

MULTI-MODAL TRANSPORTATION BOARD
THURSDAY, DECEMBER 5, 2019
6:00 PM
CITY COMMISSION ROOM
151 MARTIN STREET, BIRMINGHAM

1. Roll Call
2. Introductions
3. Review of the Agenda
4. Approval of Minutes, Meeting of **November 7, 2019**
5. **Adams Road Corridor Traffic Signal Coordination**
6. Meeting Open to the Public for items not on the Agenda
7. Miscellaneous Communications
8. Next Meeting – **January 2 , 2020**
9. Adjournment

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DRAFT

**CITY OF BIRMINGHAM MULTI-MODAL
TRANSPORTATION BOARD THURSDAY,
November 7, 2019
City Commission Room
151 Martin Street, Birmingham, Michigan**

Minutes of the regular meeting of the City of Birmingham Multi-Modal Transportation Board held Thursday, November 7, 2019.

Chairwoman Johanna Slanga convened the meeting at 6:02 p.m.

1. ROLL CALL

Present: Chairwoman Johanna Slanga; Vice-Chairwoman Lara Edwards; Board Members Amy Folberg, Daniel Rontal, Doug White; Student Representatives Chris Capone, Bennett Pompi (arrived 6:03 p.m.)

Absent: Board Members Katie Schafer, Joe Zane

Administration: Jana Ecker, Planning Director
Scott Grewe, Police Commander
Paul O'Meara, City Engineer
Austin Fletcher, Assistant City Engineer
Laura Eichenhorn, Transcriptionist

Fleis and Vandenbrink:
Justin Rose

MKSK: Ben Palevsky

2. Introductions

Ben Palevsky from MKSK introduced himself to the Board and to City Staff.

3. Review Agenda

4. Approval of MMTB Minutes of September 5, 2019

Motion by Mr. White

Seconded by Ms. Edwards to approve the MMTB Minutes of September 5, 2019 as submitted.

Motion carried, 5-0.

VOICE VOTE

Yeas: White, Edwards, Folberg, Slanga, Rontal

Nays: None

5. S. Eton – Maple Road to Villa

City Engineer O'Meara presented the item. Justin Rose from F&V reviewed additional information.

After discussion the Board concurred it would be best to try and highlight the continued bicycle path through enhanced signage and possibly street painting. They requested that F&V and Staff work together to return with a proposal for those changes.

6. Bicycle Infrastructure Priorities

Planning Director Ecker presented the item. It was clarified that Bates Street is part of the neighborhood connector route, not Pierce Street.

Dr. Rontal said he has been reluctant to allow his children to ride bicycles by themselves on busier streets without sharrows, and said the sharrows would increase the safety of the City's bicycle infrastructure. He also said it would be beneficial to increase the bicycle safety around the City's schools in order to encourage children to ride their bicycles to and from the City's elementary and middle schools.

Planning Director Ecker said Dr. Rontal's point was valuable. She noted that there are grant programs that aid municipalities in making walking and cycling routes to and from schools safer for children. She said staff could further look into possible grant options from those programs.

Motion by Dr. Rontal

Seconded by Ms. Folberg to use the provided chart as a guide for the implementation of bicycle infrastructure, to prioritize the legs of the neighborhood connector route leading to and from the City's elementary and middle schools, and to request any needed funding during the 2020-2021 budget cycle for the multi-modal recommendations highlighted in tan on the provided chart.

Motion carried, 5-0.

ROLL CALL VOTE

Yeas: White, Edwards, Folberg, Slanga, Rontal

Nays: None

7. Meeting Open to the Public for items not on the Agenda

Police Commander Grewe told the Board that:

- Signage would be put up at Old Woodward and Willits to notify vehicular traffic to the lane modifications and signal timing changes at the intersection; and,
- The MMTB will host a discussion regarding potential ADA upgrades around the City as part of a future agenda item. He said the Police Department would be reaching out to the broader community for feedback and suggestions.

8. Miscellaneous Communications

9. Next Meeting – December 5, 2019

10. Adjournment

No further business being evident, the board members adjourned at 6:31 p.m.

Jana Ecker, Planning Director

Paul O'Meara, City Engineer

DRAFT



MEMORANDUM

Engineering Dept.
Planning Dept.
Police Dept.

DATE: November 27, 2019

TO: Multi-Modal Transportation Board

FROM: Jana Ecker, Planning Director
Scott Grewe, Police Commander
Paul T. O'Meara, City Engineer

SUBJECT: Adams Rd. Corridor – North City Limit to Woodward Ave.

City staff has received complaints from various members of the public about various aspects of the operations on Adams Rd. F&V was asked to study two areas where there may be room for improvement:

- Traffic signal timing coordination, so that through traffic driving through the corridor do not have to stop at several different intersections.
- Review of the timing and geometrics of the Lincoln Ave. intersection, given the frequent level of backups that occur in this area.

HISTORY & FUTURE PLANS

The pavement history on Adams Rd. can be split into two segments, north and south of Madison Ave.:

a. South of Madison Ave. to Woodward Ave.:

A 36 ft. wide pavement was installed on this section in 1953. Although the plans are not clear, it appears that the original intent was to provide for two traffic lanes with parking on both sides. Over time, traffic demands for this corridor increased, and parking was eventually eliminated. The pavement width allowed for four 9-foot wide lanes, which is less than what is considered appropriate for a high-volume street. In the 1980's, a City-wide master traffic plan was prepared. The plan recommended reconstructing all of Adams Rd. to be five lanes wide. The City Commission never endorsed this proposal, and it was never built.

In 2003, a new trunkline sewer was installed to help drain the neighborhoods to the east and west. The pavement was replaced at that time. The City Commission was still not in favor of a five lane alternative, but also knew that the current narrow four-lane option was not a good option either. Although no traffic study was conducted, staff was directed to install a three-lane road using the same width as the original street.

b. CN Railroad Bridge to South of Madison Ave.:

This segment was built as a 40 ft. wide pavement in 1957. It was built as a four lane road, and has been maintained and resurfaced since in this configuration. The Multi-Modal Master Plan has recommended modifying this segment to three lanes with bike lanes on both sides. Federal funding has been secured to resurface this segment in 2021. In the coming year, F&V will study the corridor, particularly at the Derby Rd. intersection, to confirm that a three-lane option can be recommended in this area. The changes that are recommended below are separate from the three-lane conversion proposal, and their implementation does not change the feasibility of that proposal in any way.

F&V RECOMMENDATIONS

a. Traffic Signal Coordination

Traffic signal coordination can be implemented to improve the driving experience for motorists using Adams Rd. Not only can it reduce travel time, it can reduce noise and improve efficiency by not making vehicles start and stop so often. Once motorists understand the coordination, it can also encourage driving at the speed limit, as driving faster just results in more stopping.

As outlined in the memo, there are already coordinations operating on the Maple Rd. and Woodward Ave. corridors. Both of those streets carry significantly more vehicles than Adams Rd., therefore, we cannot recommend interrupting what is operating there for the benefit of Adams Rd. Further, the traffic signal at Lincoln Ave. must also be coordinated with Woodward Ave. in order to reduce the chance of traffic backups into Woodward Ave., given its close proximity. That said, the minor signals of Derby Rd., Buckingham Rd., and Bowers St. can be coordinated so that the chance of being stopped (when traveling Adams Rd.) is reduced. When considering this option, note that:

- The timings of the three impacted signals would not be changed, therefore this does not impact the Level of Service at each intersection.
- The only cost of coordination is the time it takes for a technician to reprogram the operating clocks at each intersection so that they become coordinated. If, over time, the coordination drifts off because the clocks are not all operating exactly at the same rate, a wireless monitor can be installed that connects the clocks by GPS, at a cost of \$1,500 per intersection. That is not recommended at this time, but may be needed in the future.

Given the above, staff recommends that coordination of the Derby Rd., Buckingham Rd., and Bowers St. intersections proceed, in order to attain the benefits noted above.

b. Adams Rd. & Lincoln Ave. Intersection

1) Timing

It is acknowledged that this intersection has notoriously operated with frequent traffic delays during the AM and PM peak hours. As noted in the F&V report, given the close proximity of Woodward Ave., optimum timing of this intersection cannot be implemented

without creating new problems due to traffic queues backing into Woodward Ave. The one problem that can be reduced is the ongoing perception for southbound vehicles being frustrated because they cannot proceed through the intersection, once the storage lane between Woodward Ave. and Lincoln Ave. (southbound) is full. The current timing “wastes” green time that cannot be used during the peak hours due to this issue. The green time could then be moved to protected left turn phases, assisting westbound and northbound directions in particular.

2) Geometrics

Lincoln Ave. is designed as a four-lane street through this intersection. Given the high volume of left turns for eastbound traffic, the intersection was analyzed to see if it would benefit from having a dedicated lane for left turns, as that would bring potential safety benefits. However, given the close proximity of Woodward Ave., the status of the left lane would have to change west of Woodward Ave., which would then greatly reduce needed traffic capacity at that intersection. Due to that concern, we cannot make this modification. However, to encourage better traffic flow in the eastbound direction, a THRU TRAFFIC KEEP RIGHT sign is recommended just east of Woodward Ave. This is a simple idea that can be implemented immediately.

The only large cost item in this proposal is to provide needed signal upgrades, should the City wish to implement the recommended protected left turn phases. If the Board endorses that proposal, F&V will be directed to provide a cost estimate, and then return for a final recommendation.

SUGGESTED RESOLUTION:

Regarding the Adams Rd. corridor, the Multi-Modal Transportation Board recommends:

- a. Implementing traffic signal coordination of the Derby Rd., Buckingham Rd., and Bowers St. intersections.
- b. Directing F&V to prepare a cost estimate for the proposed implementation of a new protected left turn phase at the Lincoln Ave. intersection.

MEMO

To: Mr. Paul O'Meara
City of Birmingham

From: Justin P. Rose, PE
Julie M. Kroll, PE, PTOE
Fleis & VandenBrink

Date: November 27, 2019

Re: Adams Road Corridor
Birmingham, Michigan
Traffic Signal Optimization Study

INTRODUCTION

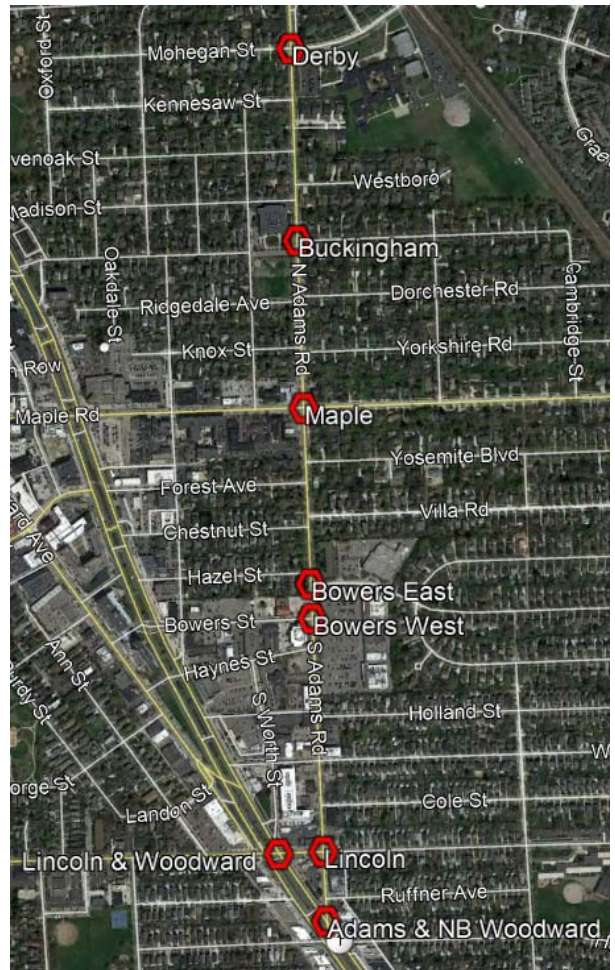
The memorandum presents the results of the evaluation of the signal timings along Adams Road from Derby to Woodward Ave. This study included the evaluation of the existing intersection operations and provides recommendations for signal timing coordination along the corridor at the following study intersections:

- Adams Road & Derby Road
- Adams Road & Buckingham Avenue
- Adams Road & Maple Road
- Adams Road & Bowers Street East
- Adams Road & Bowers Street West
- Adams Road & Lincoln Street
- Adams Road & NB Woodward Avenue
- Lincoln Street & NB Woodward Avenue

DATA COLLECTION

The existing weekday turning movement traffic volume data used in this study for were collected by F&V subconsultant Traffic Data Collection, Inc. (TDC) on Thursday, June 6, 2019, Tuesday, July 9, 2019 and additional data was collected Thursday, October 10, 2019. The turning movement counts were collected during the weekday AM (7:00 AM to 9:00 AM), Off-Peak (11:00 AM to 1:00 PM) and PM (4:00 PM to 6:00 PM) peak periods at the study intersections.

F&V also collected an inventory of existing lane use and traffic controls at the intersection and obtained the existing traffic signal timing information from the Road Commission



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for Oakland County (RCOC). For this study, only the AM and PM peak hours of existing network traffic were considered, and were identified to occur between 7:45 AM to 8:45 AM and 4:30 PM to 5:30 PM, respectively.

These data were used as a baseline to establish the current peak hour traffic volumes for the analysis of existing traffic conditions. During collection of the turning movement counts, pedestrian data and commercial truck percentages were recorded and used in the traffic analysis. Peak Hour Factors (PHFs) were also calculated for each study intersection approach. In addition, a field review of the study intersections was performed during the study periods to verify signal timings, observe traffic operations, and adjust parameters for intersection analysis, as necessary.

CORRIDOR ANALYSIS - ADAMS ROAD (DERBY ROAD TO WOODWARD AVENUE)

Signal Timing Coordination

Existing signal operations were determined using the existing traffic volumes, timing permits, lane use and intersection geometry. The intersections were evaluated using Synchro (Version 10) traffic analysis software and Tru-Traffic traffic analysis software.

Overall, the existing intersection operations currently operate well as isolated locations; however, the corridor as a whole does not operate as a coordinated system. The Tru-Traffic diagrams below show the existing Adams Road coordination (the gray bands represent the amount of green time getting through each intersection from start to finish).

Figure 1: Existing AM Timing Plan

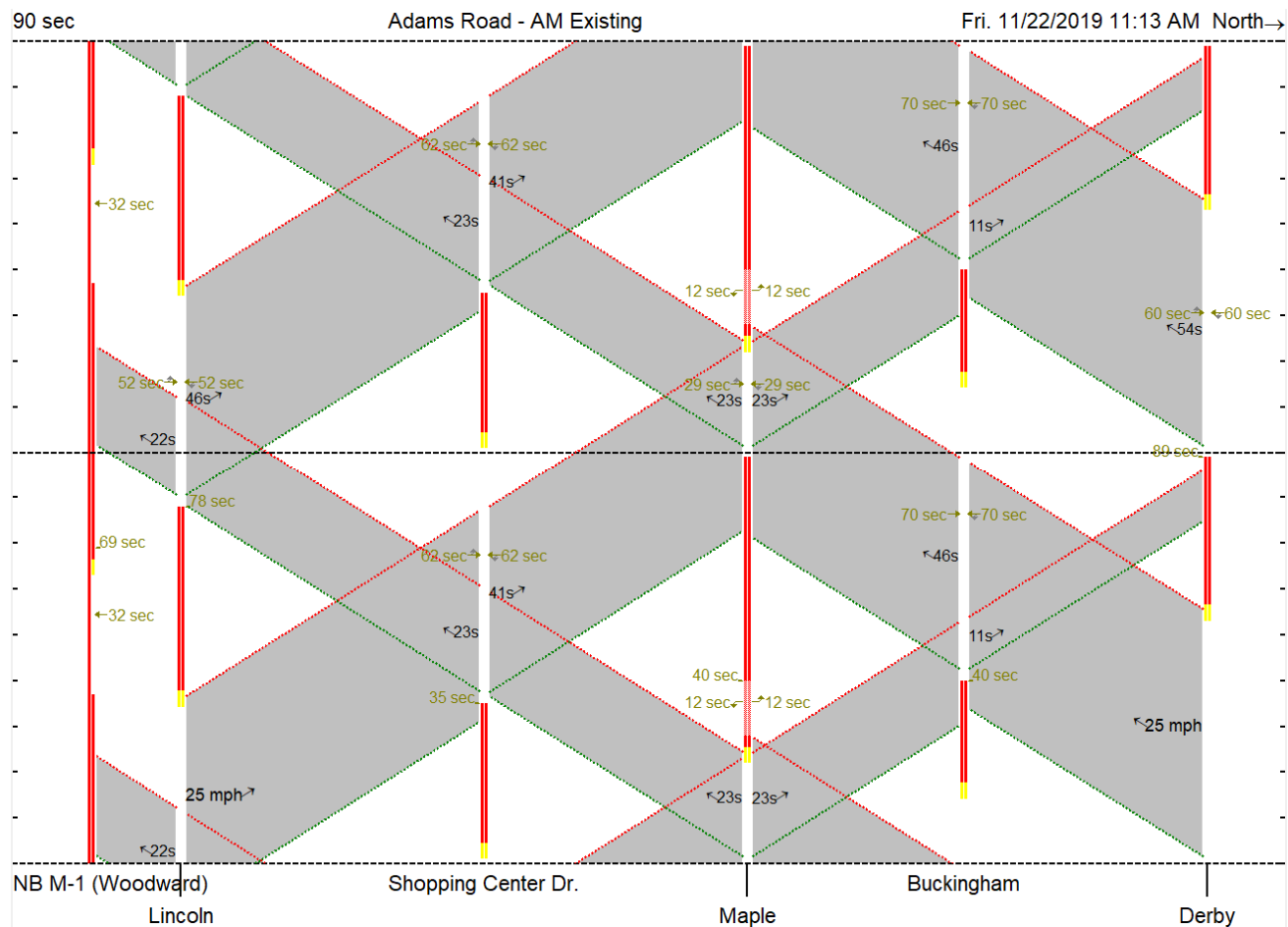
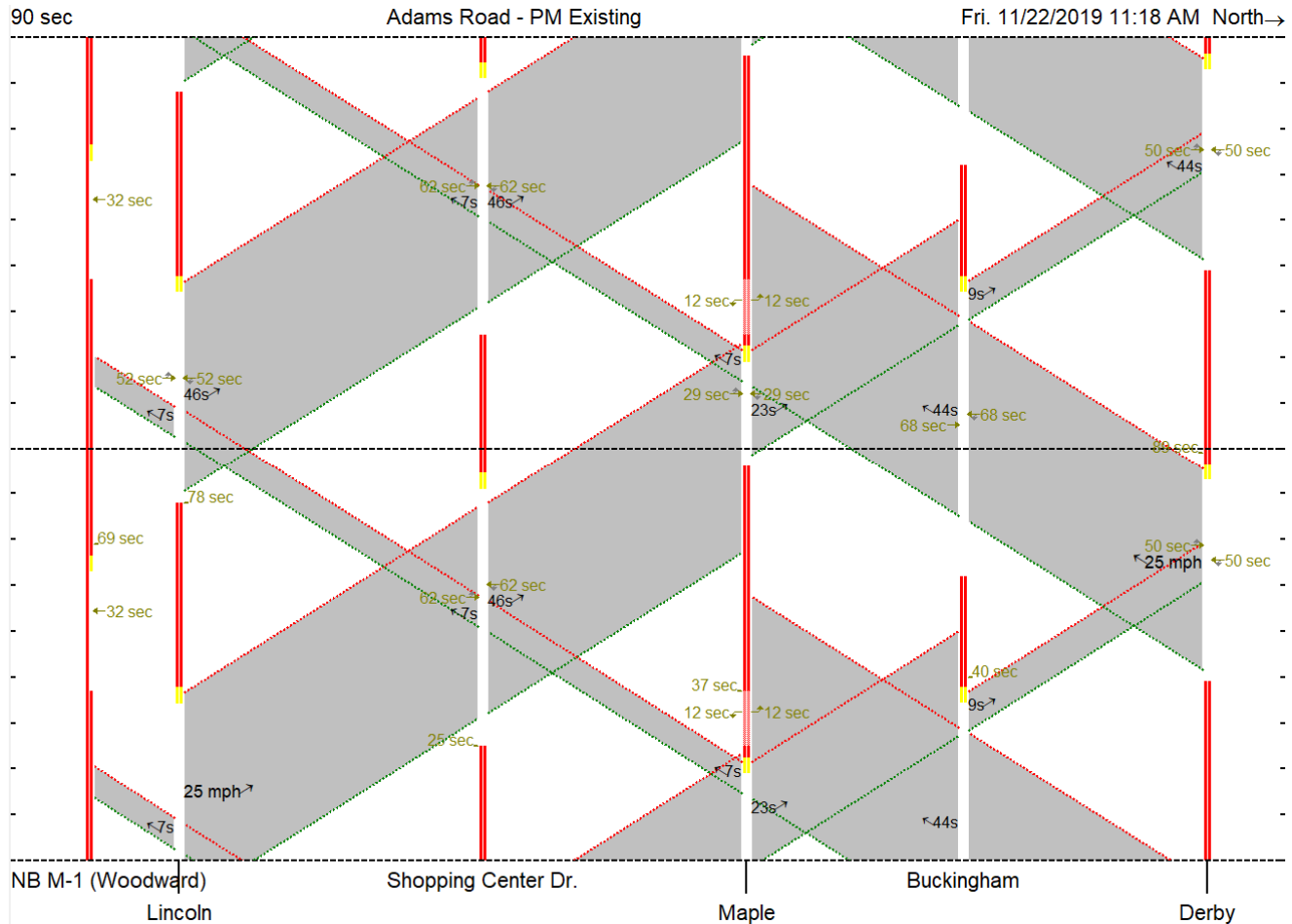


Figure 2: Existing PM Timing Plan



As shown in the figures above, the existing coordination is not optimal, especially in the PM. The timings at Derby and Buckingham are not properly coordinated with the timings at Maple, causing additional unnecessary stops and delays.

The intersections of Derby, Buckingham, and Shopping Center Drive / Bowers Street were all looked at for potential improvements in their offsets for coordination and the recommended changes at Adams and Lincoln are discussed in the next section.

Key factors in this evaluation include:

- Maple Road is currently coordinated with Elm Street and Woodward Avenue, so the offsets were not changed.
- Woodward Avenue is currently coordinated, so that timing was not changed,

The optimized signal timing coordination is illustrated in the Tru-Traffic diagrams **Figures 3 and 4**:

Figure 3: Optimized AM Timing Plan

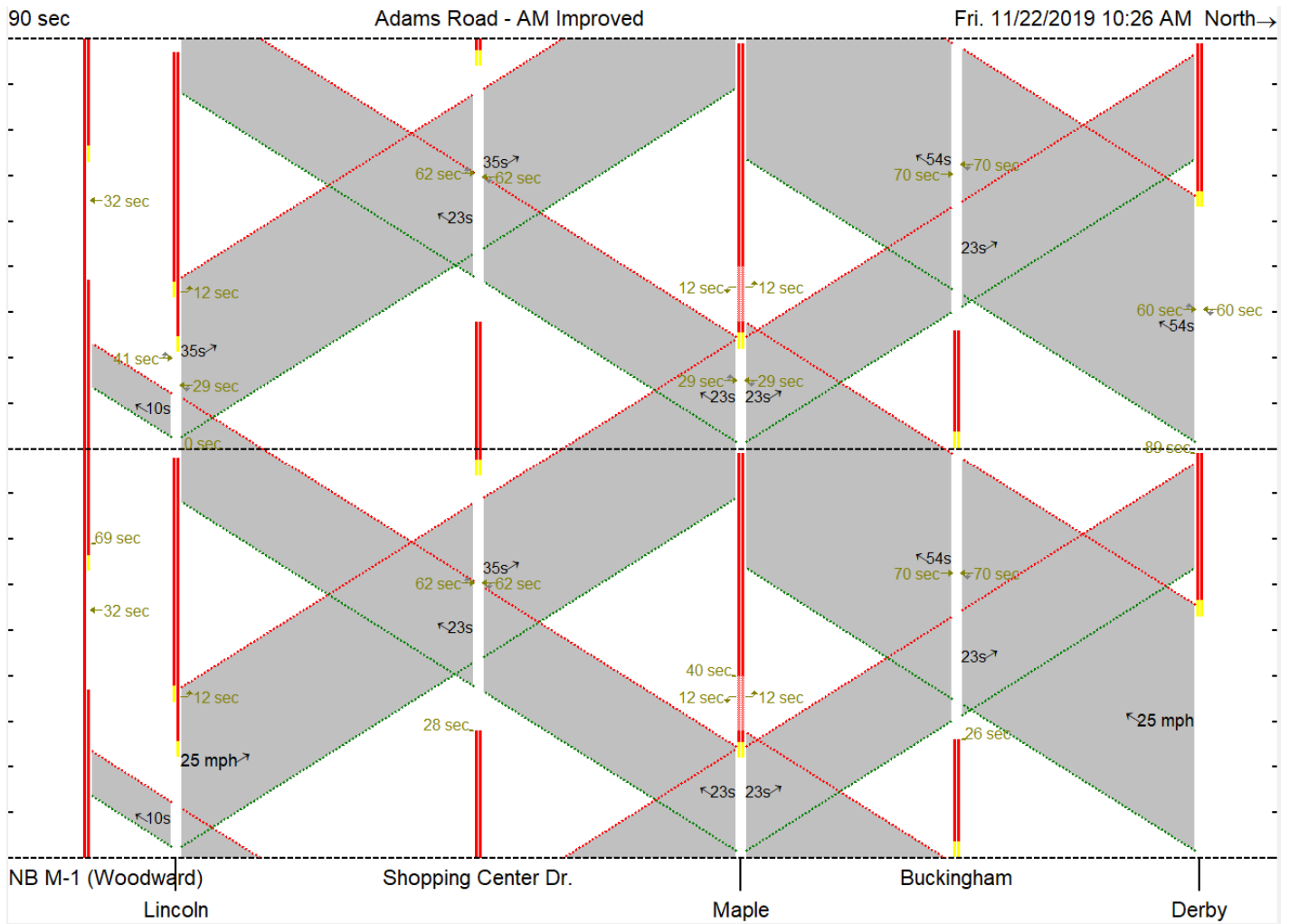
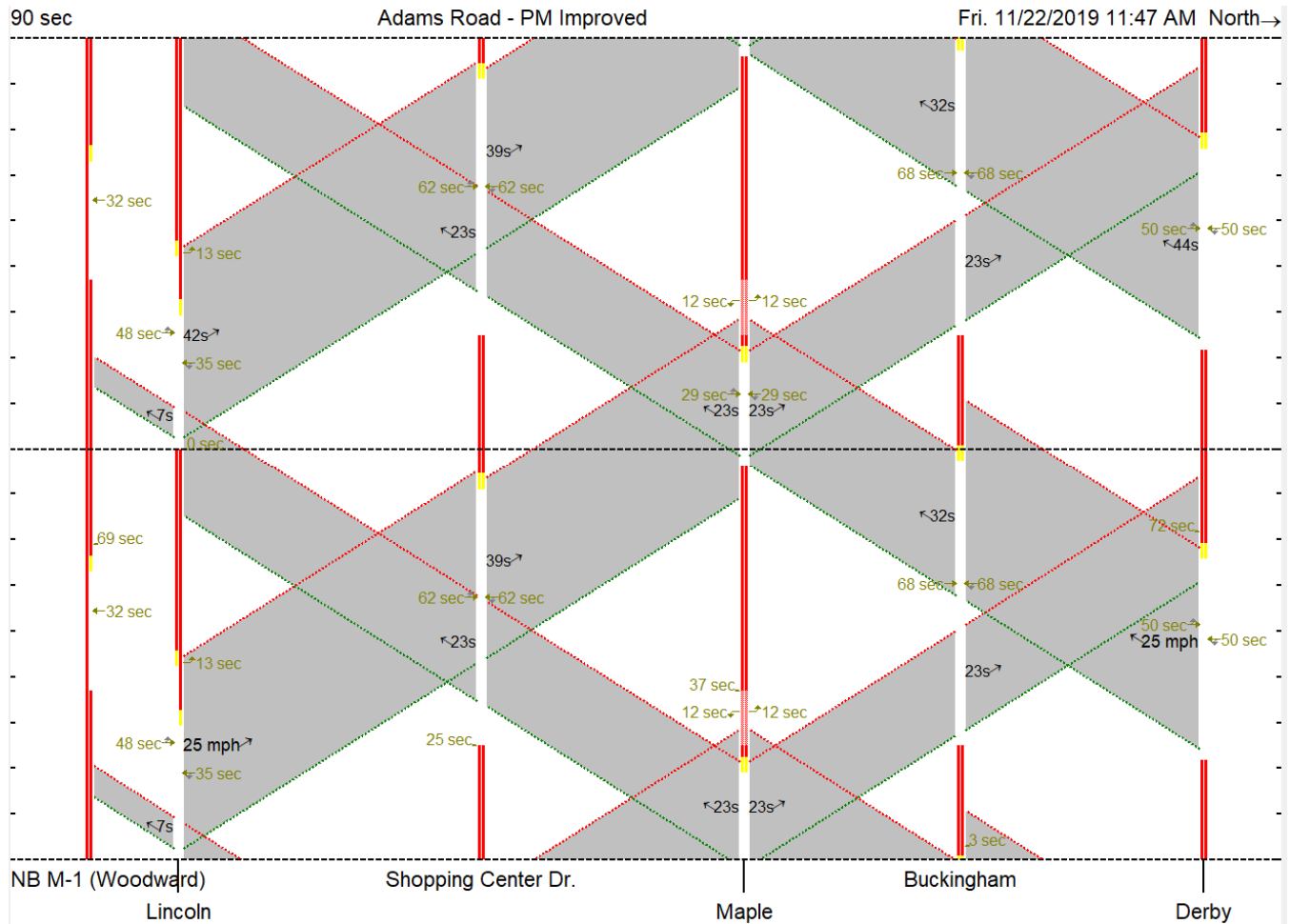


Figure 4: Optimized PM Timing Plan



As displayed in the above figures, the improved timing plans allow for better coordination throughout the Adams Road corridor for both northbound and southbound traffic. **Table 1** below details the offset changes at Derby Road, Buckingham Avenue, and Shopping Center Drive / Bowers Street.

Table 1: Intersection Offset Improvements Summary

Location	AM Offsets		PM Offsets	
	Existing	Optimized	Existing	Optimized
Derby	39	59	89	72
Buckingham	40	3	62	3
Bowers / Shopping	35	28	25	25

INTERSECTION ANALYSIS - ADAMS ROAD & LINCOLN STREET

Signal Timing Operations

Existing vehicle delays and Levels of Service (LOS) were calculated at this intersection for AM peak, MD, and PM peak hours using Synchro (Version 10) traffic analysis software. This analysis was based on the existing lane use, traffic control, existing signal timings, and the methodologies presented in the *Highway Capacity Manual 6th Edition* (HCM6). The simulation model headway factors and vehicle extension times were modified

to more accurately represent the traffic operations based on the field review. The existing signal timing was then optimized for the AM peak, MD, and PM peak hours using Synchro (Version 10) traffic analysis software.

There were several challenges associated with this signal timing optimization:

- The study intersections with Woodward Ave. have pretimed signal plans that are set by MDOT and operated by RCOC. Therefore, any recommended signal timing changes may only occur at the Adams Road & Lincoln Street intersection and need to maintain the progression on Woodward Ave.
- On Lincoln Street there is approximately 165 feet of storage length between Woodward Ave. and Adams Road. The signal timing needs to be coordinated with the Woodward Ave. intersection to ensure that vehicles do not back-up into Woodward Ave.
- The north/south operations on Adams Road conflict with the north/south operations on Woodward Ave. Therefore, the southbound through volumes can only be facilitated when Woodward Ave. is stopped. This north/south movement is then conflicting with the east/west movement on Lincoln Street.

Numerous signal timing alternatives and iterations were considered, including coordinating Adams Road through Woodward Ave, and coordinating Lincoln Street through Woodward Ave.. The implementation of either one of these options caused significant delays for the conflicting street.

One of the perceived problems for motorists occurs when southbound Adams Road receives a green indication, but the Woodward Avenue signal is red. Motorists become exceptionally frustrated when they have a green light and cannot move. As such, one of the recommended signal timing changes is to add a left turn phasing for northbound Adams Road. While appearing counterintuitive, as we would be decreasing the green time for southbound Adams, this would actually appear to be better for motorists, as they wouldn't have an unusable green light for as long a period of time.

Similarly, we are also recommending a westbound left turn phase for Lincoln Street, which prevents the eastbound Lincoln traffic from receiving a green indication while Woodward Avenue is red and they have nowhere to go.

Therefore, the recommended signal timings and operations will theoretically worsen the level of service and queuing at the intersection per our models, however the actual and perceived operations will remain the same or improve to motorists. The proposed changes for the timing are summarized in **Table 2**.

Table 2: Intersection Improvements Summary – Adams Road & Lincoln Street

Peak Period	Approach	Phase Times (s)	
		Existing	With Improvements
AM Peak	EB	38	35
	WB	38	48
	WB Left	N/A	13
	NB	52	42
	NB Left	N/A	13
	SB	52	29
	Offset	78	0
PM Peak	EB	38	35
	WB	38	48
	WB Left	N/A	13
	NB	52	42
	NB Left	N/A	13
	SB	52	29
	Offset	78	0

Geometric Evaluation

The existing intersection geometry and operations on the eastbound Lincoln Street approach at Adams Road were evaluated to determine if changes in the lane assignment would be recommended.



Key findings from this evaluation include:

- The lane reassignment would help to define operations at this intersection, by providing an exclusive left-turn lane and a through lane. However, the improvement in LOS is negligible.
- To provide this lane geometry the tapers and lane assignment would need to occur west of the intersection with Woodward Ave. This would reduce the capacity of eastbound Lincoln Street at SB Woodward Ave.
- In order to help facilitate traffic movements at this intersection, additional signing could be added to the eastbound approach on Lincoln Street at Adams Road. There is a sign on Maple Road between Adams Road and Woodward Ave. "Thru Traffic Keep Right" that could be added at this location to serve the same purpose of directing through traffic to the right lane.

INTERSECTION ANALYSIS - WOODWARD AVE.

The intersections of Lincoln Street and Adams Road & NB Woodward Avenue are under the jurisdiction of MDOT; therefore, changes to the signal timings at these intersections were not included in this evaluation. However, the intersections were evaluated to determine the impact the signal timing changes at Adams Road & Lincoln Street would have on these adjacent intersections. The proposed changes caused negligible differences in the operations for the NB Woodward Avenue intersections. Key findings from the analysis can be found below:

- Occasionally vehicles will get stuck in the median section of Woodward Ave. between NB and SB due to the queues from the adjacent Adams Road & Lincoln Street intersection. The changes in the signal timing reduced the projected queue lengths in the median from 5 vehicles to 1 vehicle, which indicates that the proposed operations at Lincoln Street will have better coordination with the adjacent intersection operations at Woodward Ave.

- The queue lengths on southbound Adams Road at Woodward Ave. increased, which indicates better utilization of the roadway segment on Adams Road between Woodward Ave. and Lincoln Street.

CONCLUSIONS

Adams Road: Derby, Buckingham, and Bowers

- Optimized coordination is recommended at Derby, Buckingham, and Shopping Center Drive / Bowers as follows.

Location	AM Offsets		PM Offsets	
	Existing	Optimize	Existing	Optimize
Derby	39	59	89	72
Buckingham	40	3	62	3
Bowers / Shopping	35	28	25	25

Adams Road & Maple Road

- Maple Road is currently coordinated with Elm Street and Woodward Avenue, so the offsets were not changed.
- The northbound and southbound Adams Road approaches provide permissive-protected left-turns. The volume of left-turns is relatively low. Allowing only permissive left-turn movements on this approach would increase the time for through traffic on Adams Road.

Adams Road & Lincoln Street

- With the recommended signal timing changes is additional time that could be utilized to improve operations for the northbound and westbound left-turn movements. Therefore, it is recommended to provide protected northbound left-turns and protected westbound left-turns. The recommended signal timing changes are summarized below.

Peak Period	Approach	Phase Times (s)	
		Existing	With Improvements
AM Peak	EB	38	35
	WB	38	48
	WB Left	N/A	13
	NB	52	42
	NB Left	N/A	13
	SB	52	29
	Offset	78	0
PM Peak	EB	38	35
	WB	38	48
	WB Left	N/A	13
	NB	52	42
	NB Left	N/A	13
	SB	52	29
	Offset	78	0

- The lane reassignment was evaluated on the westbound Adams Road approach at Lincoln Street to provide an exclusive left-turn lane and a through lane. To provide this lane geometry the tapers and lane assignment would need to occur west of the intersection with Woodward Ave. This would then reduce the capacity of the intersection on Lincoln Street at Woodward Ave.
- The signal timing on Woodward Ave. does not vary by time of day, therefore no time of day changes are recommended at the Adams Road & Lincoln Street intersection.

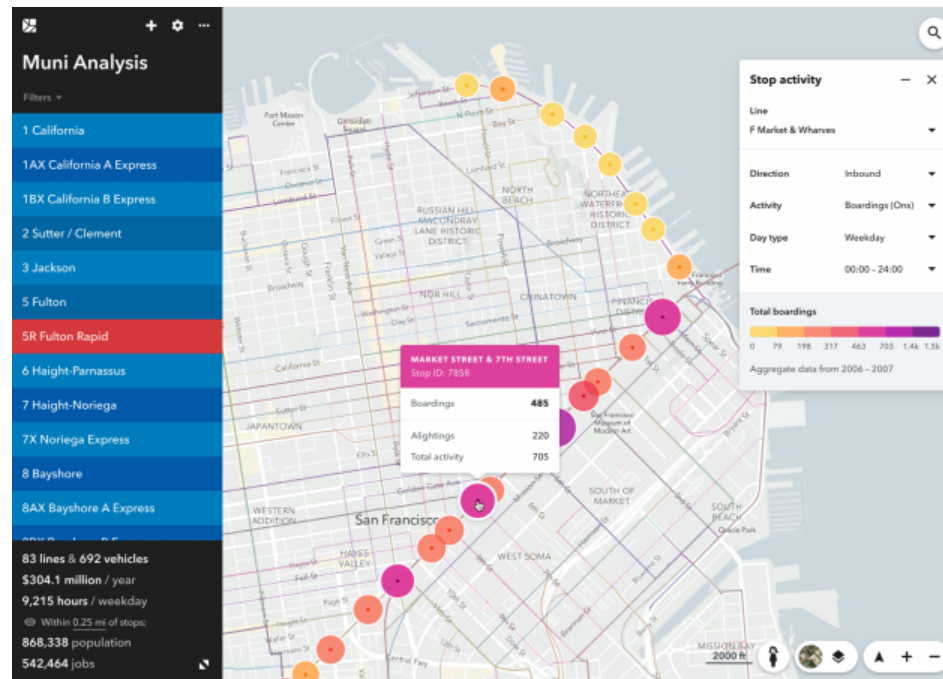
Attached: Traffic Volume Data
Synchro Results
Tru-Traffic Results

JMK,JPR:jmk

Amy Nicole | Mobility | 11/05/2019

Imagine a Fluid Multimodal Transit System That's Ahead of the Curve

Remix Works to Find Solutions to Multimodal Transit Challenges for Cities



REMIX RIDERSHIP MASS TRANSIT MAP OF SAN FRANCISCO

There's a need for a new mindset in Detroit when it comes to Mass Transit. When you look at the city as a whole, it still tends to lend more support to the Big 3 by keeping the city as car intensive as possible, versus working to add mass transit aside from the QLine and The People Mover.

Tiffany Chu, a co-founder of Remix, whom we caught up with at the Forbes Under 30 Summit, is on the cusp of something brilliant for



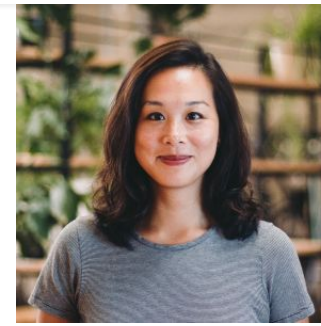


mass transit strategy. Which today, is just about every city. Remix calls itself “the leading platform for shaping urban mobility.” And it just may be.

Newsletter

HOW REMIX WORKS

Chu describes the program as a data system in which “transportation data lives in different formats, systems, and silos. Remix brings together disparate data sources into one easy-to-use view of your city’s transportation picture.” Their work is used to help bridge the communication between a city’s Transit Department, Project Management, Public Works, and more, to offer a layer of collaboration within those departments, as well as the stakeholders, by using strategic data and planning mechanisms.

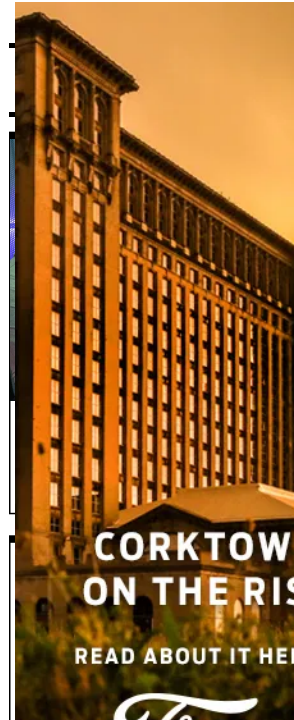
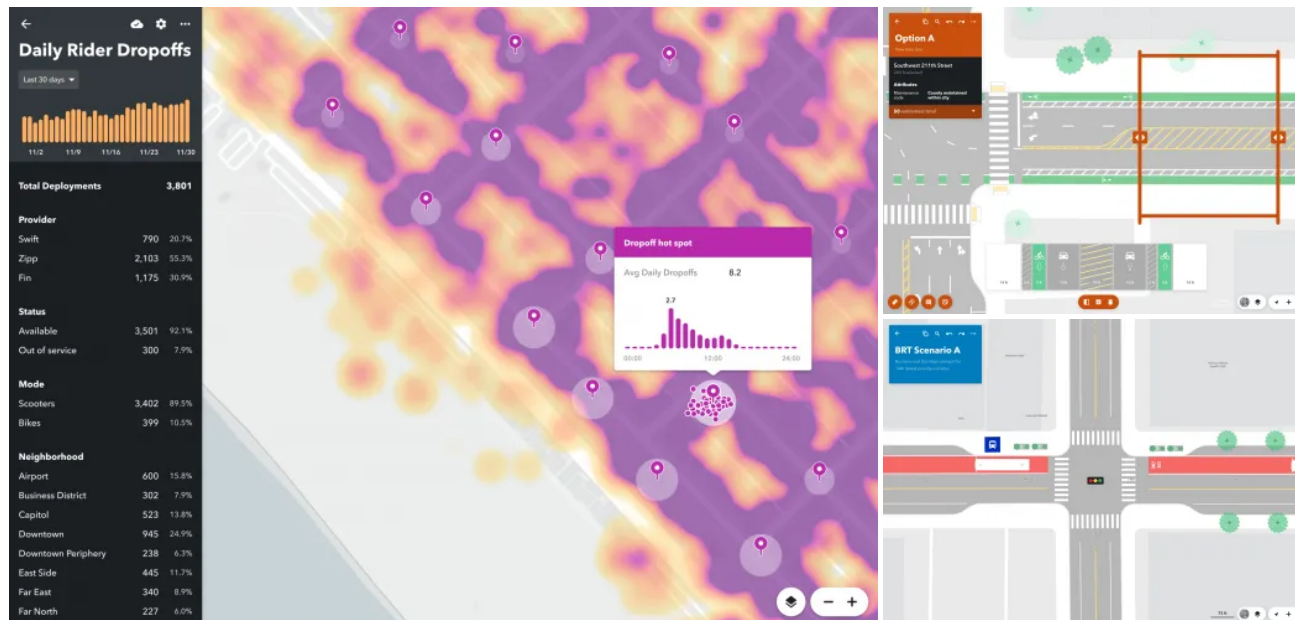


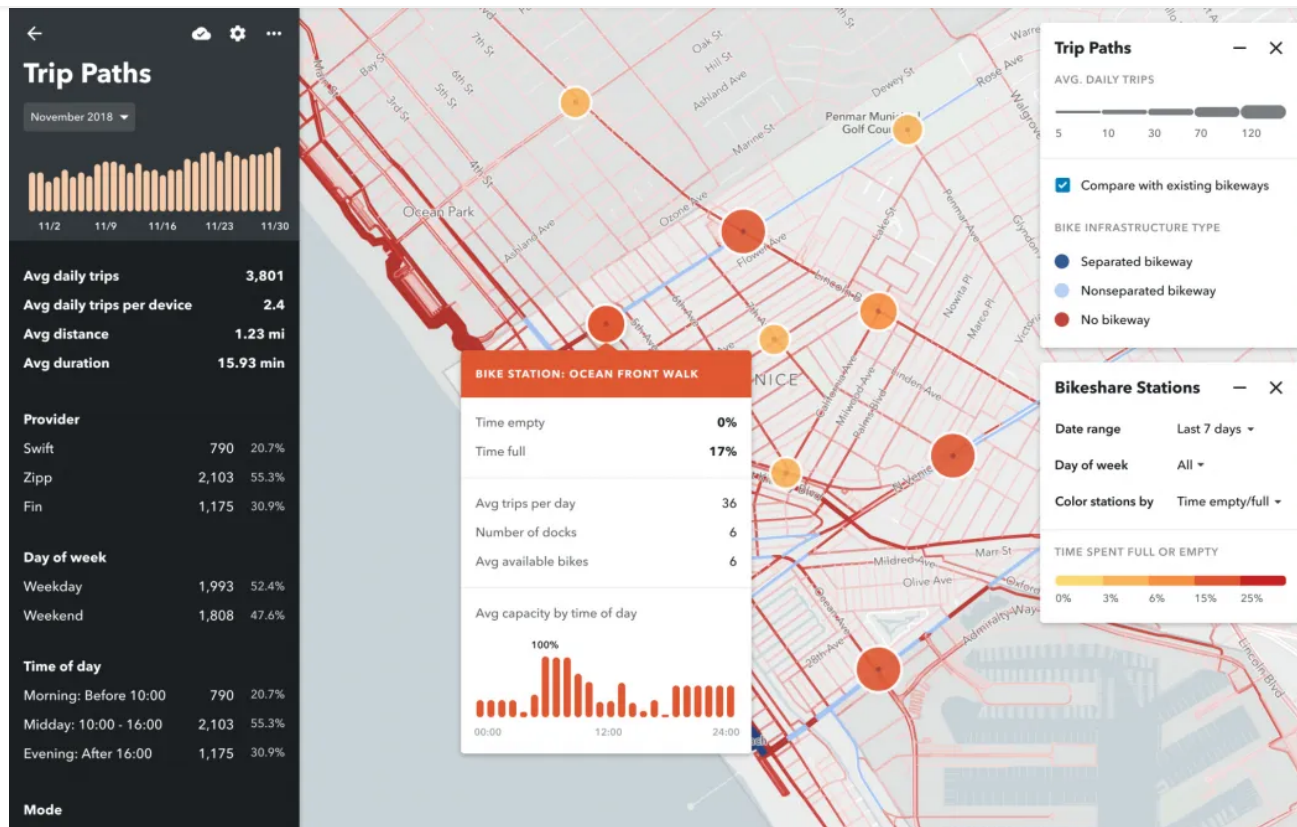
TIFFANY CHU, CO-FOUNDER REMIX



COLLABORATION IS KEY

Chu shares that there’s a collaborative layer to their program when it comes to learning and growing through the projects they work on. Currently, they are working with 325 different international cities, and when working with multiple locations they are able to blend and adapt the tactics to meet challenges in the new cities that come on board. In geographies close to Detroit, Remix is currently working with Windsor Ontario to fine-tune their transit system, as well as working with other Michigan-based locations such as Grand Rapids.





The company's funding comes from an annual subscription that delivers the services to the cities that elect to be a part of it, and the preliminary way that Remix works with different cities is to find out what their biggest challenges, and then implement strategic tactics that have been used successfully in previous locations.

LET'S GO DETROIT

Though Detroit is working on bridging the gap between the QLine and the bus network with the DART pass, which provides one method to pay for bus use and the QLine, Detroit still has a long way to go. That's just a payment system, and that system has yet to integrate more locations to catch mass transit in a timely fashion and to help reach into the suburbs. It would be interesting to see what Remix could for mobility in the city. How could it make everyone's life a little easier when it comes to transportation scenarios? Can you imagine fully-fledged pedestrian zones, bike lanes, bus lanes and a speedy multi-county, multimodal transit system? Maybe we can start there, City of Detroit

Comments



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REQUEST QUOTE

Published: September 25, 2019



Photo: Paul Kreuger, [Dunsmuir Separated Bike Lanes 456](#). CC BY 2.0.

Vision Zero is a program intended to bring traffic fatalities and serious injuries to zero. Municipalities all over the world are participating. Often, these same cities and towns are simultaneously trying to

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A “complete street” is designed for users of many different modes of transport.

WHAT IS A COMPLETE STREET?

A complete street is accessible and safe for pedestrians, cyclists, public transit, and vehicles. It must fit into the neighborhood and traffic around it, so there is no single design. A complete arterial road will look different than a complete residential street. The arterial road might have traffic-controlled crosswalks, pedestrian islands, a protected bike lane, a bus lane, and curb extensions. A residential bike route may require cars and cyclists to share the road but have traffic diversions and roundabouts.

Bikeways

Bikeways are paths or lanes designated for cyclist use. Bikeways are the most common type of bicycle infrastructure, with many varieties, including:

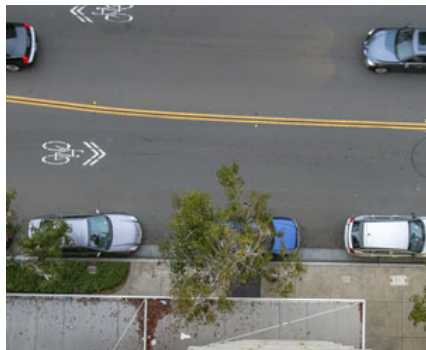
Bollards & Post Covers
Bike Parking & Storage
Hardscape
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SOCIAL FEEDS

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Transportation Officials started looking at the success of cycling cities in Europe. Safety for all ages and abilities (AAA networks) is essential for widespread adoption of cycling. AAA networks limit cyclist exposure to cars through protected bike lanes, dedicated signals, and other approaches. Vision Zero mandates help see these users are protected as well.



Shared use and quiet-street bike routes

“Sharrows” are arrows painted on the ground, with a bicycle icon, that suggest that vehicles and bicycles share the roadway. Their placement often points out the preferred location for bike traffic. Bikes should not press too closely to parked cars. Being “doored,” when a cyclist is hit by or runs into an unexpectedly-opened car door, is a very serious hazard that can cause fatalities.

Shared-use streets are bike-friendly routes. They may have sharrows or other painted markings but may also just be marked with signs. These routes are often part of quiet-street bike route networks. These streets are often residential rather than arterial. Usually, the street features other traffic calming features, like vehicle diversions that turn cars while allowing pedestrians and cyclists travel through. Where possible, these routes are placed under tree-canopied streets. Trees have a natural traffic slowing effect and provide cooler air to active travelers.

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Painted buffer lanes

Painted buffer lines are road markings that create a “do-not-cross” zone beside a bike lane. As with conventional bike lanes, cars sometimes still park or stop in the lane. However, these buffers are quite useful where the bike lane is sandwiched between parked cars and the sidewalk. The buffer makes sure that opening passenger-side doors are not a hazard to cyclists.



Contraflow cycling lanes

Contraflow lanes are lanes where some cyclists are moving the opposite direction of the motor vehicles adjacent to the lane. Sometimes, this is done with a two-way bike path, with the bike lane adjacent to vehicles moving contraflow. Sometimes bike lanes are placed on either side of a one-way street, so that bikes move in both directions. The lane that moves in the opposite direction of oncoming cars is the contraflow lane.

Protected bike lanes: separated bike

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may need access to a curb. These attempt to discourage the bike lane's use for parking, although plastic delimiters are often ripped free.

Fixed separators ensure that the bike lanes are separate. Medians, planters, jersey barriers, curbs, parked cars in a parking lane, [bollards](#), and [parking stops](#) are all commonly used.

A large study from University of Colorado Denver and University of New Mexico showed cities with protected bike lanes had [44% fewer deaths](#) for all road users.



Off-street bike paths

Off-street bike paths do not share pavement with vehicle traffic. These paths are often integrated into park space and offer a vehicle-free form of commuting. Off-street bike paths can be shared-use with pedestrians or may be specified as bike-only.

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One way to create safety for cyclists and pedestrians on smaller streets is through a variety of environmental traffic calming strategies. Our [complete guide to traffic calming](#) introduces strategies like [speed bumps and humps](#), chicanes, neckdowns, and more.

Road diets

Road diets remove the number of vehicle travel lanes on a street. This can also be called “road rechannelization,” because travel lanes are often turned into pedestrian, transit, or cycling space. Reimagining traffic flow is important to road diets. It’s not enough simply to turn a lane into a bike lane: rather, the needs of the overall network need to be considered.

For example, if the road has two lanes in each direction but many cars turn left in each case, moving to one lane may cause congestion as cars wait for a gap. Perhaps a central reversible left-turn lane can help through-traffic keep going.

Road diets reduce the overall crash frequency in an area even when they do not reduce traffic volumes.

INTERSECTION MANAGEMENT

Intersections are dangerous. When cars are turning, drivers must be aware of other vehicles, pedestrians, and cyclists, all of whom may be coming from different directions. Users of all types can be confused about right of way. Some infrastructure improvements can lead to a false sense of security: research shows that “on multi-lane roads with volumes of more than 12,000 vehicles per day, having just a marked crosswalk was associated with higher pedestrian crash rates when compared with unmarked crosswalks.” ([Federal Highway Administration](#).)

[55% of cyclist injuries](#) and 28% of cyclist fatalities happen at an intersection. Making intersections safe

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Intersections are often dangerous to all road users.

has been one of the areas of focus in Vision Zero. For bikes, there have been two common infrastructure developments.



Advanced stop lines (Bike boxes)

Advanced stop lines create a space for bicycles to stop ahead of cars at intersections with traffic signals. Awareness campaigns are necessary for their use: many cyclists are hesitant to take the space.

However, cyclists are more visible to cars and transport trucks in this location. They are less likely to be missed by right-turning vehicles. Research by the Portland State University showed that [bike boxes reduced conflict](#) between cyclists and cars, increased yielding behavior, and made both drivers and cyclists feel safer.

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intersection. The advanced left turn and the bicycle traffic are both then stopped. Then right-turning drivers can safely cross the bike lane.

BIKE SHARING

As cycling infrastructure increases, cities are moving to an implementation of bike-share. When cyclists can rent and ride one-way, bike share can be a commuting option that converts some trips from car or transit. Analysis of [NYC's CitiBike](#) shows benefits to end users and to the city. Generally, bike-share is used by inexperienced cyclists and tourists and are therefore use is supported by AAA networks.

COST TO BUILD BICYCLE INFRASTRUCTURE

Good, safe, and inclusive bike infrastructure is not inexpensive. Country-wide, it [costs](#) between \$133,170 and \$536, 680 per mile to build protected bike lanes on major streets.

However, the savings are big in [health benefits](#) and [economic stimulation](#). More importantly, they help municipalities reach Vision Zero, by [reducing traffic fatalities](#) for all road users.

INNOVATIVE INFRASTRUCTURE

Bike Tunnels

In many places bicycle tunnels are used to dip beneath fast moving traffic above. In Davis, California, there are many different tunnels connecting bike routes. They're so well regarded in the city, each with its own personality, that they have their [own entry](#) in the local wiki page.

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Photo : European Cyclists' Federation, [Hovenring](#). CC BY 2.0

Hovenring

The Dutch have many innovative bike-inclusive traffic designs, leading to the country being one of the most bike-friendly nations in the world. Even for the Netherlands, though, the [Hovenring](#) is something special. Held aloft above the highway on a series of cables, this cycletrack allows riders to pass above the vehicular fray.

Berenkuil

[Berenkuil](#) means “bear pit” in Dutch. It’s the opposite of the Hovenring, in which traffic is put onto raised roads or bridges above grade so that cyclists and pedestrians can move underneath. Similar to bike tunnels, a berenkuil solution normally allows movement in many directions under an intersection.

Rail to trail conversions

In many places across North America, unused railway lines are being converted to bike and pedestrian off-road trails. Many of these rail-to-trail conversions are used recreationally by hikers, joggers, and cyclists—but in some areas they become popular commuter routes as well. One such is the [Monon Trail](#) in Indianapolis, IN, which sees 1.3 million users per year.

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10 Ways Bicycle-Friendly Streets Are Good for People Who Don't Ride Bikes

Benefits abound for those with no intention of ever getting on a bicycle

by Jay Walljasper, **[AARP Livable Communities \(/livable-communities/\)](#)**



PHOTO BY MELISSA STANTON

A sidewalk, protected bicycle lane and marked crosswalk along Prospect Park West in Brooklyn, New York.

Even in the most crime-free of America's neighborhoods, people don't feel entirely safe when they're out and about. Drivers, some of whom view the nation's roadways as their exclusive domain, are having to contend with growing numbers of bicyclists and pedestrians.

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Bicyclists, who are largely focused on maneuvering through vehicle traffic and not getting sideswiped on shoulderless streets, sometimes don't realize how they imperil pedestrians. People traveling by foot often feel under siege from both speeding cars and unpredictable bicycles. Like many street-level conflicts, this one is about territory. Who owns the streets?

"The reason for bikeways is not what they do for bicyclists, but what they do for the whole community."

— *Livability expert Dan Burden*

But shared custody is possible. After all, each of these adversaries fits into more than one camp.

- Drivers are also walkers

- Drivers and walkers may also be bicyclists
- Bicyclists can also be walkers and drivers



The solution (and key to reducing frustration and preventing actual injury) is to share the streets by providing a space for each group. Recent research shows that bicycle-friendly projects are even good for people who will never ride a bike. Here's how:

1. Safer Streets Are Safer For Everyone

"One of the things we've found with bike infrastructure is that it makes streets safer for everyone, not just bicyclists," explains Barbara McCann, director of [Safety, Energy & Environment](https://www.transportation.gov/policy/office-safety-energy-environment) (<https://www.transportation.gov/policy/office-safety-energy-environment>) for the [U.S. Department of Transportation \(USDOT\)](https://www.transportation.gov/) (<https://www.transportation.gov/>). "It reduces the frequency of crashes. It calms traffic, which makes streets less chaotic and safer for everyone."

Adds Dan Burden, a community vitality consultant with Blue Zones — and the founder of the [Walkable and Livable Communities Institute](http://www.walklive.org/) (<http://www.walklive.org/>) — who has worked in 3,500 towns and neighborhoods across North America: "I've always said the reason for bikeways is not what they do for bicyclists, but what they do for the whole community. They're great for drivers because they make it safer to get in and out of parked cars. They're great for walkers because it creates more distance between the sidewalk and speeding vehicles."



PHOTO BY MELISSA STANTON

With sidewalks, a protected bike path and the street, New York's Times Square has a lane for every traveler.

Ken McLeod of the [League of American Bicyclists](http://www.bikeleague.org/) (<http://www.bikeleague.org/>) points out that "bike lanes of any kind calm traffic by reducing the width of the road, which signals to motorists that they should drive more carefully. Bike lanes also reduce the distance pedestrians are in contact with motor vehicles while crossing the street."



Across New York City, [injuries for motorists, pedestrians and bicyclists declined](http://www.streetsblog.org/2014/09/05/new-dot-report-shows-protected-bike-lanes-improve-safety-for-everybody/) (http://www.streetsblog.org/2014/09/05/new-dot-report-shows-protected-bike-lanes-improve-safety-for-everybody/) by 20 percent on streets with protected bike lanes. The same holds true in the city of Arlington, Virginia, outside Washington, D.C. Between 2006 and 2014, as Arlington implemented its [Complete Streets](http://www.completestreets.org/complete-streets.html) (/livable-communities/archives/info-2014/complete-streets.html) program and added infill development, there was a 50 percent decline in injuries among all users on streets, notes Dennis Leach, the director of transportation for [Arlington County](https://transportation.arlingtonva.us/). (https://transportation.arlingtonva.us/).

2. Safer Sidewalks

Marvin R. Anderson, a [community leader in St. Paul, Minnesota](http://omeka.macalester.edu/rondo/items/show/79) (http://omeka.macalester.edu/rondo/items/show/79), underscores the importance of bike lanes to older people in his neighborhood.

"It's not just cars and crime you have to be careful about, but also bikes. We need to separate the cars, the bikes and the pedestrian, like they do on [Copenhagen's streets](http://www.visitdenmark.com/copenhagen/activities/copenhagen-two-wheels) (http://www.visitdenmark.com/copenhagen/activities/copenhagen-two-wheels)."



COURTESY PHOTO

When he was the bicycling and pedestrian programs manager for Arlington County, Virginia, urban planner David Goodman pedaled his twin girls to school and himself to work on a customized bicycle built for three.

Shari Schaftlein, a human environment director with the [Federal Highway Administration](https://www.fhwa.dot.gov/) (https://www.fhwa.dot.gov/), explains: "If there's a safe and comfortable facility where people can ride, we get bikes off the sidewalks — where they can be very dangerous for pedestrians and the disabled. Also, it's easier for police to enforce laws against riding on the sidewalk

when there's a viable alternative."

3. Smoother Trips



"The anxiety and anger that many people have about bicyclists is because we have streets designed for conflict," observes Randy McFetridge, director of the [SRAM Cycling Fund](http://www.sramcyclingfund.com/) (<http://www.sramcyclingfund.com/>). "Everyone is nervous because no one knows where the bikes belong. Protected bike lanes take that chaos and disorganization away. We're not all fighting over the same space."

In fact, says Martha Roskowski of People For Bikes, defining spaces is the reason why research shows that [drivers like protected bike lanes](http://www.peopleforbikes.org/blog/entry/car-users-would-prefer-separated-bike-lanes-too-study-finds) (<http://www.peopleforbikes.org/blog/entry/car-users-would-prefer-separated-bike-lanes-too-study-finds>): "It increases the predictability of bicyclists by giving them their own place in the streets."



PHOTO BY MELISSA STANTON

The sign says "bicyclists may use full lane," but the reality of this double-line roadway makes sharing risky.

"If you actually give bicyclists a designated place in the road, they behave in a way that's more conducive for everyone getting along," adds Jim Merrell, campaign manager for the [Chicago Active Transportation Alliance](http://activetrans.org/) (<http://activetrans.org/>). He points to findings that [bicyclists stop for red lights 161 percent more often](http://articles.chicagotribune.com/2013-06-10/classified/ct-met-getting-around-0610-20130610_1_cyclists-signals-bike-traffic) (http://articles.chicagotribune.com/2013-06-10/classified/ct-met-getting-around-0610-20130610_1_cyclists-signals-bike-traffic), at special bike signals along the protected lanes of the city's busy Dearborn Avenue.

And improved civility goes both ways. A study of protected lanes on Chicago's Kinzie Street shows that half of cyclists reported improved motorist behavior.

4. Less Congestion

It makes sense that having more people on bicycles will lead to less roadway congestion. However, a [study by researchers at the University of Virginia](http://usa.streetsblog.org/2015/04/24/avoid-bikelash-by-building-more-bike-lanes/) (<http://usa.streetsblog.org/2015/04/24/avoid-bikelash-by-building-more-bike-lanes/>), finds that increased bike riding across America could mean *more* congestion if bike lanes are not included on busy streets.



For instance, even with a growing overall population, Arlington, Virginia, is seeing a 15 to 20 percent decline in traffic on some of its arterial streets, with the biggest decreases in areas that are the most bikable and walkable, says transportation director Leach.

"Our goal is to give all residents, workers and visitors a range of viable travel options," he explains, noting that the county now boasts 50 miles of off-road bicycle paths and 36 miles of bike lanes, including 1.5 miles of protected bike lanes with more to come.



PHOTO BY NANCY PAIVA

Livability expert Gil Penalosa lives car free in Toronto.


5. Increasingly Livable Communities

"Bicycling makes cities more attractive," explains [Gil Penalosa](http://livable-communities/livable-in-action/info-2015/5-questions-for-gil-penalosa.html) ([/livable-communities/livable-in-action/info-2015/5-questions-for-gil-penalosa.html](http://livable-communities/livable-in-action/info-2015/5-questions-for-gil-penalosa.html)), founder of [8 80 Cities](http://www.880cities.org/) (<http://www.880cities.org/>), which promotes making community livability for people of all ages. "The quality of the air is better and the amount of noise is less. You're more likely to know your neighbors and stop for a conversation."

Arlington's Leach notes that neighborhoods with bike lanes are often "filled with people on the streets going to stores, sitting in cafes."

6. Economic Vitality



One of s most ambitious bicycling projects is Indianapolis' Cultural Trail (<http://indyculturaltrail.org/>), an 8-mile network of separated bike and pedestrian lanes that has reinvigorated a number of struggling business districts and sparked a whopping \$1 billion in increased property values (<http://indyculturaltrail.org/2015/07/23/economic-impact-figures-released/>). The Cultural Trail has also bestowed considerable cachet on this often-overlooked city.

"The trail is putting Indianapolis on the map as a place to see bold innovation," reported the New York Times (http://www.nytimes.com/2014/03/09/travel/in-indianapolis-a-bike-path-to-progress.html?_r=0), and in 2014 the paper's Travel section selected Indy as number 34 (<http://www.nytimes.com/interactive/2014/01/10/travel/2014-places-to-go.html>) in its annual "52 Places to Go" list.

Sharing the Road

Protected Bike Lanes physically separate bicyclists from motorists and pedestrians on busy streets. (Think of them as sidewalks for bicyclists.)

Off-Road Bike Paths are essentially walkways and trails that people use in parks and vehicle-free areas.

Bicycle Boulevards, also known as Neighborhood Greenways, are low-traffic streets where bicyclists and walkers get priority over motorists.

Companies increasingly want to locate in bicycle-friendly places as a way to attract the young workers they need in order to thrive, especially in competitive tech and creative fields. Chicago is vigorously building bikeways as part of its pursuit of high-tech businesses, a strategy that paid off when Motorola Mobility decamped from the suburbs (<http://www.chicagobusiness.com/article/20150915/BLOGS02/150919894/motorola-solutions-moving-hq-and-800-jobs-downtown>) to a new headquarters near the city's first protected bike lane.

The large advertising firm Colle+McVoy moved to downtown Minneapolis (<http://www.costar.com/News/Article/Colle+McVoy-Moves-to-Wyman-Bldg/82529>), as CEO Christine Fruechte explains, "to allow our employees to take advantage of the area's many trails and to put the office in a more convenient location for commuting by pedal or foot. Our employees are healthier, happier and more productive. We are attracting some of the best talent in the industry."

Austin, Texas, is ambitiously expanding its bike infrastructure and has become one of the nation's leaders in protected bike lanes. Cirrus Logic, a computer company, moved downtown (<https://www.cirrus.com/en/company/releases/P124.html>) several years ago because the area's bike trails and protected lanes made the firm "more attractive as an employer," explains Public Relations Director Bill Schnell. "We can't just pluck anybody for our jobs. The people we want are mostly younger, and biking is part of the equation for them."

Memphis is also pushing protected bike lanes. "My job is to convince emerging companies that they can get the workers they want to come here. The bike is part of the overall strategy to compete for talent," offers Steven J. Bares, Ph.D., president of the Memphis Bioworks Foundation (<http://www.memphisbioworks.org/>), an initiative to bring fast-growing health care companies to Memphis.

7. More Opportunity

Marvin R. Anderson, a retired lawyer, has spent much of his life working to boost St. Paul's African-American community.

"Encouraging bicycling and walking are important to reweaving the Rondo neighborhood

(<http://saintpaulhistorical.com/items/show/160>)," Anderson says about the once-thriving, tight-knit community that was displaced and destroyed in the 1960s by construction of Interstate 94 (<http://libguides.mnhs.org/rondo>). "Biking and walking are healthy. Biking and walking can save people money. We need to create a culture of biking and walking."

Barbara McCann of USDOT notes, "Safe bicycling conditions provide low-income Americans with an opportunity to get to jobs, education, stores and transit so they don't have to pull together a lot of money to buy a car."

Being able to thrive without a car is essential to many African-Americans, one-third of who have no access to a car, and Latinos, one-quarter of who are carless, according to a report by the Leadership Conference Education Fund (<http://www.civilrights.org/about/edfund/>). For individuals who don't own a car or have access to one, bicycling represents important pathways to opportunity.



PHOTO BY MELISSA STANTON

Bicycle parking at a residence in Seaside, Florida

"A big thing we could do to help low-income families is to make it easier to live without a car," says Gil Penalosa of 880 Cities (<http://880cities.org/>). "And it would help middle class families to switch from two cars to one." He adds that the average cost of owning and operating one car is still \$8,500 a year (<http://newsroom.aaa.com/2015/04/annual-cost-operate-vehicle-falls-8698-finds-aaa/>), even after the recent slide in gasoline prices.

8. Saves Money For Taxpayers

In an era when streets and sidewalks across the country are in disrepair, bicycle projects can save us a bundle in maintaining and expanding our transportation systems.

Even protected bike lanes are "dirt cheap to build compared to road projects," says Gabe Klein, a partner at [Fontinalis](http://fontinalis.com/team/bill-ford/) (<http://fontinalis.com/team/bill-ford/>), a venture capitalist firm founded by Ford Motor Co. Chairman Bill Ford.



When he was the transportation commissioner in Washington, D.C., and, later, Chicago, Klein launched two of the nation's most ambitious programs for building innovative bike projects.



PHOTO BY MELISSA STANTON

Spaces for drivers, bicyclists and pedestrians in Durham, New Hampshire, home of the University of New Hampshire.

R.T. Rybak (<https://www.minneapolisfoundation.org/r-t-rybak-named-ceo-and-president-of-the-minneapolis-foundation/>), mayor of Minneapolis from 2001 to 2013, now CEO and president of the [Minneapolis Foundation](https://www.minneapolisfoundation.org/about/whoweare/) (<https://www.minneapolisfoundation.org/about/whoweare/>), stresses that cities everywhere need to be more efficient about the money they spend to move people. "We need to get more use from the streets we already have," Rybak said. "It really is the idea that bikes belong."

9. Health Care Savings

The health benefits of bicycling look almost like a miracle. Moderate physical exercise such as bicycling for only 30 minutes a day reduces a person's chances of diabetes, dementia, depression, colon cancer, cardiovascular disease, anxiety and high blood pressure [by 40 percent or more](http://www.exerciseismedicine.org/assets/page_documents/EIMFactSheet_2014.pdf) (http://www.exerciseismedicine.org/assets/page_documents/EIMFactSheet_2014.pdf).

Since tens of millions of Americans receive their health care from federal, state and local governments (i.e., Medicare, Medicaid, military and public employees' health plans), an American taxpayer who never pedals a bike will still enjoy economic benefits if other people do.



PHOTO BY MELISSA STANTON

This stick-figure family in Loveland, Colorado, is a bicycle rack.

Employees and shareholders at businesses have a stake in bicycling, too.

QBP (<https://qbp.com/>), a large bicycle products distributor in suburban Minneapolis, encourages its employees to bike to work through a series of generous incentives, which cost the company \$45,000 a year. However, QBP figured it was the right thing to do since the company makes its money from bicycling. Turns out, it was the right thing to do for economic reasons as well. The firm's health care costs dropped (<http://www.streetsblog.org/2012/03/23/a-bike-company-offers-a-prescription-for-americas-health-care-cost-crisis/>) 4.4 percent in the first two years, which translated into \$200,000 a year in savings. By contrast, other companies suffered an average 25 percent jump in health care costs over the same period.

10. A Greener Environment

Transportation accounts for more than a quarter of all greenhouse gases, the second largest sector after electricity (30 percent), according to the U.S. Environmental Protection Agency (<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>).

A study from the Worldwatch Institute (<http://www.worldwatch.org/mission>) found that swapping a car for a bike (<http://www.worldwatch.org/node/6456>) on short commutes of four miles to work and back would generate 2,000 less pounds of carbon every year — which adds up to a five percent reduction in the carbon footprint of an average American.

More bicycles on the streets and fewer cars also lessen other forms of air and noise pollution.



P.S. People of All Ages Like to Bicycle

Living a Car-Free Life



COURTESY PHOTO

Roslyn Rubin and her foldable bicycle.

Avid bicyclist Roslyn Rubin (featured in the article [**"Why Older Americans Should Give Up Their Cars"**](#) ([**livable-communities/getting-around/info-2015/older-adults-without-cars.html**](#))) has lived without a car for more than 20 years in Arlington, Virginia.

Contrary to myth, [bikes aren't only for kids](#) ([livable-communities/getting-around/info-2015/bicycles-bike-riding-older-adults.html](#)), and bicycling as a means of exercise and transportation is not the sole purview of young, male, ultra-fit daredevils.

As street-level bicycling infrastructure improves and expands, the number of older, younger, female and inexperienced bicyclists is rising, notes Martha Roskowski, vice president of PeopleForBikes. "The biggest jump we're seeing in biking is among older people," Roskowski says.

Riders age 50 and over pedaled an estimated 2.6 billion miles rides in 2009, according to the latest data from the [National Household Travel Survey](https://www.nationalhouseholdtravelsurvey.com/) (<https://www.nationalhouseholdtravelsurvey.com/>), conducted by the USDOT. That's more than a six-fold increase from 1995, when that age group covered less than 400 million miles.



[Jay Walljasper](http://www.jaywalljasper.com/) (<http://www.jaywalljasper.com/>), author of "The Great Neighborhood Book," consults, writes and speaks about making communities healthier and happier for everyone.

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