## CONCLUSION

Pretoria's inner city arcades are the public spaces of the city. However, the current design of most of the defining edges of the arcades prevents these spaces from reaching their full potential. The edges present very few opportunities for lingering and in most cases the dialogue between interior and exterior has died down, causing a loss in commercial activity.

This study aimed to investigate which design features are required to reactivate the edge in order to present the dweller with lingering opportunities and increase the commercial activity. Insights gained through mapping and studying various arcades and thoroughfares were reworked for incorporation in a guideline document called Edge handbook. The Edge handbook contributes to the interior architecture profession by providing guidelines for bringing the storefront edge to its full potential when seen in relation to its surrounding public space. The guidelines were implemented in a detailed design proposal for President Arcade.

The reality of the inner city is that the arcades and thoroughfares are city dwellers' main form of public space, which thus calls for a redefinition of the economic retail ideal. It was found that the storefront edge cannot be seen as an entity separate from the surrounding public space and therefore does not justify merely giving the retail tenant as much clear display area as possible. The needs of the urban city dweller - for example, to observe a variety of activities and exert a choice in the level of exposure - must be considered and used to guide the design of the edge within an inner city arcade.

The design therefore cannot focus only on the public arcade space or the storefront edge, but it is the dialogue between the two that will determine if the space becomes a destination for the city dweller, rather than just another thoroughfare.
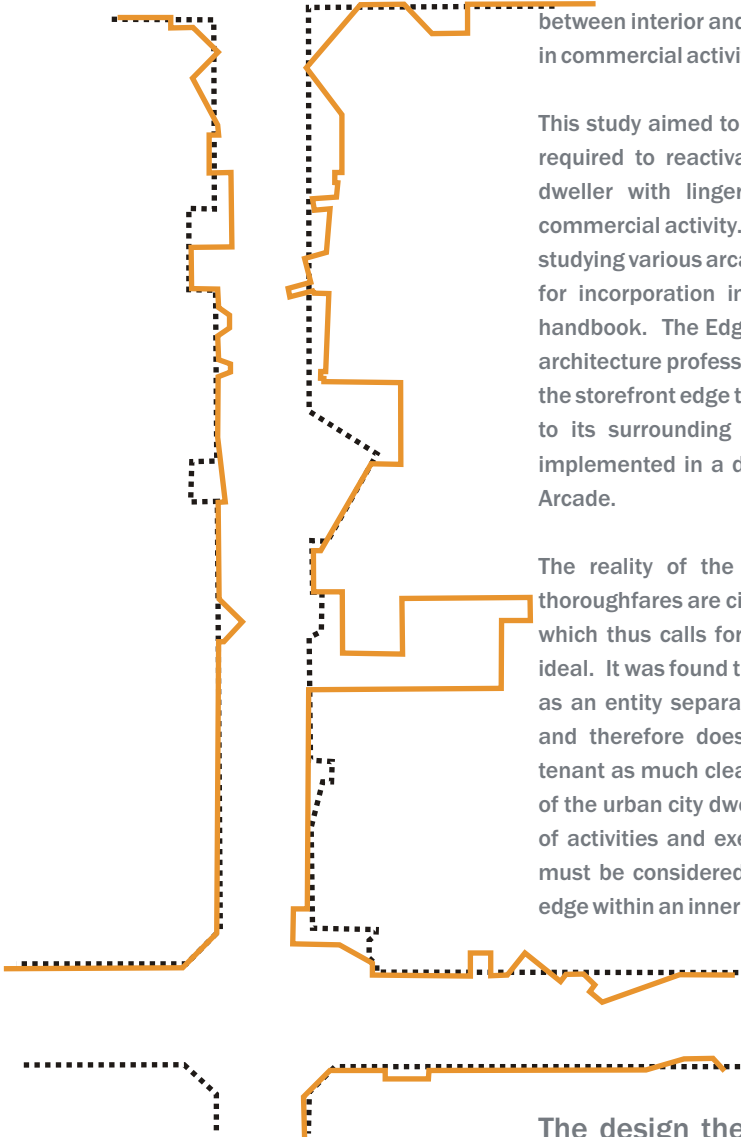
appendix

Edge handbook *a*
Lighting study *b*
Group framework *c*
Exam presentation *d*

edge handbook

lighting study

The following study is compiled to determine the energy efficiency of the lights used for the public storefront space. The overall LPD (lighting power density) and illuminance level of the space will be calculated and compared with the allowed LPD and required illuminance levels for retail spaces.

Luminous flux: radiant power emitted from source evaluated in terms of its visual effect, measured in lumens
Illuminance: amount of luminous flux falling on unit area of surface, measured in Lux. The illuminance level of an area is determined as follow:
Lumens/m² = lux
Lighting power density (LPD): the total wattage of the lights within a space divided by the total area of the space = LPD.

The Green Building Council of South Africa (GBCSA) is currently developing a Green Star rating tool for retail environments (http://www.gbcsa.co.za).

The Environmental management department of the City of Johannesburg has compiled design guidelines for energy efficient buildings in Johannesburg. According to these guidelines the allowed LPD for a class occupancy F1 (large shops) is 24 W/m² and for F2 (small shops) 20 W/m² (http://www.joburg.org.za).

The following international rating systems and guidelines were used to determine the allowed LPD for retail spaces:
☐ Vermont 2005 guidelines for energy efficient commercial construction
(http://www.publicservice.vermont.gov)
☐ The commercial lighting program by NYSERDA (New York State energy research and development authority)
(http://www.nyserda.org)
☐ International Energy Conservation Code 2006
(http://anybas.com)

According to the Vermont 2005 guidelines the allowed LPD for general retail areas are 17 W/m² and for fine merchandise display 39 W/m². The commercial lighting program by NYSERDA allows 19 W/m² for general merchandise areas and 35 W/m² for areas that require accent lighting like display windows. 15 W/m² for general retail and 39 W/m² for display windows are allowed according to the International Energy Conservation Code 2006.

The LPD allowance is much higher for retail environments in South Africa than in most other countries. In general South Africa is exposed to a high level of bright sunshine and especially in cities like Johannesburg and Pretoria, where the duration of bright sunshine exceeds 80 per cent of the possible in winter and 60 per cent during summer (Bothma 2003:32-33).

So for the purpose of this study 19 W/m² for general retail areas and 39 W/m² for fine merchandise display are used for the allowed LPD.

According to SABS 0114-1 part 16.5, the minimum required illuminance levels for shops are 300 lux and in areas where clothing inspection (fine merchandise display) takes place 500 lux.

TOTAL

142 x 110 mm downlights
Finish: Satin silver
BK26 & BK01 - Radiant lighting
with 35 Watt OSRAM
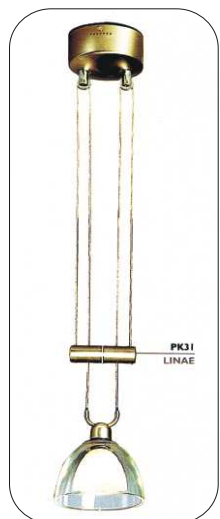Metal halide powerball
HCI-R111 light bulb

9

Life span: 12 000 hours
Luminous flux: 1705 lumen
Colour temperature: 3000K
Colour rendering: 81
Beam angle: 40 °

1200 x 26 mm Ø OSRAM
32 Watt Lumilux T8 Energysaver
tubular fluorescent ceiling light in
KA14 light fitting as per Radiant
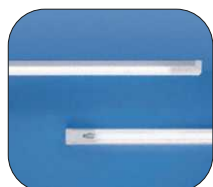lighting

4

Life span: 15 000 hours
Luminous flux: 2880 lumen
Colour rendering: 80 - 89

130 x 1200 mm Pendant
Finish: Satin chrome
PK31 - Radiant lighting with
35 Watt OSRAM
Tungsten halogen light bulb

3

Life span: 4000 hours
Luminous flux: 860 lumen
Colour temperature: 3000K
Colour rendering: 100

FIXED INSIDE COUNTERTOP
382 x 27 x 20 mm Fluorescent tube
light
8 Watt OSRAM
LUMILUX SPLIT FM

3

Life span: average of 15000 hours
Luminous flux: 970 lumen

COUNTERTOP STRIP LIGHT
610 x 23 x 28 mm Fluorescent tube
light
14 Watt OSRAM
LUMILUX SPLIT HE

2

Life span: average of 15000 hours

CALCULATIONS

ILLUMINANCE

INITIAL ILLUMINANCE (E) = total luminous flux x utilisation factor (UF) / total area

MAINTAINED ILLUMINANCE (E$_{av}$) = E x maintenance factor (MF)

Utilisation factor (UF): UF is proportion of luminous flux of light sources which falls on horizontal working plane in an interior and depends on the room index (RI) and reflectance values of room surfaces.

Maintenance factor (MF): MF is proportion of initial illuminance to which illuminance falls mid-way between cleaning and relamping periods. MF can be taken:
      for interiors maintained in average state of cleanliness - 0.8
      for interiors kept in specially clean condition - 0.9
      interiors allowed to become dirtier than average - 0.7

WIDTH OF PUBLIC STOREFRONT: 6.205 m
HEIGHT ABOVE HORIZONTAL WORKING PLANE: 2.420 m
TOTAL AREA OF PUBLIC STOREFRONT: 30.0 m²

RI = W/2H
   = 6.205 m/2(2.420 m)
   = 6.205 m/4.840 m
   = 1.28

The finishes of the public storefront are done in light colours, so the reflectance values are taken as follow: ceilings - 0.7, walls - 0.5, floor - 0.2.
According to table A3.2 (table takes RI and reflectance values into account) the UF = 0.38. The MF of the public storefront is taken as 0.9.
(Bean 2004:284-289)

3 DOWNLIGHTS IN FRONT OF ROTATING PANELS WITH DISPLAY BOXES
Area that lights project onto: 3.0 m²
Luminous flux of area: 3 x 1705 lumen = 5115 lumen
Illuminance level of area: 5115 lumen/3.0 m² = 1705 lux

3 DOWNLIGHTS AT THE BACK OF STOREFRONT
Area that lights project onto: 3.0 m²
Luminous flux of area: 3 x 1705 lumen = 5115 lumen
Illuminance level of area: 5115 lumen/3.0 m² = 1705 lux

3 PENDANT LIGHTS ABOVE COUNTERTOP
Area of countertop: 2.8 m²
Luminous flux of area: 3 x 860 lumen = 2580 lumen
Illuminance level of area: 2580 lumen/2.8 m² = 920 lux

3 DOWNLIGHTS IN DISPLAY WINDOW
Area of display window: 2.4 m²
Luminous flux of area: 3 x 1705 lumen = 5115 lumen
Illuminance level of area: 5115 lumen/2.4 m² = 2130 lux

4 FLUORESCENT CEILING LIGHTS
Area that lights cover: 18.8 m²
Luminous flux: 4 x 2880 lumen = 11520 lumen
Illuminance level of area: 11520 lumen/18.8 m² = 610 lux

3 FLUORESCENT LIGHTS FIXED INSIDE COUNTERTOP
Area of countertop 2.8 m²
Luminous flux: 3 x 970 lumen = 2910 lumen
Illuminance level: 2910 lumen/2.8 m² = 1040 lux

THE GENERAL ILLUMINANCE LEVEL ACHIEVED IN THE PUBLIC STOREFRONT:
(the lumen of the countertop strip lights are not included, as these are only turned on when needed)
5115 lumen
5115 lumen
2580 lumen
5115 lumen
11520 lumen
2910 lumen
32 355 lumen

INITIAL ILLUMINANCE (E) = (luminous flux x UF) / total area
$\qquad$ = (32 355 lumen x 0.38)/30 m²
$\qquad$ = 410 lux

MAINTAINED ILLUMINANCE (Eav) = E x maintenance factor (MF)
$\qquad$ = 410 lux x 0.9
$\qquad$ = **370 lux** (minimum required 300 lux)

LIGHTING POWER DENSITY

TOTAL AREA OF PUBLIC STOREFRONT: 30.0 m²

3 DOWNLIGHTS IN FRONT OF ROTATING PANELS WITH DISPLAY BOXES
Area that lights project onto: 3.0 m²
Total wattage of area: 3 x 35 Watt = 105 Watt
LPD of area: 105 Watt/3.0 m² = 35 Watt/m²

3 DOWNLIGHTS AT THE BACK OF STOREFRONT
Area that lights project onto: 3.0 m²
Total wattage of area: 3 x 35 Watt = 105 Watt
LPD of area: 105 Watt/3.0 m² = 35 Watt/m²

3 PENDANT LIGHTS ABOVE COUNTERTOP
Area of countertop: 2.8 m²
Total wattage of area: 3 x 35 Watt = 105 Watt
LPD of area: 105 Watt/2.8 m² = 37.5 Watt/m²

3 DOWNLIGHTS IN DISPLAY WINDOW
Area of display window: 2.4 m²
Total wattage of area: 3 x 35 Watt = 105 Watt
LPD of area: 105 Watt/2.4 m² = 44 Watt/m²

4 FLUORESCENT CEILING LIGHTS
Area that lights cover: 18.8 m²
Total wattage of area: 4 x 32 Watt = 128 Watt
LPD of area: 128 Watt/18.8 m² = 6.8 Watt/m²

3 FLUORESCENT LIGHTS FIXED INSIDE COUNTERTOP
Area of countertop 2.8 m²
Total wattage of area: 3 x 8 Watt = 24 Watt
LPD of area: 24 Watt/2.8 m² = 8.5 Watt/m²

TOTAL LPD OF PUBLIC STOREFRONT:
9 downlights x 35 Watt = 315 Watt
3 pendant lights x 35 Watt = 105 Watt
4 fluorescent ceiling lights x 32 Watt = 128 Watt
3 fluorescent countertop lights x 8 Watt = 24 Watt

Total wattage of storefront = 572 Watt

LPD: 572 Watt/30.0 m² = **19.1 Watt/m²** (LPD allowed 19 Watt/m²)

group framework

anneke allers 20194065 philip du toit 24022528 lizelle cloete 24032922 andrea seabrook 23086093 ralene vd walt 24011003 alet verster 24017486 carien theart 24038483

"...people look for order, security and a sense of completeness in their immediate spatial experiences; on the other hand, they look for mystery, challenge, and stimulation."

Goldsteen, J.B. & Elliott, C.D. 2004: 136.

cbd _problems

144

proposal   pretoria cbd

- react to existing arcades
- relate to specific character of the street
- main orientation towards the street, unveiling
  elements of surprise
- high activity around open spaces
- create interactive facades at street level
- intersect movement spines with pause areas

framework_ principles

heritage

ORANGE THEME, incl. Roadway surface

PAVEMENT RAISED @ intersections

SCULPTURES ON STREET CORNERS

TELLING THE NARRATIVE OF PRETORIA

new pause space

heritage spine

raised intersection

change tar to textured surface

framework_ paul kruger street

PAUSE NODES

MOVEMENT AREAS

public building | INTERACTIVE SIDEWALK | fast moving pedestrians | slow moving vehicles | fast moving vehicles | slow moving vehicles | INTERACTIVE SIDEWALK | public building

INTERACTIVE FACADE | fast moving pedestrians | slow moving vehicles | fast moving vehicles | slow moving vehicles | slow moving pedestrians | INTERACTIVE FACADE
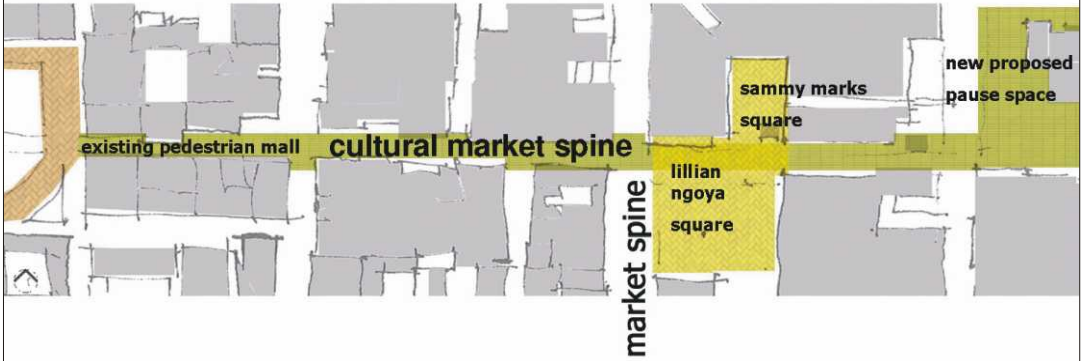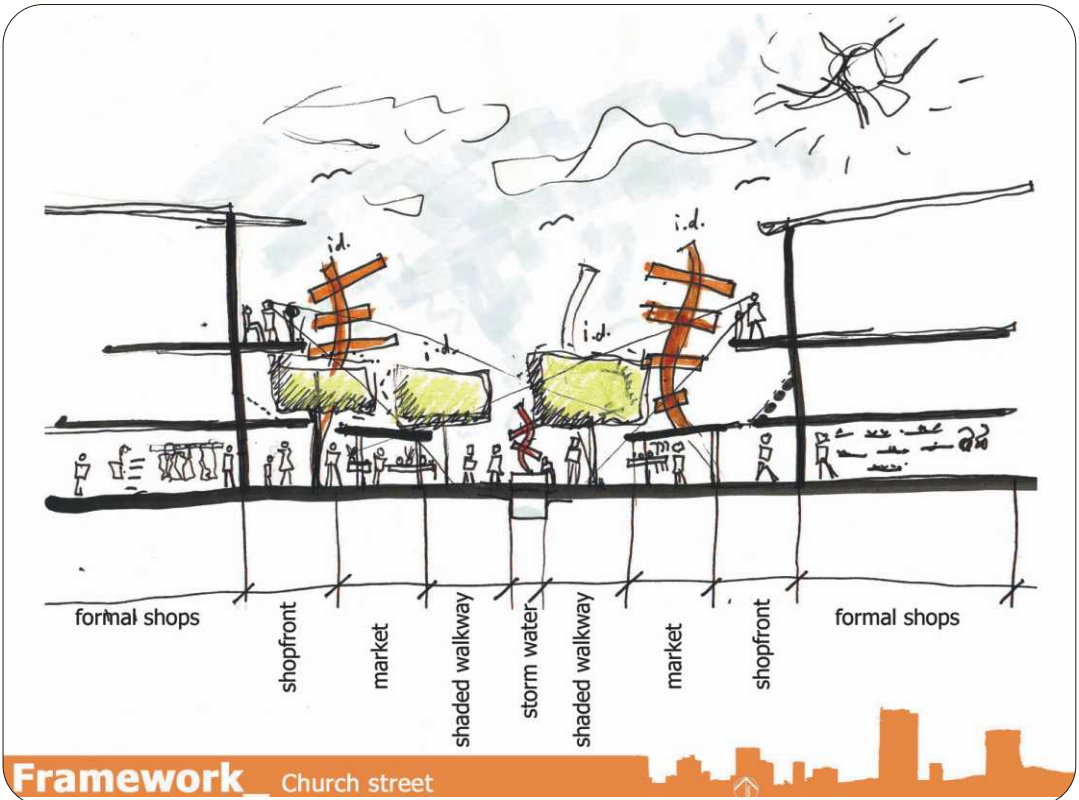
framework_ paul kruger street

existing_ paul kruger street

elements should suggest an
identity of heritage
e.g. paint, street surface, columns, screens

proposal_ paul kruger street

cultural market

EXISTING STRONG IDENTITY

existing pedestrian mall cultural market spine

market spine

lillian ngoya square

sammy marks square

new proposed pause space

framework_ church street

formal shops · shopfront · market · shaded walkway · storm water · shaded walkway · market · shopfront · formal shops

Framework_ Church street

market

YELLOW THEME, incl. Sidewalk Surface

PAVEMENT RAISED @ intersections

new pause space

raised intersections

market spine

sammy marks square

lillian ngoya square

vienna, austria

las ramblas, barcelona

framework_ van der walt street

scupltures

scupltures

market

seating

square activities

formal shopping

sidewalk

one way street

parallel parking
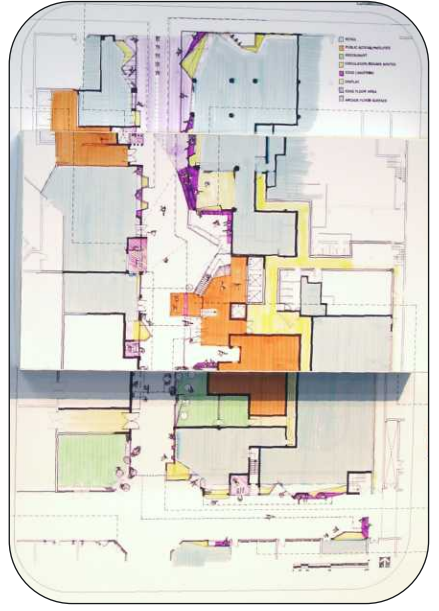
walkway seating

Framework_ Van der Walt street

exam presentation

linger   watch and be watched   elements of seduction

need for social public space   edge effect

physical needs   staying zones   visual connection

The design therefore cannot focus only on the public arcade space or the storefront edge, but it is the dialogue between the two that will determine if the space becomes a destination for the city dweller, rather than just another thoroughfare.