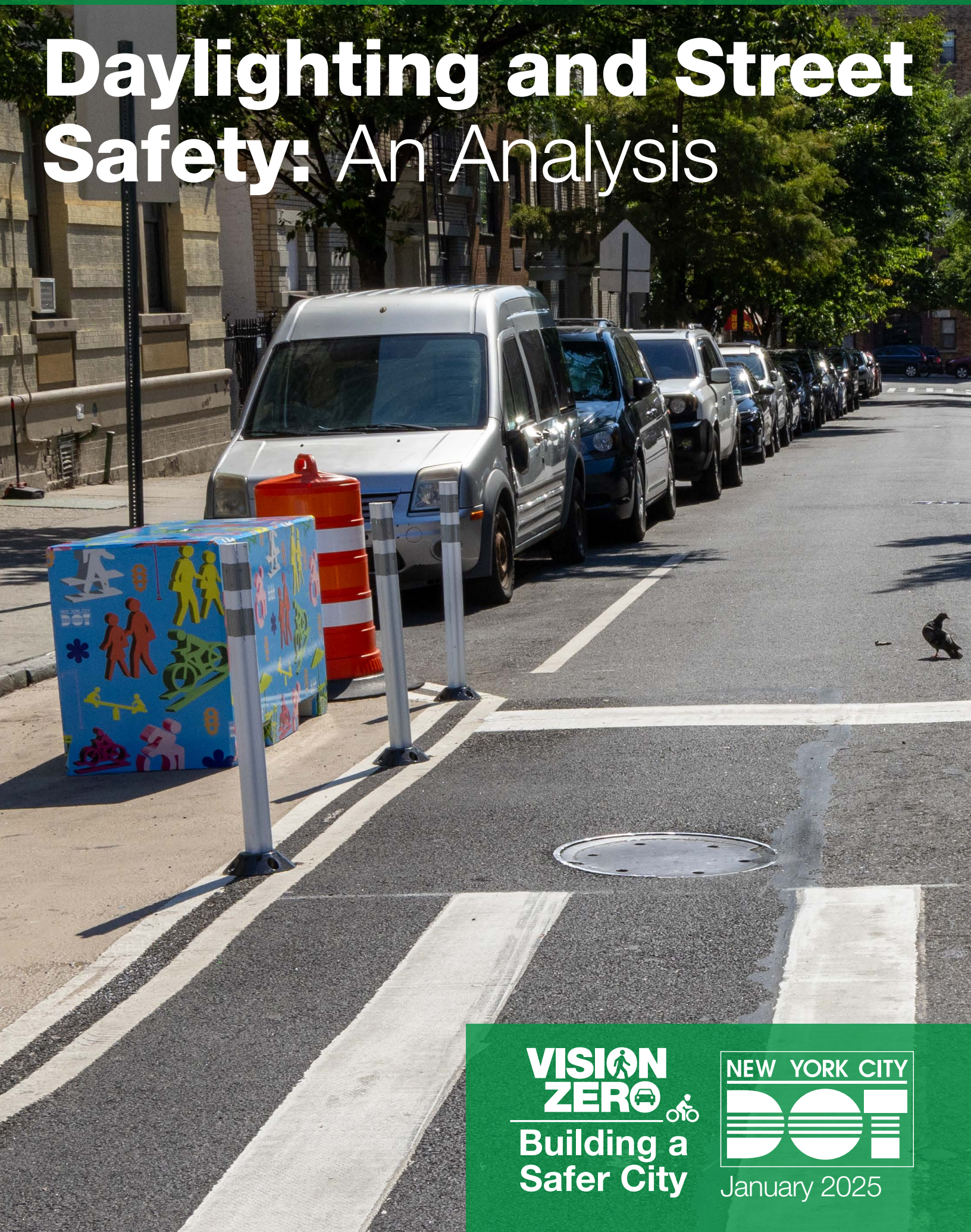
Daylighting and Street Safety: An Analysis



VISION ZERO
Building a Safer City

NEW YORK CITY DOT

January 2025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Executive Summary

Introduction

Daylighting is becoming increasingly popular in Vision Zero cities across the nation as a tool for increasing visibility and safety at intersections. In particular, New York City has been a leader in installing "hardened daylighting," which installs a physical barrier, such as posts or granite blocks, to prevent vehicles from parking next to intersections. In 2024, DOT implemented hardened daylighting at nearly 300 locations.

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. The New York City Department of Transportation (DOT) must also publish an annual progress report on daylighting.

The law 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.**

Findings

Daylighting is an effective tool – but only when applied appropriately

- **Hardened daylighting, or daylighting with physical infrastructure installed such as planters or safety bollards, had a statistically significant safety benefit with relation to pedestrian injuries, but was less effective than other street safety treatments.**
- **On average, daylighting with signs alone was not found to have a statistically significant safety benefit, but may be useful in certain cases when visibility is a particular concern.**
- **Research found that universal daylighting, as evidenced in DOT's hydrant zone analysis, does not have the widespread safety benefits anticipated and may have negative effects on safety.**

Recommendations

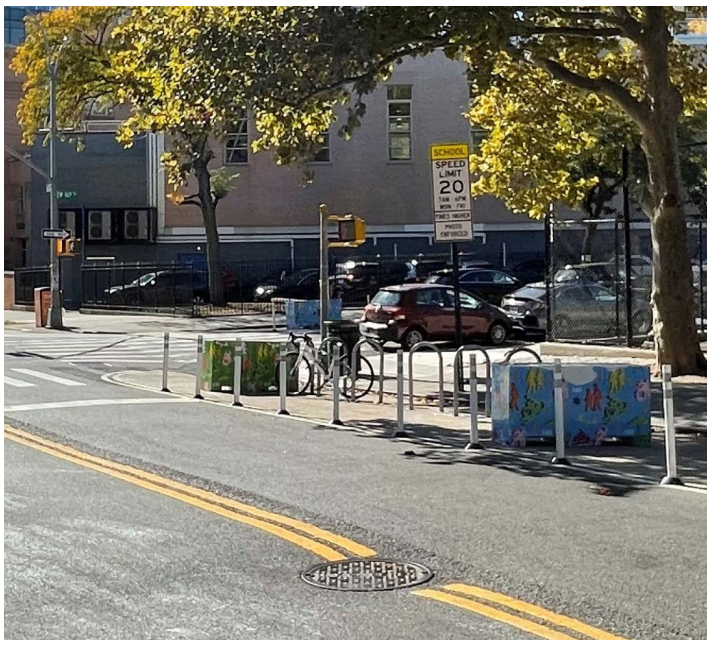
- **Use daylighting situationally as part of NYC DOT's standard safety toolkit**
- **In locations with substantial crash histories, harden daylighting and/or pair daylighting with other effective techniques to maximize safety benefits**
- **Daylighting treatments are best pursued in site-specific situations 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.**


FALL

Types of Daylighting Studied

Hydrant zones

Restricted parking adjacent to crosswalks via fire hydrants and bus stops



Hardened daylighting

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

Sign-only daylighting

Restricting parking adjacent to crosswalks using signage only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Methodology

Study Overview

Two types of analysis:

- 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.
- 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.

Detailed Findings

Hardened daylighting, or daylighting with physical infrastructure installed such as planters or safety bollards, had a statistically significant safety benefit with relation to pedestrian injuries, but was less effective than other street safety treatments.

- Locations where hardened daylighting treatments were installed had, on average after installation, a pedestrian injury every 3.4 years. Without the treatment, DOT estimates a pedestrian injury would have occurred every 2.3 years.
- Locations where neckdowns** were installed had, on average after installation, a pedestrian injury every 4.7 years. Without the treatment, DOT estimates a pedestrian injury would have occurred every 1.4 years.

On average, daylighting with signs alone was not found to have a statistically significant safety benefit, but may be useful in certain cases when visibility is a particular concern.

Research found that universal daylighting, as evidenced in DOT's hydrant zone analysis, does not have the widespread safety benefits anticipated and may have negative effects on safety.

- Intersections with hydrant zones were associated with a 30% higher normalized rate of pedestrian and total injuries*
- Intersections with hydrant zones at more than one corner were associated with a 100% higher normalized rate of pedestrian injuries compared to intersections with no hydrant zones
- At intersections on truck routes, hydrant zones were associated with a 40% higher normalized rate of total injuries

*Hydrant zone locations (hydrants and bus stops) are located throughout NYC and are very low-injury on average (0.82 injuries per intersection per year).

** A neckdown is an expansion of the curb line into the lane of the roadway adjacent to the curb (typically a parking lane) for a portion of a block either at a corner or mid-block. Also known as a curb extension, ia neckdown can enhance pedestrian safety by reducing crossing distances, can relieve sidewalk crowding, and can provide space for functional elements such as seating, plantings, bike share stations, and furniture.


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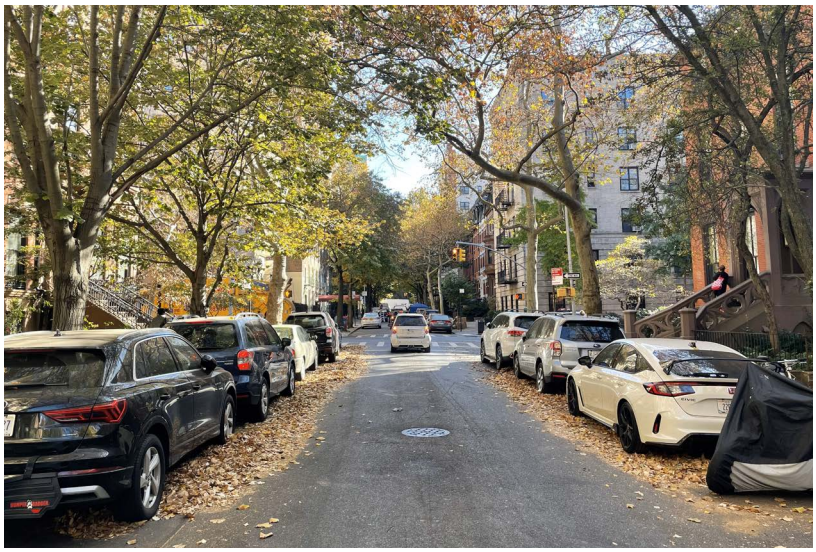
Discussion

Possible Explanations for Findings

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

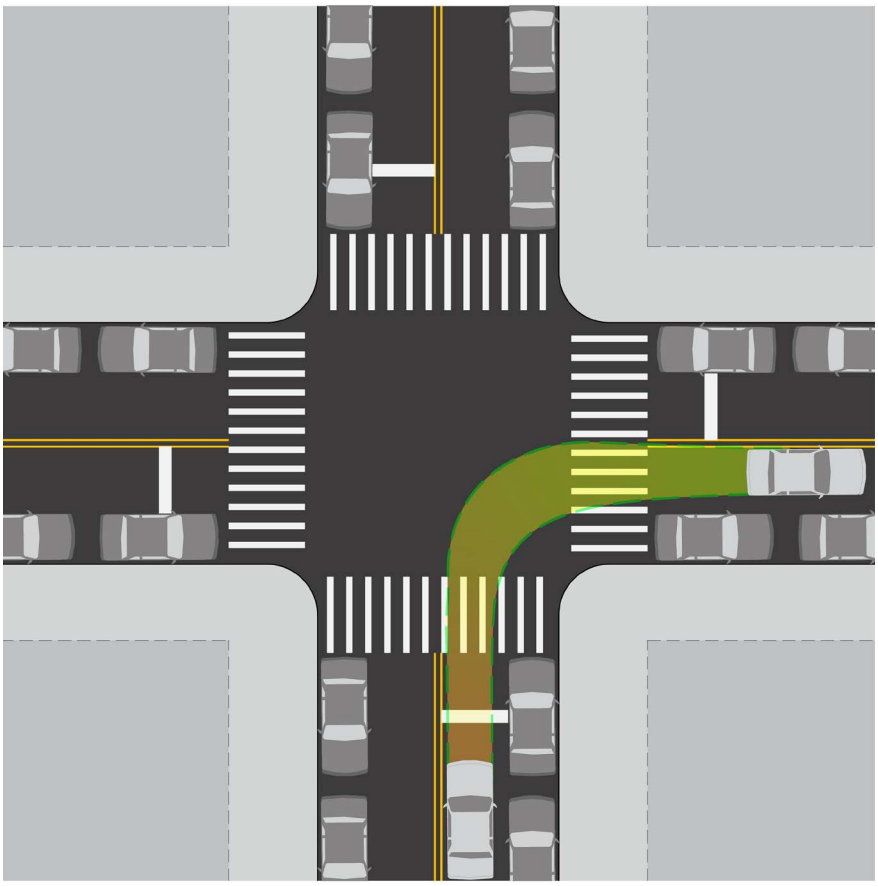
Visibility is a positive for traffic safety if it allows road users to see each other clearly and use that information early to avoid a crash. However, increased visibility can also give a driver the sense that all possible risks are known, encouraging faster speeds, reduced caution and less attention to the road. This reflects a common concept in behavioral science known as “risk compensation.”



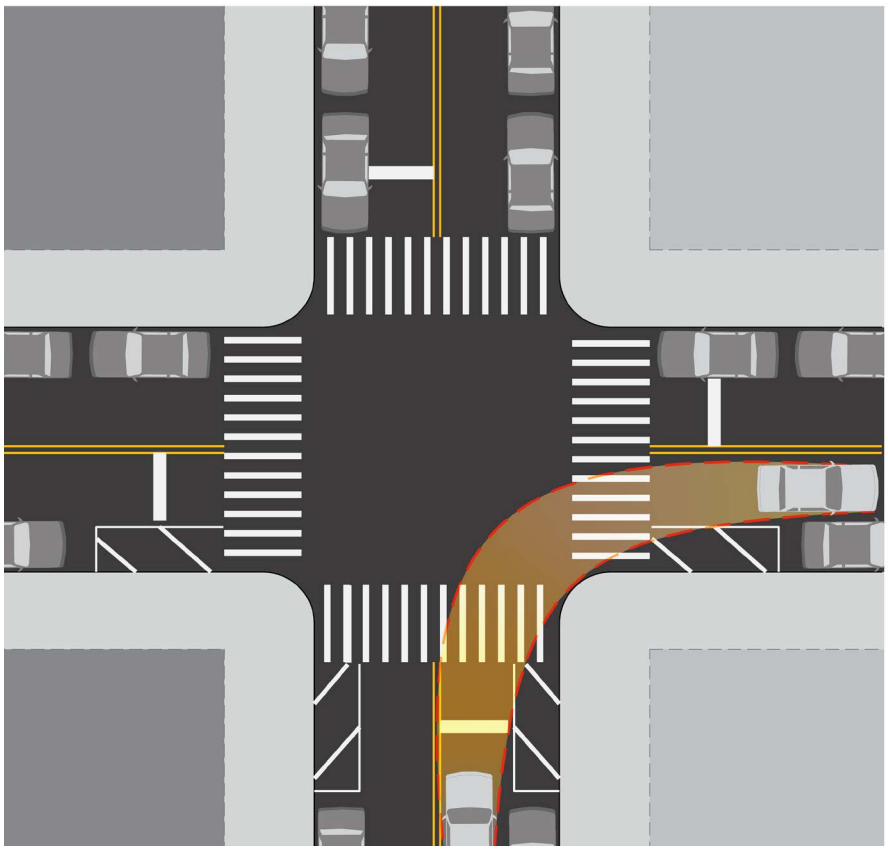
Example of a “tight” feeling street, where visibility and vehicle movement is restricted

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

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.

Design Recommendations

Locations where parking must be cleared for fire hydrants, bus stops, vehicle clearance and other issues will be prioritized for safety treatments through DOT's extensive existing process of monitoring and intervention.

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%)**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Introduction

What is daylighting?

Definitions

- **Daylighting is the removal of parking and other visual obstacles adjacent to a crosswalk.**
- **Intersections are natural points of conflict and contact between pedestrians, motor vehicles, cyclists, and all other modes of traffic.**

*Intersections must effectively route traffic while simultaneously upholding safety for all users.

*Contributors to injuries at intersections include **speed, low visibility, and disregard of traffic regulations.**

Intersection Safety Planning

Pros and Cons of Daylighting

- **Daylighting is a visibility-based measure which encourages lines of sight between intersection users.**

*Visibility contributes to safety when road users can see one another and avert collisions.

*Visibility can also encourage risk compensation, causing drivers to feel safer and in control with a wider field of view. This could lead to increased speeds and less caution when traversing an intersection, leading to collisions.

Local Law 66 of 2023

By law, DOT must daylight at least 100 intersections per year beginning 2025.

The legislation describes the daylighting process as follows:

- **DOT must publish a report to assess the feasibility of daylighting (this report)**
- **Pursuant to the conclusions of that report, DOT must then daylight 100 intersections annually, beginning January 1, 2025**
- **Each year DOT must publish a progress report on daylighting**

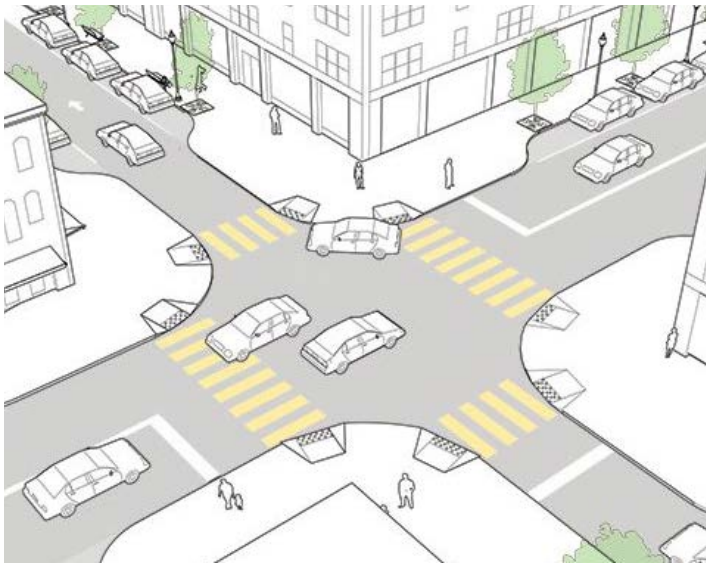
Standard Practice

Ensuring visibility at intersections is the national standard

Standard American Practice

- **Over 40 states have laws mandating daylighting, often dating to the dawn of the automobile.**
- **The city is exempt from the statewide law prohibiting parking within 20 feet of a crosswalk. In practice, daylighting in New York State is only enforced where signage and physical constructions designate it.**
- **Legal opt-outs like New York City are rare, but daylighting laws are frequently unenforced in densely populated areas nationwide.**

The Agency has committed to install 1000 daylighting improvements in 2024, in exceed-ance of the mandated goal.



Standard Practice, Con't.

Intersection Improvements

- **Best practices at urban intersections include many safety treatments, of which daylighting is often a part.**
- **This suite is generally associated with a reduction in crashes.**
    * **Neckdowns**
    * **Turn Calming**
    * **Protected Bike Lanes**

Around 20-30 feet of daylighting is often recommended.

Daylighting is endorsed by:

- **MUTCD**
- **FHWA (2018)**
- **NCHRP**
- **NACTO**

There is little *direct* evidence connecting daylighting to safety.

- **Frequently justified based on past literature and practices rather than empirical research.**

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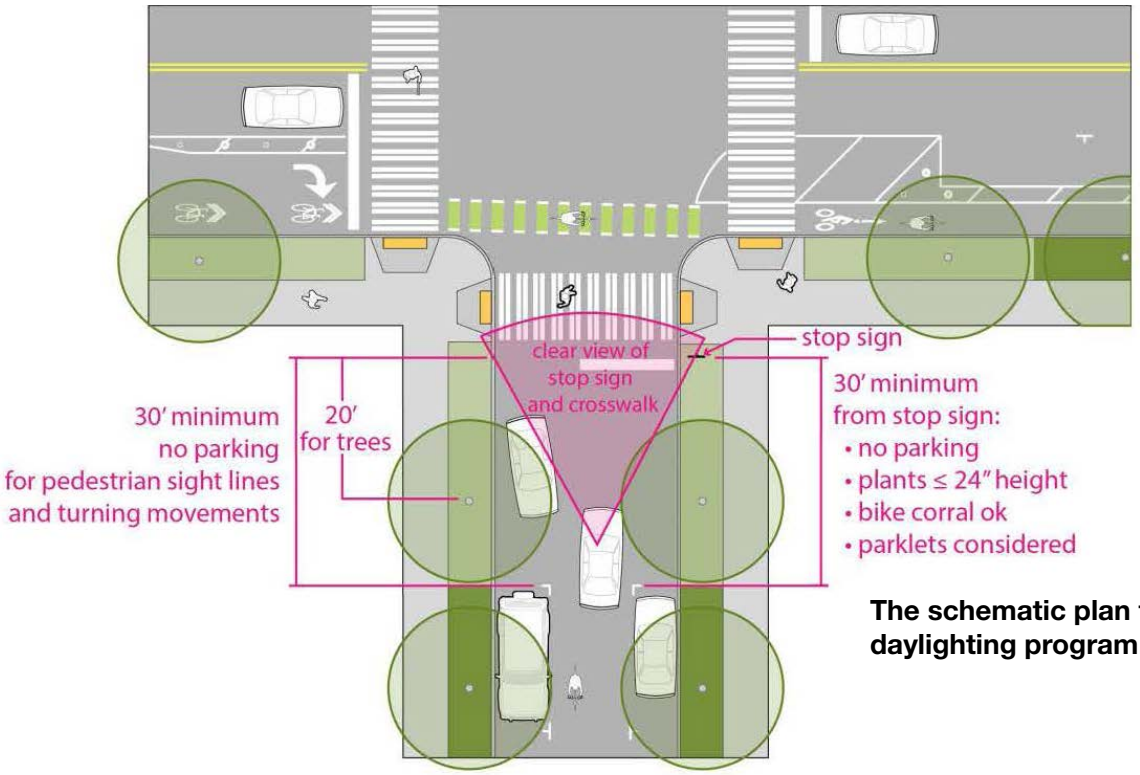


The schematic plan for Seattle's daylighting program.

Case Studies

Interventions

Seattle

- **Daylighting is a component of Seattle's comprehensive sidewalks design manual.**
- **The manual recommends daylighting with the placement of infrastructure (e.g., a bike corral, a bioswale).**
- **The city does not publish safety benefit analysis metrics for this process.**

Hoboken

The closest example to New York, Hoboken, is the most cited success story.

- The city is small – 1.3 square miles – and there are no limited access highways and a few major arterials.
- The size of the daylit area fluctuates by time of day – 15 feet in the nighttime, 25 feet during the day.
- "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.

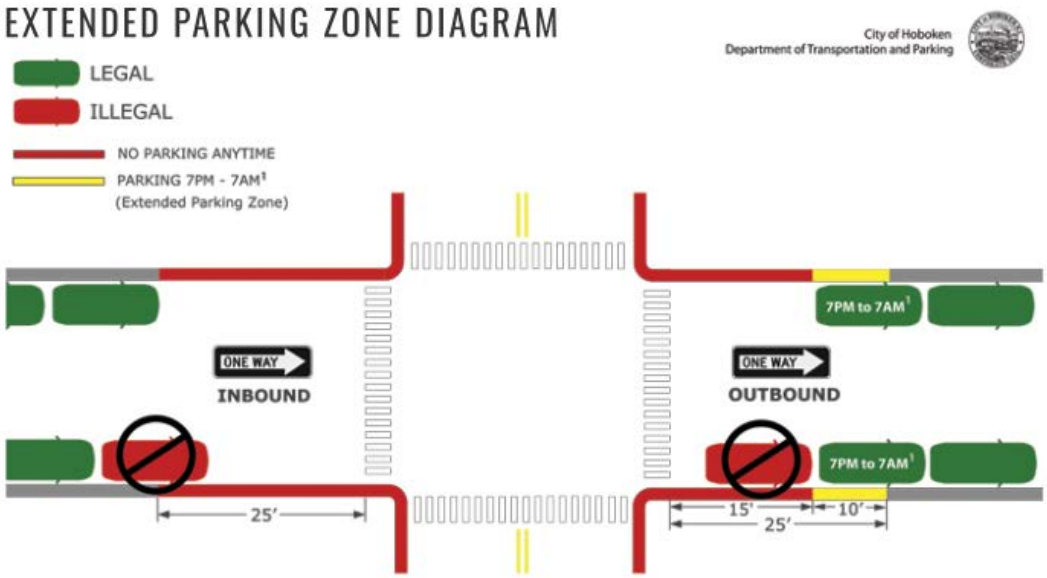


Photo: Chris Robbins

The Tenderloin, San Francisco

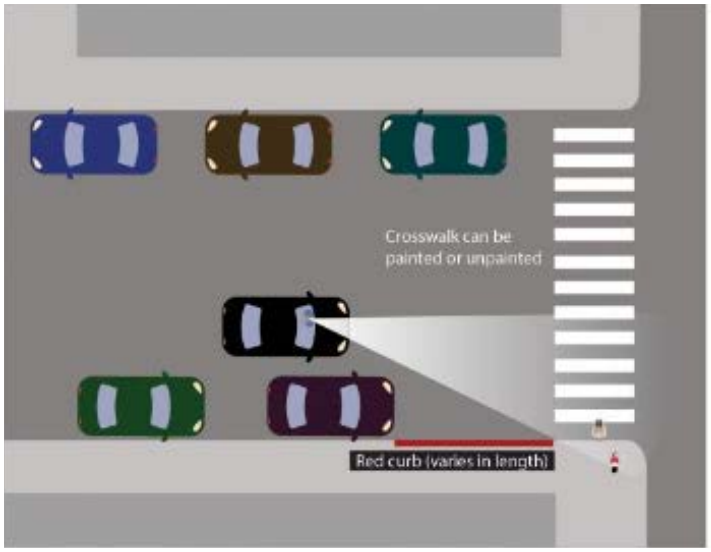
- 80 intersections in The Tenderloin were daylit in 2018.
- The city reported a 14% decrease in collisions at intersections where treatments were implemented.
- No data was available on injury reductions.
- Daylighting was achieved through red curb paint (legal regulation in SF).

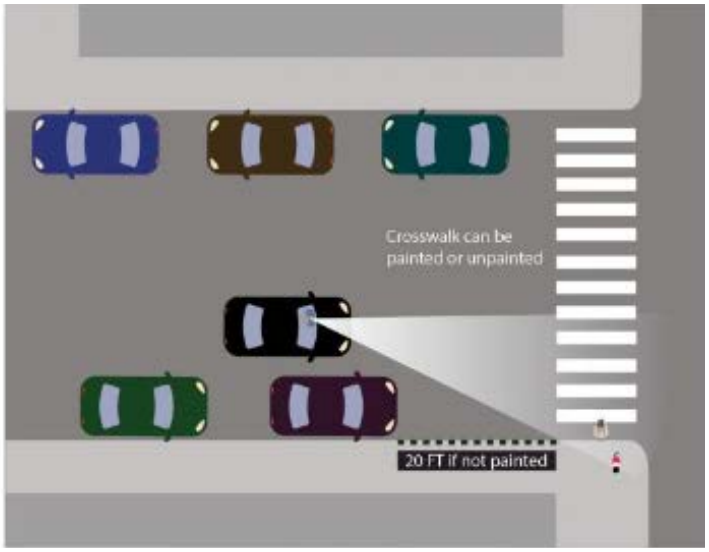
California AB-413, passed in 2023

- Daylighting was made a statewide law last year, going into effect in 2025.
- The law officially recommends enforcement through paint or signage.
- A 20-foot no parking zone is now standard statewide, overriding local law.

*Reduced to 15 feet if a locality installs curb extensions.

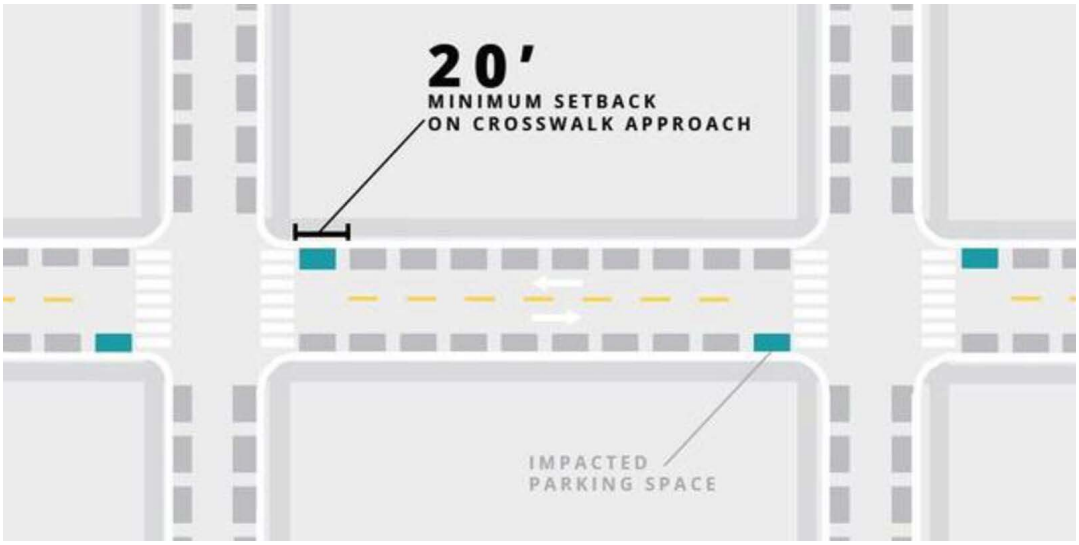
*Parking is only prohibited for motor vehicles, not bikes or scooters.





Portland, Oregon

- **Implemented as part of an intersection visibility campaign targeted at:**
  - **Pedestrian Priority Streets**
  - **City walkways**
  - **Arterial and collector streets in pedestrian districts**
  - **Streets in the High Crash Network**
- **350 uncontrolled intersections in high-crash network completed as of 2022.**
  - **For a total cost of $280,000, implementation cost $8,000 on average per intersection.**
  - **No before-after analysis of injuries or fatalities.**
- **Under Oregon state law, every intersection is a crosswalk whether marked or not.**



New York and Daylighting

Local Experience

New York, NY: Many intersections here are already daylit by existing infrastructure (bus stops, bike lanes and corrals, neckdowns, etc.)

Considerations for daylighting:

- Enforcement
- Existing visibility conditions at intersections
- Other measures that reduce turning speed

New York and Daylighting

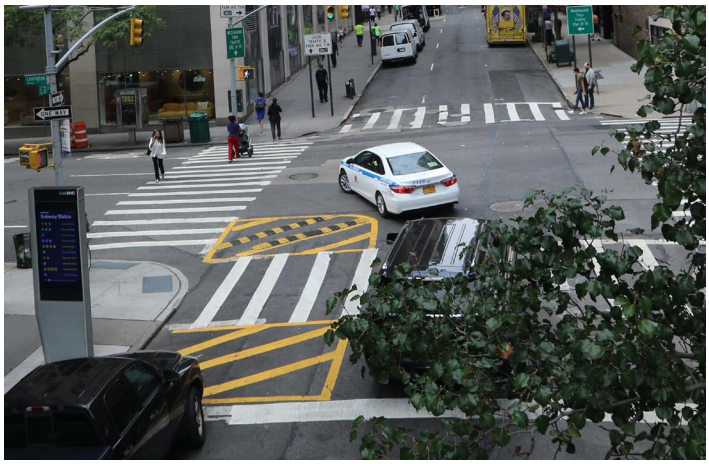
DOT Case Study:

Bicycle Infrastructure

- **The current Protected Bike Lane program effectively daylights every crosswalk it intersects at an intersection.**
- **Many bike corrals and Citi Bike docks are already located adjacent to crosswalks.**

DOT Case Study:
Turn Calming

- **Over 1,000 intersections have already been fitted with daylighting owing to the Turn Calming program.**
- **Turn Calming treated intersections with daylighting had 22% lower speeds on average than turn calming intersections without daylighting.**
- **Turn Calming with daylighting has the effect of both slowing turn speeds and increasing intersection visibility, in addition to being compatible with many other intersection treatments.**
- **Targeted at turning and failure-to-yield pedestrian and bike injury locations.**



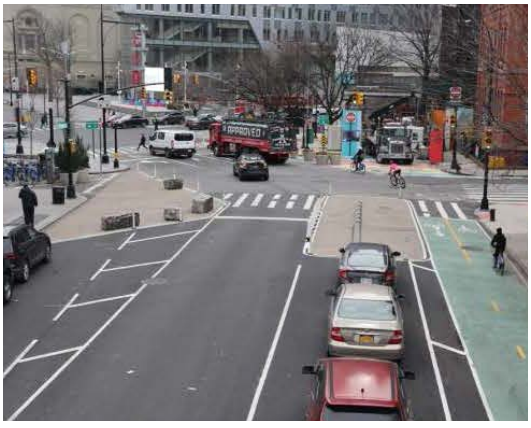
DOT Case Study:
Safety Treatment Evaluation

Pedestrians

Safety Treatment	Ped Injury Change	Ped Killed or Severely Injured Change
Road Diets	-12.5%	
Conventional Bike Lanes	-1.4%	-16.2%
Protected Bike Lanes	-17.8%	-29.2%
Pedestrian Islands	-10.2%	-29.9%
Curb & Sidewalk Extensions	-16.5%	-44.7%
Turn Calming	-17.5%	-32.7%

DOT's Safety Treatment Evaluation analyzed the effect of different street interventions. The safety treatments categories are non-mutually exclusive (e.g., some road diets contain protected bike lanes) and do not control for the presence of other safety interventions.

- **Daylighting is included in many of our existing robust safety treatments with demonstrated effects, including protected bike lanes, curb & sidewalk extensions, and turn calming.**
- **For pedestrians, curb and sidewalk extensions, LPIs and Turn Calming had the strongest effect on lowering severe injury rates; turn calming often includes hardened daylighting.**



DOT Case Study:
Street Seats and Outdoor Dining

- **Daylighting is not only a safety treatment. Livability benefits and public space can also be added when parking is prohibited.**
- **The installation of seating and outdoor dining sheds are two creative examples of DOT reimagining the use of the roadway adjacent to the crosswalk.**

New York City Current Practice
Intentional Design

- **New York City does not "automatically" daylight intersections**
  - **The city is exempt from the statewide law prohibiting parking within 20 feet of a crosswalk**
  - **In practice, daylighting in New York State is only enforced where signage and physical constructions designate it, as is visible in Yonkers and other New York cities**
  - **New York City has a similar pedestrian fatality rate to the state as a whole, despite far more pedestrian activity and exposure, suggesting that the statewide practice is not a substantial safety enhancement**
- **New York City has many daylit intersections, and regularly adds more**
  - **Over the past several years, New York City has daylit approximately 100-300 intersections annually as part of typical street redesign and safety operations**
  - **Reasons include safety/visibility for pedestrians, bikes and motor vehicles, making space for facilities such as bike share stations and e-scooter corrals, as well as the safe accommodation of large vehicle turns**

3

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.

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Hydrant Zone Crash Analysis

Introduction

“Hydrant zones” refers to existing infrastructure (fire hydrants and bus stops) that is not explicitly or intentionally installed 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 Street Improvement Projects (SIPs) that were completed or under construction**

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

Methodology:
Hydrant Zone Crash Analysis

Independent variables studied

- **Daylighting status** – whether the intersection contained any daylighting
- **Number of daylit approaches** – the number of corners daylit 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.

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 daylit intersections and non-daylit intersections and compared using a ratio:**

[Average daylit outcome] / [Average non-daylit outcome]

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

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* 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.

Findings: Hydrant Zones Crash Analysis

- **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 Ratio	Total/ Nearby Total 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
Intersection Control	Signal	1.2	1.3
	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

SAMPLE SIZE:
Total / nearby total analysis: 20,543 eligible intersections, 7,558 with any approaching daylighting

Ped / nearby ped analysis:
7,113 eligible intersections,
2,747 with any approaching daylighting

*All numerical findings displayed in the table are statistically significant, with a p-value below 0.05

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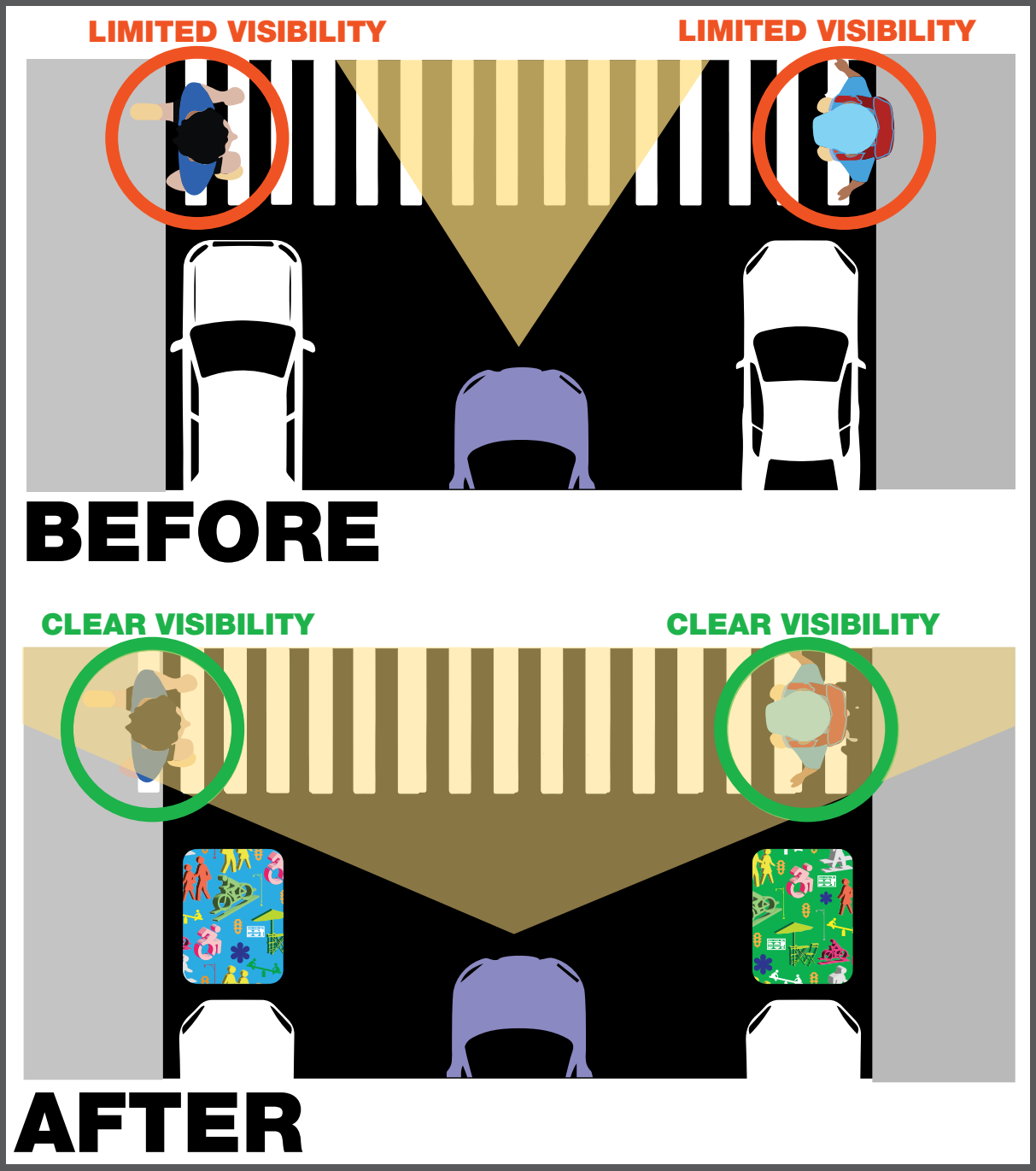
LIMITED VISIBILITY
LIMITED VISIBILITY
BEFORE
CLEAR VISIBILITY
CLEAR VISIBILITY
AFTER

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 Citi Bike	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

* DOT used the standard p-value of 0.05 to indicate a statistically significant result, representing 95% confidence in a reliable finding.

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**
- **Daylighting from neckdowns is associated with a higher average decrease in pedestrian injuries, reducing them by 0.5 per year, per intersection**
    - 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.

A small but significant safety benefit for hardened daylighting in terms of pedestrian injuries was found.

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 Citi Bike	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

* DOT used the standard p-value of 0.05 to indicate a statistically significant result, representing 95% confidence in a reliable finding.

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Conclusion

Findings

- **Intersections with hydrant zones were associated with a 30% higher normalized rate of pedestrian and total injuries.**
    * **Intersections with hydrant zones at more than one corner were associated with a 100% higher normalized rate of pedestrian injuries compared to intersections with no hydrant zones.**
    * **At intersections on truck routes, hydrant zones were associated with a 40% higher normalized rate of total injuries.**
- **No significant safety effect was found for sign-only daylighting.**
- **A statistically significant benefit for pedestrians was found for hardened daylighting, but other safety treatments had more safety benefits.**
    * **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.)

Design Recommendations

The simple absence of parking next to a crosswalk does not appear to increase safety on its own.

Universal sign-only daylighting policy is not recommended because **the absence of parking is associated with a higher incidence of pedestrian and total injuries** relative to nearby locations.

Hardened daylighting is effective in reducing pedestrian injuries but requires resources for physical installations and maintenance.

Overall, daylighting should only be deployed with other robust treatments where it has the highest proven safety benefits.

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Appendix

Study Limitations

General

- Insufficiently granular data - although daylighting is located at particular approaching-side intersection leg(s), crash data is recorded at the intersection level, so all analyses were conducted at the intersection level
- Does not account for noncompliance – it is unknown where and how often drivers park in spots that the data classifies as daylit

Hydrant Zones

- Findings apply to a subset of intersections - to avoid interference with hydrant zones, analysis was limited to intersections without other features (Open Street, hardened daylighting treatment, No Standing Anytime sign, protected bike lane, SIP)
- Impossible to capture all instances of hydrant zones- focused on hydrants and bus stops
- Impossible to perfectly normalize intersection injury rates - pedestrian volume data and precise traffic data are not available; instead, DOT normalized using nearby injury rates on the assumption that nearby intersections will have broadly similar conditions
- All comparisons involve aggregated 2017-2023 injury counts - similar totals may belie differing underlying trends
- Data availability - some datasets used for intersection eligibility and analysis are not current through the end of the study period (2023), e.g., sign data, Open Streets data

Before/After

- Small sample sizes - analysis was limited to intersections with daylighting installed between 2019 and 2021 to allow for consistent injury data before and after; also limited to intersections without any other safety treatment in the analysis period

Sample Sizes

Hydrant Zone Analysis

All intersections: 41,102

Intersections excluded for having other treatments*: 12,748

** Open Street, hardened daylighting treatment, No Standing Anytime sign, protected bike lane, or SIPs that were completed or under construction*

Intersections excluded because of complex or unusual configurations: 914

Intersections excluded for presence in a park or airport: 374

All eligible intersections: 27,066

Intersections excluded due to lack of injury crashes at nearby intersections during the study period: 6,523

Total / nearby total injury analysis

All eligible intersections: 20,543

- **Eligible intersections with any approaching daylighting: 7,558 (hydrants: 6,848; bus stops: 1,432)**

Pedestrian / nearby pedestrian injury analysis
All eligible intersections: 7,113

- **Eligible intersections with any approaching daylighting: 2,747 (hydrants: 2,420; bus stops: 672)**

Before/After Analysis

All intersections: 41,102

Intersections excluded for having other treatments during analysis period (2019-2023)*: 9,647

** Open Street, hardened daylighting treatment, No Standing Anytime sign, protected bike lane, or completed SIPs*

All eligible intersections: 31,455

Eligible intersections with any daylighting treatment during install period (2019-2021): 757

- **Eligible intersections with sign-only daylighting installations: 568***
- *** 1 intersection had no qualifying nearby comparison locations and was excluded**
- **Eligible intersections with Citi Bike station installations: 134**
- **Eligible intersections with bike corral installations: 3**
- **Eligible intersections with turn calming with daylighting installations: 33**
- **Eligible intersections with neckdown installations: 14**
- **Eligible intersections with enhanced crossing installations: 5**

Hydrant Zone Analysis Results

Approaching bus + hydrant daylighting		Cells contain daylit outcome - non-daylit outcome ("diff") or daylit outcome / non-daylit outcome ("ratio")																			
		one-way only intersections							intersections with two-way street(s)							all intersections						
		Pedestrians			Motor Vehicle Operators			total	Pedestrians			Motor Vehicle Operators			total	Pedestrians			Motor Vehicle Operators			total
		pedestrian /total	pedestrian /nearby pedestrian	pedestrian severe /total pedestrian	mvo /avg. annual daily traffic	mvo severe /mvo total	right-angle mvo / total mvo	total /nearby total	pedestrian /total	pedestrian /nearby pedestrian	pedestrian severe /total pedestrian	mvo /avg. annual daily traffic	mvo severe /mvo total	right-angle mvo / total mvo	total /nearby total	pedestrian /total	pedestrian /nearby pedestrian	pedestrian severe /total pedestrian	mvo /avg. annual daily traffic	mvo severe /mvo total	right-angle mvo / total mvo	total /nearby total
		diff	ratio	diff	ratio	diff	diff	ratio	diff	ratio	diff	ratio	diff	diff	ratio	diff	ratio	diff	ratio	diff	diff	ratio
any daylighting		3.1	1.3				-6	1.2		1.4		1.1		-1.7	1.3		1.3		1.1		-2.2	1.3
num. daylit approaches	1 leg		1.2				-5.7	1.2		1.2		1.1			1.2		1.2					1.2
	>1 leg	7.7	1.8					1.8	2.5	2		1.2		-8.8	2	2.7	2		1.1		-8.9	2
borough	MN									1.5					1.3		1.5					1.4
	BX					4.8				1.4					1.3		1.5					1.3
	BK						-6.5	1.2		1.4				-3.9	1.3		1.3				-4.4	1.2
	QN	7.1	1.5							1.3		1.1			1.2		1.3		1.1			1.3
	SI									2.3		1.3			1.8		2.3		1.3			1.8
intersection control	signal						-5.7			1.3		1.1		-4.3	1.3		1.2		1.1		-4.5	1.3
	all-way										-3.5							-3.4				
	stop on min.						-10.8								1.1					0.8		1.1
	uncontr.									1.6	4.7				1.5		1.7	4.4			3.5	1.6
average # lanes (receiving)	1		1.2				-10.5			1.7				-6.6	1.6		1.5				-7	1.5
	2	9.8						1.4		1.5		1.1	0.9	-3.6	1.4	1.5	1.4		1.1	0.9	-3.5	1.4
	3+	12.6	3.5				18.3	1.9		1.7		1.4			1.6		1.7		1.4		2.4	1.6
presence of truck route	yes	7.5	1.7					1.6		1.6		1.2	1.1		1.3	2	1.6		1.2			1.4
	no						-6.7	1.2		1.2					1.2		1.2					1.2
speed	high	5.5	1.4		1.3			1.3		1.4		1.1	0.8		1.3		1.4		1.1	0.7		1.3
	medium						-14			1.3				-4.8	1.3		1.2				-6.9	1.3
	low							1.5	-8.4	1.4					1.8	-8	1.5					1.7
population density	high		1.2				-9.1	1.1		1.3				-4.5	1.3		1.3				-5.8	1.2
	medium	7.6								1.4			0.9		1.2		1.5					1.3
	low							1.6		1.7		1.2	1.1		1.4		1.8		1.2	1.1		1.5
T intersection	yes									1.5					1.3		1.4					1.3
	no	3.6	1.2				-9.1	1.2		1.3			0.7	-3.5	1.2		1.3			0.6	-4.2	1.3

All numerical findings displayed in the table are statistically significant, with a p-value below 0.05.

Methodology Glossary

AADT: Average annual daily traffic

Daylighting: Features were considered “daylighting” if they were within a certain distance of an intersection corner on the approaching traffic side (Citi bike stations, bike corrals, and fire hydrants: 35 feet; Bus stop signs: 52 feet)

MVO: Motor vehicle occupant

Open Street: Street closed to vehicles part- or full-time to allow for pedestrian and school use

SIP: Street Improvement Project, conducted by DOT

Statistical significance: All comparisons were made using two-sample t-tests with a significance threshold of 0.05

Total injuries: All non-fatal injuries resulting from crashes during the study period, including injuries to pedestrians, bicyclists, motor vehicle occupants (MVOs), and motorized two-wheeler occupants


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