Team ‘A’ -

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Focal Question -

Is the visual transition between the exterior of the building to level 5 a comfortable one?
Hypothesis 1 -

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

- Comfortable : 1:5 brightness ratio

Hypothesis 2 -

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

- Comfortable : 1:5 luminance ratio
- Destinations:
  (a) base entry point of stairs
  (b) elevator entry on 5th floor
- Light Transition : shift in light intensity
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.”
Hypothesis 2-

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.
**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.
**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.
Procedure

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 5th level.

4. Record Luminance measurements at the east entry.
Limits

Data collection was conducted on January 8th – 9th. A more accurate study would include analysis of data collected at additional times of the year.
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
Eastern Horizontal Transition

Illuminance Measurements for Eastern Horizontal Transition

Points at 3’ Intervals From East Entrance to ‘Crystal Canyon’

DATA ANALYSIS
East Entry Procession – 9:30 am

VISUALS
East Entry Procession – 4:30 pm

VISUALS
Illuminance Measurements for Western Horizontal Transition

Points at 8’ Intervals From West Entrance to ‘Crystal Canyon’

Illuminance in Footcandles (Fc)

Western Horizontal Transition

DATA ANALYSIS
West Entry Procession – 9:30 am

VISUALS
West Entry Procession – 4:30 pm

VISUALS
DATA ANALYSIS
DATA ANALYSIS

Locations of Measurements

Illuminance Measurements for Elevator Vertical Transition

- In Elevator - Level 1
- In Elevator - Level 5
- At Elevator Door - Level 5

Elevator Transition
Stair Tower Procession – 9:30 am

Second Floor Landing

Fifth Floor Landing

VISUALS
Glare Analysis – East Entry

VISUALS

- **Overall Image**
  - Weighted Ave Pixel Intensity: 132.09
  - Total Number of Pixels: 76800

- **Background Bell Curve**
  - Low End Pixel Value: 14
  - High End Pixel Value: 26
  - Background Median Value: 40

- **Spike**
  - Low End Pixel Value: 135
  - High End Pixel Value: 170
  - Spike Median Value: 150

- **Number of Background Pixels**: 25125
- **Number of Spike Pixels**: 20524

- **Background Percentage of View**: 32.71%
- **Spike Percentage of View**: 26.72%

**Spike to Background Ratio**
- Median Spike to Median Background: 3.19 TO 1
- Schlieren Glare: YES

**Pixel Histogram**
- Frequency vs. Pixel Value
- Plot Area

**Corresponding Luminance**: 350.00 footlamberts
Glare Analysis – East Entry

VISUALS

Pixel Histogram

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<tr>
<th>Overall Image</th>
<th>Individual Pixel</th>
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<tr>
<td>Weighted Ave Pixel Intensity</td>
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<tr>
<td>Corresponding Luminance</td>
<td>350.00 footlamberts</td>
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<tr>
<th>Background Roll Curve</th>
<th>Spike</th>
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<tbody>
<tr>
<td>Low End Pixel Value</td>
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<td>Background Median Value</td>
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<tr>
<td>Spike Median Value</td>
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<th>Spike to Background Ratio</th>
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<tr>
<td>Median Spike to Median Background</td>
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<tr>
<td>Schild Glare ?</td>
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Developed by
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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 – ACCEPTED

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

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”
Recommendations -