THROUGH CHILDREN'S EYES

Rethinking the Design of Pediatric Healthcare Arrival Spaces

MEET THE SPEAKERS

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1. Project Context: Cincinnati Children's Hospital Medical Center
2. Research Objectives and Methodology
3. POE Data Analysis and Findings
4. Design Implication and Owners' Insights
5. Q&A

AGENDA

LEARNING OBJECTIVES

- Understand various user groups and a broad spectrum of behaviors typically take place in the pediatric hospital public spaces.
- Integrate a series of landmarks in the design of pediatric healthcare arrival spaces to enhance wayfinding and create a visually engaging environment.
- Apply analytical methods to inform design decisions, that strategically offer positive distractions and play opportunities for children and their parents to de-stress and socialize.
- Implement a child-centric approach in the design of pediatric healthcare environments, integrating insights from designers, researchers, and facility managers/owners.

- CEU: AIA-1 LU HSW, IDCEC - 1 LU HSW

PROJECT CONTEXT

CINCINNATI CHILDREN'S HOSPITAL MEDICAL CENTER

CINCINNATI CHILDREN'S HOSPITAL MEDICAL CENTER

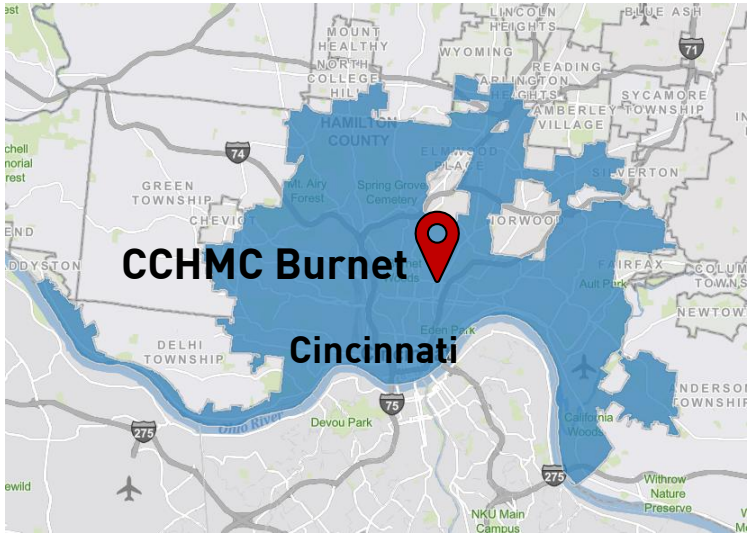
8.7M Total square feet across the system including inpatient, ambulatory, primary care, research, and administrative spaces

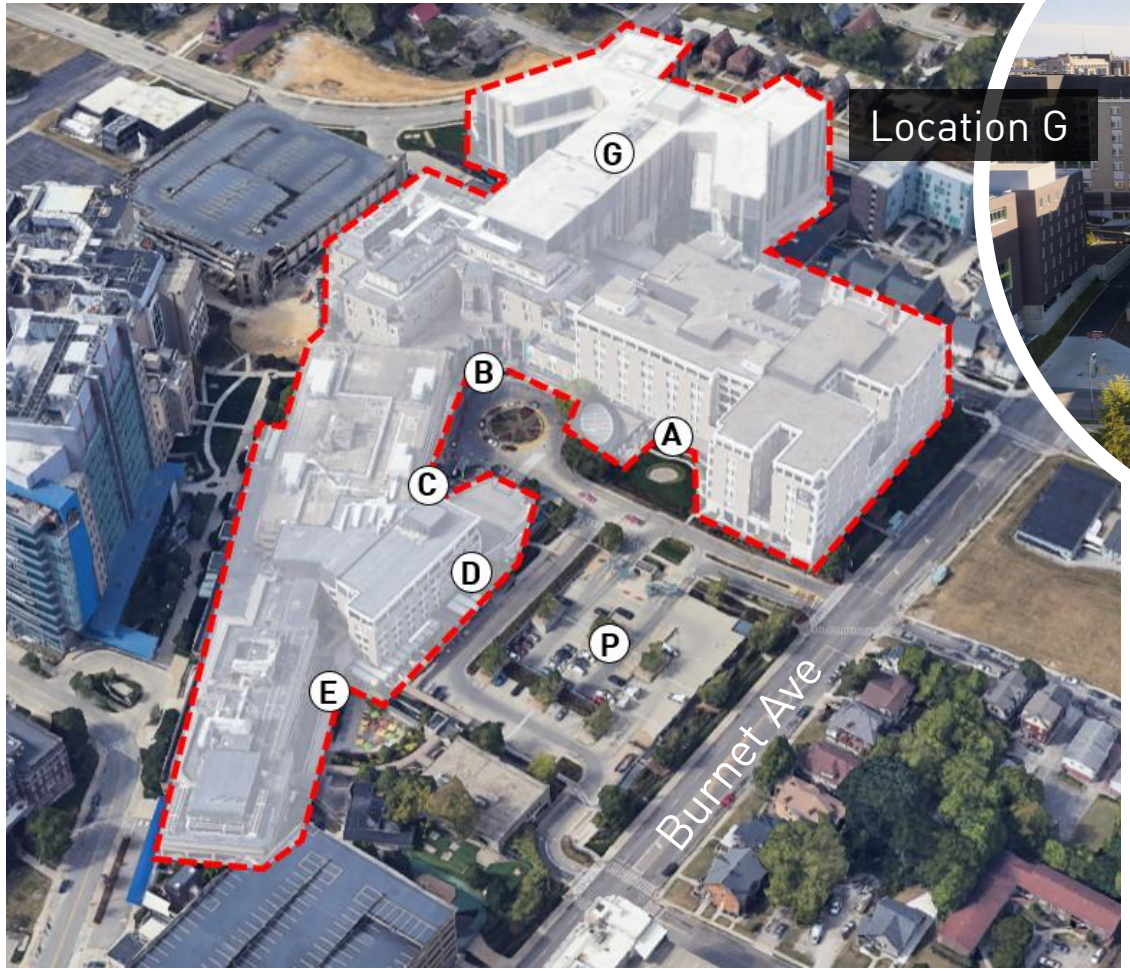
3 Multiple states, several partnerships domestically and world-wide

3 Hospitals campuses include Burnet Avenue, Liberty Township, College Hill

9 Ranked in the top ten specialties listed in the 2025-2026 US News and World Report Best Children's Hospitals Honor Roll

THE EVOLVING BURNET CAMPUS

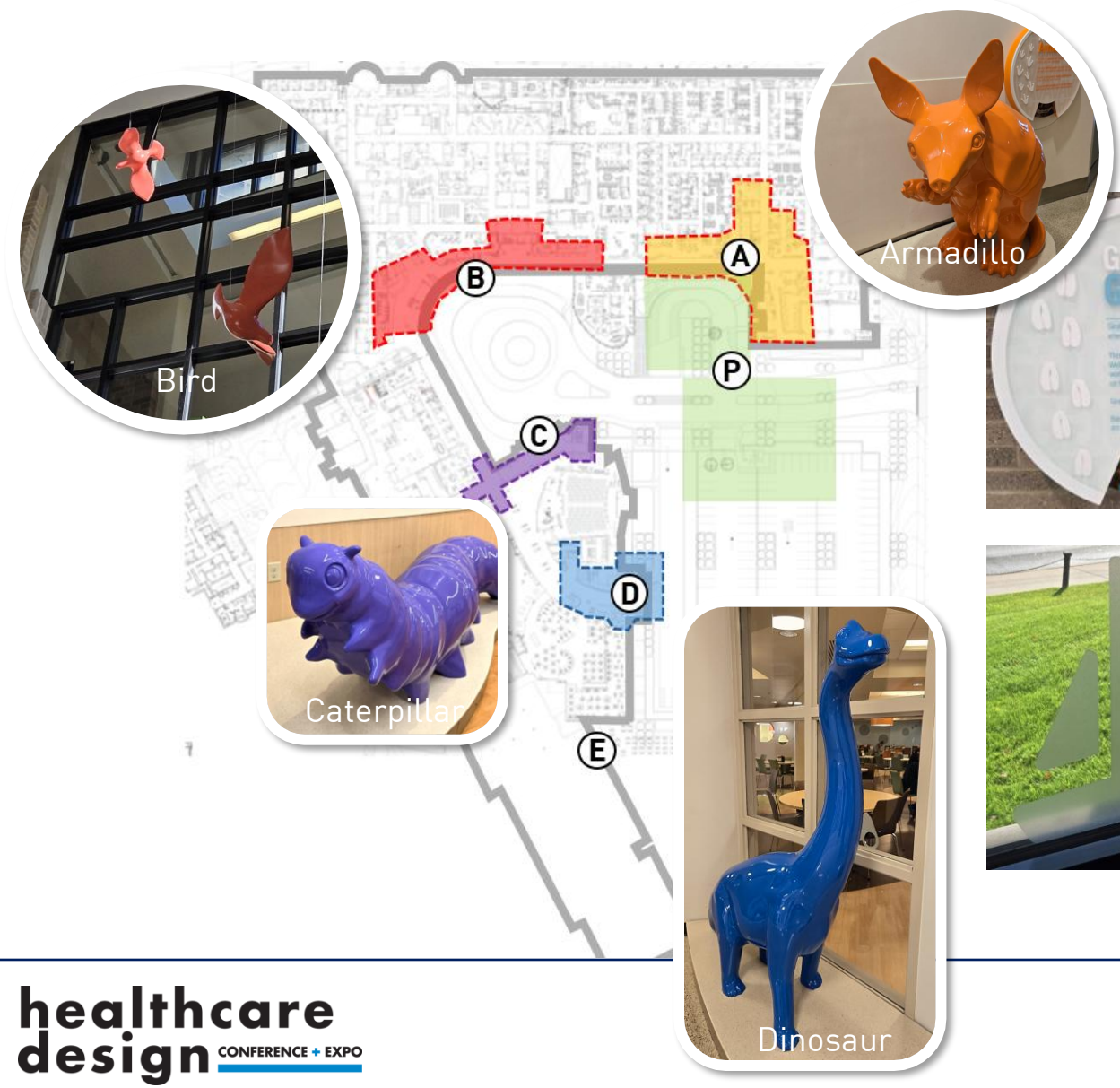


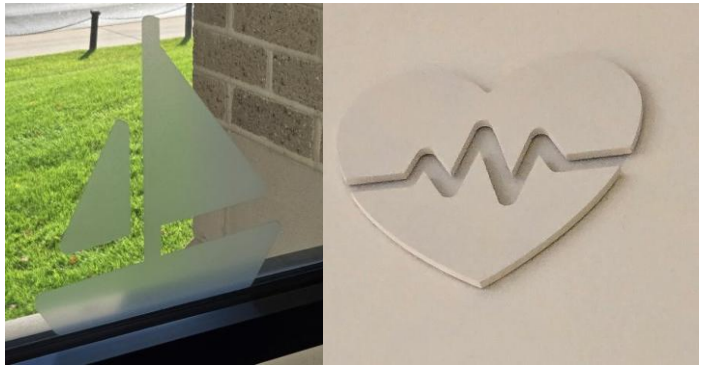


- 12 buildings, 3.4M gross SQFT
- Inpatient, outpatient, research, administrative spaces, central utility plant, visitor parking, and staff parking.

- Buildings range in age from **4** years to **94** years.

CCHMC BURNET CONCOURSE WAYFINDING

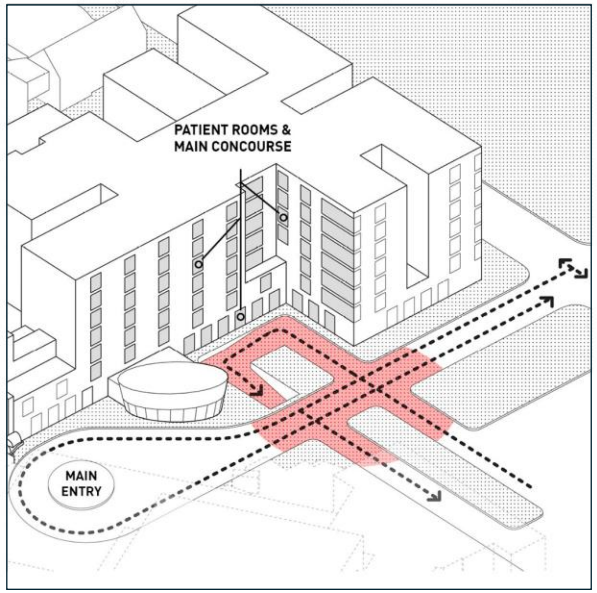




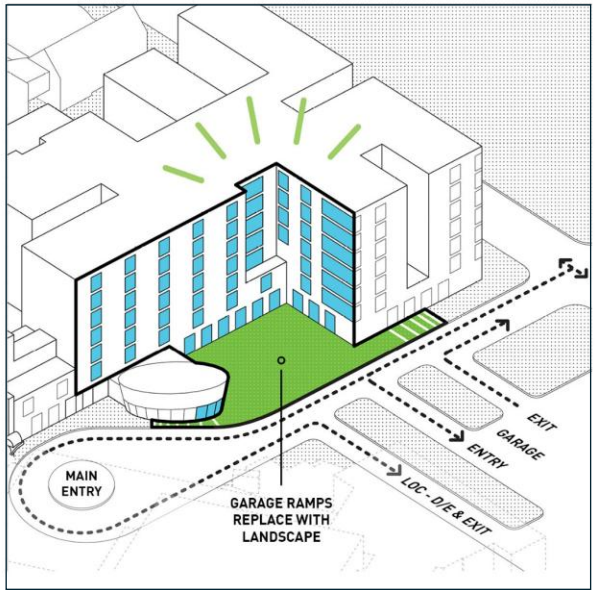
- Originally connected Locations A through D
- In June of 2024 the leg to Loc G was added

- Wayfinding cues: location letters, location colors, and location animals
- Seek and find engagement

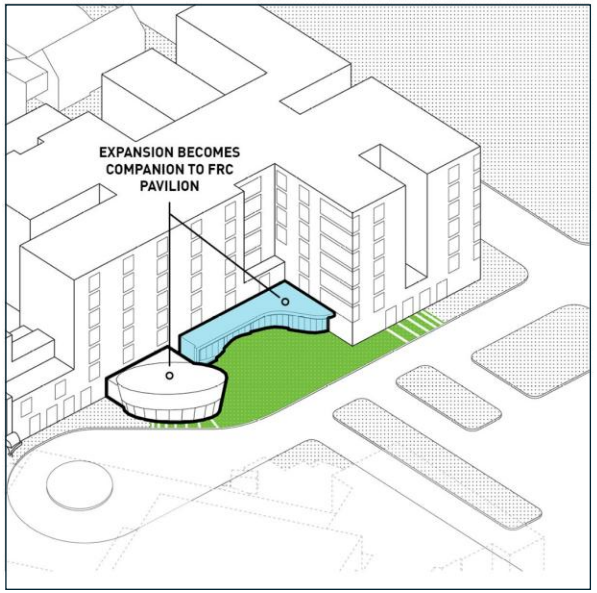
ARRIVAL FLOW & LOC A ENTRANCE EXPANSION



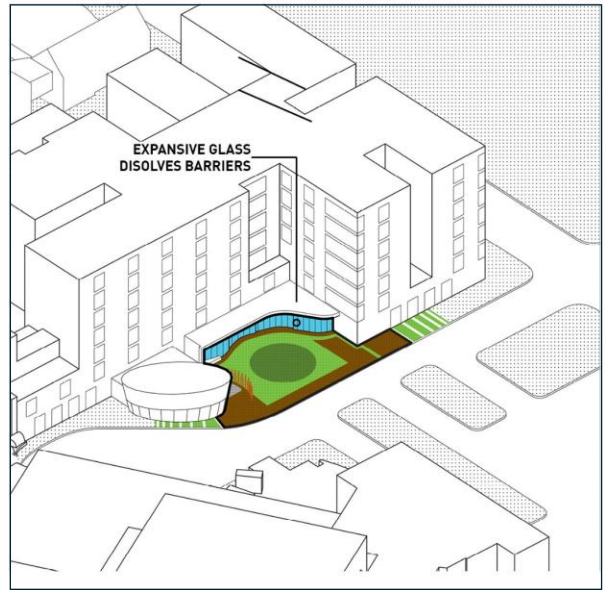
Stressful Circulation
/Patients & Visitors Lack Landscape



Improved Site Circulation
& Restored Connection to Landscape



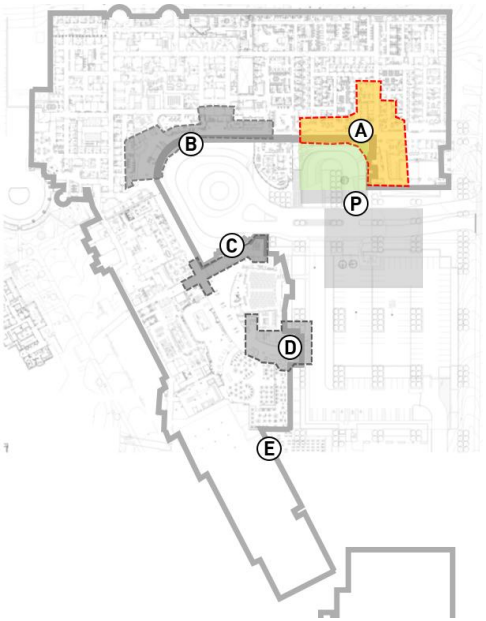
Concourse at Main Level
Expands to Reduce Internal Stresses

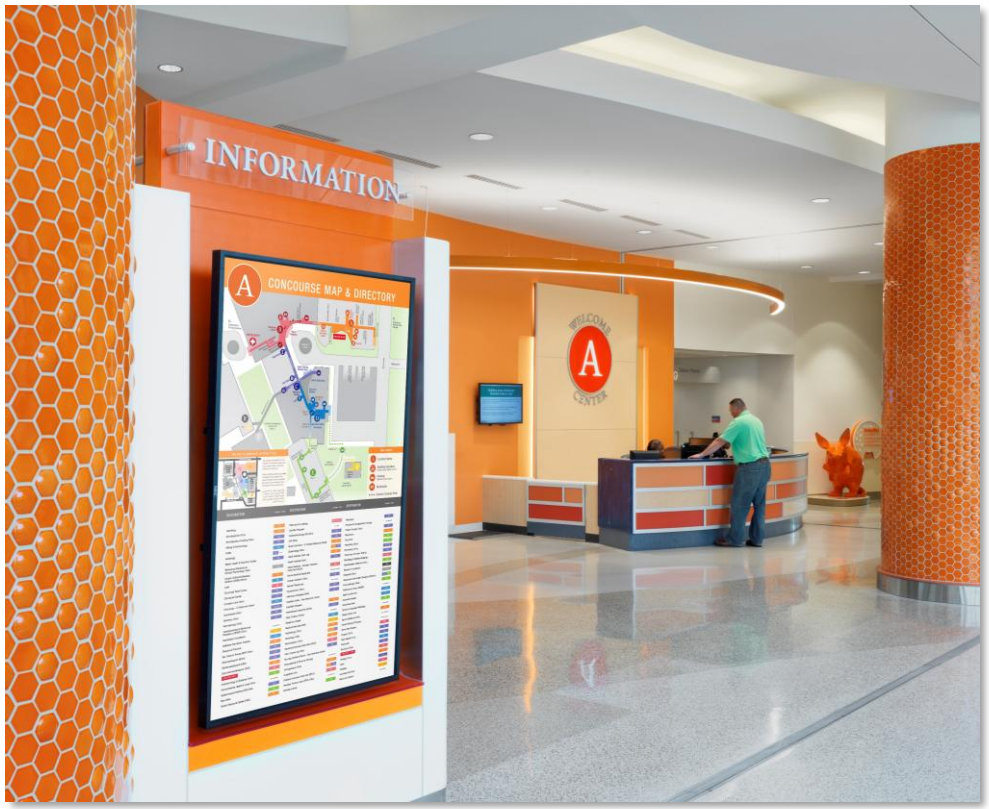


Landscape Created as
Positive Distraction & Focal Point

CONCOURSE AND ENTRANCE IMPROVEMENT

Loc A Expansion

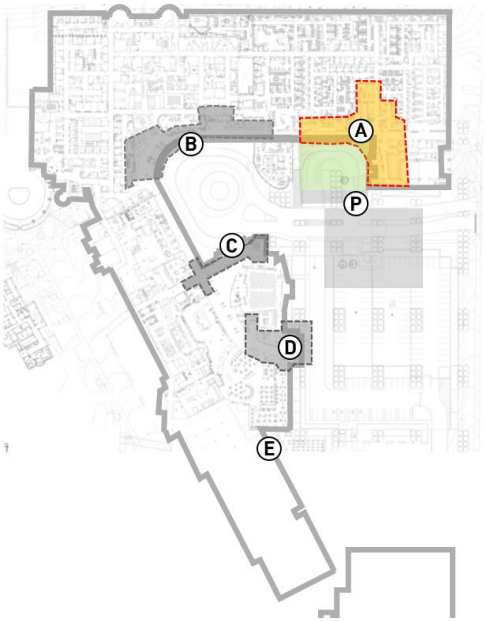




**Artwork and patient experience co-designed with Kolar Design.*

CONCOURSE AND ENTRANCE IMPROVEMENT

Loc A Expansion



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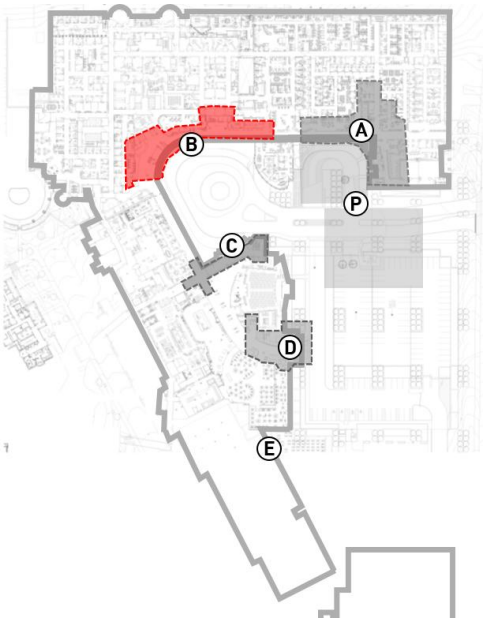
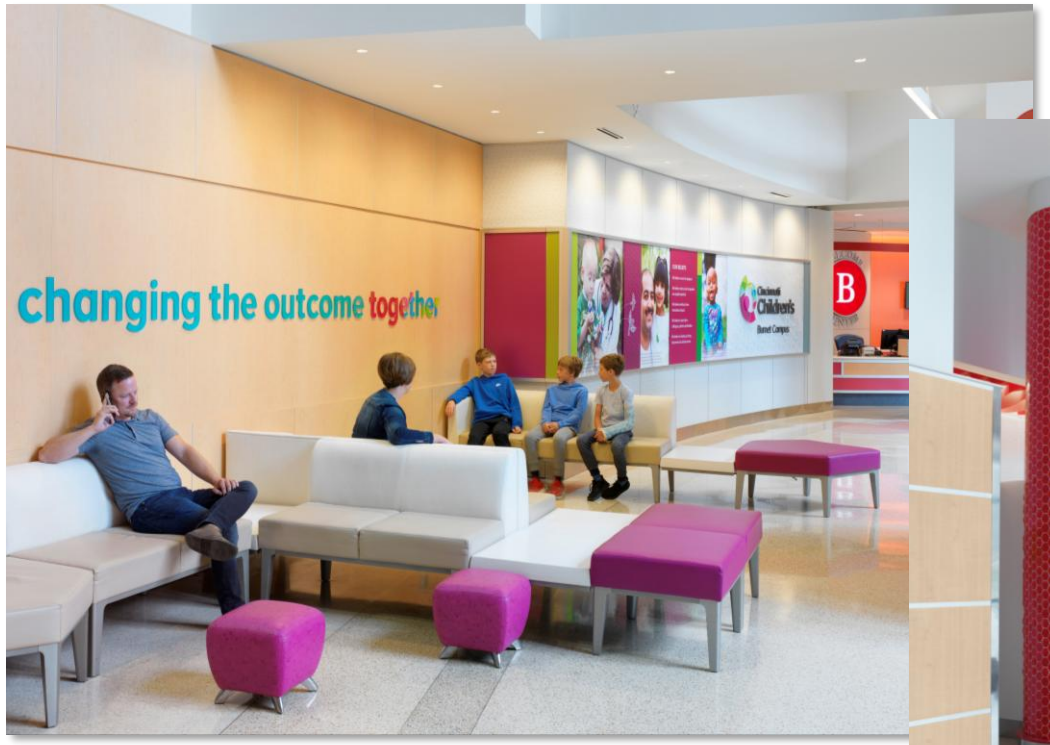
CONCOURSE AND ENTRANCE IMPROVEMENT

Loc B Entrance Lobby

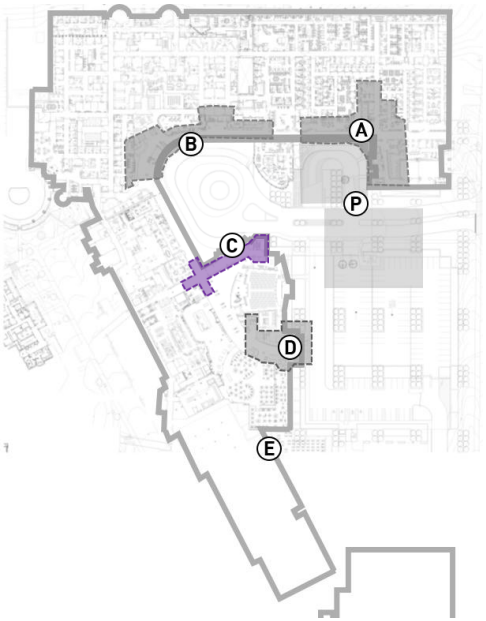




**Artwork and patient experience co-designed with Kolar Design.*

CONCOURSE AND ENTRANCE IMPROVEMENT

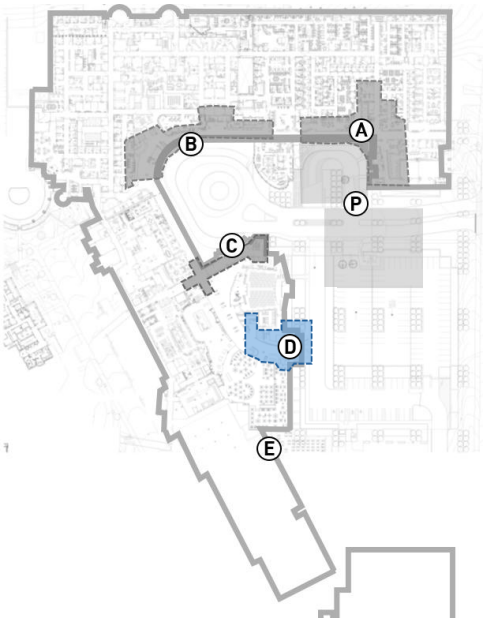
Loc C Entrance Lobby



**Artwork and patient experience co-designed with Kolar Design.*

CONCOURSE AND ENTRANCE IMPROVEMENT

Loc D Entrance Lobby



**Patient experience co-designed with Kolar Design.*

OBJECTIVES AND METHODS

ORIGINAL DESIGN GOALS

- Evaluate the vehicular and pedestrian behavior patterns in the hospital arrival zone, entrances, and the main concourse of the Cincinnati Children's Hospital Medical Center.
- Evaluate the performance of the expanded Location A entrance lobby, which offers spaces and features that support a variety of activities.
- Evaluate various positive distractions and the roles in providing "getting away" opportunities for patients, family, and staff members in the hospital public spaces.

** Original goals co-defined with Kolar Design.*

THEORATICAL FRAMEWORK

Initial Impression

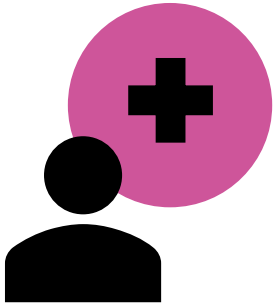
- Hospital arrival zone

Hospital Wayfinding

- Vehicle & pedestrian
- Behavior
- Location
- Route
- Time

Positive Distraction

- Playful features
- Nature
- Art



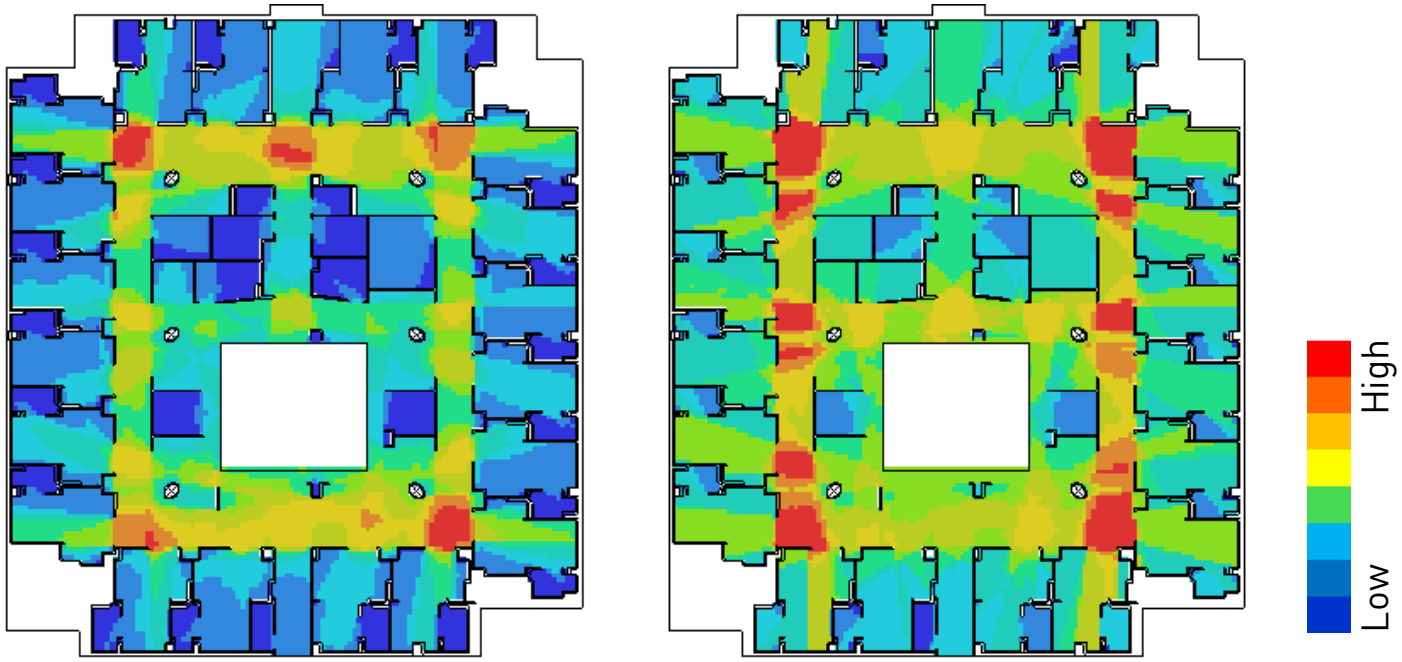
Experience & Behavior

Children user group

- Behavior pattern
- Location
- Head counting
- Time

SPACE SYNTAX

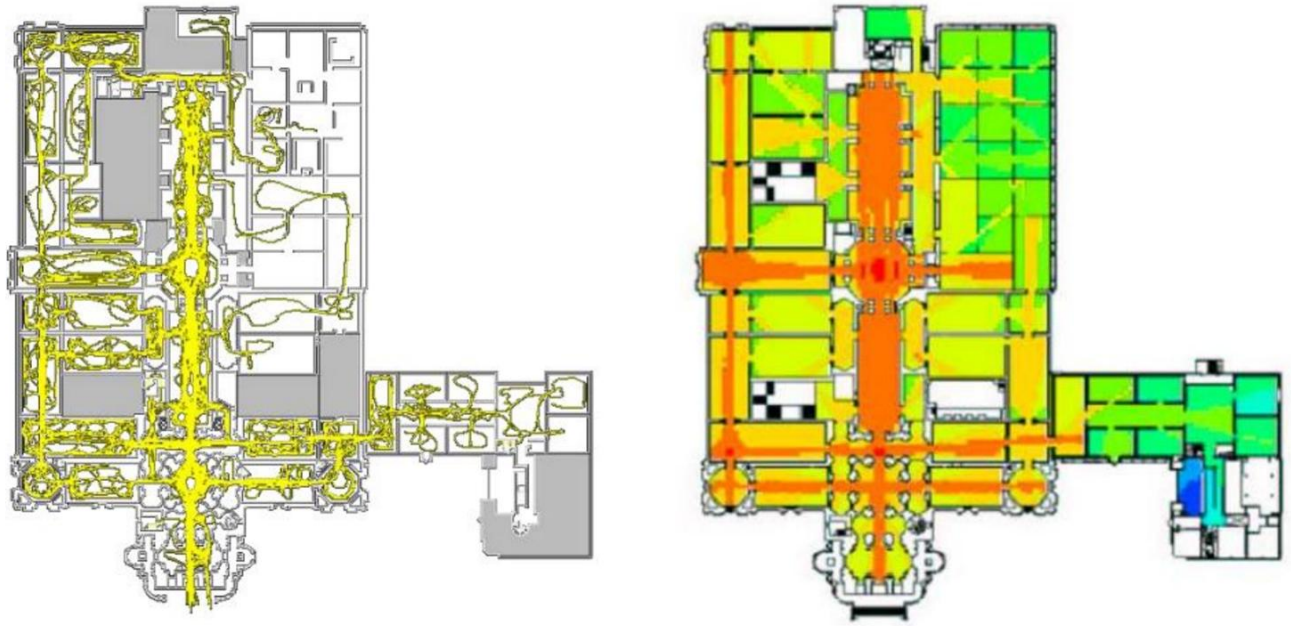
- Space syntax has been effectively used in evaluating spatial configurations in many hospitals, educational campuses, and historic and modern cities.
- Highly visible and integrated spaces are livelier and frequented by more people; segregated spaces have lesser frequent movement (Hillier et al., 1996; Wang & Huang, 2019).
- Connectivity has a clear relationship with wayfinding. Connectivity predicts repeated visits of spaces or paths in cognitive maps (Kuba et al., 2020).



Connectivity **Integration**

SPACE SYNTAX

- In two complex hospital buildings, the total use of lines was best predicted by connectivity (r=.728) and distribution of people was best predicted by integration-3 (r=.779) (Haq & Girotto, 2003).
- Landmarks' visibility significantly affect children's navigation performance in school environment (Attiya & Allani, 2025)



Movement traces of visitors in first 10 minutes of the visit at Tate Britain (left) space syntax analysis (right) (Hillier et al., 1996)

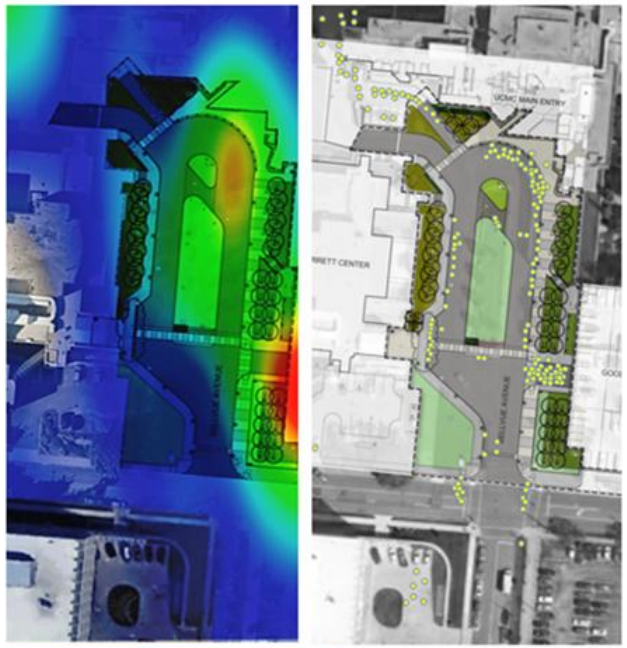
POE PROTOCOL VALIDATION

UC Medical Center Entrance Improvement

Scope: Building Arrival Zone
Traffic Group: Pedestrian

Min Integration: 0.5
Ave Integration: 1.82
Max Integration: 3.33

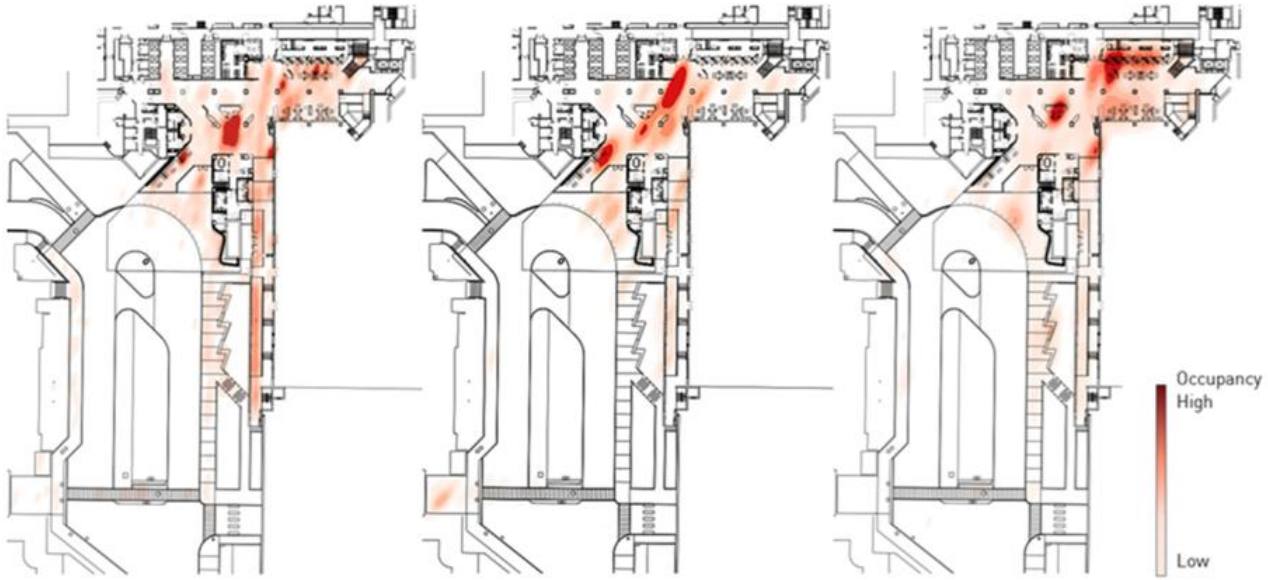
Vehicles



Occupancy High — Low

Vehicle stop location

Pedestrians



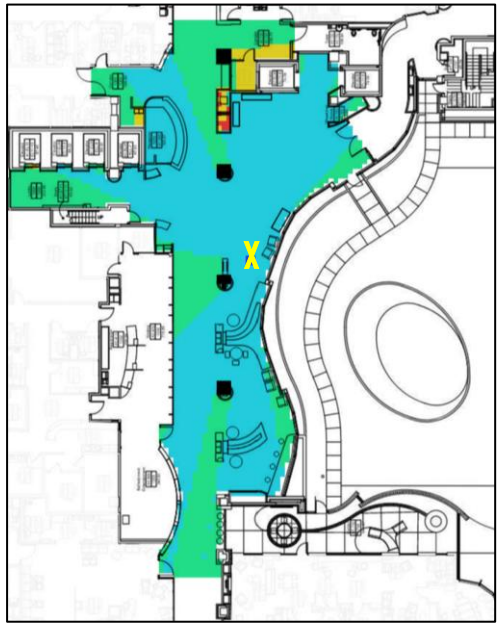
Ambulatory Patient/Visitor (*N* = 1,257) Disabled/Severe Condition (*N* = 106) Hospital Staff (*N* = 733)

Note: Pedestrian traffic volume, movement, and space occupancy within the hospital arrival zone, heatmaps are generated using Python data analytics library based on the onsite observation and behavior mapping of pedestrian behaviors (*N* = 2,096).

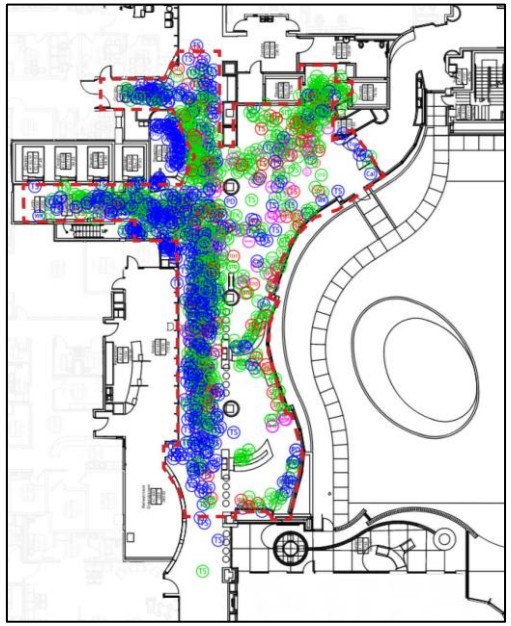
SPACE SYNTAX ANALYSES FOR CCHMC LOC A

Visual Integration

Accessibility



Visual Steps



Correlation with Behaviors

- **Space Syntax Analyses** of CCHMC Loc A entrance lobby spatial configurations focused on children's interaction with various positive distractions (e.g., table and chair, statues, wall art, textured columns, and window views of nature).

DATA ANALYSIS AND FINDINGS

AN INTEGRATED POE PROTOCOL

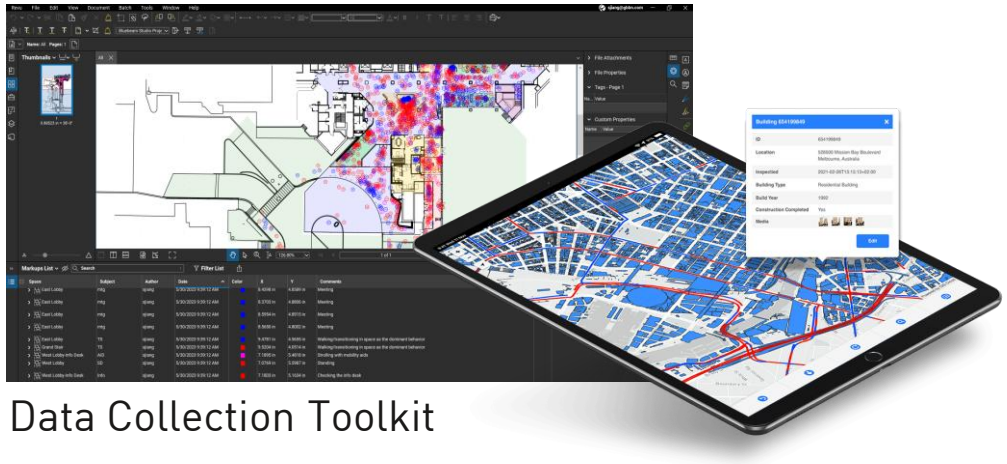
34 Total hours of behavioral data, including **8** hours vehicle shadowing and **24** hours pedestrian behavior mapping

3 Data collection trips covering typical workdays and business hours

3 Researchers collected field data

1 External research expert consulting

Peer-reviewed Research Protocol

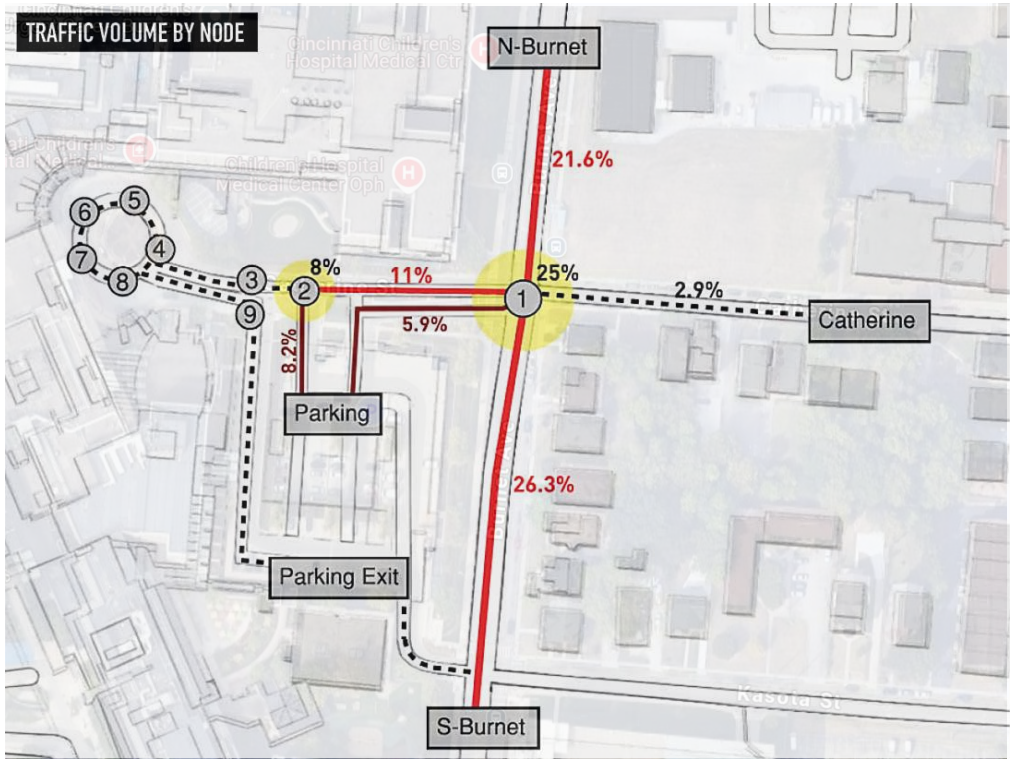


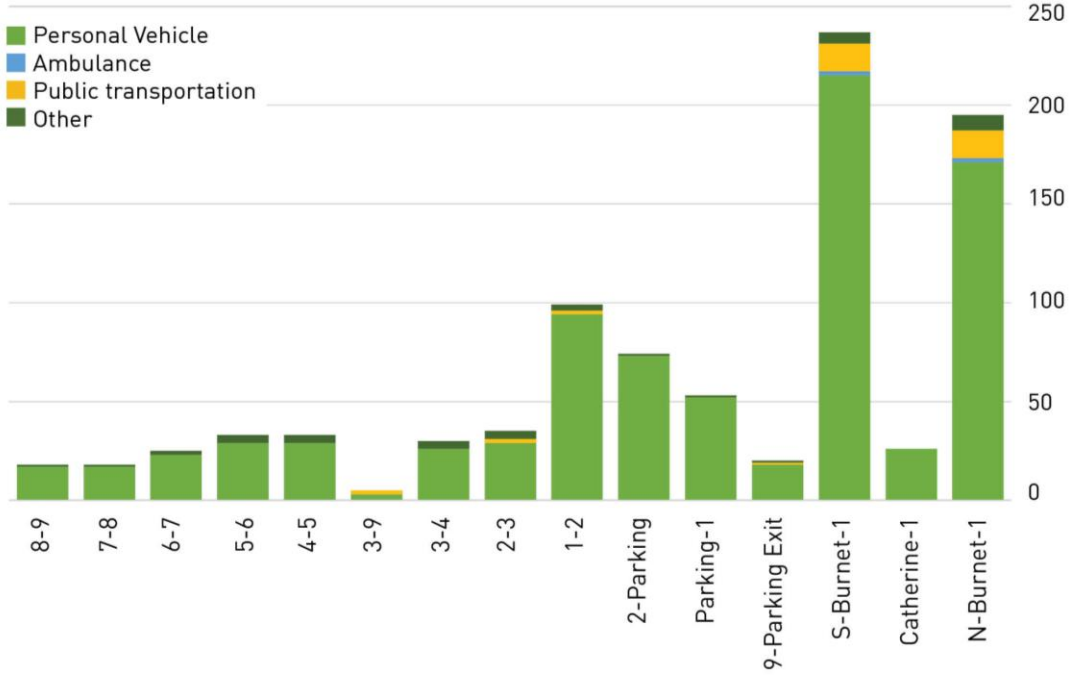
Data Collection Toolkit

OBSERVATIONAL STUDY

Vehicular Traffic Volume

- For inbound traffic flow into the arrival zone, 4.7% more vehicles entered from the south side of Burnet Ave than from the north. Regarding internal traffic flow, route segment 1-2 experienced the highest volume (11%). Paths connected to **parking are key decision-making** areas.

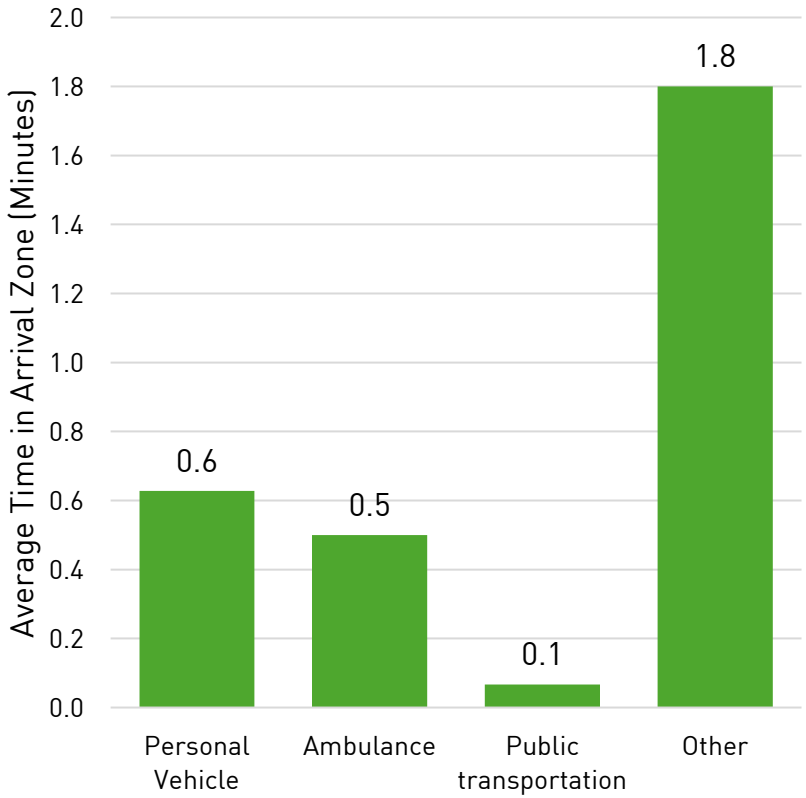




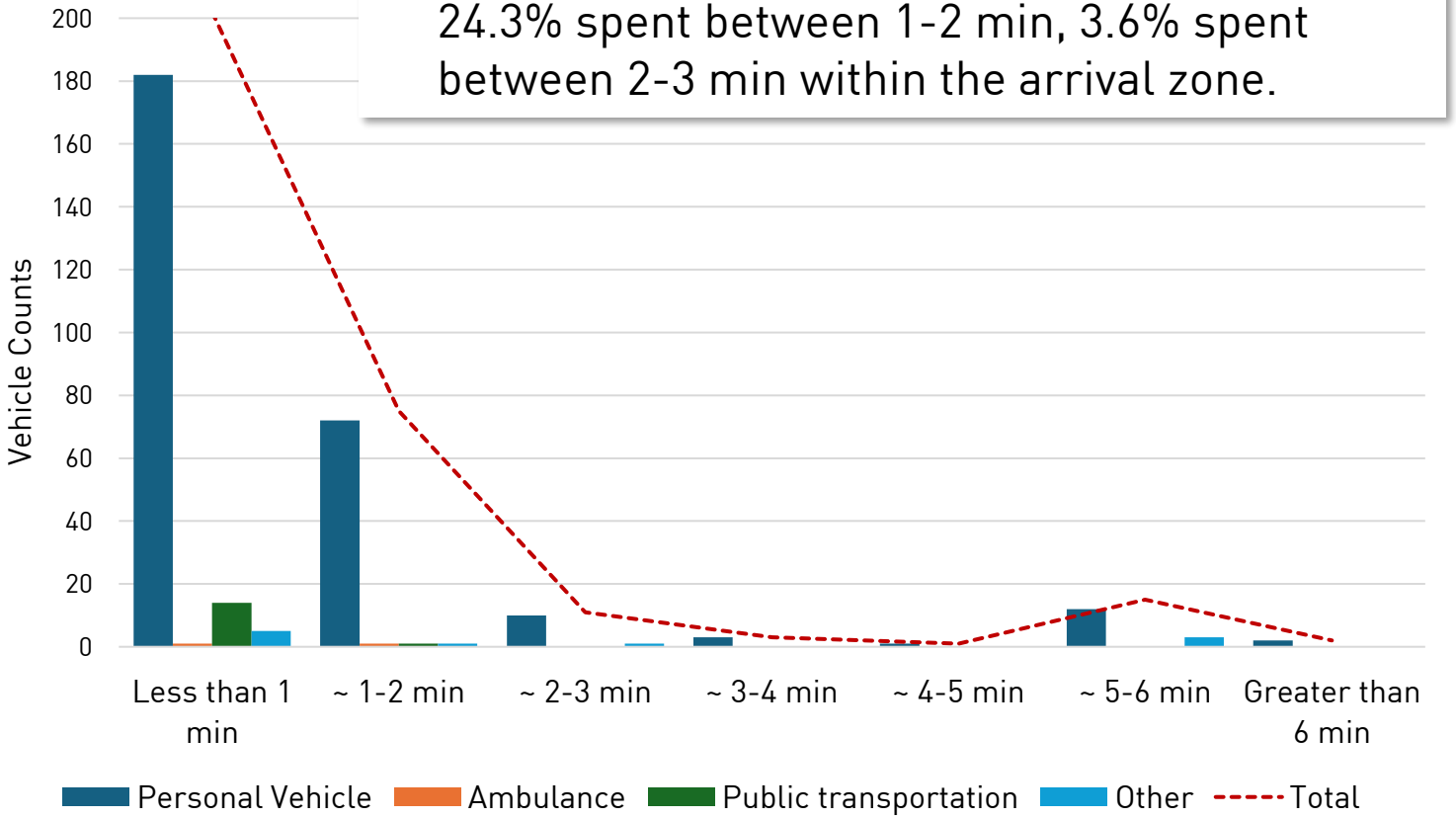
**Every 5th vehicle was shadowed for up to 6 minutes during each observational interval; each observational interval was 45 minutes.*

OBSERVATIONAL STUDY

Time Factors

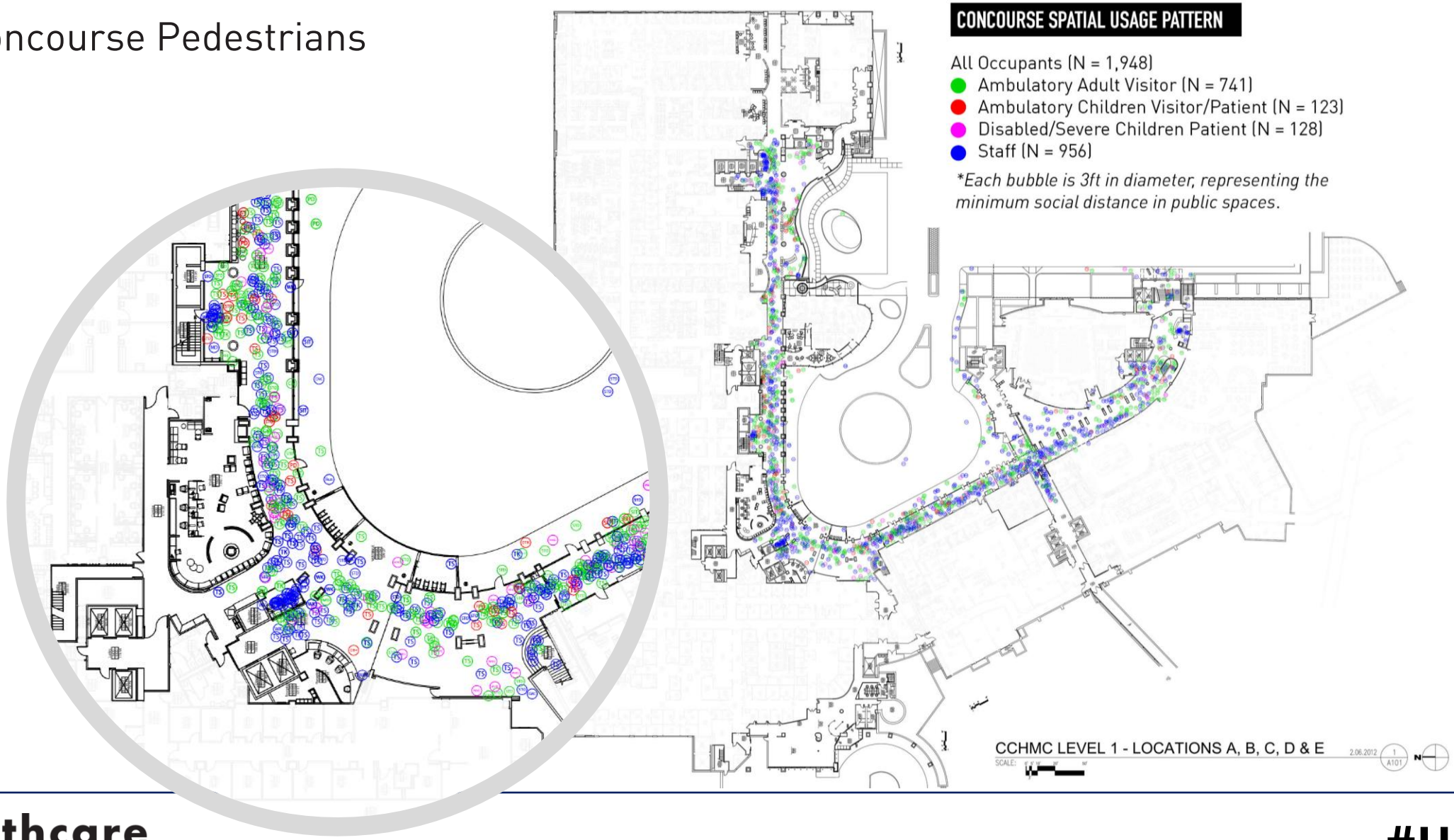


- **89.7%** of vehicles spend less than 2 minutes to either park or move through the arrival zone. Totally, **65.4%** vehicles spent less than 1 min, 24.3% spent between 1-2 min, 3.6% spent between 2-3 min within the arrival zone.



OBSERVATIONAL STUDY

Concourse Pedestrians



OBSERVATIONAL STUDY

Concourse Users

Staff Member

Adult Visitor

1.3 : 1

Staff members were the top-ranked users of the concourse, about 1.3 times the number of adult visitors who utilized the concourse space.

Adult Visitor

Children Visitor

3 : 1

Ambulatory adult visitors are frequent users of the concourse space, about 3 times of total children visitors.

Ambulatory Children

Disabled Children

1 : 1

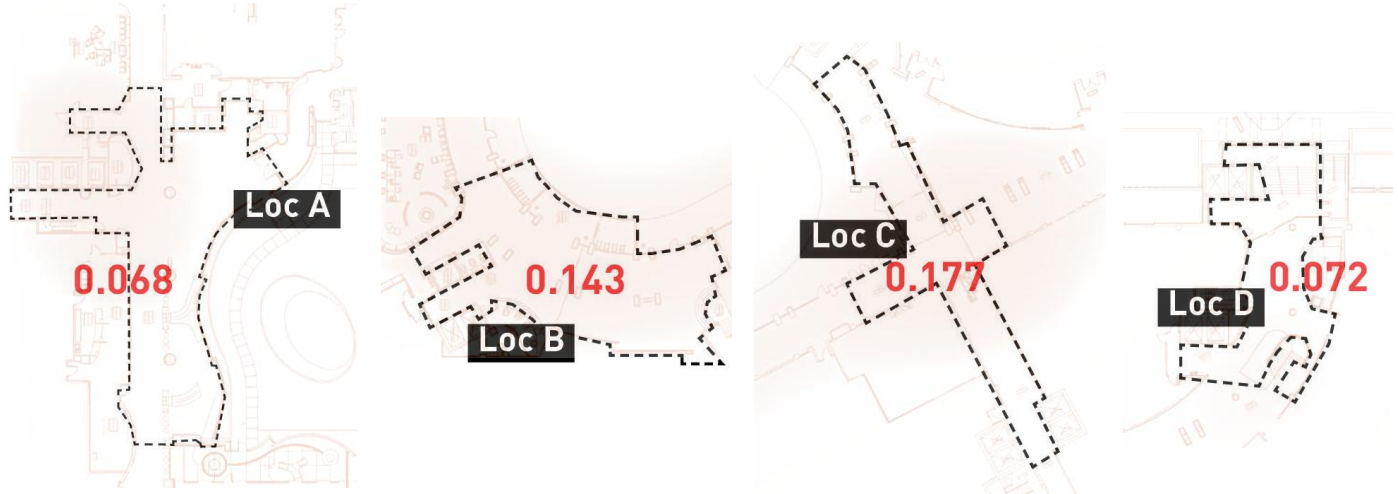
The proportion of disabled children to ambulatory children in the concourse is approximately equal.

OBSERVATIONAL STUDY

Concourse Occupancy Density

Loc C Intersection and Gift Shop

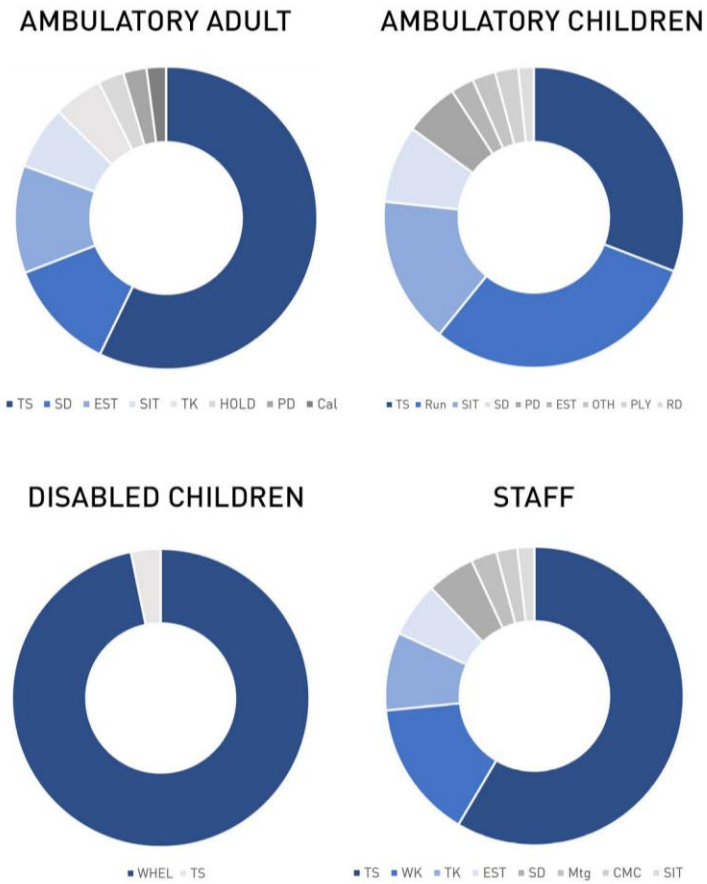
- Loc C entrance had the highest occupancy density factor (0.177), while Loc A had the lowest (0.068).
- Occupancy Density = Average Traffic Flow within a timeframe / Area SQFT.



OBSERVATIONAL STUDY

Diverse Behaviors

- Approximately 51% of behaviors were related to movement and transition; 7.4% of occupants were standing, and 4.4% were sitting in the concourse.
- Around 7.2% of occupants required escorting, and 6.2% needed a wheelchair or stretcher during transitions.
- Conversations and socialization accounted for 6%, including in-person meetings (1.3%) and phone calls (1.2%).

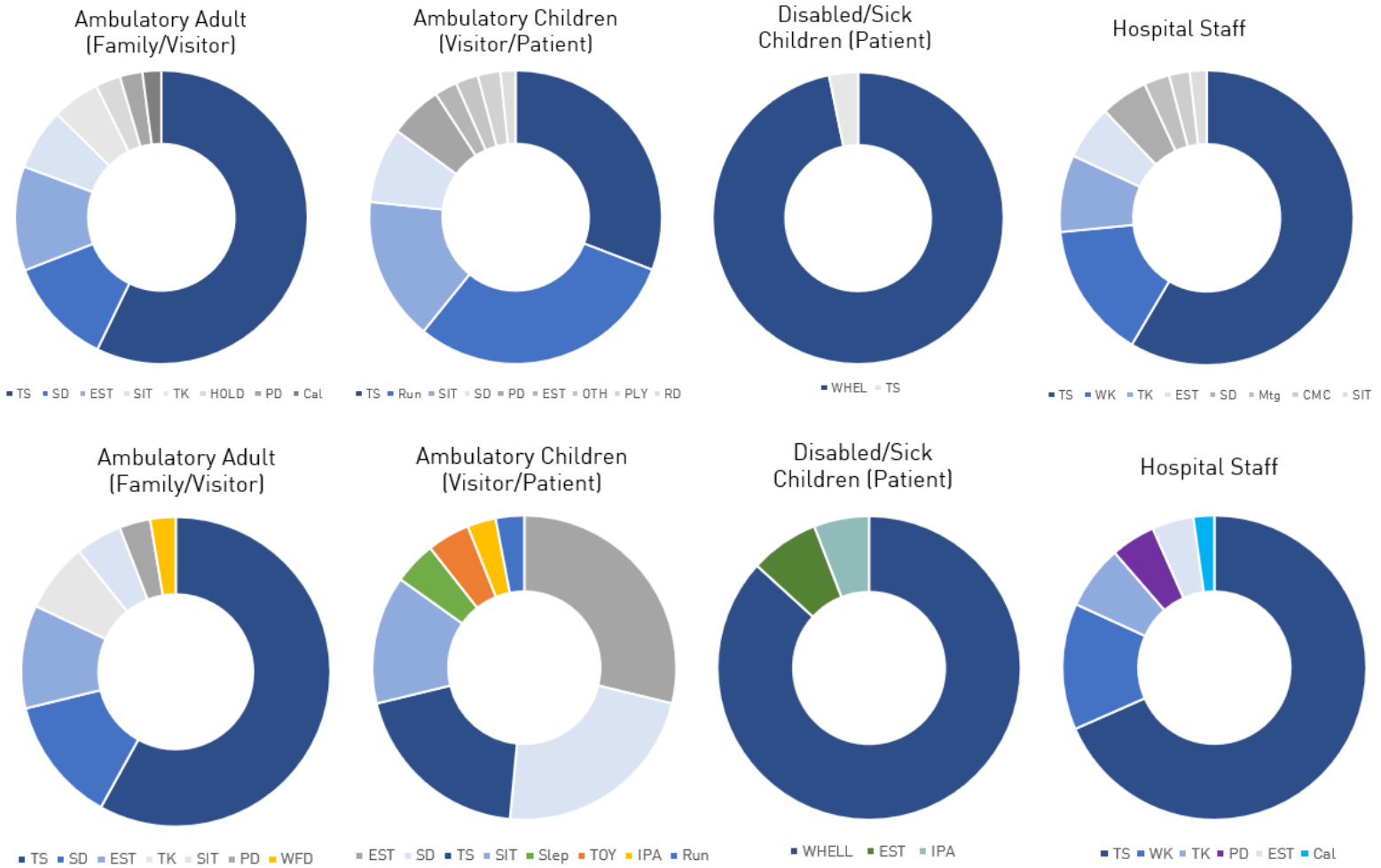


95% Topmost Behaviors by User Group (Concourse)

BEHAVIOR	COUNT	%
Transit (TS)	994	51.0
Stand (SD)	144	7.4
Escort (EST)	141	7.2
Staff at work (WK)	138	7.1
In wheelchair (WHEL)	120	6.2
Talk (TK)	117	6.0
Sit (SIT)	85	4.4
Run (Run)	37	1.9
Use digital device (PD)	35	1.8
Group meeting (Mtg)	26	1.3
Phone call (Cal)	24	1.2
Clean/Maintenance (CMC)	21	1.1
Hold a baby (HOLD)	20	1.0
Wayfinding (WFD)	15	0.8
Eat or have a meal (EAT)	7	0.4
Read hardcopies (RD)	5	0.3
Interaction with physical features (IPA)	4	0.2
Other activities (OTH)	4	0.2
Providing medical care (MD)	3	0.2
Play (PLY)	3	0.2
Smoke (SMK)	2	0.1
Play with own toy (TOY)	2	0.1
Use a walking aid (AID)	1	0.1
TOTAL	**1,948**	**100**

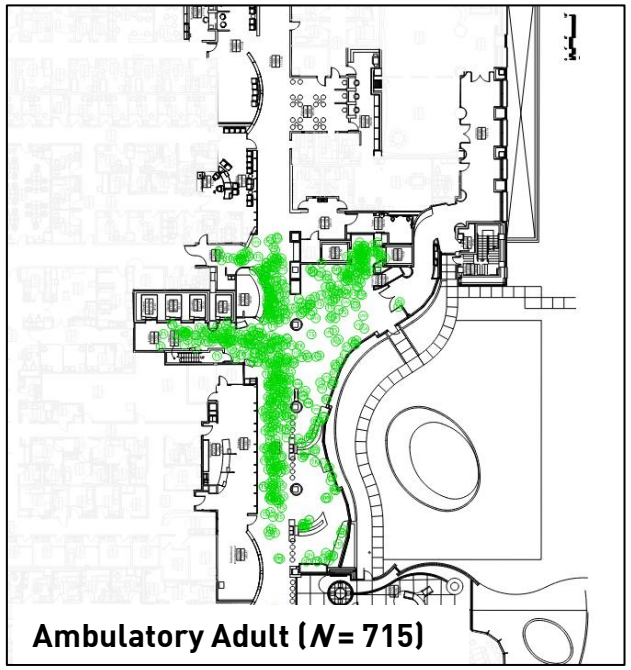
OBSERVATIONAL STUDY

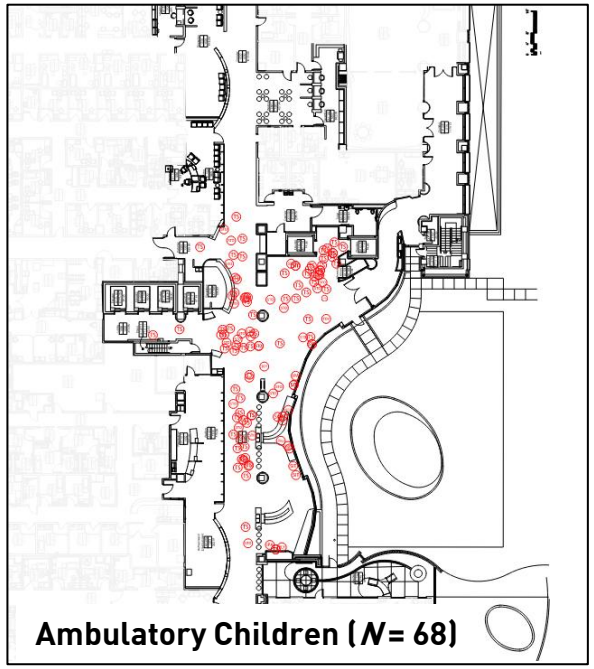
Location A vs. Concourse General

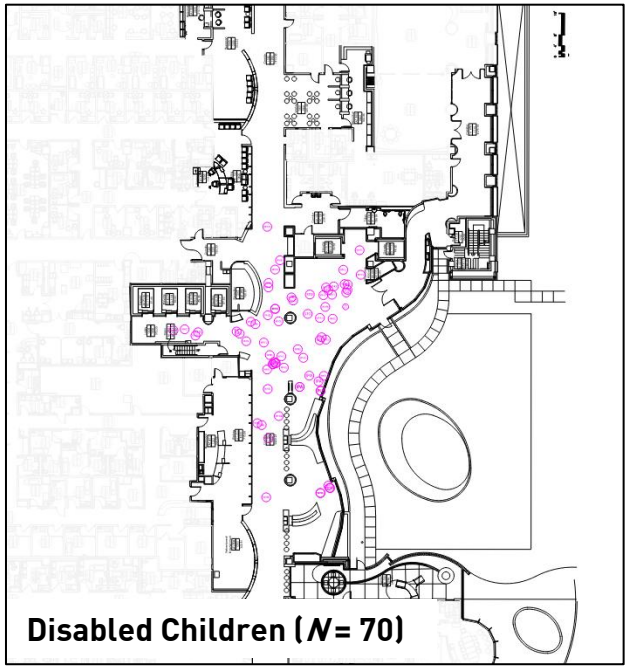


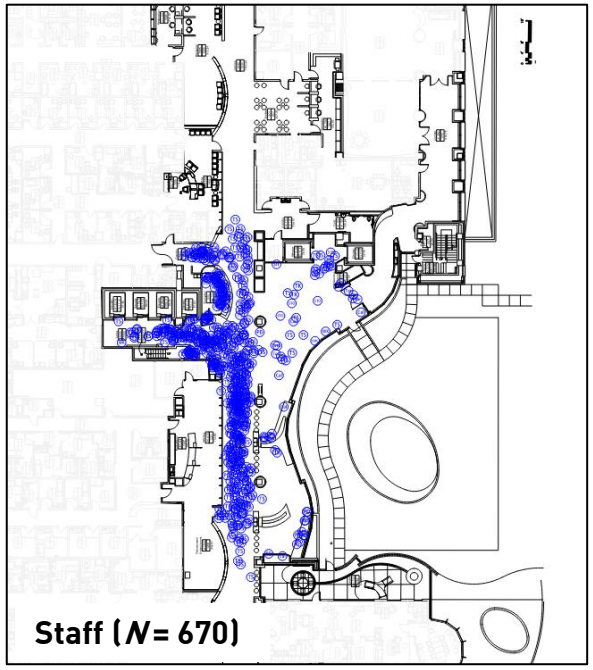
OBSERVATIONAL STUDY

Location A Lobby Occupancy Pattern









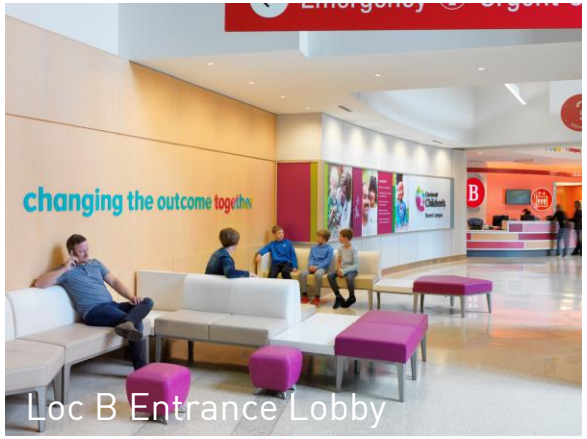
Location A Lobby Occupancy Pattern

OBSERVATIONAL STUDY

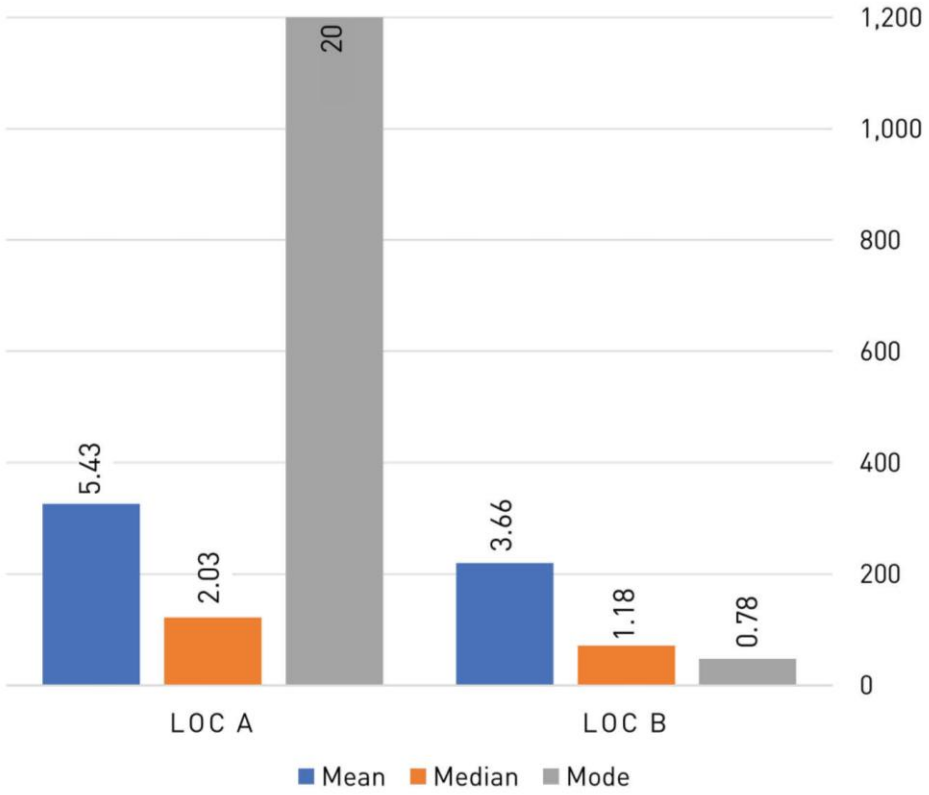
Events Time

- A total of 80 events randomly selected from either Loc A or Loc B entrance lobby; 159 people were tracked in those events
- Each event was shadowed and timed (up to 20 mins.)


Loc A Entrance Lobby



Loc B Entrance Lobby



** An event is defined as a single person or a group of people staying in the space for longer than 10 seconds and exhibiting behavior other than simply transiting. Time unit: minutes.*

POSITIVE DISTRACTIONS

*Artwork and patient experience was co-designed with Kolar Design.

SPACE SYNTAX ANALYSES

Positive Distractions Perception by Age Groups

Positive Distractions	Strollers & Wheelchairs (26")		Toddlers (34")	
	Visual Integration	Visual Connectivity	Visual Integration	Visual Connectivity
Armadillo Statue	17.4	6631	18.6	7120
Wall Art	10.5	746	10.7	797
Texture Column	11.4	1638	12.3	2178
Information Board	14.7	4322	17	5483
Curvy Bench	12.5	3047	16.1	5322
Nature Views	19.7	9446	26.5	10614

Methodology Innovation:

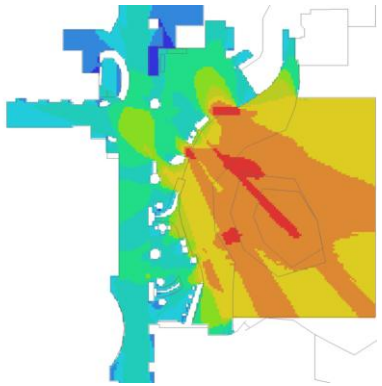
- Different age groups (infancy through adolescence) have different preferences of hospital designs
- Different age groups might have different visual experiences depending on their heights

Positive Distractions	Preschoolers (42")		Schoolage (50")		Adults (64")	
	Visual Integration	Visual Connectivity	Visual Integration	Visual Connectivity	Visual Integration	Visual Connectivity
Armadillo Statue	22.6	8580	64.4	14783	64.4	14783
Wall Art	20.9	8413	47.6	13711	47.6	13711
Texture Column	14.4	3922	21.1	5578	21.1	5578
Information Board	20.9	7222	31.4	8844	31.4	8844
Curvy Bench	34.7	11964	53.6	14078	53.6	14078
Nature Views	38.4	12940	63.3	14780	63.3	14780

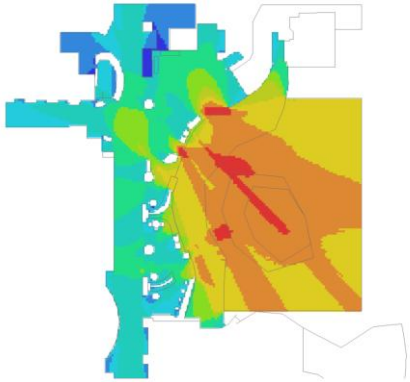
SPACE SYNTAX ANALYSES

Visibility Study by Age Group and Height

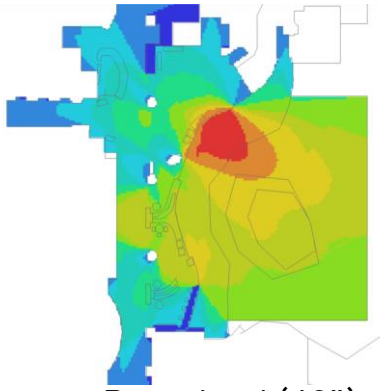
Visual Integration



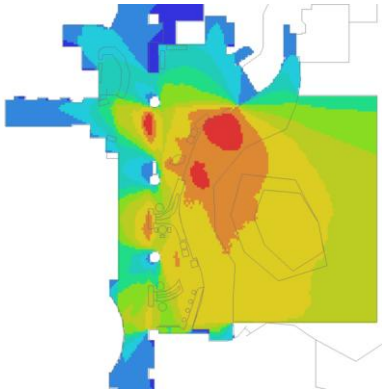
Strollers/Wheelchairs (26")



Toddler (34")

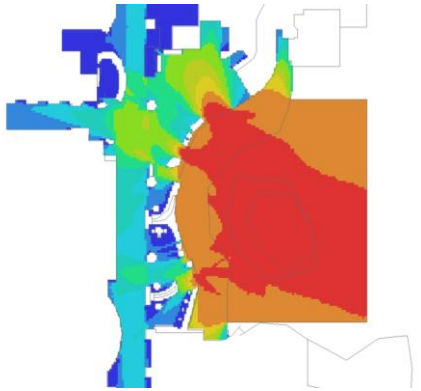


Preschool (42")

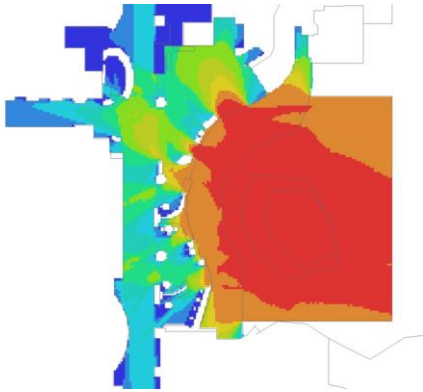


School age and older (50" and above)

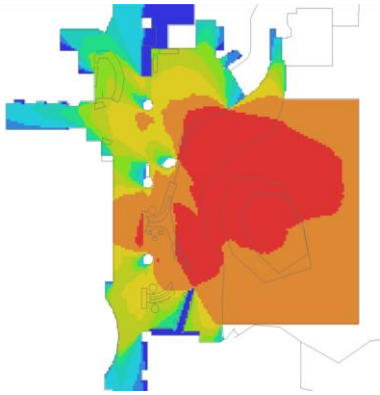
Visual Connectivity



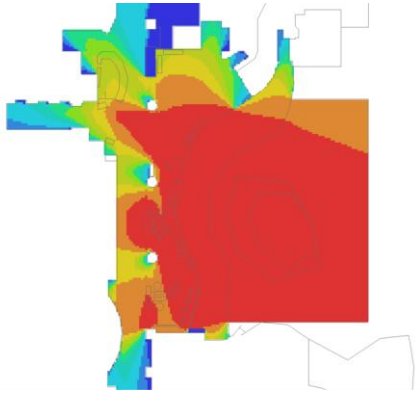
Strollers/Wheelchairs (26")



Toddler (34")



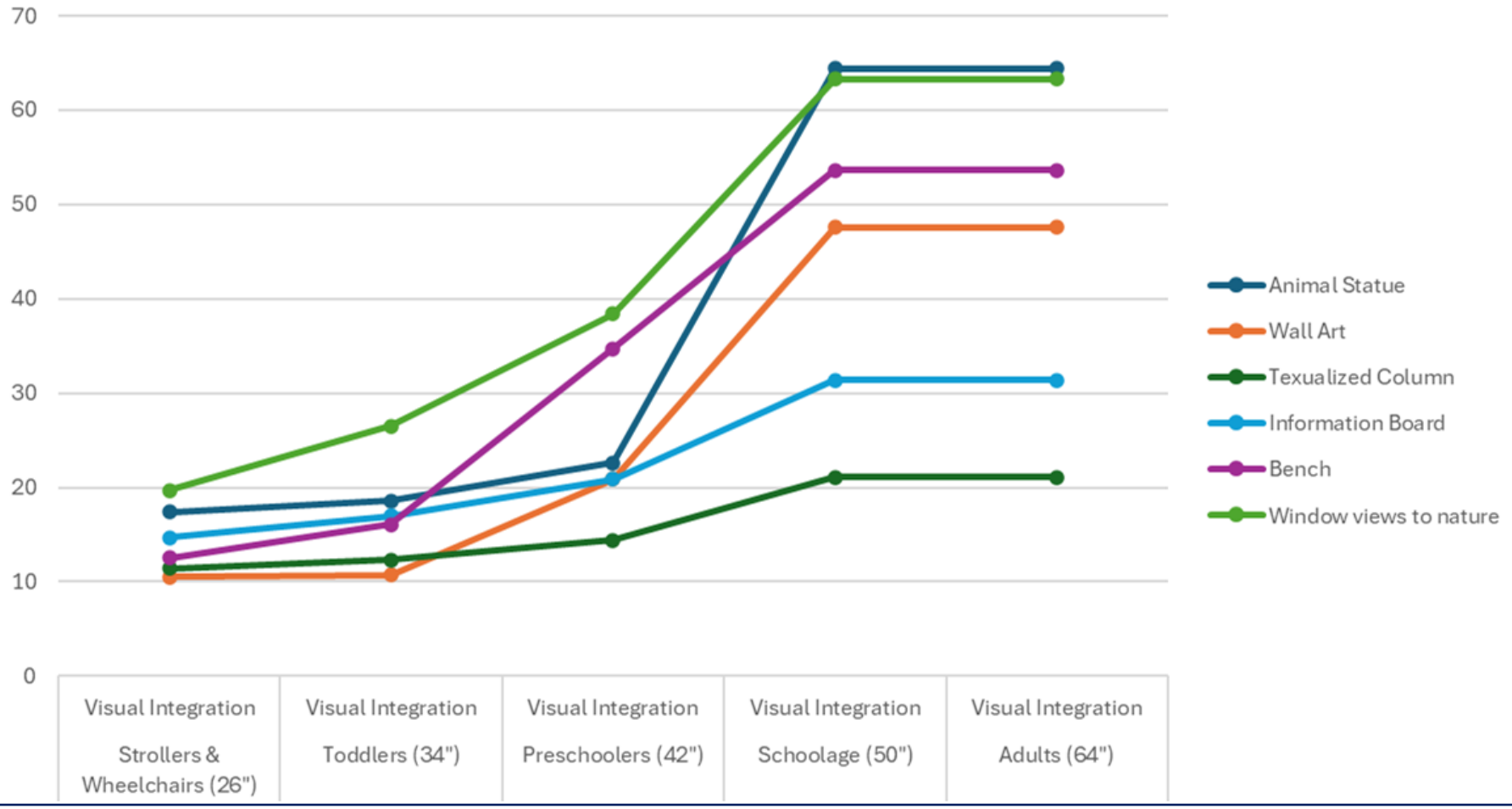
Preschool (42")



School age and older (50" and above)

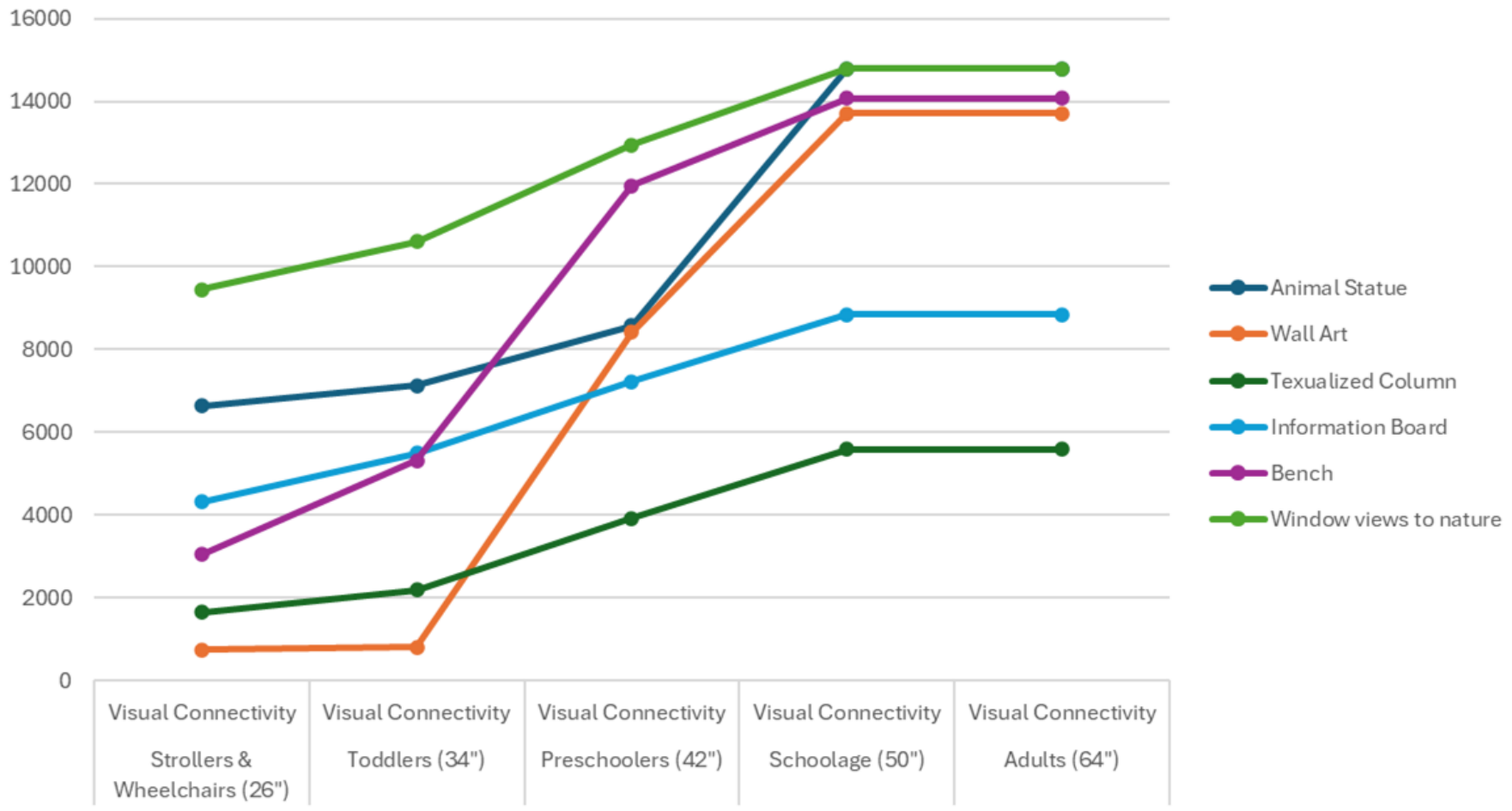
SPACE SYNTAX ANALYSES

Visual Integration of Positive Distractions Based on Ager Groups and Heights



SPACE SYNTAX ANALYSES

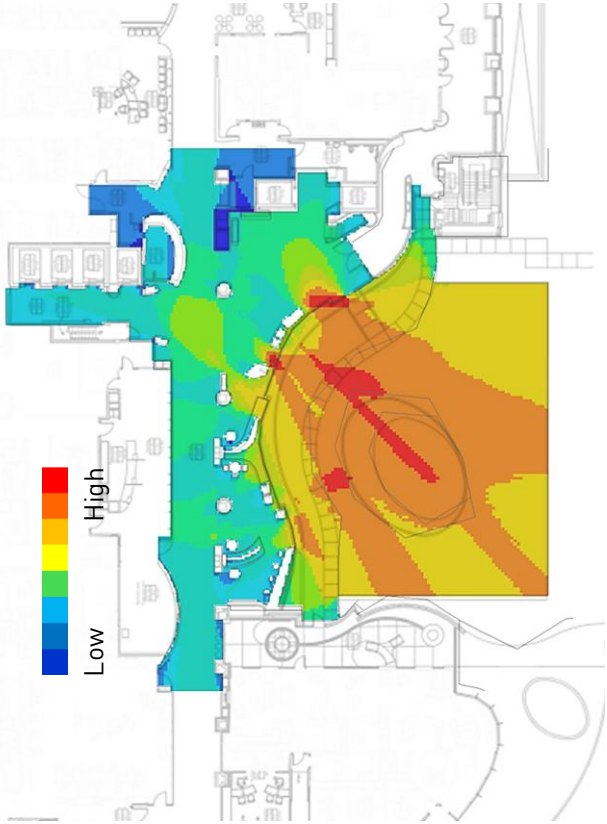
Visual Connectivity of Positive Distractions Based on Ager Groups and Heights



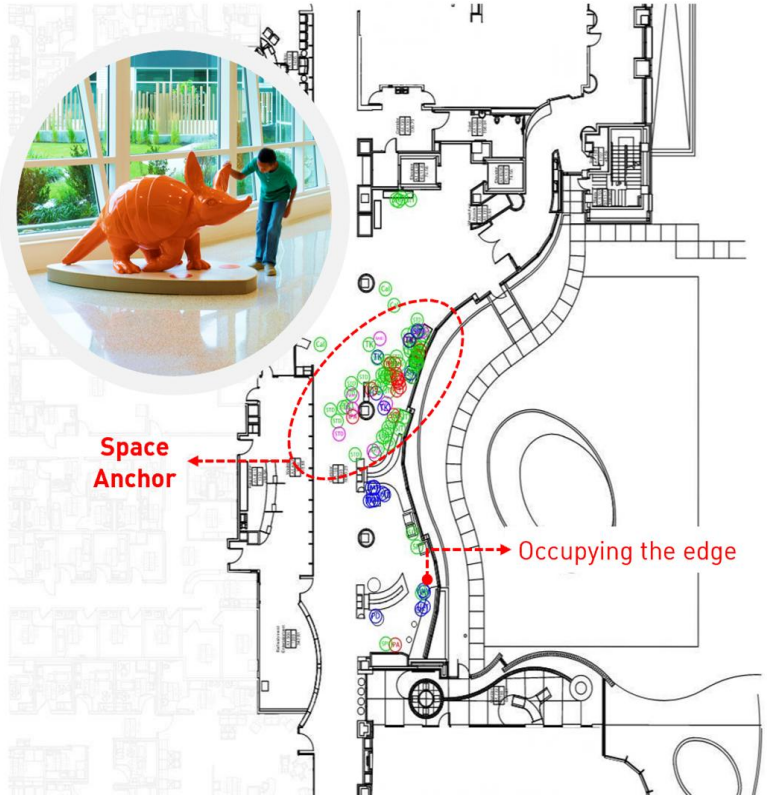
SPACE SYNTAX ANALYSES

Validation

- For child visitors seated in a wheelchair or stroller, their presence near positive distractions showed a **significantly strong correlation** with both the visual integration ($r = .95$, $p = .003$) and the visual connectivity ($r = .94$, $p = .006$).



Space Syntax Analyses



Observational Data

DESIGN IMPLICATIONS

KEY TAKEAWAYS

You need a space anchor!

- Arrival experience should consider both vehicular and pedestrian behaviors.
- The expanded Loc A entrance lobby calmed young children and offered “getting away” opportunities to staff and family members.
- Visibilities of positive distractions vary by their strategic locations.
- Design should consider children’s ages and heights to maximize visibility of positive distractions or hide undesirable features.
- The flip side: consider hygiene strategies at high tough zones and think through the patient safety and human factors lenses.

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- GBBN Architects (Architecture and Interior design)
- Kolar Design (Patient experience, wayfinding and environmental graphics)
- KFI Engineers (FKA Fosdick & Hilmer Engineering)
- THP Limited
- The RCF Group
- Messer Construction

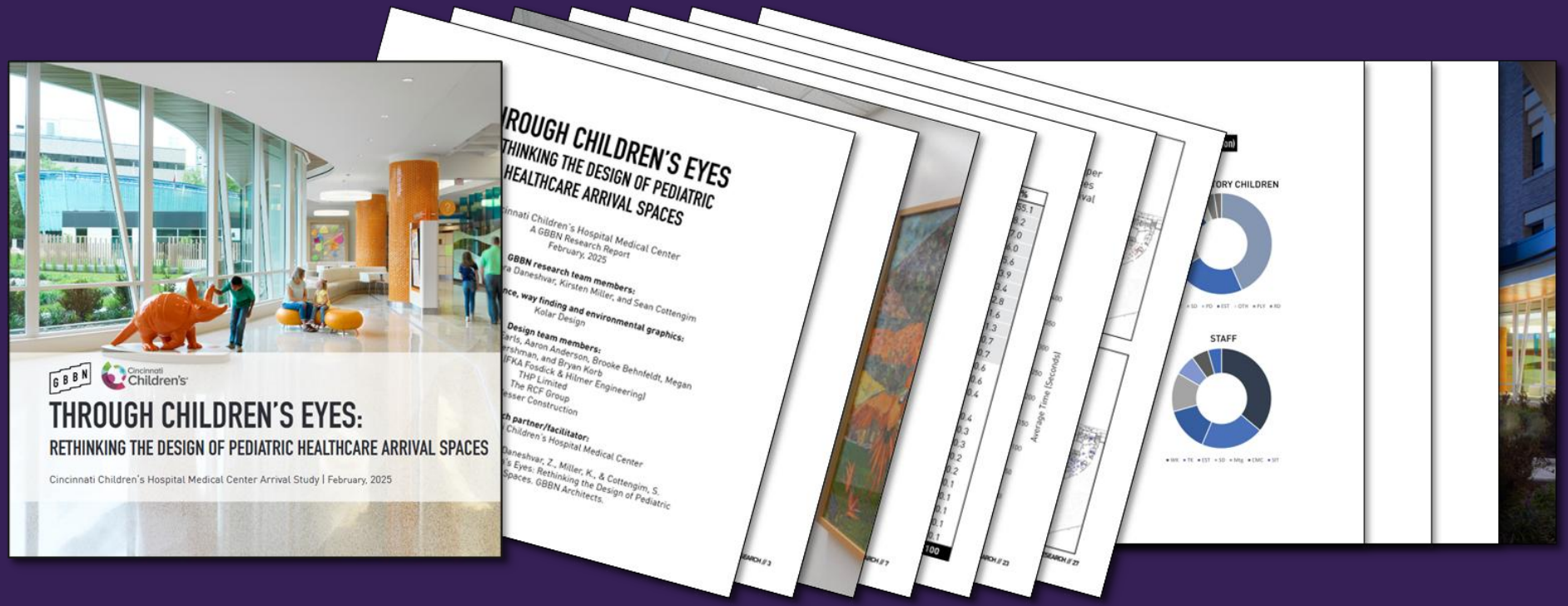
GBBN Research Team:

- Zahra Daneshvar, Kirsten Miller, and Sean Cottengim

Healthcare Facility Support:

- Doug Chamber, AVP Facilities, UC Medical Center
- Jon Hornung, Sr. Project Manager, Design & Construction Department
- Jason Luthy, Director of Space Planning at Cincinnati Children's Hospital Medical Center

FULL POE REPORT FORTHCOMING!



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