



COLLECTING DATA AT A LARGE EVENT

NATMEC Conference 2016



Presentation Overview

- Project Overview
- Data Collection Methods
- Data Results
- Pedestrian Observations
- Lessons Learned



Project Scope – Lucas Museum of Narrative Art

1. Collect “Typical Day” vehicle data on Museum Campus (Weekend and Weekday)
2. Assess “Event Day” traffic impacts for NFL game
3. Adjust data from collection period to peak month
4. Prepare Traffic Impact Study
5. Evaluate pedestrian and bicycle routes



Data Collection Methods

Data Collection – Vehicle Data

- Typical Day
 - No constraints
 - November
 - Conference Traffic



Data Collection – Vehicle Data

- Event Considerations
 - High volumes
 - Short Duration
 - Potential Gridlock
 - Low Speeds
 - Contra-flow lanes



Data Collection – Pedestrians

- Typical Day

- Park users
- Museum Visitors
- Wide pathways



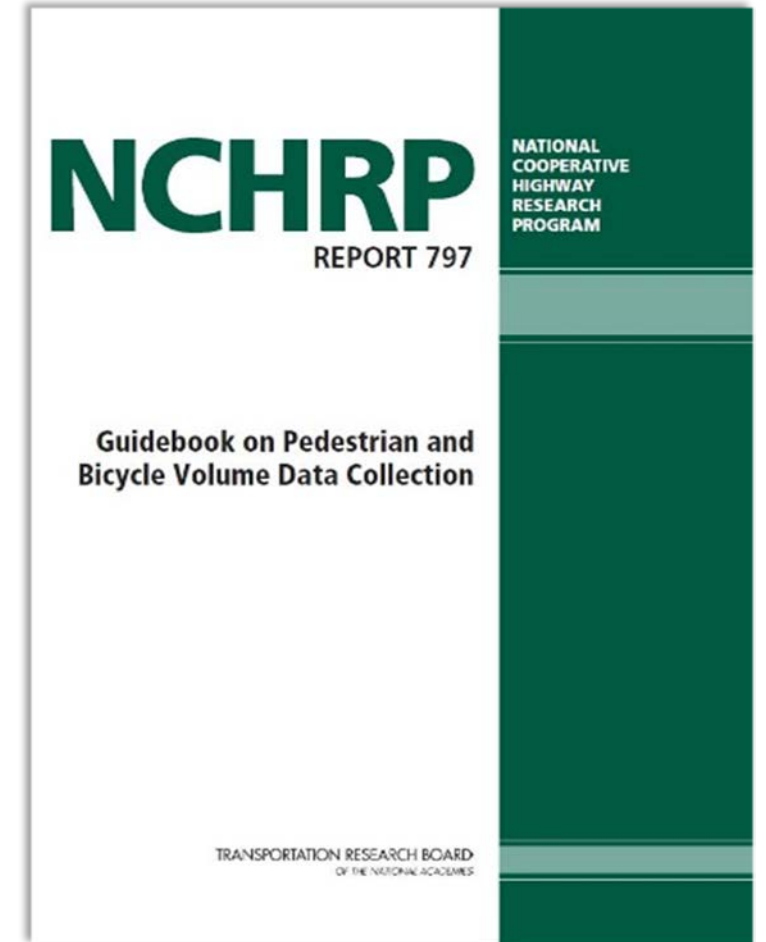
- Event Day

- Large Platoons
- Controlled Crossing Locations
- Wide pathways
- Densely packed groups



Data Collection – Equipment Technologies*

- Manual counts (field)
- Manual counts (video)
- Automated counts (video)
- Pneumatic tubes
- Inductive loop detectors
- Passive infrared
- Active infrared
- Piezoelectric strips
- Radio beams
- Thermal
- Laser scanners
- Pressure and acoustic pads
- Magnetometers
- Fiber Optic pressure sensors



*Source: NCHRP Report 797 – Chapter 5

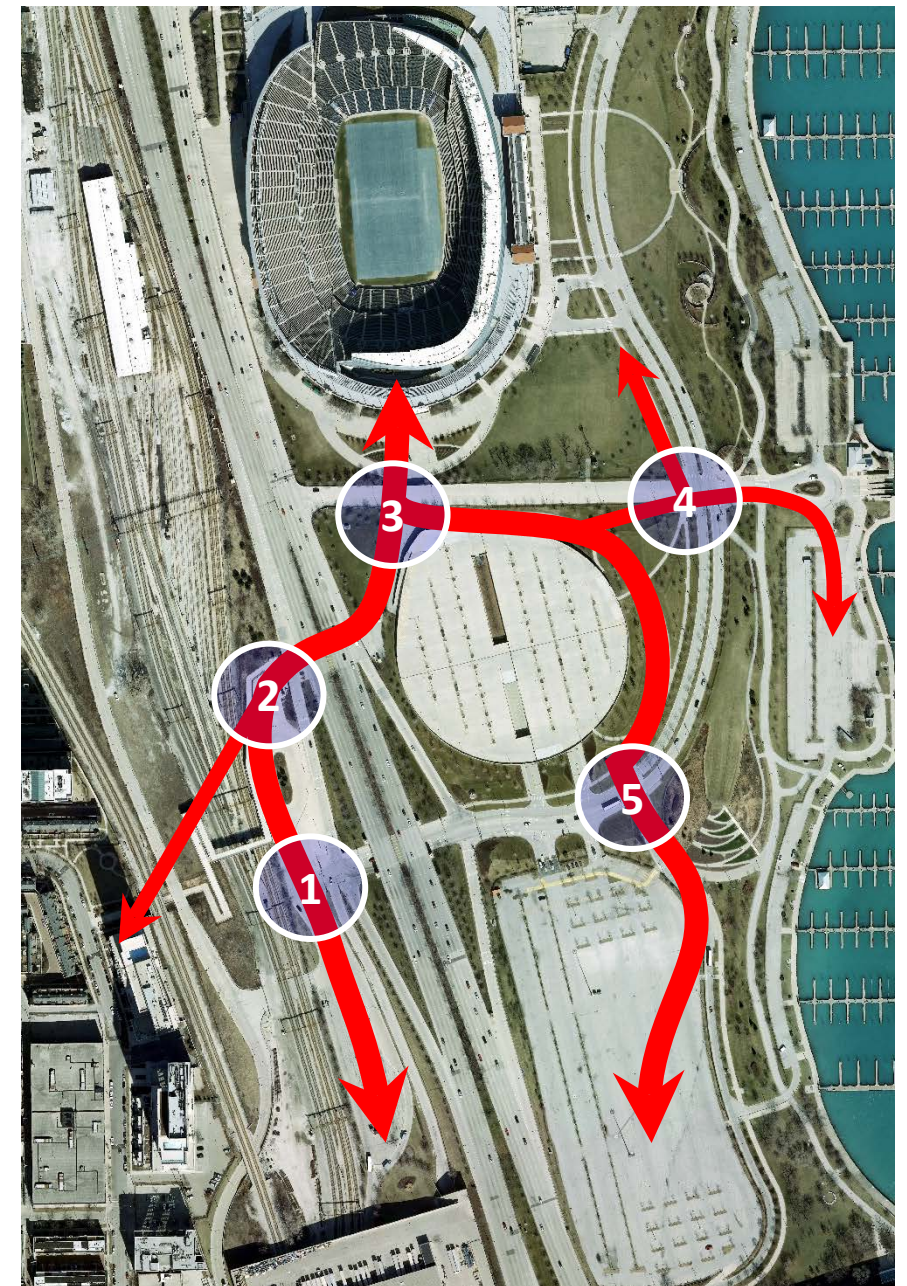
	Manual Counting	Tubes	Video (Computer Vision)	Passive & Active Infrared	Piezoelectric Sensor	Radar / Thermal + Induction / Pressure	Inductive Loops
Description	Manual tabulation of peds and bikes on site or from video	Air tube laid across the path senses interruptions to pressure	Video recording and post processing with computer vision	Passive: detects change in thermal contrast Active: detects obstruction in the beam	detects bicycles with an electric signal	Combination of radar or thermal imaging with induction or pressure pad	senses change in magnetic field as metal passes over it
Pros	Minimal equipment needs Ability to get Extra Data	Inexpensive to operate Simple operation	Very wide study area Verifiable data	Inexpensive to operate Thoroughly tested	Permanent Low post-installation cost	Accuracy of Classification Long duration counts	Permanent Long duration counts
Cons	High labor cost Extensive training required	Can't count pedestrians Bicyclists may swerve to avoid	Two-step data collection process Visible equipment	Undercounts in crowds, side-by-side travelers and is subject to interference	High installation cost Difficulty with slow pedestrians	Path users may avoid being counted Expensive and complicated set-up	Difficulty with some bicycles Difficult in shared lane environments
Count Duration	★	★★	★★	★★★	★★★	★★★	★★★
Cost	Local Labor Rates	\$1k - \$3k	\$1-3k+	\$1k-\$3k+	\$1K-\$3K + Construction	\$3k+	\$1K-\$3K + Construction
Directional Ped and Bike	Yes	Bike Only	Yes	Volume only, no differentiation	Yes, with modified equipment	Yes	Bike Only
Ease and Safety of Deployment	★★ Can require counter to be at the roadside for extended periods	★ Must enter and linger the roadway to deploy.	★★★ Quick, non-intrusive set-up.	★★ Passive: quick set-up adjacent to path Active: component alignment required	-- Construction required to embed in pavement	★ Complicated and intrusive set-up.	★ / -- Surface Mount: intrusive deployment Permanent: pavement cuts needed
Accuracy and Verification	★★ Dependent on the individual and not verifiable	★ Error in low speeds and not verifiable	★★★ Counts at all speeds includes a video recording	★★ Undercounts side-by-side travelers and is subject to interference.	★ Difficulty in high volumes Narrow detection zone	★★ Difficulty counting groups and not verifiable.	★★ Good accuracy Unverifiable
Portability	★★★	★★★	★★★	★★★	--	★	★ / --
Weather Versatility	★★ Susceptible to inclement weather	★ Damaged by snow plows and street sweepers	★★★ Can count in all but the heaviest of precipitation	★ Passive: Air temperature affects accuracy Active: Precipitation can interfere	★★★ Good operation in maintained pathways	★ Air temperature and precipitation can affect detection	★★★ Good operation in maintained pathways

Compiled with data from the Federal Highway Administration and Transportation Research Board

Data Results

Ped Count Overview

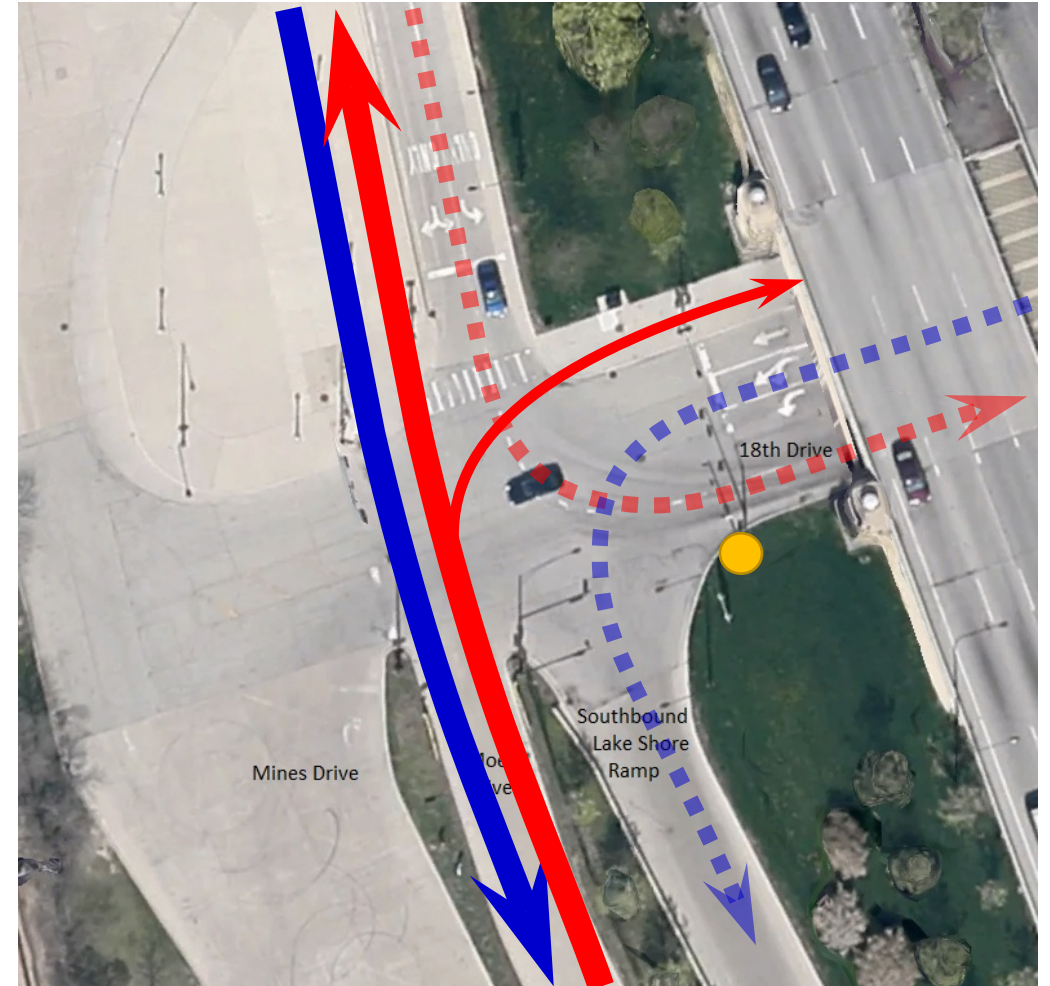
- South approaches to Soldier Field
- 5 locations for pedestrian focus
 - 1) 18th Drive and LSD
 - 2) 17th Drive Underpass
 - 3) Waldron Underpass
 - 4) Waldron at Museum Campus
 - 5) 18th Drive and Burnham Harbor



18th Drive at Lake Shore Drive

- Pedestrians from:
 - South tailgating area to Soldier Field
- Shuttle Drop off area
- Complex intersection – 6 leg
- Standard Definition setup

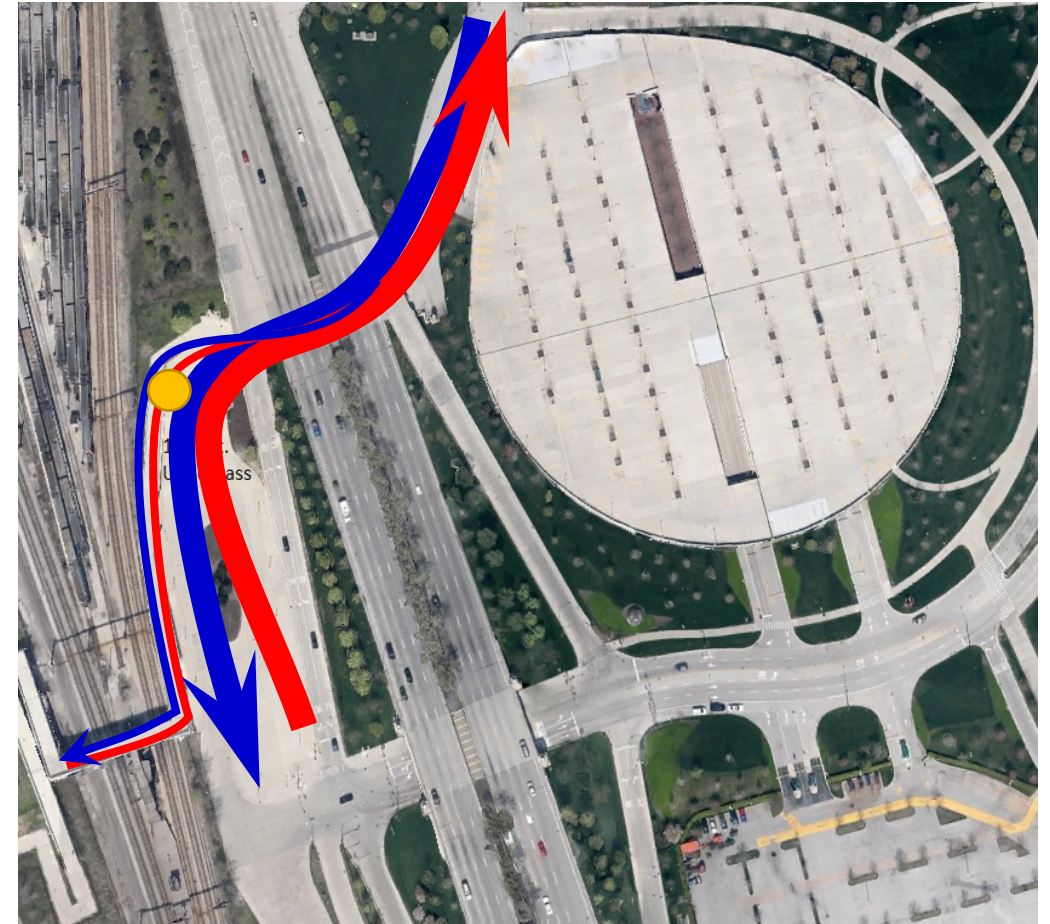
Location	Pregame Flow (6AM – 1PM)	Postgame Flow (1PM – 8PM)
McCormick Pl/17 th Underpass	4,477	2,003
McCormick Pl/Waldron	370	486
Total	4,847	2,489



17th Drive Underpass

- Pedestrians from:
 - McCormick Place via 18th Drive & Lake Shore Drive
 - 17th Underpass
 - 18th Drive Overpass
 - 18th Drive Metra Electric Rail Station
- High-Quality Video Setup

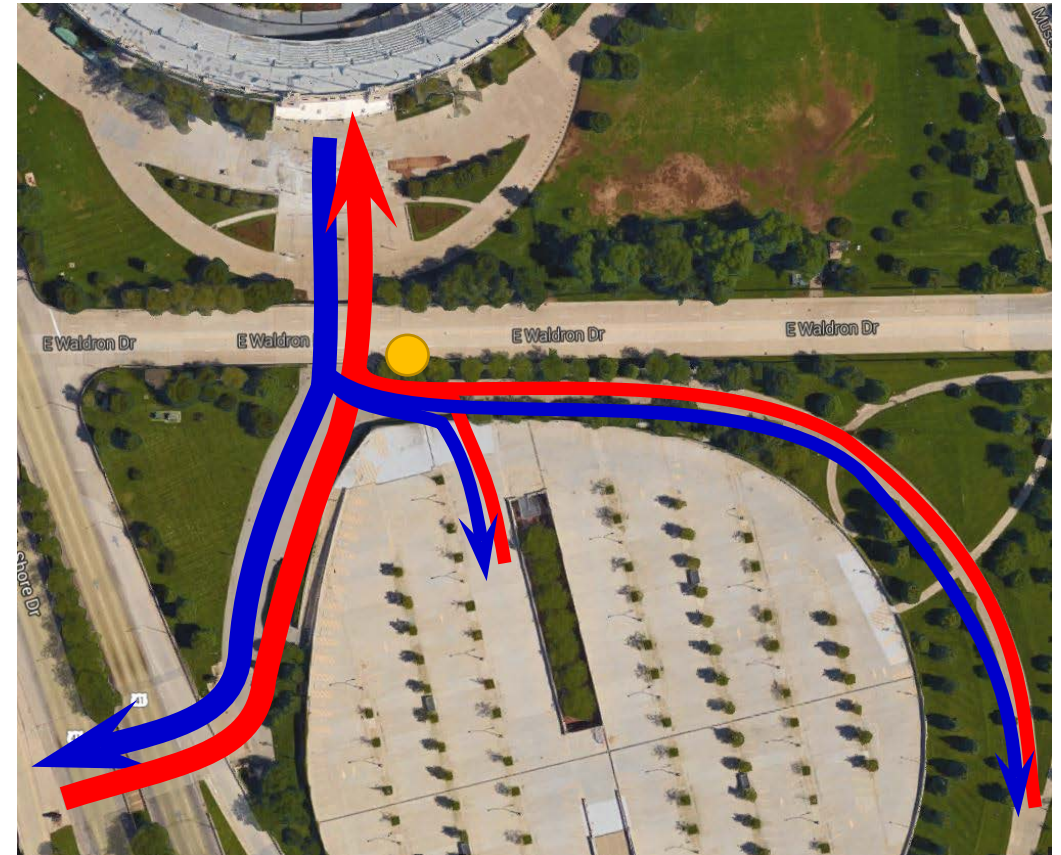
Location	Pregame Peds (6AM – 1PM)	Postgame Peds (1PM – 8PM)
McCormick Pl/Soldier Field	6,358	6,850
18 th Overpass/Soldier Field	7,250	4,691
Total	13,608	11,541



Waldron Drive Underpass

- Pedestrians from:
 - 17th Underpass
 - Waldron Parking Deck
 - Burnham Harbor Drive
 - Waldron/Museum Campus
- High-Quality Video Setup

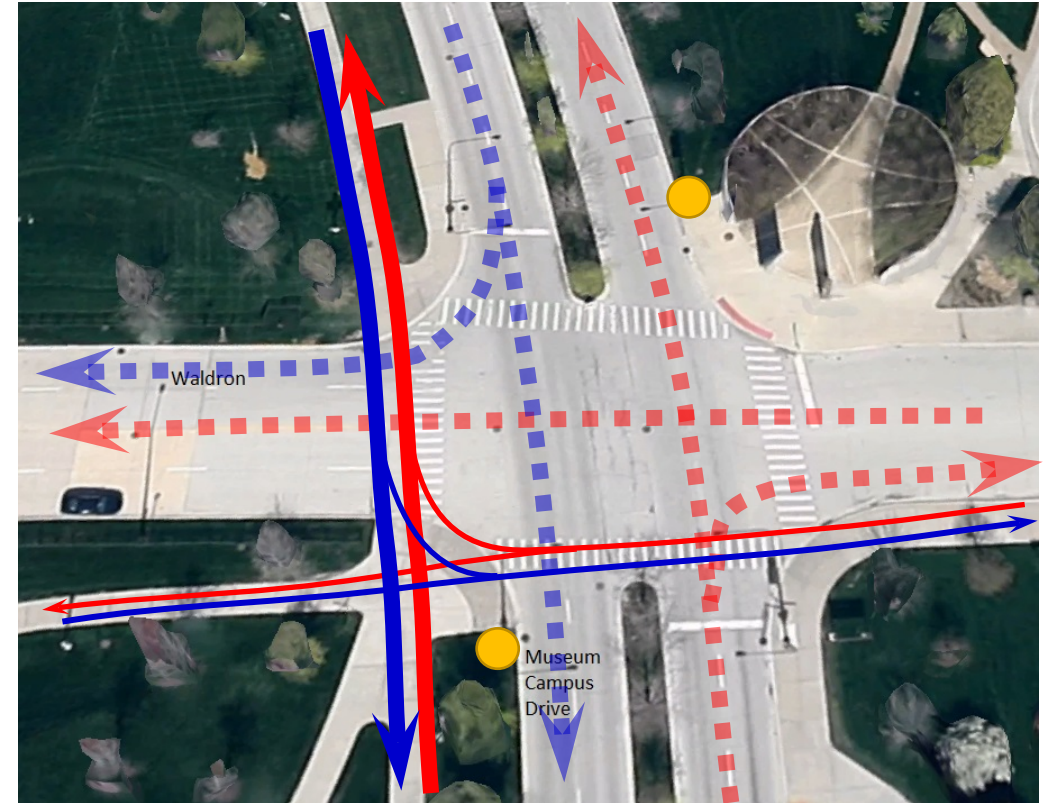
Location	Pregame Peds (6AM – 1PM)	Postgame Peds (1PM – 8PM)
Soldier Field/17 th Underpass	9,356	8,243
Soldier Field/Waldron Deck	8,235	7,151
Total	17,591	15,394



Waldron Drive and Museum Campus Drive

- Pedestrians from:
 - Harbor Lots
 - South Lot via Museum Campus
- Standard Definition setup

Location	Pregame Peds (6AM – 1PM)	Postgame Peds (1PM – 8PM)
Burnham Harbor/Soldier Field	2,592	2,023
18 th Drive/Waldron	1,647	1,144
Total	4,239	3,167



18th Drive at Burnham Harbor Drive

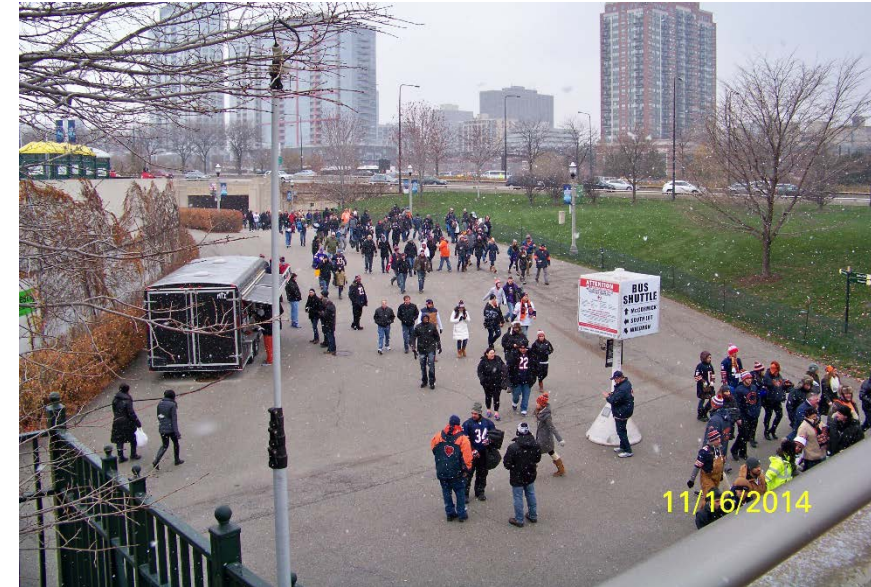
- Pedestrians from:
 - South tailgating area to Soldier Field
- Major area of conflict between pedestrians and vehicles
- Standard Definition setup

Location	Pregame Peds (6AM – 1PM)	Postgame Peds (1PM – 8PM)
South Lot/Soldier Field	5,664	7,065
Total	5,664	7,065



Total Pedestrian Counts

- Progression between McCormick Place and Soldier Field:
 - 18th and Lake Shore Drive
 - 17th Underpass
 - Waldron Underpass



Route	18 th /LSD	To/From 18 th 17 th Underpass		Waldron Underpass
		To/From 18 th	To/From Overpass	
Pregame Peds (6AM – 1PM)	4,477	→ 6,358 (+42%)	7,250	→ 9,356 (-31%)
		13,608		
Postgame Peds (1PM – 8PM)	2,003 (-57%)	← 6,850	4,691	← 8,243
		11,541 (+40%)		

Total Pedestrian Counts

Location	Pregame (6AM – 1PM)	Postgame (1PM – 8PM)	Pre/Post Game Comparison
18 th /LSD	4,477	2,003	-2,474
17 th Underpass <i>(18th Dr / Overpass)</i>	13,608 <i>(6,358 / 7,250)</i>	11,541 <i>(6,850 / 4,691)</i>	-2,067 <i>(+492 / -2,559)</i>
Waldron Underpass	9,356	8,243	-1,113
18 th & Burnham Harbor	5,664	7,065	+1,401
Burnham Harbor Lots	2,592	2,023	-569
Total (17th Underpass, 18th/BHD, BH Lots)	21,864	20,629	-1,235 (6%)

Pedestrian Observations

Pedestrian Behavior Observations

- Shortest Path
 - Non-compliance with traffic control measures
 - Likely to leave pathway to save time/shorten route
 - Willing to wait to cross at shorter route

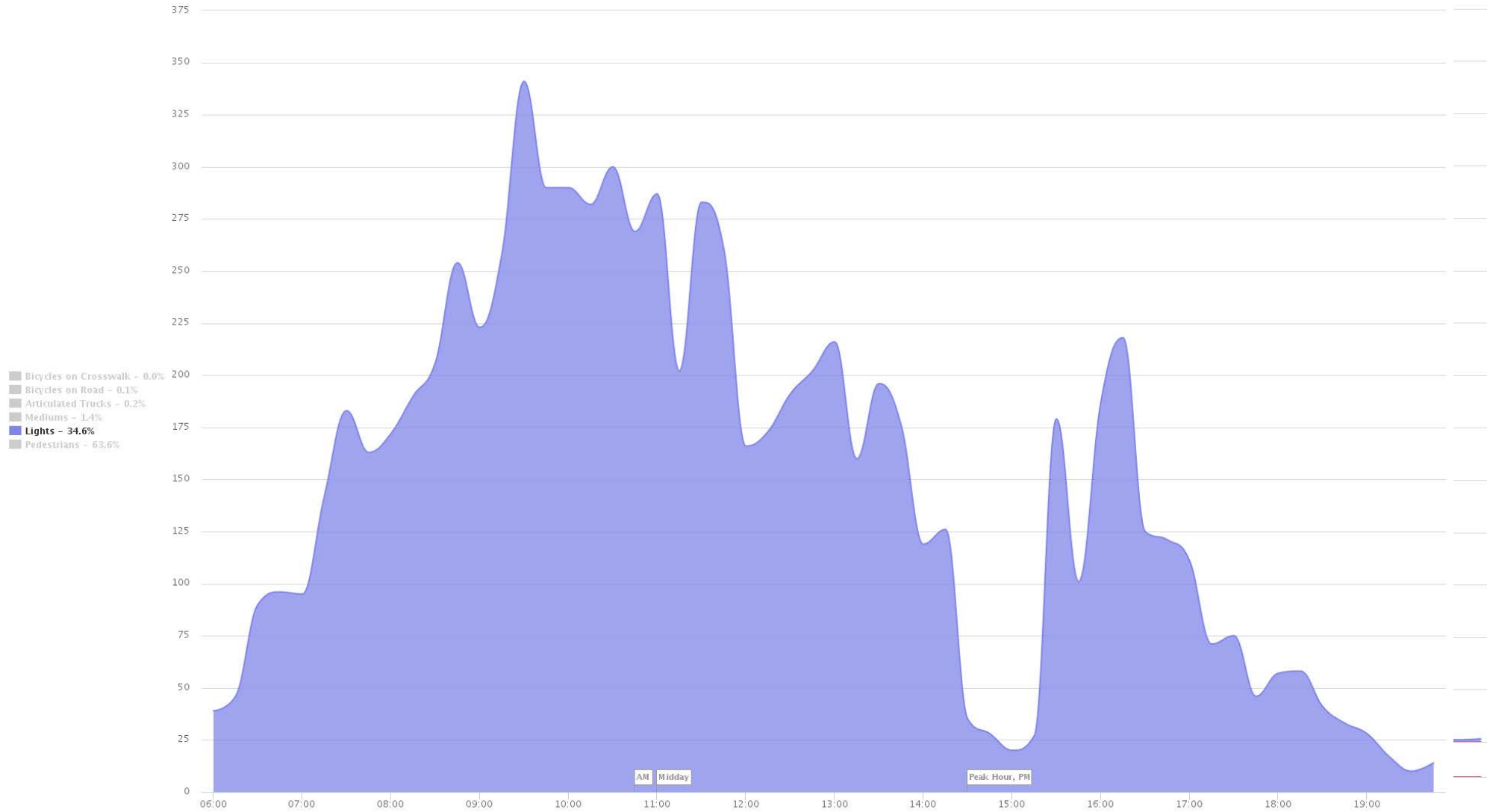


Pedestrian Behavior Observations

- Herd Mentality
 - Heavy flows exiting game are difficult to interrupt
 - Can cause impact for vehicles exiting at conflict points



Pedestrian Behavior Observations



Lessons Learned

Lesson #1

- **Densely packed groups are difficult to count accurately**
 - Avoid choke points with slow moving pedestrians
 - Free flowing locations with defined paths work better



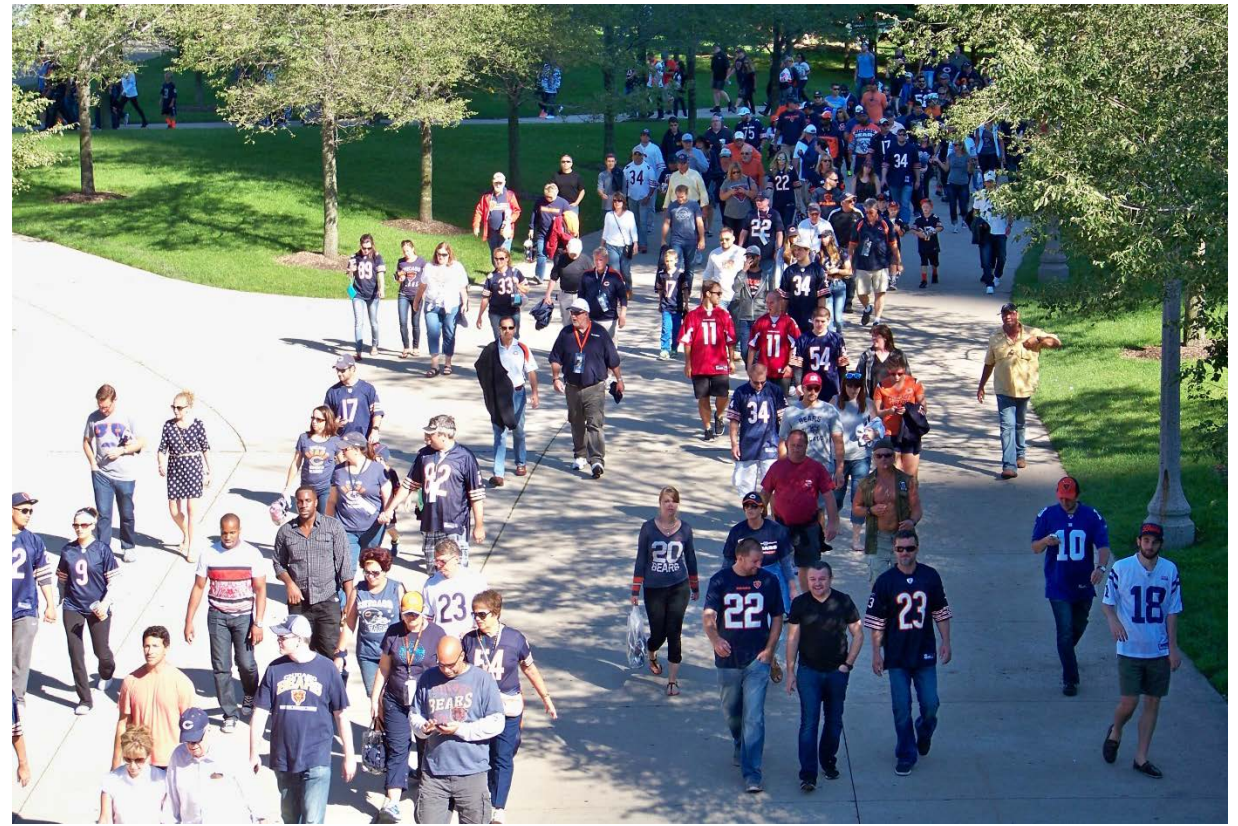
Lesson #2

- **Video Quality has significant impact**
 - Distance to pedestrians affects count totals
 - Use higher quality video setting for pedestrian focused counts if possible
 - More camera views may provide better accuracy



Lesson #3

- **Location is key**
 - Too close to destination point may be too dense
 - Further away from destination may be too dispersed
 - Important if possible to view behavior in advance to choose optimum locations
 - Multiple locations help to provide better evaluation





Thank you!

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