## Presentation Outline

**Introduction + Building Statistics + Concept**

**Lighting Depth**
- Main Entrance + Parking Lot
- Gift Shop
- Lobby + Waiting Area
- Team Station
- Exterior Space
- Special Purpose Space
- Circulation Space
- Mechanical Breadth
- Acoustical Breadth
- Work Space

**Electrical Depth**
- Copper vs. Aluminum Feeders
- Energy Savings vs. Increased Feeder Size

**Summary + Acknowledgements**

* Not included in presentation
**Presentation Outline**

Introduction + **Building Statistics** + Concept

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**Summary + Acknowledgements**

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**Building Information**

- **Building Name**: Franklin Square Hospital Center Patient Tower and Emergency Department Addition
- **Location**: 9000 Franklin Square Drive, Baltimore, MD 21237
- **Building Occupant Name**: MedStar Health Facilities
- **Function**: Medical
- **Size**: 356,000 sq. ft.
- **Number of Stories**: 7 stories
- **Dates of Construction**: Fall 2007 - Summer 2010
- **Overall Project Cost**: $175 million
- **Project Delivery Method**: Design - Bid – Build

**Primary Project Team**

- **Owner**: Franklin Square Hospital Center
- **Project Manager**: Lillibridge Healthcare Services, Inc.
- **Architect**: Wilmot/ Sanz Inc
- **MEP Engineer**: Leach Wallace Associates
- **Structural Engineer**: Rathgeber/Goss Associates
- **Civil Engineer**: Dewberry & Davis
Design Concept
Franklin Square Hospital Center, a member of MedStar Health, provides the highest quality healthcare and education to our communities.

- FSHC Mission Statement

Service
Patient First
Integrity
Respect
Innovation
Teamwork
Presentation Outline

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Site Plan

Patient Tower + Emergency Department Addition
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Summary + Acknowledgements

First Floor
- Main Entrance + Parking Lot
- Exterior Space
Presentation Outline

Introduction + Building Statistics + Concept

Lighting Depth
- Main Entrance + Parking Lot | Exterior Space
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Electrical Depth
- Copper vs. Aluminum Feeders
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Summary + Acknowledgements
### Key Features

- Main entrance canopy
- Central plaza with wooden terrace and seating area
- Central walkways

### Main Entrance + Parking Lot

- Gift Shop
- Special Purpose Space
- Lobby + Waiting Area
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### Exterior Space

- Copper vs. Aluminum Feeders
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### Presentation Outline

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  - Circulation Space
  - Mechanical Breadth
  - Acoustical Breadth
- Parking Lot
- Exterior Space

Main Entrance + Parking Lot | Exterior Space

Design Goals

- Create an inviting night time environment
- Attract and guide visitors to the main entrance
- Meet IESNA recommendations and ASHRAE Standard 90.1 Lighting Power Density Code
- Direction, safety, visual interest

Summary + Acknowledgements

Electrical Depth

- Copper vs. Aluminum Feeders
- Energy Savings vs. Increased Feeder Size
Presentation Outline

Introduction + Building Statistics + Concept

Lighting Depth
- Main Entrance + Parking Lot
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- Exterior Space
  - Special Purpose Space
  - Circulation Space
  - Mechanical Breadth
  - Acoustical Breadth
- Electrical Depth
  - Copper vs. Aluminum Feeders
  - Energy Savings vs. Increased Feeder Size

Main Entrance + Parking Lot

Exterior Space

Summary + Acknowledgements
Main Entrance + Parking Lot | Exterior Space

- Plaza seating area highlighted to provide visual interest
- Walkways lead visitors to main entrance and canopy
- Design meets IESNA recommendations

<table>
<thead>
<tr>
<th>Design</th>
<th>Roadway</th>
<th>Walkways</th>
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<td>Avg. Illuminance</td>
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<td>0.5 fc</td>
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<td>Compliance</td>
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</table>

- Design meets ASHRAE Standard 90.1 Lighting Power Density Code

<table>
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<tr>
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<tbody>
<tr>
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</table>
**Gift Shop | Special Purpose Space**

**Key Features**
- Vertical Display Cases around perimeter of shop
- Franklin Square Hospital Center Logo
- Store Front Display Areas

**Presentation Outline**

**Introduction + Building Statistics + Concept**

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**Lighting Depth**
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**Electrical Depth**
- Copper vs. Aluminum Feeders
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**Summary + Acknowledgements**

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**Gift Shop | Special Purpose Space**

**Design Goals**

- Create a pleasant environment for browsing
- Attract visitors from adjacent atrium space
- Meet IESNA recommendations and ASHRAE Standard 90.1 Lighting Power Density Code
- Inviting, focal points, highlight merchandise
**Presentation Outline**

Introduction + Building Statistics + Concept

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**Electrical Depth**

- Copper vs. Aluminum Feeders
- Energy Savings vs. Increased Feeder Size

**Summary + Acknowledgements**

**Gift Shop | Special Purpose Space**

**Design Summary**

- Vertical accent lighting on merchandise and FSHC logo
- Non-uniform lighting throughout space providing visual interest
- Design meets IESNA recommendations

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<tr>
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- Design meets ASHRAE Standard 90.1 Lighting Power Density Code

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Presentation Outline

Introduction + Building Statistics + Concept

Lighting Depth
- Main Entrance + Parking Lot
- Exterior Space
- Special Purpose Space

Lobby + Waiting Area
- Lobby + Waiting Area
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Electrical Depth
- Copper vs. Aluminum Feeders
- Energy Savings vs. Increased Feeder Size

Summary + Acknowledgements

Lobby + Waiting Area | Circulation Space

Key Features
- Reception / Security desk
- Emergency and pediatric emergency waiting areas
- Store front façade and vestibule
Presentation Outline

Introduction + Building Statistics + Concept

Lighting Depth
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Electrical Depth
- Copper vs. Aluminum Feeders
- Energy Savings vs. Increased Feeder Size

Summary + Acknowledgements

Lobby + Waiting Area | Circulation Space

Design Goals

- Create a relaxed non-uniform setting for visitors
- Uniform illumination on desk task plane
- Meet IESNA recommendations and ASHRAE Standard 90.1 Lighting Power Density Code
- Relaxation, uniform illumination on task plane
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<th>Lobby + Waiting Area</th>
<th>Circulation Space</th>
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<td>Team Station</td>
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<td>Summary + Acknowledgements</td>
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**Presentation Outline**

- Introduction + Building Statistics + Concept
- Lighting Depth
  - Main Entrance + Parking Lot | Exterior Space
  - Gift Shop | Special Purpose Space
  - Lobby + Waiting Area | Circulation Space
    - Mechanical Breadth
    - Acoustical Breadth
  - Team Station | Work Space
- Electrical Depth
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  - Energy Savings vs. Increased Feeder Size
- Summary + Acknowledgements

**Lobby + Waiting Area | Circulation Space**

**Design Summary**

- Uniform illumination on desk work plane
- Indirect and direct lighting to provide relaxation
- Design meets IESNA recommendations
<table>
<thead>
<tr>
<th>Desk</th>
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<td>IESNA Criteria</td>
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<td>Compliance</td>
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</table>
- Design meets ASHRAE Standard 90.1 Lighting Power Density Code
  | LPD |
  | Design | 1.3 W/SF |
  | ASHRAE Criteria | 1.7 W/SF |
  | Compliance | YES |
Presentation Outline

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Summary + Acknowledgements

Design Goals

- Evaluate existing acoustical conditions of the pediatric emergency waiting area
- Propose scenarios to improve acoustical environment
- Target reverberation time between 0.65 and 0.75 seconds
Presentation Outline

Introduction + Building Statistics + Concept

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Electrical Depth
  Copper vs. Aluminum Feeders
  Energy Savings vs. Increased Feeder Size

Summary + Acknowledgements

Lobby + Waiting Area | Acoustical Breadth

Existing Conditions

<table>
<thead>
<tr>
<th>Surface</th>
<th>Material</th>
<th>Area (ft²)</th>
<th>Transmission Coefficient</th>
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<tbody>
<tr>
<td>Wall</td>
<td>Sheetrock</td>
<td>1755.5</td>
<td>0.05</td>
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<tr>
<td>Floor</td>
<td>Concrete</td>
<td>3750.0</td>
<td>0.05</td>
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<tr>
<td>Ceiling</td>
<td>Acoustical</td>
<td>1000.0</td>
<td>0.10</td>
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</table>

Volume = 4853.9 ft³

Tₕ = 0.10 + 0.40

Average Tₕ = 0.50
Presentation Outline

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Summary + Acknowledgements

Lobby + Waiting Area | Acoustical Breadth

Existing Condition | 0.46 s

Existing Conditions
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Lobby + Waiting Area | Acoustical Breadth

Existing Condition | 0.46 s

Proposed Scenario 1

Proposed Scenario 1: Pediatric Waiting Room Renovation Time

Summary

Acknowledgements
**Presentation Outline**

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- Energy Savings vs. Increased Feeder Size

**Summary + Acknowledgements**

---

**Lobby + Waiting Area**

- Acoustical Breadth

**Proposed Scenario 1**

- **Existing Condition** | 0.46 s
- **Scenario 1** | 0.67 s

---

**Diagram**

- Diagram showing the layout of the Lobby + Waiting Area with annotations for Acoustical Breadth.

**Table**

- Table comparing Proposed Scenario 1 with other scenarios, including energy savings and feeder size.

---

**Summary**

- Comparison of existing condition vs. proposed scenario 1.

---

**Acknowledgements**
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Summary + Acknowledgements

Lobby + Waiting Area | Acoustical Breadth

Existing Condition | 0.46 s

Scenario 1 | 0.67 s

Proposed Scenario 2

<table>
<thead>
<tr>
<th>Proposed Scenario 2 - Pediatric Waiting Room: Reverberation Time</th>
<th>Simplex Coefficients</th>
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<tbody>
<tr>
<td>Surface</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Walls</td>
<td>0.15</td>
</tr>
<tr>
<td>Floors</td>
<td>0.05</td>
</tr>
<tr>
<td>Ceilings</td>
<td>0.03</td>
</tr>
<tr>
<td>Doors</td>
<td>0.10</td>
</tr>
<tr>
<td>Windows</td>
<td>0.02</td>
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</tbody>
</table>

Volume: 400 ft³, Target: 0.65 s
Target Reverberation Time: 0.64 s ± 0.05 s
Presentation Outline

Introduction + Building Statistics + Concept

Lighting Depth
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Electrical Depth
- Copper vs. Aluminum Feeders

Summary + Acknowledgements

Lobby + Waiting Area | Acoustical Breadth

Proposed Scenario 2

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Reverb Time (s)</th>
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<tbody>
<tr>
<td>Existing Condition</td>
<td>0.46</td>
</tr>
<tr>
<td>Scenario 1</td>
<td>0.67</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>0.56</td>
</tr>
</tbody>
</table>

**Proposed Scenario 2 - Pediatric Waiting Room Reverberation Time**

- **Surface**
  - Walls
  - Ceiling
- **Material**
  - Gypsum Board
- **Reverb Time (s)**
  - Scenario 1: 0.67
  - Scenario 2: 0.56

**Energy Savings vs. Increased Feeder Size**

- **Average Feeder Size**
  - Scenario 1: 0.67
  - Scenario 2: 0.56
Summary

- It is recommended to enclose the space as in Scenario 1 to achieve within the preferred reverberation time range
- Scenario 2 increases the reverberation time by implementing different material properties and not changing the architecture

**Existance Condition** | 0.46 s
---|---
**Scenario 1** | 0.67 s
**Scenario 2** | 0.56 s
**Presentation Outline**

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- Copper vs. Aluminum Feeders
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**Method**

- Increase existing feeder sizes by 1, 2 and 3 sizes and produce a cost comparison
- Determine the energy loss by finding the feeder lengths, voltage drop across each conductor
- Use utility generation rates to estimate energy costs

**Electrical Depth**

<table>
<thead>
<tr>
<th>Type</th>
<th>Rate (kW)</th>
<th>Hours</th>
<th>Cost Per Year ($)</th>
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<tr>
<td>PEAK</td>
<td>0.10977</td>
<td>8</td>
<td>1944</td>
</tr>
<tr>
<td>ELECTRIQUE/PEAK</td>
<td>0.10766</td>
<td>6</td>
<td>1456</td>
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<tr>
<td>OFF/PEAK</td>
<td>0.06860</td>
<td>20</td>
<td>2830</td>
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</tbody>
</table>

**Energy Savings vs. Increased Feeder Size**

<table>
<thead>
<tr>
<th>Type</th>
<th>Rate (kW)</th>
<th>Hours</th>
<th>Cost Per Year ($)</th>
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</thead>
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<tr>
<td>OFF/PEAK</td>
<td>0.06860</td>
<td>20</td>
<td>2830</td>
</tr>
</tbody>
</table>

TOTAL COST PER YEAR (kW-hr): $232.62
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  Copper vs. Aluminum Feeders
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Summary + Acknowledgements

Electrical Depth | Energy Savings vs. Increased Feeder Size

<table>
<thead>
<tr>
<th></th>
<th>Initial Conductor Cost ($)</th>
<th>Initial Cost Difference ($)</th>
<th>Energy Loss Per Year ($)</th>
<th>Energy Cost Savings Per Year ($)</th>
<th>Simple Payback Period (YRS)</th>
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<td>$78,696.23</td>
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<td>$6,727.93</td>
<td>-</td>
<td>-</td>
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<td>1 Size Larger</td>
<td>$93,623.80</td>
<td>$14,927.57</td>
<td>$5,751.86</td>
<td>$976.08</td>
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<tr>
<td>2 Sizes Larger</td>
<td>$111,238.61</td>
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<td>$1,746.74</td>
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<tr>
<td>3 Sizes Larger</td>
<td>$131,255.71</td>
<td>$52,559.48</td>
<td>$4,401.26</td>
<td>$2,326.67</td>
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Summary

Energy Cost Savings vs. Initial Cost
Summary

**Lighting Depth**
- Improved the overall quality and aesthetic conditions for visitors and employees
- Met recommended light levels and power density requirements

**Acoustical Breadth**
- Enhanced the pediatric emergency department waiting area by changing material absorption conditions

**Electrical Depth**
- Increasing feeder sizes may be a viable solution to reduce energy loss and save money
Acknowledgements

Faculty
Dr. Richard Mistrick
Dr. Kevin Houser
Professor Ted Dannerth
Professor Robert Holland
Professor Kevin Parfitt

Leach Wallace Associates, Inc.
Phil Mackey
Nick Nucci

Friends, Family and especially my fellow AE Students
### Presentation Outline

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- **Lighting Depth**
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  - Team Station | Mechanical Breadth *
  - | Acoustical Breadth
- **Electrical Depth**
  - Copper vs. Aluminum Feeders *
  - Energy Savings vs. Increased Feeder Size
- **Summary + Acknowledgements**

### Questions + Comments

<table>
<thead>
<tr>
<th>Electrical Depth</th>
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<tbody>
<tr>
<td>Copper vs. Aluminum Feeders *</td>
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<tr>
<td>Energy Savings vs. Increased Feeder Size</td>
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