



# **BURTON BARR CENTRAL LIBRARY**

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**Horizontal – Vertical Visual Transitions**

## Team 'A' -

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Bruce Haglund  
Vidhi Agarwal,  
Steven Porterfield,  
Phoebe Richbourg,  
Connie Thibeau-Satsis,  
David Almany,  
Stephen Dent,

University of Idaho  
Arizona State University  
University of Idaho  
University of Virginia  
Arizona State University  
University of Nevada, Las Vegas  
University of New Mexico



## **Focal Question -**

*Is the visual transition between the exterior of the building to level 5 a comfortable one?*



**RESEARCH QUESTION**

## Hypothesis 1 -

“Light transition” between exterior entry area to  
“Crystal Canyon” is comfortable.

- Comfortable : 1:5 brightness ratio

## Hypothesis 2 -

“Light transition” from 1<sup>st</sup> level to the 5<sup>th</sup>  
level destinations is comfortable.

- Comfortable : 1:5 luminance ratio

- Destinations:

(a) base entry point of stairs

(b) elevator entry on 5<sup>th</sup> floor

- Light Transition : shift in light intensity

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**HYPOTHESIS**

## Hypothesis 1 -

1. Difference of illuminance levels between the nth intervals along path from entry area to “Crystal Canyon.”
2. Difference of luminance levels between the nth intervals along path from entry area to “Crystal Canyon.”
3. Measurement of adjustment time measured in video minutes between the nth intervals along path from entry area to “Crystal Canyon.”

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**OBJECTIVES**

## **Hypothesis 2-**

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1. Difference of illuminance levels between base of stairs, stair landings, and the top of the stairs.
2. Difference of luminance levels between base of stairs, stair landings, and the top of the stairs.
3. Difference between illuminance levels between elevator access at first floor to fifth floor.
4. Difference between luminance levels between elevator access at first floor to fifth floor.

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**OBJECTIVES**

**Illuminance:** the quantity of light; measured in footcandles /lux

**Measured Luminance:** function of amount of light falling on surface and the reflectance of that surface (ability to reflect light) (cd/square ft); Poor indicator of perceived brightness because of the issues of the surrounding conditions and the ability of the eye to adapt to those conditions.

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**DEFINITIONS**

**Apparent Brightness:** the phenomena of what we perceive in a subjective manner attributed to varied degrees of illuminance and luminance intensity in relation to surrounding events. Through arbitrarily measured in footlamberts, it is not considered reliable due to psychological, aesthetic, and physiological variables of the visual process.

**Seeability:** perception of surface luminance is based on the eye's ability to adapt to the environment. Eye adapts faster moving from dark to light and slower from light to dark.

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**DEFINITIONS**



## **Procedure**

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1. Organized and sequential measurements of illuminance levels.
2. Illuminance measurements along horizontal entry sequence from both east and west entries.
3. Illuminance measurements from base of stairs to the 5<sup>th</sup> level.
4. Record Luminance measurements at the east entry.

## Limits

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Data collection was conducted on January 8<sup>th</sup> – 9<sup>th</sup>. A more accurate study would include analysis of data collected at additional times of the year.



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**LIMITATION OF STUDY**

## **Instrumentation -**

Sylvania Light Meter DS2000 –

Digital light meters illuminance in footcandles.

Minolta Luminance Meter LS-100

Digital measurement of reflected light.

Culp Software

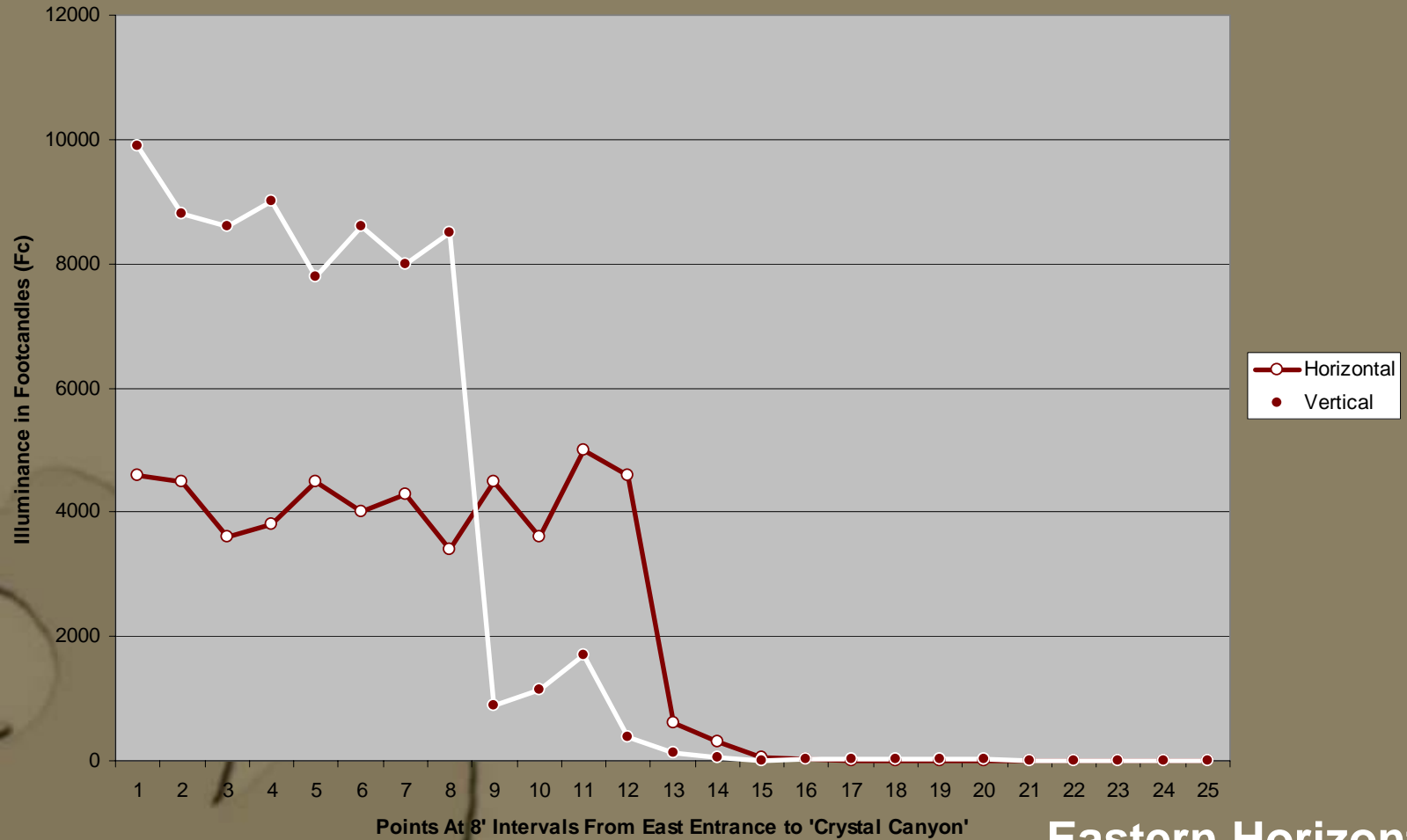
Glare analysis instrumentation

courtesy of Jeff Culp – Ball State University

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**INSTRUMENTS USED**

# Illuminance Measurements for Eastern Horizontal Transition



**Eastern Horizontal  
Transition**

**DATA ANALYSIS**

# East Entry Procession – 9:30 am



1



2



3



4



5



6

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**VISUALS**

# East Entry Procession – 4:30 pm



1



2



3



4



5

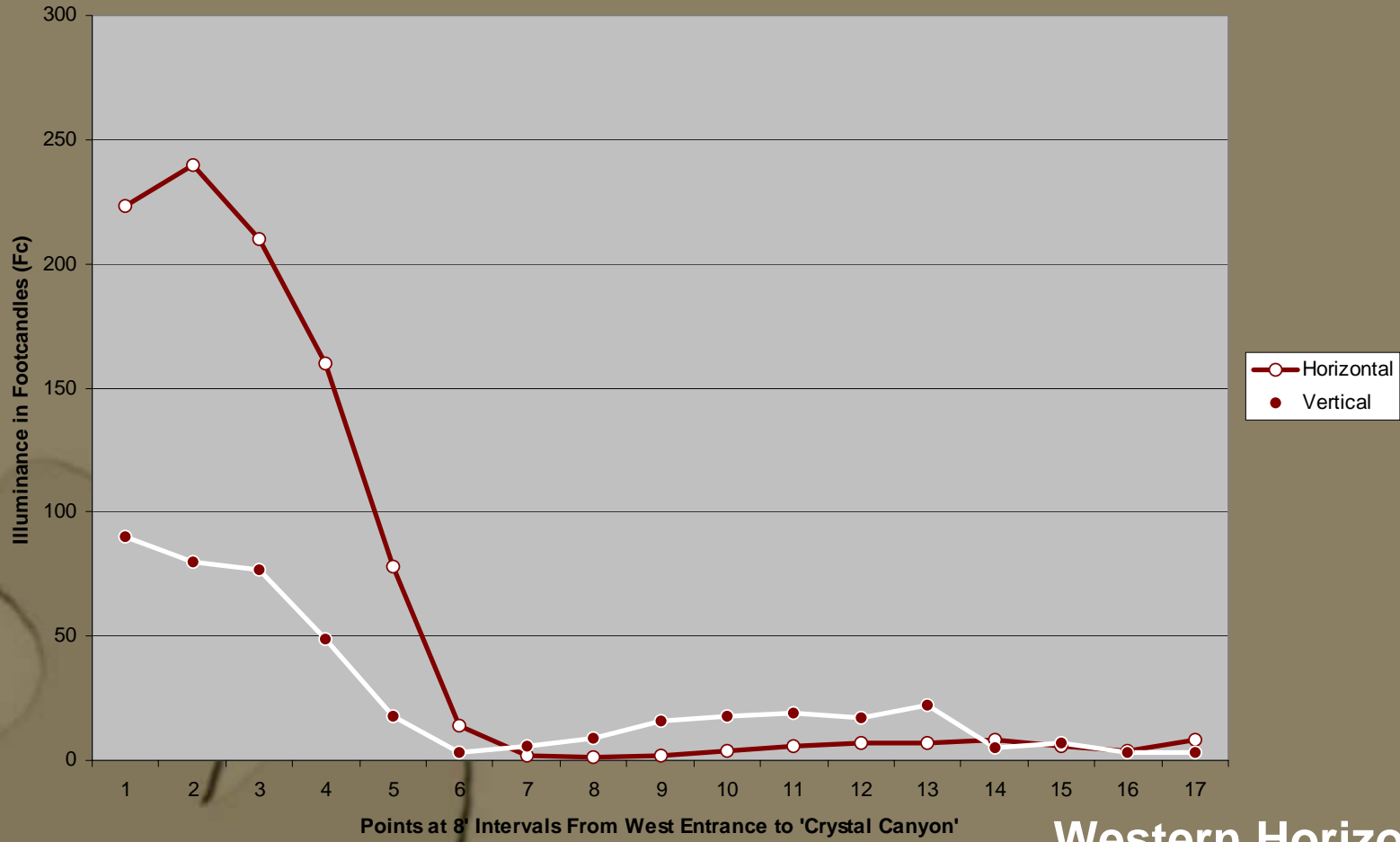


6

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**VISUALS**

## Illuminance Measurements for Western Horizontal Transition



**Western Horizontal  
Transition**

**DATA ANALYSIS**



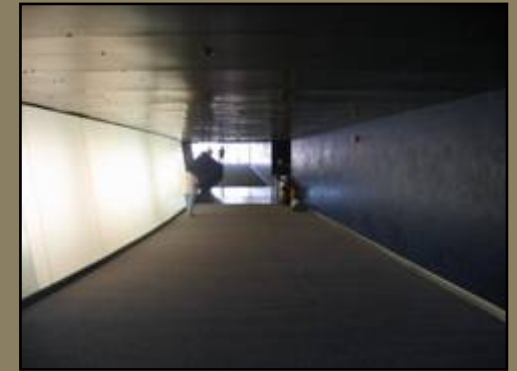
# West Entry Procession – 9:30 am



1



2



3



4



5



6

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**VISUALS**



# West Entry Procession – 4:30 pm



1



2



3



4



5

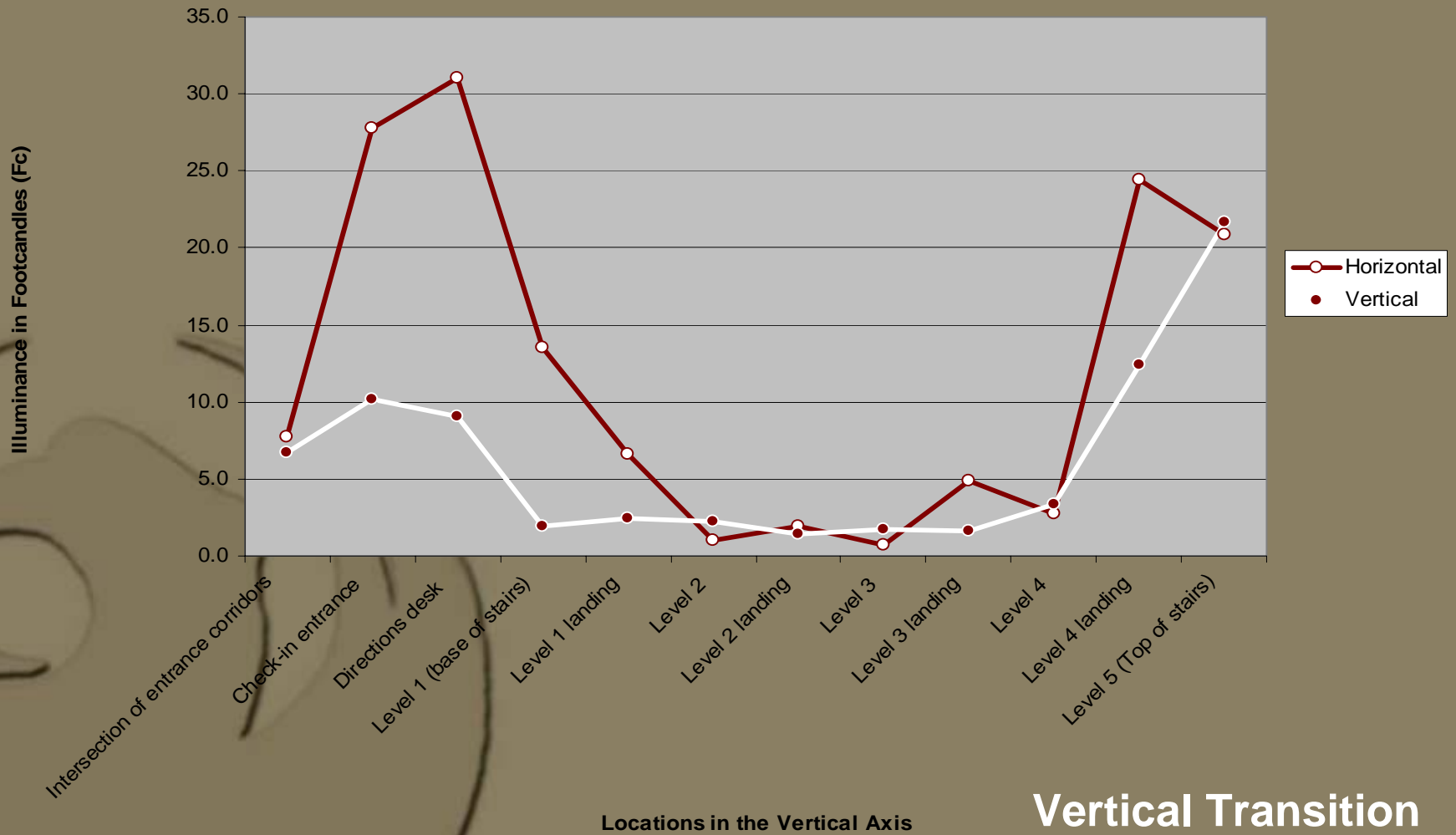


6

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**VISUALS**

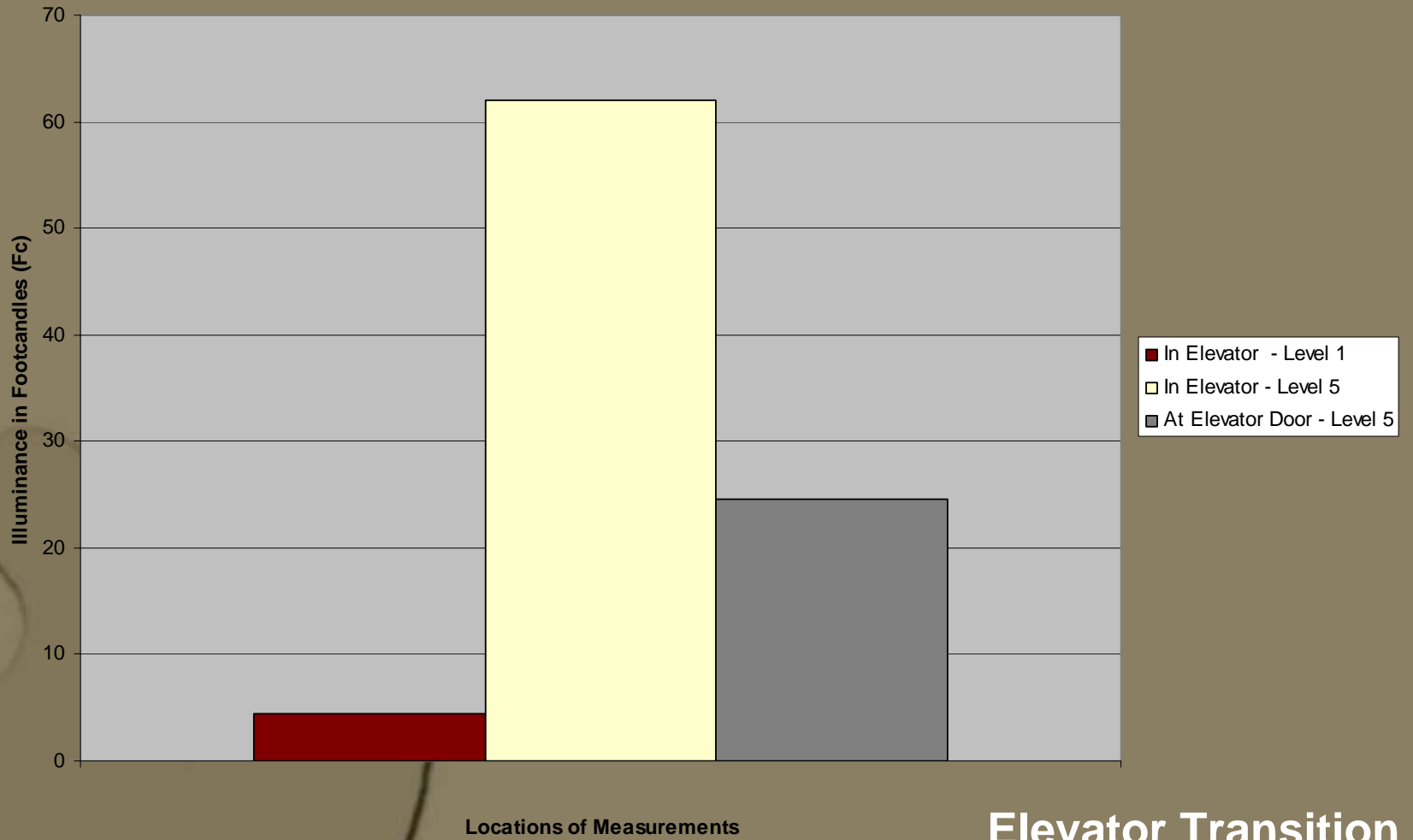
## Illuminance Measurements for Stair Vertical Transition



Vertical Transition

**DATA ANALYSIS**

# Illuminance Measurements for Elevator Vertical Transition



**DATA ANALYSIS**

# Stair Tower Procession – 9:30 am



Second Floor Landing

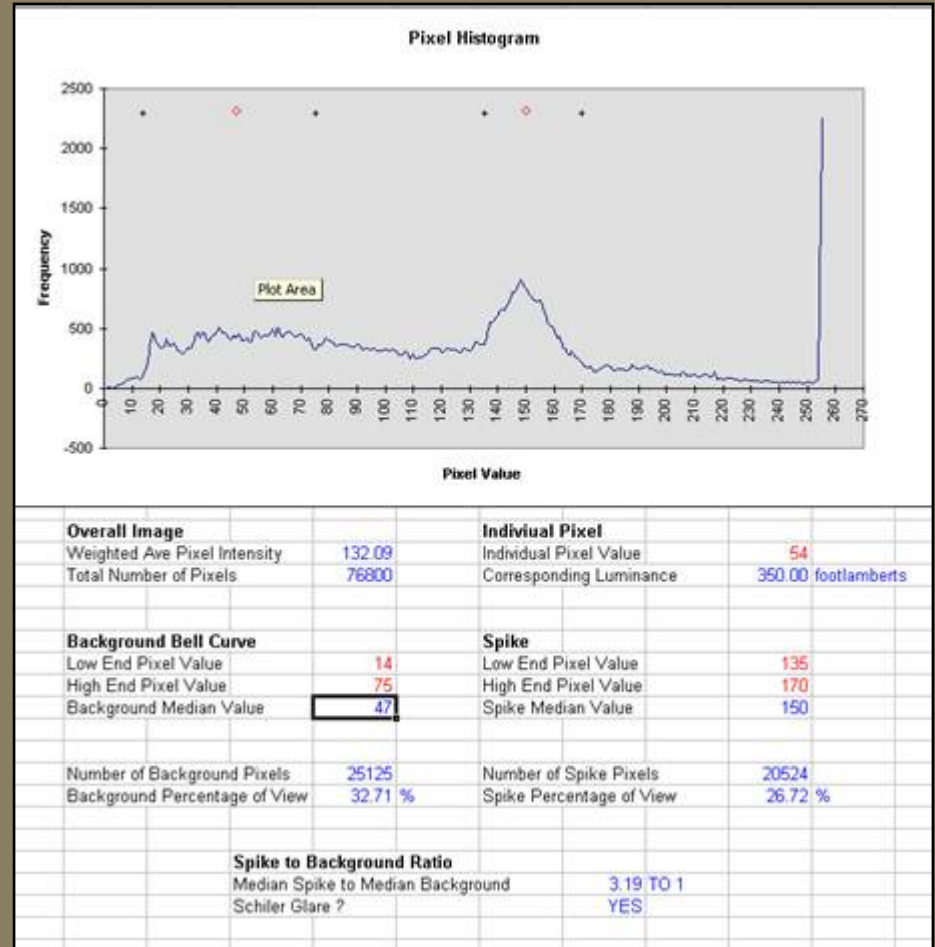
Fifth Floor Landing



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**VISUALS**

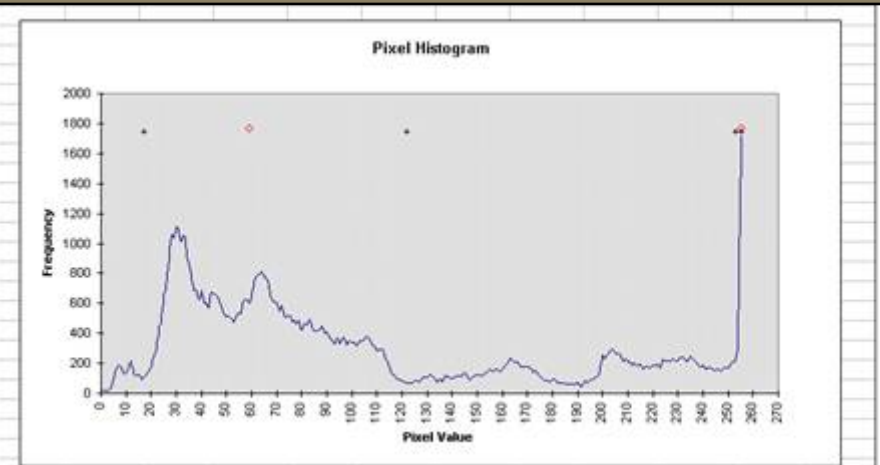
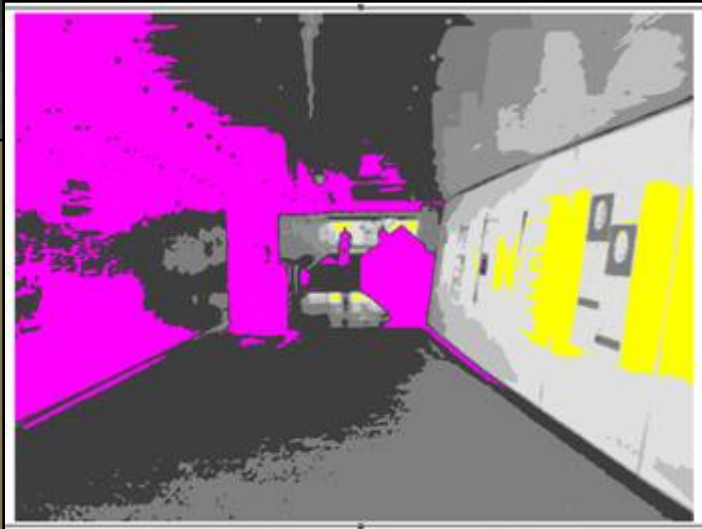
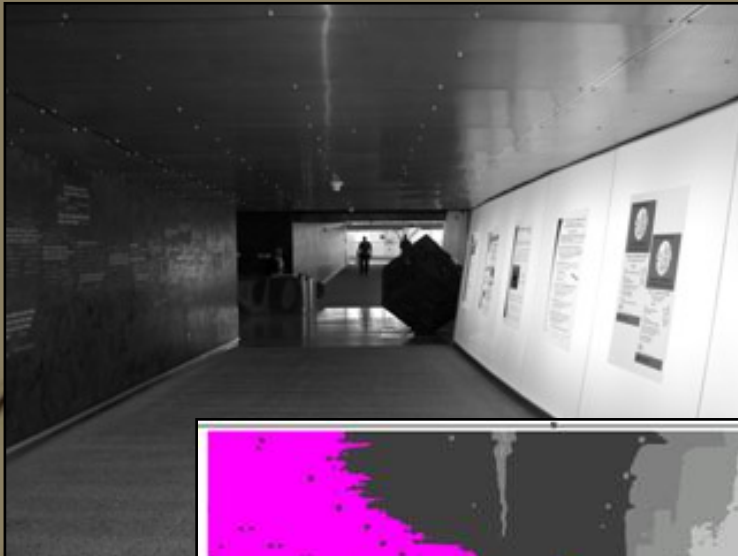
# Glare Analysis – East Entry



**VISUALS**



# Glare Analysis – East Entry



<b>Overall Image</b>		<b>Individual Pixel</b>	
Weighted Ave Pixel Intensity	117.11	Individual Pixel Value	54
Total Number of Pixels	76800	Corresponding Luminance	350.00 footlamberts
<b>Background Bell Curve</b>		<b>Spike</b>	
Low End Pixel Value	17	Low End Pixel Value	253
High End Pixel Value	122	High End Pixel Value	255
Background Median Value	59	Spike Median Value	255
Number of Background Pixels	52840	Number of Spike Pixels	2272
Background Percentage of View	68.80 %	Spike Percentage of View	2.96 %
<b>Spike to Background Ratio</b>			
Median Spike to Median Background		4.32 TO 1	
Schlier Glare ?		YES	

Developed by  
 Jeff Culp  
 CERES Ball State University  
 jculp@wp.bsu.edu

**VISUALS**

## **Hypothesis 1 - REJECTED**

The light transition between the exterior and the entry passageway is uncomfortable during the morning hours.

The light transition between the entry passageway to the “Crystal Canyon” is comfortable

## **Hypothesis 2 – ACCECPTED**

The light transition between the base of the stairs to the 5<sup>th</sup> level of the “Crystal Canyon” is acceptable.

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**CONCLUSION**

## **Recommendations -**

Mimic the features of the West Entry on the East Entry.

- Plant additional Palo Verde Trees along the walkway leading to the East Entry to reduce the reflective glare from the building materials.

Install a perforated metal canopy on top of the steel trellis to filter sunlight, easing the transition from the “outside – in”

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**CONCLUSION**



## Recommendations -



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**CONCLUSION**