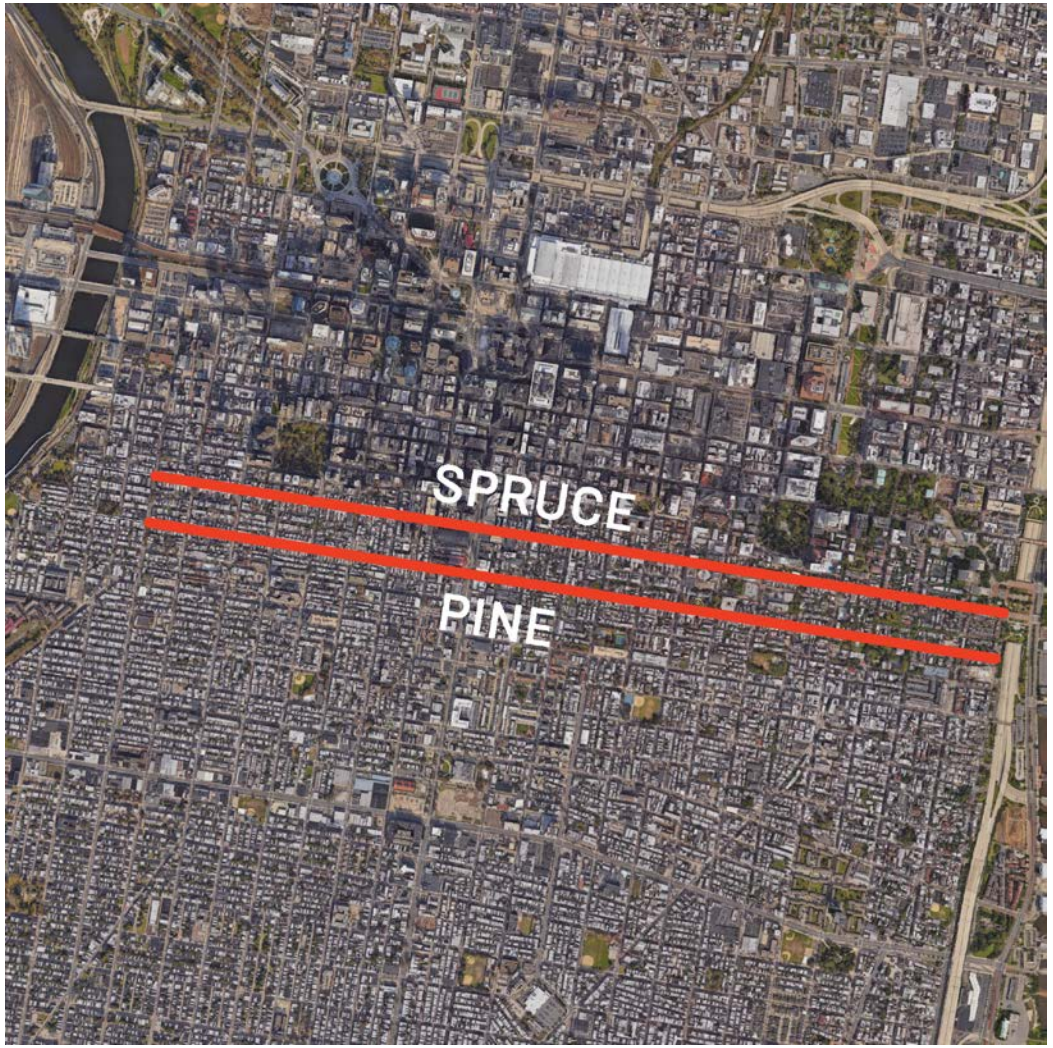
SPRUCE/PINE REPAVING & SAFETY PROJECT SUPPORTING DATA DOCUMENT

SPRING 2018

OFFICE OF TRANSPORTATION AND INFRASTRUCTURE SYSTEMS

CITY OF PHILADELPHIA
otis
MANAGING DIRECTOR'S
OFFICE OF TRANSPORTATION
& INFRASTRUCTURE SYSTEMS

TABLE OF CONTENTS



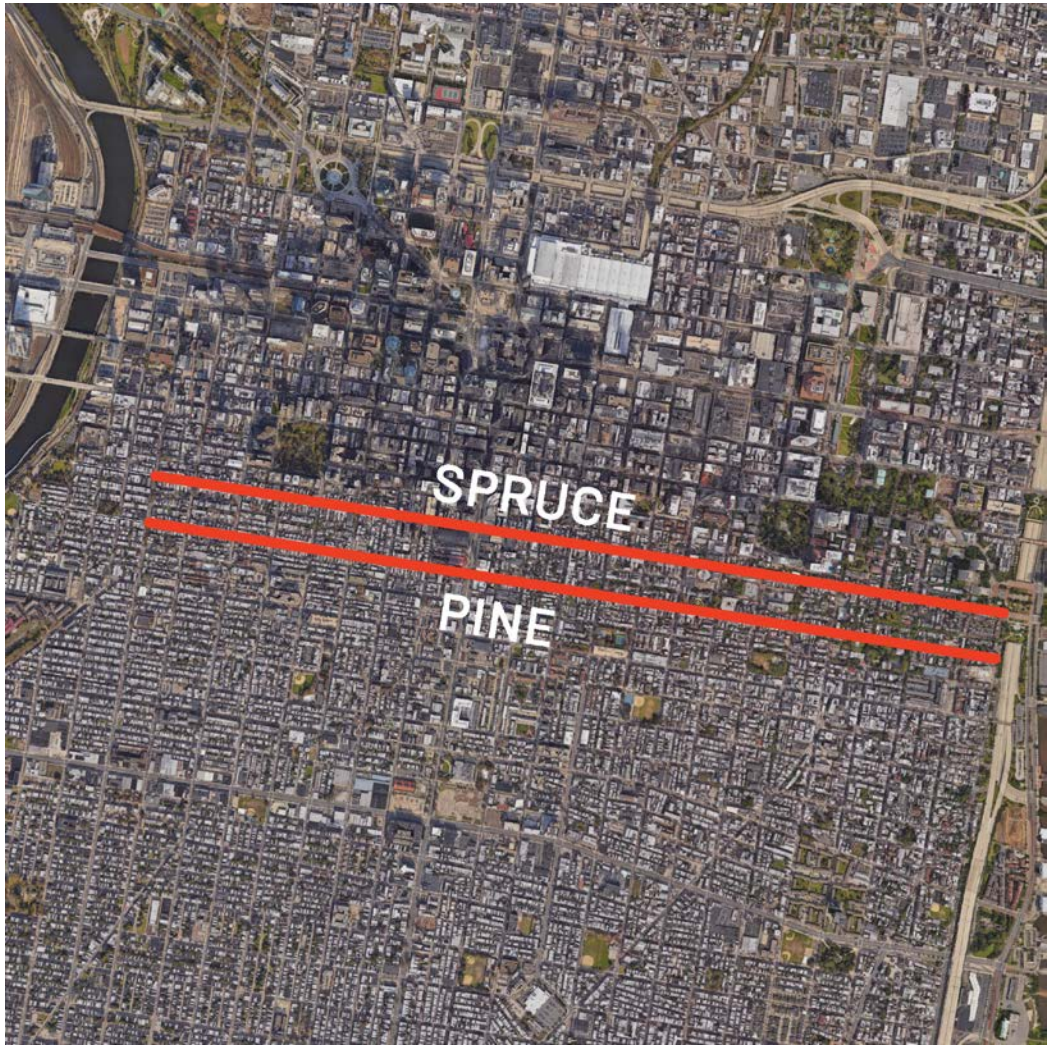
REPAVING & SAFETY PROJECT
FRONT – 22ND

Project Details

- Repaving and restriping
- Location of bicycle lane
- Location of parking & loading
- Intersection treatments

NOT under consideration

- Protected bicycle lanes

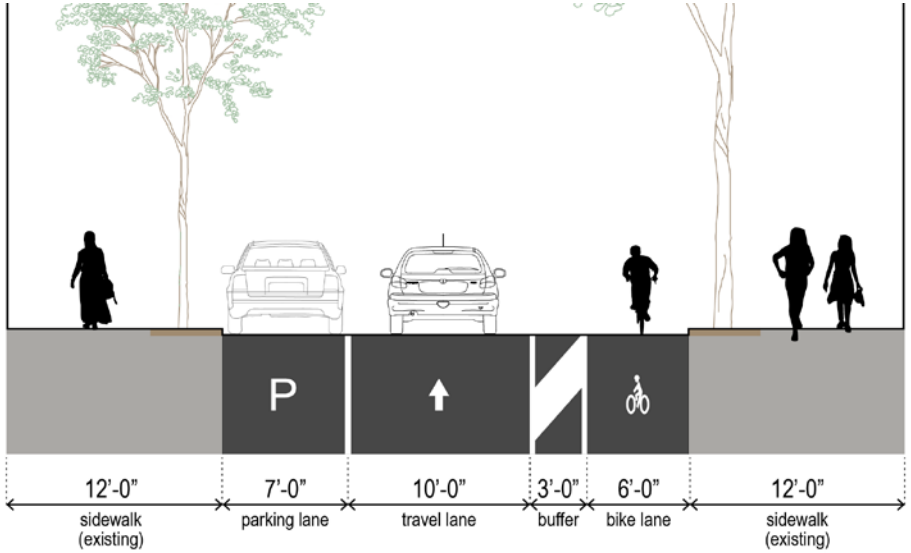


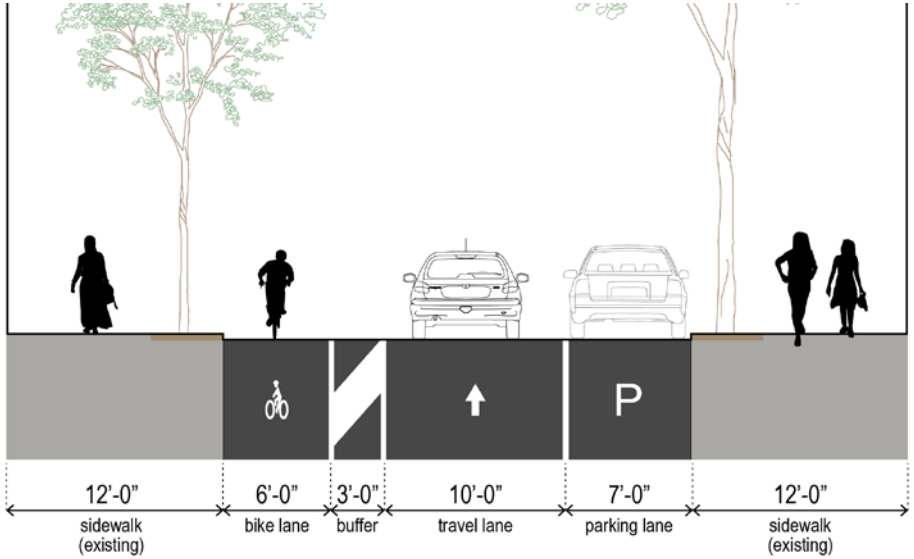
REPAVING & SAFETY PROJECT
REPAVING & RESTRIPING

- Spruce & Pine Streets on the City's repaving schedule
- Line striping has faded over time, including striping and crosswalks
- Repaving projects are an opportunity to reevaluate the roadway configuration and identify opportunities for improvement
- The project will:
  - Shift the bike lanes to the left side of Spruce and Pine
  - Upgrade intersection treatments
  - Relocate and update parking and loading areas

REPAVING & SAFETY PROJECT
SWITCHING PARKING/LOADING & BICYCLE LANE SIDES

- Keep existing lane widths the same
- Switch the bicycle lane and buffer to the left side of each street
- Switch the parking/loading lane to the right side of each street
- Puts bicyclists on driver-side with smaller blind spots
- Reduces risk of right-hook crashes
- Parking & loading areas to be adjusted before and after implementation, as needed





EXISTING STREET CONFIGURATION

- 6-foot bike lane (right)
- 3-foot buffer
- 10-foot travel lane
- 7-foot parking lane (left)

PROPOSED STREET CONFIGURATION

- 6-foot bike lane (left)
- 3-foot buffer
- 10-foot travel lane
- 7-foot parking lane (right)

BICYCLE LANE & PARKING SAFETY RESEARCH
LEFT HAND BICYCLE LANE RESEARCH

oTIS looked at existing research and best practices in other cities to determine whether moving the bike lanes to the left side of the street would improve safety.

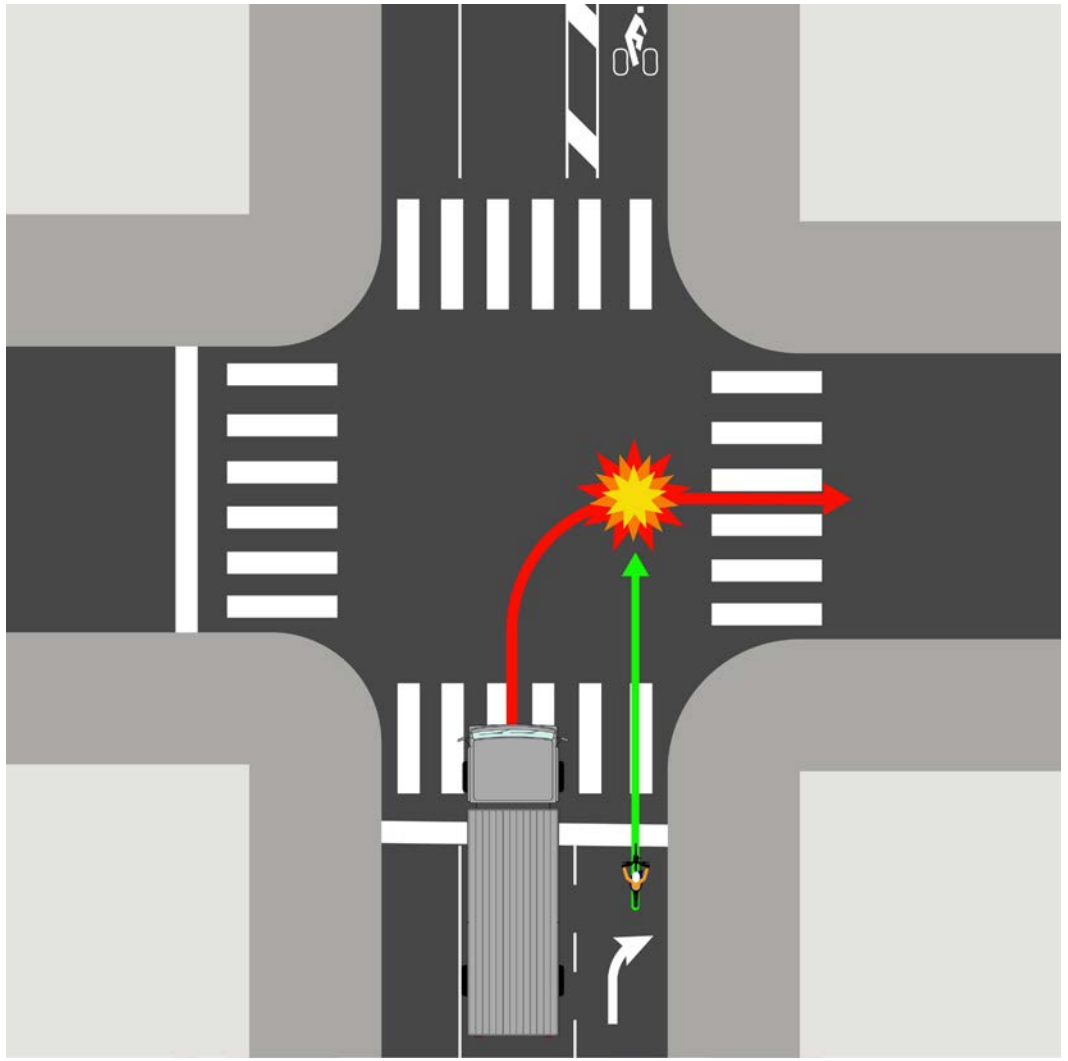
The following slides contain the sources we used for research and major take-aways that informed our decision-making process.

BICYCLE LANE & PARKING SAFETY RESEARCH
MIXING ZONES, RIGHT HOOK CRASHES, & BLIND SPOTS

THE DANGER OF RIGHT-HOOK CRASHES

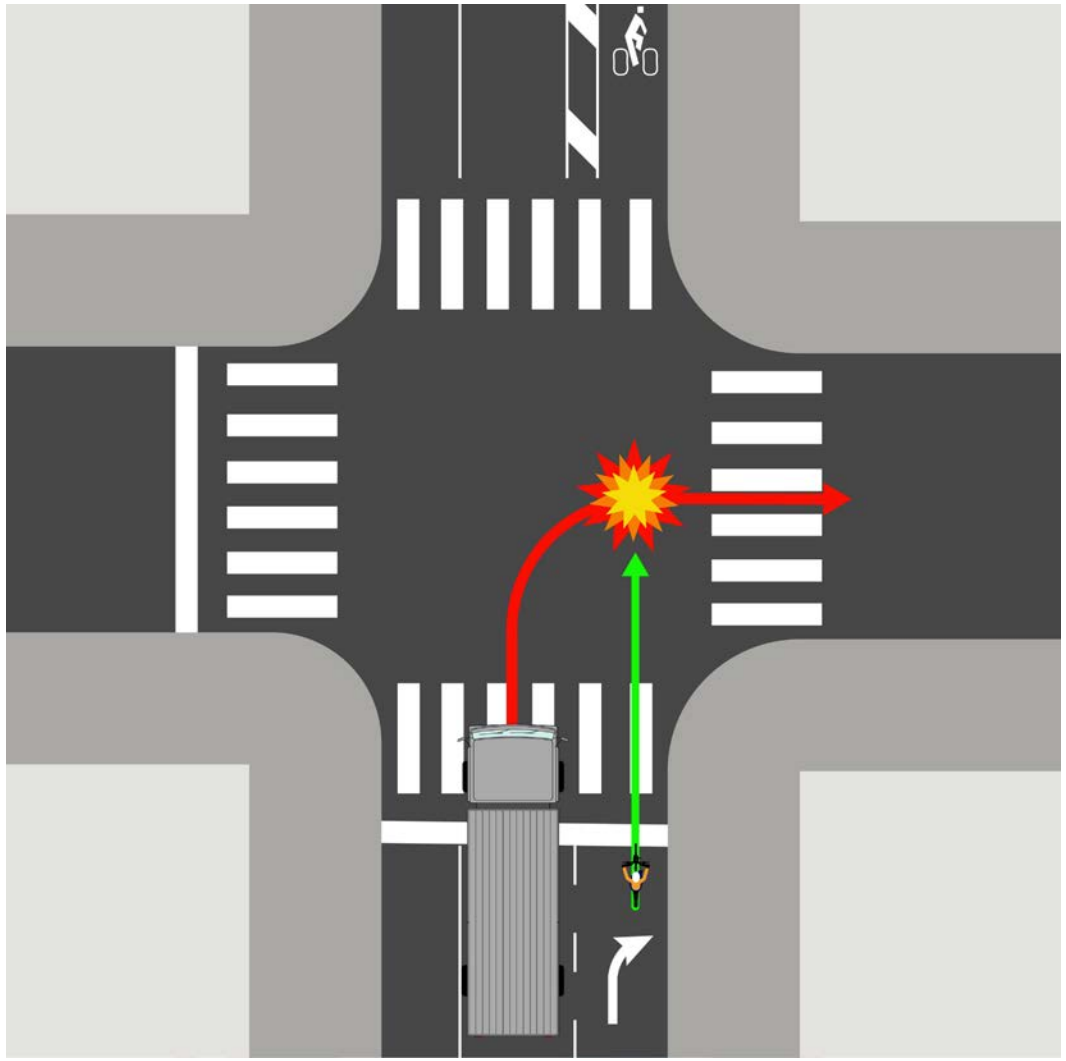
Failure to yield the right of way was **the cause of 25% of bicyclist fatalities** across the United States in 2015.

– The Governor's Highway Safety Association (GHSA)



RIGHT HOOKS

A right-hook crash is a crash between **a motor vehicle that is turning right** and **a bicycle that is continuing straight.**



RIGHT HOOKS

Spruce Street has 14 right hook locations.

Pine Street has 18 right hook locations.

Total of 32 locations for possible right hook conflicts.

THE DANGER OF BLIND SPOTS

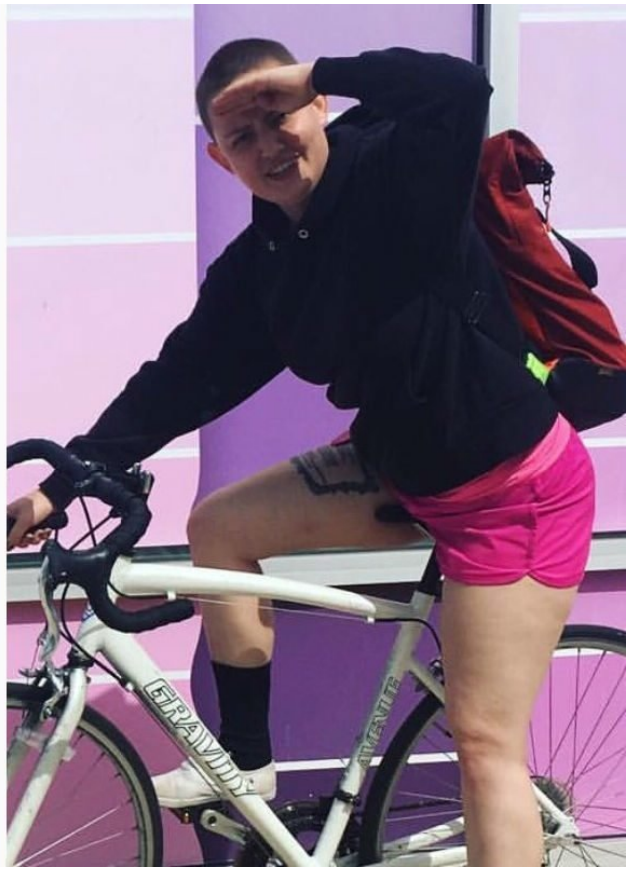
In nearly **70%** of bicyclist-motor vehicle crashes at intersections, the person driving the vehicle reported that **they did not see the person on the bicycle** before the crash.

– The Institute of Transportation Engineers (ITE)

THE DANGER OF BLIND SPOTS

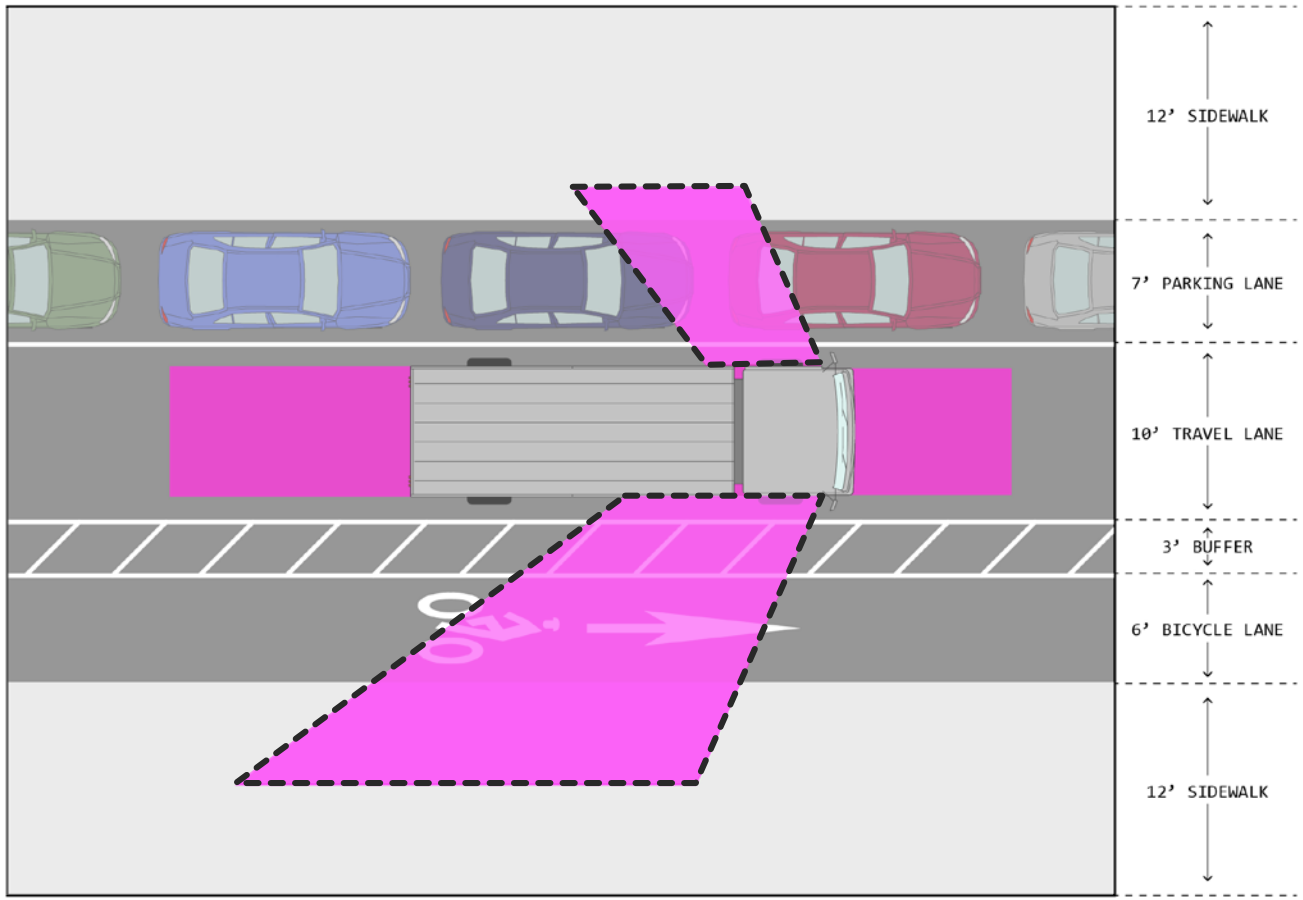
Emily Fredricks was killed in a right hook crash with a trash truck on Spruce Street at 11th as she rode her bike to work on the morning of November 28th, 2017.

THE DANGER OF BLIND SPOTS

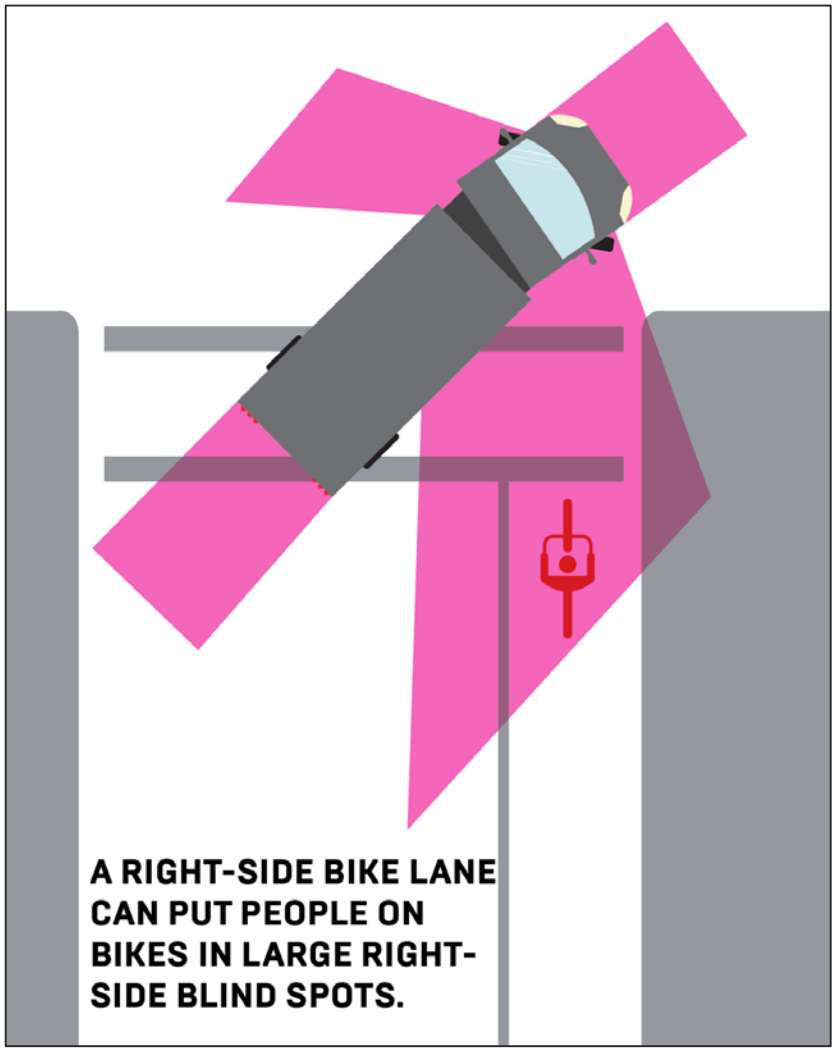


Becca Refford was seriously injured in a right hook crash with a box truck on 13th Street at Pineth as she rode her bike to work on the morning of December 15th, 2017.

THE DANGER OF BLIND SPOTS

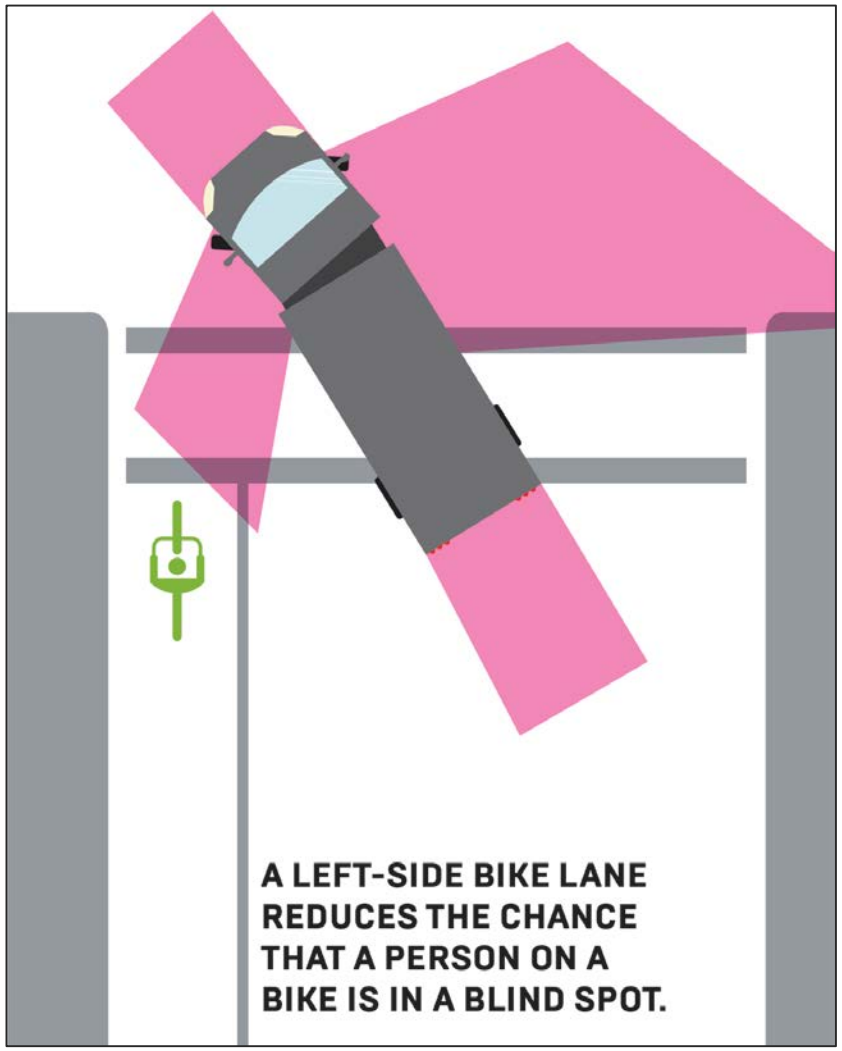


Drawing not to scale



LEFT VS RIGHT HOOK CRASHES

Large vehicles like trucks have **smaller blind spots on their left** sides than on their right sides



BENEFITS

Spruce Street would go from **14** right-turn conflict locations to **15** left-turn conflict locations.

Pine Street would go from **18** right-turn conflict locations to **14** left-turn conflict locations.

BICYCLE LANE & PARKING SAFETY RESEARCH

LEFT HAND BICYCLE LANE RESEARCH

Blower, Daniel. “TRUCK MIRRORS, FIELDS OF VIEW, AND SERIOUS TRUCK CRASHES.” University of Michigan Transportation Research Institute, June 2007. https://deepblue.lib.umich.edu/bitstream/handle/2027.42/58728/99830.pdf;jsessionid=6FFDC1DE6DB75D625616742137006FB1?sequence=1.

Major takeaways from this source:

- Truck crashes involving a right-hand turn or lane change happen much more frequently than truck crashes involving a left-hand turn or lane change - page i, page 8, page 9, page 17
- Truck drivers have much more restricted fields of vision than drivers in other vehicles - page 1
- The right-side of a truck is only visible through mirrors, while the left side can sometimes be seen directly - page 1
- Federal requirements regarding placement and number of mirrors are minimal - page 1, page 17
- Data indicates that crashes are much more common when a truck driver is making a maneuver that relies solely on mirrors, i.e. a right turn or lane change - page 2
- The blind spots on the right side of a truck are more severe than the blind spots on the left side of a truck, especially for vehicles close to the cab (such as bicycles at an intersection) – page 11, page 17

BICYCLE LANE & PARKING SAFETY RESEARCH

LEFT HAND BICYCLE LANE RESEARCH

Federal Highway Association. “Lesson 19: Bicycle Lanes.” In *FHWA Course on Bicycle and Pedestrian Transportation*, 19-1 to 19-10. Washington DC, n.d. https://safety.fhwa.dot.gov/PED_BIKE/univcourse/pdf/swless19.pdf.

Major takeaways from this source:

- “On one-way streets, bicycle lanes should be installed on the right-hand side, unless conflicts can be greatly reduced by installing the lane on the left-hand side. Left-side bicycle lanes on one-way streets may also be considered where there are frequent bus or trolley stops, unusually high numbers of right turning motor vehicles, or if there is a significant number of left-turning bicyclists.” – page 19-2
  - The presence of right-turning trucks as well as SEPTA bus stops on the right side of the street means that placing the bicycle lanes on the left side along Spruce and Pine is consistent with this Federal Highway Association design guidance.
  - 6 of the 10 highest turn-volume intersections along Spruce and Pine are right-turn intersections. 4 of the top 5 highest turn-volume intersections along Spruce and Pine are right-turn intersections. This also indicates that switching the bike lanes to the left is consistent with this Federal Highway Association design guidance.

BICYCLE LANE & PARKING SAFETY RESEARCH
LEFT HAND BICYCLE LANE RESEARCH

Federal Motor Carrier Safety Administration. “Large Blind Spots (‘No Zones’).” US DOT, July 19, 2017. https://www.fmcsa.dot.gov/ourroads/large-blind-spots.

Major takeaways from this source:

- Trucks have more severe blind spots on their right side than they do on their left side.
- Although the trucks traveling along Spruce and Pine are (in most cases) smaller than the trucks discussed in this resource, the same physics apply to a less-extreme degree.

BICYCLE LANE & PARKING SAFETY RESEARCH

LEFT HAND BICYCLE LANE RESEARCH

National Association of City Transportation Officials. “Left-Side Bike Lanes.” In *Urban Bikeway Design Guide*. New York, NY, n.d. https://nacto.org/publication/urban-bikeway-design-guide/bike-lanes/left-side-bike-lanes/.

Major takeaways from this source:

- “Left-side bike lanes offer advantages along streets with heavy delivery or transit use, frequent parking turnover on the right side, or other potential conflicts that could be associated with right-side bicycle lanes. The reduced frequency of right-side door openings lowers dooring risk.”
    - While the issue of right-side dooring is not relevant to Spruce and Pine, NACTO confirms the previously-cited FHWA guidance on left side bike lanes as an appropriate treatment along corridors with frequent transit stops.
- Left side bike lanes improves bicyclist visibility by motorists by having the bike lane on the driver’s side.
- Fewer bus and truck conflicts as most bus stops and loading zones are on the right side of the street.

BICYCLE LANE & PARKING SAFETY RESEARCH
LEFT HAND BICYCLE LANE RESEARCH

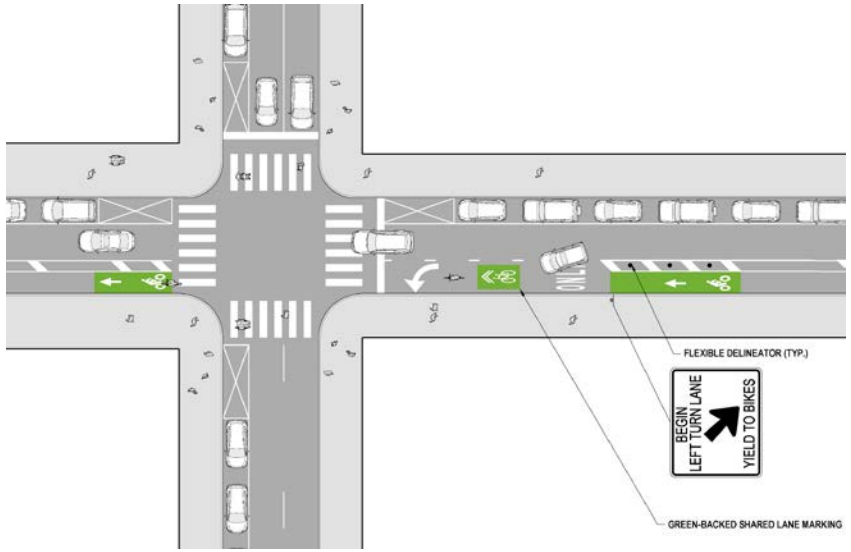
Institute of Transportation Engineers. “The Difference Between Right and Left Bike Lanes.” *ITE Journal* 84, no. 7 (July 2014): 14–15.

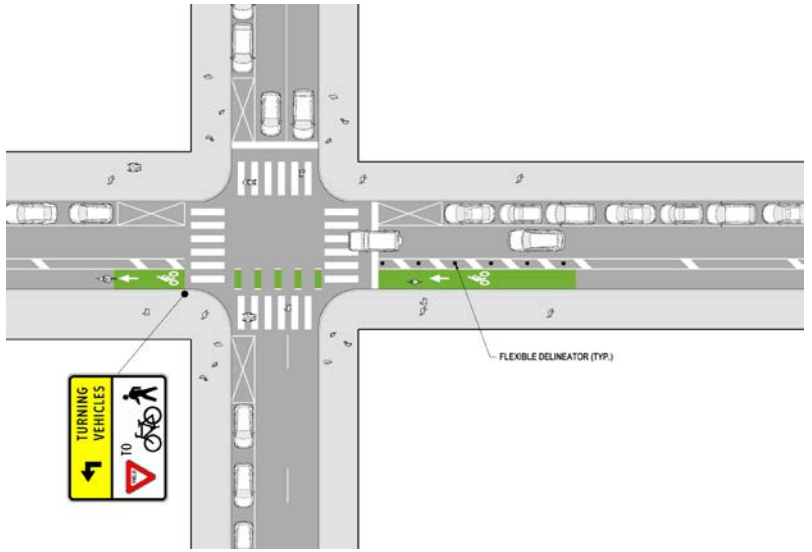
Major takeaways from this source:

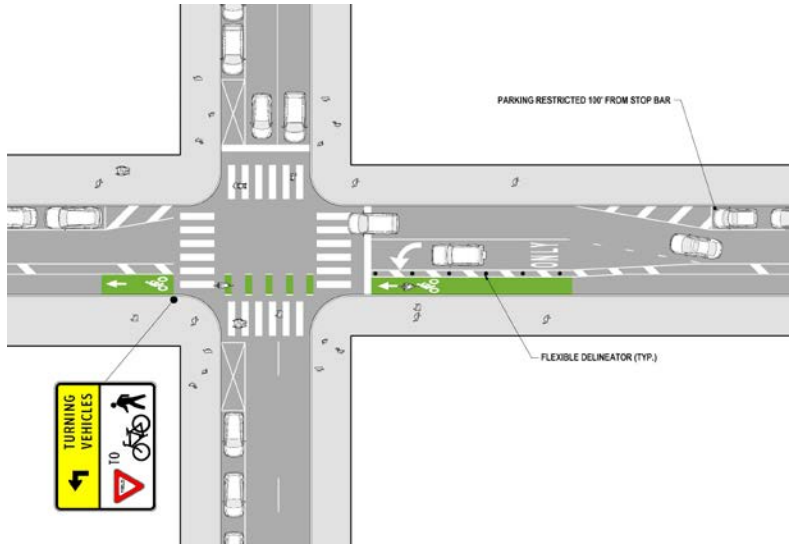
- Left side bike lanes improves bicyclist visibility by motorists by having the bike lane on the driver’s side – page 15
- Left side bike lanes reduce conflicts with right-turning vehicles at intersections and reduce the presence of bicycles in large blind spots – page 15
- Left-side bicycle lanes reduce conflicts between vehicles like buses that are pulling over to the right side – page 15
- Every street and every situation is different, so there is no standard for how to implement a bike line on a specific street. Local context should be taken into account when determining what facility to install. – page 15

BICYCLE LANE & PARKING SAFETY RESEARCH
UPGRADED INTERSECTION TREATMENTS

- Intersection improvements will make Spruce & Pine Streets safer for people walking, biking, and driving.
- Toole Design Group proposed three intersection safety improvements that meet national standards to:
  - Help alert drivers to the presence of the bike lane
  - Help alert people on bikes to the intersection conflict zone
- The City and Toole Design Group are working together to evaluate vehicle turn volumes to identify which intersection treatments are appropriate along the corridors' 44 intersections

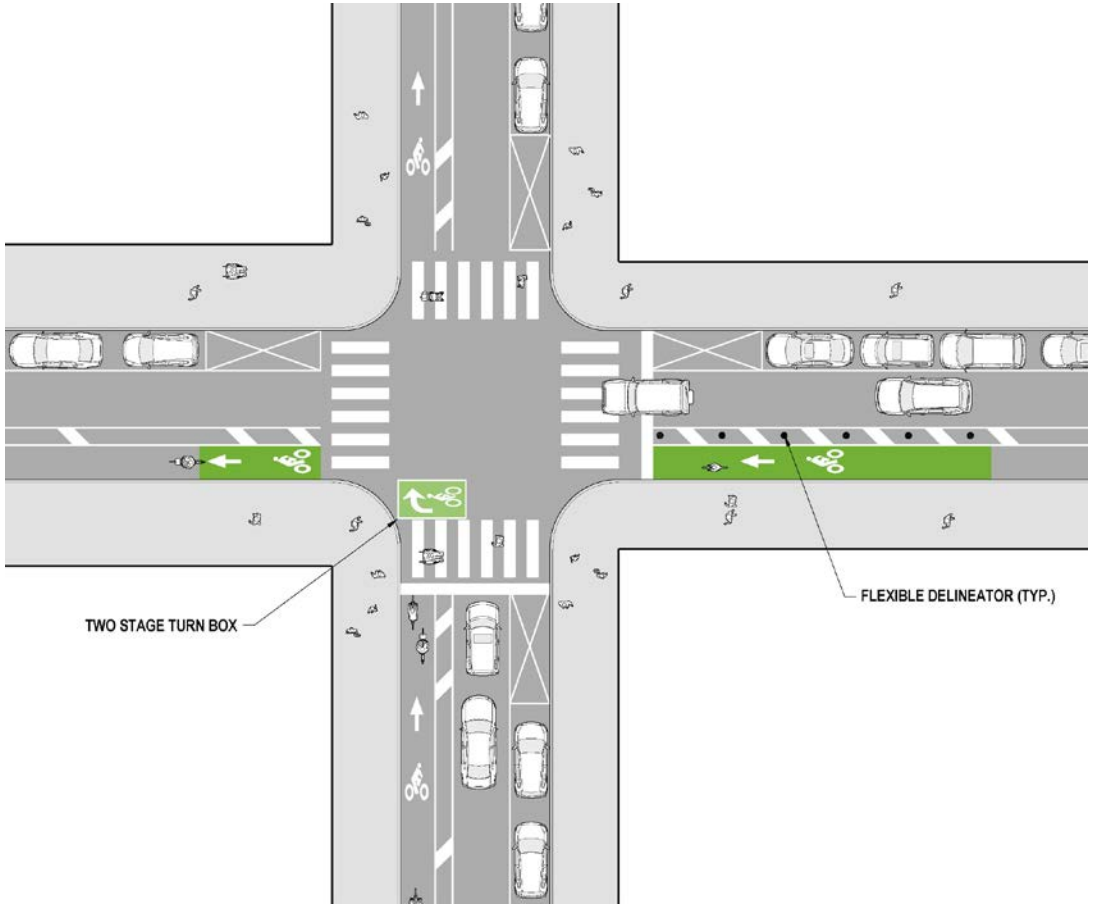






BICYCLE LANE & PARKING SAFETY RESEARCH
UPGRADED INTERSECTION TREATMENTS

- How will bikes make turns off of Spruce & Pine?
  - Two-staged turn boxes will clearly direct bicyclists in a path to turn onto adjacent streets
  - Two-staged turn boxes provide a path across the intersection without the need to merge with or cross vehicle traffic



REPAVING & SAFETY PROJECT
UPDATE PARKING & LOADING CONFIGURATION

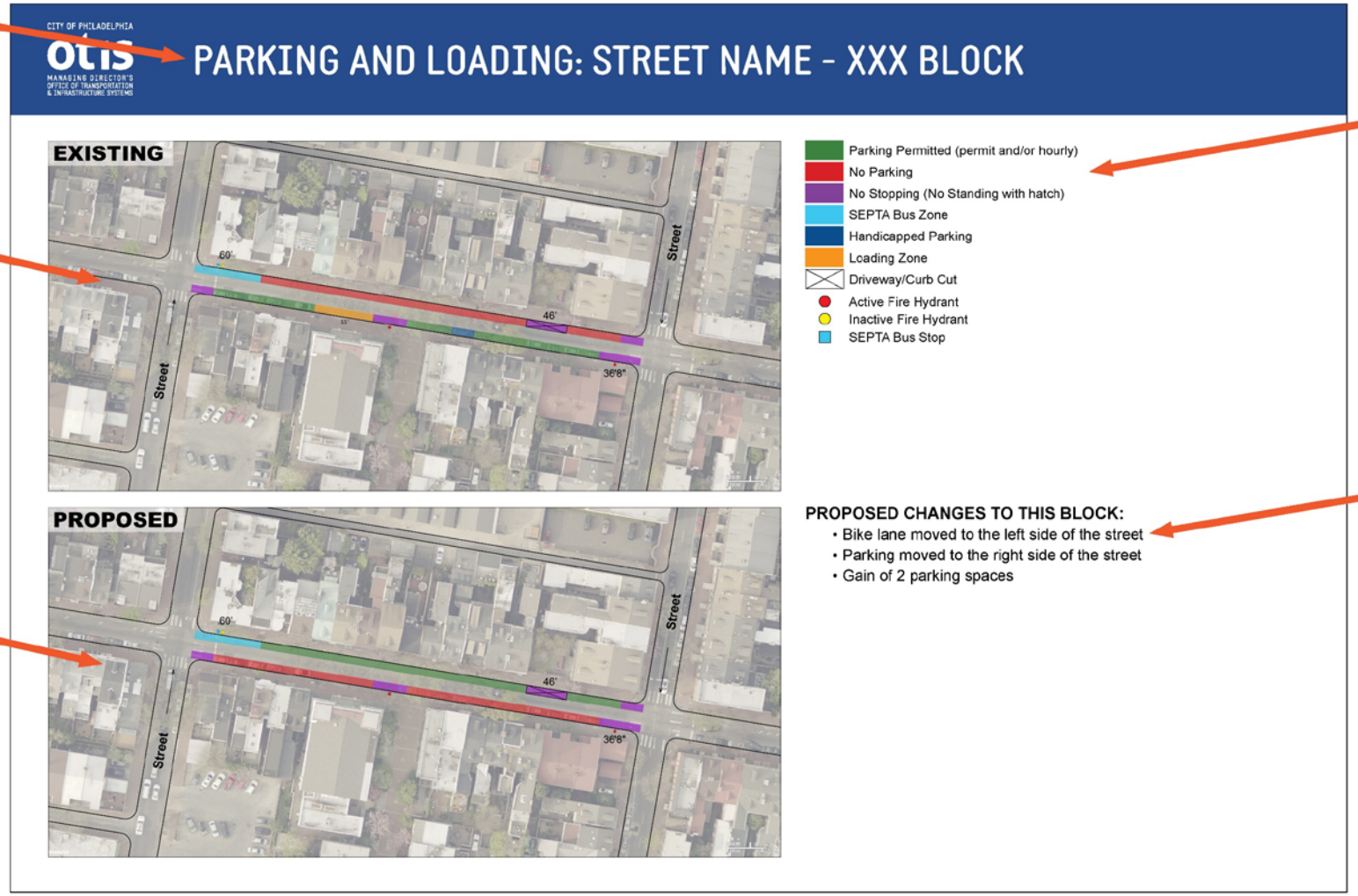
- There is an opportunity to adjust parking & loading configuration on a block by block level
  - A block by block look is needed because of alleys, hydrants, driveways and loading zone
  - The City is partnering with PPA, civic groups, and people who work and live on Spruce & Pine to determine the configuration.
- How are we coming up with the new parking & loading configuration?
  - **January 2018** – Documented existing conditions
  - **March 2018** – Walked the corridors with PPA, SEPTA, and Streets Department to identify opportunities and constraints
  - **April – May 2018** – Working with civic groups, residents, and business owners to determine parking & loading configurations

SAMPLE BLOCK ANALYSIS FOR PUBLIC INPUT

1 The specific block being discussed

2 A diagram of the current parking and loading on this block.

3 A diagram of what parking and loading on this block could look like. **(This is where we need your input!)**



4 A legend explaining what the different colors mean.

5 A preliminary summary of the changes between the existing parking and loading and the proposed parking and loading.

PUBLIC INFORMATION SESSION RESULTS
SUMMARY

Full session results and meeting materials are posted on phila.gov/otis

- 330+ meeting attendees over 2 meetings
- General public support for Repaving & Safety Project
- Majority of attendees travel Spruce and Pine regularly
- Survey respondents live, travel and work along the corridors
- Primary pedestrian safety concern: Turning drivers not yielding to pedestrians in crosswalk
- Primary biker safety concern: Bike lane blocked by loading or double parked vehicles
- Primary driver safety concern: Travel lane blocked by loading or double parked vehicles
- Many other concerns noted by roadway users of all modes

CONCURRENT CONVERSATIONS

- Community civic groups
- Major Employers
- Residents, Business, and Property Owners
- Philadelphia Fire Department & EMS
- Local Hospitals
- Philadelphia Parking Authority
- Bicycle Coalition of Greater Philadelphia

PROJECT CONTEXT
GENERAL CONCERNS ON SPRUCE & PINE STREETS

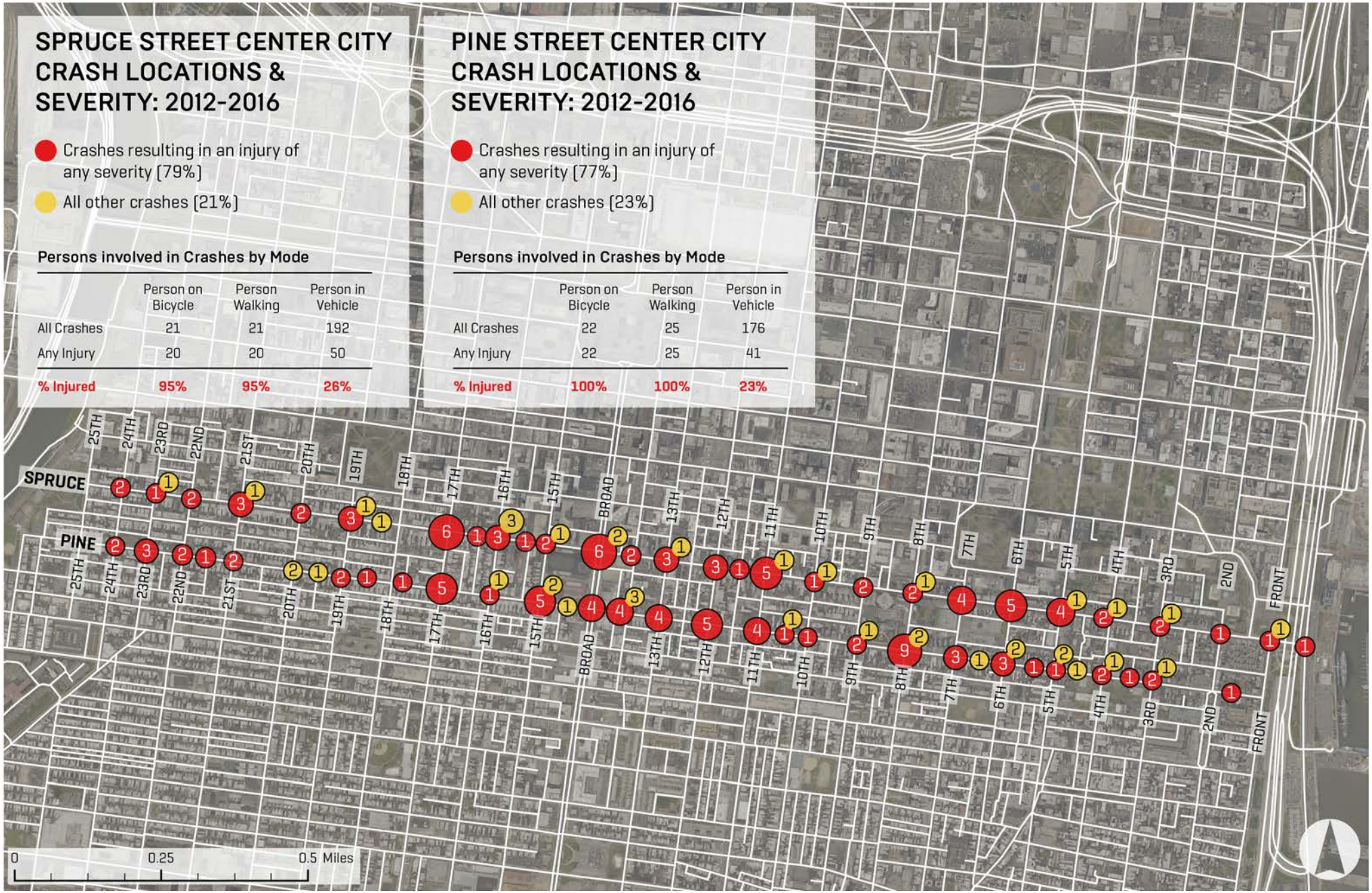
Community concerns

- Ability to load and access front of house (children, groceries, etc.)
- Emergency vehicle access
- Business and delivery loading
- Trash pick up
- Snow removal
- Parking for Houses of Worship

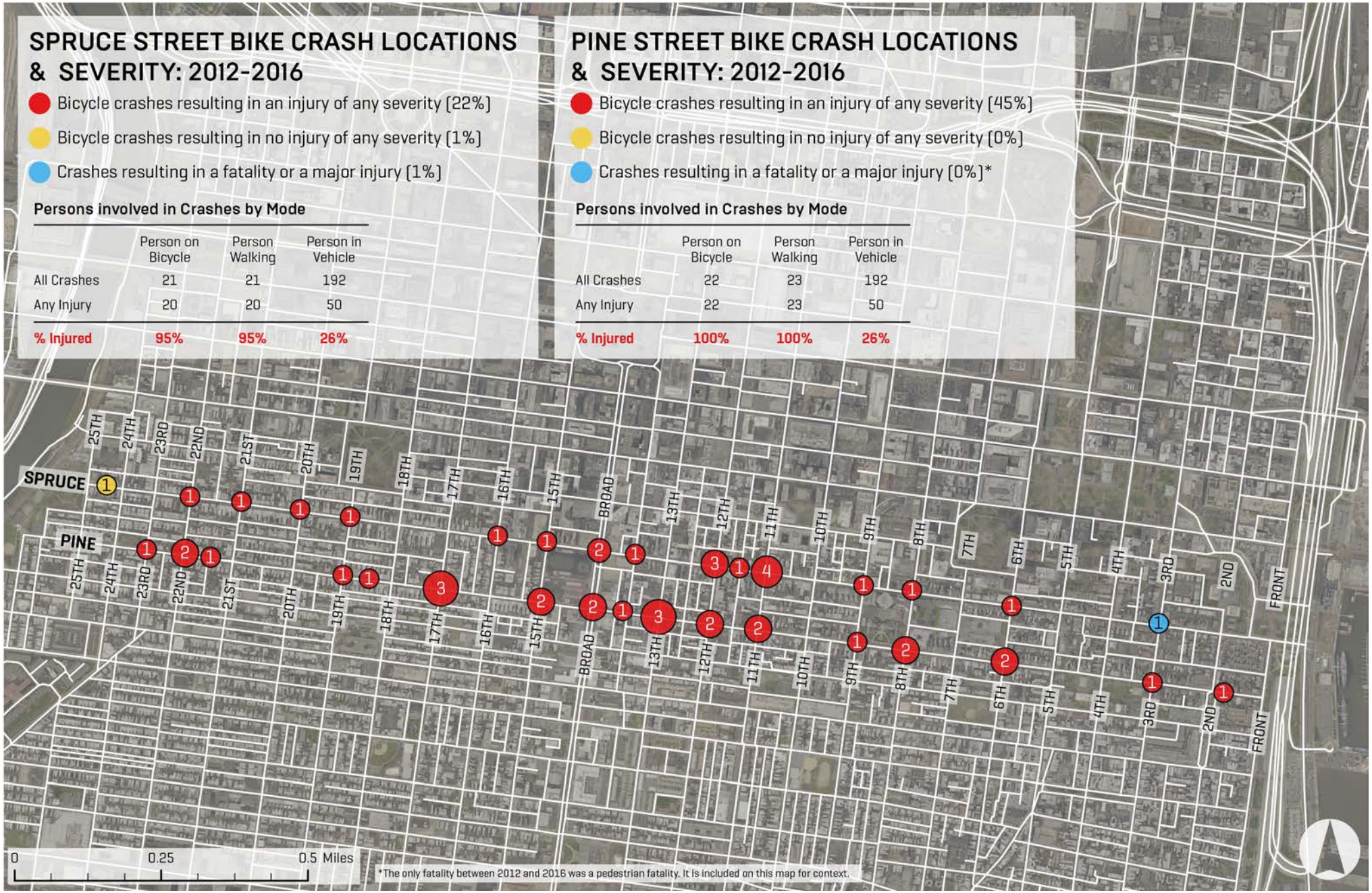
People traveling concerns

- Loading/parking obstructions in the bike lane
  - Necessitates weaving and merging with vehicular lane
- Pavement quality
- Striping quality
- Construction obstructions
- Turning vehicles/mixing zones
- Aggressive driving/biking

PROJECT CONTEXT
CRASH HISTORY



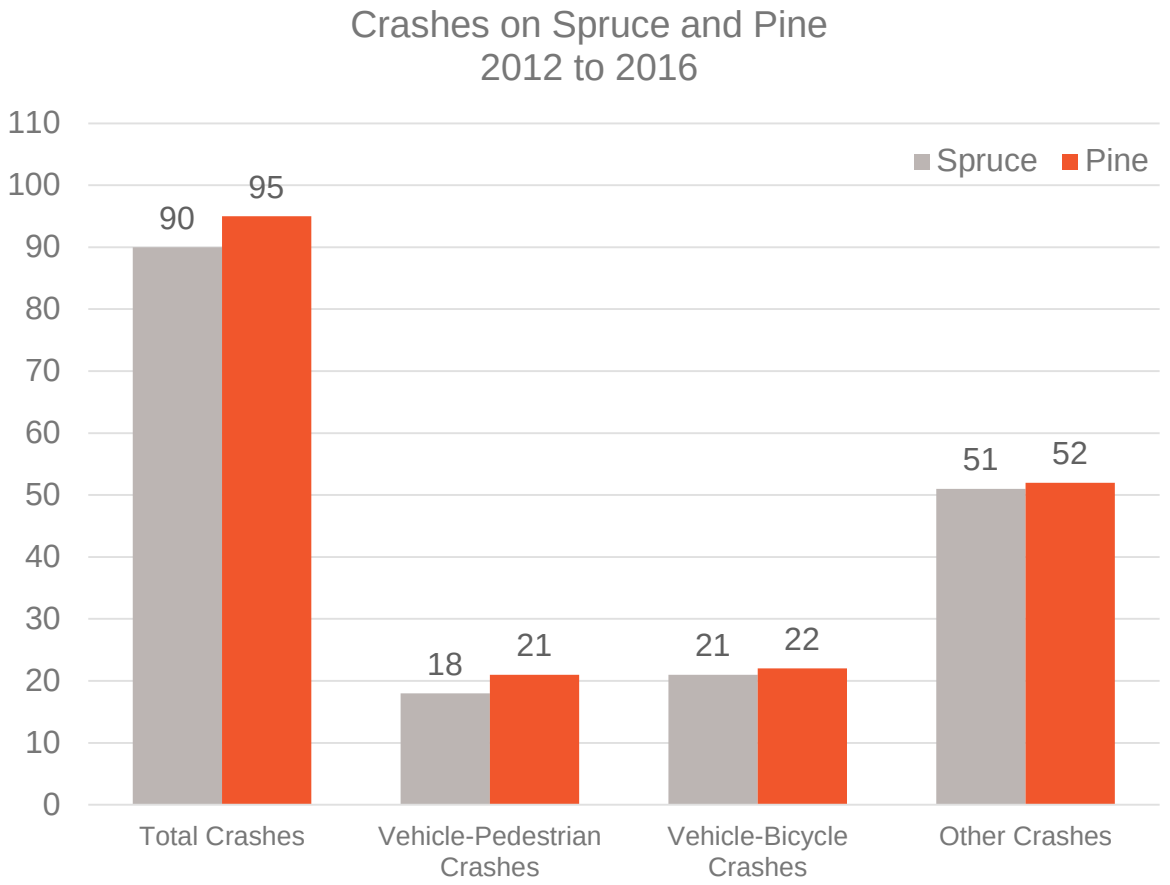
SOURCE: PENNDOT CRASH DATA 2012-2016



SOURCE: PENNDOT CRASH DATA 2012-2016

CRASHES: 2012 – 2016

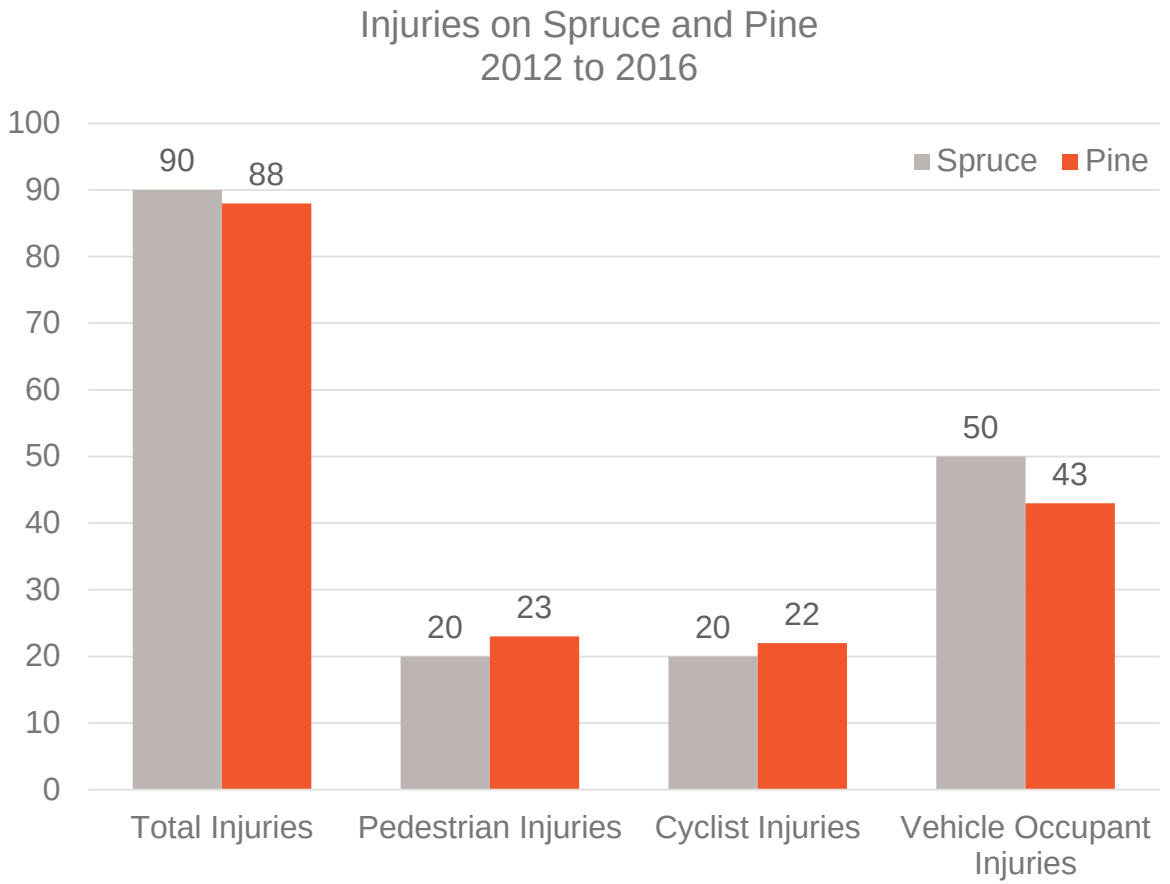
- Spruce Street between Front and 27th Streets
  - Total Crashes: 90
  - Crashes involving a Pedestrian: 18
  - Crashes involving a Cyclist: 21
- Pine Street between Front and 27th Streets
  - Total Crashes: 95
  - Crashes involving a Pedestrian: 21
  - Crashes involving a Cyclist: 22



SOURCE: PENNDOT CRASH DATA 2012-2016

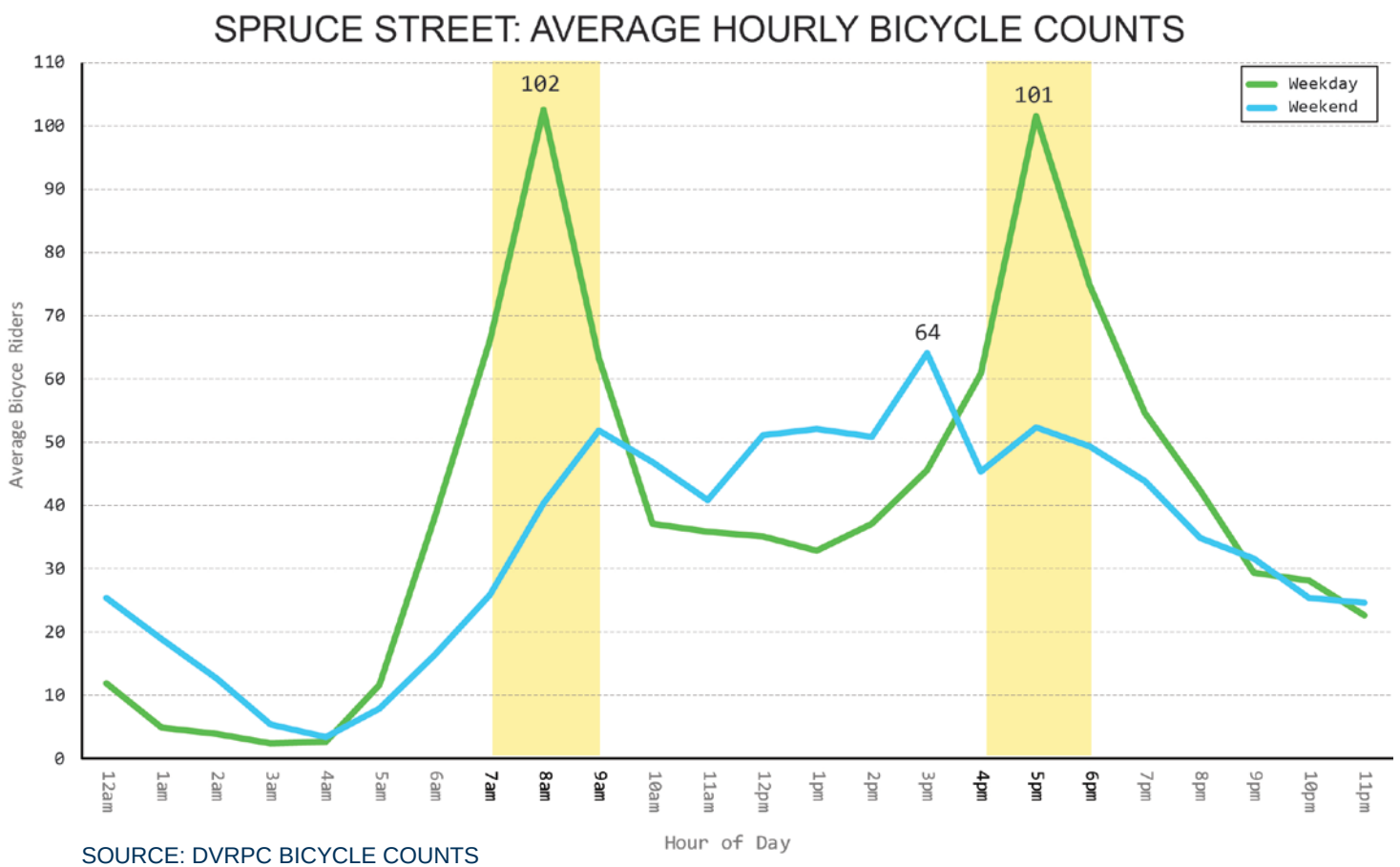
INJURIES: 2012 – 2016

- Spruce Street between Front and 27th Streets
  - Total Injuries: 90
  - Pedestrian Injuries: 20
  - Bicyclist Injuries: 20
  - Vehicle occupant injuries:50
- Pine Street between Front and 27th Streets
  - Total Injuries: 88
  - Pedestrian Injuries: 23
  - Bicyclist injuries: 22
  - Vehicle occupant injuries: 43



SOURCE: PENNDOT CRASH DATA 2012-2016

PROJECT CONTEXT
BICYCLE VOLUMES

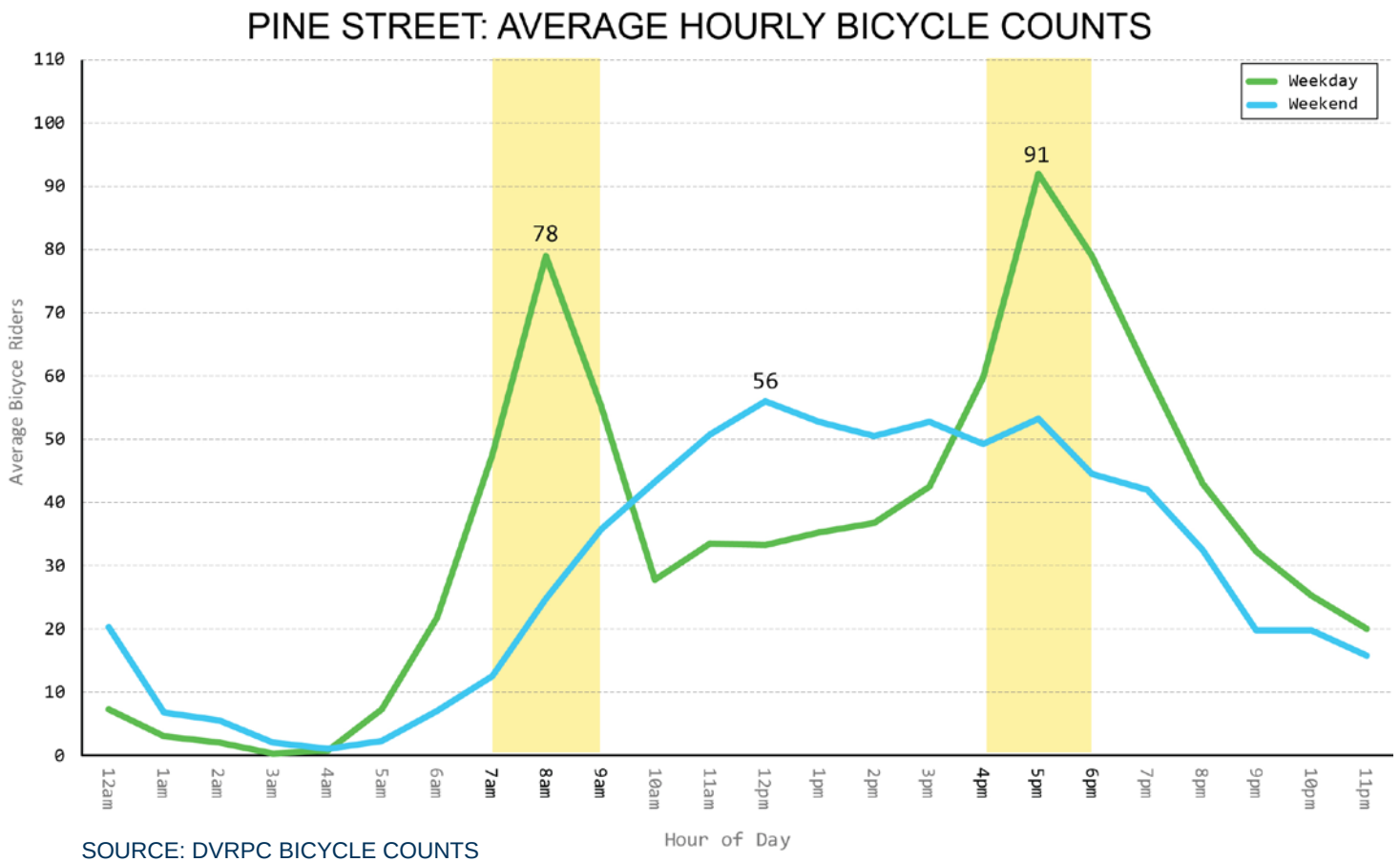


SOURCE: DVRPC BICYCLE COUNTS

WEEKDAY BIKE RIDERSHIP PEAK HOURS:

7AM – 9AM
4PM – 6PM

PROJECT CONTEXT
BICYCLE VOLUMES



SOURCE: DVRPC BICYCLE COUNTS

WEEKDAY BIKE RIDERSHIP PEAK HOURS:

7AM – 9AM
4PM – 6PM