



NYC Daylighting Study

*New York City Department of Transportation
2025*

VISION ZERO  
Building a Safer City

Introduction

What is Daylighting?

NYC Local Law 66 of 2023 defines daylighting as “street design elements for enhancing visibility of cross traffic and pedestrians for motorists approaching an intersection” and is commonly understood to mean the **prohibition of parking adjacent to crosswalks.**

Daylighting is becoming increasingly popular in Vision Zero cities across the nation as a tool for increasing visibility and safety at intersections.



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Introduction

What is Daylighting?

Daylighting is endorsed by many professional organizations and guidelines, including the Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration (FHWA), National Cooperative Highway Research Program (NCHRP), and National Association of City Transportation Officials (NACTO). However, little research has been done on the direct relationship between daylighting and injury rates.

This groundbreaking, first-of-its-kind study aims to fill that gap by exploring the relationship of daylighting to traffic injuries and is mandated by NYC Local Law 66 of 2023.



Standard Practice

Around 20-30 feet of daylighting is often recommended

- **Standard American Practice**
 - Over 40 states have laws mandating daylighting, often dating to the dawn of the automobile.
 - New York State mandates daylighting, but NYC is excluded
 - Daylighting laws are frequently unenforced in densely populated areas nationwide.
- **Little *direct* evidence connecting daylighting to safety**
 - Frequently justified based on past literature and practices rather than empirical research
 - Hoboken
 - “Hoboken Daylighting” includes hardening via plastic delineators based on community input and pedestrian crash data (starting in the 2010s).
 - The city has not published a before-after analysis of the specific effects of daylighting on safety.
 - San Francisco
 - 80 intersections in The Tenderloin were daylit in 2018.
 - The city reported a 14% decrease in collisions at intersections where treatments were implemented
 - No data was available on injury reductions



Study Design

Types of Daylighting Studied

Hydrant Zones



Restricted parking adjacent to crosswalks via fire hydrants and bus stops

Sign-only daylighting



Restricting parking adjacent to crosswalks using signage only

Hardened daylighting



Restricting parking near corners using physical interventions like markings, plastic delineators, concrete blocks, bike parking, etc.

Study Design

Methods

Two types of analysis:

- 756 intersections where before and after injury results from daylighting existed were also studied. These locations, both hardened and signed-only, were installed between 2019-2021 and compared to other nearby intersections to control for broader trends. This analysis provided the clearest comparison, but had a smaller sample size.
- 7,558 intersections with hydrant zones (90% fire hydrants, 10% bus stops), were studied and compared to other locations citywide. This analysis provided a very large sample size but no before/after analysis was possible.

Before/After Analysis

Findings: Pedestrian Injuries

- Hardened daylighting is associated with a decrease in pedestrian injuries, on average reducing injuries by 0.14 per year, per intersection (i.e. Locations where hardened daylighting treatments were installed had, on average after installation, a pedestrian injury every 3.4 years. Without the treatment, they would have had a pedestrian injury every 2.3 years.)
- Daylighting from neckdowns is associated with a higher average decrease in pedestrian injuries, reducing them by 0.5 per year, per intersection (i.e. Locations where neckdowns were installed had, on average after installation, a pedestrian injury every 4.7 years. Without the treatment, they would have had a pedestrian injury every 1.4 years.)

Treatment Type	Sample Size	Difference in Difference	P-Value
Sign-Only Daylighting	567	0.00	0.96
Hardened daylighting	189	-0.14	0.01
...from CitiBike	134	-0.11	0.08
...from a bike corral	3	-0.03	0.84
...from turn calming	33	-0.12	0.48
...from a neckdown	14	-0.50	0.02
...from an enhanced crosswalk	5	-0.10	0.57

Hydrant Zone Crash Analysis

Findings

- **Daylit intersections were associated with a 30% higher normalized rate of pedestrian and total injuries**
 - Normalized rate was created by comparing each location's injuries to injuries at nearby locations
 - These results were statistically significant across nearly all sub-categories*
- Intersections with daylighting at more than one corner were associated with a 100% higher normalized rate of pedestrian injuries
- At intersections on truck routes, daylighting was associated with a 40% higher normalized rate of total injuries
- At intersections in low population density areas, daylighting was associated with a 50% higher normalized rate of total injuries

Approaching Bus + Hydrant Daylighting		Peds	Total
		Ped/ Nearby Ped	Total/ Nearby Total
		Ratio	Ratio
Any Daylighting		1.3	1.3
# Daylit Approaches	1 leg	1.2	1.2
	> 1 leg	2	2
Borough	MN	1.5	1.4
	BX	1.5	1.3
	BK	1.3	1.2
	QN	1.3	1.3
	SI	2.3	1.8
	Signal	1.2	1.3
Intersection Control	All-Way		
	Stop on Minor		1.1
	Uncontr.	1.7	1.6
Average # of Lanes (Receiving)	1	1.5	1.5
	2	1.4	1.4
	3+	1.7	1.6
Presence of Truck Route	Yes	1.6	1.4
	No	1.2	1.2
Speed	High	1.4	1.3
	Med	1.2	1.3
	Low	1.5	1.7
Population Density	High	1.3	1.2
	Med	1.5	1.3
	Low	1.8	1.5
T Intersection	Yes	1.4	1.3
	No	1.3	1.3

Discussion

Possible Explanations for Findings

Why would the removal of automobile parking near the crosswalk increase traffic injuries in non-hardened daylighting locations?

Visibility is a positive for traffic safety if it allows road users to see each other clearly and use that information early to avoid a crash

However, increased visibility can also give a driver the sense that all possible risks are known, encouraging faster speeds, reduced caution and less attention to the road. This reflects a common concept in behavioral science known as "risk compensation"



Example of a "tight" feeling street, where visibility and vehicle movement is restricted



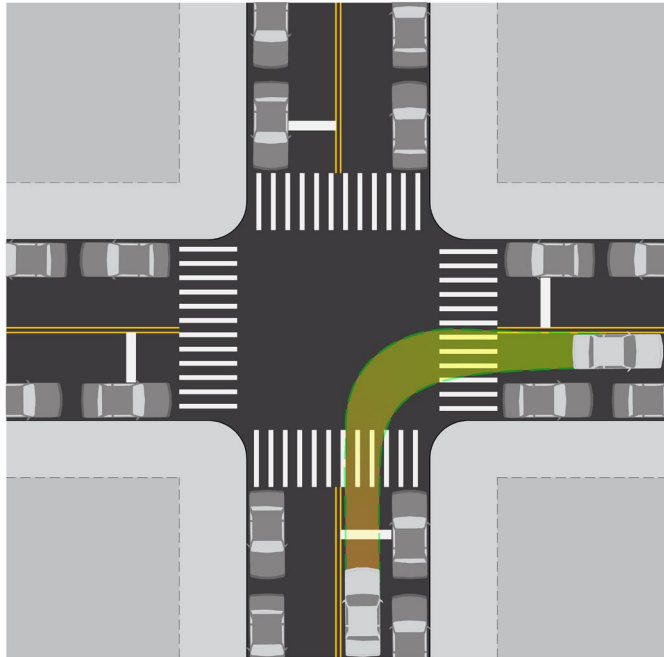
Example of an "open" feeling street, with expanded visibility and more unrestricted vehicle movements

Discussion

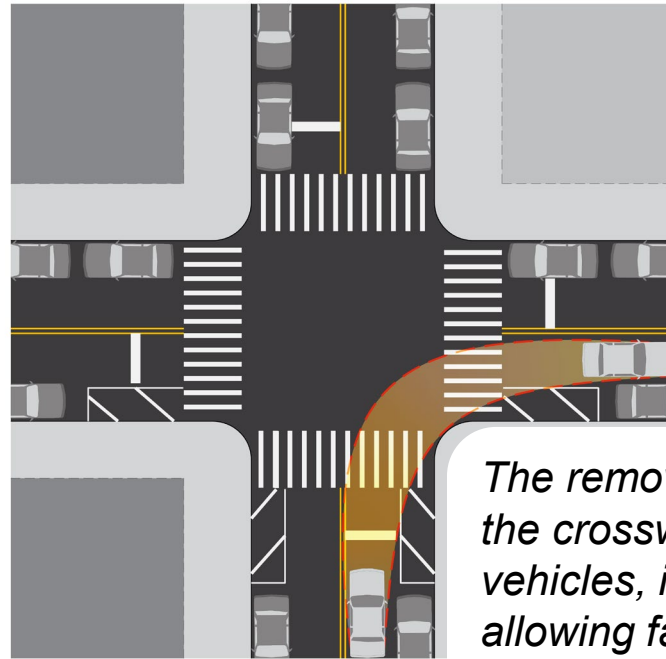
Possible Explanations for Findings (cont.)

Why would the removal of automobile parking near the crosswalk increase traffic injuries?

No Daylighting



Daylighting



The removal of parking adjacent to the crosswalk opens more space for turning vehicles, increasing pedestrian exposure, allowing faster and wider angle turns through that space.

Conclusion

Design Recommendations

More robust treatments that also add visibility at the crosswalk should be prioritized as they have more dramatic safety and transportation benefits. These treatments are all associated with [declines](#) in fatalities and severe injuries:

- Road Diets (-30%)
- Protected Bike Lanes (-18%)
- Pedestrian Islands (-36%)
- Curb & Sidewalk Extensions (-34%)
- Turn Calming (-16%)
- Leading Pedestrian Intervals (-30%)



Conclusion

Recommendations

- Use daylighting situationally as part of NYC DOT's standard safety toolkit
- Daylighting treatments are best pursued in site-specific situations and are not recommended to be deployed universally.
- Continue to collect data from newly daylit locations to further evaluate effectiveness in specific contexts, and to harden any locations with continued safety concerns
- Prioritize the use of a wide range of intersection safety improvements to reduce turning vehicle speeds and improve visibility. This includes sidewalk extensions, which have greater safety benefits

Thank you!

Analysis

Analysis

Introduction

DOT used two analytical methods to evaluate the effectiveness of daylighting:

DOT's standard method to measure the safety efficacy of a particular treatment is **before/after analysis**. In this study a "difference in differences" method was used to analyze the performance of many forms of both hardened and sign-only daylighting. This method compares daylit intersections with nearby non-daylit intersections to account for localized injury trends. Specifically, this helped DOT account for the large injury declines that occurred due to COVID-19 lockdowns and the resultant changes in travel patterns.

However, the analysis was limited by small sample sizes caused by limitations on the years of applicable crash data and the need to exclude locations where other safety improvements were installed during the evaluation period.

To supplement this analysis, DOT evaluated a large number of intersections with "**hydrant zones**," areas where parking is indirectly restricted by a fire hydrant or bus stop (~90% of locations were hydrants). This infrastructure has existed for decades or more, and DOT does not have install dates needed to perform before/after analysis. Therefore, DOT used a neighbor comparison method to see if intersections with "hydrant zones" performed better than would be expected on average.

Hydrant Zone Crash Analysis

Hydrant Zone Crash Analysis

Introduction

“Hydrant Zones” refers to existing infrastructure (fire hydrants and bus stops) that is not explicitly or intentionally set up for safety or daylighting but has the inadvertent effect of eliminating parking at the corner of an intersection, resulting in a similar daylighting effect.

DOT compared intersections with and without hydrant zones between 2017 and 2023*.

**The analysis was limited to intersections that were:*

- not in a park or an airport*
- where no interventions were added before or during the study period such as an Open Street, hardened daylighting treatment, No Standing Anytime sign, protected bike lane, or SIPs that were completed or under construction*

Additionally, a small group of intersections (5%) were excluded due to complex or unusual configurations

Hydrant Zone Crash Analysis

Methodology

Independent variables studied

- **Daylighting status:** whether the intersection contained any daylighting
- **Number of daylight approaches:** the number of corners daylight where traffic is approaching the intersection.
- **Number of traffic lanes:** average number of traffic lanes on all outgoing or receiving legs of the intersection. This was separated into three groups: 1 lane, 2 lanes, or 3 or more lanes.
- **Average vehicle speed:** Average of 85th percentile recorded traffic speeds approaching the intersection on all streets/legs. These speeds were then grouped into thirds (low, medium, and high).
- **Borough:** The borough where the intersection is situated. If an intersection is at the boundary of two boroughs, the intersection is associated with both boroughs.
- **Intersection Control Type:** Whether an intersection contains an all-way stop, traffic signal, stop on the minor street, or is uncontrolled.
- **Neighborhood population density:** The American Community Survey's 2022 population counts were divided by the neighborhood acreage to yield a density, and these were then grouped into thirds (low, medium, and high).
- **Truck Route:** This binary category indicates whether a recognized truck route passes through the intersection.
- **Traffic direction:** The traffic direction(s) of streets at an intersection. Three groups were studied: intersections that contain only one-way streets, intersections that contain at least one two-way street, and a group that encompasses all intersections.

Hydrant Zone Crash Analysis

Methodology (cont'd.)

Dependent (outcome) variables studied to determine an intersection injury rate:*

1. Total injuries divided by the average of total injuries at nearby intersections
 2. Pedestrian injuries divided by the average of pedestrian injuries at nearby intersections
- Both metrics are normalized by average nearby injury counts to account for local conditions
 - Nearby comparison locations consist of a maximum of three intersections along each street in the study intersection, located within 1 mile of the study location
 - To assess the effectiveness of daylighting, DOT calculated average outcomes across daylight intersections and non-daylit intersections and compared using a ratio:

$$\frac{[\text{Average daylight outcome}]}{[\text{Average non-daylit outcome}]}$$

A comparison ratio **> 1 indicates higher normalized injury rates** at daylight intersections compared to non-daylit intersections. A comparison ratio **<1 indicates lower normalized injury rates** at daylight intersections.

* Other outcome variables studied but discarded due to redundancy and lack of statistical significance: right-angle motor vehicle injuries divided by the total motor vehicle injuries, pedestrian injuries divided by total injuries, pedestrian severe injuries divided by total pedestrian injuries, motor vehicle injuries divided by average annual daily traffic, motor vehicle severe injuries divided by total motor vehicle injuries.

Hydrant Zone Crash Analysis

Findings

- **Daylit intersections were associated with a 30% higher normalized rate of pedestrian and total injuries**
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 - These results were statistically significant across nearly all sub-categories*
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	Low	1.8	1.5
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	No	1.3	1.3

Before/After Analysis

Before/After Analysis

Introduction

Using 2017-2023 crash data, DOT compared injuries before, to injuries after daylighting was installed. The locations analyzed were limited to intersections with treatments installed between 2019 and 2021 and with no other safety interventions installed during the analysis period. Two years of before and after data were employed for each installation analysis.

An important consideration is that the COVID pandemic occurred during the analysis period. This led to a dramatic overall decline in traffic injuries in New York City and did not affect all areas of the city in the same way.

To account for this and other ambient trends, a “difference in differences” method was used. Daylit intersections were compared with nearby non-daylit intersections to create “treatment” and “control” groups, respectively. The untreated intersections served as a baseline to compare the treated intersections to. By comparing the daylit and non-daylit intersections in a given area, the methodology attempts to isolate the impact of a daylighting treatment from COVID background trends.

Before/After Analysis

Metrics and Treatments Studied

Metrics studied:

- Number of pedestrian injuries per intersection
- Number of total injuries (all travel modes) per intersection

Treatment subgroups:

- Daylighting types
 - Hardened daylighting: physical infrastructure introduced with the effect of daylighting the intersection.
 - Turn Calming with daylighting
 - Neckdowns
 - Enhanced Crosswalks
 - Citi Bike stations
 - Bike corrals
 - Sign-only daylighting: daylighting via curb regulation only, typically a No Standing Anytime sign

Before/After Analysis

Methodology

1. For each daylighting treatment, identify nearby non-daylit comparison locations. Comparison locations consist of a maximum of three non-daylit intersections along each street of the daylit intersection and located within 1 mile of the daylit location. Locations with any other roadway interventions installed during the analysis are excluded from both the daylit and comparison locations.
2. Calculate the change in annual injuries between the before and after periods for each daylit and non-daylit intersection. Then take the difference in the change in injuries at each daylit intersection versus its nearby non-daylit counterparts. Finally, average this 'difference in differences' by treatment subgroup for an overall treatment-level difference-in-difference metric.

Before/After Analysis

Findings: Total Injuries

No significant relationship between daylighting and total (all mode) injuries was found

- Neither hardened nor sign-only daylighting showed a significant relationship with an increase or decrease in overall injuries.
- The overall distribution of total injuries at daylit locations is likely to be random and suggests other factors are more influential in determining safety outcomes at these locations.
- For instance, of the seven metrics we tested, two of them were positive and the remaining five were negative. None of the associations were statistically significantly different from zero.

Treatment Type	Sample Size	Difference in Difference	P-Value
Sign-Only Daylighting	567	-0.06	0.27
Hardened daylighting	189	-0.10	0.42
...from CitiBike	134	0.01	0.92
...from a bike corral	3	0.83	0.30
...from turn calming	33	-0.30	0.43
...from a neckdown	14	-0.58	0.34
...from an enhanced crosswalk	5	-0.85	0.33

Before/After Analysis

Findings: Pedestrian Injuries

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 - These results reinforce the positive effects seen in the NYC DOT Safety Treatment Evaluation, whereby curb and sidewalk extensions were found to reduce pedestrian injuries by 44%. This positive effect could be due to the shortened crossing distance as well as from the additional visibility from daylighting.

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