Downtown Houston Pedestrian Lighting

Lighting Design Masterplan Report

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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1 Introduction

This report covers the Lighting Masterplan for Downtown Houston. Arup were commissioned by Downtown Houston+, the family of organizations that care and invest in Downtown Houston, in 2023 to develop a site wide lighting masterplan for strategic phased implementation.

The aim of the Lighting Masterplan for Downtown Houston is to enhance the pedestrian experience and to set the scene for all phases of lighting intervention and solicit feedback and comments from the client and the wider project team. The objective of this masterplan is to provide overall strategies and solutions to achieve this goal. This document is not intended to provide detailed design for implementation.

In addition, this document provides 8 strategies to improve pedestrian lighting with a focus on key nodes of activity, connecting corridors, and concepts for illuminaton of the "Big Art, Big Change" murals. The murals are a part of the two-year, two-phase implementation plan coordinated by Street Art for Mankind. These concepts for illumination can be found in section 6.

Downtown Houston is a 1,178 acre area bounded by Interstate 45, Interstate 69/ Highway 59, and Interstate 10/ Highway 90. There are 9 of Houston's 22 Fortune 500 companies located in Downtown, with over 124,000 commuting into the Downtown space, filling 52 million square feet of office space. Along with daily commuters into the area, it is also home to over 11,000 residents. Downtown Houston also hosts multiple bars and restaurants, sports stadiums and conference venues. Areas of Downtown are under explored, due to low perceptions of safety by users.

These areas with a low perception of safety were explored in the Existing Conditions Lighting Analysis Report, which should be read in conjunction with the Lighting Design Masterplan Report for additional information and background.

The goal of the Existing Conditions Lighting Analysis Report was to understand the pedestrian experience of those that spend their time in Downtown Houston, from Office Workers, Residents, Visitors and Tourists. Following a nighttime survey and Nighttime Vulnerability Assessments in 24 locations, we were able to use this data and information to create a high level overview of lighting vision and conceptual design approach for Downtown Houston.

Lighting exemplifies design and sustainability principles while contributing to the nighttime economic, cultural and social vitality of the area. Lighting can play a transformative and meaningful role in creating a positive and inspiring experience for people in the urban environment after dark.

We want to reshape Downtown for the multitude of users both during the day and in the hours of darkness, creating a connected Downtown where users can linger, creating stories and memories whilst feeling secure in their environment. This Masterplan can be summarized as creating opportunities that support growth and diversity of the nighttime economy as well as improving the quality of life of urban citizens and visitors during the evening.

Figure 1: Downtown Houston from the air

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2 Design Overview

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2.1 Site Overview

2.1.1 Downtown Houston Demographic

These infographics show the current demographic of Downtown Houston. The landscape is undergoing huge change currently, with a growing population calling Downtown Houston home. Currently there are 11,700 people living in the Downtown core.

We aim to improve the perception of safety of Downtown during the hours of darkness, allowing more female presenting users, families and the elderly to feel safe living, working and visiting Downtown Houston. Studies show female-presenting people experience more discomfort in dark spaces than male-presenting people in urban areas. 13% of Downtown residents are under 13 years of age and should have safe access to parks and nighttime entertainment. As more people move into the city, the population will naturally grow older and we want users to be able to navigate their neighborhood safely and easily. Downtown needs to be accessible and safe for both current and future residents.

Alongside the number of residents growing, the number of visitors now exceeds that of employees in Downtown Houston. From the data provided by Downtown Houston +, many of the residents are in their 30-50s, whilst the visitors have an even split between all the age groups. Downtown Houston is a multifaceted hub that offers an abundance of experiences and we want visitors to spend their time within the city creating new memories.
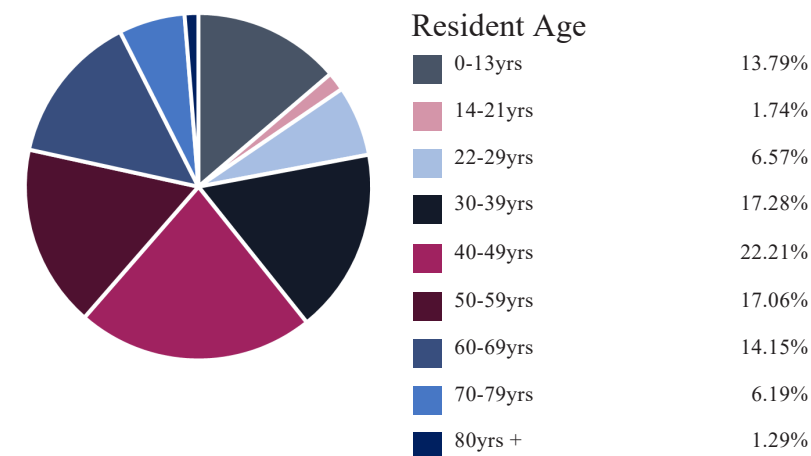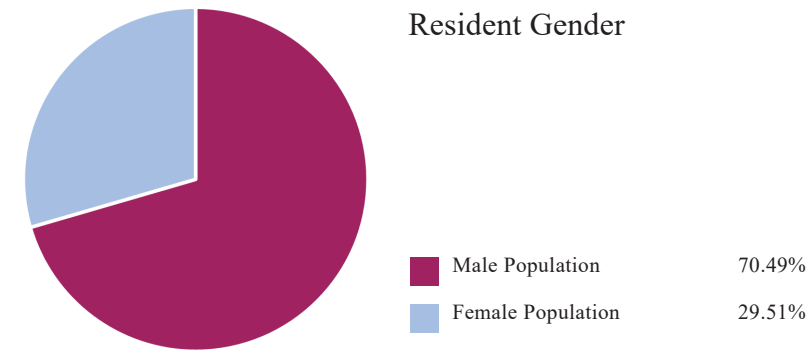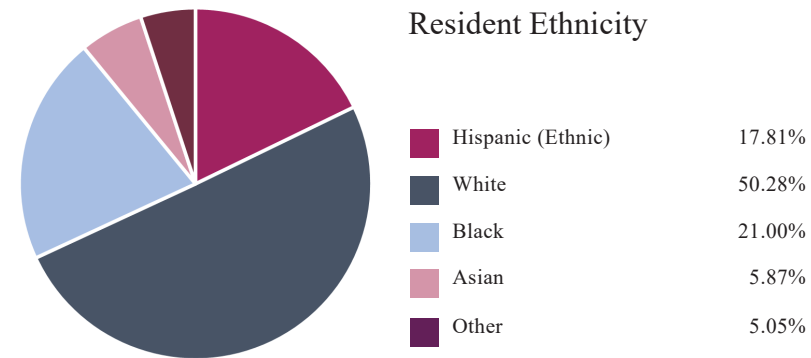
Providing safety and security will be the main form giver of the lighting masterplan. Perceived safety in public spaces creates a sense of nighttime freedom in a place, which will bring more people onto the streets of Downtown Houston. This creates a lively and connected image of the nighttime environment, which in turn reinforces the nighttime economy.

To further the nighttime economy, we are proposing a high level nighttime activation plan that helps regenerate district areas.

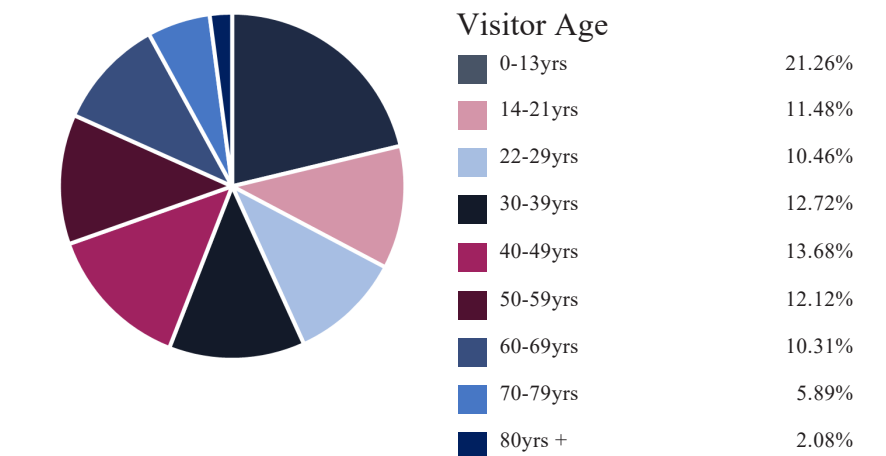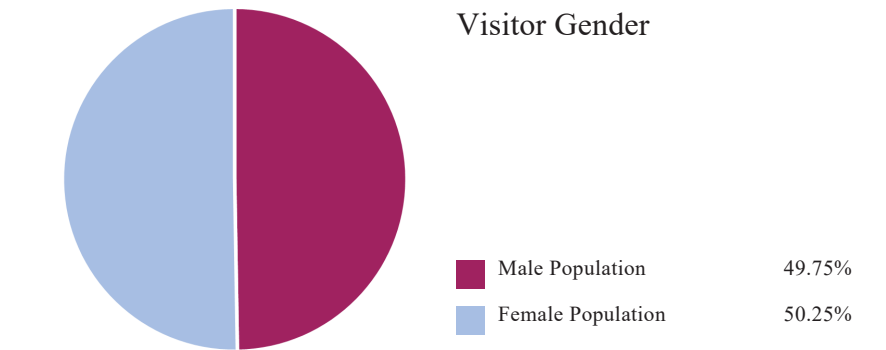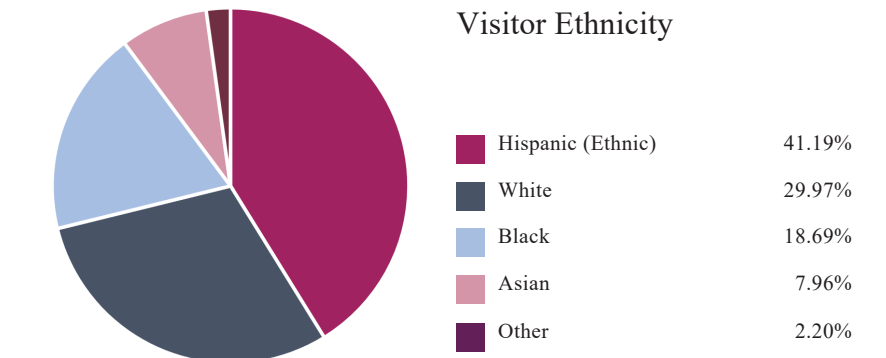Source: Downtown Houston +

HDMD Downtown Demographics 2023.

Residents

Many of the residents in Downtown Houston are white males. We are keen to bring a broader range of residents to Downtown Houston to closer match the gender split of visitors to Downtown. By bringing a greater sense of place and perception of safety, more female presenting users will see Downtown as a place they will be safe living.

Resident Ethnicity

Hispanic (Ethnic)	17.81%
White	50.28%
Black	21.00%
Asian	5.87%
Other	5.05%

Resident Gender

Male Population	70.49%
Female Population	29.51%

Resident Age

0-13yrs	13.79%
14-21yrs	1.74%
22-29yrs	6.57%
30-39yrs	17.28%
40-49yrs	22.21%
50-59yrs	17.06%
60-69yrs	14.15%
70-79yrs	6.19%
80yrs +	1.29%

Visitors

The gender split for visitors is near even, showing that Downtown Houston is for everyone. Also of note, this ethnicity breakdown reflects the demographic percentage of Houston overall. Creating a lively and connected nighttime environment will allow these users to spend more time in Downtown to enjoy everything the city has to offer.

Visitor Ethnicity

Hispanic (Ethnic)	41.19%
White	29.97%
Black	18.69%
Asian	7.96%
Other	2.20%

Visitor Gender

Male Population	49.75%
Female Population	50.25%

Visitor Age

0-13yrs	21.26%
14-21yrs	11.48%
22-29yrs	10.46%
30-39yrs	12.72%
40-49yrs	13.68%
50-59yrs	12.12%
60-69yrs	10.31%
70-79yrs	5.89%
80yrs +	2.08%

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2.1.2 Nodes

Urban connectivity is key in cities, and especially one as large as Houston. Within the Downtown area we are aspiring for cohesive local-level connectivity. By connecting key areas across the city, via nighttime placemaking, we aim to give users the feeling of safety to spend time in the Downtown area

Nodes are the economic, social and cultural focal points of a region, while corridors are circulation routes that connect them and link the region to the larger world. Nodes play a critical role in the region's economy through business, commerical, retail and hospitality. These areas have a high concentrations of jobs and businesses and help attract new residents to the region.

There are many key nodes of activity across Downtown, with key corridors connecting them. By aiding the creation of primary and secondary corridors to connect these nodes, we can facilitate choice for users and allow for the creation of public spaces for fostering conviviality, artistic expression, street markets, and cultural events that make cities spaces of consumption, entertainment, pleasure, and festivity.

A portion of the different key nodes across Downtown are shown in the figure to the right. These nodes are key spaces where people gather often.
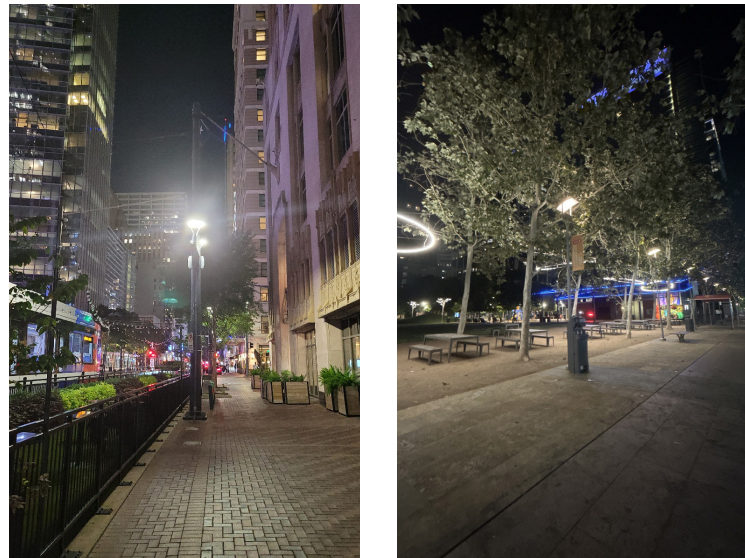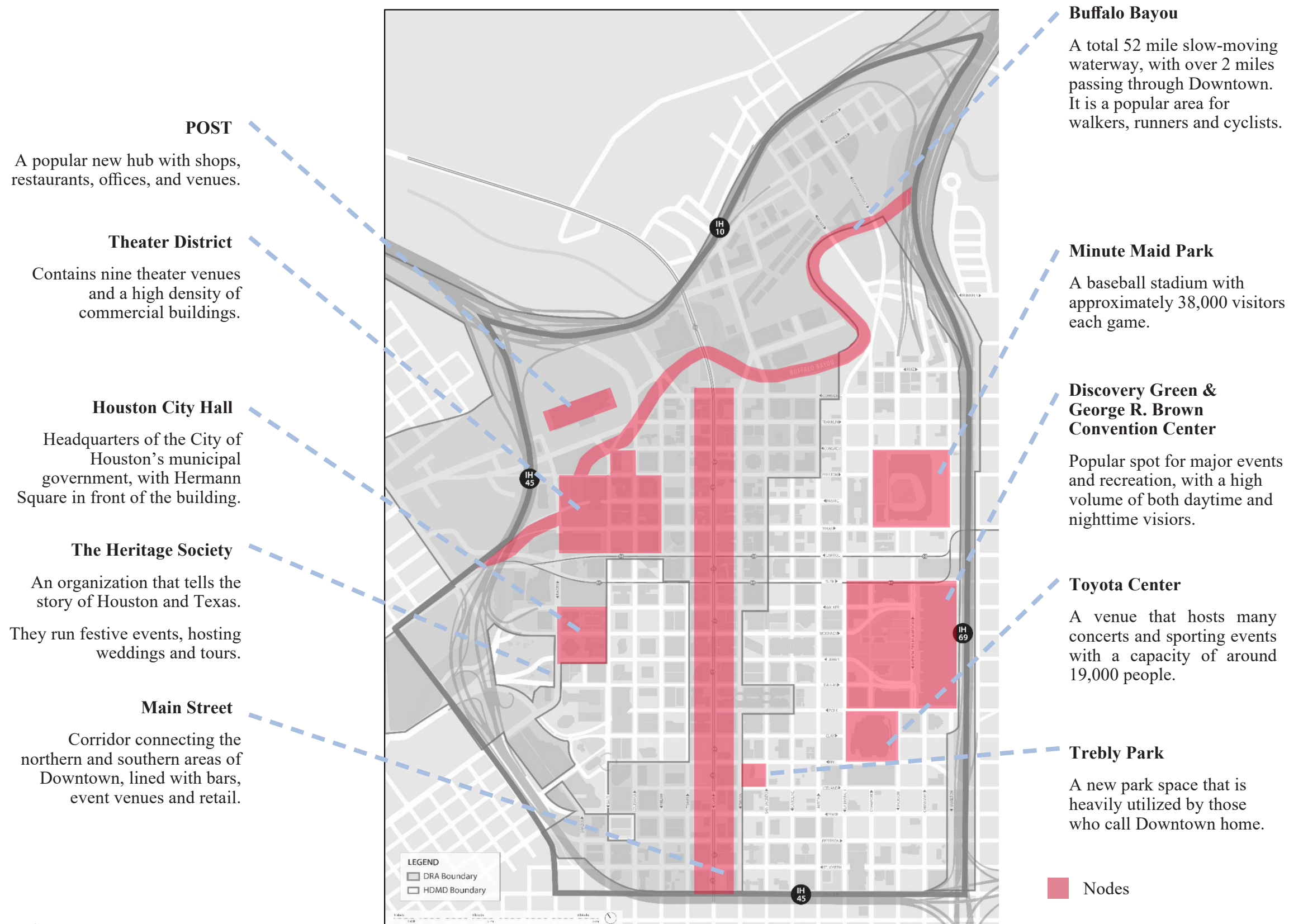
POST

A popular new hub with shops, restaurants, offices, and venues.

Theater District

Contains nine theater venues and a high density of commercial buildings.

Houston City Hall

Headquarters of the City of Houston's municipal government, with Hermann Square in front of the building.

The Heritage Society

An organization that tells the story of Houston and Texas.

They run festive events, hosting weddings and tours.

Main Street

Corridor connecting the northern and southern areas of Downtown, lined with bars, event venues and retail.

Buffalo Bayou

A total 52 mile slow-moving waterway, with over 2 miles passing through Downtown. It is a popular area for walkers, runners and cyclists.

Minute Maid Park

A baseball stadium with approximately 38,000 visitors each game.

Discovery Green & George R. Brown Convention Center

Popular spot for major events and recreation, with a high volume of both daytime and nighttime visiors.

Toyota Center

A venue that hosts many concerts and sporting events with a capacity of around 19,000 people.

Trebly Park

A new park space that is heavily utilized by those who call Downtown home.

LEGEND
DRA Boundary
HDMD Boundary

Nodes

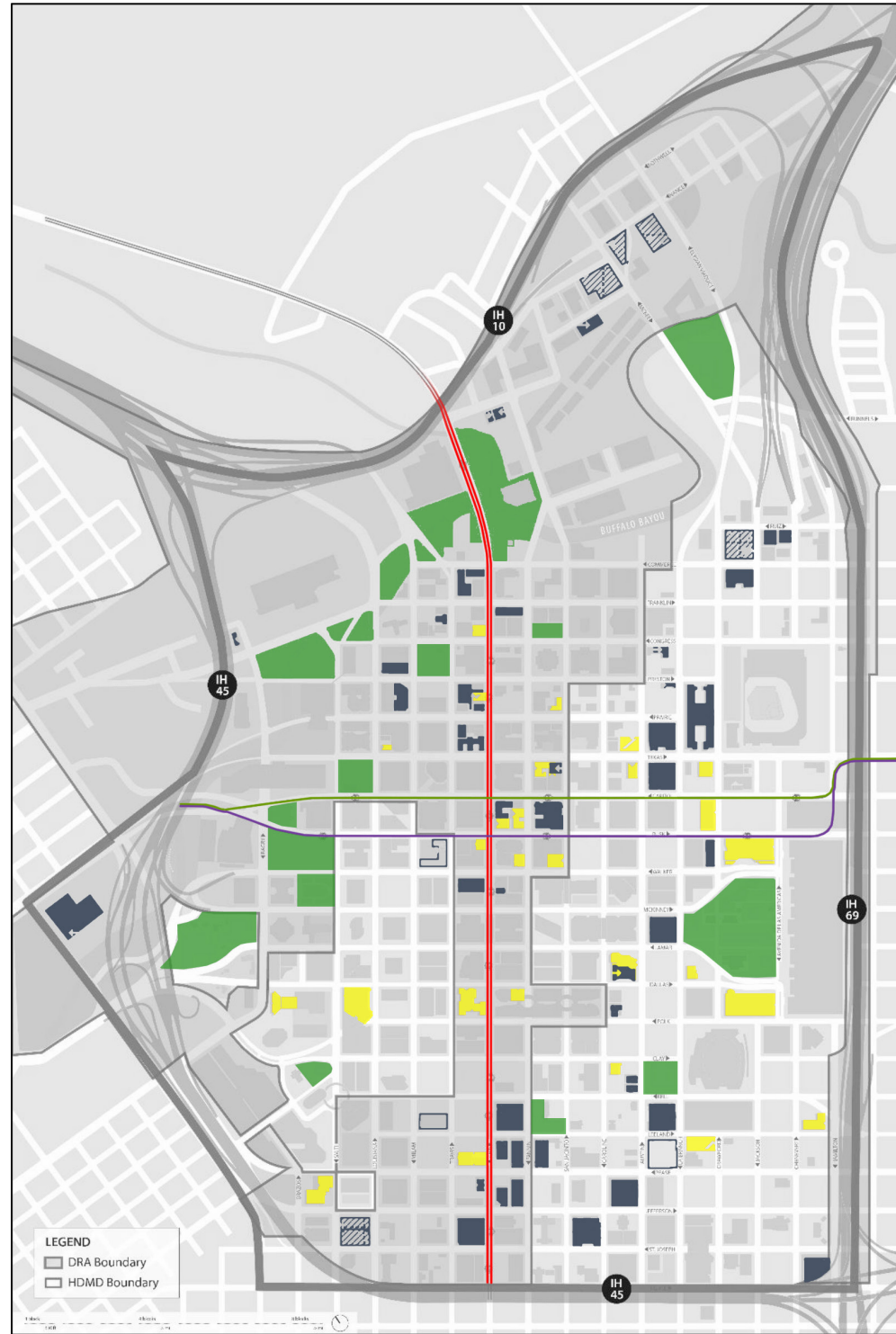Figure 2: Images of Key Nodes taken during site walks, Main Street and Discovery Green

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2.1.3 Building Use

There are a range of hotels and residential buildings within Downtown Houston. These are spaced across the city, but hotels tend to cluster around key destinations in the city, with residential clusters split between the center and the south of Downtown.
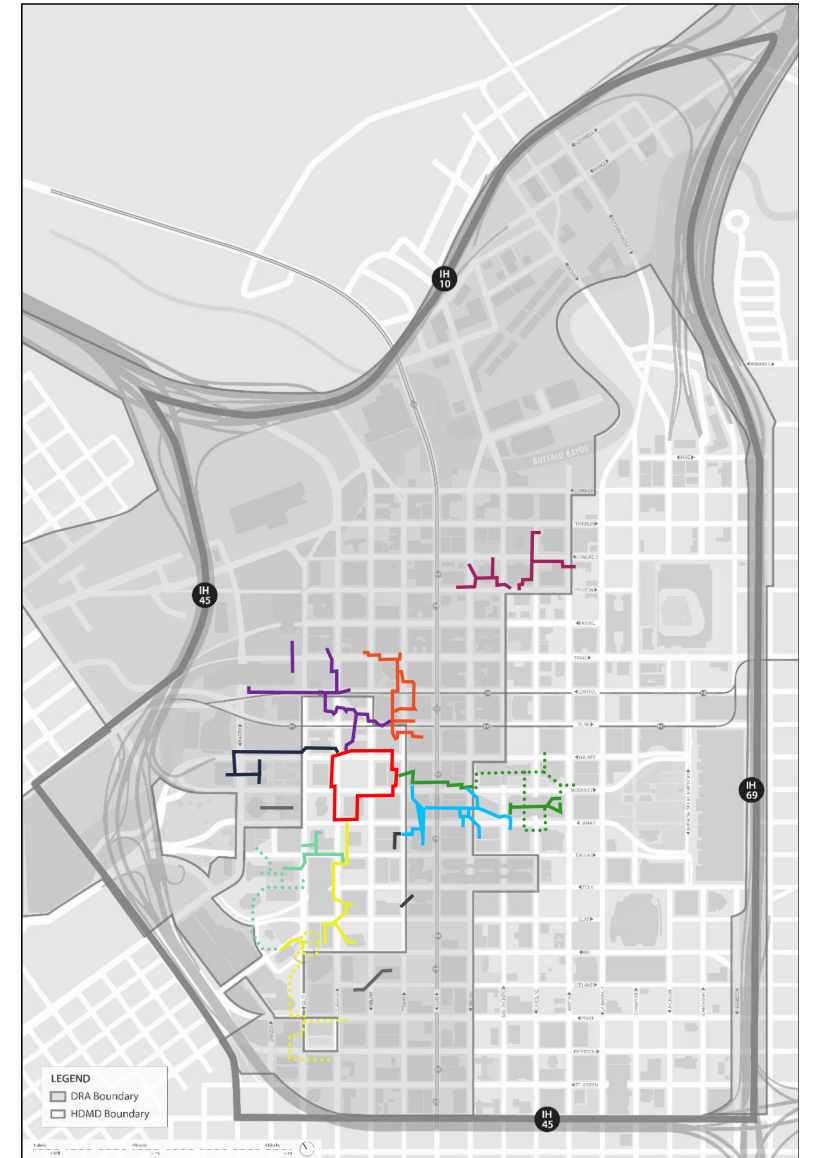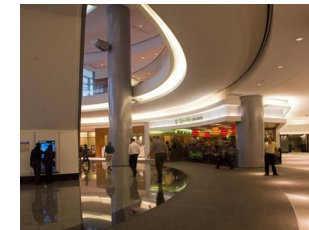
The map to the right also shows the parks and green spaces across Downtown Houston. Many of these are adjacent to Buffalo Bayou, with some smaller stand alone parks along the outskirts towards the north. Discovery Green, Trebly park, and Market Square park are key areas of high pedestrian activity and scored well during the Nighttime Vulnerability Assessments.

Also highlighted on this map are the three MetroRail Lines that run through Downtown, the Red Line, Green Line, and Purple Line.

METRORail Red Line

METRORail Green Line

METRORail Purple Line

Hotels

Residential Buildings

Parks

Downtown Houston is also home to the Tunnels (the routes of which are shown on the map below). The Houston tunnel system is a network of subterranean, climate-controlled, pedestrian walkways that links 95 full city blocks 20 feet (6 m) below Houston's Downtown streets. It is approximately six miles (9.7 km) long. The tunnels are open during working hours and only accessible through or adjacent to office buildings. These tunnels are widely used by office workers and tourists, but we are keen to bring these users from these tunnels up to the surface to experience Downtown Houston and the proposed nighttime illuminated pedestrian experience.

Harris County Tunnel

N. Lousiana Tunnel

N. Travis Tunnel

Tunnel Loop

Walker Tunnel

S. Louisiana Tunnel & Skywalk

Lamar Tunnel

E. McKinney Tunnel & Skywalk

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2.1.4 Nighttime Activity Heatmap

Corridors make connections between nodes and with other areas across the region and beyond. Corridors are linear travel routes that move people and goods from one location to another.

Nodes and corridors become a component of a broader neighbourhood and community that represent the current and future growth areas of our region. The nodes become a focal point to serve those larger areas and take on a more prominent role in increasing population and employment density while at the same time serving larger areas. The larger areas around the nodes will benefit from the growth and can take advantage of many of the same essential elements that make attractive places for people to live, work, learn, and play.

Nodes and corridors work together to create an inter-linked system, giving the city a sense of place and allowing users to move between areas of high economic interest.

Some corridors can be clearly seen when overlaid with a heatmap based on visitor and resident foot traffic collated by Downtown Houston+ during Q3 2023. The data collected through Placer.ai focused on visitors and residents to Downtown, specifcally during 9pm-2am.

However, it is clear from this heatmap that more people tend to stay within the nodes, rather than moving between them. Part of our masterplan will be activating these corridors more to ensure all users of Downtown Houston feel safe to move around the city.
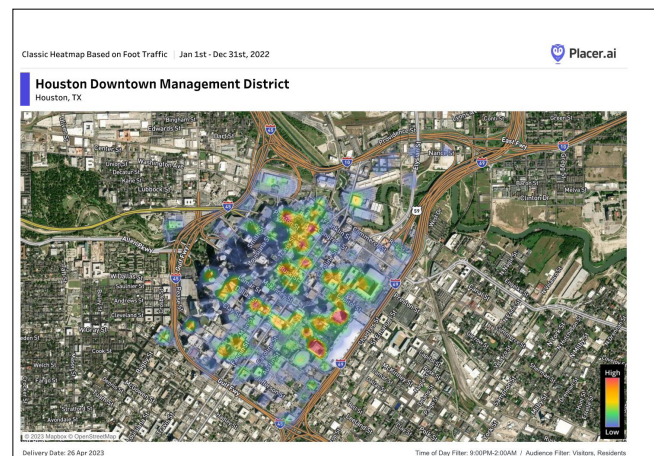
There are areas in the south where there is foot traffic around the residential buildings, but this does not spill outside of the building block. Activating the nighttime and creating spaces the residents can access will help create greater pedestrian movement in the hours of darkness.

Lots of foot traffic in the northern part of Main Street. Activation of the southern end of main street will bring more nighttime economy, nighttime placemaking, and nighttime safety to this node.
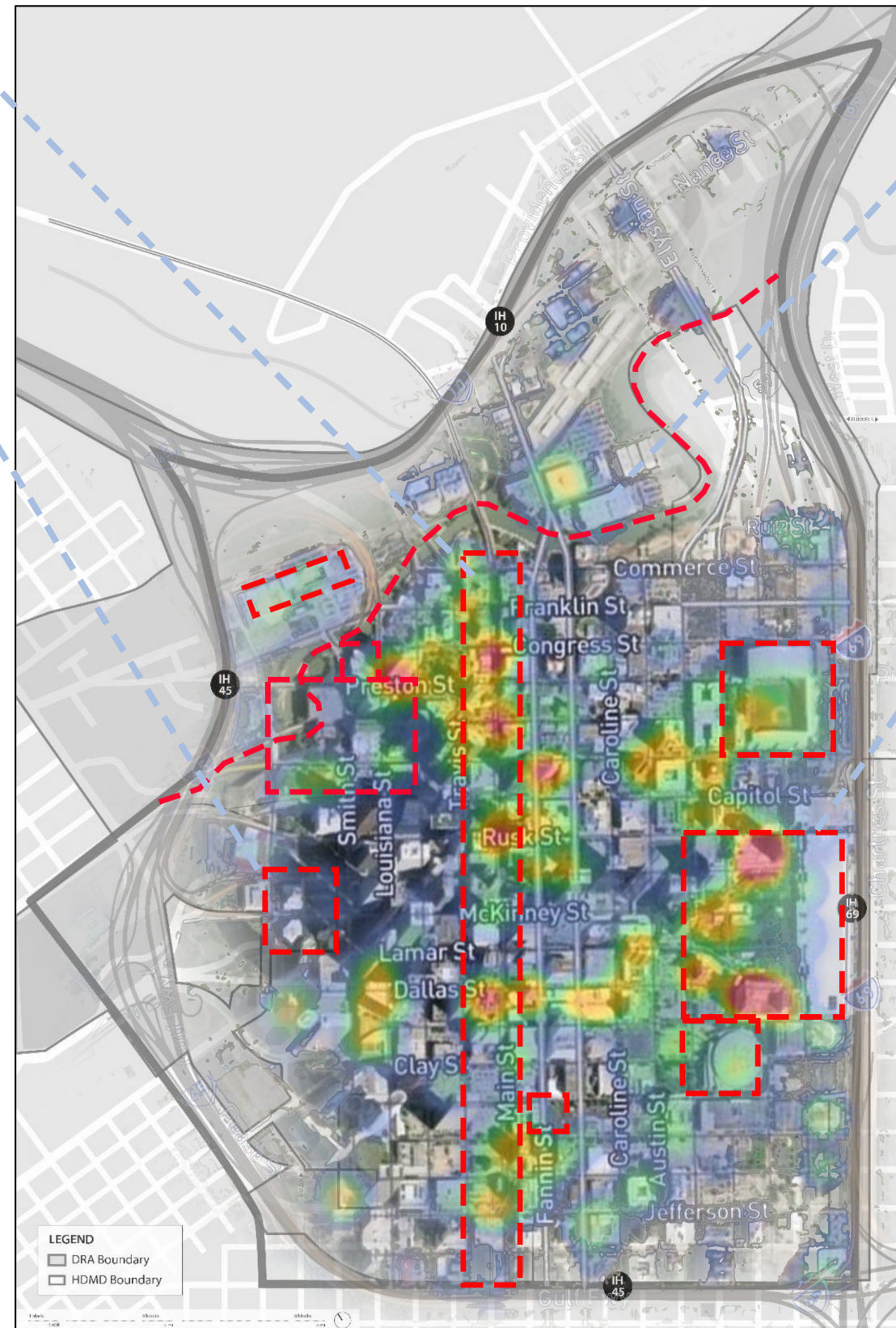
Hermann Square has minimal foot trafic, despite having two park areas for users to sit and rest.

There is minimal foot traffic in and around the Bayou during the hours of darkness.

Lots of foot traffic around Discovery Green.

Data from Placer.ai

Heatmap Scale
High Foottraffic

Low Foottraffic

LEGEND
DRA Boundary
HDMD Boundary
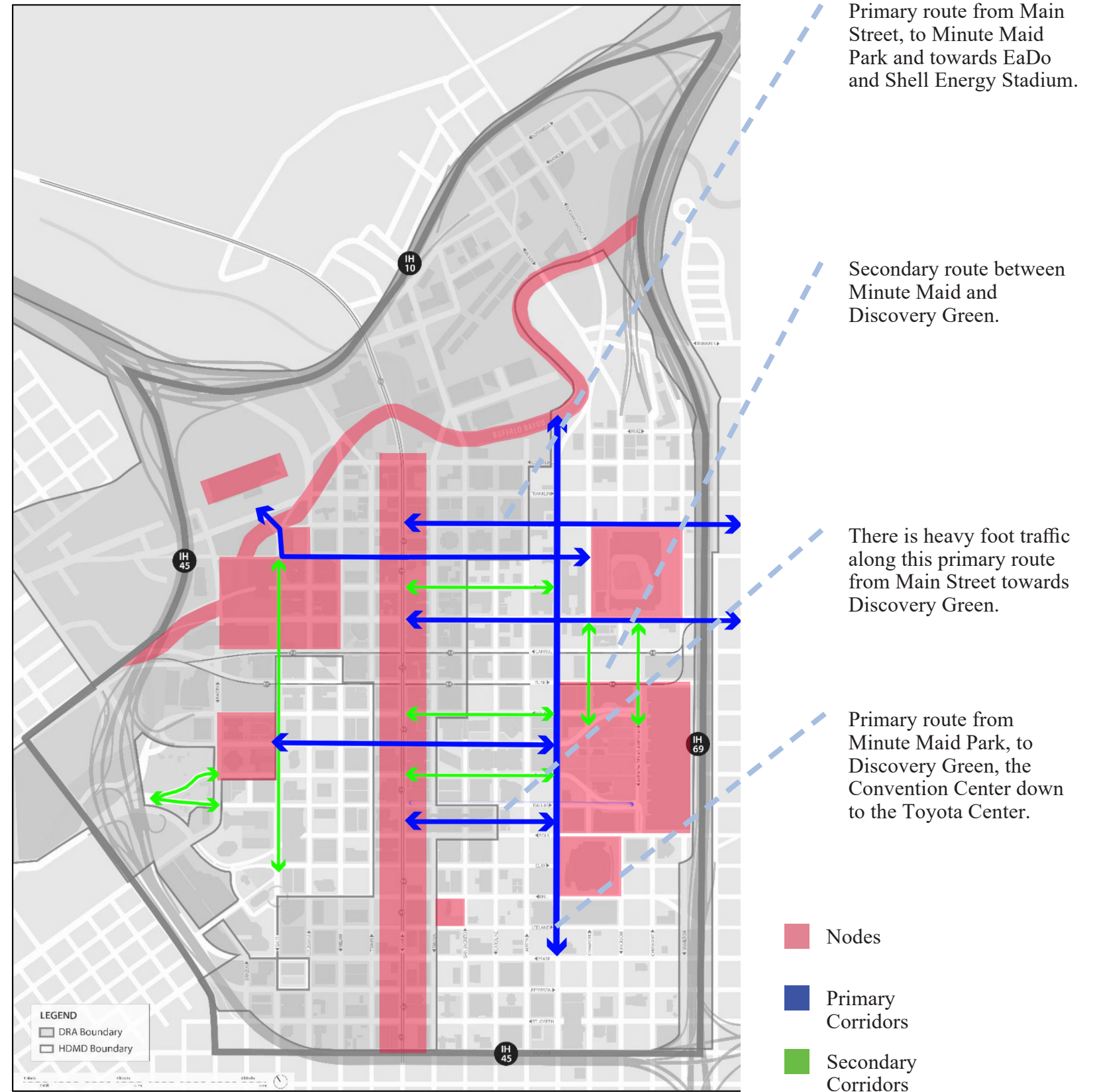
Nodes

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2.1.5 Corridors

Using these maps, we have identified some key journeys users currently make, and routes we want them to begin utilizing more.

These key routes in Downtown Houston allow people to move between (for example), Minute Maid Park and Main Street. These corridors have been split between primary (predominantly East to West) and secondary (predominantly North to South) corridors. Ensuring these routes are appropriately illuminated and inspire users to move between nodes is key to the Lighting Masterplan across Downtown Houston.

These user journeys will not be as linear as the routes highlighted here - some examples are detailed out in section 2.2

Figure 3: Images of Primary Corridors taken during site walks, Texas and Prarie Street.

Primary route from Main Street, to Minute Maid Park and towards EaDo and Shell Energy Stadium.

Secondary route between Minute Maid and Discovery Green.

There is heavy foot traffic along this primary route from Main Street towards Discovery Green.

Primary route from Minute Maid Park, to Discovery Green, the Convention Center down to the Toyota Center.

Nodes

Primary Corridors

Secondary Corridors

LEGEND
DRA Boundary
HDMD Boundary

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2.1.6 Murals

"Houston's street art and street art community reflect the diversity of Houston itself, with people who come from all different backgrounds and ethnicities,"

Emily Ding - Houston Mural Artist

The Houston Murals are a key part of the Downtown identity, with our scope covering the Big Art Bigger Change murals, a series of 33 large murals that amplify social and environmental justice in Houston and beyond.

When looking at the primary corridors between nodes across Downtown Houston, many of the murals line these sidewalks. Currently, more often than not, these pieces are not illuminated and are lost to the darkness of the night.
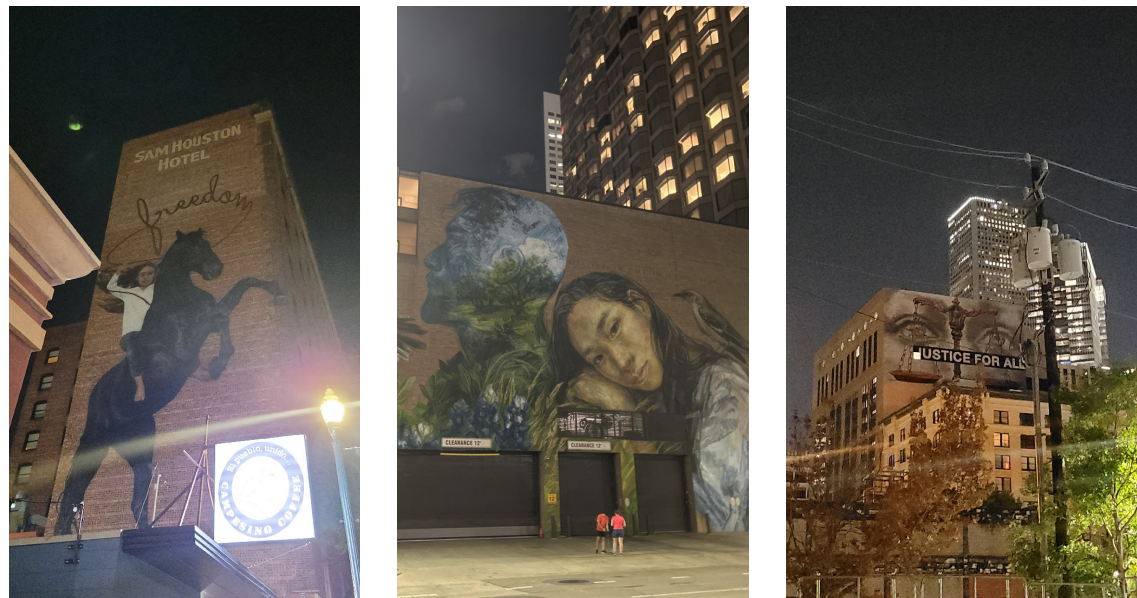
Figure 4: Images of Primary Corridors taken during site walks, Texas and Prarie Street.

LEGEND
☐ DRA Boundary
☐ HDMD Boundary

■ Nodes

■ Primary Corridors

■ Secondary Corridors

■ Mural Locations

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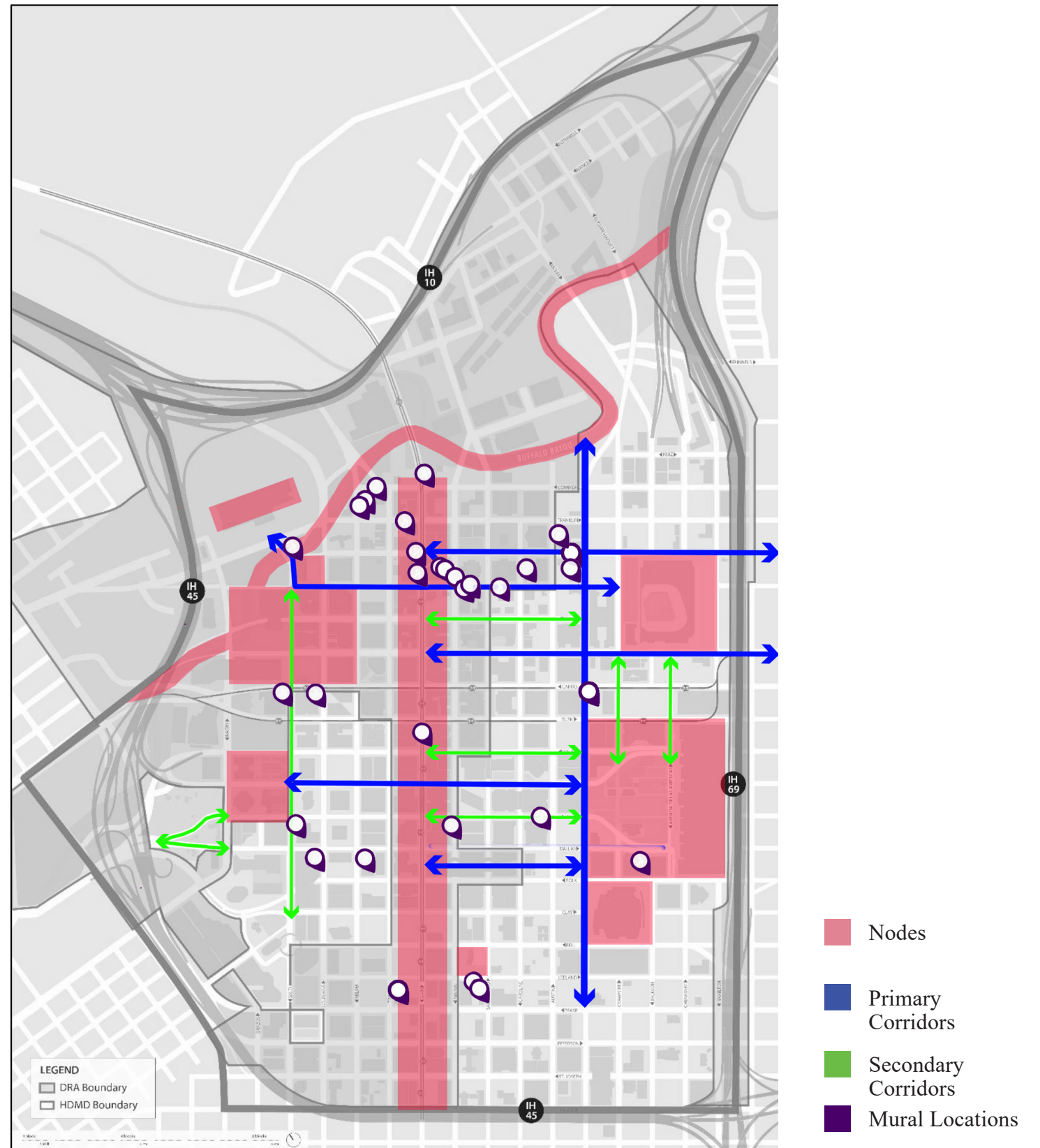
2.1.7 Horizontal Illumination

Comparing the foot traffic map and the primary and secondary journey map with the illumination heatmap, there is a discrepancy between the main areas of pedestrian traffic and horizontal lighting level.

Some of the areas we have noted as primary corridors have lower than desired illumination levels. This is also true for many areas in the southern end of Downtown where there are residential concentrations.

A more in-depth review of the heatmap can be found in the Arup Existing Conditions Analysis Report. A conclusion of this study can be found on the following pages.

Very little lighting in the Warehouse district which may influence the lower level of foot traffic. Bringing greater illumination to the sidewalk and nighttime activation to the area will improve perception of safety.

There is the potential to bring greater foot traffic to POST. It was clear from the nighttime survey that there is limited pedestrian lighting on the corridor towards it.

We identified areas of the Bayou and surrounding parks as being a dark zone, with a concentration of unhoused population under some of the bridges that impact the feeling of safety. This region will be re-developed in 2025 and is an opportunity area for incorporation of the key strategies from this report to re-enforce the Downtown identity and connectivity.

Some of the Primary corridors between nodes are very low lit, which may be preventing people from wanting to walking down them.
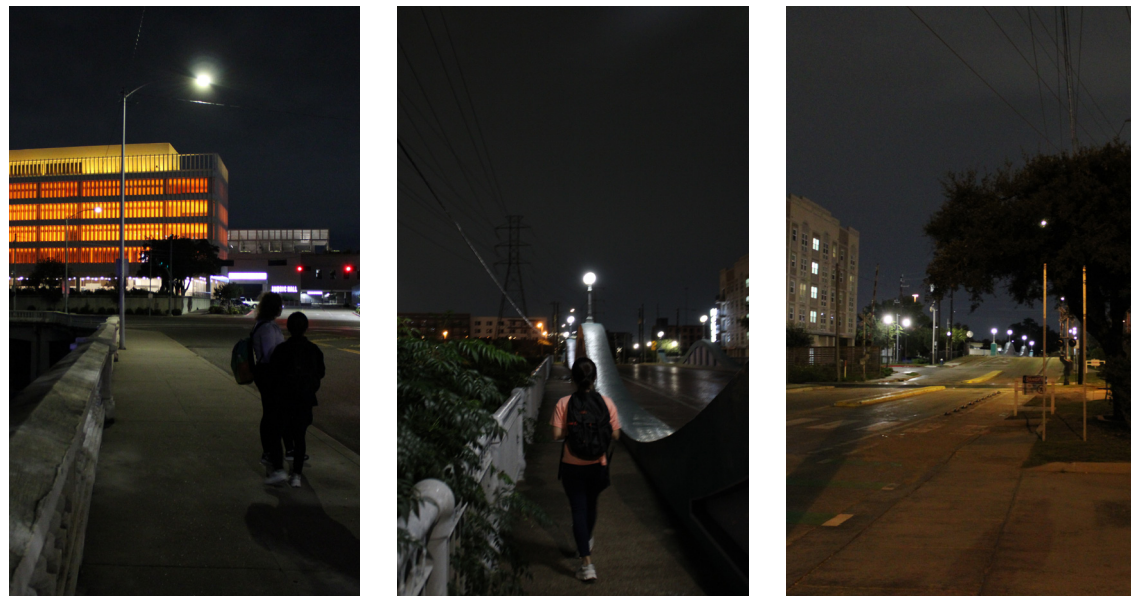
Figure 5: Images of POST and the Warehouse District.

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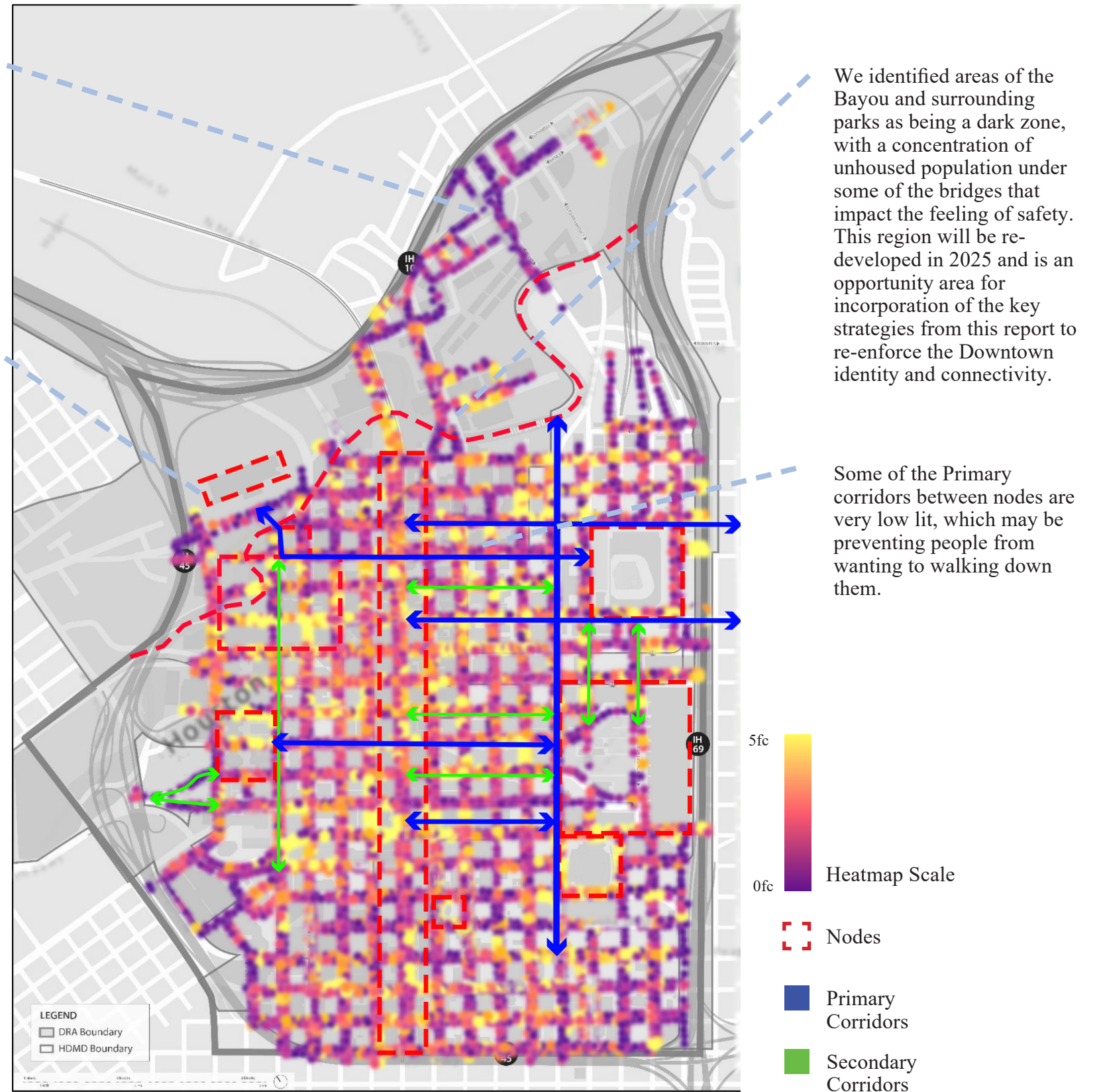
2.1.8 Reference Illumination Levels

This page shows what these illumination levels mean in location. These are images taken at different locations around Downtown Houston with the measured footcandle value taken during the Existing Conditions Night Surveys.
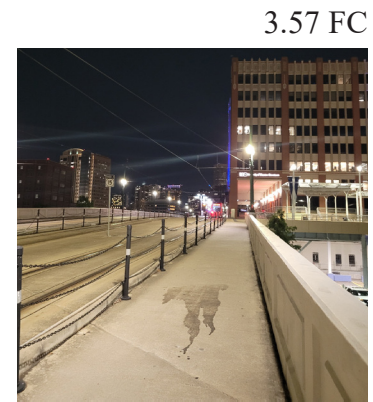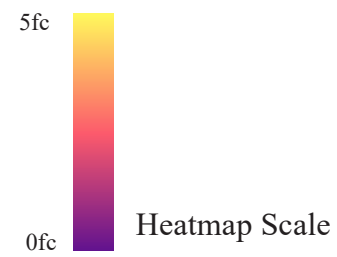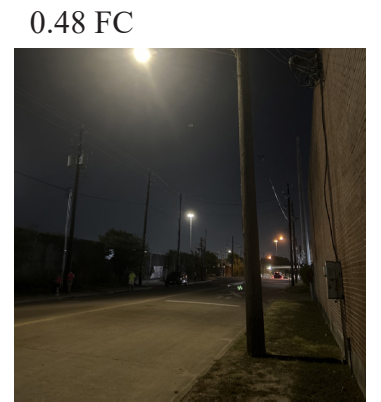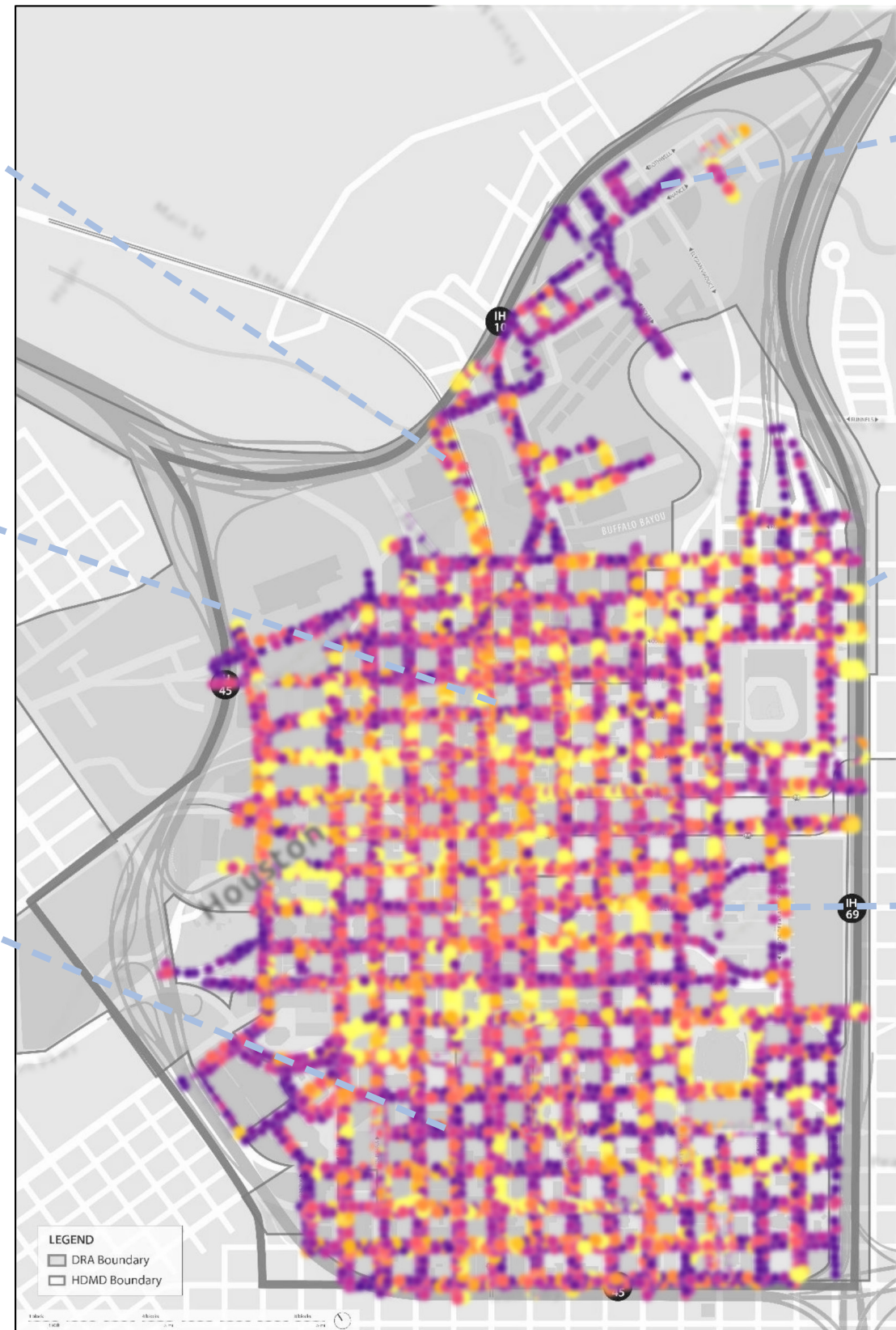
3.57 FC

N Main & Girard

3.20 FC

Main & Prarie

1.75 FC

Leeland & Travis

5fc

0fc

Heatmap Scale

0.48 FC

Nance & Elysian

5.19 FC

Franklin & 69

1.06 FC

Discovery Green

LEGEND
DRA Boundary
HDMD Boundary

ARUP
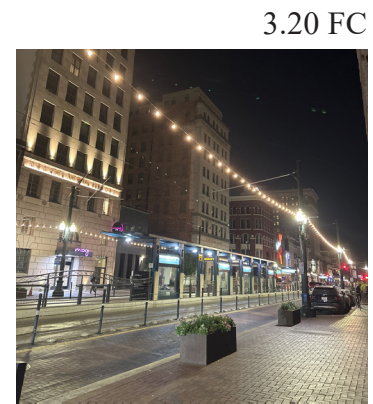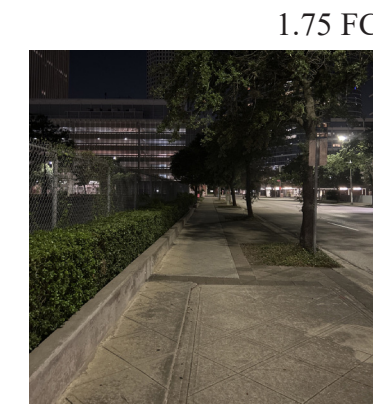
2.2 Journey Through The Light

2.2.1 Example of Pedestrian Experience: Visitor

To understand some of the journeys across Downtown, three personas were created. This provided understanding for the journey, brightness map and areas of interest as they moved through the city. It is to be noted that 2fc is the aimed for standard, however, between 1 and 4 footcandles can be acceptable, depending on the surrounding conditions.

Example Pedestrian Experience: Downtown Visitor Julieta

Julieta lives in EaDo but is a huge Houston Astros fan and spends many evenings at Minute Maid Park watching her team play. She often parks outside the ballpark, walking through the underpasses to get there. Although she hates walking through these underpasses in the dark, it is quicker and cheaper than an uber, or parking in Downtown.

Usually she arrives with plenty of time and heads towards Main Street to get some early dinner. Ever since she watched the murals get painted during 2022, she likes to walk down the roads where she can spot as many as possible to see how the elements are evolving the artwork.

After dinner she heads to the ballpark for the game. Her friends always sit together and celebrate all the wins by going out on the town! After drinks and celebrations in the bar, they often jump onto the Light Rail and head back to one of their houses to continue the celebration.

1. Arrives in Downtown via EaDo underpasses
2. Heads towards Main Street for dinner looking at the Murals.
3. Has dinner around Main Street.
4. Returns to Minute Maid Park for Astros Game.
5. Goes to Main Street to celebrate Astros win!
6. Heads back home to EaDo via the Light Rail.
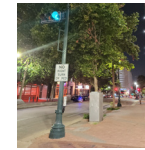
Heatmap Scale
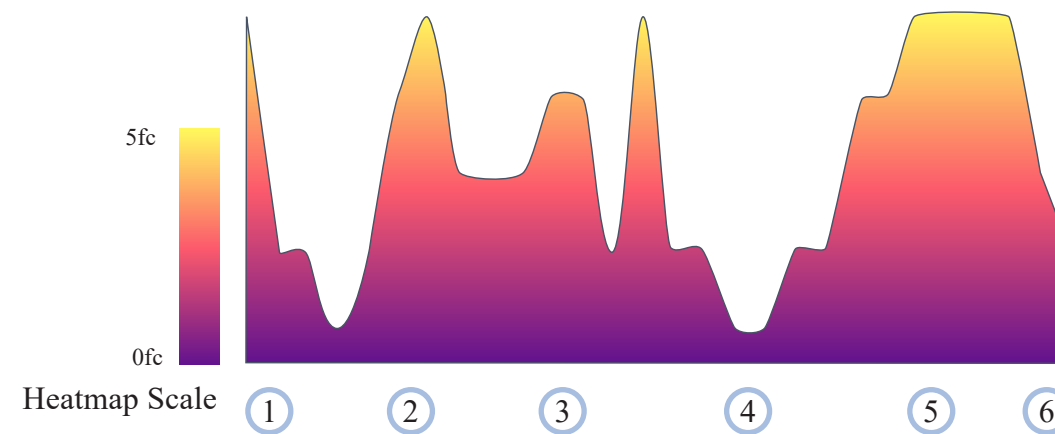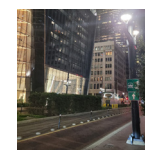
This brightness journey shows the range of illumination along Julieta's route - with Main and Texas being the most illuminated, but her route back to Minute Maid Park along Preston Street being the darkest consistent journey.

LEGEND
☐ DRA Boundary
☐ HDMD Boundary

ARUP
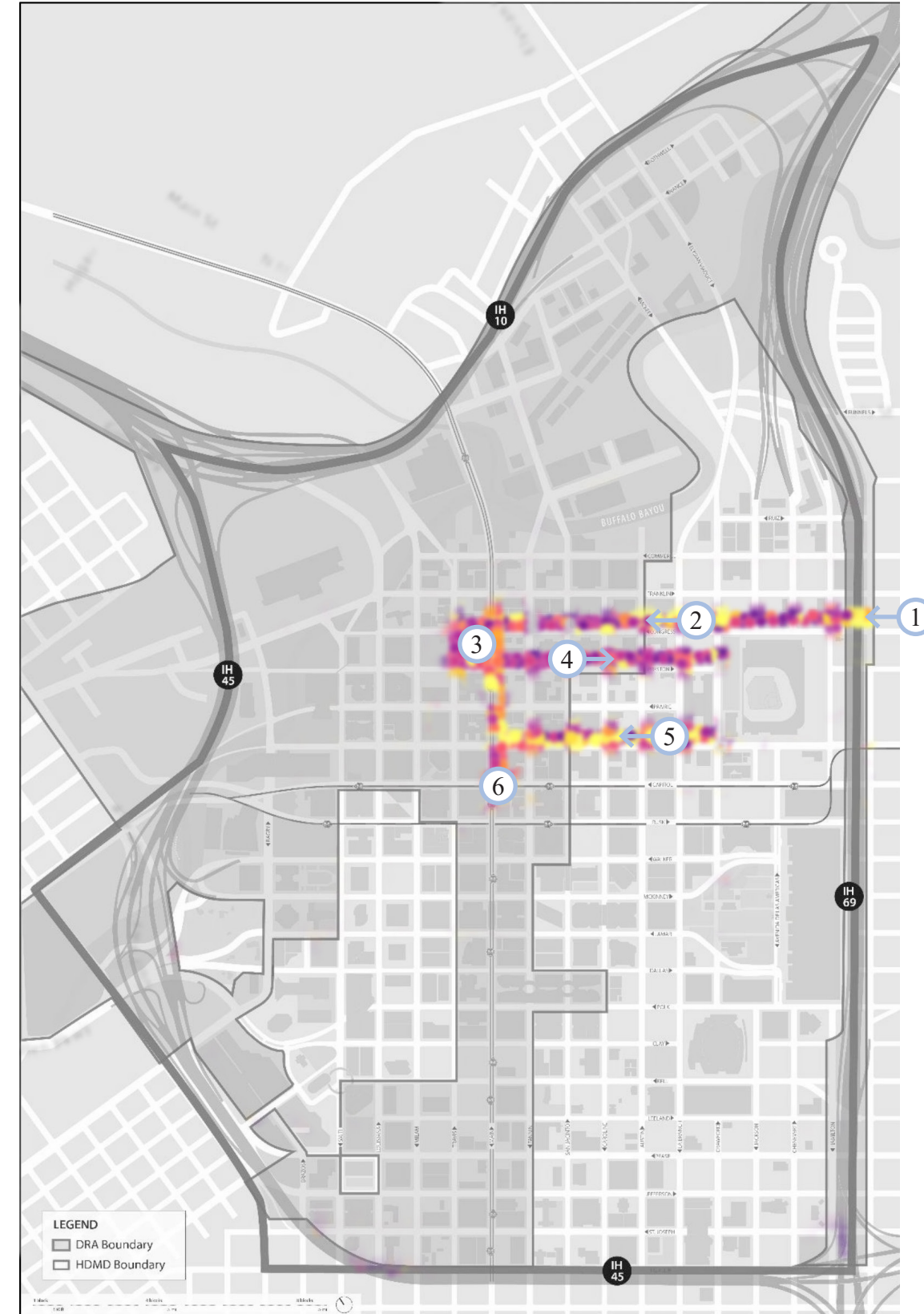
2.2.2 Example of Pedestrian Experience: Resident

**Example Pedestrian Experience: Downtown Resident Todd**

Todd has a young family and lives in South Downtown. His route home takes him past Green Street, and he stops to see if BLCK Market has any fun clothes or gifts for his daughter Marnie. On his walk back he passes many closed storefronts. Some areas he walks through are very dark and he is glad he is a tall male presenting person.

On arriving home he scoops up Marnie and takes her out to get some food at the local food truck before walking her over to Trebly Park for their evening cinema showing. He's thankful for the space to let her run around and spend time meeting other similar aged kids.

1. Leaves work and heads towards GreenStreet.
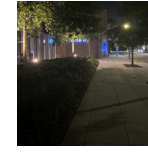
2. Shops at GreenStreet at BLCK Market for Marnie.
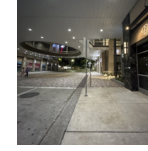
3. Leaves GreenStreet and walks home via Clay and Caroline Street.

4. Arrives home and gets dinner from a local street vendor.
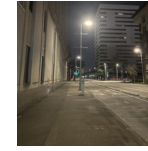
5. Walks to Trebly Park through Leeland Street.
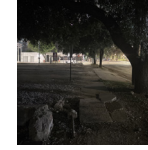
6. Arrives at Trebly Park with Marnie for the Cinema Night.
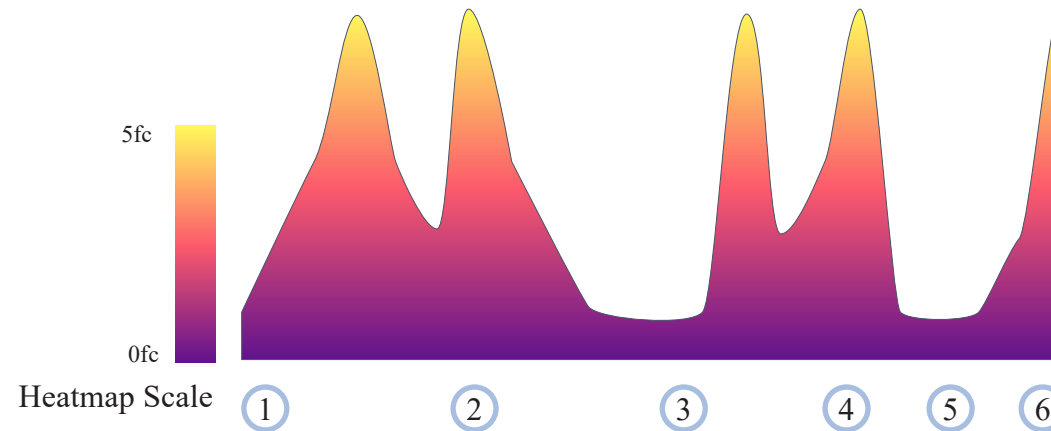
This brightness journey shows varied light levels across Downtown, from very bright in GreenStreet and around the parks, to very dark between them.

ARUP
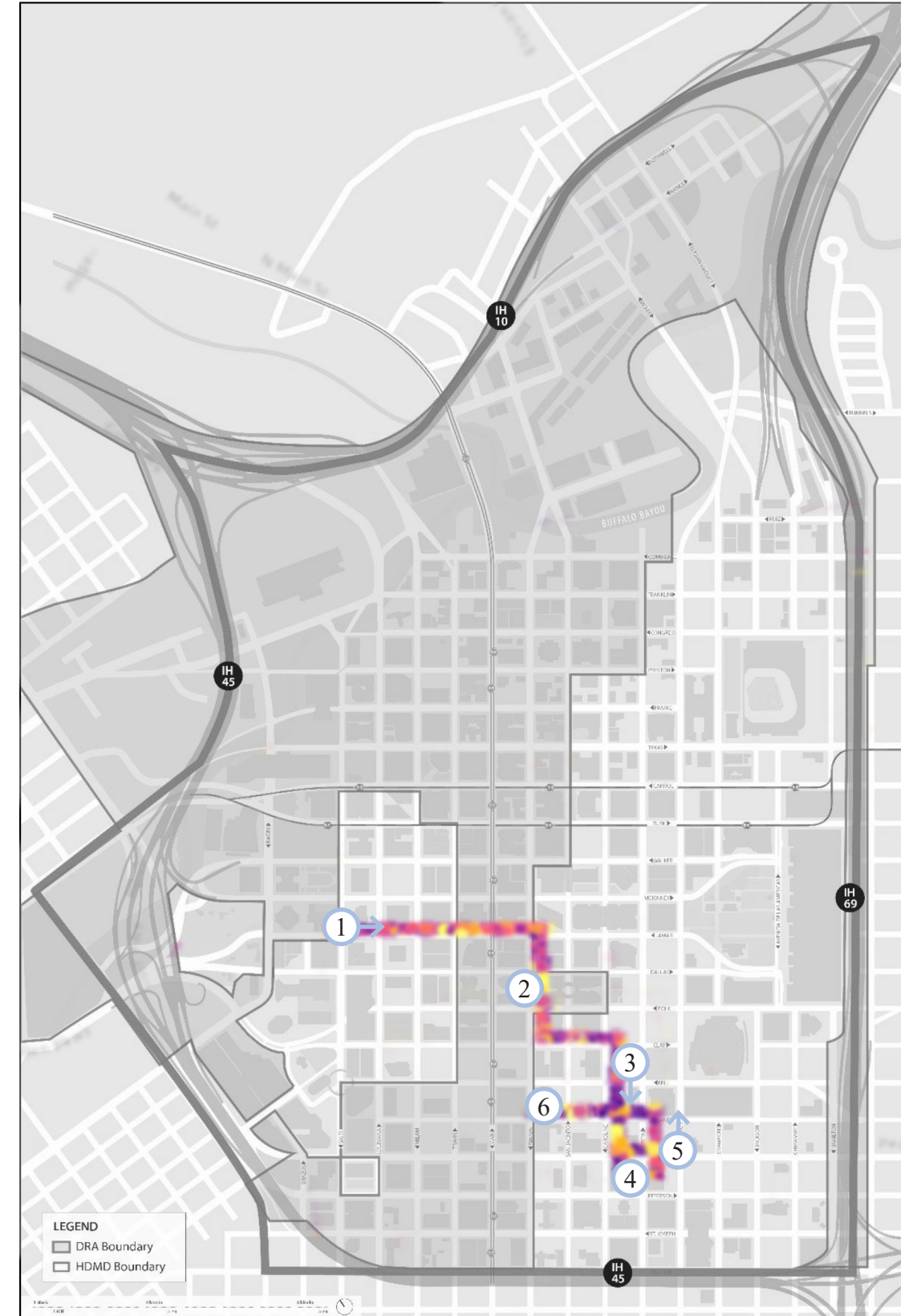
2.2.3 Example of Pedestrian Experience: Office Worker

Example Pedestrian Experience: Downtown Worker Angela

Angela has worked in Downtown for many years. She likes to go to the theaters and orchestras and her husband David has bought her tickets for the Houston Symphony tonight. She is very excited for it. She has seen Downtown change over the years and likes to try new food places as they open, and this is a great opportunity to do that!

She leaves work and walks up towards the POST, which she hasn't had the opportunity to visit yet. She takes a detour through Tranquillity Park for a little nature boost after being sat at her desk all day.

Walking up to POST, Angela finds it slightly hard to navigate, as the sidewalks around the POST have low levels of lighting. She meets David there, then after their dinner they head to Jones Hall for the Symphony via Milam Street.

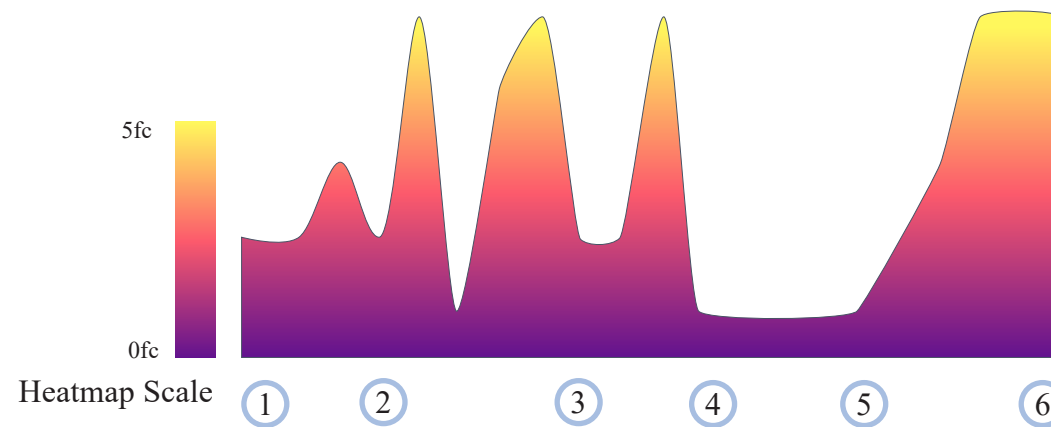| 1 | Leaves work and heads towards the POST. |
2	Walks through Tranquillity Park.
3	Navigates to the POST after leaving the park.
4	Meets up with David for dinner at the POST, finding the last section very dark.
5	Walks from the POST to Jones Hall via Milam Street.
6	Arrives at Jones Hall for the Houston Symphony.
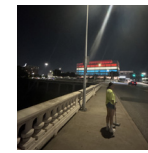
Heatmap Scale
5fc
0fc
1 2 3 4 5 6

This brightness journey shows how dark the streets up towards the North end of Downtown around the POST are. As Angela walks more towards the theater district there is a greater average illuminance level.
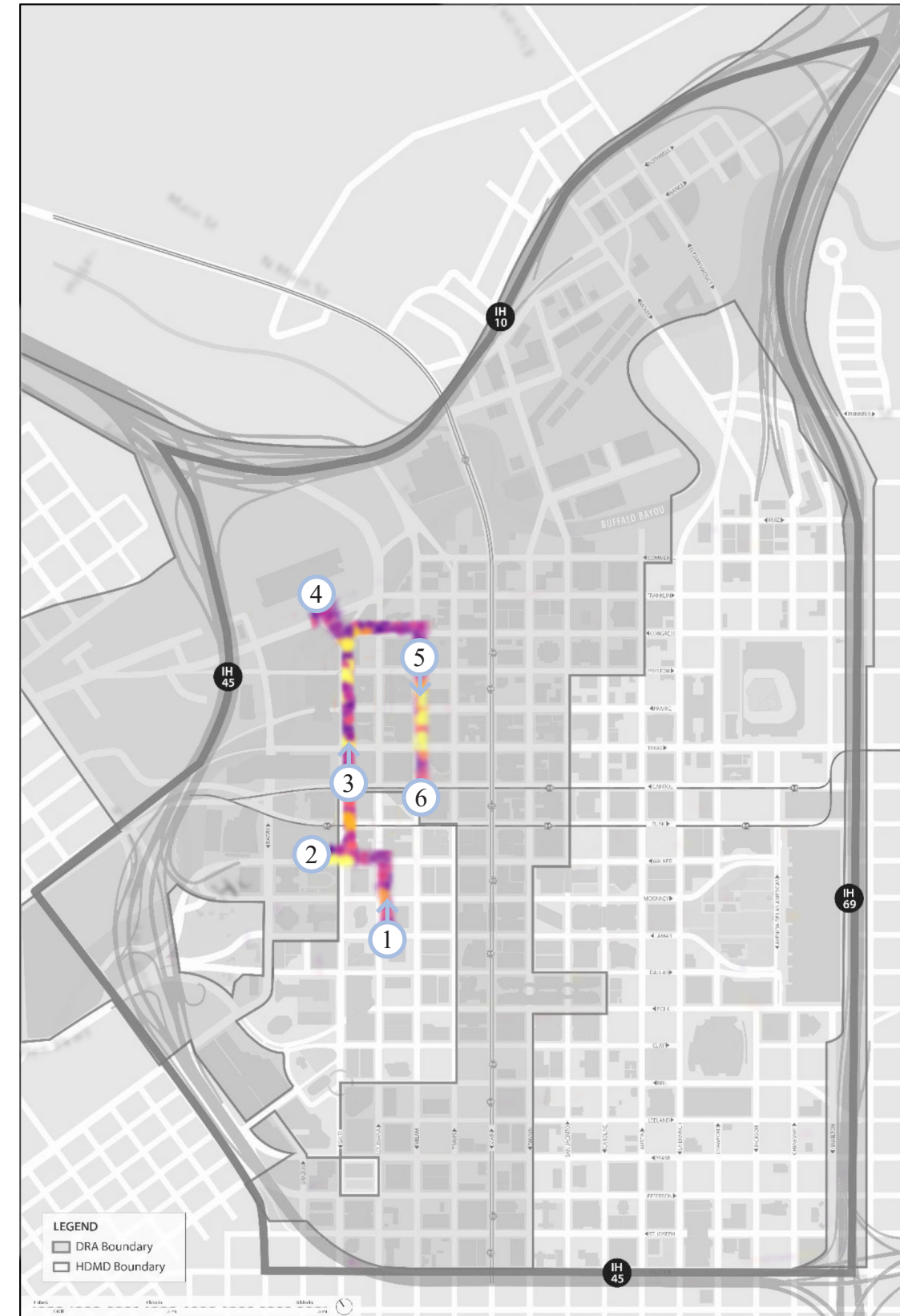
LEGEND
☐ DRA Boundary
☐ HDMD Boundary

ARUP

3 Existing Conditions Analysis

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Existing Conditions Analysis

3.1 Nighttime Vulnerability Assessment

The NVA (Nighttime Vulnerability Assessment) process identifies areas of vulnerability through the analysis of qualitative and quantitative measurements that brings together user nighttime experience, the built environment, and technical lighting. The goal of the NVA was to provide Downtown Houston+ with the necessary information that allows them to engage with concepts of pedestrian safety and equal access after dark, reflect on possible lighting vulnerabilities, assess the risks involved, and act to mitigate and reduce the risk to the public.

24 sites for data collection were chosen, and these are displayed in figures 6 and 7. A deeper dive into all these locations can be found in the Arup Existing Conditions Analysis Report.
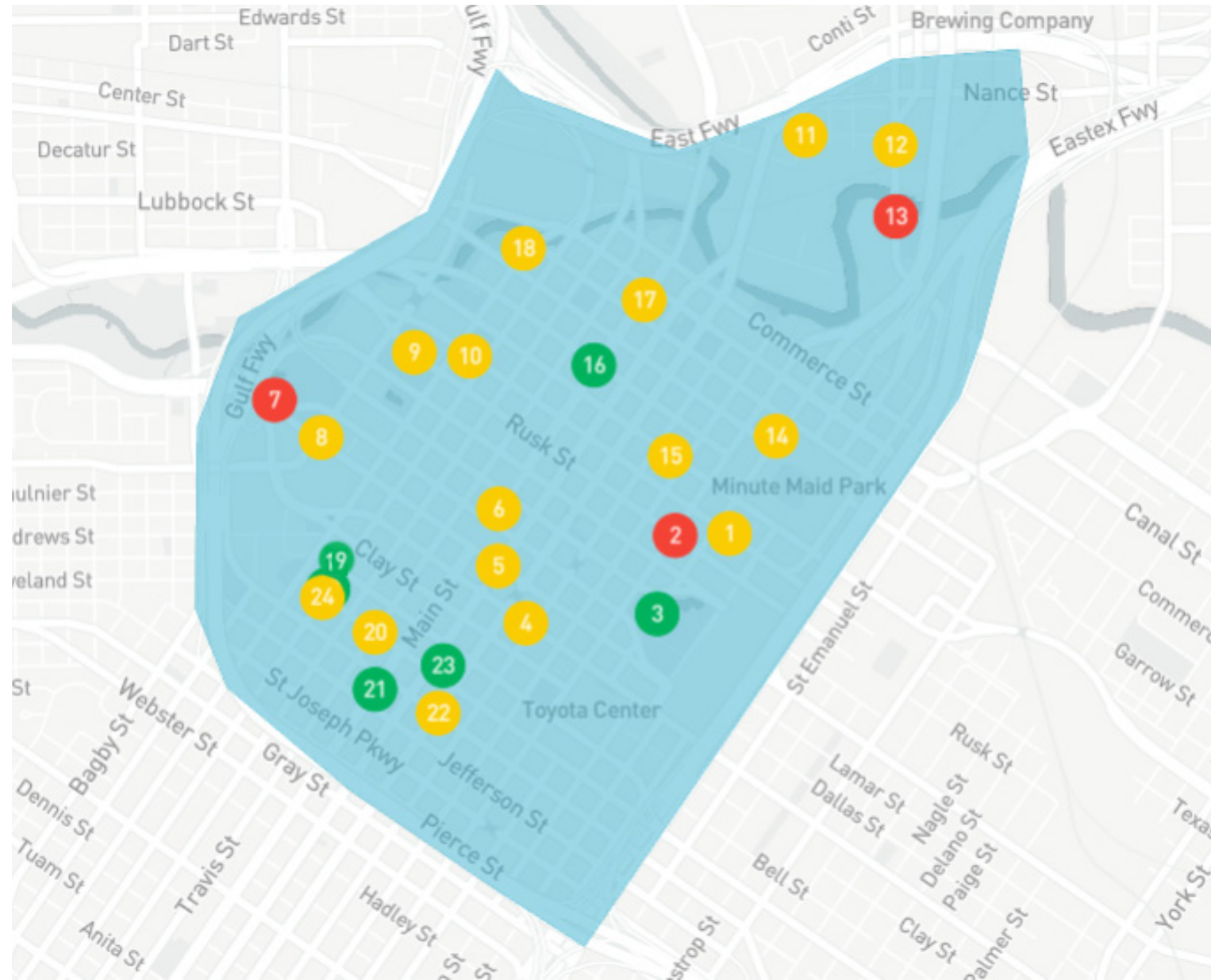
Figure 6: The 24 Selected NVA Site Locations inputted into the Arup Lighting NVA Tool.

Figure 7: The 24 Selected NVA Site Locations inputted into the Arup Lighting NVA Tool.

Site	Score	Adjacent Land Use	Opportunities
1	56	Surface Lot / Public Transport	Consistent lighting across public transport Activate empty parking lots
2	67	Parking Garage	Illuminate foliage Activate empty parking lots
3	44	Park	Discovery Green does not require much intervention, it is already a well utilized space.
4	62	Retail	Illuminate foliage Relamping for consistent color
5	59	Retail	Activate retail lighting Activate Underpasses
6	49	Office / Public Transport	Consistent lighting across public transport Activate retail lighting
7	71	Park	Reduce darkness across public parks Illuminate foliage Activate Underpasses
8	58	Office	Reduce darkness across public parks
9	56	Park / Bridge / Public Transport	Reduce darkness across public parks Illuminate foliage
10	66	Office / Public Transport	Consistent lighting across public transport Activate retail lighting
11	63	Residential	Illuminate foliage Activate retail lighting Relamping for consistent color
12	59	Residential / Rail Crossing	Illuminate foliage Activate retail lighting
13	67	Park / Bridge	Reduce darkness across public parks Activate empty parking lots
14	55	Stadium	Activate empty parking lots Activate retail lighting
15	50	Surface Lot	Illuminate foliage Activate empty parking lots
16	47	Retail / Public Transport	Main Street is an area that will have opportunities alongside the Reimagining Main Street project.
17	55	Retail / Public Transport	Activate empty parking lots Activate retail lighting
18	54	Bridge	Reduce darkness across public parks Illuminate foliage
19	44	Office	Reduce darkness across public parks
20	61	Surface Lot	Activate empty parking lots
21	43	Residential / Retail / Public Transport	Consistent lighting across public transport Activate retail lighting
22	61	Retail	Illuminate foliage
23	44	Park	Activate retail lighting (Resident facades)
24	57	Office / Park	Reduce darkness across public parks

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3.1.1 Nighttime Opportunities

The NVA identified only a few locations deemed very unsafe for the vulnerable population. These are discussed in greater detail in the Arup Existing Conditions Analysis Report.

In conclusion, the NVA highlighted many key areas of opportunity across the 24 case study locations that are consistent across Downtown Houston. These have helped provide information that allows us to engage with concepts of pedestrian safety and equal access after dark, reflect on possible lighting vulnerabilities, assess the risks involved, and act to mitigate and reduce the risk to the public. A selection of different key areas of improvement have been outlined across this page.

These are areas that were found consistently across the 24 locations and will heavily influence the different toolkit designs for the Downtown Houston Lighting Masterplan.

Consistent Public Transport Lighting

Create a consistent lighting across public transport hubs to aid navigation and feelings of safety. This notion will need to be reviewed with METRO.

Illuminate Foliage

Many of the sidewalks have low unifomity and dark light levels due to foliage growing over the street lighting.

Activate Retail Lighting

Dark facades create a closed perception of a space. Adding an element of visual interest even when the stores themselves are closed, will add visual transparency to a space.

Activate Parking lots
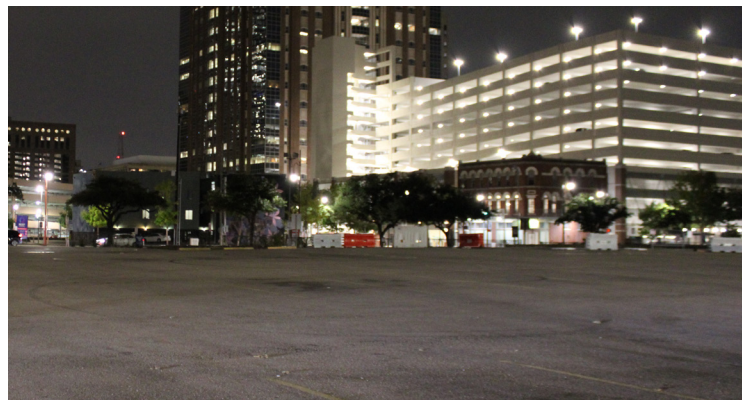
Dark and empty surface parking lots contrast to the highly lit and often glary high rise parking lots and surrounding streetscapes. This disconnect creates empty pockets of Downtown.

Activate Underpasses

The underpass creates a bright spotlight for those standing within it. Activating these at night will make them more of an entrance to Downtown.

Increase Public Park Lighting

Many park boundaries and adjacent streetscape entrances are not illuminated and creates a dark void where it is hard for users to see who is coming.

Relamp for Consistent Color

Ensuring a more even color temperature across site will make each district feel more cohesive.

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4 Masterplan Strategies

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4.1 Design Summary

The information gathered from our site walks and night surveys allowed us to create an overall vision for the masterplan. We want to create a nighttime identity for Downtown. This is achieved by bringing the underpasses to act as portals to the city, creating consistency across the color temperature and public transport, and illuminating the foliage in an interesting, uniquely Houston way. We want to align with the Sustainable Development Goals, with a focus on goals 3, 8, 9, 11 and 15.

We also want to activate the nighttime use of Downtown Houston, through repurposing the surface parking lots when they are unused during the night. Activating the retail lighting and bringing temporary interventions into Downtown will bring people and invite them to linger. Part of this projects scope is to assess and improve the lighting for the many murals across Downtown.

Finally, it will be key to ensure everyone and anyone can enjoy Houston at night, by making the lighting inclusive for all. The topics listed below will be further expanded on later in this report.

Create Downtown Identity
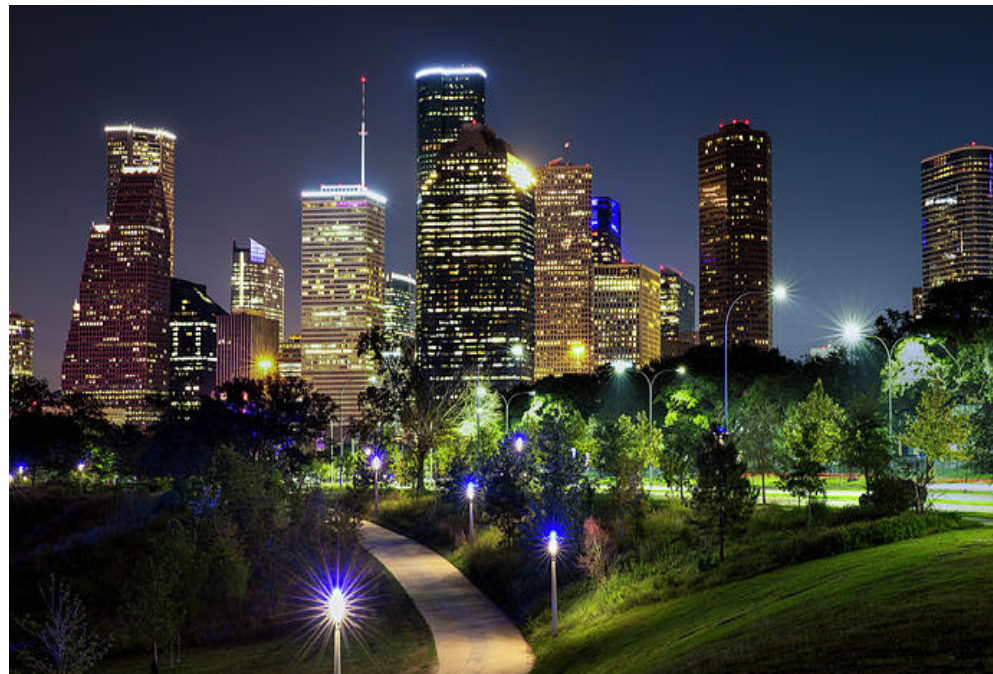
- Use underpasses as portals
- Rethink lighting for public transport shelter
- Relamp for consistent Correlated Color Temperature
- Illuminate foliage

Activate Nighttime

- Activate parking lots
- Activate private retail lighting
- Temporary interventions of programming
- Connect murals/ improve lighting for murals

Downtown For All (Inclusive Design)

- Improve lighting around parks
- Ensure safety for vulnerable population
- Foster community
- Celebrate cultural heritage

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4.2 Priority Themes

Through understanding the users of Downtown Houston, we are able to recognize some key themes which can be addressed and facilitated by lighting in the context of nighttime economy, nighttime placemaking, and nighttime safety.

These themes are best practice for all cities and spaces where users dwell, work and play, but through our night walks and nighttime vulnerability assessments (NVAs) we found many of the key opportunities feed into these themes.

These principles, and the noted areas of opportunity, work in tandem alongside the lighting principles best practices to create a lighting masterplan that allows Downtown Houston to create an after dark environment that is diverse, appealing, connected and creates a feeling of place, ownership and individuality.

Many of these themes are bigger than just lighting approaches, but these should be the focus of Downtown. A comprehensive approach should be supported by good lighting during the nighttime. This is a larger conversation with stakeholders, owners, Downtown Houston + and other parties and these are not detailed in this report.

Diversifying Community

Curating an inviting space that draws in groups of currently underrepresented communities, including women and families.

Creating Areas for Individuals to Reside

Offering appealing park areas for individuals to linger, engage in, and relish a range of activities, such as Trebly Park and Discovery Green.

Connecting Resources

Reestablishing a connection between individuals and the retail and hospitality options situated within easy walking distance.

Eliminating Obstacles

Eliminating obstacles, both physical or psychological, for those moving during the hours of darkness by activating frontages, improving key crossings and wayfinding.

Providing a Variety of Activities

Ensuring there is more for visitors and residents beyond retail, dining, and beverages, giving spaces for them to feel safe playing and exploring their city.

Fostering a Sense of Community

Commending and enhancing the accessibility to distinctive assets of Downtown Houston, which mirror its identity and history.

Revitalizing Underutilized Areas

Revitalizing empty and seldom-utilized areas and structures, energizing exteriors and ground levels to infuse liveliness into the streets, such as empty surface lots during non-game days.

Augmenting Cultural Heritage

Creating environments and locations that foster active community involvement for residents in Downtown, cultivating a robust feeling of ownership and pride.

Adapting to the Landscape of Retail

Exhibiting adaptability and the capability to adjust to the swiftly evolving patterns of retail, encompassing the rapid adoption of online retail practices.

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4.3 Lighting Principles

When creating the pedestrian experience, there are some best practices to ensure the final design is welcoming, creates a perception of safety and brings a feeling of place. The approach to pedestrian focused lighting design primarily concentrates on enhancing the overall experience for both Houstonians and visitors. This is achieved by seamlessly integrating light with the diverse streetscape, landscape, and architectural elements.

The importance of the public environment's quality of experience, nighttime economy, nighttime placemaking, and nighttime safety during the hours of darkness is a crucial factor in the success of the overall design concept for Downtown Houston pedestrian lighting masterplan.

In the absence of high-quality lighting, urban spaces often become bewildering and disorienting, losing the nuances of material textures and colors, resulting in an unfriendly and uninviting ambiance.

Therefore, a comprehensive understanding of space dimensions, moods, atmospheres, textures, and colors is imperative during nighttime. This understanding ensures not only visibility but also the ability to relish the surroundings.

These principles will be applied to all the design's toolkit elements of the proposed masterplan, alongside the priority themes and areas of opportunity.

It is to be noted, these principles go beyond the areas of opportunities as identified in the Existing Conditions Lighting Analysis Report and are the background of all the strategies presented in this Masterplan.

Identity

Fostering the distinct character of the development and its individual sections.

Placemaking

Nurturing the suitable atmosphere and tone in every specific space and location.

Legibility

Facilitating easy navigation by emphasizing and improving pathways and scenic views.

Sustainability

Using the right lighting, reducing energy consumption, and being considerate of the surrounding ecosystem.

Safety

Providing lighting to offer a feeling of security and confidence to both users and the community, while also diminishing instances of undesirable behaviour.

Longevity
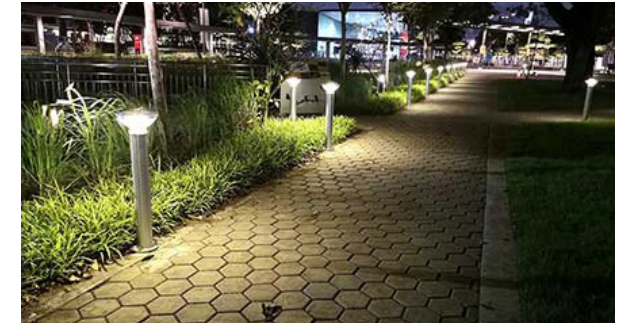
Creating timeless designs that are easily maintainable and obtainable without sacrificing quality.

ARUP

4.3.1 Lighting Layers

A layered approach will be utilized to inform a consistent overarching design of lighting within the development. The considered application of lighting layers in conjunction with a cohesive lighting strategy to individual character areas will reinforce their unique identities while creating legible and safe environments throughout the development.

The three key layers of light to be considered are:

- Ambient horizontal illumination
- Ambient vertical illumination
- Accent illumination

The figures on the right demonstrate the fundamental characteristics of each layer and their contributions to the final lighting composition.

Ambient horizontal illumination

A base layer of light on the horizontal plane (typically the ground).

Aids wayfinding and promotes safe navigation by illuminating pathways, changes in level, and other potential obstructions and risks of trips/falls along the route.

Typically provided by the downward portion of a luminaires photometric distribution.

Ambient vertical illumination

A base layer of light to the vertical plane.

Improves illumination for facial recognition to enhance the perception of safety, a key aspect influencing the use of public realm space.

Typically provided by the diffuse portion of a luminaires photometric distribution, or inter-reflection from adjacent surfaces.

Accent illumination

Localized highlights of higher illumination (typically to static elements such as monuments, façades, vegetation, street furniture, etc.)

Encourages the use of public realm space by providing destinations, directing the eye and channeling the movement of people towards surfaces and areas of higher luminance.

Creates impressions of space, depth and volume.

ARUP

4.3.2 Background & Foreground

The lighting strategy will reinforce the intended spatial composition of focal points and backdrops to support the architectural hierarchy of spaces and places. Light should be used to reveal materiality, enhance depth, and set or extend the perceived boundaries of a space; these are key attributes for enhancing placemaking and legibility.

The following approaches should be used to help define the lit composition of spaces and places:

- Lighting to reveal materiality
- Lighting to create brightness contrast
- Lighting to create rhythm or arrangement

These parameters can be used individually or in combination to vary the extent of accentuation between intended foreground and background. This serves to create visual interest and direct views and movement within the architectural landscape.
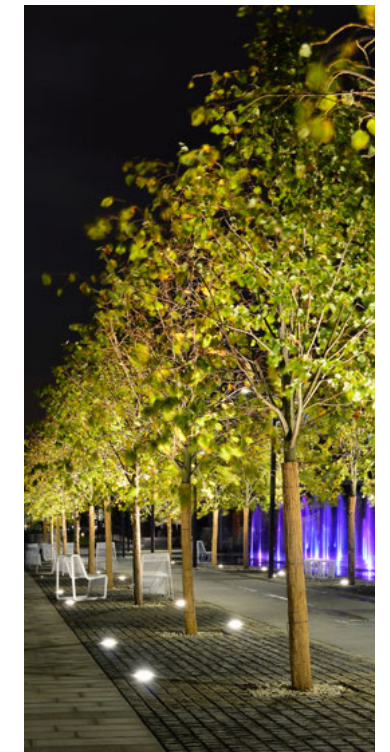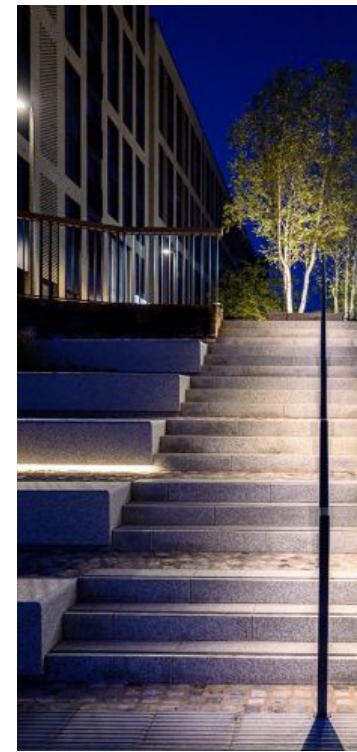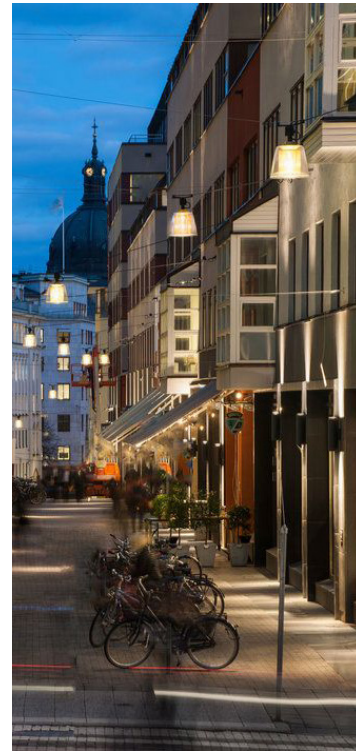
Materiality and Texture

The way light hits a surface (e.g. Perpendicular wash lighting versus grazing at a shallow angle) can change the way texture is revealed.

The color temperature and color rendering of light should complement and accentuate the natural hues of a material (e.g. Warmer light onto red brick).

Brightness and Contrast

The brightness of surfaces can determine their relative prominence within a scene; this is determined by both the quantity of light falling onto it and its surface reflectance.

Contrasts in brightness and color can be designed to take advantage of the visual systems' ability to perceive distinct objects.

Rhythm and Arrangement

The rhythm and arrangement of lighting can serve to create a specific character or style.

Bolder approaches to patterning and accentuation can be used in the appropriate settings; more restrained but effective options include inversion (from downlighting to uplighting) or changing the alignment of the light and architecture.

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4.3.3 Shades of Night

Within an urban context, night is much more than simply a time between sunset and sunrise. Cities are becoming increasingly 24-hour hubs, with flexible working and emphasis on maximizing the nighttime economy.

As a result 'night' can mean different things to different users and visitors:

• Evening and late night shoppers, primarily in winter months when the sun sets earlier

• General commuters in winter months when morning and evening commutes are undertaken during darkness

• Visitors/tourists to city center evening events

• Patrons of food and beverage offering

• Visitors to the cities nightlife offering

• Nightworkers, shift workers and early starters who commute to work during hours of darkness

Each of these 'shades of night' do not operate exclusively and may overlap/interact at different times.

The lighting strategy and equally the lighting control strategy should respond to and accommodate the expectations and needs of these many groups.

Entertainment | Night life | Shift Workers | Food and Beverage | Evening Commuters | Evening Shoppers | Morning Commuters

12am | 6pm | 6am | 12pm

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5 Masterplan

ARUP

Masterplan

5.1 Toolkit Overview

The NVA case studies across Downtown, alongside the work with personas and the journeys users take across the city highlighted 8 different areas of opportunity that can be applied across a range of different areas. This section gives an overview of how these different tools can be utilized and the impact they will have.
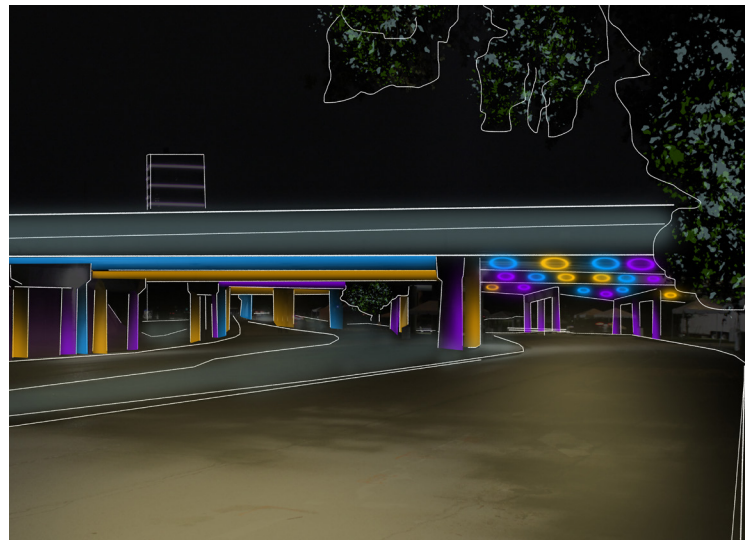
Underpasses
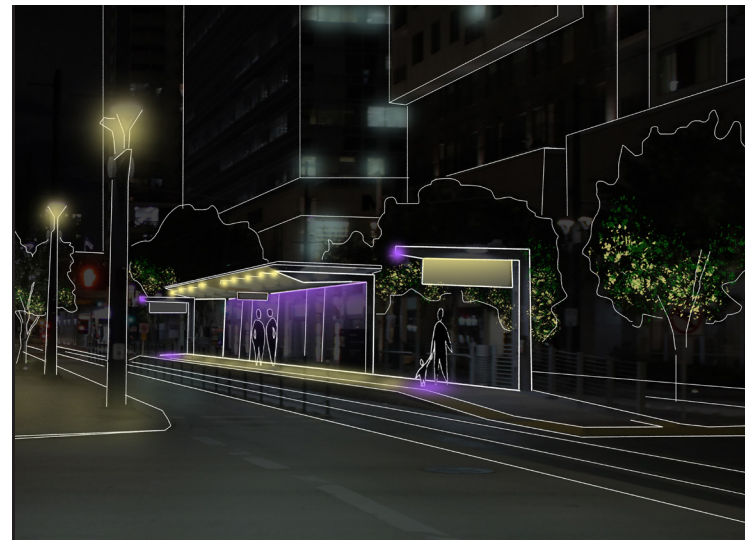
Public Transport
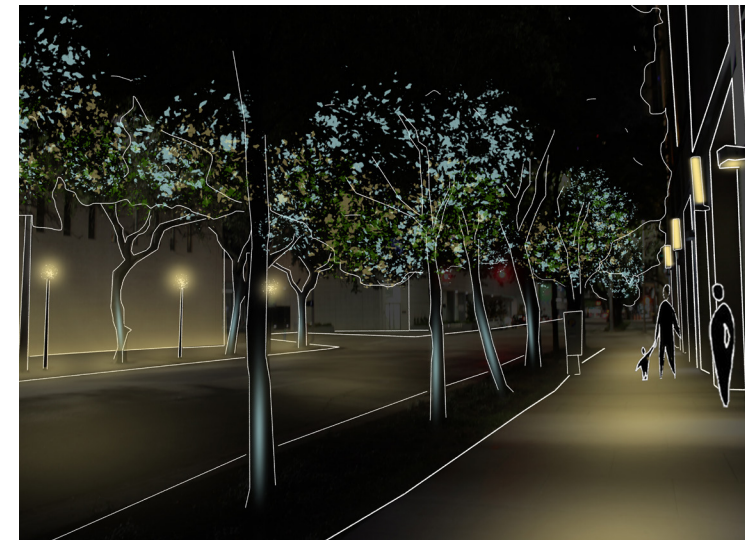
Relamp for Consistent Correlated Color Temperature

Illuminated Foliage
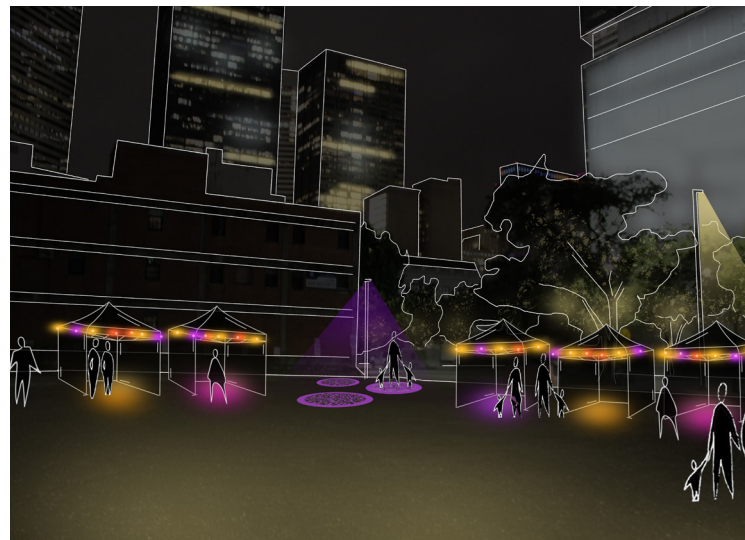
Activated Surface Parking Lots

Activated Private Retail Lighting
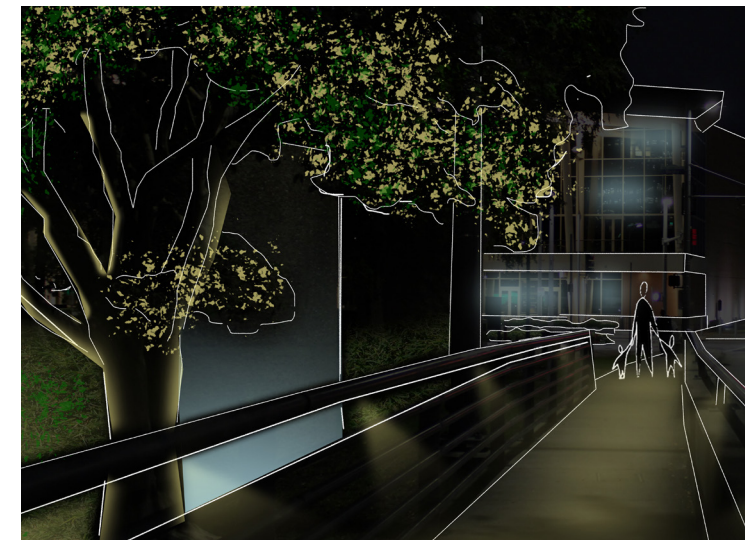
Increase Public Park Lighting

Facade Lighting

ARUP

5.1.1 Toolkit- Underpasses

The underpasses create an entrance way to Downtown Houston, and for those crossing underneath them to make their way to the varying nodes and stadiums across the city, are a first impression of the area they are walking into. Currently many of the underpasses are illuminated with wall packs or under deck lights, creating a spotlighting effect for those waking through, which can be glary and uncomfortable. By bringing fun elements into the city, they can be illuminated and draw users into the Downtown area.

Render
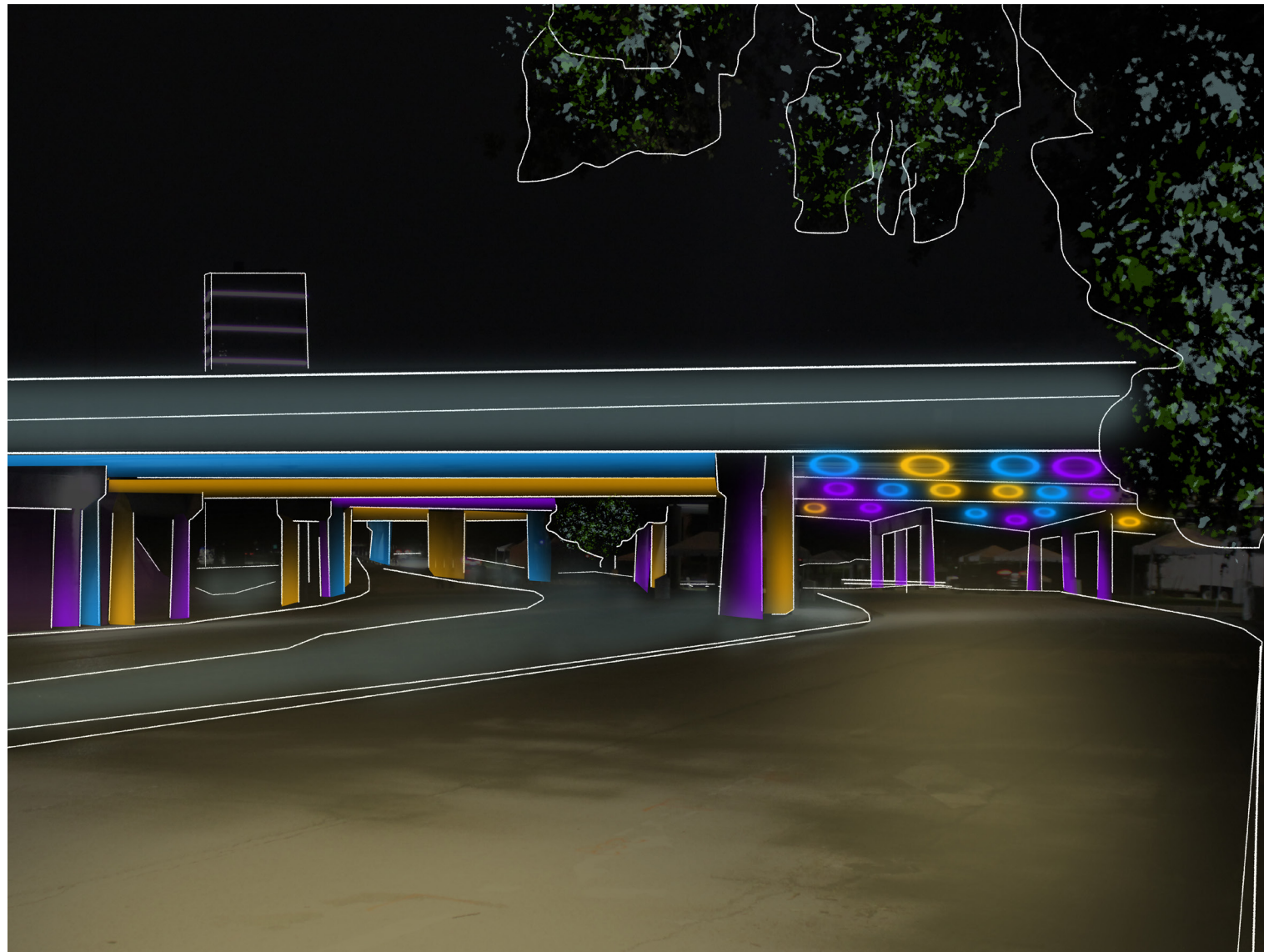
Reference Projects & Precedent Images

Sensing You (I-87 & Clara St.): Lighting installation comprised of 1000 painted circles and 81 light rings that are individually controlled. The light patterns of the illuminated circles are activated by the pedestrians crossing underneath.

Sea Change: Interactive light-based artwork that activates the pedestrian experience within a bus exchange transit tunnel. When the tunnel is unoccupied the artwork cast a gentle quiet shifting of turquoise colors, however, when a pedestrian or cyclist enters the tunnel, a wave of intense blue or green light is triggered to ripple across the wall in front of them.

NVA Spider Diagram

NVA Location: 7 — BaseNorm — NVA Result
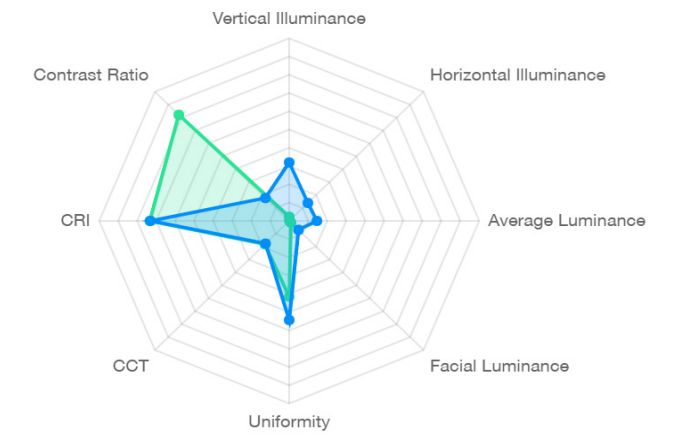
Due to the high glare of the underpass and the darkness of the sidewalk, this NVA location had low illuminance levels, leading into a high contrast ratio. By creating more of an entrance way and illuminating the surrounding trees, this high contrast ratio will be bought down and make the area a more uniform experience for all those walking through.

Luminaire Examples

Facade Spotlight

Facade Linear

ARUP

5.1.2 Toolkit - Public Transport Lighting Shelter

There is a range of public transport shelters across Downtown, with many carrying a different visual language or minimal signage. By designing a consistent concept with the same color temperature and light levels balanced to the environment will create a transport identity that is easily recognizable across Downtown. This notion will need to be reviewed with METRO.

Render

Reference Projects & Precedent Images
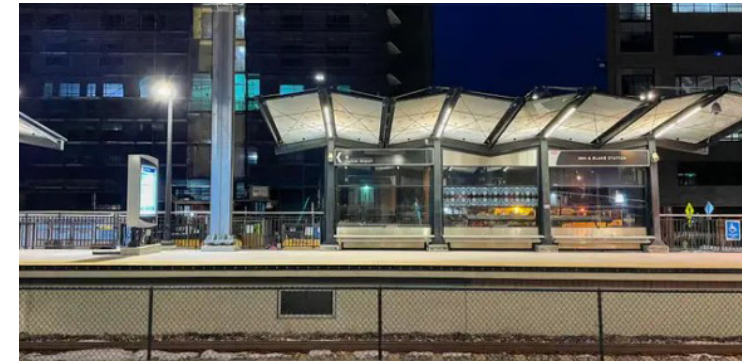
Denver Train Station: This evenly lit platform provides appropriate horizontal and vertical illumination, allowing users to navigate the space safety.

Houston, Texas: This preexisting rail stop provides a good example of a well illuminated station. The diffuse light from the columns add a pop of color to create a comfortable ambiance.

NVA Spider Diagram

NVA Location: 21   BaseNorm   NVA Result
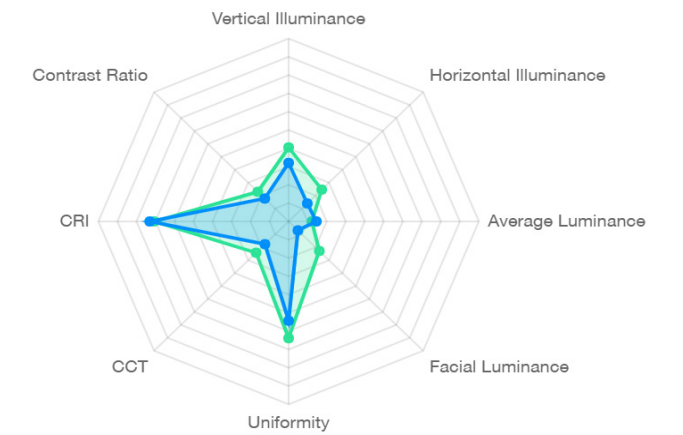
By bringing a more consistent lighting scheme to the transport hubs will help balance the horizontal and vertical illuminance and increase the average luminance.

Luminaire Examples

Recessed Downlight

Recessed Linear Uplight

ARUP

5.1.3 Toolkit - Relamp for Consistent Correlated Color Temperature

Through research, is has been shown that warmer color temperatures feel safer and more comfortable to users, with many cities adopting this. Creating spaces with a lower variation of color temperature will give a functional and pleasant experience and allows feature spaces or facades illuminated in a warmer or cooler color to draw the eye towards it in a positive way.

Render

Reference Projects & Precedent Images

Ann Arbor, Michigan: Consistent color street lighting allows the storefront light to spill into the street and grab the users eyes as they move through.

Plaza de Armas, Seville: The consistently lit park allows users to move freely and safely around the space, with the warmer colored facade lighting in the background drawing the eye towards the architecture.

NVA Spider Diagram
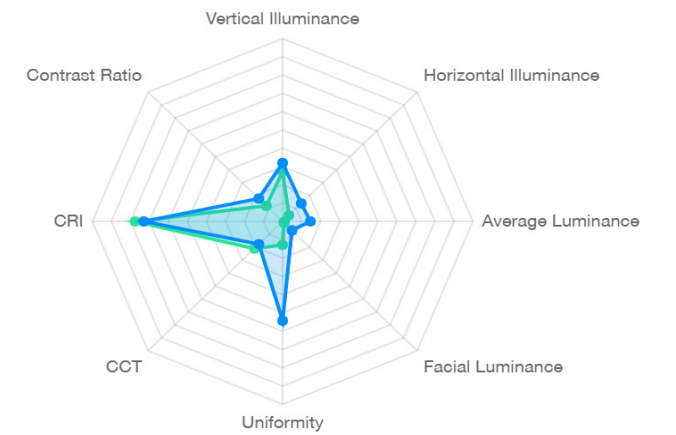
The sidewalk in this NVA had a broad range of horizontal illuminance, from very low to very high, with a Correlated Color Temperature range from 2500 – 4500 kelvin. On the spider diagram, this range has evened out to give the ideal value, but this is not the pedestrian experience. This broad range of temperatures has contributed to the low horizontal illuminance and uniformity shown in the diagram. Ensuring all the luminaires have a similar CCT and bringing consistent illumination to the sidewalk will improve these values.

Luminaire Examples

Pole Top Luminaire

Wall Mounted Luminaire

ARUP

5.1.4 Toolkit - Illuminated Foliage

It was noted that many of the sidewalks across Downtown are dark due to the foliage growing over the street lighting. Rather than additional upkeeping to the trees, and for the foliage to provide plentiful shade during the day, we are proposing illuminating the foliage. This will bring the lighting down to a human scale, whilst creating a visually interesting vertical surface, help to mitigate the vulnerability issues by adding layers and depth and create a sense of identity to Downtown Houston.

We are keen to avoid uplighting the trees from the base due to the excess light spill into the night. It is noted that the luminaires chosen will be required to withstand the high winds due to Houston being in a hurricane corridor.

Render

Reference Projects & Precedent Images

Christchurch, NZ: The Botanic D'Lights created an interactive light trail through the Botanic Gardens and Arts Centre, creating a vibrant, lively city residents can engage with.

Montana Ave, City of Santa Monica: Tree Art & Light Installation along ten blocks of the business district. One tree on each block has been transformed into a unique illuminated work of art. The project aims to support the economic recovery of the area

NVA Spider Diagram

NVA Location: 22   BaseNorm   NVA Result
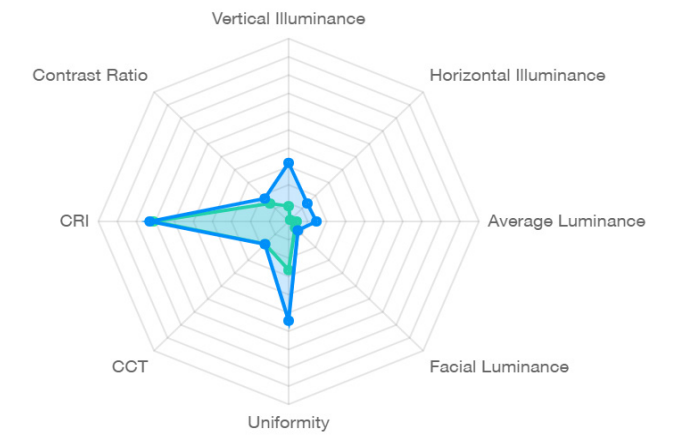
This NVA location had a very dark sidewalk – shown in the low horizontal illuminance, luminance and uniformity. Bringing illumination to the trees will allow more light spill onto the sidewalk and improve these values, making it a safer feeling area for users to walk through.

Luminaire Examples

Tree Pendant

Tree Pendant

ARUP

5.1.5 Toolkit - Activated Surface Parking Lots

Many of the surface parking lots are left dark and empty in the hours of darkness. By improving the sense of community and bringing local business and entertainment to these spaces, and generate revenue in the process, these dark spaces can be reclaimed.

Render
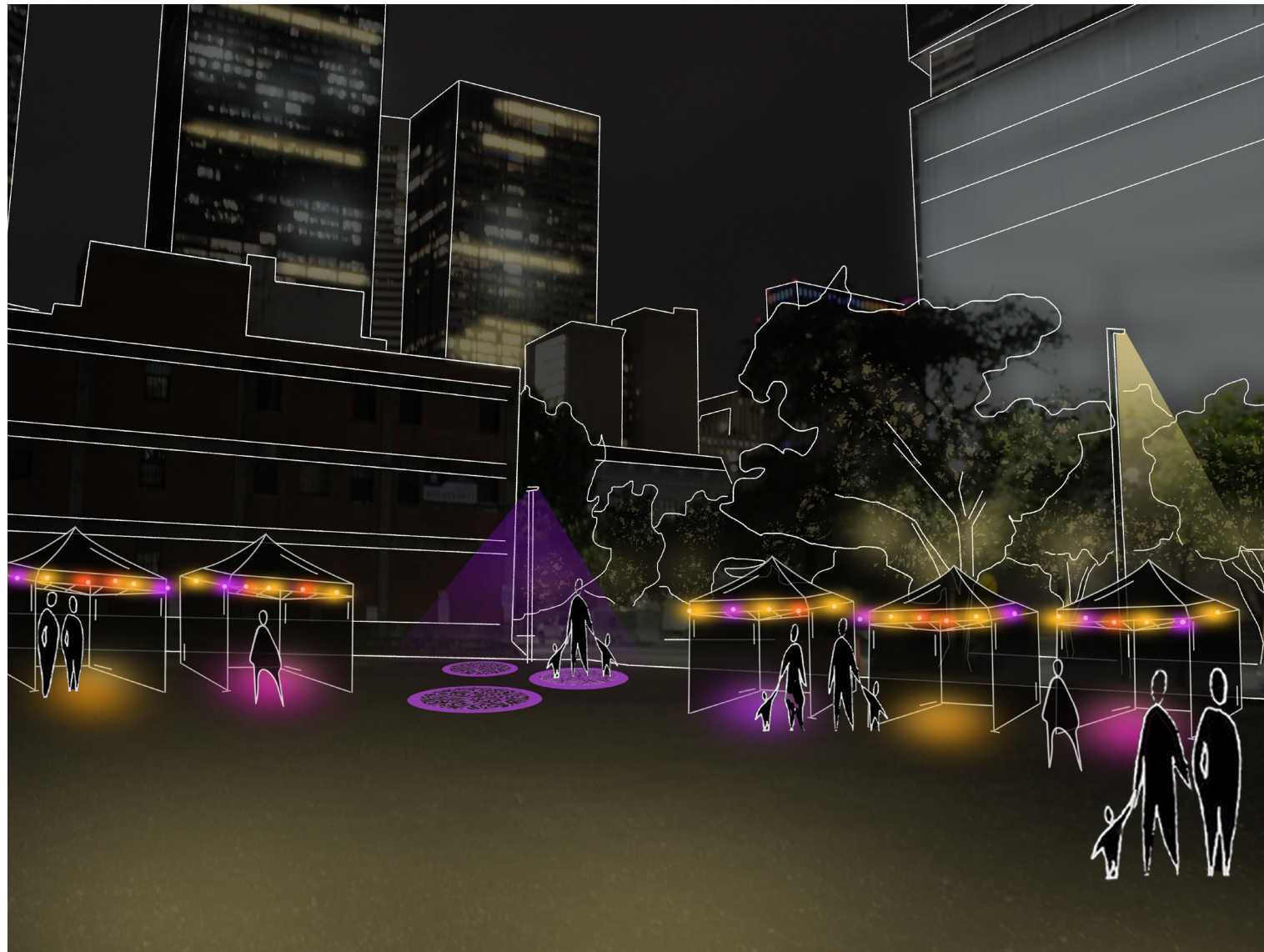
Reference Projects & Precedent Images

Austin Night Market: This night market opens once a year in a mall parking lot, where many people come to eat new food and shop from local vendors.

Union Square East, NYC: Union Square East calls itself the 'ultimate holiday destination, offering a magical experience with enchanting lights, award-winning dining, and shopping at the renowned Greenmarket and Union Square Holiday Market'. It provides a space for events at a range of entertainment venues, set against the backdrop of bustling markets.

NVA Spider Diagram
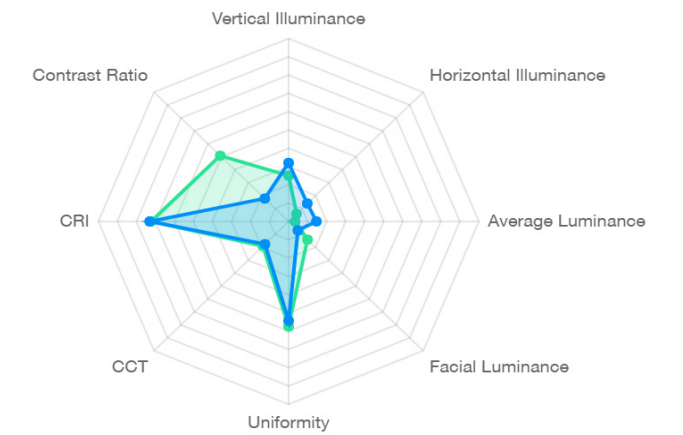
This location when measured had low horizontal illuminance. By activating these spaces at night and bringing in food markets and programming that brings users and temporary lighting to these spaces will improve area use and feelings of safety.

Luminaire Examples
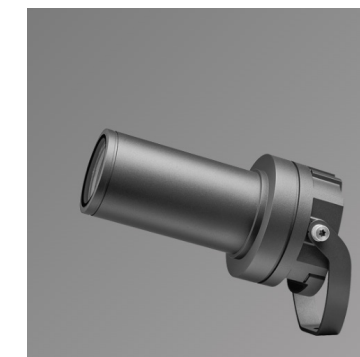
Framing Projector

ARUP

5.1.6 Toolkit - Activated Private Retail Lighting

Activating retail lighting focuses on illuminating storefront windows that are closed during the hours of darkness. This both improves the general illuminance on the sidewalks, the visual transparency, and the scale of the site. Reducing areas that look completely closed at night makes corridors through the city feel more appealing, even if the store iself is closed for the evening.

Render

Reference Projects & Precedent Images

OPEN, Flint Collective: Using neon lights to transform eight empty storefronts designed to re-inject color and light into the East Village neighborhood in Manhattan, which went dark as the city shut down.

Paris, France: The bright and vibrant store front of many stores are used to entice passing pedstrians into the store, in turn, increasing foot traffic and boosting the number of customers for the business. The canopy of light is an additional factor that draws people in closer to those store fronts.

NVA Spider Diagram

NVA Location: 17 — BaseNorm — NVA Result
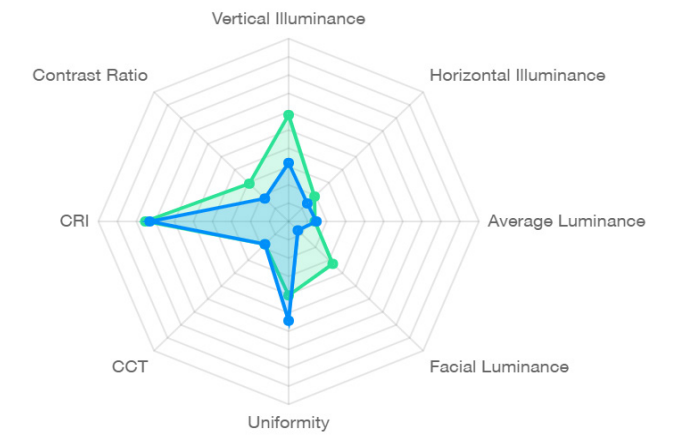
Many of the streets with retail lighting scored well in the spider diagram element of the NVA, but less so in the qualitative side. This is because the dark facades create a visual barrier to those moving through the space. Creating bright retail windows during times of closure and hours of darkness

Luminaire Examples
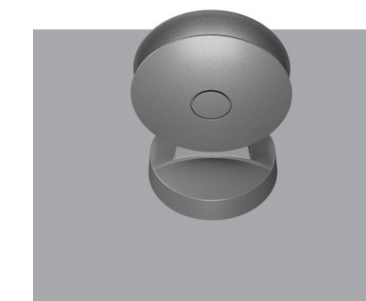
Frame Outlining Luminaire

Linear LED Color Changing Strip

ARUP

5.1.7 Toolkit- Increase Public Park Lighting

It is important to illuminate different levels of lighting and add multiple layers to help users perceive a space as safer through visual transparency at night whilst moving through these spaces. This can be through illuminating the tree foliage, surrounding grassland, and internal pathways to remove dark areas and make these spaces accessible for all in the hours of darkness.

Render
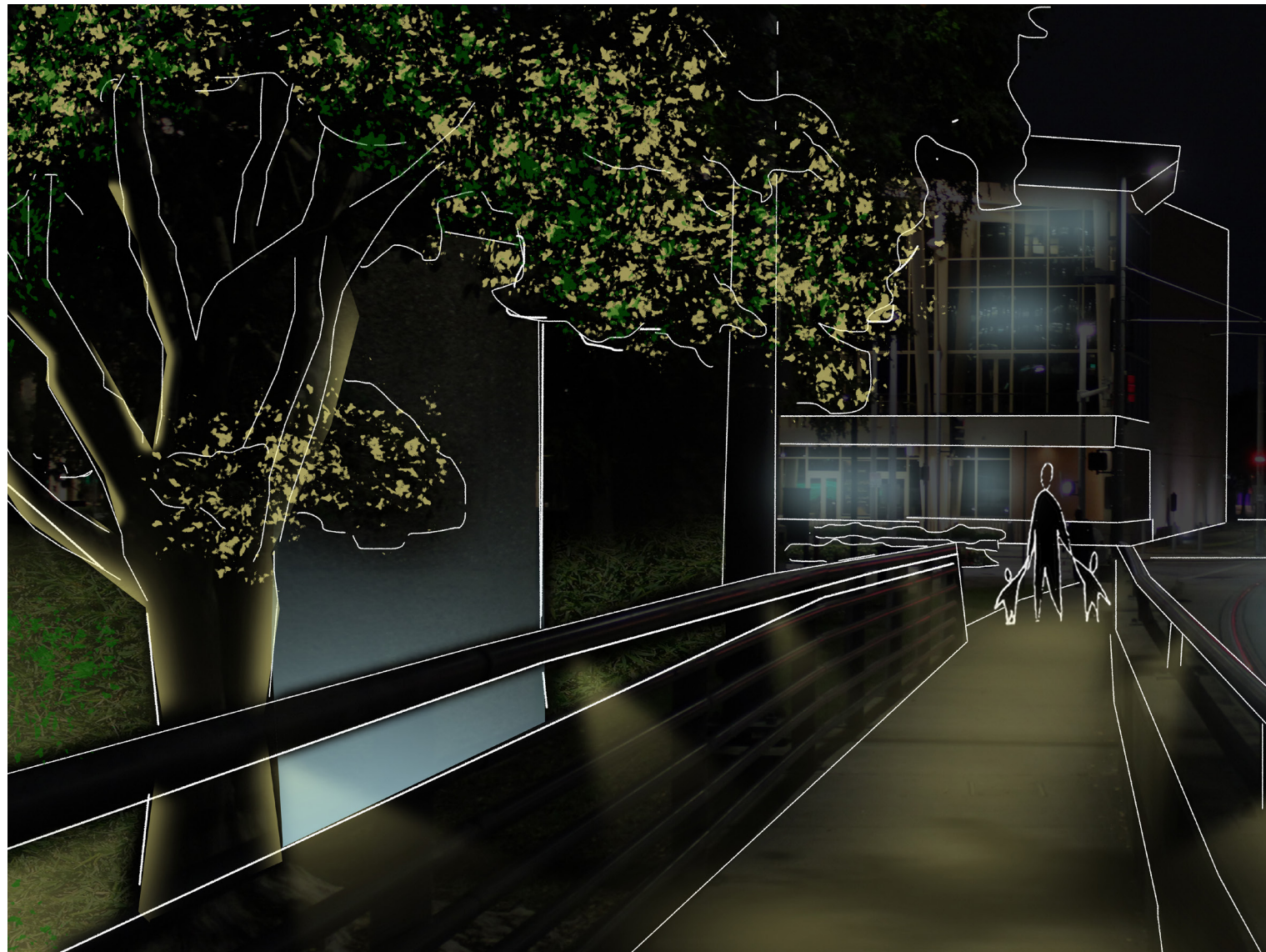
Reference Projects & Precedent Images

St. James Park, Toronto Canada: This park has soft illumination throughout its entirety with the seating and shading structures lit appropriately in order to draw people into the park.

Romare Bearden Park, Charlotte, NC: This public park in the heart of the city has ample illumination to make this feel safe at night. The park also includes feature light walls that makes the space feel more inviting.

NVA Spider Diagram

NVA Location: 9
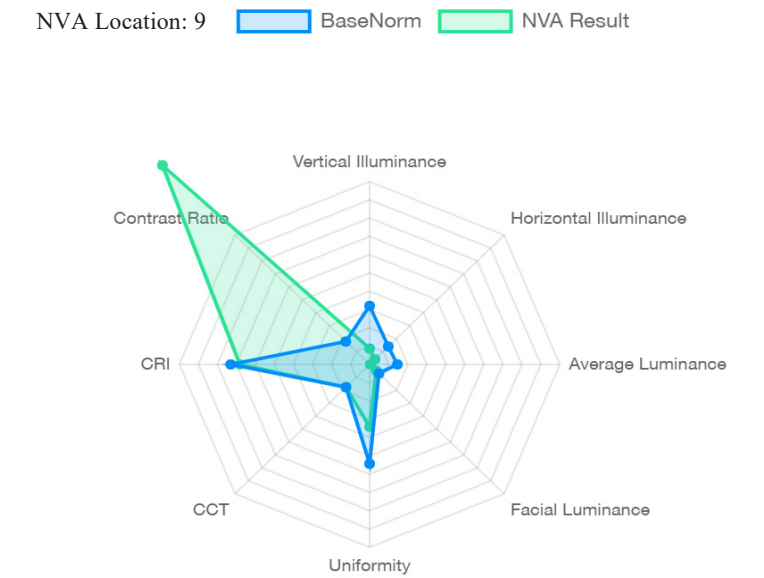
This area was consistently dark, with minimal contrast between the park alongside and the walkway. This area creates a visual boundary for the users. Illuminating this parkland will allow those walking the city streets in the hours of darkness to see what is around them and feel safer.

Luminaire Examples

Parkland Bollard

Tree Uplighter

ARUP

5.1.8 Toolkit- Facade Lighting

Facade lighting makes buildings visible in the urban space and enables orientation, whilst creating features for pedestrians on their walks. Both uniform illumination and accented illumination improves the visual transparency a facade can have within a space. Illuminated facades can highlight heritage buildings and areas within the Downtown Houston area, improve vertical illumination and create more visually interesting corridors for users.

Render

Reference Projects & Precedent Images

San Francisco City Hall, CA: This facade fêted with a visual display using LEDs and architectural projections, transforming the façade of the 100-year-old building. Arup, working with Obscura Digital and the Centennial Planning Committee, helped project striking lighting designs depicting the history of City Hall onto the building, illuminating this National Historic Landmark.

Houston, TX: Lines of light are used to create a modern, graphic design on the facade of this Downtown building. This allows the campus to stand out visually creating a fun environment to draw those around it towards it, whilst making the area brighter at night and therefore feeling safer to walk around in during hours of darkness.

NVA Spider Diagram
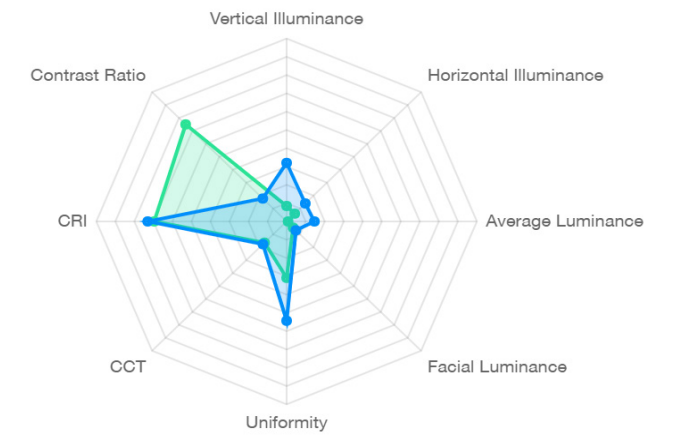
This NVA location was another area with low lighting levels on the sidewalk, with dark facades on the surrounding building. Illuminating the facade will improve the visual transparency, help improve the illuminance and reduce the contrast ratio by bringing more illumination to the area overall.

Luminaire Examples
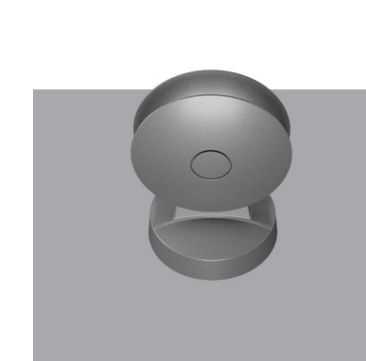
Frame Outlining Luminaire

Facade Linear

ARUP
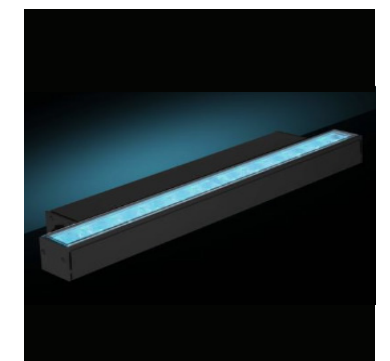
5.2 Implementation Case Studies

To show how these toolkits can be combined, 3 different locations have been chosen as a case study. These areas are:

1. Main Street

    Residents, Visitors, Workers, Tourists

2. A Residential Area (around Austin and Jefferson)

    Residents

3. An Underpass (around Congress and Hamilton)

    Visitors, Workers, Tourists

These three locations showcase a different experience of Downtown Houston that many residents, workers, tourists and visitors will have as they move through the different districts, nodes and corridors that make up Downtown.

Each of our proposed toolkits can be overlaid with one another to create a cohesive and welcoming feeling.
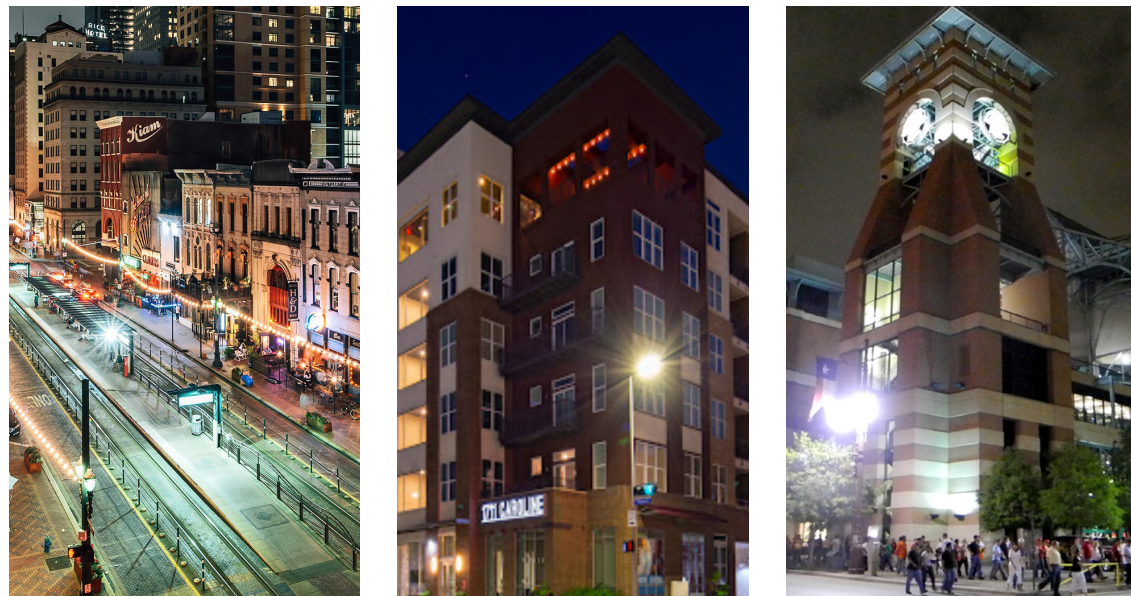
Figure 8: Images around the 3 locations during the hours of darkness

LEGEND
DRA Boundary
HDMD Boundary

Location Areas

Nodes

Primary Corridors

Secondary Corridors

ARUP
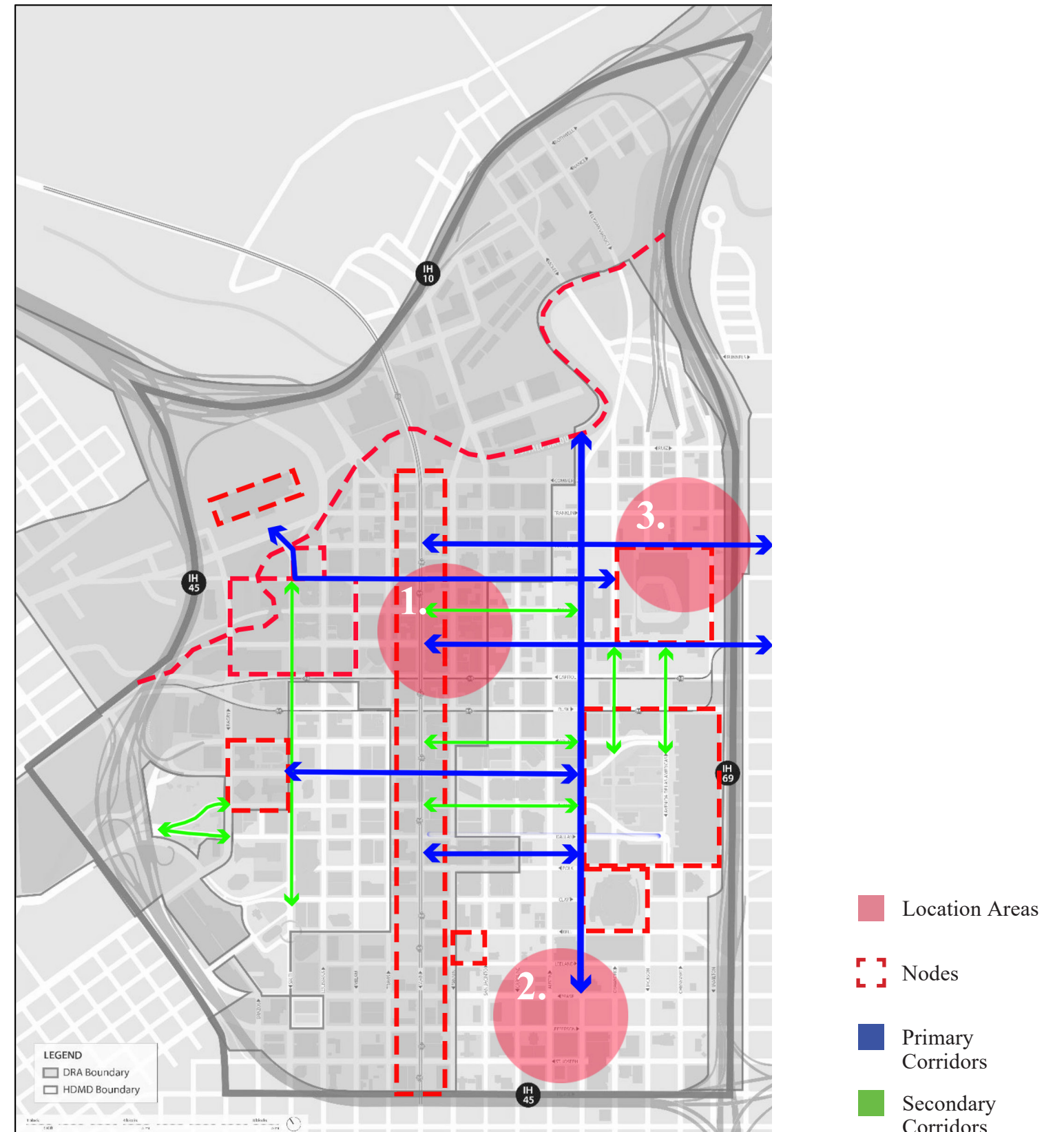
5.2.1 Main Street

Main Street is the face of Downtown, where residents, office workers, tourists and visitors are reunited, across daytime and nighttime. It is a focus of developers and different stakeholders due to it's influence to the nighttime environment of the city.

As part of the identity of Downtown, the entire street should have signature tree lighting where trees are planted, adding the different levels of light.

An area of opportunity we found during the NVA survey is the lack of visual transparency due to closed storefronts at night. This creates a lack of vibrance along some parts of Main Street that are at odds with other sections. Therefore, there is an opportunity to keep these sections of street alive by activating these private retail windows through illuminations in the hours of closure.

There are many key transport hubs along Main Street. Whilst the current stations are modern and highly illuminated, these were found to be overlit in comparison to the rest of the street, and causing a spotlighting effect to those using these transportation methods. Adjusting these lighting outputs to be more in line with the lighting levels across Main Street can make them feel more balanced to their surroundings.
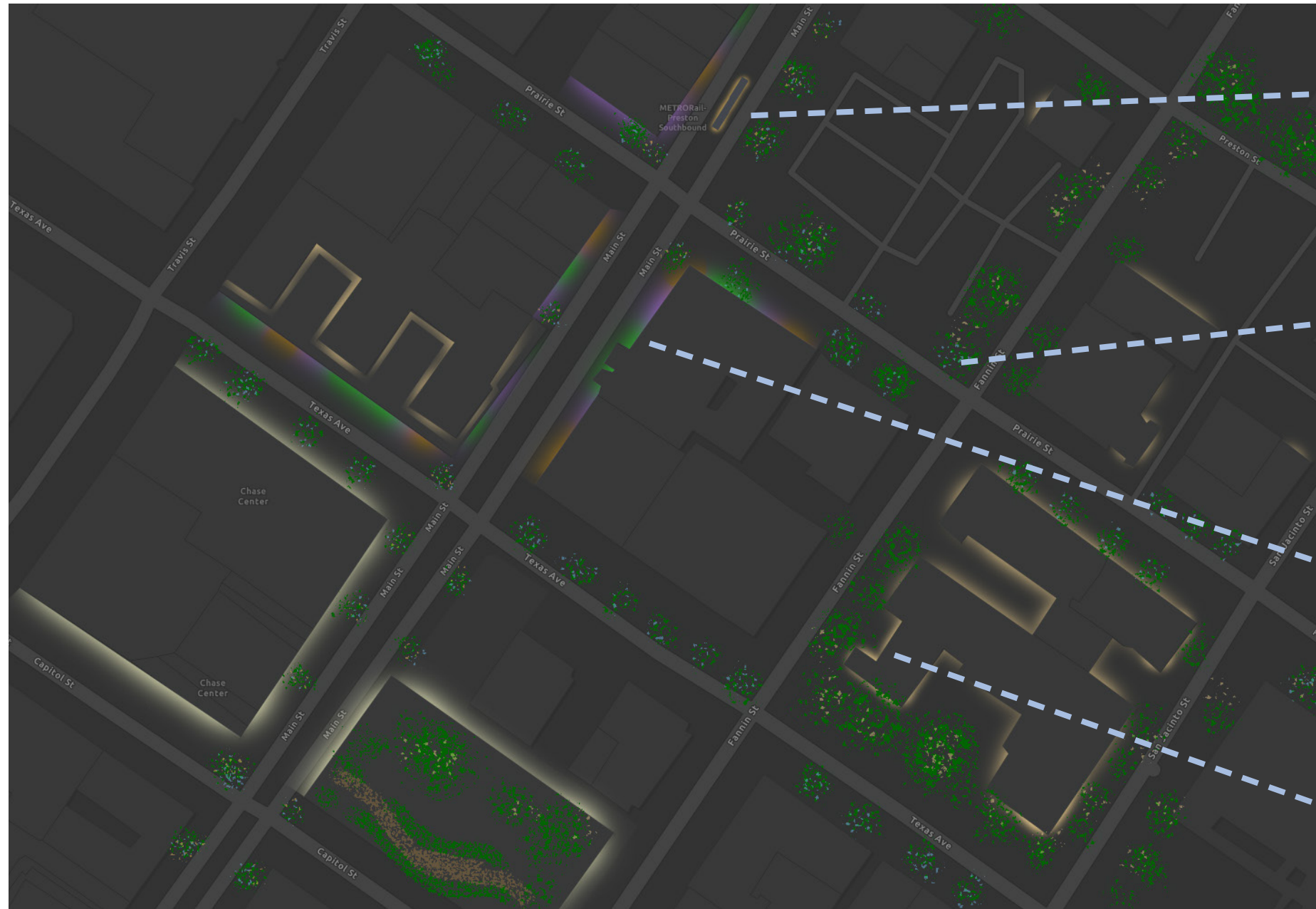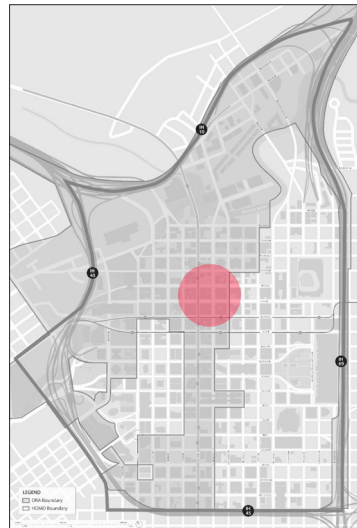
Transport lighting

Illuminated Foliage

Activated Retail
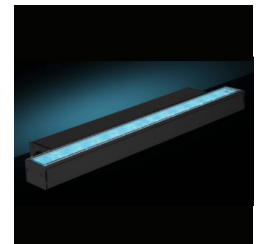
Facade Lighting

Figure 9: Public Transport Lighting Shelter
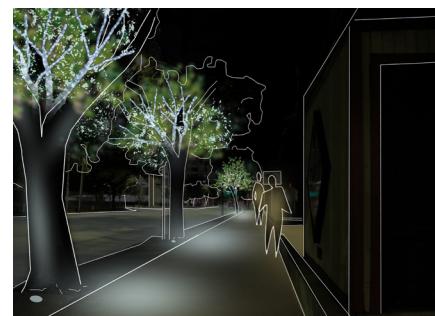
Figure 10: Illuminated Foliage

Figure 11: Facade Lighting

Figure 12: Activated Private Retail Lighting

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5.2.2 Residential Area - Austin and Jefferson

South Downtown is a great example of a residential area with high potential for future developments. Through our nighttime surveys and NVA work, we found that areas around Jefferson and Austin Streets have a medium level of vulnerability. When compared to the rest of Downtown, this may not seem significant, but these areas are where the most vulnerable population (women and children) are transiting during nighttime back to their residences.

We aim to improve the perception of safety in this environment to residents by giving them illuminated transit routes to enjoy the surrounding parks (Trebly Park and Discovery Green) after work. About 4% of the residents are children under 4 years old, who are eager to explore parks and playgrounds.

Improving the perception of safety in these connections between parks will be achieved through working with facade lighting whenever there is opportunity, balancing the Correlated Color Temperature and illuminating the foliage on as many sidewalks as possible.

During the weekends and non-game days, there is a great opportunity to stimulate the local economy with pop-up events and local markets in the empty parking lots. Those activities enhance the sense of community for the residents.
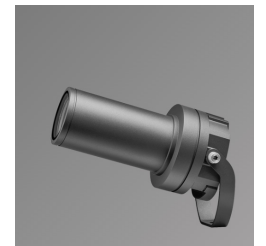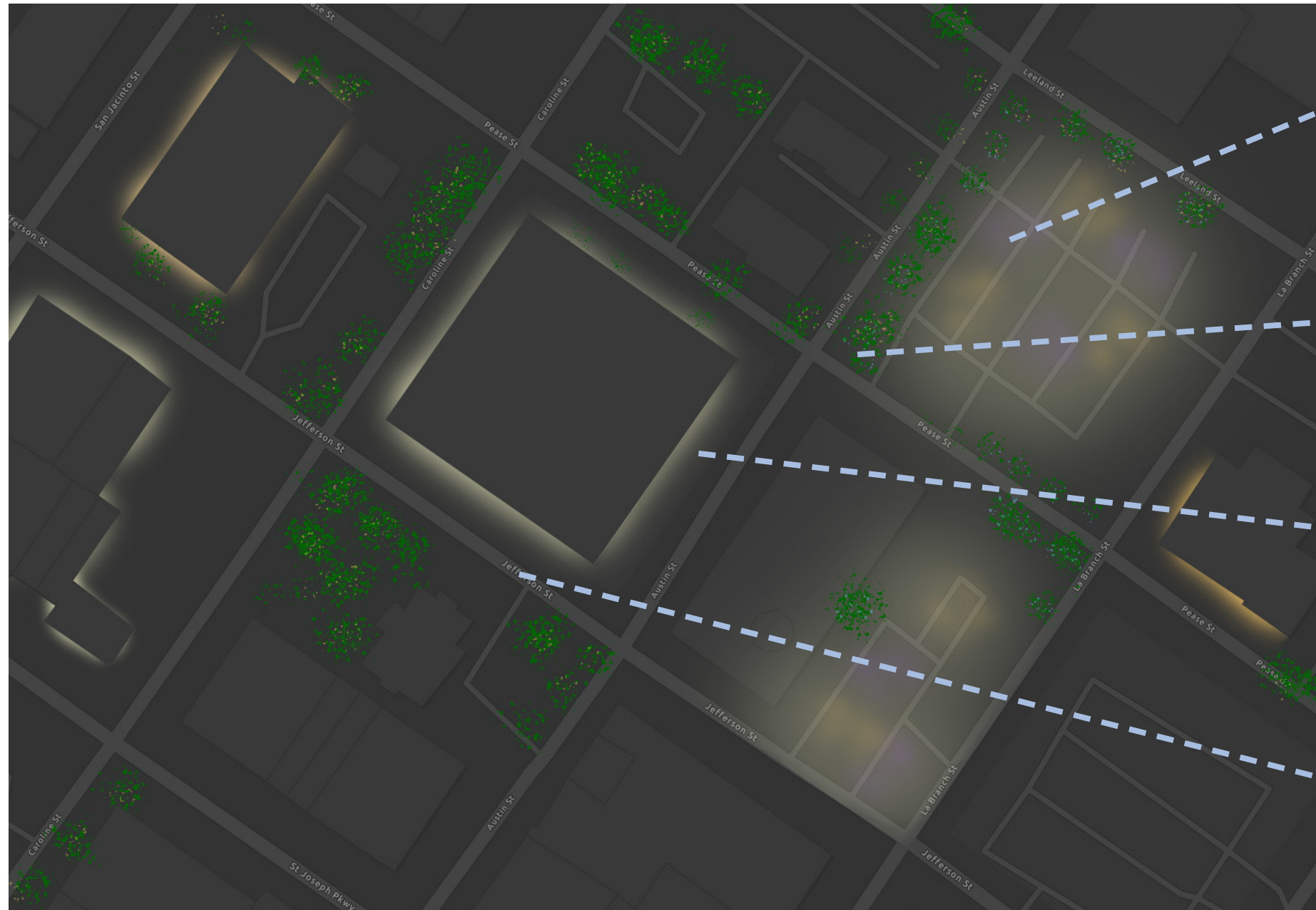
Activate Parking Lot

Illuminated Foliage
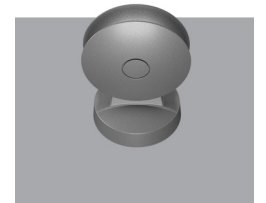
Facade Lighting

Consistent Correlated Color Temperature

Figure 13: Relamp for Consistent Correlated Color Temperature
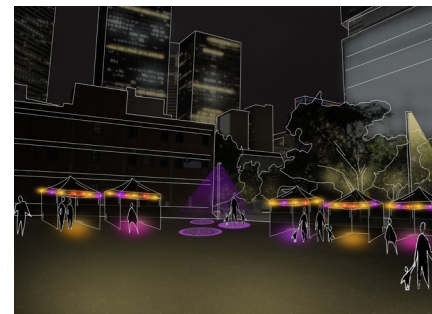
Figure 14: Activated Surface Parking Lots

Figure 15: Illuminated Foliage

Figure 16: Facade Lighting

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5.2.3 Underpass - Congress and Hamilton

The underpasses around Downtown will become a past issue within the next 20 years due to new construction, but before these changes the underpasses are still a physical barrier for all the pedestrians arriving in Downtown. Many people pass through the underpasses on the East from EaDo and the parking lots in that area for access to Minute Maid Park, the Conference Center and Discovery Green.

On non-game days, local markets can take place in the empty parking lots.

The trees in this area should be illuminated, with two different lighting scenes. One for during game days, which can have a festive color change to celebrate the event, and regular days to be illuminated just in white. This illumination will balance the darker sidewalks and parking lots close to the Minute Maid Park.
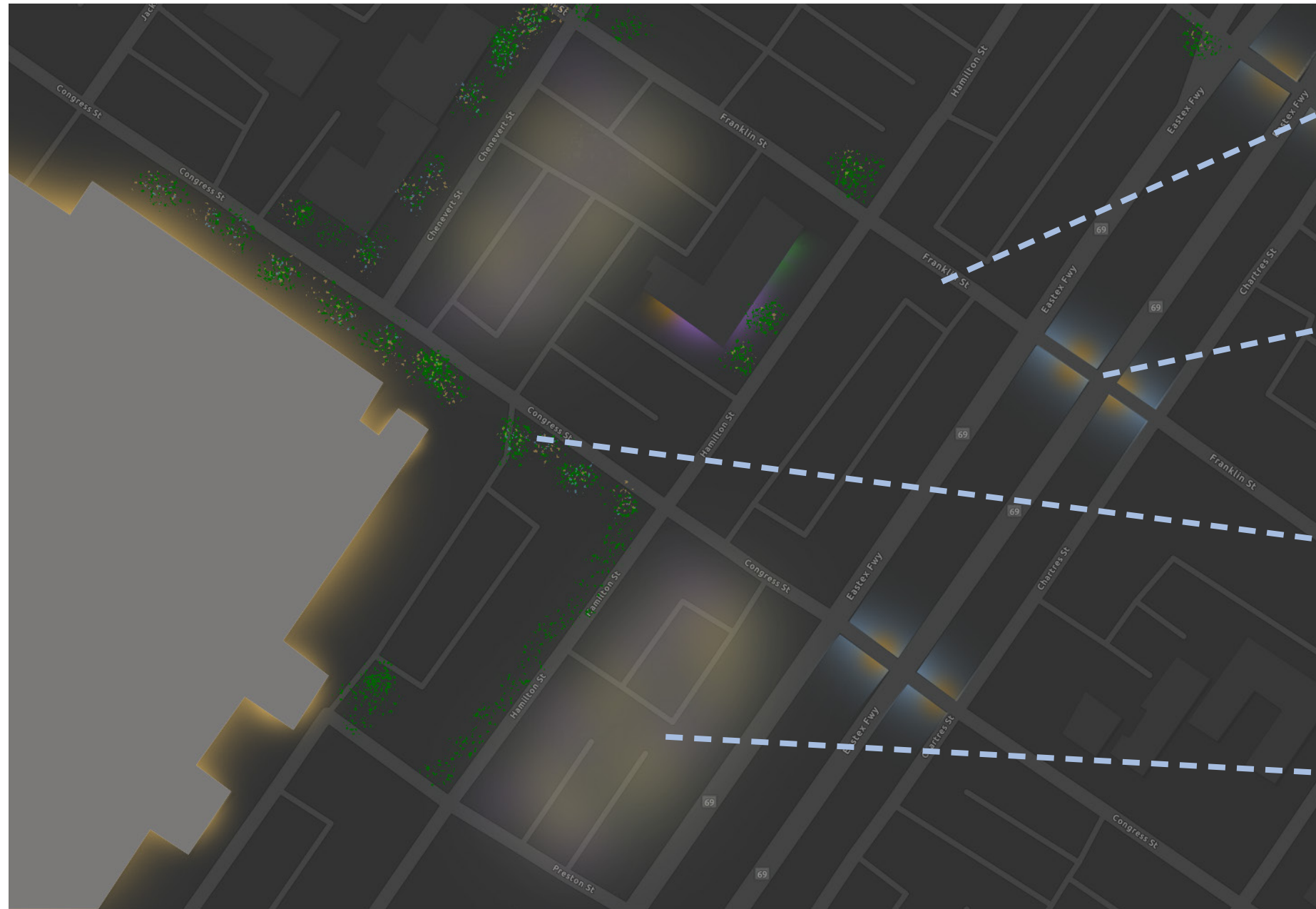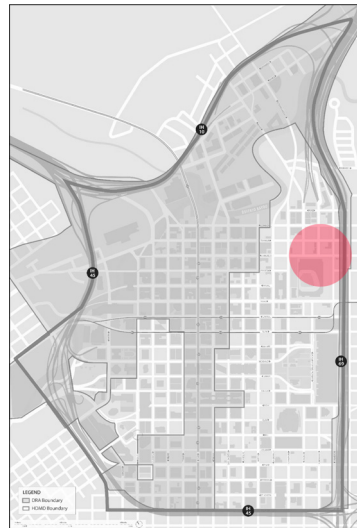
Consistent Correlated
Color Temperature

Underpass Lighting

Illuminated Foliage
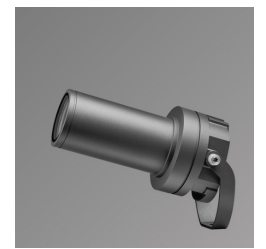
Activate Parking Lot
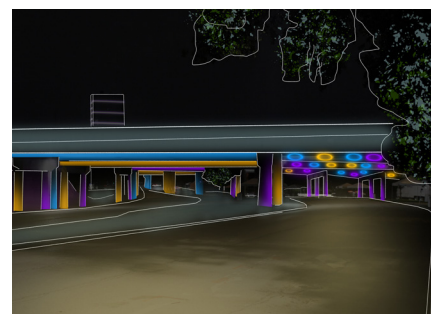
Figure 17: Underpasses

Figure 18: Relamp for Consistent Correlated Color Temperature
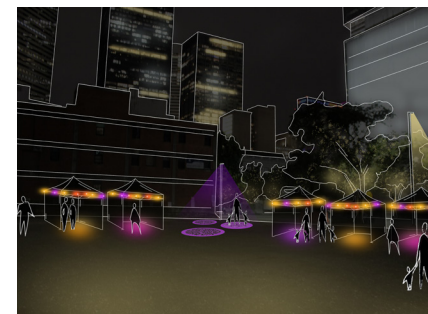
Figure 19: Activated Surface Parking Lots

Figure 20: Public Transport Lighting Shelter

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5.3 Planning the Future of Downtown

Downtown is the economic heart and spiritual core of the city and the lighting masterplan aims to create a united Downtown. Visitors, residents and users of Downtown desire a city that is designed for inclusive, multigenerational experiences. This includes mixed use lifestyle districts, with parks, cafes and markets creating moments that celebrate Downtown Houston's unique character. Downtown Houston is an iconic hub, with Main Street and Historic Market Square, to the Avenida Houston campus and the iconic Texas-shaped lazy river in the Marriott Marquis. Groups of all ages gather in Discovery Green and Trebly Park and experience shows and concerts in the Theater District.

We want to link all these moments together to create a safe and welcoming Downtown experience. However, this requires more than just a lighting vision and masterplan toolkit. Strategic planning, community input, involvement from key partners, and incentives to encourage development are all critical to realizing the concepts outlined in this report.

This report showcases a series of recommendation, which are not intended to be detailed design to build document. The following pages provide a workflow for next steps to highlight opportunities across Downtown, with narrative to help decisions on high priority and key implementation areas.

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5.3.1 Toolkit Impact
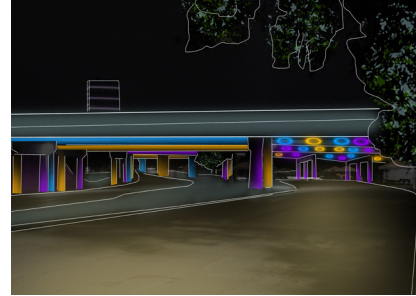
Creating entrances to Downtown which can react to current events, game days and holidays creates an identity and sense of arrival. It is only applicable in a few areas around the entrance to the city, thus has minimal impact to the wider Downtown scheme.

Facade lighting would have a strong impact in the visual transparency and placemaking across Downtown. However, due to the installation requirements on the facades, and buy in from property owners, this drives the cost up.

Highlighting park entrances and adding more lighting will have a high impact on the areas around them.
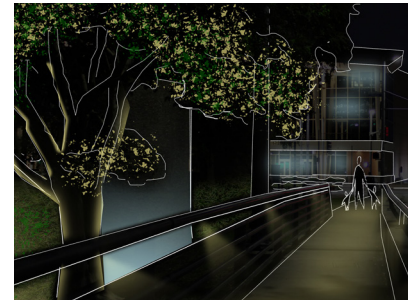
Illuminating the foliage will have the highest overall impact to the pedestrian experience across Downtown Houston. However, due to the scale of this installation and the high number of trees in Downtown, this makes it a high cost toolkit option.

Higher Cost

Lower Impact

Higher Impact

Lower Cost

Replacing luminaires or bulbs in the existing light fittings will be lower cost than adding new fixtures. However, there will be minimal impact when compared to the other toolkits available.

Replacing luminaires in the existing transport hubs will be lower cost than adding new fixtures.

Activating parking lots during the night on non-game days will have a high impact to those living and working around these areas. It is lower cost due to minimal lighting intervention, just programming intervention is required.
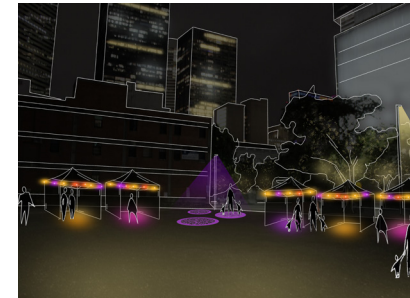
Activating retail lighting across key nodes will have a huge impact in the visual transparency across Downtown. This lower cost is due to minimal intervention needed - activated retail lighting can be achieved using off the shelf products.

These 8 toolkits can be applied in a range of locations - but there are different price tags, accessibility and impact associated to each. Whilst all of these will have a positive impact, the infographic on this page will help showcase which will have the greatest impact for cost association.

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5.3.2 Connect and Enhance Collaborative Committee Meeting

The toolkit of design strategies was presented at Downtown Houston+'s joint Connect and Enhance Collaborative Committee meeting in November 2023, facilitated by Arup Lighting. During this meeting, we presented the draft masterplan and gathered feedback on perceived relevance and impact of the recommended strategies across Downtown Houston.

These results align with the impact chart on the previous page, highlighting that the foliage, surface parking activation and retail lighting will have the greatest impact. In our impact chart, we have activating the underpasses at a lower impact than the committee chose. Whilst the underpasses will have a high impact directly around them, they will not have as large an impact when viewed in conjunction with the entirety of Downtown due to the large area of Downtown and the low number of key underpasses.

The group was also asked how lighting can improve Downtown Houston, creating the word web below. This shows that creating a space that is vibrant and welcoming, but also feels safe are the most important elements.

How can lighting improve Downtown Houston?

How do you rate the relevance & impact of each of the strategies presented?

◀ **Lowest Impact** – – – – – – – – – – – **Highest Impact** ▶

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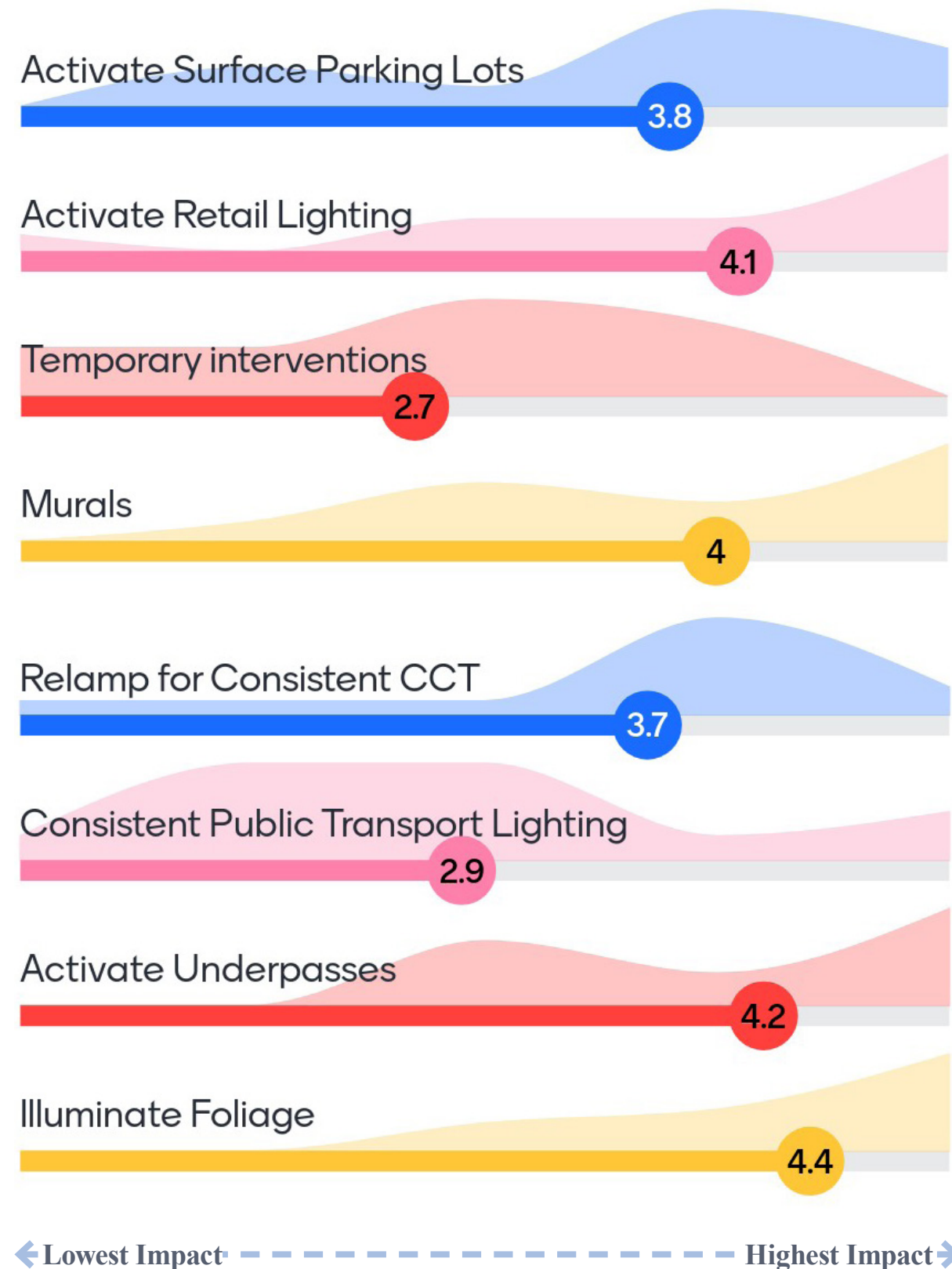
5.3.3 Decisions Flowchart

This flowchart is designed to help rationalize which toolkit opportunities are best focused for a chosen location. There are suggestions to guide the lighting design in the area. Each area reviewed may need more toolkit applications than this flowchart highlights, as this is designed to start the process, rather than fully design each location.

Start

Does this location have the appropriate level of lighting for the nighttime activity?

Y — Minimum intervention needed to enhance the Downtown Houston Identity.

N

Is there a concentration of pedestrian activity during the nighttime?

Y — Are there Commercial Zones in this area?

N — Are there residential buildings nearby?

Are there Commercial Zones in this area?

Y — Is there Public Transportation near?

N — Are you under or near an underpass?

Is there Public Transportation near?

Y

Ensuring the transport lighting and surrounding retail lighting is activated to improve the feeling of safety.

N

Ensuring the hospitality routes have bright sidewalks and eye-catching storefronts..

Are you under or near an underpass?

Y

Creating underpass entrances to Downtown and improving the feeling of safety by ensuring all the luminaires are the same color temperature.

N

Areas in Downtown with no hospitality areas can benefit from even Correlated Color Temperature values and facade lighting to aid visual transparency.

Are there residential buildings nearby?

Y — Are there suface parking lots nearby?

N — Are there parks nearby?

Are there suface parking lots nearby?

Y

Activating surface parking lots around residential areas will bring users out after dark and help both the nighttime economy and perception of safety.

N — Are there parks nearby?

Are there parks nearby?

Y

Illuminating both the entrances to parks and the streets surrounding the parks will allow users to feel safe moving around their local areas.

N

Areas in Downtown with no residential areas can benefit from even Correlated Color Temperature values and facade lighting to aid visual transparency.

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6 Murals

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Murals

6.1 About

Big Art Bigger Change Murals is an unprecedented series of 33 large murals curated by Street Art for Mankind. Created by prominent international and local artists to amplify social and environmental justice in Houston and beyond, it aims to beautify and redynamize Downtown and make it "The New Street Art Destination".

As part of our lighting vision we will we provide concepts to illuminate these pieces at night. The following pages show each of these artworks both in the day and the nighttime.

As was discussed in section 2.1.6, when looking at the primary corridors between nodes across Downtown Houston, many of the murals line these sidewalks. Currently, more often than not, these pieces are not illuminated and are lost to the darkness of the night.

The following pages show both the level of lighting intervention required for each site, and then the lighting scheme that we deem most appropriate.
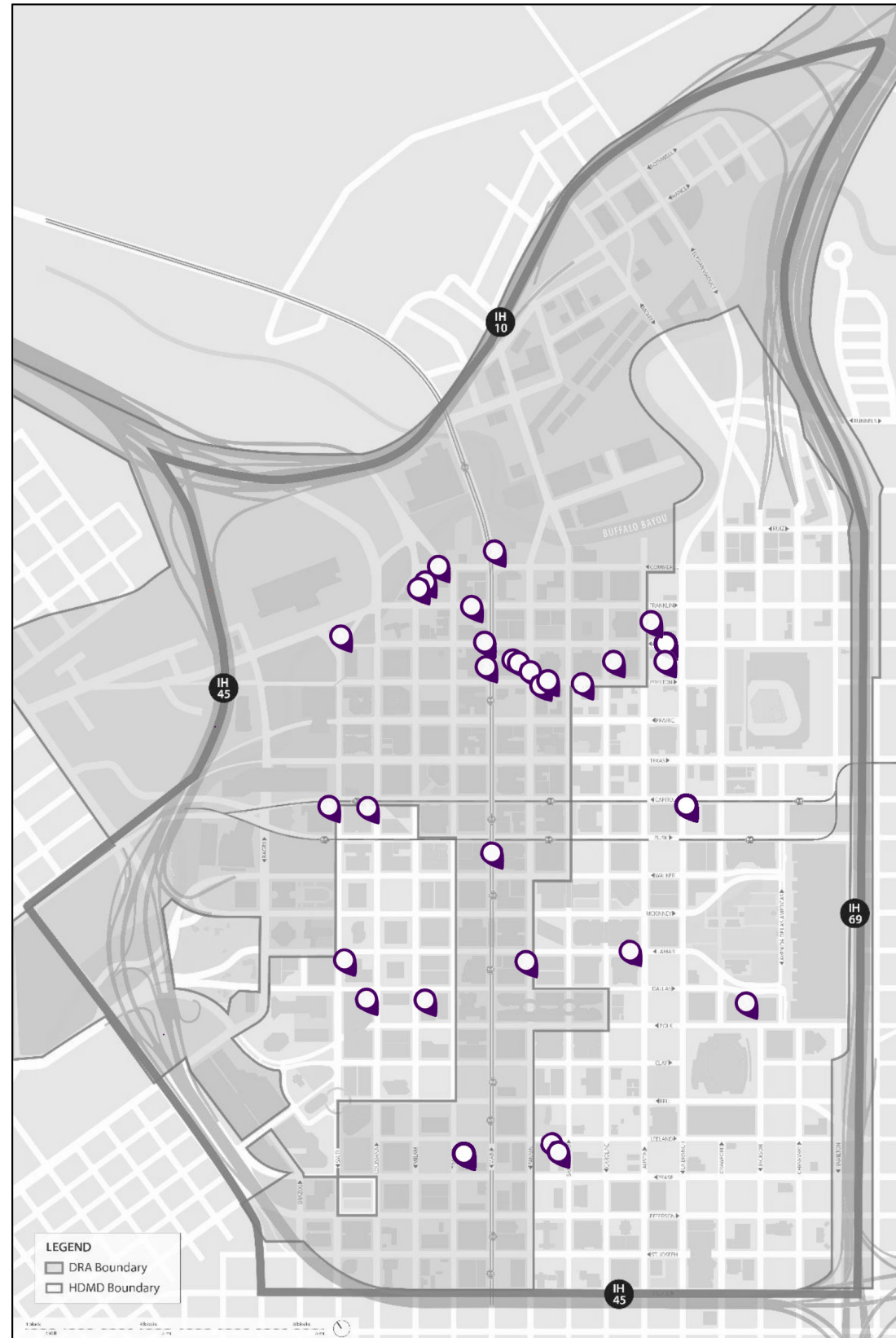
Figure 22: Locations across Downtown

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6.2 Mural Overview

Below are some murals used as examples classified into three categories based on priority: Low Intervention, Medium Intervention, and High Intervention.

| Low | Medium | High |

Low

Some are lit from building lighting and will not need supplementary lighting.

Medium

Those that are lit are generally illuminated via bulkheads in the centre of the art work.

High

Many murals are unlit at night and key items are lost to the darkness.

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6.3 Mural Lighting Concepts

6.3.1 Concept Designs

Concept A: Gobo Projector

Wall mounted
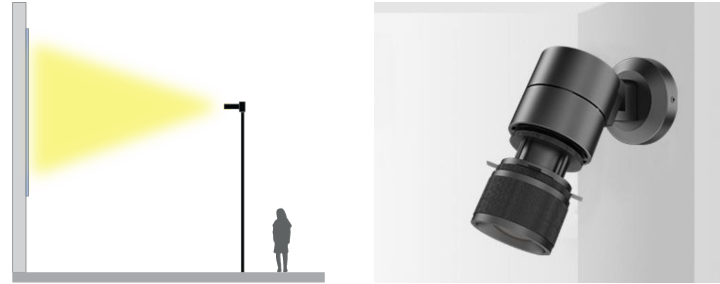
Pole mounted
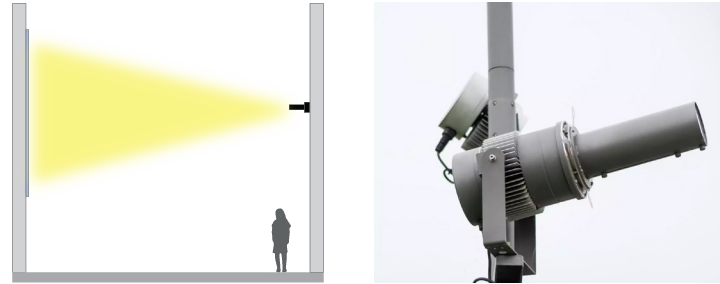
Gobo Projectors can be mounted on new or existing lighting poles around the mural. Other alternatives can be mounting the projectors to buildings across from the mural facades, but this will require coordination and agreement with the owner of the buildings.

Gobos projectors are effective at highlighting a specific shape or form inside the mural, allowing the design to jump off the wall.

Concept B: Wall Washing

Linear wall wash
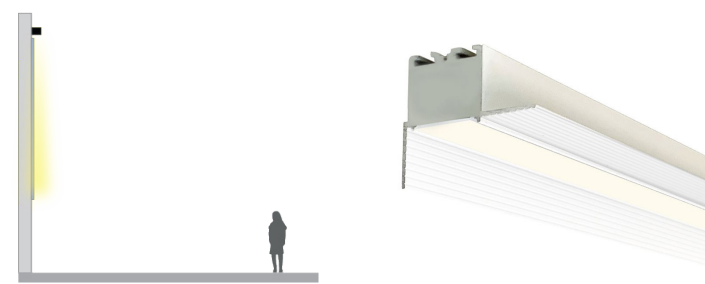
Arm mounted
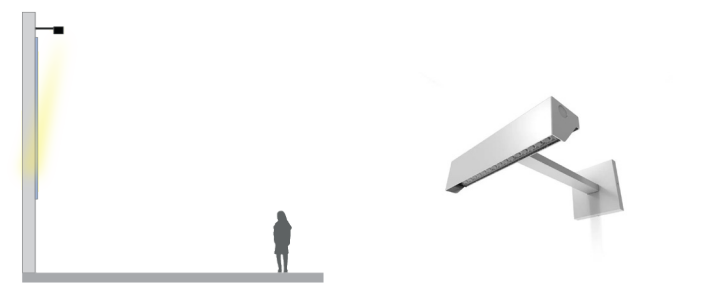
Linear uplight
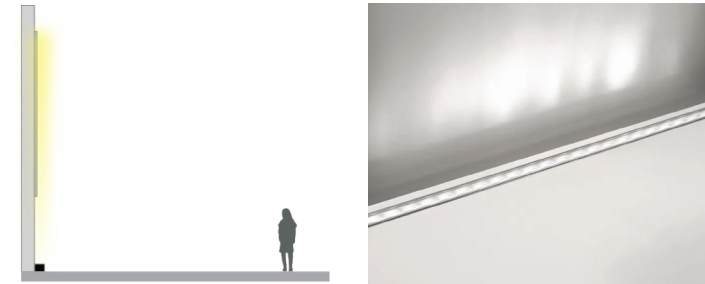
Wall washing fixtures can be mounted with an arm, linear, or small spot fixtures to give the desired distance from the wall to illuminate it effectively. These can be mounted above or below the mural.

To ensure there are no unwanted shadows across the mural, care will be made to check the textures of the wall or elements standing out of the wall (eg pipes).

Concept C: Integrated Lighting

Flexible linear/ Fiber optic
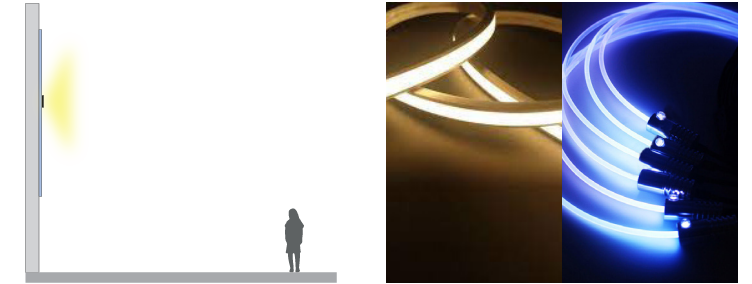
The intent is to highlight a portion of the mural to re-enforce the concept of the mural, without lighting the entire mural.

Coordination is key to incorporate a light source without disturbing the artwork. To ensure this, the artist would be brought on board for approval and sign-off, as the intent of the light is complementary to the art expression.

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6.3.2 Concept Reference Images

Concept A: Gobo Projector
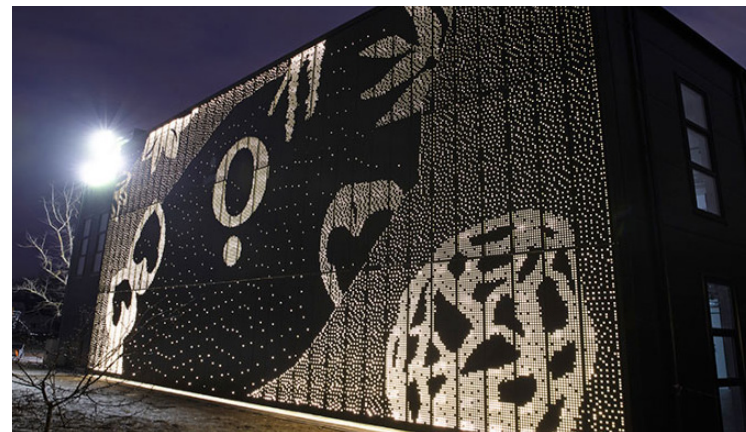
Concept B: Linear Wall Washing

Concept C: Integrated Lighting

ARUP
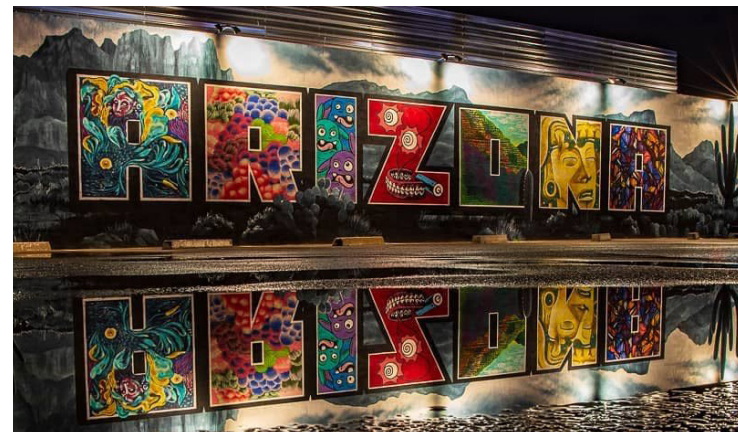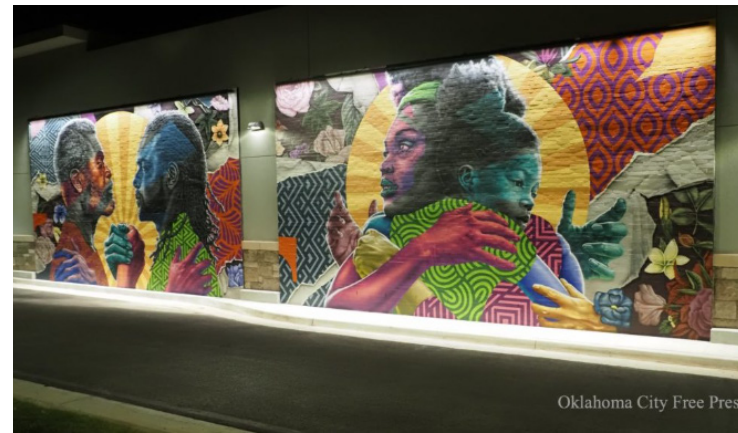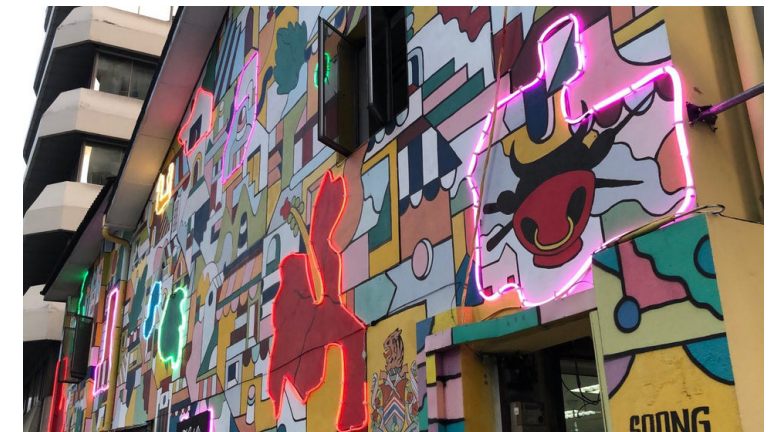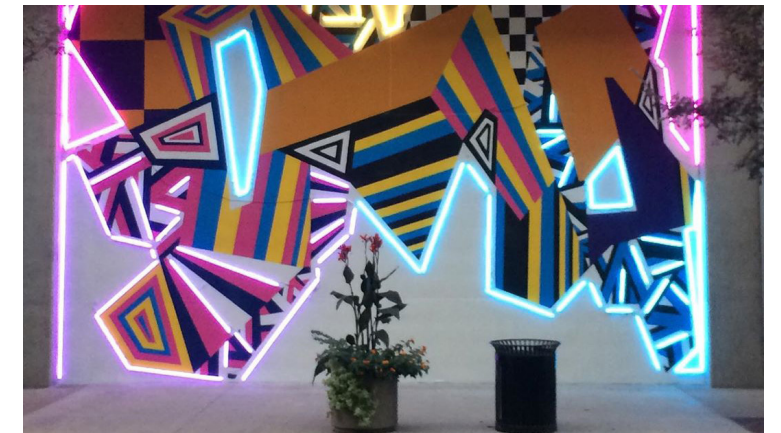
6.3.3 Mural Flowchart

This flowchart is designed to help rationalize which lighting opportunity is best focused for each location. These are suggestions to guide the lighting design in the area. The following pages show each mural and the suggested lighting design intervention.

Start

Is the mural well lit during hours of darkness? Eg. Is the art legible and the colors accurately represented by the electric light?

(Y) — No intervention needed.

(N)

Is there lighting on the mural or aiming towards the art?

(Y) Does the light source create glare on the mural?

(N) Improve the lighting by replacing the luminaire or adding accessories into the fixture

(Y) Remove the light source

(N) Does the art have contrast between the background?

(Y) Mount a gobo projector or fixtures integrated in the mural to highlight the main aspects of the art

(N) Provide a wall washer luminaire

Gobo Projector Example

Integrated Lighting Example

Wall Wash Example

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6.4 Mural Interventions

Moh Awudu/Ablade Glover

Accra Floods

Figure 24: Daytime
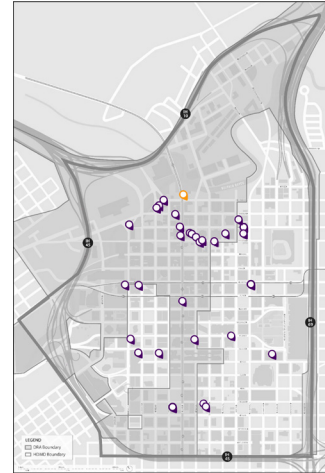
Figure 23: Map Location

Figure 25: Current Nighttime Condition

On Site Observations

The upper half of the mural is not illuminated, and the bottom portion has lights spilling from wall packs mounted for the pedestrian path.

Intervention: Medium

The concept is to let the lighting flow as your eyes move over the yellow centerpiece. For this mural, the recommendation is to eliminate the hard cutoff by increasing the illumination above the wall pack heights. A standalone pole can be mounted at the planters in front of the mural.

Concept A/C: Projector/Integrated Lighting
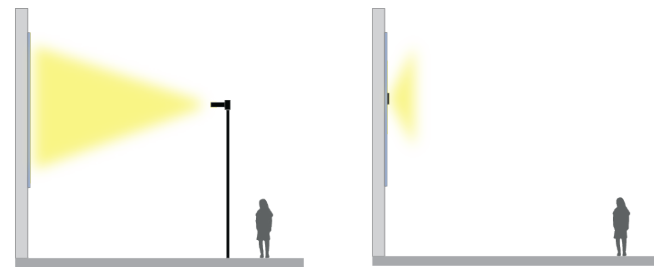
Belin

Quality Education for All

Figure 27: Daytime
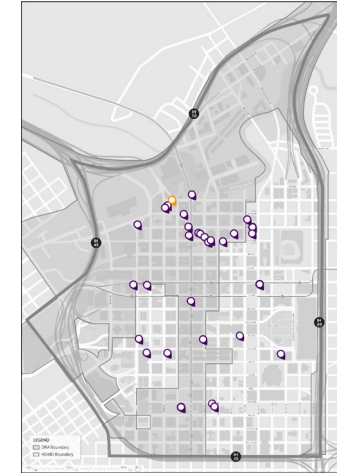
Figure 26: Map Location
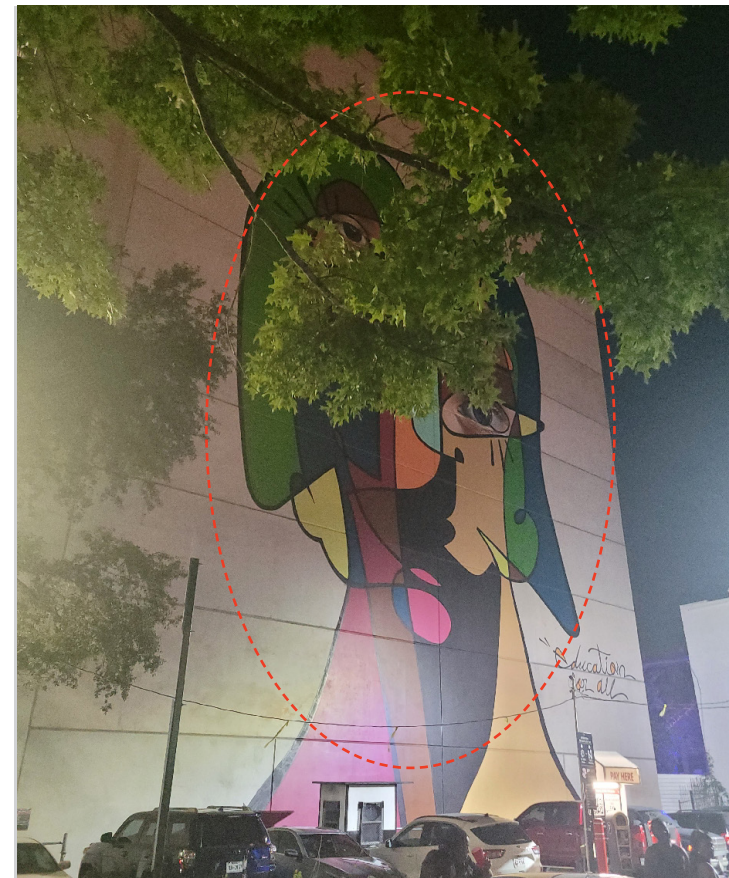
Figure 28: Current Nighttime Condition

On Site Observations

The mural is lit unevenly, and its colors appear less vibrant compared to daytime.

Intervention: Medium

Overall, there are surrounding lights illuminating the mural with low color rendering. Due to the texture and size of the mural, there are two options to enhance its colors: either by mounting a gobo projector or by installing a wall washer with an extended arm. For the second option, the top of the mural will be brighter, fading towards the floor.

Concept A/B: Gobo Projector/Wall Washer

ARUP
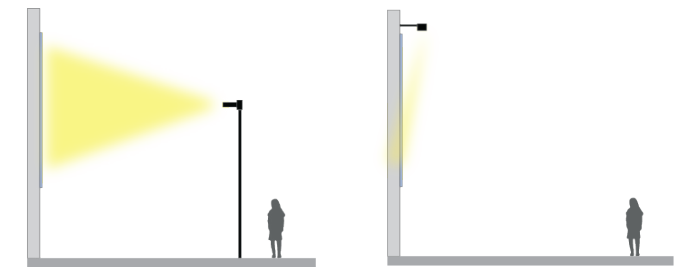
Ana Marietta

Sharing the World

Figure 30: Daytime
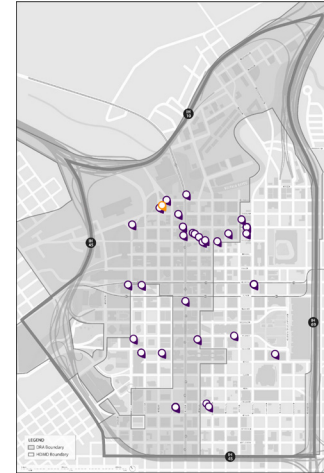
Figure 29: Map Location

Figure 31: Current Nighttime Condition

On Site Observations

The mural spans the entire facade of the building. The location faces a parking lot lacking existing poles or general lighting, resulting in an unlit artwork.

Intervention: Medium/High

Due to the nature of the dark background, it would be interesting to illuminate only the moon in the mural to make it the focal point, creating a moonlight effect.

Concept A: Gobo Projector
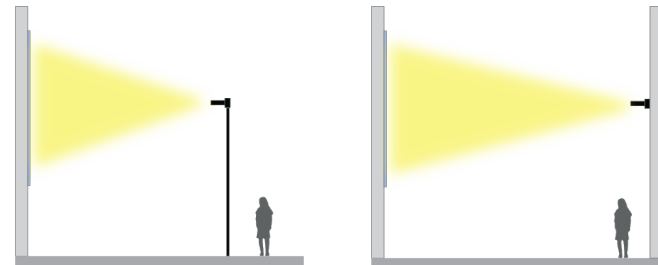
MrD1987

Keep Your Eye on The Road

Figure 33: Daytime
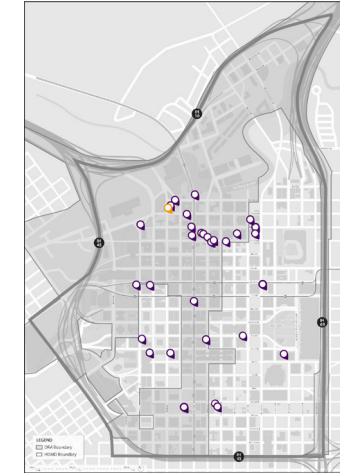
Figure 32: Map Location

Figure 34: Current Nighttime Condition

On Site Observations

Glaring light spills from the building behind the mural, making it appear darker than it actually is.

Intervention: Medium/High

Although the mural already receives some illumination from street lighting, a bit of extra lighting can be introduced to help people discover the details on the mural. There is potential to increase the overall illumination on the mural by washing it either from above or below.

Concept B: Wall Washer

ARUP
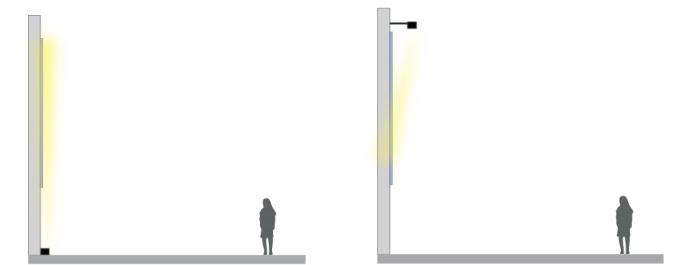
AEC

The Meeting

Figure 36: Daytime

Figure 35: Map Location

Figure 37: Current Nighttime Condition

On Site Observations

The mural mostly gets light spills from the sidewalk festoon lights. Appears looking dark on the right side.

Intervention: Medium

Although the mural already receives some illumination from street lighting, increasing the brightness of the mural would be beneficial to improve not only the mural but also the pedestrian experience on the sidewalk.

Concept A/B: Gobo Projector/Wall Washer
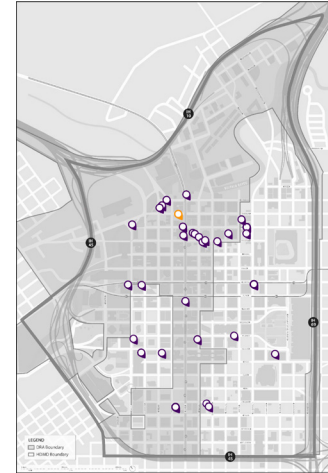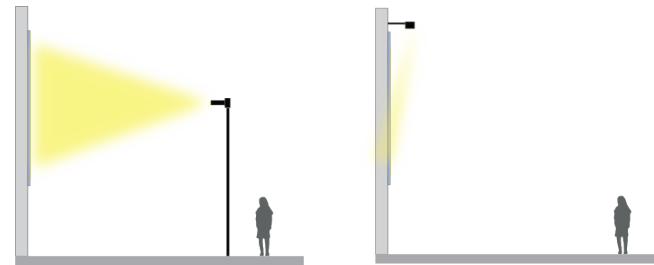
Victor Ash

Justice for All

Figure 39: Daytime

Figure 38: Map Location
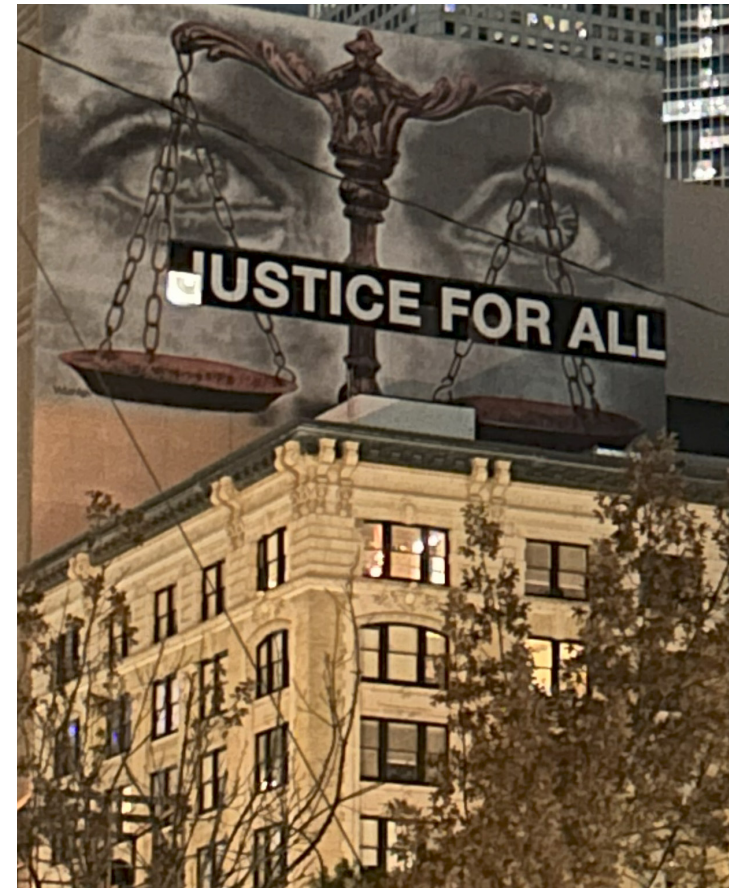
Figure 40: Current Nighttime Condition

On Site Observations

The mural is positioned above eye level and can be easily overlooked.

Intervention: Medium

Additional lighting can be incorporated to enhance the visual draw of the mural. The mural should be illuminated from the top of the building using linear or arm-mounted fixtures for a wash-down effect.

Concept B: Wall Washer

ARUP
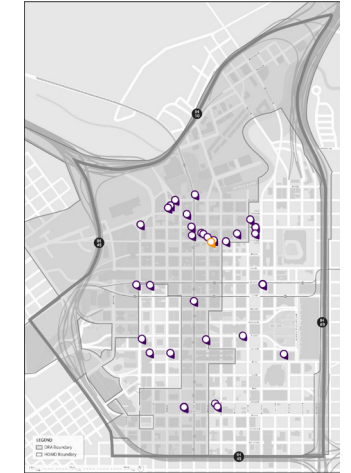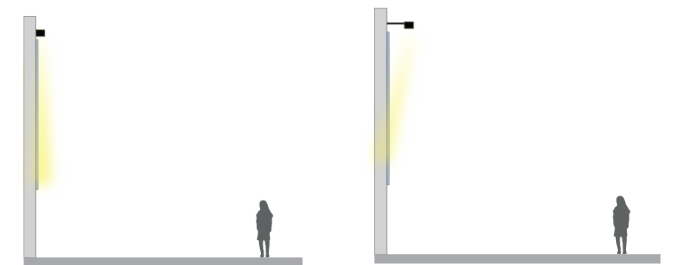
Victor Ash

Lady Justice

Figure 42: Daytime

Figure 41: Map Location

Figure 43: Current Nighttime Condition

On Site Observations

This massive mural can be hidden when viewed from below, amidst the surrounding buildings and trees.

Intervention: High

This mural currently lacks lighting due to its height. The canvas is a flat wall with no obstructions and can be illuminated from below. This approach will give the mural the feeling that it is almost flying between the buildings.

Concept B: Wall Washer
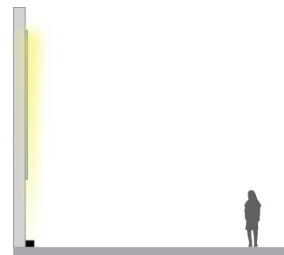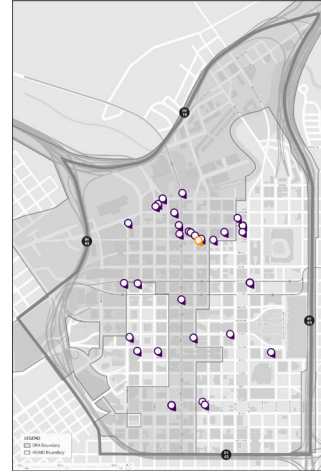
Aches

Pas de Deux

Figure 45: Daytime

Figure 44: Map Location

Figure 46: Current Nighttime Condition

On Site Observations

The vibrant colors of the mural have the potential to be further enhanced at night.

Intervention: Medium

A projector can frame the dancers and leave the background faded to black.

Concept A: Gobo Projector

ARUP
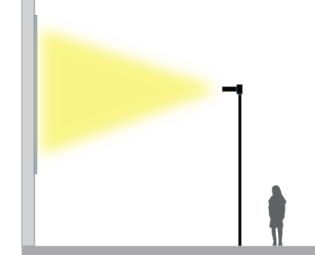
Alex Arzu

Unity

Figure 48: Daytime
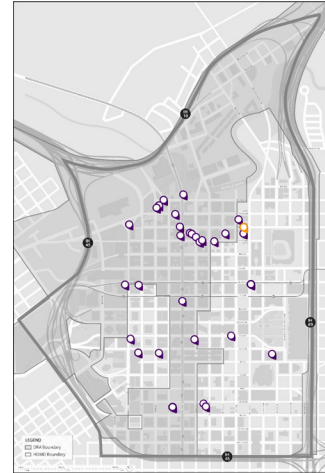
Figure 47: Map Location

On Site Observations

Although there is nearby public lighting, it is not sufficient to adequately illuminate the mural, causing it to blend into the surroundings.

Intervention: High

The mural currently lacks lighting. Additional illumination shall be added from a gobo projector mounted on a pole. Since there are no existing poles in a strategic position, a new pole might be required.

Concept A: Gobo Projector

Figure 49: Current Nighttime Condition
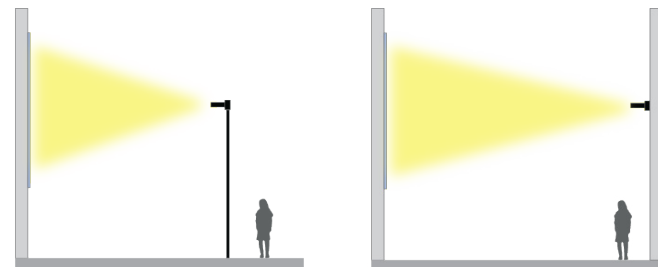
Emmanuel Jarus

Illumination

Figure 51: Daytime
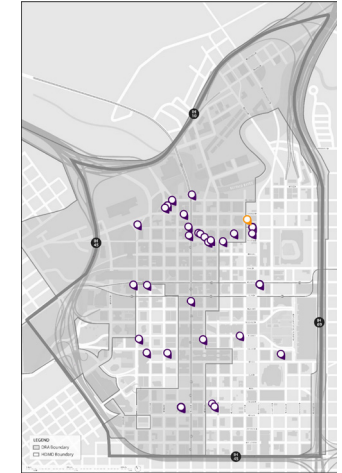
Figure 50: Map Location

On Site Observations

The light spills from the parking lot don't reveal the true tones of the mural. From a site observation, there are two wall pack luminaires at each top corner of the mural; currently, these fixtures are not functioning. However, even if the luminaires are not working, there is infrastructure for power in the location.

Intervention: Low/Medium

Existing infrastructure should be used to install new linear washers from the top of the building.

Concept B: Wall Washer

Figure 52: Current Nighttime Condition

ARUP
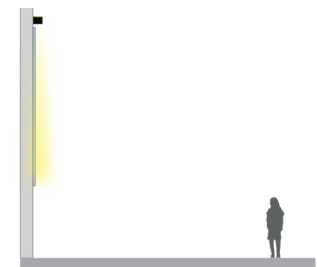
Case Maclaim

King of the Road

Figure 54: Daytime
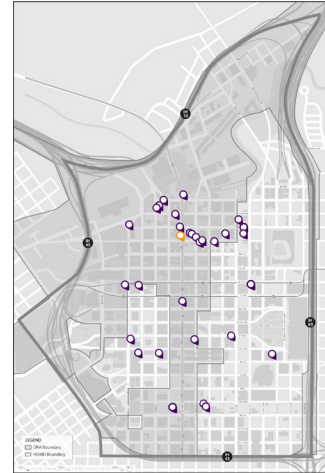
Figure 53: Map Location

Figure 55: Current Nighttime Condition

On Site Observations

The large "King of the Road" mural has a privileged location with no obstructions in front of the street. It is visible from both Main St and Prairie St. The white background contrasts with the dark tones of the African American boy, making the mural stand out, even without dedicated lighting or much spill from public lighting.

Intervention: Medium/High

Due to the size of the mural, highlighting only the boy and his bike is the recommended approach. To achieve this, install a gobo projector on top of the building in front of the mural on Prairie Street. This location would avoid tree obstructions.

Concept A: Gobo Projector
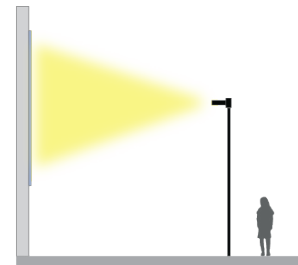
Adry del Rocio

Empowered

Figure 57: Daytime
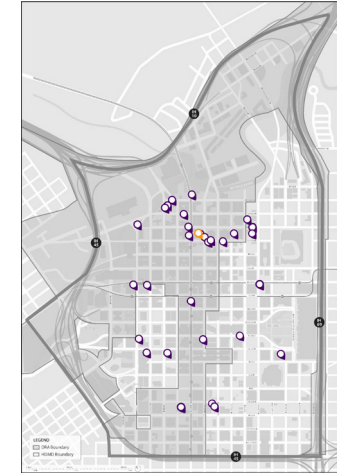
Figure 56: Map Location

Figure 58: Current Nighttime Condition

On Site Observations

This mural shares the same site location as "King of the Road" and "La Shamana"; however, the same lighting approach cannot be applied to this mural. "Empowered" can be easily missed by the general public as it is placed between two tall buildings. The vibrant colors help draw attention to the mural.

Intervention: Medium/High

Few options exist for illuminating "Empowered." The opposite building is ideal for the projector, mounted on the lower wall for future planning, leaving the taller facade as a blank canvas, with an oval flood distribution illuminating the mural.

Concept A: Gobo Projector

ARUP
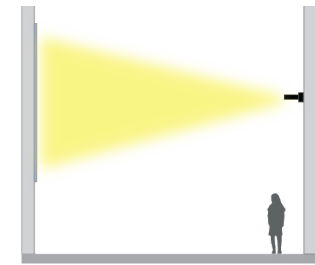
Lula Goce

La Shamana

Figure 60: Daytime

Figure 59: Map Location

On Site Observations

"La Shamana" is the last mural sharing the site location with "King of the Road" and "Empowered," but unlike "King of the Road," this mural does not have a high contrast between the character and the background.

Intervention: High

Although the mural already receives illumination from street lighting, a bit of extra lighting can be introduced to highlight its details.

Concept C: Integrated Lighting
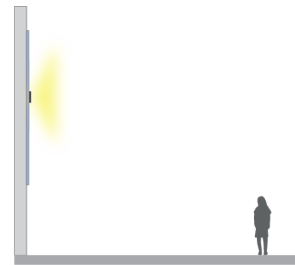
Figure 61: Current Nighttime Condition
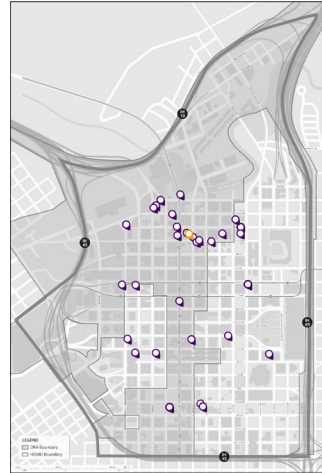
Ernest Zacharevic

Healthy Aging

Figure 63: Daytime

Figure 62: Map Location

On Site Observations

The mural appears dark and desaturated due to the poorly lit environment, indicating a need for integrated lighting.

Intervention: High

Consider illuminating only specific structures to make the mural more interesting, for example, only lighting the lever.

Concept C: Integrated Lighting
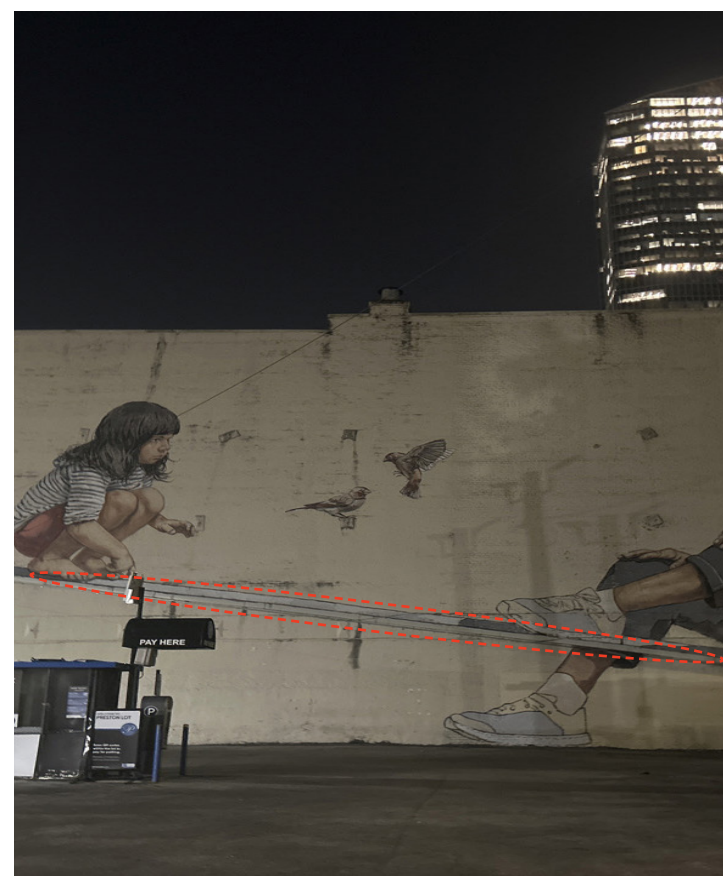
Figure 64: Current Nighttime Condition

ARUP
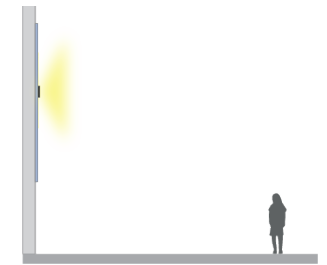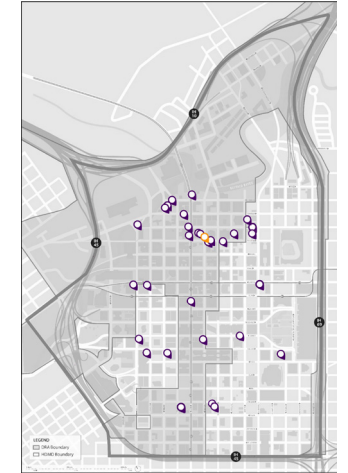
Victor Ash

Human Rights

Figure 66: Daytime
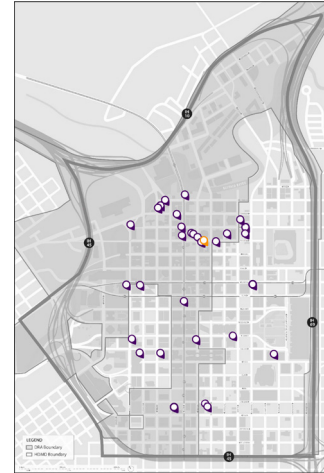
Figure 65: Map Location

Figure 67: Current Nighttime Condition

On Site Observations

Tall mural located above eye level. The mural currently lacks lighting.

Intervention: Medium

Additional illumination will be added to brighten it. Consider using a gobo projector to light it from afar for a more uniform lighting effect.

Concept A: Gobo Projector
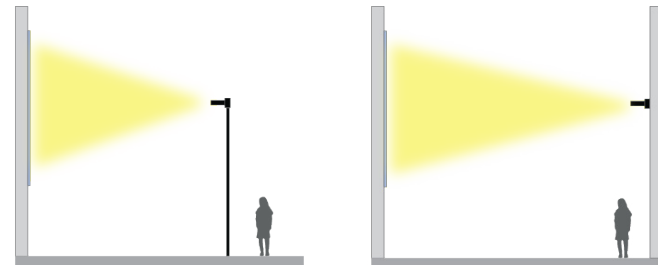
Smug

Assiduity

Figure 69: Daytime
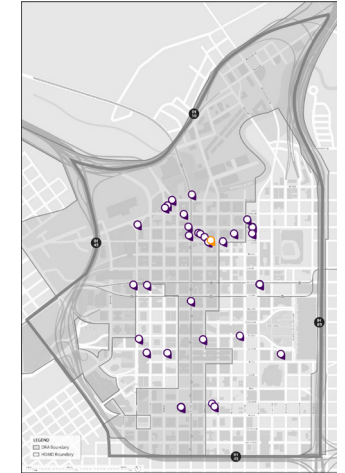
Figure 68: Map Location

Figure 70: Current Nighttime Condition

On Site Observations

Significant mural that shall be lit more effectively.

Intervention: Medium

Additional lighting can be incorporated to enhance the details of the mural. Consider using a gobo projector to light it from afar for a more uniform lighting effect.

Concept A: Gobo Projector

ARUP
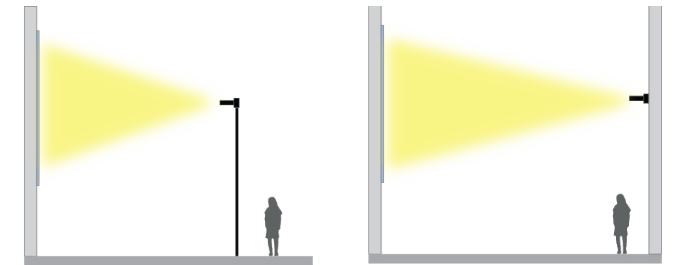
Bimbo Adenugba

Legacy

Figure 72: Daytime
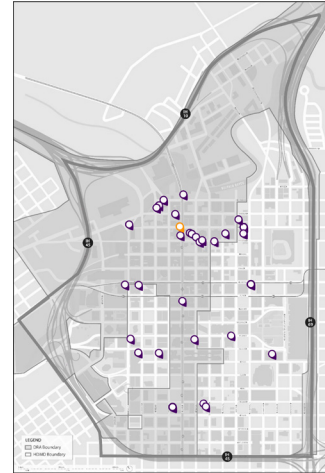
Figure 71: Map Location

On Site Observations

The mural appears dark. Details shall be enhanced.

Intervention: Low

Though the mural already receives some lighting, it can be more evenly illuminated. There is potential to light only specific details of the murals. For example, consider only lighting the firefly jar.
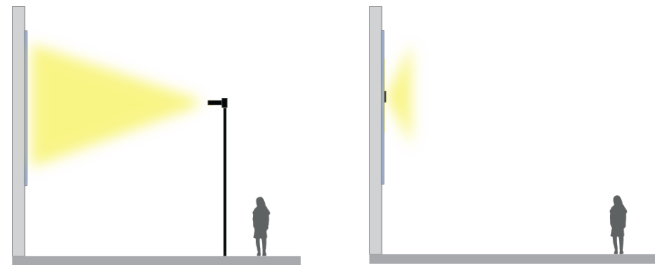
Figure 73: Current Nighttime Condition

Concept A/C: Projector/Integrated Lighting

Vinie Graffiti

Digital Citizen

Figure 75: Daytime
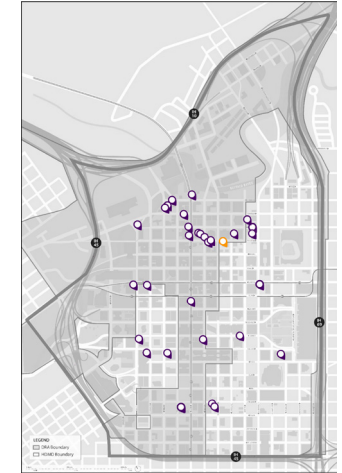
Figure 74: Map Location

On Site Observations

The texture of the mural has the potential to be emphasized through lighting.

Intervention: Medium

Consider using a gobo projector to light it from afar for a more uniform lighting effect.
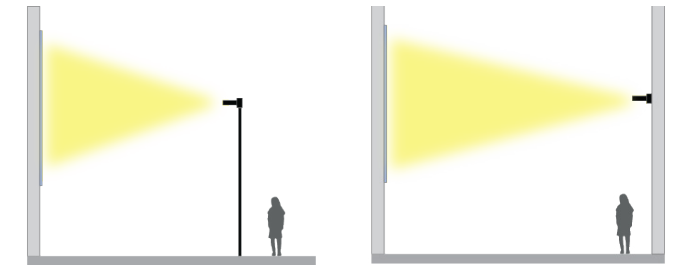
Figure 76: Current Nighttime Condition

Concept A: Gobo Projector

ARUP

Nomad Clan

Inexorable

Figure 78: Daytime
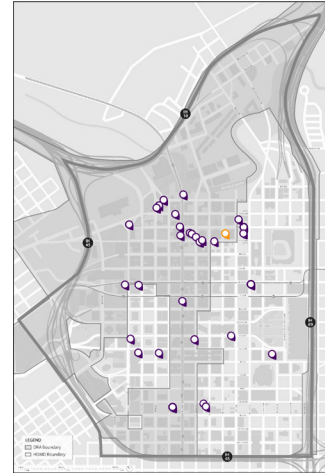
Figure 77: Map Location
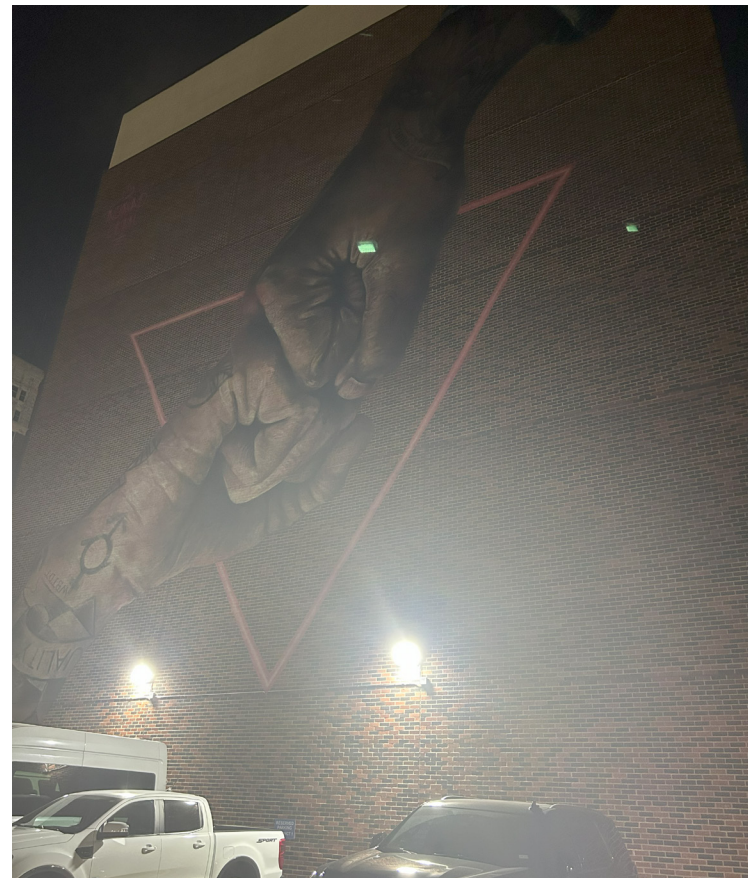
Figure 79: Current Nighttime Condition

On Site Observations

The mural is unevenly illuminated due to the glaring lights from the wall packs in the middle.

Intervention: Medium

Wall packs shall be repositioned or added to ensure the even illumination of the mural.

Concept B: Wall Washer
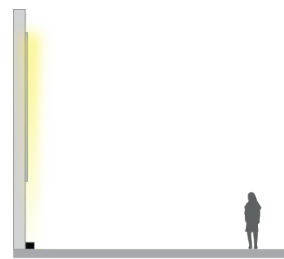
Mr Cenz

Elevation

Figure 81: Daytime
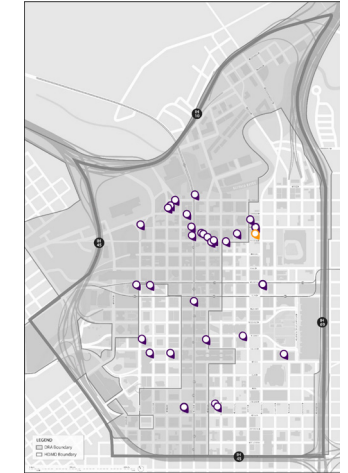
Figure 80: Map Location

Figure 82: Current Nighttime Condition

On Site Observations

The mural is set back from the street/sidewalk and positioned above eye level.

Intervention: Low

The mural can be more evenly illuminated by adding additional lighting. Consider using a wall washer with an arm mount to provide uniform lighting.

Concept B: Wall Washer

ARUP
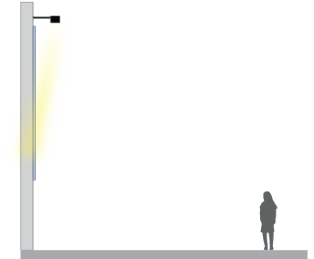
Louis Michel

We All Wear The Mask, But How Long Will It Last
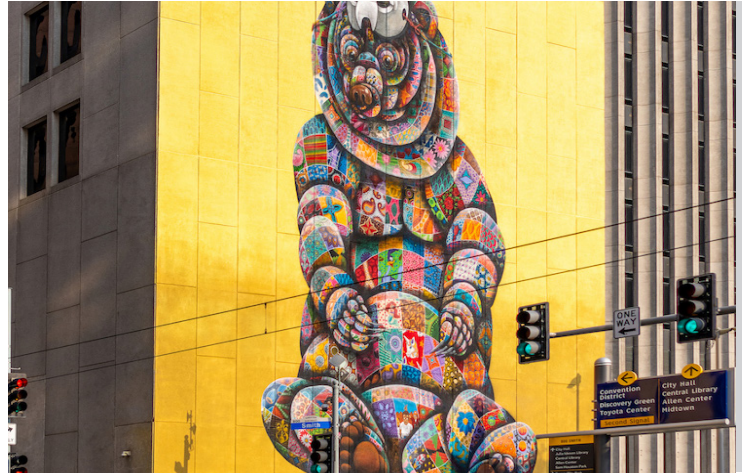
Figure 84: Daytime
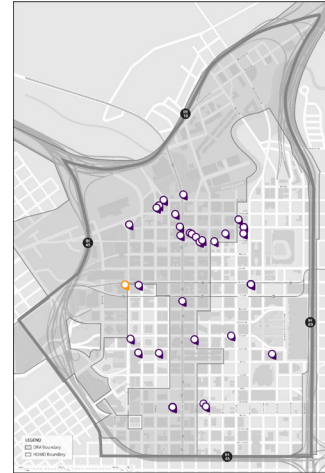
Figure 83: Map Location

Figure 85: Current Nighttime Condition

On Site Observations

Colors of the mural shall be enhanced.

Intervention: Low

The mural can be more evenly illuminated by adding additional lighting. Consider using a gobo projector to light it from afar for a more uniform lighting effect.

Concept A: Gobo Projector
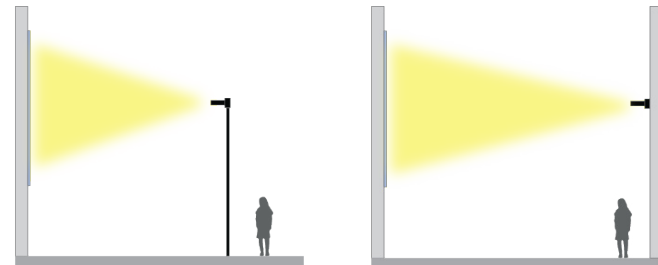
Icy & Sot

Women's Freedom of Choice

Figure 87: Daytime
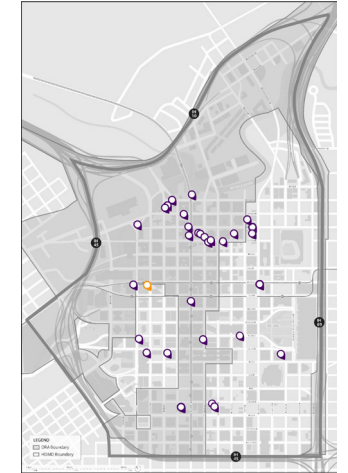
Figure 86: Map Location

Figure 88: Current Nighttime Condition

On Site Observations

Poorly lit environment that affects the mural.

Intervention: High

Additional lighting can be incorporated to enhance the illumination of the mural, with the potential to selectively project certain details. For example, consider only lighting the birds around the figure's face.

Concept A/B: Gobo Projector/Wall Washer

ARUP
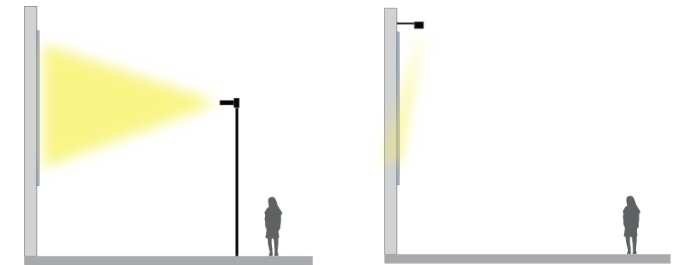
W3r3on3

Innovation for All

Figure 90: Daytime

Figure 89: Map Location

Figure 91: Current Nighttime Condition

On Site Observations

Glaring lighting environment. Potential to have mural be self-illuminated.

Intervention: Low

The mural is in a great location and currently lit; however, some additional lighting should be integrated to garner more attention. For example, consider illuminating only the earth.
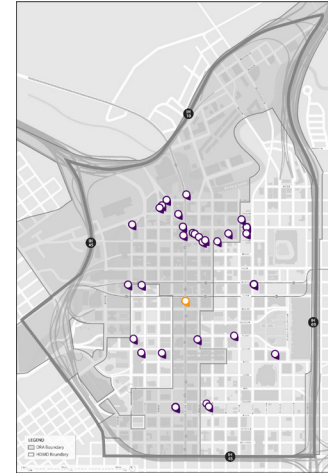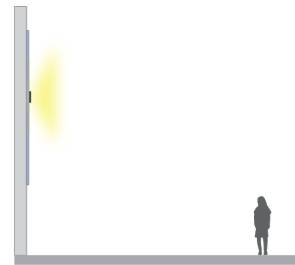
Concept C: Integrated Lighting

Ricky Lee Gordon

THE OCEAN / OUR TEACHER / OUR HEALER / OUR LIFE
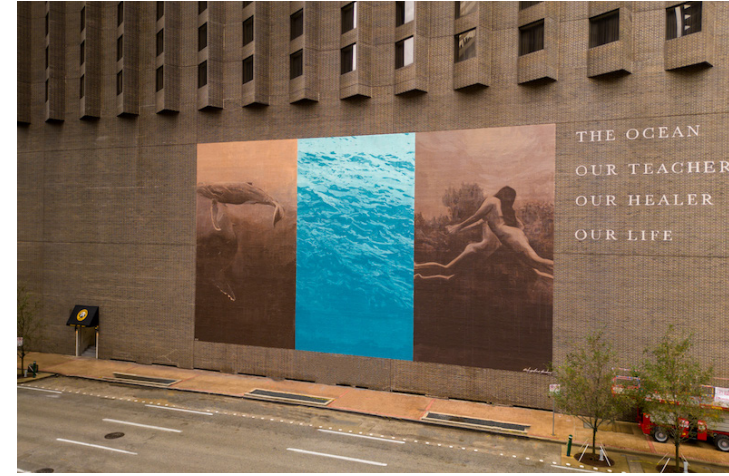
Figure 93: Daytime

Figure 92: Map Location

Figure 94: Current Nighttime Condition

On Site Observations

The mural is desaturated by the glaring lights emanating from the wall packs.

Intervention: None

The mural is already currently lit. There is potential to change the color temperature of the light fixture.

ARUP
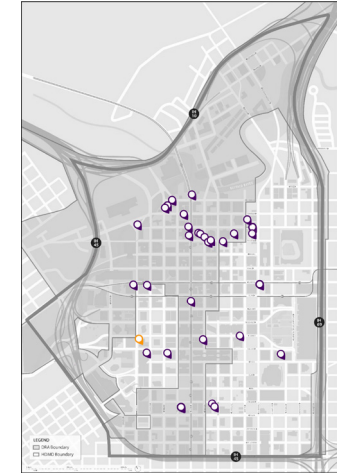
Hera Herakut

The Strongest of Us

Figure 96: Daytime
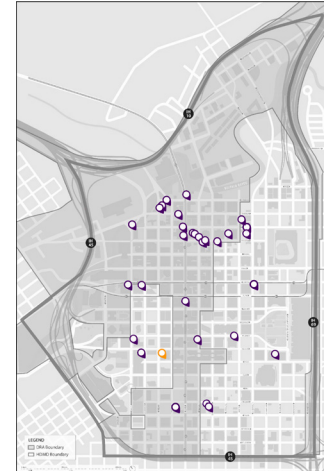
Figure 95: Map Location
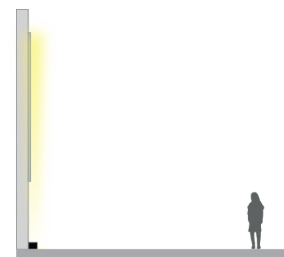

Figure 97: Current Nighttime Condition

On Site Observations

The mural receives lighting from both the parking lot where it's located and omnidirectional street lights..

Intervention: Low

The low intervention given to this mural is due to the fact that the existing lighting is deemed acceptable, allowing the mural to stand out as it is. If it is desirable to highlight the mural for a consistent experience with other murals, the recommendation is to use a floor-mounted floodlight to uplight the two figures.

Concept B: Wall Washer

Vesod

The Fifth Element

Figure 99: Daytime
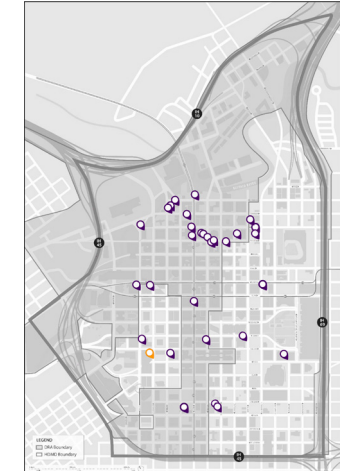
Figure 98: Map Location
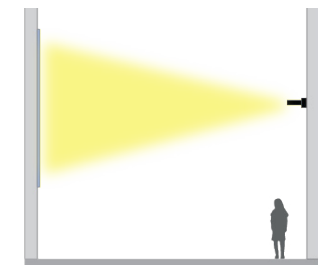

Figure 100: Current Nighttime Condition

On Site Observations

Unlike "The Strongest of Us," this mural is one of the darkest murals in the Big Art, Bigger Change initiative. The height of the mural, its angled location in relation to the street, and a floodlight that creates a significant contrast with the dark mural are elements that negatively impact the overall mural experience

Intervention: Medium

Certain issues, like the mural's physical constraints, can't be addressed, but others need collaboration. Reduce glare by adding a shield, re-aiming the fixture, or adding louvers to the floodlight. Illuminate the mural with a wall or roof-mounted projector to frame the artwork.

Concept A: Gobo Projector

ARUP

Carlos Alberto

Hope of a Greener Future
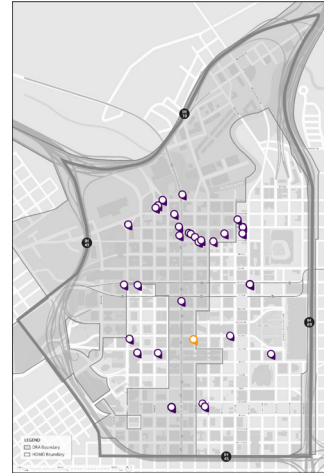

Figure 102: Daytime

Figure 101: Map Location
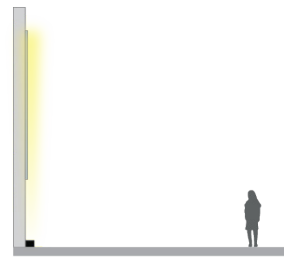

Figure 103: Current Nighttime Condition

On Site Observations

The mural is currently lit; however, the uplights are slightly too bright, causing the mural to appear uneven and spotty.

Intervention: Low

While the mural is illuminated, a subtle lighting adjustment can be made to better showcase the artwork. For example, additional uplights should be added to ensure more uniformity. The current spacing is not ideal as the lights are too far apart, resulting in hotspots on this public art installation. This wall requires at least twice the number of luminaires currently installed.

Concept B: Wall Washer

Emily Ding

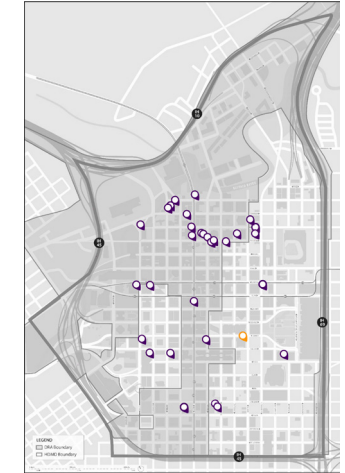Loving Houston

Figure 105: Daytime

Figure 104: Map Location
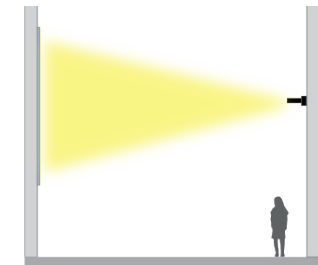

Figure 106: Current Nighttime Condition

On Site Observations

The mural mostly receives light spills from street poles.

Intervention: Medium

Additional lighting shall be incorporated to enhance the details of the mural. Consider utilizing a gobo projector mounted on a nearby wall for a more uniform lighting effect.

Concept A: Gobo Projector

ARUP

Sonny Sundancer
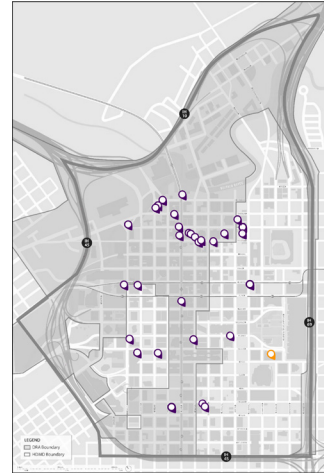
Fight or Flight

Figure 108: Daytime

Figure 107: Map Location
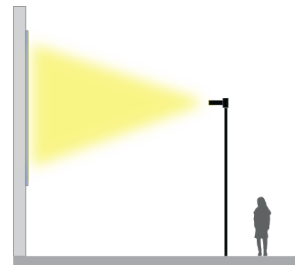

Figure 109: Current Nighttime Condition

On Site Observations

Although the mural is situated in a prominent area (at the end of Jackson St), during nighttime, it appears dark as it lacks sufficient illumination from the street lighting.

Intervention: High

To enhance the nighttime legibility of the mural, additional lighting can be installed, and there is potential to mount a gobo projector onto the two lighting poles that provide street lighting. This will ensure that the art is uniformly lit.

Concept A: Gobo Projector

Martin Ron

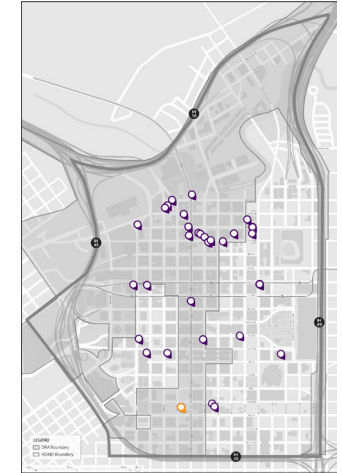Ecosystem Restoration Mural

Figure 111: Daytime

Figure 110: Map Location
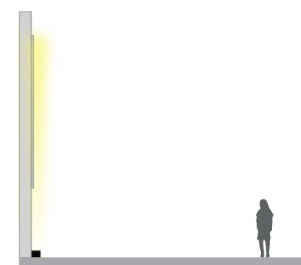

Figure 112: Current Nighttime Condition

On Site Observations

The Holiday Inn hosts this mural on its west facing facade. Although it is not at street level, it is street visible.

Intervention: Low

The hotel has two floodlights aimed at the mural, but they cause uneven illumination and hot spots at the bottom. Properly aiming the floodlights upward can improve the lighting and reduce the scalloped effect. If re-aiming doesn't work, replacing them with a new fixture designed for proper lighting distribution is a recommended solution.

Concept B: Wall Washer

ARUP

Hopare

Child Labour

Figure 114: Daytime

Figure 113: Map Location

Figure 115: Current Nighttime Condition

On Site Observations

The black background blends into the art, and the illuminance provided by the public street lighting is insufficient to highlight the mural.

Intervention: Medium

Since there are no existing poles inside the parking lot, the chosen option is to mount a gobo projector on top of the roof of the Zydeco Louisiana Diner, and the restaurant can provide power for the projector.
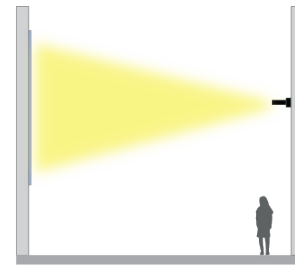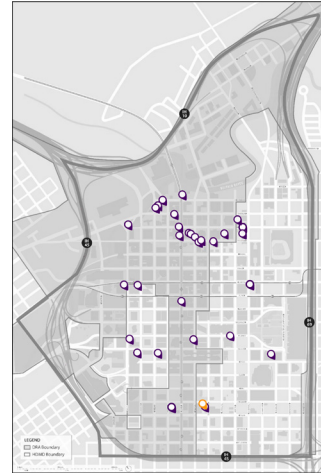
Concept A: Gobo Projector

Dragon 76

Zero Hunger

Figure 117: Daytime

Figure 116: Map Location

Figure 118: Current Nighttime Condition

On Site Observations

The mural lacks uniform illumination due to a noticeable glare produced by the wall packs installed close to the top of the mural.

Intervention: Medium

The wall packs do not offer adequate illumination for the art and ideally should be removed. Since there is power from the wall packs near the top of the mural, the ideal solution is to install a linear fixture to wash down the art. During the detailed design development, it will be necessary to verify the total load of the proposed fixture versus the existing fixtures.
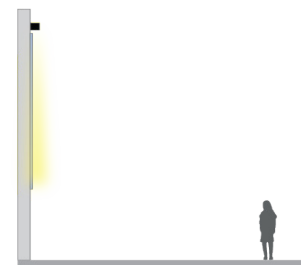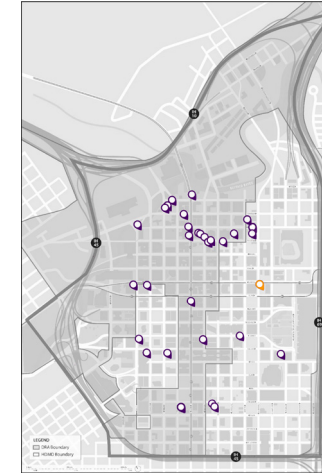
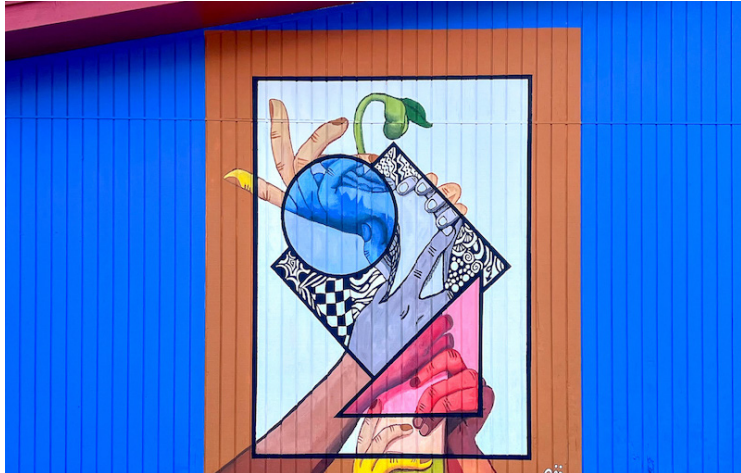### Concept B: Wall Washer

ARUP

Giselle Oviedo

Reaching Up

Figure 120: Daytime

Figure 119: Map Location

On Site Observations

The illuminance over the mural is sufficient for its size; however, the mural is located inside a parking lot and is not very visible from the street due to physical constraints.

Intervention: Low

This intervention is considered "Low," as its current condition is acceptable without any additional lighting. If deemed desirable, it is possible to enhance the experience by making the entire mural more visible from the visitor's point of view. To achieve this effect, the recommendation is to wash down the art by installing a linear wall grazer.

Concept B: Wall Washer

Figure 121: Current Nighttime Condition

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