Architectural Spot and Floodlight

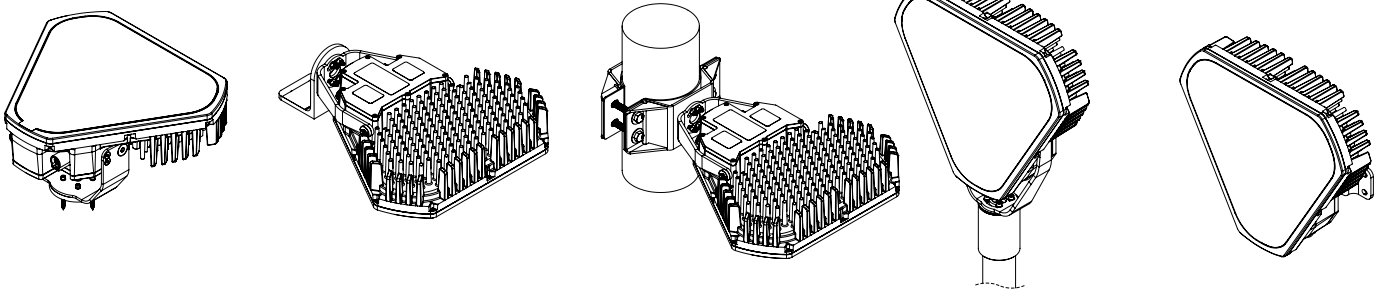
PRODUCT SPECIFICATION SHEET

FL200 STANDARD MOUNTING BRACKET OPTIONS



SM200 BRACKET | SM300 BRACKET | SM400 BRACKET | SM500 BRACKET | CUSTOM LENGTH BRACKET

FL200 ADDITIONAL MOUNTING BRACKET OPTIONS



3G COMPLIANT BRACKET | 90 DEGREE ANGLE ADAPTER | POLE MOUNT BRACKET[1] | TENON MOUNT BRACKET[2] | SM70 BRACKET

NOTE: 1. Available for pole diameters 5.25-6" (134-153mm) and 6-6.75" (154-171mm).
2. Available for tenon diameters 2-2.5" (50-64mm).

FL200™

INFINITY GVA TECHNOLOGY

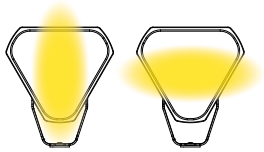
GVA LIGHTING

RGBW Outer-Mixing Architectural Spot and Floodlight

PRODUCT SPECIFICATION SHEET

PRODUCT SPECIFICATIONS: FL200 RGBW-OM (OUTER MIXING)

ELECTRICAL	Rated Input Voltage	48VDC	380VDC	120-277VAC
	Power Consumption (max.)	200W	210W	235W
	Driver Type	N/A	N/A	Constant Voltage
	Driver Loss	N/A	N/A	Power Factor 200VAC: max. 97% 120VAC: max. 99%
	THD	N/A	N/A	200VAC: <17.5% 120VAC: <10%
	Circuit Level Surge Protection	Transient-voltage-suppression diode □		[4]
OPTICAL	Light Source	69 x High Power LEDs		
	CRI	80[1]		
	Output (typical) 4°[2]	Color	Wave Length (nm)	Luminous Flux (lm)
		Red	620	1,370
		Green	525	3,367
		Blue	470	1,019
		White - 4000K[3]		3,274
		All On		8,518
	Output (typical) 7°[2]	Color	Wave Length (nm)	Luminous Flux (lm)
		Red	620	1,340
		Green	525	3,230
		Blue	470	962
		White - 4000K[3]		4,579
		All On		9,498
	Optics	High optical efficiency PMMA TIR Lens, Micro Lense Film, Tempered Glass Cover		
	Beam Angle (FWHM)	4 (4.5°X4.5°), 5 (5°x5°), 7 (7°x7°), 8(8°x8°),10 (10°x10°), 20 (20°x20°), 40 (40°x40°), 60 (60°x60°), 75 (75°x75°), 85 (85°x85°), 10x40 (10°x40°), 40x10 (40°x10°), 10x60 (10°x60°), 60x10 (60°x10°), 30x55 (30°x55°), 55x30 (55°x30°)		
	Projected Lumen Maintenance	L70 > 60,000hrs @ Ta =50°C (122°F)		
CONTROL	Control Interface	DMX control through GVA's Power-Data Equipment		
PHYSICAL	Size (HxWxD)	421 x 376 x 100 mm (16.6 x 14.8 x 3.9 in)		
	Weight	10 kg (22 lbs)		
	Housing	ASTM B117 marine grade 3000h compliant powder coated, 6061 aluminum alloy		
	Rated Operation Temperature	-40°C (-40°F) to +50°C (122°F)		
	Environment	Dry, Damp or Wet Locations, 0-100% humidity		
CERTIFICATION & SAFETY	Listings	RoHS, REACH		
	IEC Classifications	Class I Luminaire		
	RoHS, REACH, CE, IP66, 6 KG IK08			Constructed to meet requirements outlined in UL1598 & IEC60598



1. Minimum 90 CRI also available.
2. Luminous flux may vary by optical distribution.
3. Warmer color temperatures typically have a lower lumen output.
4. ± 2 kV line to line (differential mode) /± 2 kV line to common mode ground (tested to secondary ground) on AC power port, ±0.5 kV for outdoor cables based on IEC61000-4-5
5. Supplementary protection recommended at the input of power supply
6. IK10 available. Contact factory for details.

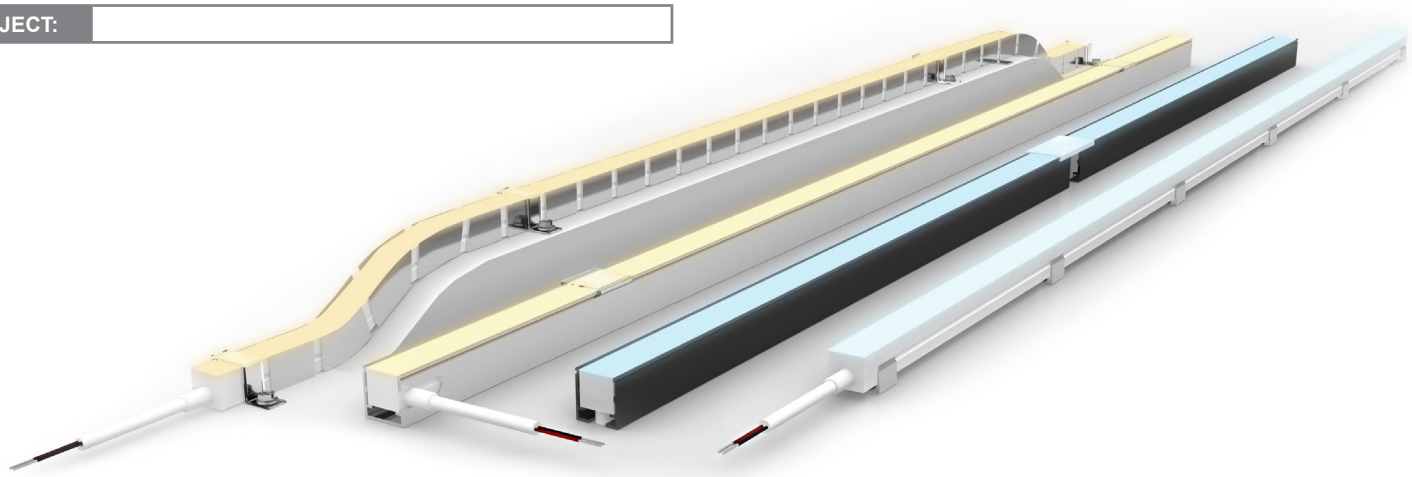
These figures are subject to change due to further development and innovations of LED light sources.

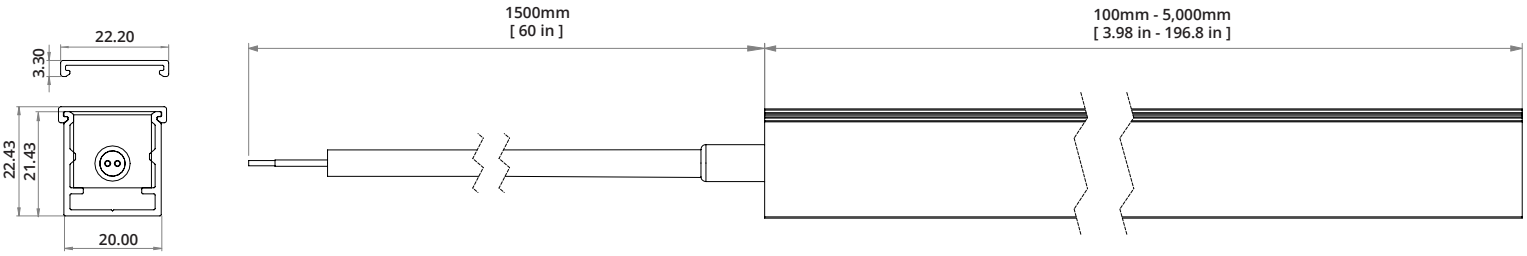
HL-ART-1615-DWT

Specification-Grade, Direct-View, Fixed or Flexible LED System for Architectural Delineation

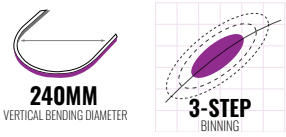
PRODUCT SPECIFICATION SHEET

DATE:	
TYPE:	
COMPANY:	
PROJECT:	





FIXED PROFILE / MOUNTING CLIP



FEATURES

Physical

H-ART-1615-DWT is a specification-grade, direct-view, fixed or flexible LED system for outdoor and indoor architectural delineation and special lighting effects.

Featuring GVA factory engineered aluminum profiles and mounting options, installable with a maximum vertical bend radius of 120mm / 4.72" with applicable profile selection.

Electronics are encapsulated by a high-quality Dow silicone, using a fully automated co-extrusion technology.

IP67 protection, superior heat management.

Optics & Electronics

A premium selection of LEDs is used with 3-step micro-binning and CRI 80+ guaranteeing consistency and high quality of light.

Constant current integrated circuit design ensures uniformed light intensity along the entire length of luminaire.

Fully controllable with specified DMX control protocols.

Customization

Front, back, and side cable entry options available for different install options. Endless fixture length configurations allow for the ultimate freedom of design.

Cut lengths and terminations are done at GVA factory to ensure IP rating, reliability and to maintain a sleek luminaire form factor by avoiding bulky DIY end caps.

Life Cycle

Long lifetime expectancy of L70B10 > 54,000 hours with Five-year limited warranty

HL-ART-1615-DWT

Specification-Grade, Direct-View, Fixed or Flexible LED System for Architectural Delineation

PRODUCT SPECIFICATION SHEET

SPECIFICATION LOGIC: HL-ART-1615-DWT

FAMILY	POWER W/FT	NOMINAL LENGTH[1]	CCT[2]	CABLE ENTRY	IP RATING
HL-ART-1615-DWT	**4.6W/FT**	Min length - **100mm** Maximum length - **5000mm** Increments available - **50mm**	**DWT**-2700K+5300K	**FF** - Front + Front **SS** - Side + Side **BB** - Bottom + Bottom **FX** - Front + Closed **SX** - Side + Closed **BX** - Bottom + Closed	**IP67**

Order example: HL-ART-1615-DWT-4.6W/FT-3150MM-DWT-FF-IP67

PRODUCT CONFIGURATION

1. Standard unit of length is in millimeters. Lengths in inches and feet is calculated from millimeters.
2. Due to tolerances of LED binning and production processes, CCT values can vary up to +5%.

Field alterations will void factory warranty

PRODUCT SPECIFICATIONS

		Standard
Electrical	Power Consumption[1]	15W/m (4.6/ft)
	Voltage	24VDC (23.5Vmin, 24.5Vmax)
Physical	Minimum Length	100mm
	Height x Width	16mm x 15mm / 0.63” x 0.59” (W x H)
	Body Finish	Premium Dow silicone encapsulation, white
	Bend Direction	Vertical
	Bend Radius	120mm / 4.72"
	Cable Entry Options	Front, Side, Bottom
	Fixture Connections	IP67 injection-moulded input and output connectors
Optical	Light Source	3014 LEDs, 3-step micro binning
	Control Protocol	DMX512
	Lumen Output @ 2700+5300K(lm/ft)	312
	Efficacy @ 5300K(lm/W)	68
	Projected Lumen Maintenance	L70B10 > 54,000 hours
Temperature Range	Storage Temperature	-25°C /-13°Fmin, 60°C /140°Fmax
	Max Ambient Temperature	35°C /95°F
	Min Ambient Temperature	-25°C /-13°F

1. Due to tolerances of the electronic components, light output and electrical power can vary up to 10%.

integral LED

Product Specification Sheet

GOLF BALL BULB E27 470LM 4.9W 2700K NON-DIMM 220 BEAM CLEAR INTEGRAL

ILGOLFE27NC055

This 4.9W retro-fit Integral LED Mini Globe (large screw base) delivers a warm light and brightness, similar to a 40W filament bulb. It features high output LEDs and an anti-glare refractor. Ideal for living rooms, dining rooms and bedrooms, in classic or modern wall or floor/table lamp fittings.

Details

Quick Order Code:	777785
Barcode:	5055788259527
Category:	Lamps
Range Name:	Everyday
Market Segment:	Commercial indoor, Residential indoor
Warranty (Years):	2
CE RoHS:	Yes

Physical Data

Product Length (mm):	76
Product Width (mm):	45
Product Weight (g):	25
Material:	Plastic, Polycarbonate, Nickel plated brass
Base Term:	Edison screw
Bulb Base:	E27
Construction:	Aluminium and Plastic heat-sink, Injection moulded diffuser
Globe Finish:	Clear
Globe Type:	Golf Ball
Bulb or Luminaire Shape:	Round
Placement / Application:	Indoor, General Lighting
Spot Type:	SMD

Electrical Data

Power Consumption (W) :	4.9
Power Factor:	0.4
Wattage equivalent (W):	40
Amperage (mA):	45

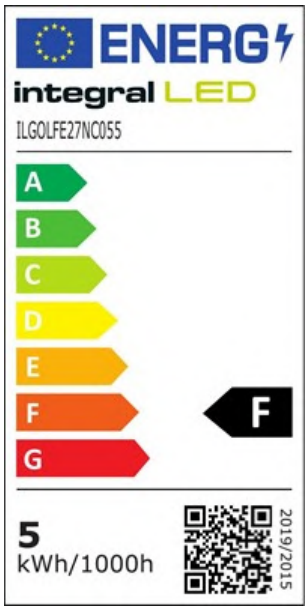
Dimming:	Non-Dimmable
Driver Included:	Yes
Electric Current:	AC
True Wattage Eq (W):	40
EN:	EN-62560
LVD Certified:	Yes

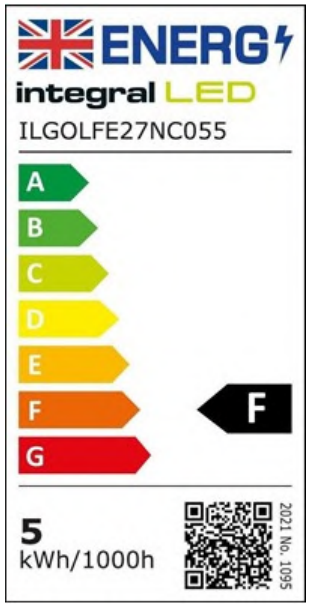
Light Data

Luminous Flux in Lumens (lm):	470
Luminous efficacy (lm/W):	96
Correlated Colour Temperature (CCT) (K):	2700
Colour Temperature:	2700K - Warm
Colour Temperature Name:	Warm
Beam Angle:	220
Colour Rendering Index (CRI):	80
Colour Type:	Single
Frequency Range (Hz):	50/60
Instant on (Less than 1 second):	Yes
LED Type:	Surface mounted device (SMD)
Lifetime (hours):	15000
Switching Cycles:	7500

Environment

EN:	EN-62560
LVD Certified:	Yes
CE RoHS:	Yes
Previous Energy Rating:	A+
New Energy Rating:	F
Hg 0% (Mercury Free):	Yes
IP Rating (Ingress Protection):	IP20
Lowest Operating Temperature (°C):	-20
Maximum Operating Temperature (°C):	40





Packaging

Portal.integral-led.com

LED LITE™

Energy Saving LED

DT641-6 Rubber Festoon Harnesses

Features:

- Rubber festoon cable must be used for all permanent outdoor installations in accordance with BS EN 60598-1:2000.
- Suitable for permanent outdoor use.
- Outdoor installations in a sheltered area in accordance with BS EN 60598-1:2000.
- Mains voltage double insulated rubber festoon harness
- Complete with 16A-6h/230V 2P+E IP44 rated plug
- IP Rating: IP44 (with GLS or golf ball lamps fitted)
- BC Lampholders
- Maximum lamp rating: up to 10W LED lamps (lamps not included)
- The high temperatures rating of the lampholder rubber seal ensures a long life seal directly onto the golf ball or GLS lamps
- Tough H05RNH-F cable (2*1.5 mm²) for permanent outdoor installations
- Power cable: round rubber cable H05RN-F cable (2*1.0 mm²)
- 3 metres lead-in to the first lampholder
- Complies with BS EN 60598-1, BS EN 60598-2:20, BS EN 61184

Specifications:

Model	Length	Distance to 1st lamp holder	Spacing between holders	Number of lamp holders
DT 641	7.5m	2.5m	50cm	10
DT 642	9m	3m	29cm	20
DT 643	15m	3m	29cm	40
DT 644	50m	3m	33cm	140
DT 645	100m	3m	100cm	100
DT 646	100m	3m	50cm	200

Made in Italy

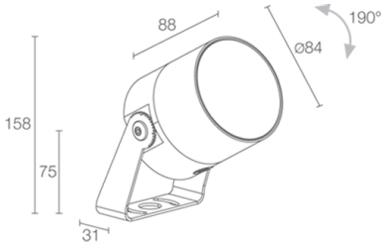
25/01/2023 Rev. 32

Ginko 3.0, code: GN30011FL5

Projectors for outdoor applications

kg 1,25 - 2,41 IP66 IP69K IK09 IPS CASAMBI

A A+ A++



DESCRIPTION

projector for outdoor applications; Awards: German Design Award 2020, IF Design Award 2019, Muuuz International Awards 2019; surface mounted (ceiling, wall, ground, spike); Power consumption: 15W; Power supply: 24Vdc; Lumen output at source: 1343 lm (3000K, 15W, CRI >90); Delivered lumen output: 945 lm (3000K, 42°, 15W, CRI >90); 1 high power density COB LED, 2-step MacAdam, 50 000h L95 B10 (Ta 25°C); LED colour: 2700K; Optics: 42°: optical system consisting of a high-efficiency TIR lens; CRI Colour Rendering Index: >90; Body material: body made of ANTICORODAL 6082 low-copper-content aluminium alloy for excellent resistance to corrosion, made entirely on a CNC lathe. Bracket in AISI 316L stainless steel, tumble finished and painted; Finishes: jasper green finish obtained through an initial treatment with a ceramic nanoparticle coating, to prepare for painting, followed by a coat of epoxy paint and one of polyester paint to provide corrosion resistance of more than 1500 hours of salt spray. Paints compliant with the Qualicoat standard used in the automotive sector; RAL finish on request; Screen material: 4-mm-thick transparent extra-clear glass with vitrified serigraphy, high transmittance to ensure chromatic uniformity of light and tempered for excellent resistance to knocks and scratches; power supply unit not included; includes 1.5 m neoprene cable H05RN-F 2x0.75/0.75 Ø6.3 mm; Ingress protection: IP66, IP69K; Impact resistance: IK09; 12°x64°, 28°x72° optics and shadow-effect filter, adjustable through 360° using the magnet provided; version with RGBW LED colour (10W, 24Vdc) and version with bracket in customized height available on request; Casambi control using the Casambi app with dedicated electronics; Protection systems: IPS (Intelligent Protection System) protects lighting fixtures from water infiltrations, which can occur if there are faulty junctions between the cables in outdoor or underwater applications. This innovation, patented by L&L, also guarantees electrical protection against polarity reversal, hot plugging, ESD and power surges, which can occur if there are faults in the electrical circuit; Operating temperature: -20°C — +45°C; Glow wire test: 960°; Photobiological safety: in accordance with IEC TR 62778:2014; Appliance class: class III; Weight: 1250 g, stainless steel: 2405 g; Dimensions: Ø84x88 mm; Energy efficiency class: A / A+ / A++ (integrated LED module) in accordance with UE 874/2012; Accessories: WB80105 Standard snoot - jasper green, WB8010N Standard snoot - black anodized, WB80205 Asymmetrical snoot - jasper green, WH8000 Honeycomb louvre , WP0100 Spike for in-ground installation, WP1004 Fastener strap - 5 m, WP10065 Spike for in-ground installation - h 500 mm - jasper green, WP10075 Spike for in-ground installation - h 800 mm - jasper green; tested and approved via E.O.L. (End Of Line) test with functioning test and check of electrical power consumption

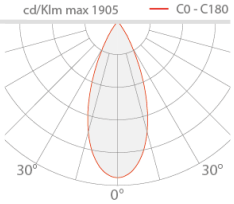
Status: Available

ELECTRICAL CHARACTERISTICS	
Power consumption	15W
Power supply	24Vdc
Power supply unit	power supply unit not included
LIGHTING CHARACTERISTICS	
Number and type of LED	1 high power density COB LED
Average LED life	50 000h L95 B10 (Ta 25°C)
LED colour	2700K
CRI Colour Rendering Index	>90
Binning	2-step MacAdam
Optics	42°
Lumen output at source	1343 lm (3000K, 15W, CRI >90)
Delivered lumen output	945 lm (3000K, 42°, 15W, CRI >90)
MECHANICAL CHARACTERISTICS	
Dimensions	Ø84x88 mm
Weight	1250 g, stainless steel: 2405 g
Finishes	jasper green
Mounting	with bracket, screws and plugs
Body material	body in anticorodal aluminium, AISI 316L stainless steel bracket
Screen material	screen in serigraphed, transparent, tempered extra-clear glass
GENERAL CHARACTERISTICS	
Operating temperature	-20°C — +45°C
Ingress protection	IP66, IP69K
Impact resistance	IK09
Features	12°x64°, 28°x72° optics and shadow-effect filter, adjustable through 360° using the magnet provided
Energy efficiency class	A / A+ / A++ (integrated LED module) in accordance with UE 874/2012
Glow wire test	960°
Appliance class	class III
Walkover	no
Drive-over	no
Power cables	includes 1.5 m neoprene cable H05RN-F 2x0.75/0.75 Ø6.3 mm
Protection systems	IPS (Intelligent Protection System)
Photobiological safety	in accordance with IEC TR 62778:2014
Notes	version with RGBW LED colour (10W, 24Vdc) and version with bracket in customized height available on request; Casambi control using the Casambi app with dedicated electronics

PHOTOMETRIC DATA

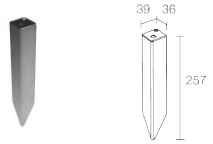
L - 42° CRI 80

H (m)	∅ (m)	Lux max (3000K) 15W	cd/Klm max 1905
1.00	0.77	2213	
2.00	1.55	553	
3.00	2.32	246	
4.00	3.10	138	
5.00	3.87	89	

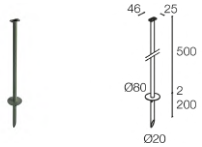


ACCESSORIES

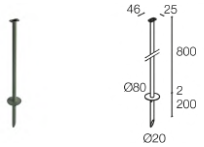
Installation Accessories



WP0100
Spike for in-ground installation



WP10065
Spike for in-ground installation - h 500 mm - jasper green



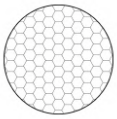
WP10075
Spike for in-ground installation - h 800 mm - jasper green

Anti-glare

WB80105
Standard snoot - jasper green

WB8010N
Standard snoot - black anodized

WB80205
Asymmetrical snoot - jasper green



WH8000
Honeycomb louvre
built into the lighting fixture

NERI

Light 803
Cod. **PN803**

Connection:
Post-top

Technical sheet
Rev. 04 - 2020/05/12

DESCRIPTION

Compliance
- ENEC safety mark (N. 02123).
- In compliance with EN 60598-1; EN 60598-2-3; EN 62031; EN 55015 EMC; EN 61547 EMC; EN 61000-3-2/3; IEC/TR 62778.

Dimensions - Area - Weight

Height	Width	Lenght	Weight	IP	IK	Area exposed to wind
760 mm	445 mm	445 mm	8 kg	66*	09	0,225 m^2

*Module

Electrical characteristics

Voltage	Frequency	Cos φ	Isolation class	Operative Temp.
220-240V	50-60Hz	>0.9	CL II ⧈	-35°C / +35°C

- Classe I of insulation (on request).

Connection
- Post top: flange with center hole Ø 28mm for fastening to the support.

Materials
- Die-cast aluminium (UNI EN 1706).
- Galvanized steel sheet.
- Extra clear transparent tempered flat glass.
- Polycarbonate.
- Brass and stainless steel fasteners.

Structure - Main components
- Aluminium upper tilting frame for access to the auxiliary compartment.
- Optical compartment with IP66 degree of protection.
- Polycarbonate plate.
- Protective screen in tempered glass extra clear transparent top with impact resistance IK09 (EN 62262).
- Osmotic valve for internal/external pressure balancing.
- Dedicated compartment to house any additional voltage arresters or remote control systems.
- Upper frame with possibility of predisposition for auxiliary devices conforming to Zhaga Book 18.
- Predisposition for NEMA Socket.

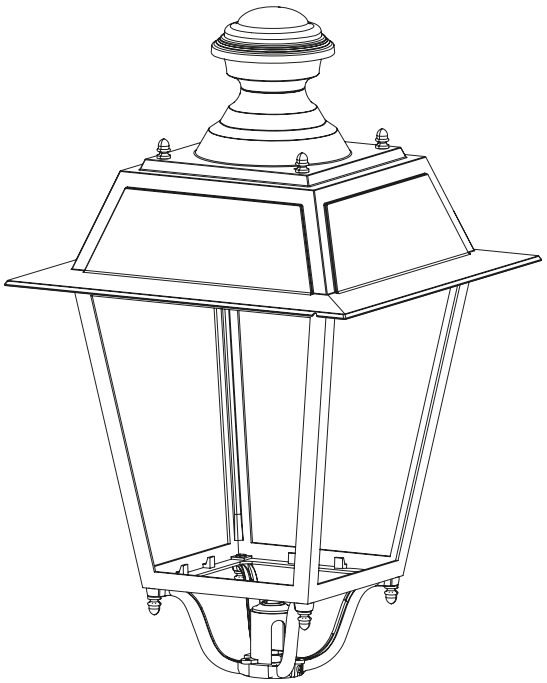
Electrical Auxiliaries
- Electronic power supply with short-circuit, overtemperature and overvoltage protection with estimated life time B10 at 100,000 h.
- Automatic disconnection switch on opening.
- Terminal block for cables with max. 2.5 mm2 cross-section.
- Standard DM and CM 6kV/10kV (CL I, CL II) differential mode overvoltage protection and 10kV/10kV (CL I, CL II) additional protection (on request).

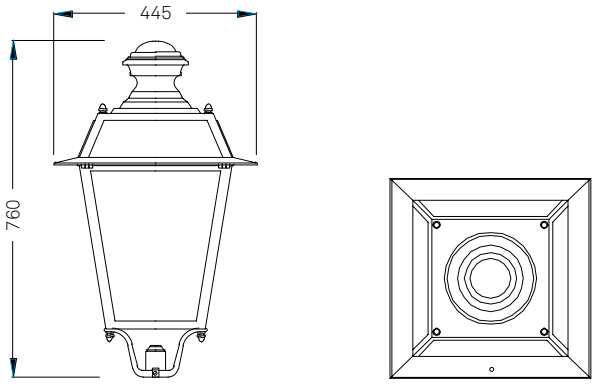
Operations - Maintenance
- During maintenance no screws or components are separated from the structure.
- Periodic maintenance for external cleaning of the structure and the screen from dust and smog and for checking the tightening of the product.
- Refer to the product installation and maintenance manual.
- It is the responsibility of the installer to ensure correct installation and electrical connection in accordance with applicable regulations.

Painting
- Standard colour: Black Grey.
- Painting cycles (see specific sheet).

Accessories
- PIR presence sensor (driver function code 09).
- Infrared programmer for presence sensor (cod. 7019.030.002).
- Polycarbonate screen with IK10 shock resistance on request (cod. 7060.041.107D).

DRAWINGS





NERI

Light 803
Cod. **PN803T**
Cod. **SN803T**

Optics: I - II - III - IV - V
Screen: Transparent

Technical sheet
Rev. 04 - 2020/05/12

DESCRIPTION

Optic

Cod. XX	Lighting distribution	Distribution type	LOR*	ULOR
20	Type II - A	Asymmetric	0,86	9%
21	Type III - A	Asymmetric	0,86	9%
24	Type IV- A	Strong asymmetric	0,82	9%
28	Type I - A	Center road	0,88	9%
30	Type V - A	Rotosymmetric	0,86	10%

* optical efficiency of the device due to physical shielding.
- Modular (2 X 2) refractive lens in PMMA.
- Maximum luminous intensity class $\gamma \geq 90°$: < 0.49 cd/klm.
- Wide range of optical lighting distributions (on request).
- Minimum height installation: 2.5m.

Luminous flux

3000K		System*		LED module			
Cod. YYY	**lm**	**W**	**lm/W**	**n.LED**	**mA**	**W**	**lm/W**
1IA	1500	11,7	129	16	219	9,6	157
1I0	2500	20,1	125	16	376	16,9	148
1I1	3500	29,1	120	16	549	25,1	140
1I2	4500	36,4	124	24	460	31,3	144
1I3	6000	50,8	118	24	642	44,2	136

Luminous flux

4000K		System*		LED module			
Cod. YYY	**lm**	**W**	**lm/W**	**n.LED**	**mA**	**W**	**lm/W**
3IA	1500	11,3	133	16	209	9,1	165
3I0	2500	19,3	130	16	358	16,0	156
3I1	3500	27,9	125	16	521	23,7	147
3I2	4500	34,5	130	24	438	29,7	152
3I3	6000	48,1	125	24	609	41,8	143
3I4	7500	62,1	121	24	796	55,3	136

* The energetic values in the table are referred to the LED + Power supply. The values of luminous flux and system efficiency are obtained by multiplying the values in the table by the coefficients of efficiency (LOR) indicated in the optical configuration.
- CCT 2200K and 2700K on demand.
- LED type: Nichia NVSW219
  Source efficiency LED: 165 lm/W @ Tj=25°C, 700 mA, 4000K
  Source efficiency LED: 157 lm/W @ Tj=25°C, 700 mA, 3000K
- Life time specification for gradual light output degradation (EN 62722-2-1, LM80 data) 120,000h L90B10 (Tq = 25°C)
- Colour Rendering Index: Ra ≥ 70
- Angular color uniformity $\Delta u'v' \leq 0.003$
- Photobiological risk: (EN 62471): RG0 (Exempt Risk)
- Photobiological risk (IEC/TR 62778): Threshold distance between class RG1 and class RG2 at 2.1 m from the source.

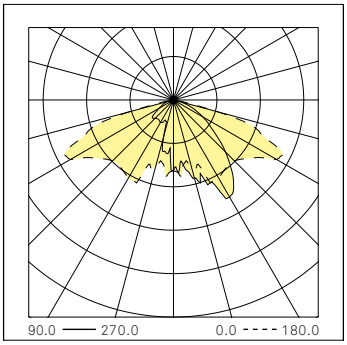
Driver

Cod. ZZ	Driver functions
02	**1-10V + NCL** (Analogic control + Neri costant lumen)
04	**AmpDim + NCL** (Luminous flux regulator + Neri Constant Lumen)
06	**DALI + NCL** (Digital control + Neri costant lumen)
09	**PIR Presence detector + SR**
10	**Zhaga connector + SR**
14	**NVL6H + NCL** (autodimming -30% x 6h + Neri costant lumen)

PHOTOMETRIC CURVES

Type II – A

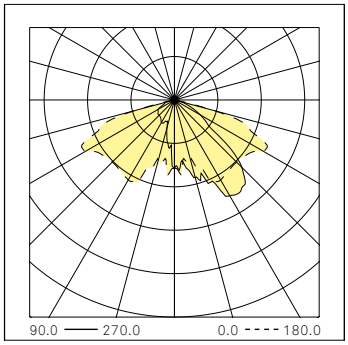
Luminous intensity class G*4



Flux code CIE				
N.1	N.2	N.3	N.4	N.5
38	73	96	100	86

Type III - A

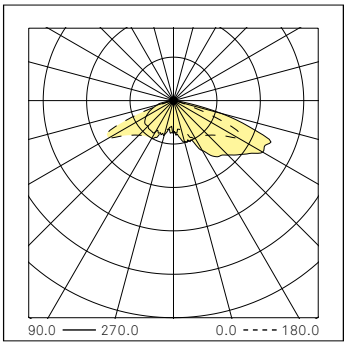
Luminous intensity class G*4



Flux code CIE				
N.1	N.2	N.3	N.4	N.5
38	73	97	100	86

Type IV - A

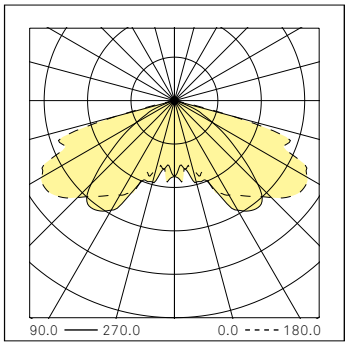
Luminous intensity class G*4



Flux code CIE				
N.1	N.2	N.3	N.4	N.5
25	59	94	100	82

Type I - A

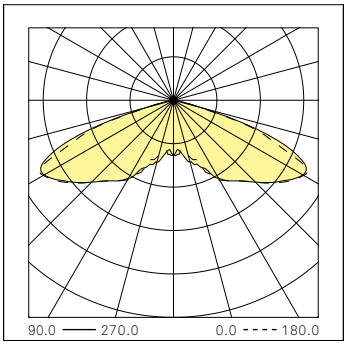
Luminous intensity class G*6



Flux code CIE				
N.1	N.2	N.3	N.4	N.5
36	77	98	100	88

Type V - A

Luminous intensity class G*6



Flux code CIE				
N.1	N.2	N.3	N.4	N.5
22	59	95	100	86

NERI

Antares - Size 1
Cod. **MNAN1**

Connection: Post-top
Side

Technical sheet
Rev. 04 - 2021/05/13

DESCRIPTION

Compliance
- ENEC safety mark.
- In compliance with EN 60598-1; EN 60598-2-3; EN 62031; EN 55015 EMC; EN 61547 EMC; EN 61000-3-2/3; IEC/TR 62778.

Dimensions - Area - Weight

Height	Width	Lenght	Weight	IP	IK	Area exposed to wind
143-300mm	340 mm	608-761 mm	10,5 Kg	66	08	0,066 m^2

Electrical characteristics

Voltage	Frequency	Cos ϕ	Insulation class	Operative Temp.
220-240V	50-60Hz	>0.9	CL II ⧈	-35°C / +50°C

- Classe I of insulation (on request).

Connection
- Side or post top mounting on tubes from Ø 46mm to Ø 76mm, external diameter Ø 95mm.
- Bracket with a tilting system of 20° (5° step).
- Adjustable from 0° to +20° with post top configuration and from -5° to +15° with outreach configuration.
- Fixing by two grub screws M8 lock nuts with stainless steel.

Materials
- Die-cast aluminium (UNI EN 1706).
- Extra-clear transparent flat glass.
- Stainless steel screws.
- Polycarbonate.

Structure - Main components
- Upper frame in aluminium to access the auxiliaries compartment.
- Shield in flat tempered glass with impact resistance IK08 (EN 62262) fixed by angle brackets.
- Silicone gasket between the lower frame and cover.
- Integrated heat sink in cast aluminium in continuity with the external frame.
- Polycarbonate reflector.
- Osmotic valve to balance internal/external pressure.
- Dedicated space for any surge protection devices or remote control systems.
- Predisposition for NEMA Socket.
- Predisposition for auxiliary devices in compliant with Zhaga Book 18.

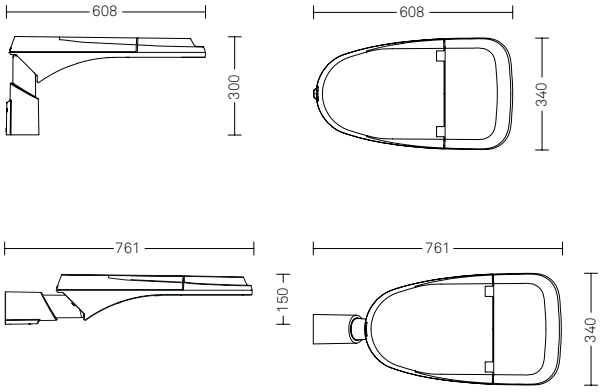
Electrical auxiliaries
- Electronic power supply with protection against short circuits, overheating and power surges with an estimated B10 duration of 100,000 h.
- Automatic disconnector when opening.
- Terminal block for wires with max. section of 2.5mm2.
- Input power cable with PG16 cable gland (Ø 10-14mm).
- Standard surge protection for differential/common mode 6kV/10kV (CL I, CL II) and 10kV/10kV (CL I, CL II) in presence of additional protections (on demand).

Operations and maintenance
- Opening-closing by means of two buttons on the upper hinged cover.
- Periodic maintenance for the external cleaning of the structure and the screens from dust and smog and tightening control to the support - refer to the product's installation and maintenance manual.
- It is the installer's responsibility to ensure correct installation and electrical connection in accordance with the applicable standards.

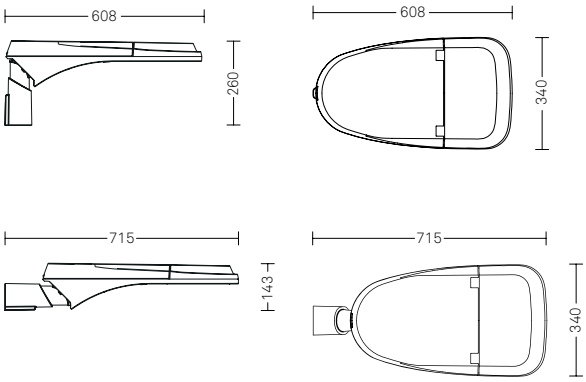
Painting
- Powder coating.
- Monochrome version: light grey metallic matt Superdurable textured RAL 9006 colour.

Accessories
- Side and post top mounting accessory with diameter Ø 60mm (tubes from Ø 46mm to Ø 60mm, external diameter Ø 76mm).
- PIR presence detector.
- Infrared programmer for presence detector (code 7019.030.002).

DRAWINGS



Side and post top mounting accessory with diameter Ø 60mm (on demand)



NERI

Antares - Size 1
Cod. **MNAN1**

Optics: Type II - III - IV - V
Screen: Transparent

Technical sheet
Rev. 04 - 2021/05/13

DESCRIPTION

Optic

Lighting distribution	Distribution type	LOR*	ULOR
Type II - A	Asymmetric	100%	0%
Type III - A	Asymmetric	100%	0%
Type III - D	Asymmetric	100%	0%
Type IV - A	Forward throw	100%	0%
Type V - A	Rotosymmetric	100%	0%

* optical efficiency of the device due to physical shielding.
- Modular (2 X 2) refractive lens in PMMA.
- Maximum luminous intensity class **γ ≥** 90°: < 0.49 cd/klm.
- Wide range of optical lighting distributions (on request).
- Plastic reflector to recover luminous flux and reduce glare.
- Minimum height installation: 2.5m.

Luminous flux - 3000K

System**			LED module			
lm	W	lm/W	n.LED	mA	W	lm/W
2500	19.5	128	16	365	16.4	152
3500	27.7	127	16	532	24.3	144
4500	37.1	121	16	713	33.0	136
6000	47.1	127	24	621	42.8	140
7500	61.6	122	24	809	56.5	133

Luminous flux - 4000K

System**			LED module			
lm	W	lm/W	n.LED	mA	W	lm/W
2500	18.5	135	16	347	15.6	161
3500	26.2	133	16	504	22.9	153
4500	35.0	129	16	674	31.1	145
6000	44.7	134	24	587	40.4	149
7500	58.0	129	24	764	53.2	141

**The energetic values in the table are referred to the LED + Power supply.
- CCT 2200K and 2700K on demand.
- LED type: Nichia NVSW219
  LED Efficacy: 165 lm/W @ Tj=25°C, 700 mA, 4000K
  LED Efficacy: 157 lm/W @ Tj=25°C, 700 mA, 3000K
- Life time specification for gradual light output degradation (EN 62722-2-1, LM80 data) 120,000h L90B10 (Tq = 25°C)
- Colour Rendering Index: Ra **≥** 70
- Angular color uniformity **Δ**u'v' **≤** 0.003
- Photobiological risk: (EN 62471): RG0 (Exempt Risk)
- Photobiological risk (IEC/TR 62778): Threshold distance between class RG1 and class RG2 at 3.4 m from the source.

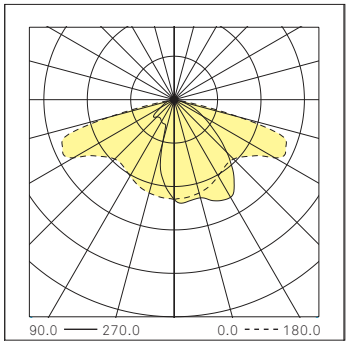
Driver

Driver functions
1-10V + NCL (Analogic control + Neri Constant Lumen)
DALI + NCL (Digital control + Neri Constant Lumen)
PIR Presence detector + SR
Zhaga connector + SR
NVL6H + NCL (Autodimming -30% x 6h + Neri Constant Lumen)

POLAR DIAGRAMS

Type II – A

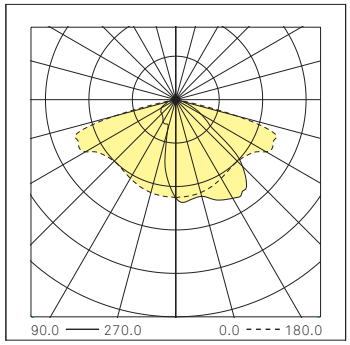
Luminous intensity class G*4



CIE Flux code				
N.1	N.2	N.3	N.4	N.5
40	72	96	100	100

Type III - A

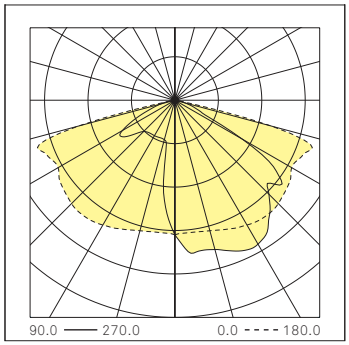
Luminous intensity class G*3



CIE Flux code				
N.1	N.2	N.3	N.4	N.5
40	73	96	100	100

Type III - D

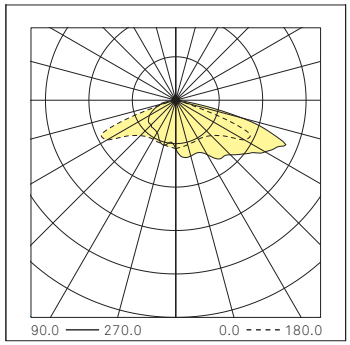
Luminous intensity class G*4



CIE Flux code				
N.1	N.2	N.3	N.4	N.5
37	72	96	100	100

Type IV- A

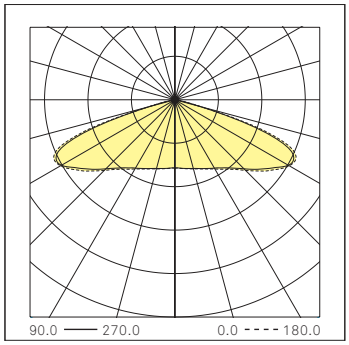
Luminous intensity class G*2



CIE Flux code				
N.1	N.2	N.3	N.4	N.5
27	58	93	100	100

Type V - A

Luminous intensity class G*4



CIE Flux code				
N.1	N.2	N.3	N.4	N.5
23	57	95	100	100

NERI

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Fixing: Post top
Source: LED-P

Technical sheet
Rev. 00 - 2019/03/25

DESCRIPTION

Compliance

EN 60598-1; EN 60598-2-3; EN 62031; EN 55015 EMC; EN 61547 EMC; EN 61000-3-2/3; IEC/TR 62778

Dimensions

Height	Width	Length	Weight	IP	IK	Area (S)
774mm	585mm	585mm	17Kg	66	08	0.106 m^2

Electrical characteristics

Voltage	Frequency	Cos φ	Insulation class	Operative Temp.
220-240V	50/60Hz	> 0,9	CL II ⧈	-35°C/+50°C

- Class I of insulation (on request).

Fixing
- Post top mounting on tubes Ø 60mm (with adapter ring) or on Ø 78mm tubes (without adapter ring), flush on Ø 89mm tube.

Materials
- Cast and sheet aluminium (UNI EN 1706).
- Extra-clear transparent flat glass or prismatic flat glass or white flat glass.
- Stainless-steel fasteners.
- Internal reflector made of PC.

Structure – Main components
- Upper shell can be opened with screws.
- Consists of two cast aluminium parts. The bottom part is the slender but robust 'V' shaped bracket and the upper part is the low spherical top that hosts the engine.
- Double screen with a white PC recovery reflector (for each screen).
- Osmotic valve for balance internal/external pressure.

Electrical auxiliaries
- Pre-installed power cable passing internally through one of the arm (length 6m).
- Wiring plate with appropriate space for auxiliary remote management devices.

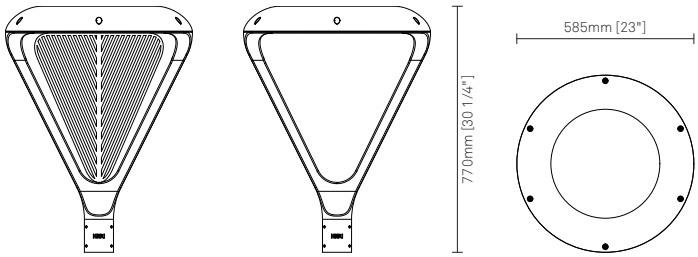
Operations and maintenance
- During maintenance operations no screw or component is separated from the structure.
- Please refer to product installation and maintenance manual.
- It is responsibility of the installer the correct installation and electric connection in accordance with applicable regulations.

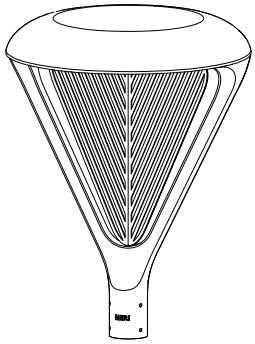
Finish
- Standard colour: Neri Gray.
- Paint system (see specific technical sheet).

Accessories
- Decorative blade in anodized aluminum (customisable on request).

DRAWINGS

Lang is a two brackets post top luminaire characterised by two light sources, that can be completely independent in terms of distributions and lumen output. Versions available are: basic (one light source); ready (two light sources, one driver and a list of ready-made distributions and flux configurations to choose from); pro (fully customisable version with two drivers if needed).





Version with decorative blade

NERI

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Category: Performance
Screen: Prismatic
Version: Ready

Technical sheet
Rev. 00 - 2019/03/25

READY | PRISMATIC
The 'Ready' version is equipped with two light sources and a shared driver. This version comes in five standard and most commonly used configurations. The four light distributions have been already combined together whilst ten different lumen outputs for each source can be selected and adopted.

Lighting distribution	Screen	LOR	IES Class
Type III + Type III	Prismatic	-	Full Cutoff
Type III + Type IV	Prismatic	-	Full Cutoff
Type IV + Type IV	Prismatic	-	Full Cutoff

- LOR: optical efficiency appliance due to the physical shielding.
- Modular 3 X 3 refractive lens in PMMA.
- High efficiency reflector in plastic material for flux recovery and glare reduction.
- Minimum installation height: 3m.
- Max installation height: over 15m.

LUMINOUS FLUX

Colour Temperature			3,000K					
System*			Back			Front		
lm tot	W tot	lm/W	n LED	mA	W	n LED	mA	W
5,000	48	105	16	442	21	16	442	21
7,000	70	100	16	658	31	16	658	31
7,500	63	119	32	324	27	32	324	27
9,000	81	111	32	391	35	32	391	35
12,000	104	115	32	542	46	32	542	46
15,000	137	109	32	718	61	32	718	61

Colour Temperature			4,000K					
System*			Back			Front		
lm tot	W tot	lm/W	n LED	mA	W	n LED	mA	W
5,000	44	113	16	411	19	16	411	19
7,000	65	108	16	608	28	16	608	28
7,500	62	121	32	304	27	32	304	27
9,000	75	120	32	365	33	32	365	33
12,000	101	118	32	502	45	32	502	45
15,000	133	113	32	661	60	32	661	60

* The energy values in the table refer to LED module + driver.
- LED type: CSP Nichia
- Power LEDs module on printed circuit board with metal core plate.
- Internal heat sink in cast aluminium seamless with external frame.
- Estimated life: 100,000 h L90B10.
- Colour Rendering Index: CRI > 70 within the 5 ellipses of Mac Adam.
- Photobiological risk (IEC/TR 62778): class RG1 to class RG2 at 2.78m from source.
- Photobiological risk (EN62471): class RG0.

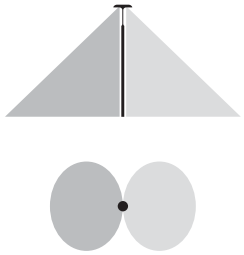
DRIVER FUNCTIONS

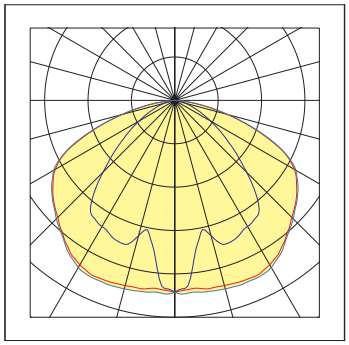
1-10V + NCL (Analogic control + Neri constant lumen)
AmpDim + NCL (Flux regolator + Neri constant lumen)
DALI + NCL (Digital control + Neri constant lumen)
NVL + NCL (autodimming -30% x 6h + Neri constant lumen)

- NFC programmable electronic power supply with self-diagnostic functions.
- Standard surge protection for differential/common mode 6kV/10kV (CL I, CL II) and 10kV/10kV (CL I, CL II) in presence of additional protections (on demand).
- Estimated Duration B10 to 100,000 h.

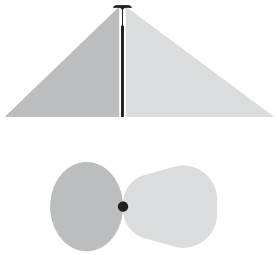
PHOTOMETRIC CURVES

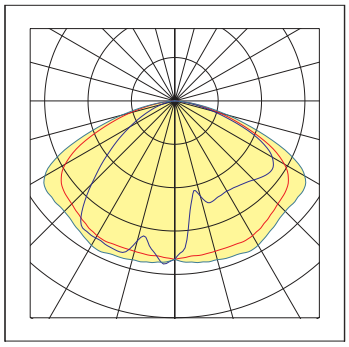
Back	Front
Type III	Type III



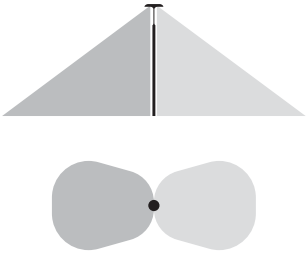


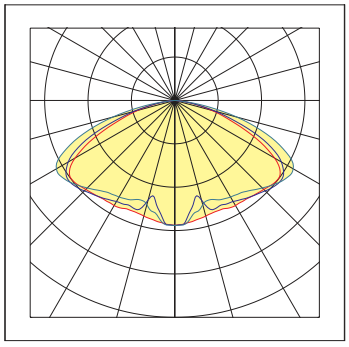
Back	Front
Type III	Type IV





Back	Front
Type IV	Type IV





NERI

Lang
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Category: Performance
Screen: Prismatic
Version: Ready

Technical sheet
Rev. 00 - 2019/03/25

READY | PRISMATIC
The 'Ready' version is equipped with two light sources and a shared driver. This version comes in five standard and most commonly used configurations. The four light distributions have been already combined together whilst ten different lumen outputs for each source can be selected and adopted.

Lighting distribution	Screen	LOR	IES Class
Type II + Type III	Prismatic	-	Full Cutoff
Type II + Type IV	Prismatic	-	Full Cutoff

- LOR: optical efficiency appliance due to the physical shielding.
- Modular 3 X 3 refractive lens in PMMA.
- High efficiency reflector in plastic material for flux recovery and glare reduction.
- Minimum installation height: 3m.
- Max installation height: over 15m.

LUMINOUS FLUX

Colour Temperature			3,000K					
System*			Back			Front		
lm tot	W tot	lm/W	n LED	mA	W	n LED	mA	W
5,250	45	116	16	303	14	32	303	26
6,750	61	110	16	391	18	32	391	35
9,000	81	111	16	542	25	32	542	46
11,250	107	105	16	718	34	32	718	61

Colour Temperature			4,000K					
System*			Back			Front		
lm tot	W tot	lm/W	n LED	mA	W	n LED	mA	W
5,250	44	120	16	285	13	32	285	25
6,750	57	119	16	365	17	32	365	33
9,000	78	116	16	502	23	32	502	45
11,250	102	110	16	661	31	32	661	60

* The energy values in the table refer to LED module + driver.
- LED type: CSP Nichia
- Power LEDs module on printed circuit board with metal core plate.
- Internal heat sink in cast aluminium seamless with external frame.
- Estimated life: 100,000 h L90B10.
- Colour Rendering Index: CRI > 70 within the 5 ellipses of Mac Adam.
- Photobiological risk (IEC/TR 62778): class RG1 to class RG2 at 2.78m from source.
- Photobiological risk (EN62471): class RG0.

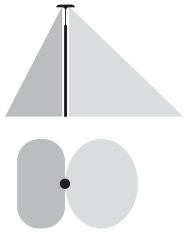
DRIVER FUNCTIONS

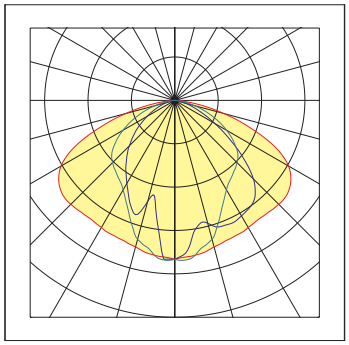
1-10V + NCL (Analogic control + Neri constant lumen)
AmpDim + NCL (Flux regolator + Neri constant lumen)
DALI + NCL (Digital control + Neri constant lumen)
NVL + NCL (autodimming -30% x 6h + Neri constant lumen)

- NFC programmable electronic power supply with self-diagnostic functions.
- Standard surge protection for differential/common mode 6kV/10kV (CL I, CL II) and 10kV/10kV (CL I, CL II) in presence of additional protections (on demand).
- Estimated Duration B10 to 100,000 h.

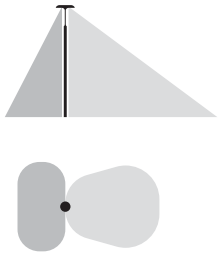
PHOTOMETRIC CURVES

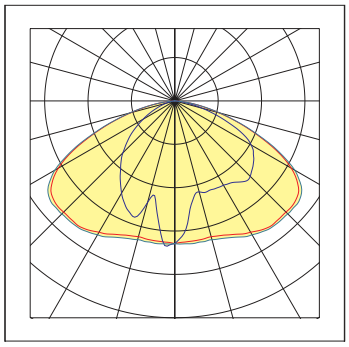
Back	Front
Type II	Type III





Back	Front
Type II	Type IV





NERI

Lang
PNLANL

Category: Performance
Screen: Transparent
Version: Ready

Technical sheet
Rev. 00 - 2019/03/25

READY | TRANSPARENT
The 'Ready' version is equipped with two light sources and a shared driver. This version comes in five standard and most commonly used configurations. The four light distributions have been already combined together whilst ten different lumen outputs for each source can be selected and adopted.

Lighting distribution	Screen	LOR	IES Class
Type III + Type III	Transparent	-	Full Cutoff
Type III + Type IV	Transparent	-	Full Cutoff
Type IV + Type IV	Transparent	-	Full Cutoff

- LOR: optical efficiency appliance due to the physical shielding.
- Modular 3 X 3 refractive lens in PMMA.
- High efficiency reflector in plastic material for flux recovery and glare reduction.
- Minimum installation height: 3m.
- Max installation height: over 15m.

LUMINOUS FLUX

Colour Temperature			3,000K					
System*			Back			Front		
lm tot	W tot	lm/W	n LED	mA	W	n LED	mA	W
5,000	44	114	16	418	19	16	418	19
7,000	66	106	16	618	29	16	618	29
7,500	63	119	32	308	27	32	308	27
9,000	76	118	32	370	33	32	370	33
12,000	104	115	32	567	46	32	567	46
15,000	138	109	32	673	61	32	673	61

Colour Temperature			4,000K					
System*			Back			Front		
lm tot	W tot	lm/W	n LED	mA	W	n LED	mA	W
5,000	42	119	16	389	18	16	389	18
7,000	60	117	16	572	27	16	572	27
7,500	59	127	32	290	26	32	290	26
9,000	70	129	32	346	31	32	346	31
12,000	96	125	32	474	43	32	474	43
15,000	124	121	32	620	56	32	620	56

* The energy values in the table refer to LED module + driver.
- LED type: CSP Nichia
- Power LEDs module on printed circuit board with metal core plate.
- Internal heat sink in cast aluminium seamless with external frame.
- Estimated life: 100,000 h L90B10.
- Colour Rendering Index: CRI > 70 within the 5 ellipses of Mac Adam.
- Photobiological risk (IEC/TR 62778): class RG1 to class RG2 at 2.78m from source.
- Photobiological risk (EN62471): class RG0.

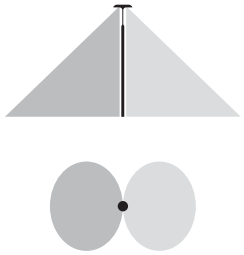
DRIVER FUNCTIONS

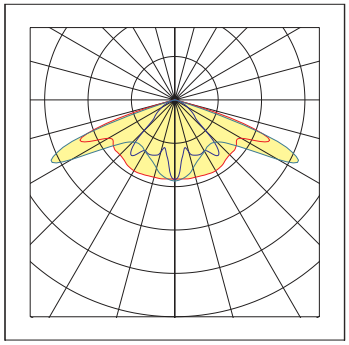
1-10V + NCL (Analogic control + Neri constant lumen)
AmpDim + NCL (Flux regolator + Neri constant lumen)
DALI + NCL (Digital control + Neri constant lumen)
NVL + NCL (autodimming -30% x 6h + Neri constant lumen)

- NFC programmable electronic power supply with self-diagnostic functions.
- Standard surge protection for differential/common mode 6kV/10kV (CL I, CL II) and 10kV/10kV (CL I, CL II) in presence of additional protections (on demand).
- Estimated Duration B10 to 100,000 h.

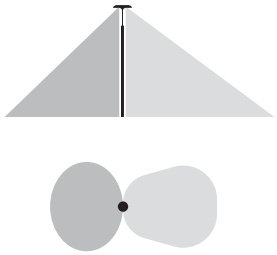
PHOTOMETRIC CURVES

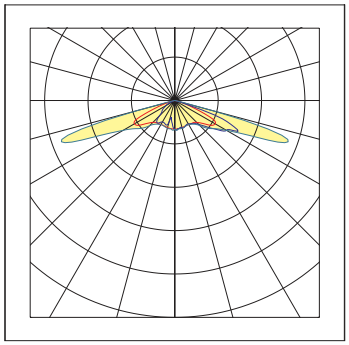
Back	Front
Type III	Type III



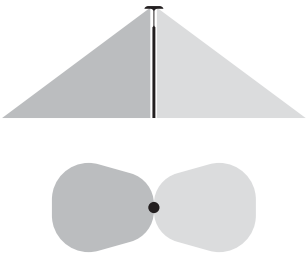


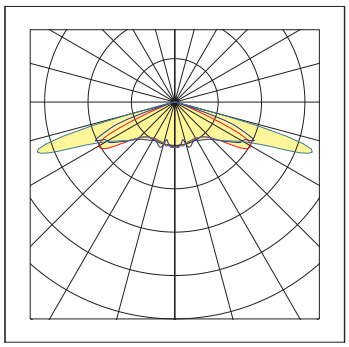
Back	Front
Type III	Type IV





Back	Front
Type IV	Type IV





NERI

Lang
PNLANL

Category: Performance
Screen: Transparent
Version: Ready

Technical sheet
Rev. 00 - 2019/03/25

READY | TRANSPARENT
The 'Ready' version is equipped with two light sources and a shared driver. This version comes in five standard and most commonly used configurations. The four light distributions have been already combined together whilst ten different lumen outputs for each source can be selected and adopted.

Lighting distribution	Screen	LOR	IES Class
Type II + Type III	Transparent	-	Full Cutoff
Type II + Type IV	Transparent	-	Full Cutoff

- LOR: optical efficiency appliance due to the physical shielding.
- Modular 3 X 3 refractive lens in PMMA.
- High efficiency reflector in plastic material for flux recovery and glare reduction.
- Minimum installation height: 3m.
- Max installation height: over 15m.

LUMINOUS FLUX

Colour Temperature			3,000K					
System*			Back			Front		
lm tot	W tot	lm/W	n LED	mA	W	n LED	mA	W
5,250	45	118	16	288	13	32	288	26
6,750	58	117	16	370	17	32	370	33
9,000	80	113	16	511	24	32	511	46
11,250	105	107	16	673	32	32	673	61

Colour Temperature			4,000K					
System*			Back			Front		
lm tot	W tot	lm/W	n LED	mA	W	n LED	mA	W
5,250	42	126	16	270	12	32	270	24
6,750	53	126	16	346	16	32	346	31
9,000	73	123	16	474	22	32	474	43
11,250	95	118	16	620	29	32	620	56

* The energy values in the table refer to LED module + driver.
- LED type: CSP Nichia
- Power LEDs module on printed circuit board with metal core plate.
- Internal heat sink in cast aluminium seamless with external frame.
- Estimated life: 100,000 h L90B10.
- Colour Rendering Index: CRI > 70 within the 5 ellipses of Mac Adam.
- Photobiological risk (IEC/TR 62778): class RG1 to class RG2 at 2.78m from source.
- Photobiological risk (EN62471): class RG0.

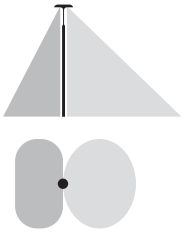
DRIVER FUNCTIONS

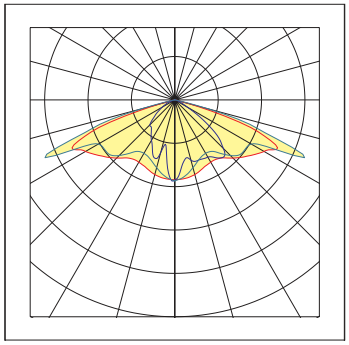
1-10V + NCL (Analogic control + Neri constant lumen)
AmpDim + NCL (Flux regolator + Neri constant lumen)
DALI + NCL (Digital control + Neri constant lumen)
NVL + NCL (autodimming -30% x 6h + Neri constant lumen)

- NFC programmable electronic power supply with self-diagnostic functions.
- Standard surge protection for differential/common mode 6kV/10kV (CL I, CL II) and 10kV/10kV (CL I, CL II) in presence of additional protections (on demand).
- Estimated Duration B10 to 100,000 h.

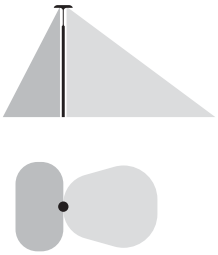
PHOTOMETRIC CURVES

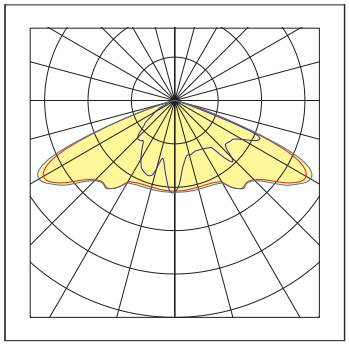
Back	Front
Type II	Type III





Back	Front
Type II	Type IV





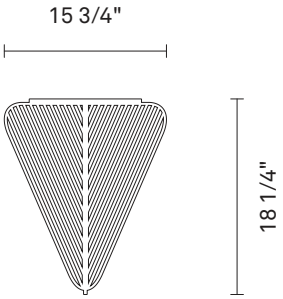
NERI

Lang
PNLANL

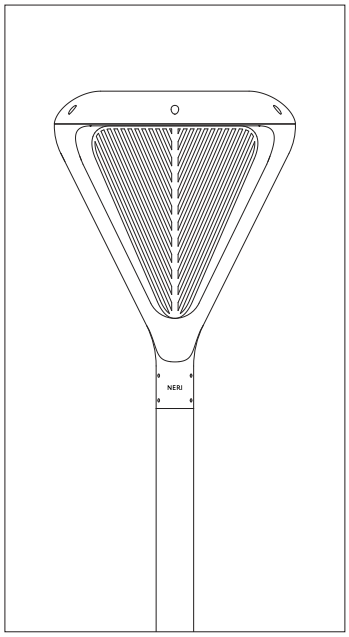
Fixing: Post top
Source: LED-P

Technical sheet
Rev. 00 - 2019/03/25

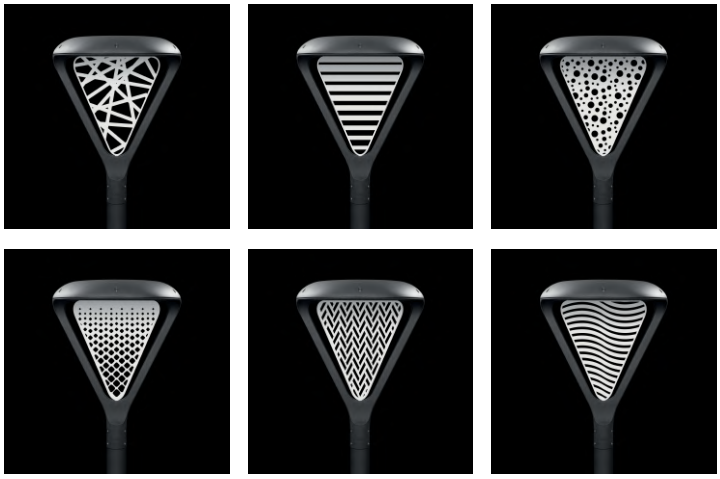
THE BLADE:
The blade is an accessory made of laser cut aluminum that can be added to the luminaire. It lends itself to endless personalisation possibilities ranging from brand logos to city crests, from patterns to colors.



DRAWINGS



CUSTOMISATION:
The examples of Blade shown here are purely for illustrative and demo purposes. Blade projects have to be submitted to Neri Technical Department for feasibility study, approval and engineering before being produced.



NERI

Nebula Collection

INDEX

DESCRIPTION

Compliance

- ENEC safety mark (pending).
- n compliance with EN 60598-1; EN 60598-2-3; EN 62031; EN 55015 EMC; EN 61547 EMC; EN 61000-3-2/3; IEC/TR 62778.

Dimensions

Height	Width	Length	Weight	IP	IK	Area (S)
900 mm	105 mm	105 mm	8 Kg	66	08	0.09 m^2

Electrical characteristics

Voltage	Frequency	Cos φ	Insulation class	Operative Temp.
220-240V	50/60Hz	> 0.9	CL II ⧈	-35°C/+25°C

- Insulation Class I on demand.

Fixing
- Fixing by two headless screws M6 lock nuts with stainless steel.
- Central frame with a tilting system of ± 45°.

Materials
- Extruded aluminium.
- Galvanized steel.
- Extra clear transparent or prismatic tempered flat glass.
- Stainless or burnished steel fasteners.
- Silicone gaskets.

Structure – Main components
- External frame in extruded aluminum.
- Shield in extra-clear transparent or prismatic tempered glass with impact resistance IK 08 (EN 62262).
- Integrated heat sink in aluminium.
- Central cover in aluminium sheet to access the tilting adjustment dedicated compartment.
- Osmotic valve to balance internal/external pressure.
- Dedicated space for surge protection devices or remote control systems.

Electrical features
- Electronic power supply with protection against short circuits, overheating and power surges.
- Input power cable with PG13.5 cable gland (Ø 6 - 12 mm).
- Standard surge protection for differential/common mode 10kV/10kV (CL I, CL II).

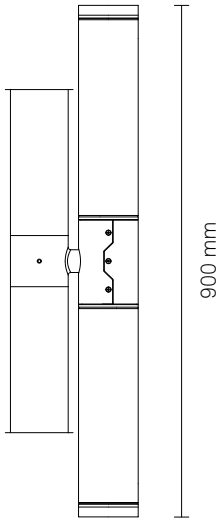
Operations and maintenance
- Please refer to the installation and maintenance manual of the product.
- It is responsibility of the installer the correct installation and electric connection in accordance with applicable regulations.

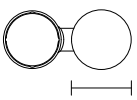
Finish
- Powder coating or anodising.

Powder coating:
- Neri grey
- Pure white
- White aluminium
- Grey aluminium
- Jet black
- Moss green

Anodising:
- Silver anodising
- Gold anodising
- Bronze anodising
- Brown anodising
- Black anodising
- Information about paint steps used on this product in specific technical sheet.

DRAWINGS





NERI

Pictor Bollard System

Rev. 01 - 2022/04/19

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NERI

Pictor Bollard System

Technical sheet
Rev. 01 - 2022/04/19

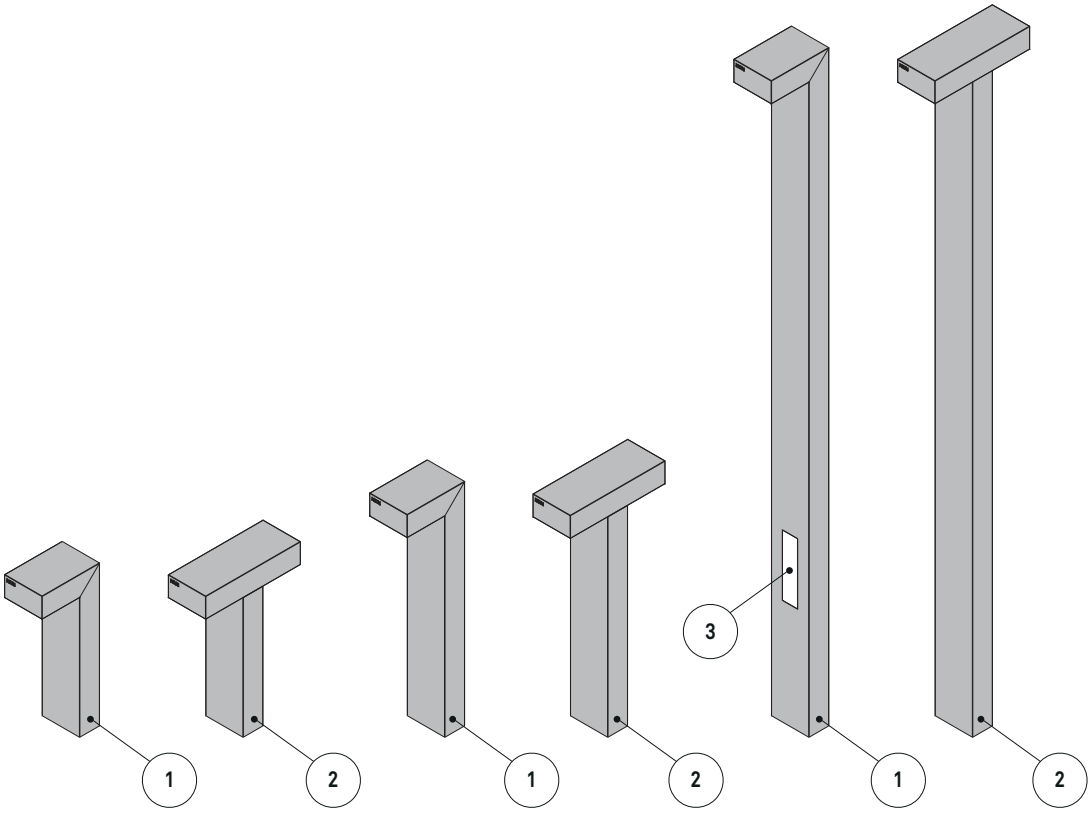
The Pictor Bollard system allows numerous configurations. The number of lighting fixtures and accessories varies according to the main structure of the chosen bollard.

1 - Main bollard structure with one luminaire
Available versions:
h 600mm
h 900mm
h 2500mm

2 - Main bollard structure with two luminaires
Available versions:
h 600mm
h 900mm
h 2500mm

3 - Decorative LED module accessory

Other accessories available on request:
- Quick connector
- PIR presence detector
- SPD 10kV DM/CM



NERI

Pictor Bollard System

Cod. **BOPIC**

Technical sheet

Rev. 01 - 2022/04/19

BOLLARD - h 900mm

Compliance

- In compliance with EN 60598-1; EN 60598-2-3; EN 62031; EN 55015 EMC; EN 61547 EMC; EN 61000-3-2/3; IEC/TR 62778.

IP66 IK08

Dimensions - Area - Weight

Height	Width	Lenght	Weight	Area exposed to wind
900 mm	160 mm	245 mm	13 Kg	0.08 m^2

Electrical characteristics

Voltage	Frequency	Cos ϕ	Insulation class	Operative Temp.
220-240V	50-60Hz	> 0,9	CL II - CLI	-25°C / +50°C

Mounting

- Rectangular flange 150 x 77 mm (thickness 5 mm) for mounting with four anchors bolts.

Materials

- Extruded aluminium.
- Cast aluminium.
- Aluminium sheet.
- Steel sheet.
- Extra-clear transparent flat glass.
- Stainless and burnished steel screws.

Structure - Main components

- External frame in extruded aluminium.
- Shield in extra-clear tempered glass with impact resistance IK08 (EN 62262).
- Integrated heat sink in aluminium.
- Anchors bolts supplied.

Electrical auxiliaries

- Electronic power supply with protection against short circuits, overheating and power surges with an estimated B10 duration of 100,000 h.
- Supplied with cable
- Standard surge protection for differential/common mode 6kV/10kV (CL I, CL II).

Operations and maintenance

- Periodic maintenance for the external cleaning of the structure and the screens from dust and smog and tightening control to the support - refer to the product's installation and maintenance manual -.
- It is the installer's responsibility to ensure correct installation and electrical connection in accordance with the applicable standards.

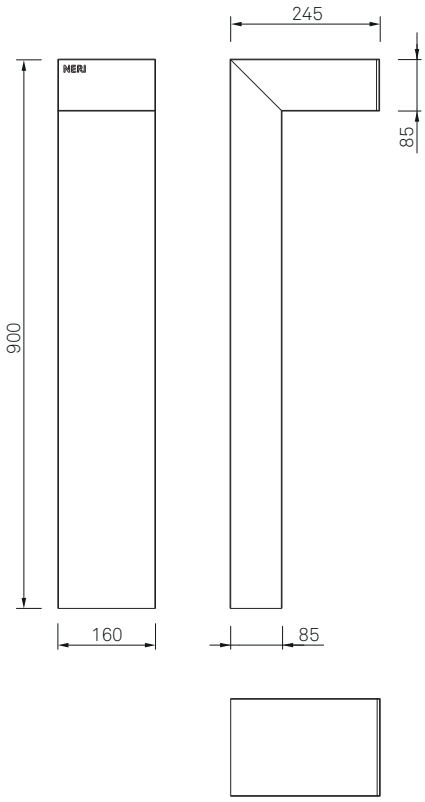
Painting

- Powder coating.
- Standard colors: Neri grey, pure white (RAL9010), jet black (RAL9005), moss green (RAL6005), white aluminium (RAL9006), grey aluminium (RAL9007).

Accessories (on request)

- Quick connector.
- PIR presence detector.
- SPD 10kV DM/CM.
- Prismatic flat glass.

DRAWINGS



NERI

Pictor Bollard System
Cod. **BOPIC**

Optics: Type II - IV
Screen: Transparent

Technical sheet
Rev. 01 - 2022/04/19

LUMINAIRE CONFIGURATION

Optic configuration - Transparent screen

Lighting distribution	Distribution type	LOR*	ULOR
Type II - D	Asymmetric	100%	0%
Type IV - A	Forward throw	100%	0%

* optical efficiency of the device due to physical shielding.
- Modular (2 X 2) refractive lens in PMMA.
- Maximum luminous intensity class γ ≥ 90°: < 0.49 cd/klm.
- Wide range of optical lighting distributions (on request).
- Reflector to recover luminous flux and reduce glare.

Luminous flux - 3000K

System**			LED module			
lm	W	lm/W	n.LED	mA	W	lm/W
550	5.2	105	8	2 x 90	3.8	143
1000	9.3	108	8	2 x 167	7.2	138

Luminous flux - 4000K

System**			LED module			
lm	W	lm/W	n.LED	mA	W	lm/W
550	5.0	110	8	2 x 86	3.6	151
1000	8.8	113	8	2 x 159	6.8	146

** The energetic values in the table are referred to the LED + Power supply.
- CCT 2200K, 2700K and Amber on demand.
- LED Type: Lumileds Luxeon 5050
  LED efficacy: 164 lm/W @ Tj=25°, 800 mA, 3000K
  LED efficacy: 169 lm/W @ Tj=25°, 800 mA, 4000K
- Life time specifi cation for gradual light output degradation
  (EN 62722-2-1, LM80 data) 100,000h L90B10 (Tq = 25°C).
- Color rendering index (Ra): ≥ 80
- Angular color uniformity Δu'v' ≤ 0,003
- Photobiological risk (IEC/TR 62778): RG1 Unlimited

Driver

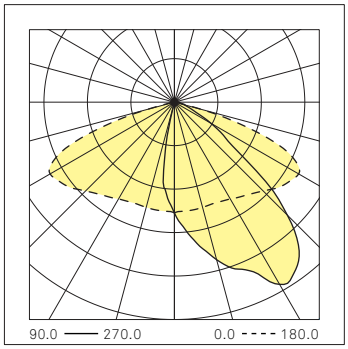
Driver functions
1-10V + NCL (Analogic control + Neri Constant Lumen)
DALI + NCL (Digital control + Neri Constant Lumen)
NVL6H + NCL (Autodimming -30% x 6h + Neri Constant Lumen)
ON-OFF + NCL (On-Off + Neri Constant Lumen)

Note: The double light sources configuration requires the same parameters for both light sources (optical configuration, luminous flux and driver function).

POLAR DIAGRAMS

Type II – D

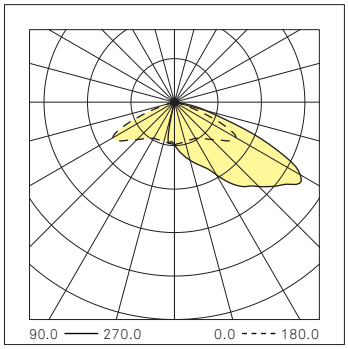
Luminous intensity class G*4



CIE Flux code				
N.1	N.2	N.3	N.4	N.5
39	76	97	100	100

Type IV - A

Luminous intensity class G*3

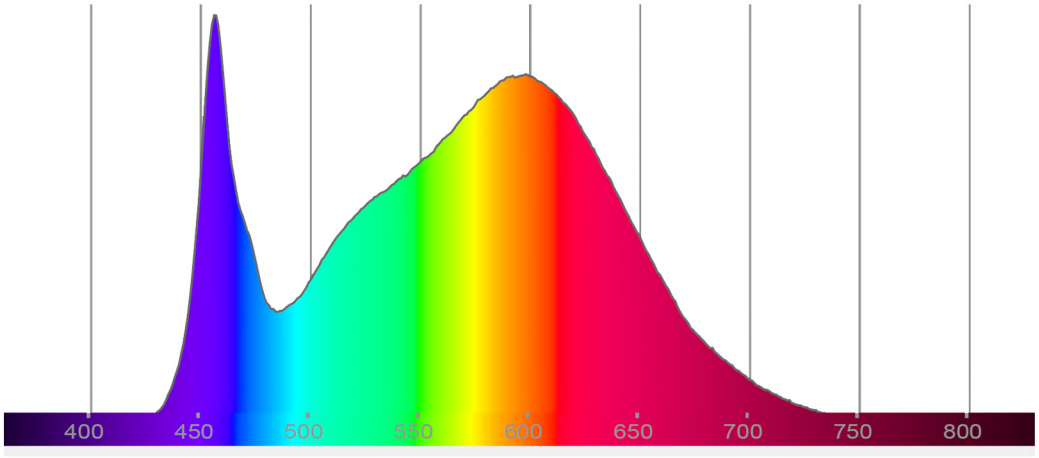


CIE Flux code				
N.1	N.2	N.3	N.4	N.5
26	65	96	100	100

8.3 SPECTRAL DISTRIBUTION

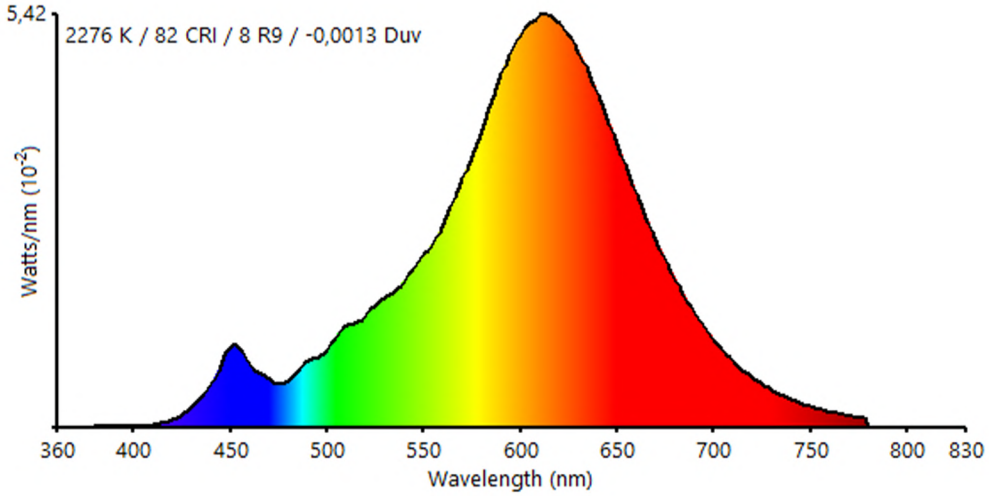
GVA LUMINAIRES - SPECTRUM

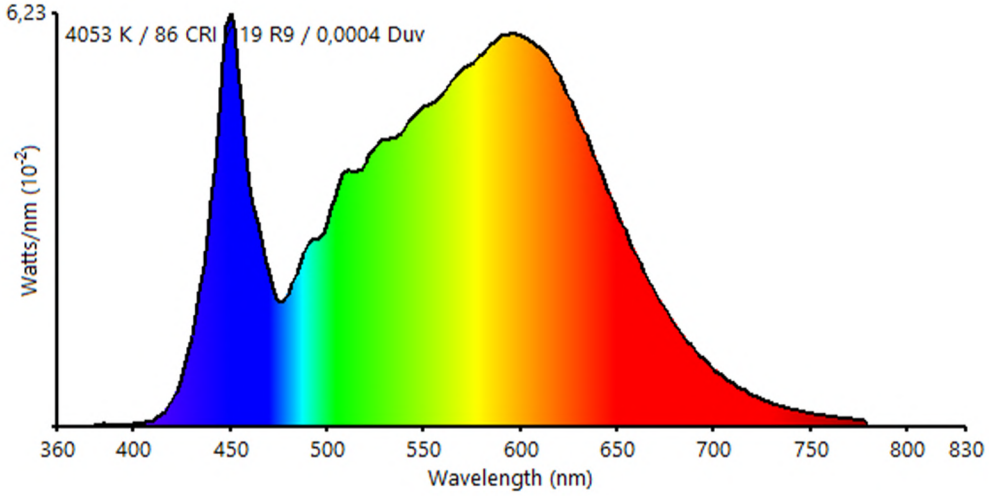
HL ART



NERI LUMINAIRES - SPECTRUM

803 LANTERN, LANG, PICTOR, NEBULA





8.4 BUDGET

City	Ref	Area	Group	Q.ty		Manufacturer	Product	Optic	Flux Source	Flux system	Power	CCT	CRI	Control	LUMINAIRES Cost	TOTAL	CTRL costs	Q.ty	Cost	TOTAL	OTHER costs	Q.ty	Cost	TOTAL
BOLOGNA	AA [CRI90]	Square	#1.03 #1.04 - #1.05 #1.10	12	pz	NERI	803	Type V	5769	4500	56	2200	80	DALI/Casambi	175,00 €	**2.100,00 €**	CASAMBI-DALI	4	150,00 €	**600,00 €**				**- €**
									5769	4500	47	3000	80											
									5769	4500	44	4000	80											
	AA [CRI80]	Square	#1.01 - #1.02 - #1.09	11	pz	NERI	803	Type V	5769	4500	71	2200	90	DALI/Casambi	169,00 €	**1.859,00 €**	CASAMBI-DALI	3	150,00 €	**450,00 €**				**- €**
									5769	4500	56	3000	90											
									5769	4500	51	4000	90											
	AB [CRI90]	Book club Green area	#1.06 - #1.07 - #1.08 #4.01 - #4.02 - #4.03	4	pz	NERI	Nebula L	Type V	2301	1772	39	2200	90	Casambi	1.650,00 €	**6.600,00 €**	CASAMBI	6	130,00 €	**780,00 €**				**- €**
									2948	2270	39	3000	90											
									3200	2464	39	4000	90											
	AC [CRI90]	Arcades	#2.01 - #2.02 - #2.03 #2.04 - #3.01	76	pz	NERI	Pictor	Type IV	1370	1000	19	2200	90	DALI/Casambi	280,00 €	**21.280,00 €**	CASAMBI-DALI	3	150,00 €	**450,00 €**				**- €**
									1370	1000	15	3000	90											
	XXX	Shop lights														**2.000,00 €**								
																33.839,00 €				**2.280,00 €**				**- €**
																							TOTAL	**36.119,00 €**
AMSTERDAM	BA [CRI90]	Path	#3.01 - #3.02 - #5.01 #5.02	29	pz	NERI	Lang	2x Type III	6471	5500	79	2200	90		280,00 €	**8.120,00 €**	CASAMBI	29	130,00 €	**3.770,00 €**	New poles	2	200,00 €	**400,00 €**
									6471	5500	61	3000	90											
									6471	5500	56	4000	90											
	BB	Handrail	#2.02	44	pz	GVA	HL_ART	Diffused				TW	90	Casambi	188,50 €	**5.814,09 €**	POWER DATA	20	147,00 €	**2.060,94 €**	Transport	1	1.127,00 €	**790,03 €**
																					Mounting kit	44	30,16 €	**930,26 €**
																					Connectors	30	4,50 €	**94,63 €**
		Seatings	#2.03 - #2.04	4	pz	GVA	HL_ART	Diffused				TW	90	Casambi	325,00 €	**911,30 €**				**- €**	Mounting kit	4	52,00 €	**145,81 €**
	BC	Trees	#3.01	1	m	LED LITE	DT 646	-	-	-	-	-	-	-	317,95 €	**317,95 €**	N/A		- €	**- €**				**- €**
				150	pc	INTEGRAL LED	Golf Ball Bulb	Clear beam	470	470	4,9	2700		FIXED	5,00 €	**750,00 €**	N/A	0	- €	**- €**				**- €**
	BD	Trees	#2.01	4	pz	L&L	Ginko 3.0	42°	1343	945	15	2700	90	Casambi	320,00 €	**1.280,00 €**	Driver	2	89,00 €	**178,00 €**	Strap	4	58,50 €	**234,00 €**
	BF	Crossing	#1.01	1	pz	NERI	Antares	Type IV	9000	9000	76	3000	90	DALI	170,00 €	**170,00 €**	N/A	0	- €	**- €**	New pole	1	200,00 €	**200,00 €**
	XXX	Benches														**2.000,00 €**	N/A	0	- €	**- €**				**- €**
																19.363,34 €				**6.008,94 €**				**2.794,73 €**
																							TOTAL	**28.167,01 €**
TARTU	CA.1 [CRI90]	Pedestrian path	#1.01 - #4.01	10	pz	NERI	Lang	2x Type III	6471	5500	79	2200	90		275,00 €	**2.750,00 €**	CASAMBI	15	130,00 €	**1.950,00 €**				
									6471	5500	61	3000	90	Casambi										
									6471	5500	56	4000	90											
	CB [CRI90]	Bridge	#2.01 - #2.02	58	pz	NERI	Pictor	Type II	1370	1000	19	2200	90		215,00 €	**12.470,00 €**	CASAMBI-DALI	4	150,00 €	**600,00 €**				**- €**
									1370	1000	15	3000	90	DALI/Casambi										
									1370	1000	13	4000	90											
	CA.2 [CRI90]	Bridge end	#3.01 - #3.02	8	pz	NERI	Lang	2x Type III	1370	1000	19	2200	90		275,00 €	**2.200,00 €**	CASAMBI-DALI	15	150,00 €	**2.250,00 €**				**- €**
									1370	1000	15	3000	90	DALI/Casambi										
									1370	1000	13	4000	90											
	CC [CRI90]	Beach	#5.01 > #5.03	3	pz	NERI	Nebula L	Type V	2301	1772	39	2200	90		1.650,00 €	**4.950,00 €**	CASAMBI	3	130,00 €	**390,00 €**				**- €**
									2948	2270	39	3000	90	Casambi										
									3200	2464	39	4000	90											
	CD	Pillar	#2.03 > #2.16	4	pz	GVA		60°							1.934,30 €	**5.423,78 €**					Custom arm	12	210,00 €	**3.500,00 €**
				4	pz	GVA		40°							1.934,30 €	**5.423,78 €**	DMX-DALI	2	786,12 €	**1.102,14 €**	Leader cable	2	90,30 €	**126,60 €**
				6	pz	GVA	FL 200	20°	7206	7206	94	RGBW	N/A		1.934,30 €	**6.135,67 €**					Jumper cable	4	79,89 €	**224,01 €**
	CF	Fiber Optic / art	N/A	3	pz	TBD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.000,00 €	**6.000,00 €**	N/A	0	- €	**- €**	N/A	0	- €	**- €**
																45.353,23 €				**6.292,14 €**				**3.850,61 €**
																							TOTAL	**55.495,98 €**

TOTAL	**119.781,99 €**

9. ANNEX

1 ANNEX: ULL stakeholder engagements

This appendix details ULL activities in each city up to 31 January 2023. These are the activities (as narrated in D2.2 Introduction) that have fed into the delivery of a lighting design in each city 'based on qualitative research from ULLs and other data.' As detailed in D2.1, the technical report and D2.2, the ULL approach, whose establishment was detailed in this deliverable, fundamentally combines qualitative and ethnographic social research with community engagement and consultation. The two are interconnected: research interviews are often tools for design insight and consultation, while, conversely, workshop events generally provide sociological data on the lives and issues of older people. This appendix therefore provides details of the full range of research and engagement in each city that made up ULL preparation and activity. Where this involved formal meetings, details have been provided of structure, attendance and outcomes. This is accompanied by details of other engagements with stakeholders.

1.1 Amsterdam

As discussed in the Deliverable, Amsterdam presents a different and more complex context for ULL development than the other two cities. Firstly there are multiple ethnic divisions representing different patterns of ageing and different social networks, with little overlap. Secondly, the area is characterised by a long history of governmental and political interventions and organizations, with existing networks and institutions. With the exception of the two launch events detailed below, ULL activity has largely taken the form of adding discussions and workshops to existing forums and organizations.

1. **Projects Fair (3 March)**

Networking event at Station Wildeman for wide range of community action groups active in the area. ENLIGHTENme ULL had a stall with publicity material and was able to meet potential partners and collaborators

2. **Networking event (23 June)**

Meeting with a range of local stakeholders to present ENLIGHTENme aims and coordinate activities. 30 participants included city and neighbourhood design teams, resident activist groups, community centre directors.

Discussion covered complexity of local initiatives that ENLIGHTENme will have to work with, education on range of networking mechanisms in the area, discussion of range of urban design projects currently being planned or implemented.

3. **Public Meeting (23 June)**

Station Wildeman community centre. 15 participants, including local community activists and residents, Station Wildeman staff.

Agenda:

Welcome from Station Wildeman

Presentation of aims and activities of ENLIGHTENme

Presentation of public lighting installation plans

Discussion of local redevelopment initiatives and relationship of ENLIGHTENme to other projects.

Minutes/summary:
Following presentations, discussion largely focused on the complexity of the range of initiatives in the neighbourhood and problems of communication and coordination.
Detailed discussion of the installation site based on local knowledge and its place in wider development initiatives
Main Takeaways:

- Installation is strategically good choice
- Need to integrate ENLIGHTENme with existing local initiative forums

4. Workshop (24 June)

Station Wildeman community centre. 18 older people, ENLIGHTENme team, Station Wildeman staff.
Agenda: The workshop was organized in standard project format:
Presentation: introduction of ENLIGHTENme and ULL project. Focus on ageing issues and important of lighting. Virtual nightwalk around Wildeman: slide show of night photography covering the installation site in order to raise awareness of lighting issues.
Workshop: Participants divided into 3 groups, each with facilitator. Each group was provided with about 150 'reference images' – photos of different lighting effects, street furniture and pubic realm design chosen to reflect a range of effects and provision that could be applied to our installation site. Each group was asked to consider different aspects of the installation site (the bridge and pathways), and select images that they felt would be suitable for the different areas, deciding as a group, through discussion. The results were placed on boards with notes giving reasons for the group's choices.
Minutes/summary:
Workshop was taped and photographed and notes taken by workshop facilitators uploaded to our database.
Main takeaways:

- Strong focus on litter, maintenance, pavements and obstacles in elderly journeys through the site
- Need more micro-analysis fo physical path based on walkabouts
- Strong focus on lack of night-time activity.


5. Night walk with city team (1 July)

Participants from city team working with ENLIGHTENme, including lighting experts and community project participants.

1 hour walk along lighting installation site to familiarise project partners and networks with project methodology and aims and to get detailed understandings of specific features of the installation site

Main takeaways:

- More focus on interaction of lighting with pavements, cycle barriers and other obstacles
- Detailed tracking of specific routes taken by older pedestrians in relation to specific tasks and routines. To be pursued through individual interviews and walkabouts
- Need more attention to ways in which different ethnic groups use public space

6. 3 Technical meetings with municipal stakeholders (3 Nov, 22 Dec and 18 Jan 2023)

Presentation of draft designs and discussion of technical issues, leading to agreement to install designs. Because of the highly consultative manner in which local planning decisions are taken and the complex web of local initiatives, several consultation meetings were required in order to discuss and agree various aspects of the co-design.

Main issues:

- Agreement of the areas to be included in the installation site. This required consideration of both social priorities and coordination with other municipal initiatives in the area.
- Discussion of which lighting parameters were to be explored through the installation over the course of its implementation, and how to connect ENLIGHTENme scientific priorities with those of the city and of local initiatives.

7. Meetings with community groups

ULL research and engagement activities in Wildeman needed to be structured in relation to two features of the area:

- Enormous number and complexity of local initiatives, and meeting fatigue. It was counterproductive to add new meetings specific to ENLIGHTENme ULL. Instead, the ULL has been included in the agendas of meetings of other local groups. During the D2.1-2.2 period up to 31 January 2023, the most important have been
    - Meetings of WeShare, a forum for a wide range of Wildeman organizations and initiatives. This is a monthly meeting, and ENLIGHTENme has received regular feedback and discussion in these meetings. Extensive participation in WeShare WhatsApp group to maintain involvement in range of contributing organizations.
    - Presentations to ad hoc meetings of local activist groups.
    - Meetings with several local design teams including: 1. the initiative to redevelop a park in our installation site; 2. The design team redeveloping the area around Station Wildeman itself.
- Wildeman comprises numerous ethnic groups which do not participate in the same networks and meetings. Participation of all groups in joint ULL meetings is not practicable in general.
    - White ethnic Dutch have been engaged by joining existing activities for the elderly: 1. Participation in a weekly elderly walking group has provided weekly discussion for insight into elderly concerns, activities, lifestyle and routines. 2. Participation in a weekly elderly swimming club has provided weekly discussion of similar themes, and exploration of issues of active ageing.
    - The researcher participates in a number of regular and frequent organizations or forums that involve elderly ethnic residents: 1. A weekly woman's group that spans several ethnicities and focuses on cooking together, allowing for extensive weekly discussions; 2. Participation in weekly meetings and communal dinners at the 'city farm' in Wildeman, which has allowed engagement with a range of ethnic elders; 3. Weekly volunteering with a foodbank that delivers meals to elderly citizens in their homes, allowing for discussion and interviews as well as access to the expert knowledges of other volunteers in this programme.
    - Continued involvemenet in 'Theetuin Wildeman' gatherings, weekly, of older residents in Station Wildeman, March 2022-Jan 2023. Participation in discussions, also interviews and local walks with members of the gatherings.
    - Participation in a range of elderly Christmas activities in Station Wildeman

8. **Wildeman viert Festivity (10 September)**
   Interviews, discussions and public announcement at local neighbourhood event.
9. **Moroccan women focus group (13 September)**
   Walkabout in installation area and elsewhere with elder members of Moroccan community.
10. **Elderly cycling group 'Doortrappers' (12 December)**
    Discussions of local cycling issues, use of installation area for mobility and elderly routines.

11. **Observations and walkabouts**

Approximately 50 hours of observation, photo-documentation and walkabouts in the installation site, including:

- Observation of the pedestrian bridge at various times of day and weak, accompanied by about 25 short 'cold interview
- Five detailed accompanied walks through the extent of the installation site in order to understand at a micro-level the specific routes taken by elderly residents with different levels of mobility, and to identify impediments at a micro-level (pavements, curb stones, cycle barriers, etc)
- Approximately 8 hours of observation in the installation site with a community liaison officer with wide contacts amongst local elderly, allowing for expert interviews with users of the site, particularly the bridge.

12. **Interviews**

As in most ethnographically-oriented research of this sort, 'interviews' range from formal 1-2 hour conversations to numerous short conversations with the same informant over a number of different meetings. Because of the features described above, this was more the case in Amsterdam than in the other two cities: there was resistance to formal interviews, but openness to engaging in less formal circumstances, often in the context of other activities. On the this basis, the estimate of interview engagements over the course of D2.1 is 30 elderly stakeholders. In the period between the ends of D2.1 and D2.2 there were an additional 30 interviews. This includes extensive interviews with Moroccan and Turkish elders, including men, to which the research assistant previously had little access, including members of local mosques.

1.2 Bologna

As discussed in D2.1, the Bologna research site is characterised by low levels of participation in organized civic associations but very high levels of social engagement, interest and networking. Formal meetings and workshops are documented below but do not entirely represent the character of ULL activity, either in terms of research or engagement.

1. **Public Meeting (13 May)**

Due Madonne Center, via Carlo Carli, Bologna. In attendance: ENLIGHTNme team, project partners, 52 residents and stakeholders

Agenda

1.Welcome from District President Marzia Benassi and Simona Tondelli

2.Introduction to ENLIGHTENme project (framework, team and objectives)

3.The importance of light

4.Introduction to the methodology of the ULL (Elettra Bordonaro and Joanne Entwistle)
5.Introduction to the Piazza de Lambrakas where the ENLIGHTENme lighting intervention will be installed in 2023 (Elettra Bordonaro and Joanne Entwistle)
6. Q&A discussion of older residents living in the area

Minutes of 13 May 2022 Public Meeting

2. Under item 2 it was described how the ULL was born from the collaboration of Configuring Light group (Elettra Bordonaro, Joanne Entwistle, Don Slater),Researchers in the area (Urban Innovation Foundation, Umberto Mezzacapo and Chiara Sponza), and "Informal" researchers (residents and users of Piazza Lambrakis). EB described how the ULL will operate: through workshops and through activities, such as the one taking place later, we will explore how light effects our wellbeing.

3. Under item 4 JE described how The Urban Lighting Labs (ULL) have been created with the aim of researching and implementing innovative policies for urban lighting and studying full-scale interventions in specific areas in three study cities envisaged by the ENLIGHTENme project. She described how the workshop will operate and how we hope to gather feedback on the experience of the public realm at night by older residents. It was explained that the ULL aims to involve residents, the community and the city in order to generate qualitative data, co-design processes and urban lighting pilot projects. JE also explained that the ULL will also be a way to conduct qualitative research and lighting research before, during and after external and internal lighting interventions and to co-design and implement internal and external lighting interventions.

4. Under item 5 there was detailed Q&A from participants. Firstly the issue of the problems with overlit public spaces, and increasing exposure of humans to too much light was pointed out by the EB. ST pointed out also that scientific communities and policy makers are ever more focused on lighting due to the exponential raising of human exposure to the electric light, thus deeply affecting the circadian rhythm, health and wellbeing of people, making them more incline to the cancer, neurodegeneration and psychiatric morbidity, especially particularly fragile people such as elderly.

2. Workshop (13 May) Virtual Nightwalk through Piazza Lambrakis

In attendance: 40 older citizens, 15 residents living around Lambrakis, Due Madonne Center, Bologna

Agenda: Virtual night walk through Annelinn: This workshop aim was to illustrate the different qualities of light.

Minutes/summary:

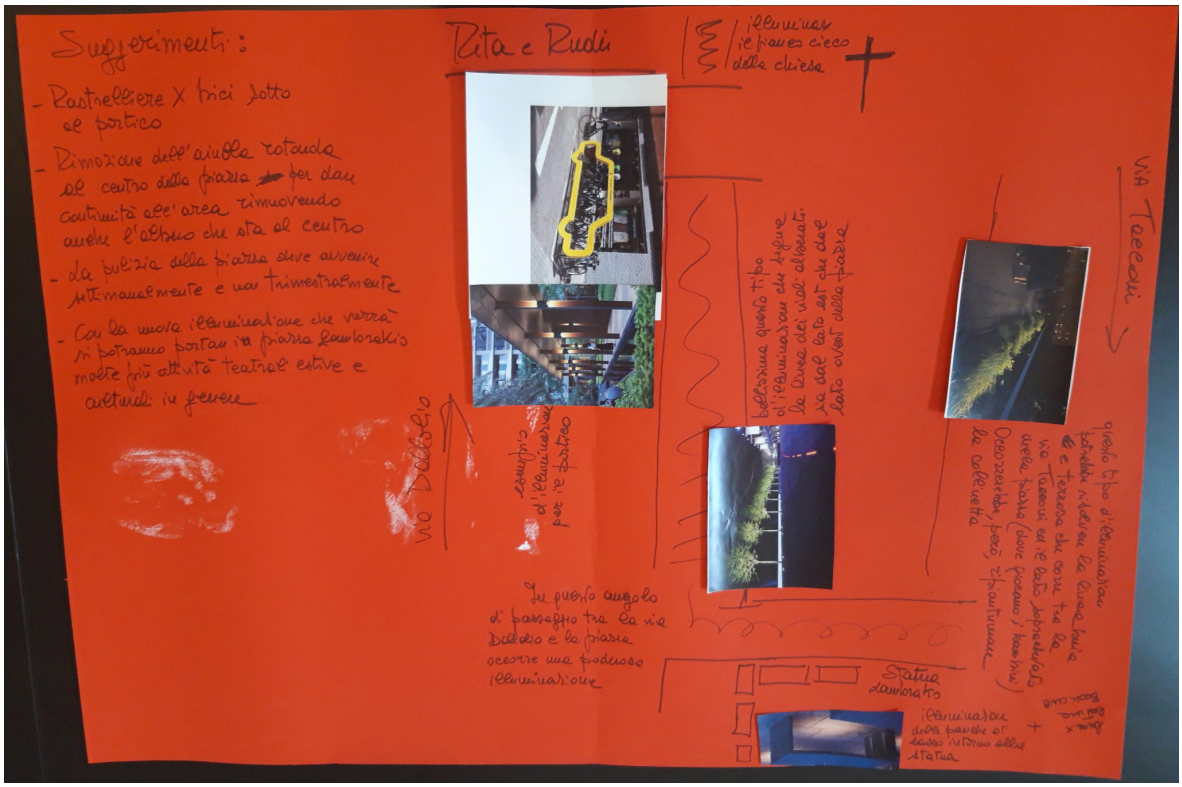
After a Welcome, Introductions, there was a small PowerPoint presentation by EB about the language of light. Through PowerPoint slides she demonstrated the power and importance of light; how we receive light with our eyes, what effects different forms of light have on surfaces, objects. Brief presentation on the parameters of light (luminance, brightness, contrast, colour rendering at night, colour temperature).

EB then took the residents on a virtual night walk around Piazza Lambrakis discussing the different problems with the lighting around the square. Some problems, such as high contrast were noted. There was also the opportunity at this workshop to play with the Responsive light module, designed by ENLIGHTENme partner, Neri. EB and Argun used this module to illustrate the differences in colour temperature and luminance that can be generated through this one module. Some questions from residents concerned how bright these lights can go and whether or not they can be used in public spaces like Lambrakis. EB explained how the light module is an illustration of the sort of intervention that will be used in the experimental lighting she will design for the Piazza.

3. Second Workshop – montage activity (19 May)

In attendance: ENLIGHTENme team and project partners. 52 residents, around 40 residents were aged 60+ and equal mix of male and female residents.
Format: Participants were split in four groups and invited to draw on A2 sized and coloured paper the Lambrakis square according to their imagination and taking into account their needs and desires in terms of usability, accessibility, sociability and so on. They were given a wide range of photos showing public spaces with different types of lighting, possible uses and functions, different types of street furniture, etc.

Summary/Minutes: record of main discussion points in each group:



- Bike racks should be installed under the porch as a consequence of a shortage of parking spaces for bikes. An alternative could be to create space for the racks outside the porch, removing a couple of car parks
- It would be necessary to remove the round fountain/flowerbed and the tree that are in the center of the square to give continuity to the area
- The cleaning of the square must take place weekly and not quarterly
- With the new lighting that will come, many more summer theatrical and cultural activities can be brought to Lambrakis square
- Lighting must also be enhanced in the passageways between via Dall'Olio and piazza Lambrakis
- The type of lighting that follows the line of an hypothetical tree-lined avenues on both the east and west sides of the square is much appreciated
- Light up the Lambrakis statue and the stone benches around the statue
- The lighting on the side of via Tacconi must be redone, as shown in a photo attached to the diagram: this type of lighting could solve the dark and earthy line that runs between via Tacconi and the raised side of the square (where children play). However, the small hill should be planted again
- To enliven the square, a corner for the Book club could be set up at the Lambrakis statue, using and illuminating the concrete benches with ad hoc lighting.
- Under the arcades, indirect lighting which is not very powerful but diffused could be installed,

by placing devices along the columns. For this to work, however, the walls and columns of the arcades must be repainted.

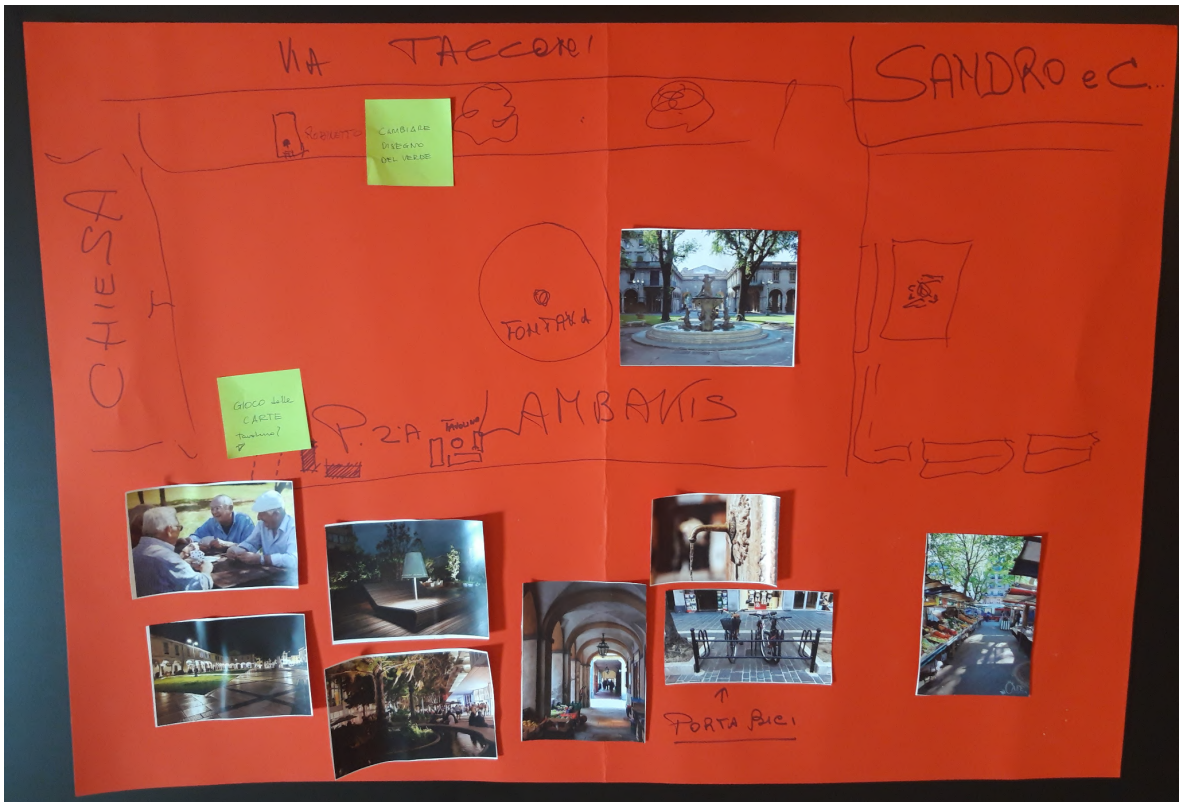
- Due to the feeling of insecurity it induces, the blind side of the church should be illuminated and the entrance from via dall'Olio towards the square too
- The trees with the lighting underneath are considered very beautiful, they give a very nice scenic effect, it could be done along the whole square but an agronomic consultation is needed
- It would be necessary to have a lighting system that would lower the intensity of the lights during the evening shows (projections, theater, dance, etc.) and raise it soon after. During the shows it should properly illuminate the stage

Group representative: Rita Roatti

- In the center of the square more bins and possibly closed (due to the presence of birds that turn it upside down to find food) are needed
- The part of the square towards via dall'Olio should be more illuminated and with more homogeneous light
- Before covid citizens used to organize events in the square who successfully managed to involve also elderly, especially in summertime
- The light under the benches makes mosquitoes come, that's why it should be better to switch light on in summer and off in winter

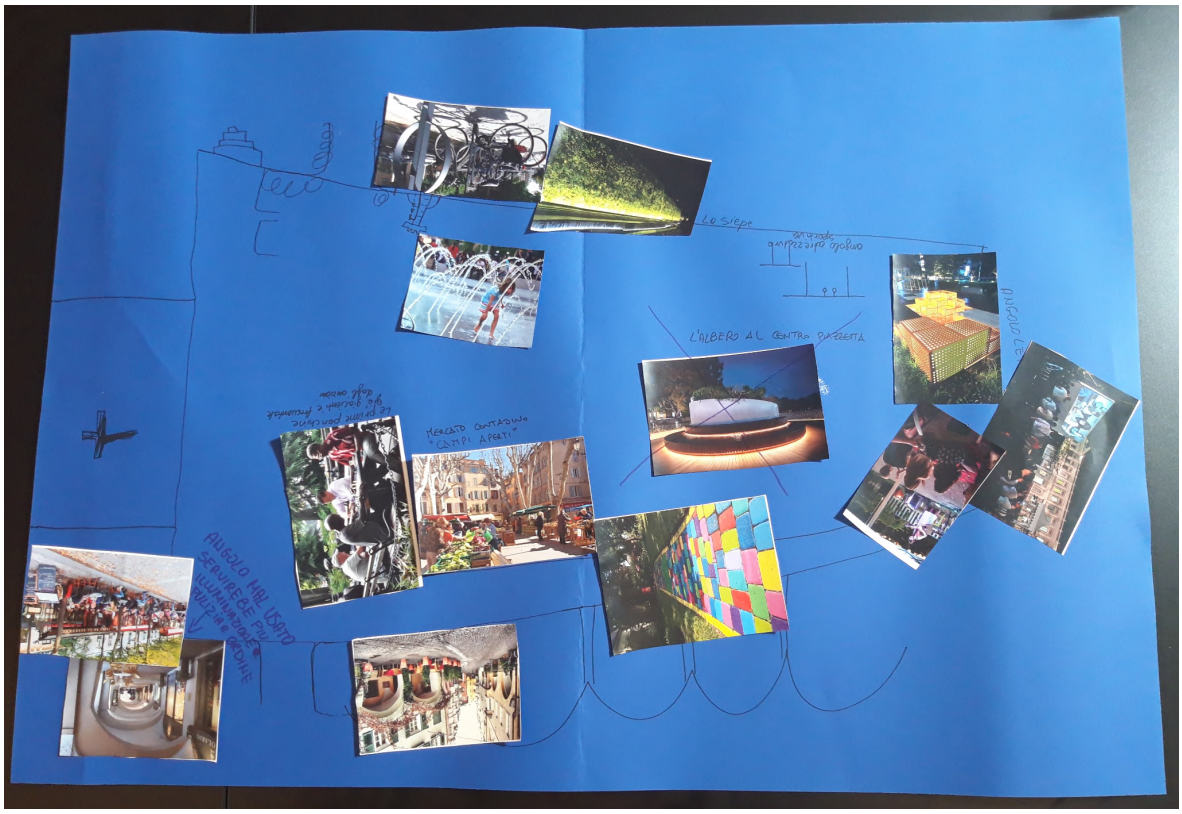
- Evening screenings, shows, music, in brief: a good reason to go out (it would be necessary to organize more evening events, especially spring and summertime) to push elderly to participate and get out of home more often)
- Bike racks are needed
- A brand new fountain should be put at the bottom of the square with water games to let children playing
- Bike racks are needed all along the square because more and more families, especially young ones, only use the bike to get around. In any case there is a shortage of racks
- The protection of children is an important issue as in the passable streets surrounding Lambrakis square cars sometimes go very fast (for example children sometimes run away from the side of via Tacconi, so green barriers must be put in place for them)
- Gymnastic equipment for adults, located in the southwest corner of Lambrakis (towards the church), could be a way to attract and make people stay in the square, apart from the health issue which is very important as well. A gymnastic teacher would already be available
- Games for children in the center of the square should be made available
- Via Dallolio is very dark, it would require more lighting and a little warmer
- The square should be turned into a multifunctional space, where there could be games for children and gymnastic equipment for the elderly
- It's necessary to remove the broken fountain which overturns and releases water that floods the square and, mixed with dust, carries mosquitoes

Group representative: Silvia Branca



- The green path and the flowerbed should be changed and renewed
- The fountain at the center of the square should be removed
- Small tables to play cards should be put in the area where usually elederly sit and chat
- Bike racks are needed all along the square
- In the south-west corner of the square, beside the church, during the night people pee there, that's why a public toilet should be set on motion when bar are closed
- A bakery and an ice-cream parlour would make the square more comfortable, attractive and nice

Group representative: Sandro & c.



- That part on the right side of the church has never been used, more lighting, cleaning and order is advisable
- The tree at the center of the square must be cut as soon as possible
- Farmers Market “Campi aperti” could be a way to make the square more sparkling
- A green barrier/illuminated hedge should be put all along the right side (via Tacconi)
- Bike racks are needed
- A corner with gymno equipment would be much appreciated
- A book corner at the beginning of the square, or somewhere else, could be a way to make the square being more attractive
- Fountain may be kept especially in terms of structure, nevertheless the design should be changed, renew it and lighting it
- the side of the square nearby the church should be kept clean and illuminated in order to let people enjoy it; near the connection with portico a bar with small tables would make this area more enjoyable
- on the left side of Lambrakis among the trees there’s a lot of dirt, dogs shit, no grass, totally unhygienic, so that an anti-trauma carpet for children is needed, this way they would enjoy themselves much more
- Square cleaning happens rarely
- the southern part of the square, that part closer to via Emilia, could be a place for projection, nothing usually happen here, also because most of the activities, event and so on are

concentrated in the middle and on the opposite side of the square • The fountain split the square in two, once there used to be red fishes and water but nowadays it fragments the square, it must be removed to give continuity to the square • A rowing machine and a Calisthenics equipment to practice outdoor sport should be installed in the square • Cleaning has to be done more often because square is particularly dirt in spring and summer
Group representative: Bassam Kheriti

4. Public meeting (4 Nov 2022)

Due Madonne Center, via Carlo Carli, Bologna. In attendance: ENLIGHTNme team, project partners, 60 residents and stakeholders

Agenda: Introduction to ENLIGHTENme program. Explanation of WP3 project of testing light therapy in homes. Presentation of draft designs for Piazza Lambrakis.

5. Design workshop (4 Nov 2022)

Due Madonne Center, via Carlo Carli, Bologna. In attendance: 40 residents and stakeholders

Format: participants divided into three groups and asked to discuss three areas of the design (arcade, open space and seating area) structured through two questions: how will the design change the feeliing or use of the space? And are there any issues that the design does not address?

Main points:

- Extremely positive and enthusiastic response to the lighting itself.
- Concerns about cost and maintenance, and who will be responsible; the political organization of the initiative needs to be addressed more clearly
- Strong demand for more activities and cultural events to make use of what will now be a rather theatrical space, more to support activation.

6. Research assistance

In October 2022, a new research assistant was appointed. Because of her research training and energy, this marked a significant shift in the research and how it has fed into design. The RA has developed a much deeper rapport with the formal and informal networks around Lambrakis so that the engagements under point 7 below have become very extensive and regular, and fed directly into design work through comments on issues such as zoning of the space (how people distribute and separate themselves on the square); use of specific areas such as the activity zone at the south side of the square, which became a specific focus of lighting design; and the ways in which people use the arcades both for shelter, shopping and socializing. She has also made a strong connection with the local parish church and its attendant community and social workers, which has allowed incorporation into lighting design attention to tensions between church and non-church users of the square.

7. Engagement with local social networks

ULL activity in Piazza Lambrakis is characterised by regular (daily or weekly) engagement with specific informal groups that assemble in the area. These provide relationships with local informants, involving longer term contact and discussions. The main groups that have regularly worked with us are:

- A group of 5-10 older men who gather every evening in the square for 1-2 hours, as they have for about 30 years. Regular discussions with this group cover local social networks and events, their own uses of the location and observations of others, suggestions for improvements and design ideas, discussions of ENLIGHTENme project and progress of the interventions.
- A group of 10+ men who meet daily, after work, at one of the two cafes in the square from 15.00-18.00.
- Women picking up children from school meet daily at the second café in the square, with leisure to discuss everyday routines and events in the area;
- Daily conversations at the local grocery shop which is run by a central community leader and informant;
- Active members of the local parish church

8. Interviews

During the period covered by the Deliverable 2.1, there were 21 formal interviews conducted with elderly locals. These are of course in addition to the less quantifiable informal conversations over the course of research. Since the new RA was appointed, the level of engagement has increased, mainly in terms of informal interviews in the context of ongoing ethnographic relationships. She has added approximately 30 regular contacts amongst the elderly, plus about 20 other local stakeholders.

9. Observation:

Approximately 130 days observation and photo documentation, covering change in seasons, weather conditions, times of day and days of week.

1.3 Tartu

As in the other two cities, Tartu ULL engagement has involved a mix of formal meetings and the range of qualitative research methods. Because of the low level of civic engagement (both formal and informal), there has been a larger proportion of formal interviews, though a few institutions (community centres, library and a walking group for the elderly) have allowed more developed engagement.

1. Public meeting (19 May 2022)

City staff and local stakeholders. 30 participants.

AGENDA:

1.Welcome and introduction to the team
2.Introduction to the ENLIGHTENme project and its overall objectives
3.Introduction to the ULL in Annelinn
4.Introduction to the methodology of the ULL
5.Introduction of the Beach/Pedestrian Bridge where the ENLIGHTENme lighting intervention will be installed in 2023
6. Q&A and discussion of the activities of older residents in Annelinn

Minutes:

1. Welcome and introduction to the ENLIGHTENme project: Don Slater welcomed participants and introduced the CL team working on the ENLIGHTENme project. DS also outlined the main objectives of the ULL in Tartu as citizen co-design.
2. Discussion of methodology. DS explained how the ULL will gather data and the other forms of social research taking place in the area. He described how the ULLs will be a mixture of discussions and

active workshops using a variety of materials as prompts (virtual nightwalks, group workshops using photo-elicitation and collage activities). DS also explained how the team will also carry out participant observation (at some older citizen events) and interviews with older people and their carers/family. He explained that the focus was on older citizens (60 +) and their relationship to lighting and design and the impact of lighting on their health and well-being but this will also involve talking to others in the community who support older people, such as carers and family members.

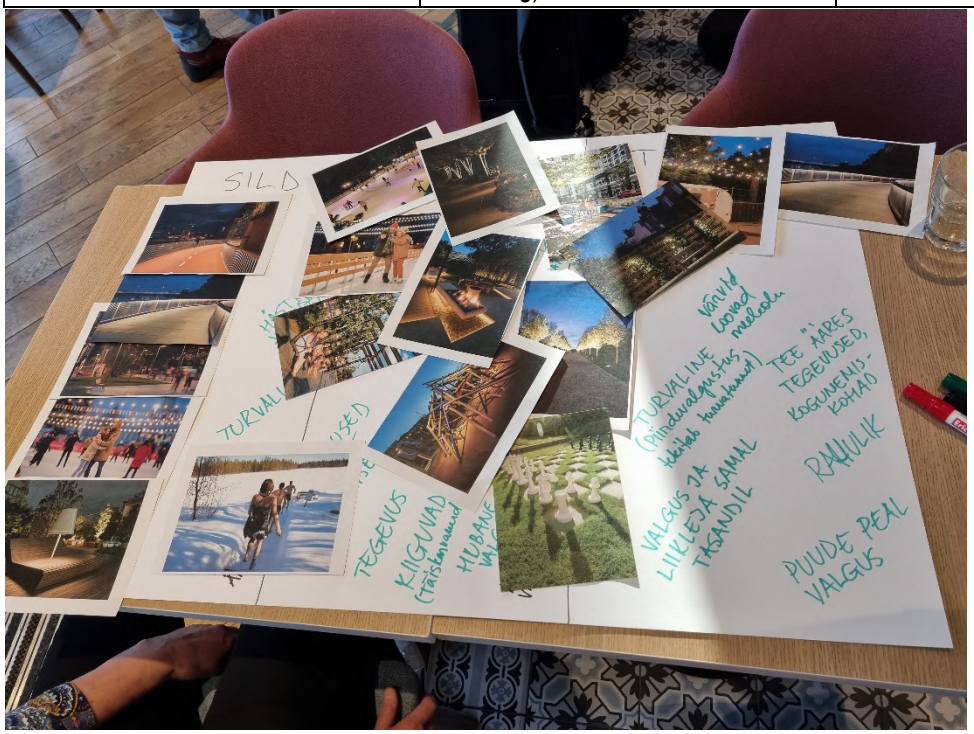
3. Discussion of the ways in which public lighting support older citizens also took place. DS, on behalf of the CL team, explained some of the parameters of lighting and other aspects of public realm design that are important (benches, nature, for example)
4. Outline of the methodology – CL discussed with the participants the format of their methodological approach, especially focusing on interviews, observation and documentation, discussions, how we work with older citizens in design workshops (using images, interactive materials) and how we encourage older citizens, their carers, families, local institutions to engage in these activities to enable them to articulate their experiences of public realm lighting and other design
5. The Pedestrian bridge near the Beach was introduced and discussed as a good place for the ULL lighting installation as it features as a meeting point for older people.
6. Discussion of some of the workshops and events where the team can access older people – carers and social worker informed the CL team of the various community groups, such as the walking group in Annelinn and agreed to let the CL team observe this group and participate in the walk.
7. Meeting closed

2. Public Lighting Workshop (19 May 2022)

In attendance: 30 people, mix of city staff in social services, lighting, etc and older Annelinn stakeholders
Format: Participants divided between 3 tables, each with facilitator. Each table was provided with about 150 ‚reference images' – photos of different lighting effects, street furniture and pubic realm design chosen to reflect a range of effects and provision that could be applied to our installation site. Each group was asked to consider three aspects of the installation site (the bridge, the beach and the pathway area), select images that they felt would be suitable for the different areas, deciding as a group, through discussion. The results were placed on boards with notes giving reasons for the group's choices.
Summary: Example of Workshop activity:
Group 2:

BRIDGE	BEACH	PATH
Well lit	Using different colours (light chains along the river)	Colours create a nice atmosphere
Soft light	City is my home	Safety (border lighting creates safe feeling)
Safe	Contrast free lighting	Activities beside the path
Border (fence) lighting, spiders	Opportunities for conducting different activities	Meeting places
	Activities	Light and pedestrian on the same level
	Swinging (for adults)	Calm
	Cozy tree lighting	Lighting on trees
	Intimate	
	Cute lighting	

	Winter swimming (notice when drowning)	



Group 2 summary:
Participants: Olja, Piret, Another Lady, Elderly person.
Railing with calm light are good, and railing can be necessary if there is danger to fall somewhere.
I keep asking people “WHY?”
Piret says that warm light is nice and group agrees with that
Elderly person in the group proposes that there is good if there are some activities, e.g., swings.
Another lady says that she likes lighting that lights trees very much, later in the end elderly person says the same. She also likes light chains, says it feels like home. Elderly person agrees.
Piret proposes that place for winter swimming could be better. Local elderly says that there is already exists place for winter swimming. Piret explains that it could be improved with better lighting.
Piret proposes some activities by the road, not all of activities should be at the beach. Elderly person finds image with activities and asks if it could be one of them, but another lady says, that better place for activities is beach area, e.g., winging, skating, swimming. Both Piret and another lady agrees that grown ups also like swinging. Everyone agrees.
Another lady is concerned if we have covered safety topic. Says that image with the lighted railing seems safe. Human scale lighting, not anonymous 10m lighting pole. Elderly person agrees.
Piret likes use of different colors, another lady says, that it is also part as “city as our home”. Piret argues, that we can use it by the road, to make it more interesting and creates better mood.
I asked elderly person how she feel now while crossing the bridge, she says that she is so used to it, that it’s difficult to say anything, but always can be better. Discussion that people who sees something for the first time sees things differently that people who are used to it.

3. Workshop with older citizens at day centre in Annelinn (22 May)

In attendance: 21 residents, 4 carers, ENLIGHTENme team

As this was an informal meeting with the aim of beginning the collection of data from older citizens, there was no formal Agenda or minute taking.

Presentation/Introduction: Virtual night walk through Annelinn: This workshop aim was to illustrate the different qualities of light. DS talked about the lighting conditions and took the participants along the main pathways and areas in the Annelinn estate b night using night photographs of Annelinn (can use the PPT slides).

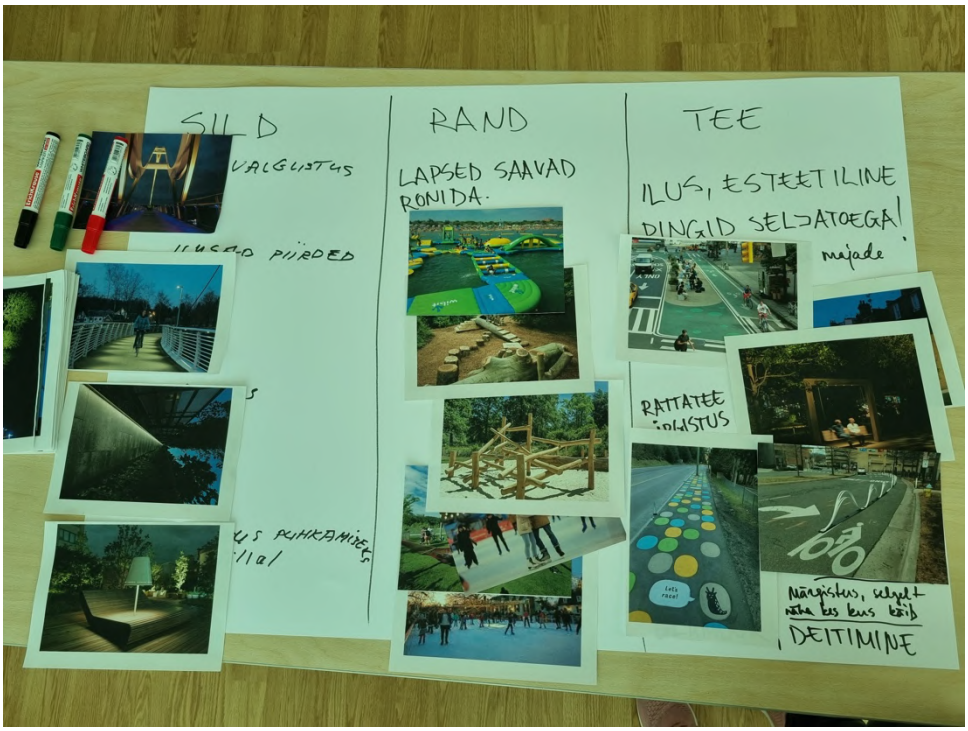
- Welcome, Introductions
- PowerPoint short presentation by DS on behalf of the CL team
- Aims of the ENLIGHTENme: DS gave a short overview of the aims of the project
- What is light: using illustrative slides, DS demonstrated the power and importance of light; how we receive light with our eyes, what effects different forms of light have on surfaces, objects. Brief presentation on the parameters of light (luminance, brightness, contrast, colour rendering at night, colour temperature).

Workshop Format (as in other workshops): Participants divided between 4 tables, each with facilitator. Each table was provided with about 150 ‚reference images' – photos of different lighting effects, street furniture and pubic realm design chosen to reflect a range of effects and provision that could be applied to our installation site. Each group was asked to consider three aspects of the installation site (the bridge, the beach and the pathway area), select images that they felt would be suitable for the different areas, deciding as a group, through discussion. The results were placed on boards with notes giving reasons for the group's choices.

Summary: Example of Workshop activity:

Group 1:

BRIDGE	**BEACH**	**PATH**
Good lighting (picture – behind the benches + plants)	Kids can climb	Beautiful, aesthetic
Nice borders	Not enough benches (bench with a low light – nice but young people can ruin it)	Benches with backrest (also in microdistrict between the buildings)
Safety		Marking on cycling path, (physical border)
Comfort for resting on the bridge (benches)		More fun elements (colourful dots on the ground, something similar near the Anne pond)
		Glamour, dating (picture – swing)



Notes on Group 1:

Bridge lighting: Would be nice for dating - for young people.

Not enough benches, and need back rest.

All want bike separation - above all the visual separation.

Talked about public space in general, not separate spaces.

Lamp is nice but not practical - will be vandalised.

Like colourful path/road because it is ‘happy’, cheerful’

Like the light arches - it’s ‘beautiful’ - what does that mean?

Making demands for yourself as an older person or via demand for younger people.

Red dress lady - really talking long time about love locks - for YOUNG people but also something nice for her to look at. Nice to see young people in love.

Old people as observers - nice environment to look at, people doing things.

No privacy - Annelinn is empty but everyone is watching, sounds of people/neighbours. Very thin walls, and bad ventillation so windows are open.

4. Workshop with older citizens at second day centre (4 June)

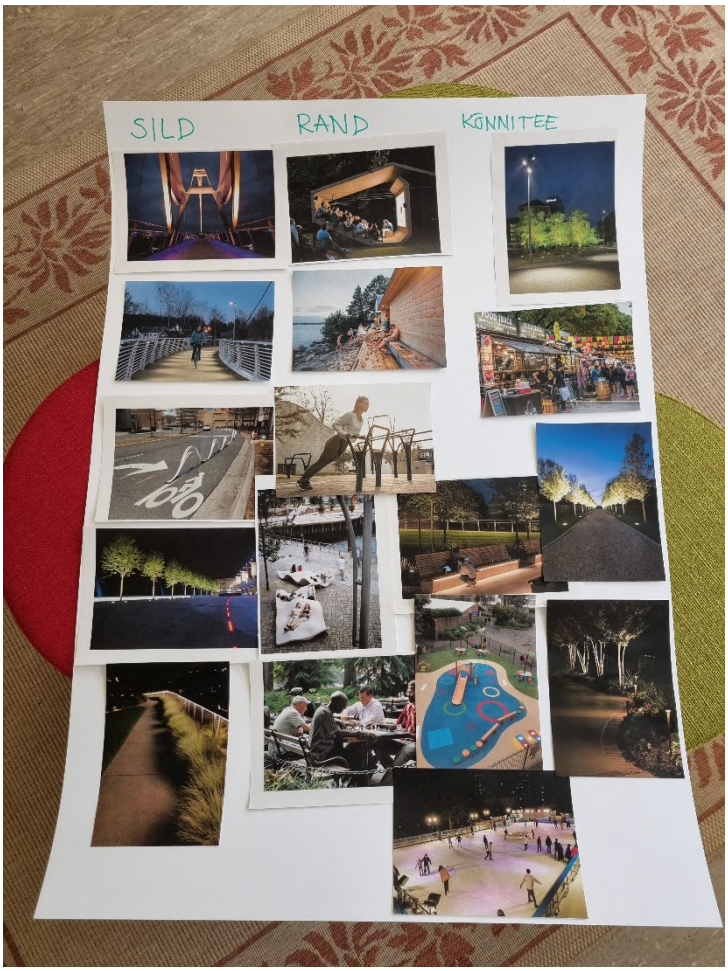
In attendence: 13 elderly participants, 2 carers

Format: Same format as other workshops: presentation of aims of the project, virtual nightwalk around installation site followed by dividing into groups to discuss lighting and design parameters using reference images.

Summary of one group: The participants were divided into three groups with their carers to consider the atmosphere in public space. This involved a montage activity with a range of different photographs (night scenes with planting, benches, iceskating, park activities) and in groups the older citizens were encouraged to choose the photos they liked and montage them onto boards and describe with marker pens what they liked in the photo. Using these Boards, the participants discussed their experience of the night. Some discussion of benches and where they need to be positioned. Some participants described how they didn't go out after dark.
One elderly participant and the team discussed railings with lighting along them. There was a discussion also of how warm like is much calmer and nicer than cold light. Workshop summary:
Railing with calm light are good, and railing can be necessary if there is danger to fall somewhere. Elderly person in the group proposes that it would be good if there are some activities, e.g., swings.
Another lady says that she likes lighting that lights trees very much, later in the end elderly person says the same. She also likes light chains, says it feels like home. Elderly person agrees.
Piret propose that place for winter swimming could be better. Local elderly says that there is already exists place for winter swimming. Piret explains that it could be improved with better lighting.
Piret proposed some activities by the road, not all of activities should be at the beach. Elderly person finds image with activities and asks if it could be one of them, but another lady says, that better place for activities is beach area, e.g., winging, skating, swimming. Both Piret and another lady agrees that grown ups also like swinging. Everyone agrees.
Another lady is concerned if we have covered safety topic. Says that image with the lighted railing seems safe. Human scale lighting, not anonymous 10m lighting pole. Elderly person agrees.
Piret likes use of different colors, another lady says, that it is also part as "city as our home". Piret argues, that we can use it by the road, to make it more interesting and creates better mood.
I asked elderly person how she feel now while crossing the bridge, she says that she is so used to it, that it's difficult to say anything, but always can be better. Discussion that people who sees something for the first time sees things differently that people who are used to it.
At the end of the workshop: the four groups presented their board to the others and discussed their main findings. These boards were photographed as evidence of the activity and for assisting the CL team in their thinking about the design of the pedestrian bridge and Beach.

Photos of the boards shown here:

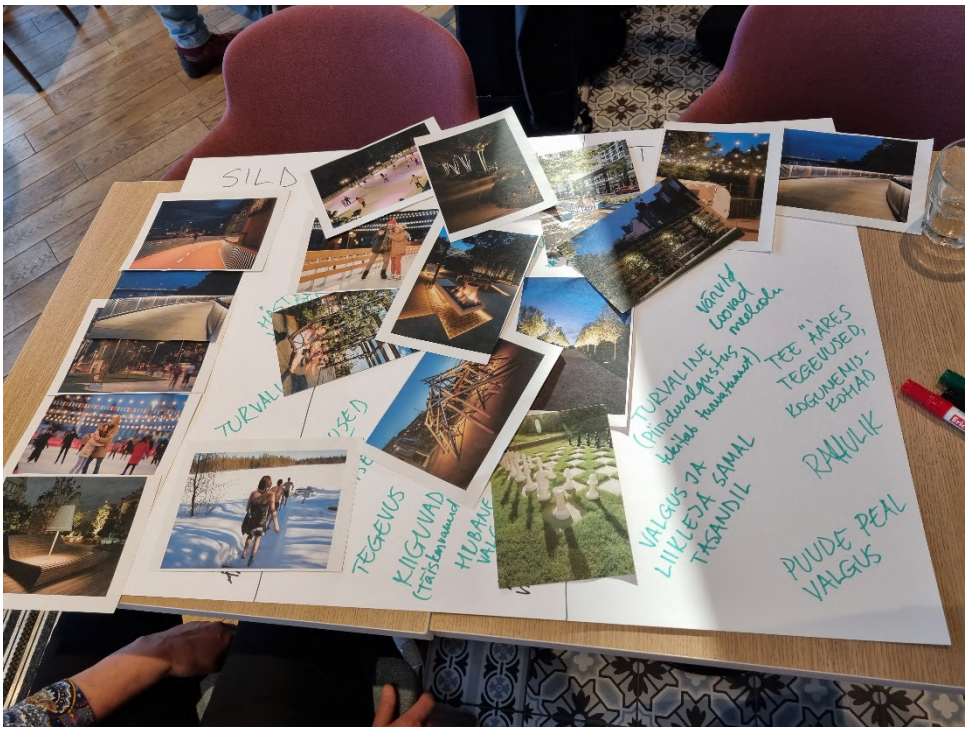
Group 1



Group 2:

BRIDGE	BEACH	PATH
Well lit	Using different colours (light chains along the river)	Colours create a nice atmosphere
Soft light	City is my home	Safety (border lighting creates safe feeling)
Safe	Contrast free lighting	Activities beside the path
Border (fence) lighting, spiders	Opportunities for conducting different activities	Meeting places

	Activities	Light and pedestrian on the same level
	Swinging (for adults)	Calm
	Cozy tree lighting	Lighting on trees
	Intimate	
	Cute lighting	
	Winter swimming (notice when drowning)	



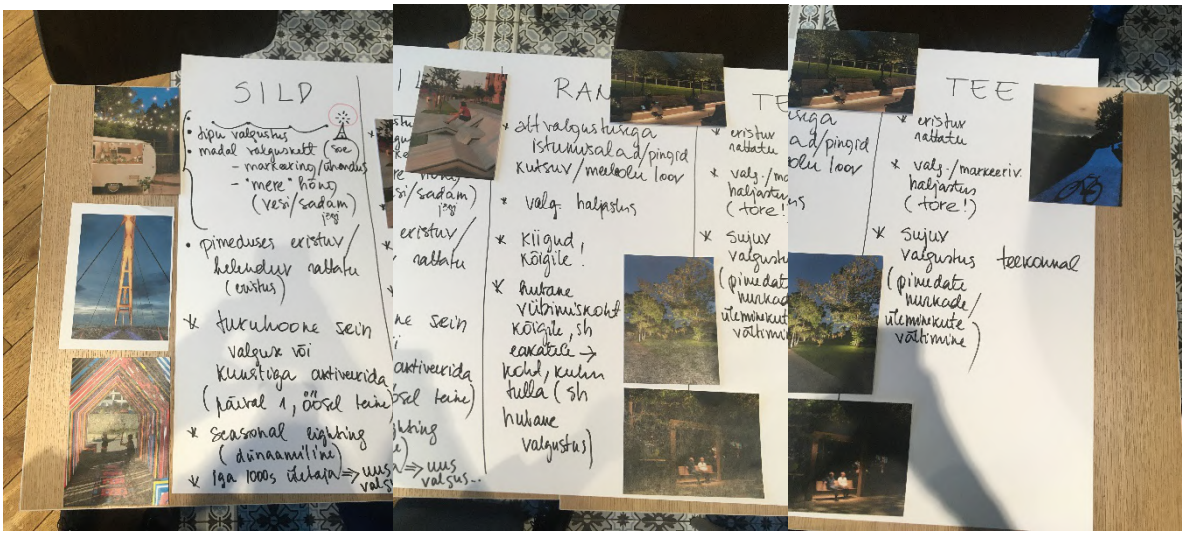
Group 3:

BRIDGE	BEACH	PATH
Dim/soft light	Object that stands out	Lower/ground lighting, can see where you are stepping and does not shine directly at your face
Light under seating, trashcans beside the benches, lighting under handle	Sitting area for being together with people	Energy efficient lighting
Nice architectural design (landmark, well lit)	Common activities (movies)	Playful
	Activities (chess)	Interesting surface – but still easy to use scooter and bike
		Lit trees and plants (but not good for insects)
		Beautiful and eye-catching lighting design

Group 4:

BRIDGE	BEACH	PATH
Lighting at the top	Sitting area/benches with light coming below – inviting and creates atmosphere	Distinctive cycling path
Low light chain (warm) – connecting, seaside vibes (water, harbour)	Lighted greenery	Lighted greenery
Distinctive in the dark, glowing cycling path	Swings for everyone!	Smooth lighting on the path (while getting from A to B), no dark spaces, corners

Lighting or art on the market building wall (different during night and day)	Cozy area for everyone, also elders - place to come and meet (cozy lighting)	
Seasonal lighting (dynamic)		
Every 1000th crosser – lighting changes		



5. Walking group workshop (25 May)

As discussed in the Deliverable, Tartu is characterised by low levels of civic participation and low interest in joining organizations despite high levels of activity amongst the elderly. Much ULL activity therefor consisted of joining existing activities in order to generate discussions for research/co-design. For example, the research assistant regularly participated in weekly older citizens' walking group in Annelinn. Some of the groups' walks passed the lighting installation site and allowed for onsite discussion of design features, uses of the area and needs for amenities. For example, on 25 May, four members of the group participated in a one hour long discussion, on site.

Topics covered: frequency of use of different aspects of the site (exercise, benches, bridge)
Detailed narratives of shopping trips into city, using the bridge
Dangers in area, above all mixed use by bikes and pedestrians
Seasonal changes in use and atmosphere of the site
Transport connections, toilet facilities
Winter and summer sport uses of the area
Inter-generational relations in this area

6. Meetings with local associations and civic stakeholders

1. 9 March – meeting with Annelinn library staff and members of the Annelinn Association (residents' group) to discuss local issues for elderly and bases for cooperation
2. 9 March – meeting with Kalda day centre staff to discuss social services provision for the elderly and develop strategies for engaging the elderly in Annelinn
3. 10 March and 18 May – meetings with Tartu social services, elderly care providers
4. 22 May – meetings with Kodukotus, the largest local provider of activities and centres for the elderly including staff and participants
5. 4 May – meeting with members of Tartu Maheaed (community gardening organization)

7. Additional workshops to review draft designs

Meeting with Tartu municipal government and social policy stakeholders 10 Nov 2022)

Attendance: 15 members of city team, social care professionals, lighting professionals, urban planning professionals

Format: presentation of draft designs

Main points:

- Discussion of technical issues for lighting installation
- Discussion of ways in which the designs meet concerns for active ageing.

Workshop at day centre (23 Nov 2022)

Format: presentation of plans, followed by discussion of two specific areas of the installation site (the bridge and the beach area) guided by two questions: how would this design change the feeling and use of this space?; are there any issues that his design does not address?

Attendance: 5-10 (people came in late) including care workers and elders

Main points:

- Very enthusiastic response: surprised by what can be done with light; appreciative of attention to this space
- Confirmed importance of cycle/pedestrian separation
- Strong interest in atmosphere, walkability due to comfortable ambience, and aesthetics of bridge
- Strong support for the optic fibre installation in the ice

Workshop at day centre (24 Nov)

Format: presentation of plans, followed by discussion of two specific areas of the installation site (the bridge and the beach area) guided by two questions: how would this design change the feeling and use of this space?; are there any issues that his design does not address?

Attendance: 5 elderly participants plus staff

Main points:

- Very concerned about cost and electricity prices; very little understanding of how city infrastructure is maintained
- Light will help encourage after-dark use, but not enough: ice, lazy habits, indoor activities like TV, fear of drunks and gangs
- Need to encourage outdoor activities generally (lighting may help)

Workshop at library (15 Dec)

Format: presentation of plans, followed by discussion of two specific areas of the installation site (the bridge and the beach area) guided by two questions: how would this design change the feeling and use of this space?; are there any issues that his design does not address?

Attendance: 7 elderly participants plus staff

Main points:

- Design could be more technically ambitious, plus more facilities could be build in this area
- Concern about cycle traffic issues
- Support for the design but strong feeling that a lot more was needed to activate this area.
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8. Interviews

During the period covered by the Deliverables 2.1 and 2.2, there were 60 interviews carried out, of an average length of one hour. Of these, 35were with elderly citizens, 25 with care workers, relatives, local actors.

9. Observation

During the period covered by the Deliverable2.1 and 2.2, there were approximately 15 days of observation, photo documentation and short street interviews in the installation site. This is difficult to quantify but represents observation of the site across seasonal and weather variations, different times of day and week and participation in special events.