Evaluation of Minneapolis Bicycle Operations Projects

FHWA Experiments
MnDOT Design Exceptions
Internal Public Works Evaluations

Evaluation Work Plan
May 2012

Section 1 – Introduction and Background

This work plan outlines a process for evaluating a series of bicycle operations projects in Minneapolis. The projects include treatments that received Federal Highway Administration (FHWA) approval for experimentation or a Minnesota Department of Transportation (MnDOT) federal aid design exception. Most treatments are funded through the Federal Non-Motorized Transportation Pilot Program grant.

Seven treatments originally received FHWA approval and another seven received MnDOT design exceptions. Since approval, one FHWA project underwent an evaluation and one MnDOT project was canceled. In addition to the approved FHWA and MnDOT projects, the Minneapolis Public Works Department (DPW) will evaluate two other bicycle-related projects. In total, the scope of the work plan includes 14 unique treatments.

FHWA Approval for Experimentation

1. Colored Green Conflict Zones
2. Colored Green Crosswalk Treatments
3. Intermittent Colored Background for Shared Lane Markings
4. ~~Continuous Colored Background for Shared Lane Markings (evaluation complete)~~
5. Advisory Bike Lanes
6. Enhanced Shared Lane Markings
7. Bike Traffic Signal

MnDOT Federal Aid Design Exception

1. Bike lane in lieu of 2nd motorized vehicle lane on one-way street
2. One travel lane plus buffer lane on one-way St in lieu of two travel lanes
3. Two-way width with parking on one-side, 1.5' reaction distance in lieu of 2'
4. Two-way width with parking on both sides, 10.5' travel lanes with adjacent bike lanes
5. Two-way width with parking on both sides, 10.5' travel lanes with adjacent bike lanes
6. Bike lane in lieu of 2nd motorized vehicle lane on one-way street
7. ~~Two-way width with parking on one-side, 7' parking and 11' travel lanes (project canceled)~~

Internal Public Works Evaluation

1. 25 mph speed study
2. Colored Green Conflict Zones

Most projects were installed in the summer and fall of 2011. The FHWA and DPW projects will undergo a two-year evaluation process and the MnDOT project evaluations will last five years. While many treatments were applied at multiple sites or along multiple corridors, the evaluation will only examine a limited number of locations. Due to the large number of treatments, the evaluation will follow a methodology similar to one outlined in the FHWA report Pedestrian and Bicyclist Traffic Control Device Evaluation Methods[1]. This will ensure a consistent method is applied to each individual evaluation.

1 Federal Highway Administration. Pedestrian and Bicyclist Traffic Control Device Evaluation Methods. Publication No. FHWA-HRT-11-035. U.S. Department of Transportation. May 2011.

Section 2 - Project Team

The evaluation process will be managed and coordinated by DPW with assistance from Transit for Livable Communities (TLC), MnDOT and the University of Minnesota (U of M).

Managing Staff

Simon Blenski, Bicycling and Pedestrian Section (DPW)

Simon will be the Evaluation Coordinator, serving as a liaison to the project team, Technical Advisory Panel and other staff members. He will be responsible for assembling all necessary evaluation measures, managing the video tabulation and analysis process, writing the final report, corresponding with agency representatives and ensuring the evaluation follows the established schedule.

Tony Hull, Non-Motorized Planning and Evaluation Analyst (TLC)

Tony will serve as the Video Coordinator, working with the video contractor to collect the necessary video and preparing the footage for tabulation and analysis. He will also assist with other aspects of the evaluation including managing the video tabulation and analysis process.

Technical Advisory Panel

A Technical Advisory Panel (TAP) will be assembled to help guide the evaluation process. The TAP will include representatives from DPW, MnDOT and the U of M. Before this work plan is finalized, the TAP will convene to review the project research questions, evaluation measures and evaluation approach. The group's comments will then be incorporated into a finalized work plan.

Proposed TAP Members

Shaun Murphy, Traffic and Parking Services (DPW)
Steve Mosing, Traffic and Parking Services (DPW)
Dennis Bechard, Traffic and Parking Services (DPW)
Bob Carlson, Transportation Planning and Engineering (DPW)
Dan Ericson, Office of Metro State Aide (MnDOT) + Others from MnDOT State Aide

Additional Staff

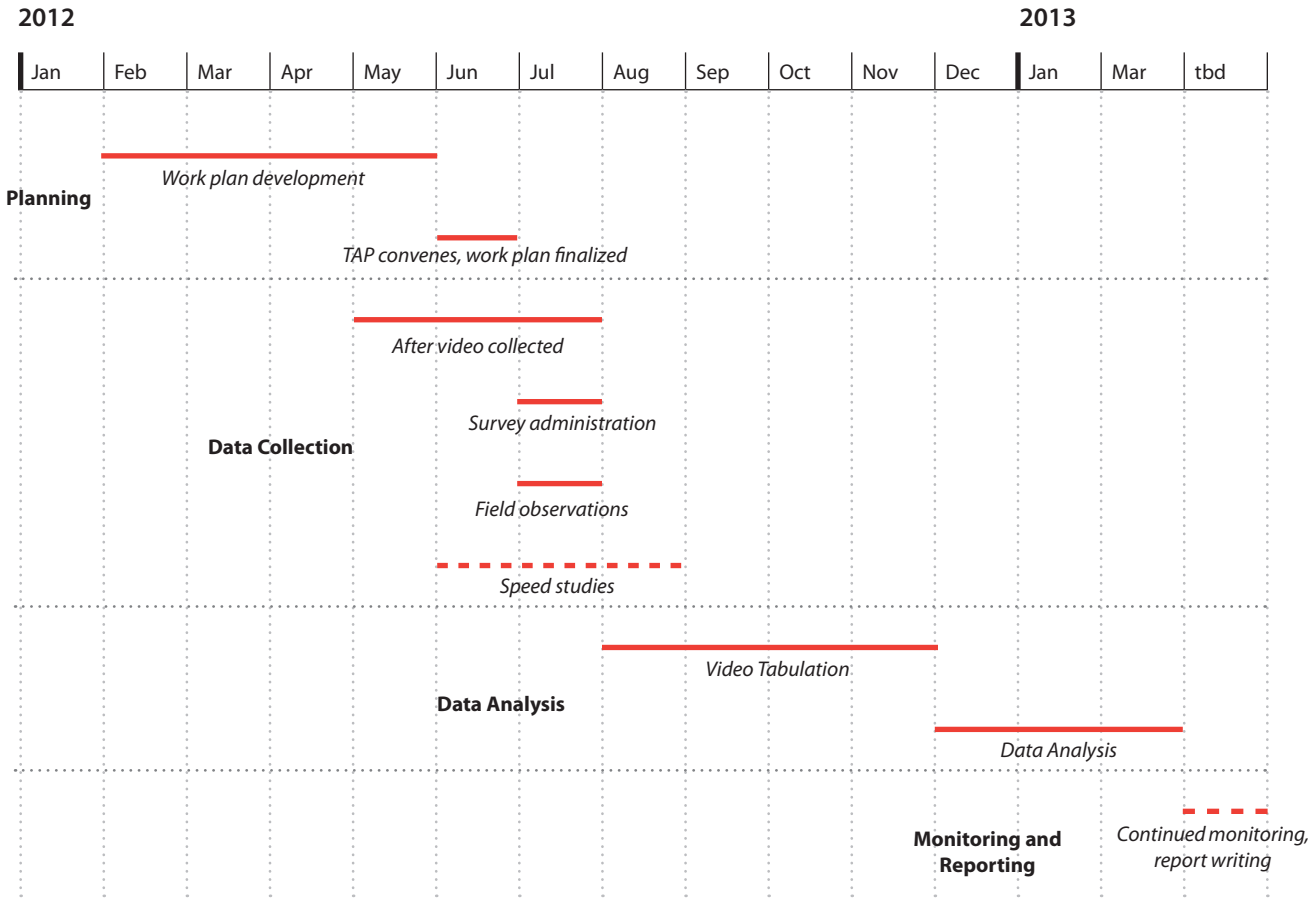
Video tabulation and analysis requires a significant number of work hours. Based on past experience, DPW has concluded that an average 2 hours of viewing time is required for each hour of actual footage. While the total hours of footage is yet to be determined, it is estimated that each treatment will require an average of 20 hours of footage for a total of 180 hours, or about 400 work hours. This workload would undoubtedly require additional personnel assigned to the project team. Field observations and survey administration will also require staff time.

In addition to video work hours, some projects will require statistical analysis. Basic analysis can be performed by DPW, but advanced analysis will require assistance an academic institution. It is estimated that 100 hours will be need to plan and conduct the statistical analysis.

Currently, DPW is working with the Minnesota Traffic Observatory at the U of M to handle the majority of the video tabulation and analysis. However, a definite plan has not been established.

Section 3 – Evaluation Timeline

The evaluation will be divided into four phases: Planning, Data Collection, Data Analysis, and Continued Monitoring and Reporting. Planning, Data Collection and Data Analysis will last approximately 12 months. Additional months will be required for continued monitoring and reporting. DPW will coordinate with FHWA and MnDOT to determine the precise timeline for continued monitoring; specifically with respect to safety and crashes.



Most projects were installed from August to October of 2011.

Before video was collected in June and July of 2011.

Section 4 - Methodology and Primary Research Questions

The FHWA report Pedestrian and Bicyclist Traffic Control Device Evaluation Methods outlines a procedure for planning a bicycle or pedestrian project evaluation. The six step process will be applied to the overall evaluation and each individual treatment.

1. **Problem Identification**: What is the safety or traffic operations issue?
2. **Research Question**: What is the research question?
3. **Measures of Effectiveness**: How will performance be assessed?
4. **Evaluation Designs**: What is the study approach?
5. **Evaluation Methods**: How will users, traffic operations, or crashes be measured?
6. **Selecting components to the evaluation plan**: How can time, budget, and practicality be balanced to execute the plan?

The primary evaluation methodology and research questions are listed below. The process is intended to be broad enough to encompass the subtleties of each treatment, but focused enough to provide consistency across the individual evaluations. More focused methods and research questions for each treatment are outlined in the following section.

Problem Identification

The primary problem identified at the project locations is the potential for conflicts with vulnerable road users (primarily bicyclists) and motor vehicles. Each location has unique circumstances that originate from a number of factors including turning movement conflicts, excessive motor vehicle speeds, high volumes of vulnerable road users, lack of available facilities or a combination of multiple factors. The treatments aim to reduce the potential for conflicts caused by these factors.

These treatments also aim to increase the number of trips made by bicycling or walking at the various project locations. However, increasing non-motorized trips should not be considered a problem, but rather an added goal of these projects.

Most treatments being evaluated are considered innovative or new to local users. With any new treatment there is a period of learning or adjustment. There may also be discrepancies between actual and perceived safety. DPW is interested in understanding user comprehension and how users perceive the treatments.

Research Questions

The primary research questions for this evaluation are the following:

1. Has the treatment improved the safety of users?
2. Have traffic volumes changed at the treatment?
3. Is the treatment being used as intended?
4. How do users perceive the treatment?

Measures of Effectiveness

To measure the safety of users, the number of reported crashes will be analyzed before and after the treatment is installed. User behavior will also be observed at many locations. To measure traffic volumes, before and after traffic counts will be conducted at or near treatments. To gauge user perception, user surveys will be conducted at many locations.

Evaluation Design

The primary design of this evaluation will follow a before and after method. In most cases the measures of effectiveness will all be collected before and after the installation of the treatment. However, in some cases before data is not available or before and after comparability is limited. For example, the bicycle traffic signal installation at Broadway Street NE and 5th Street NE resulted in significant changes to the intersection geometry and access for bicyclist and pedestrians. While it is feasible to collect before data at this location, it is more

valuable to focus on observations in the new environment.

Evaluation Methods

For each of the 4 main research questions, the following measures of effectiveness will be used. Specific measures will vary from project to project.

1. Has the treatment improved the safety of users?

    - Crashes: Department of Public Safety (DPS) Crash Reports
    - Behavior: Video analysis documenting user behavior and interactions
    - Manual observations may be used to gather additional data

2. Have traffic volumes changed at the treatment?

    - Counts: DPW traffic counts

3. Is the treatment being used as intended?

    - Behavior: Video analysis documenting user behavior and interactions*

4. How do users perceive the treatment?

    - Surveys administered to motorized and non-motorized users

Evaluation Components

The components of the evaluation will vary for each treatment and will depend on input from the TAP and assessing the overall feasibility of the tasks at hand.

**Intended use* is explicitly outlined in this work plan for FHWA projects and one DPW project. Intended use is not outlined for MnDOT projects because the treatments are facilitating normal traffic flow - not planned points of conflict like most of the FHWA projects.

Section 5 - Individual Project Work Plans

FHWA Approval for Experimentation

1. Colored Green Conflict Zones
2. Colored Green Crosswalk Treatments
3. Intermittent Colored Background for Shared Lane Markings
4. ~~Continuous Colored Background for Shared Lane Markings~~ (evaluation complete)
5. Advisory Bike Lanes
6. Enhanced Shared Lane Markings
7. Bike Traffic Signal

MnDOT Federal Aid Design Exception

1. Bike lane in lieu of 2nd motorized vehicle lane on one-way street
2. One travel lane plus buffer lane on one-way St in lieu of two travel lanes
3. Two-way width with parking on one-side, 1.5' reaction distance in lieu of 2'
4. Two-way width with parking on both sides, 10.5' travel lanes with adjacent bike lanes
5. Two-way width with parking on both sides, 10.5' travel lanes with adjacent bike lanes
6. Bike lane in lieu of 2nd motorized vehicle lane on one-way street
7. ~~Two-way width with parking on one-side, 7' parking and 11' travel lanes~~ (project canceled)

Internal Public Works Evaluation

1. 25 mph speed study
2. Colored Green Conflict Zones

FHWA 1 - Colored Green Conflict Zones

Authority: FHWA Approval for Experimentation
Experiment Title: 9(09)-6 (E) - Bike Markings and Signals Minneapolis
Sites: 8
Locations: 7th St N, Plymouth Ave N, 15th Ave SE, E 16th St (3), Blaisdell Ave S, 1st Ave S
Video Location: 7th St N

Problem Identification

There are several locations in Minneapolis that require merging or turning motorists to cross a through bike lane. It is important that both bicyclists and motorists recognize that this portion of the roadway requires a higher degree of care in order to avoid crashes. To emphasis the potential conflict area and convey the message to both bicyclists and motorists, the bike lane is painted a solid green color. The first 7th Street North location is of particular importance as a through bike lane crosses an access point to an interstate on-ramp with high volumes of turning motorists.

Intended Use

Bicyclists: It is expected that bicyclists will ride in the bike lane and in the green conflict zone.

Motorists: It is expected that right turning motorists will use caution when crossing the green conflict zone and yield to any bicyclists approaching or already in the green conflict zone.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
7th St N (1)	100	9,100
7th St N (2)	100	9,100
15th Ave SE	1,270	7,300
E 16th St (1)	290	3,900
E 16th St (2)	180	6,900
E 16th St (3)	180	6,900
Blaisdell Ave S	470	9,900
1st Ave S	240	8,200

Research Questions and Summary Table

No.	Research Question	Measure	Design	Method*
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Have the number of bicyclist-motorist conflicts decreased?	Observed Behavior	Before/After	Video
1c	Are bicyclists riding in the green conflict area?	Observed Behavior	Before/After	Video
1d	Are bicyclists using caution when entering the green conflict area? (head turning or scanning)	Observed Behavior	Before/After	Video
1e	Are motorists signaling before crossing the green conflict area?	Observed Behavior	Before/After	Video
1f	Are motorists yielding before crossing the green conflict area?	Observed Behavior	Before/After	Video

2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts
3a	Are bicyclists using the treatment as intended?	Observed Behavior	Before/After	Video
3b	Are motorists using the treatment as intended?	Observed Behavior	Before/After	Video
4a	Do bicyclists feel safer with the addition of the treatment?	Perception	After	Surveys
4b	Do motorists understand the purpose of the treatment?	Comprehension	After	Surveys

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. At the 7th Street North location, bicyclist and motorist behavior will be observed to respond to questions 1b-f. To address question 2, before and after traffic counts will be conducted at or near treatments. To gauge user perception surveys will be administered to both motorists and bicyclists after the treatment is installed.

Evaluation Designs

The evaluation of colored green conflict zones will follow a before and after method. All measures of effectiveness will be analyzed is this manner except for bicyclist motorist surveys, which will only be administered after installation.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Video will be used to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users. Surveys will be administered to users in order to gauge perception and comprehension.

Evaluation Components

Information to come

Supporting Literature

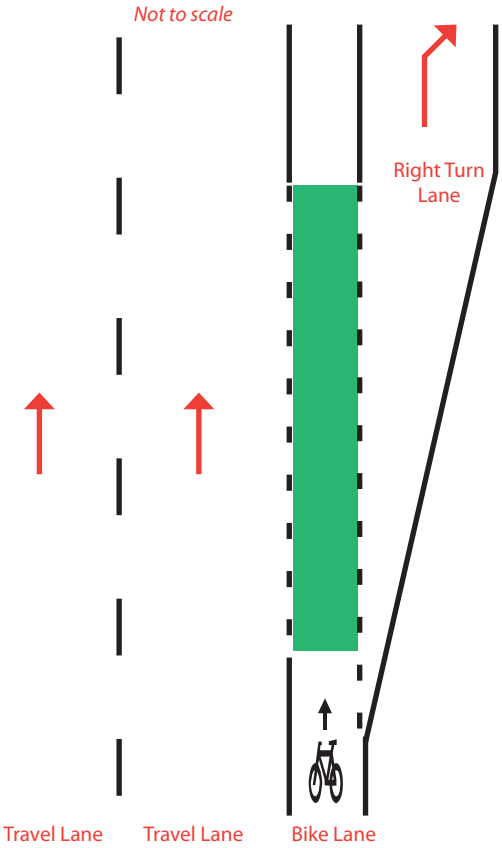
Brady, John, et. al. "Effects of Colored Lane Markings on Bicyclist and Motorist Behavior at Conflict Areas." Center for Transportation Research. The University of Texas at Austin. August 2, 2010.

Hunter, William H., et. al. "Evaluation of Blue Bike-Lane Treatment in Portland, Oregon." Transportation Research Record 1705. Paper No. 00-0456. 2000.

Hunter, William, H. et. al. "Evaluation of a Green Bike Lane Weaving Area in St. Petersburg, Florida." University of North Carolina Highway Safety Research Center. September 2008.

Typical Layout

Not to scale



FHWA 2 - Colored Green Crosswalk Treatments

Authority: FHWA Approval for Experimentation
Experiment Title: 9(09)-6 (E) - Bike Markings and Signals Minneapolis
Sites: 2
Locations: Lyndale /Hennepin Aves at Oak Grove Street and Groveland Ave
Video Location: Lyndale Ave S at Oak Grove Street

Problem Identification

The Loring Bikeway is an off-street bicycle and pedestrian path adjacent to Lyndale and Hennepin avenues. The Lyndale and Hennepin corridor is a significant corridor for all modes with access to downtown, south Minneapolis and several freeways on and off-ramps. While the Loring Bikeway provides a separated facility for vulnerable road users, the path makes at-grade crossings with two cross streets: Oak Grove Street and Groveland Avenue. These crossings create potential conflict areas with through bicyclists and pedestrians and turning motorists. To emphasis the potential conflict area and convey the message to users, two crosswalks are painted a solid green color.

Intended Use

Pedestrians: It is expected that pedestrians will walk or roll within the green crosswalk.

Bicyclists: It is expected that bicyclists will ride in the green crosswalk.

Motorists: It is expected that right turning motorists will use caution when crossing the green crosswalk and yield to any pedestrians or bicyclists approaching or already in the green crosswalk. It is also expected that approaching motorists will remain stopped behind the designated stop bar while pedestrians or bicyclists are crossing or while the motorist has a red signal.

Daily Bicyclist, Pedestrian and Motor Vehicle Traffic

Location	Bicyclists	Pedestrians	Motor Vehicles
Lyndale/Hennepin at Oak Grove Street	1,060	320	30,000
Lyndale/Hennepin at Groveland Ave	1,060	520	30,000

Research Questions and Summary Table

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist and pedestrian-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Have the number of bicyclist-motorist and pedestrian-motorist conflicts decreased?	Observed Behavior	Before/After	Video
1c	Are bicyclists and pedestrians using caution when entering the green crosswalk? (head turning or scanning)	Observed Behavior	Before/After	Video
1d	Are turning motorists signaling before crossing the green crosswalk?	Observed Behavior	Before/After	Video
1e	Are motorists yielding before crossing the green crosswalk?	Observed Behavior	Before/After	Video

1f	Are queued motorists waiting behind the stop bar?	Observed Behavior	Before/After	Video
2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts
3a	Are bicyclists and pedestrians using the treatment as intended?	Observed Behavior	Before/After	Video
3b	Are motorists using the treatment as intended?	Observed Behavior	Before/After	Video
4a	Do bicyclists and pedestrians feel safer with the addition of the green crosswalk?	Perception	After	Surveys
4b	Do motorists understand the purpose of the green crosswalk?	Comprehension	After	Surveys

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. At the Oak Grove Street location, bicyclist and motorist behavior will be observed to respond to questions 1b-f. To address question 2, before and after traffic counts will be conducted at or near treatments. To gauge user perception surveys will be administered to motorists, bicyclists and pedestrians after the treatment is installed.

Evaluation Designs

The evaluation of colored green crosswalks will follow a before and after method. All measures of effectiveness will be analyzed is this manner except for bicyclist, pedestrian and motorist surveys, which will only be administered after installation.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist and pedestrian-motorist crashes. Video will be used to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users. Surveys will be administered to users in order to gauge perception and comprehension.

Evaluation Components

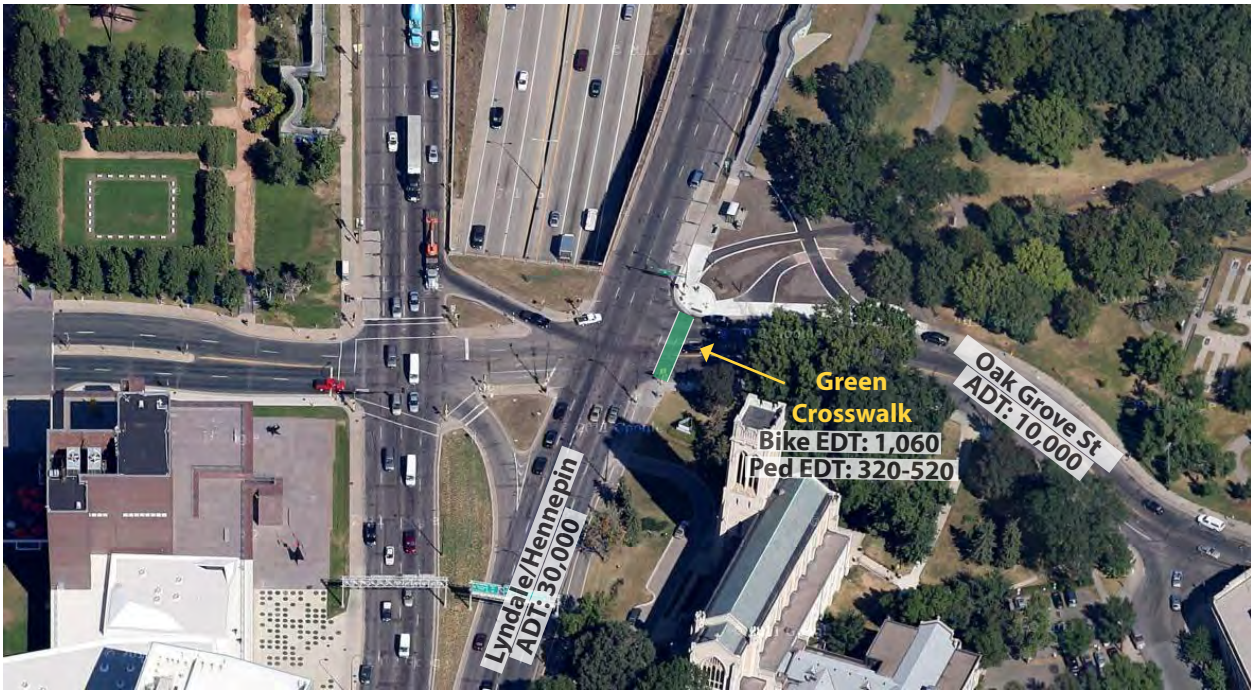
Information to come

Supporting Literature

Brady, John, et. al. "Effects of Colored Lane Markings on Bicyclist and Motorist Behavior at Conflict Areas." Center for Transportation Research. The University of Texas at Austin. August 2, 2010.

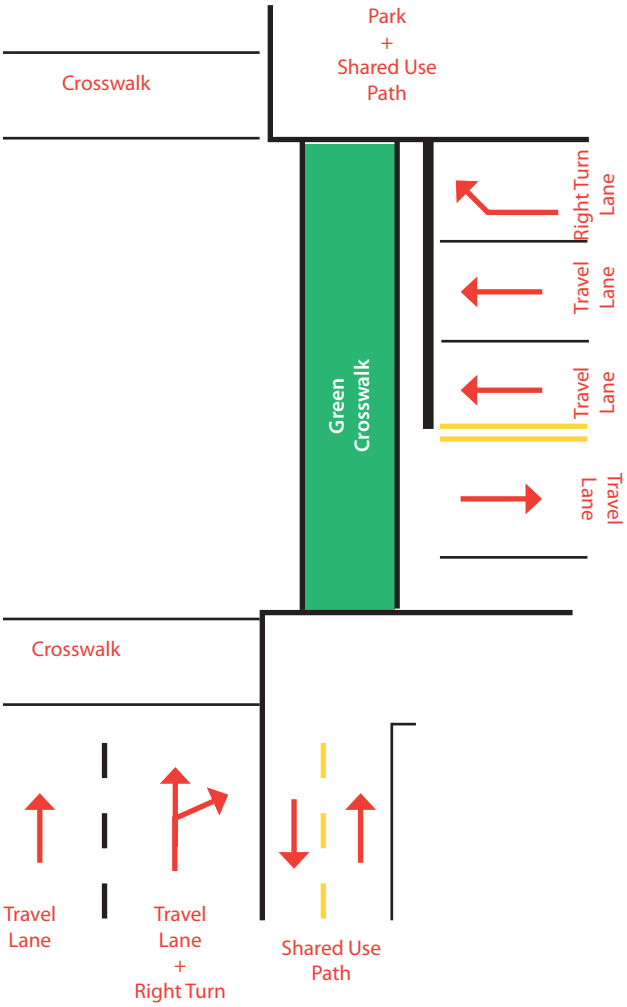
Hunter, William H., et. al. "Evaluation of Blue Bike-Lane Treatment in Portland, Oregon." Transportation Research Record 1705. Paper No. 00-0456. 2000.

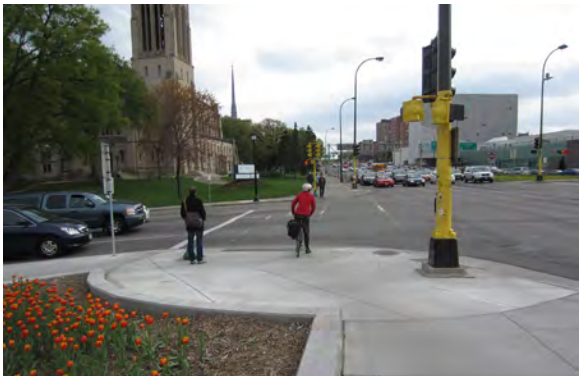
Hunter, William, H. et. al. "Evaluation of a Green Bike Lane Weaving Area in St. Petersburg, Florida." University of North Carolina Highway Safety Research Center. September 2008.



Typical Layout

Not to scale





FHWA 3 - Intermittent Colored Background for Shared Lane Markings

Authority: FHWA Approval for Experimentation
Experiment Title: 9(09)-6 (E) - Bike Markings and Signals Minneapolis
Sites: 1
Location: Bryant Ave S, W Lake St to W 40th St
Video Location: Bryant Ave S south of W 33rd St

Problem Identification

Bryant Avenue South is a north-south bikeway that runs through south Minneapolis. The bikeway consists of bike boulevard sections on the northern and southern segments and a share lane marking treatment through the central segment. The bike boulevard sections run through quiet, residential areas, while the central segment has higher volumes of motor vehicle traffic and a high frequency bus route.

The central segment of Bryant Avenue South from West Lake Street to West 40th Street has two travel lanes with parking on both sides of the street. The current allocation of right-of-way does not allow for the application of bike lanes. Instead shared lane markings were considered for the corridor. Due to the higher traffic volumes and bus traffic, a green background was added to the shared lane markings to increase the visibility of the markings and highlight a path where motorists could expect to see bicyclists.

With the presence of parked vehicles, the shared lane markings are offset to encourage bicyclists to ride in a safe lateral position away from opening vehicle doors. The distance of the center of the shared lane marking from the curb will varies in order to examine the effectiveness of the distance from the "door zone." In one direction the lateral distance from the curb is 12.5 feet and in the other direction it is 14 feet.

Intended Use

Bicyclists: It is expected that bicyclists will ride in the green shared lane (where applicable) or in the assumed path of the green shared lane (where not applicable).

Motorists: It is expected that motorists will follow the roadway as normal, but will use extra caution when overtaking bicyclists. Minnesota Statute requires a motorist to leave at least three feet of clearance when overtaking a bicyclist.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
Bryant at W Lake St	1,190	3,200
Bryant at W 40th St	210	2,300

Research Questions and Summary Table

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Where do bicyclists tend to ride? Does this vary by the placement of the green zone, the presence of parked vehicles or the presence of oncoming vehicles?	Observed Behavior	After	Video

1c	Where do motorists tend to drive? Does this vary by the placement of the green zone, the presence of parked vehicles or the presence of oncoming vehicles?	Observed Behavior	After	Video
1d	Do motorists give bicyclists a safe passing distance (at least 3 ft)? Does this vary by the placement of the green zone, the presence of parked vehicles or the presence of oncoming vehicles?	Observed Behavior	After	Video
2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts
3a	Are bicyclists using the treatment as intended?	Observed Behavior	Before/After	Video
3b	Are motorists using the treatment as intended?	Observed Behavior	Before/After	Video
4a	Do bicyclists feel safer with the addition of the green zone?	Perception	After	Surveys
4b	Do motorists understand the purpose of the green zone?	Comprehension	After	Surveys

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. Bicyclist and motorist behavior will be observed to respond to questions 1b-d. To address question 2, before and after traffic counts will be conducted at or near treatments. To gauge user perception surveys will be administered to motorists, bicyclists and pedestrians after the treatment is installed.

Evaluation Designs

The evaluation of intermittent colored green zones will follow a before and after method. All measures of effectiveness will be analyzed is this manner except for user behavior and user surveys, which will only be administered after installation. Before user behavior was not collected due to significant changes made to the corridor.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist and pedestrian-motorist crashes. Video will be used to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users. Surveys will be administered to users in order to gauge perception and comprehension.

Evaluation Components

Information to come

Supporting Literature

City of Minneapolis. "Hennepin Avenue Green Shared Lane Study." Minneapolis Public Works Department. August 2011.

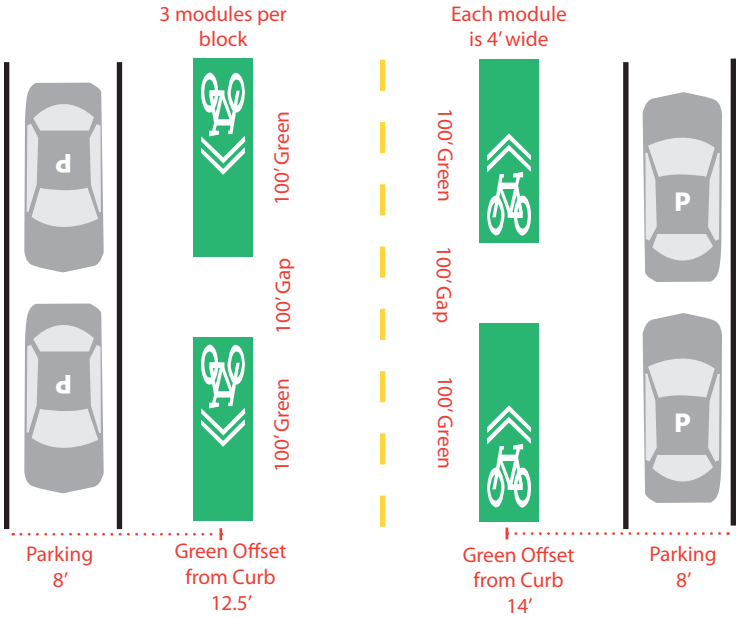
Furth, Peter, et. al. "More Than Sharrows: Lane-Within-A-Lane-Bicycle Priority Treatments in Three U.S. Cities. Presented at the 2011 Annual Meeting of Transportation Research Board.

Hunter, William W. "An Evaluation of Red Shoulders as a Bicycle and Pedestrian Facility." Florida Department of Transportation. July 1998.

San Francisco Department of Parking and Traffic and Alta Planning & Design. "San Francisco's Shared Lane Pavement Markings: Improving Bicycle Safety." February 2004.

Typical Layout

Not to scale



FHWA 4 - Continuous Colored Background for Shared Lane Markings

Authority: FHWA Approval for Experimentation
Experiment Title: 9(09)-6 (E) - Bike Markings and Signals Minneapolis
Sites: 1
Location: Hennepin Ave, Washington Ave to 11th St S

Evaluation Complete. See the "Hennepin Avenue Green Shared Lane Study" for results.

FHWA 5 - Advisory Bike Lanes

Authority: FHWA Approval for Experimentation
Experiment Title: 9(09)-6 (E) - Bike Markings and Signals Minneapolis
Sites: 1
Location: E 14th St, 11th Ave S to Portland Ave S
Video Location: E 14th St west of 10th St S

Problem Identification

East 14th Street is home to the first advisory bike lanes in North America. The advisory bike lanes are part of the East 14th Street/East-West15th Street/East 16th Street bikeway that runs along the southern edge of downtown. Prior to installation, the East 14th Street segment had two travel lanes with parking on both sides of the street.

To maintain parking and accommodate a bicycle facility on the street, a solution was borrowed from Europe known as "suggestion lanes" or "advisory bike lanes." Advisory bike lanes are similar to standard bike lanes with bicycle symbols and lateral white lines. However, the difference is that the left line of the bike lane is a dotted white line instead of a solid white line. In addition, the centerline of the roadway is removed creating one, two-way travel lane. On East 14th Street the advisory bike lanes are each six feet wide and the central travel lane ranges from 14-20 feet. The advisory bike lanes allow bicyclists to have a dedicated space to ride. The central travel lane requires on-coming motorists to share the travel lane. If space is needed pass oncoming vehicles, motorists are allowed to merge into the advisory bike lanes, but must yield to bicyclists before doing so.

Intended Use

Bicyclists: It is expected that bicyclists will ride in the advisory bike lane.

Motorists: It is expected that motorists will follow the roadway as normal, but will use extra caution when overtaking bicyclists or approaching oncoming motorists.. Minnesota Statute requires a motorist to leave at least three feet of clearance when overtaking a bicyclist. When approaching on oncoming motorist, it is expected that the motorist will merge into the advisory bike lane, but yield to any bicyclists approaching or already in the advisory bike lane.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
14th at Chicago Ave S	330	1,900

Research Questions and Summary Table

No.	Research Question	Measure	Design	Method
1a	Have the number of crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Where do bicyclists tend to ride? Does this vary by the presence of parked vehicles or oncoming vehicles?	Observed Behavior	Before/After	Video
1c	Where do motorists tend to drive? Does this vary by the presence of bicycles or oncoming vehicles?	Observed Behavior	Before/After	Video
1d	Are motorists yielding to bicyclists before merging into the advisory bike lane?	Observed Behavior	After	Video

1e	When a motorist overtakes a bicyclist, are they leaving a safe passing distance?	Observed Behavior	Before/After	Video
1f	Do the advisory bike lanes and lack of centerline appear to create conflicts among bicyclists and motorists?	Observed Behavior	Before/After	Video
2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts
3a	Are bicyclists using the treatment as intended?	Observed Behavior	Before/After	Video
3b	Are motorists using the treatment as intended?	Observed Behavior	Before/After	Video
4a	Do bicyclists feel safer with the addition of the advisory bike lanes?	Perception	After	Surveys
4b	Do motorists understand the purpose of the advisory bike lanes?	Comprehension	After	Surveys

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. Bicyclist and motorist behavior will be observed to respond to questions 1b-e. To address question 2, before and after traffic counts will be conducted at or near treatments. To gauge user perception surveys will be administered to motorists and bicyclists after the treatment is installed. Note DPW will be conducting an internal speed study of East 14th Street that is separate from the evaluation of advisory bike lanes.

Evaluation Designs

The evaluation of advisory bike lanes will follow a before and after method. All measures of effectiveness will be analyzed is this manner except for certain types of user behavior and user surveys, which will only be administered after installation. Some before user behavior will not be collected due to significant changes made to the corridor.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Video will be used to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users. Video will be collected at a location where the center travel lane I 14 feet. Surveys will be administered to users in order to gauge perception and comprehension.

Evaluation Components

Information to come

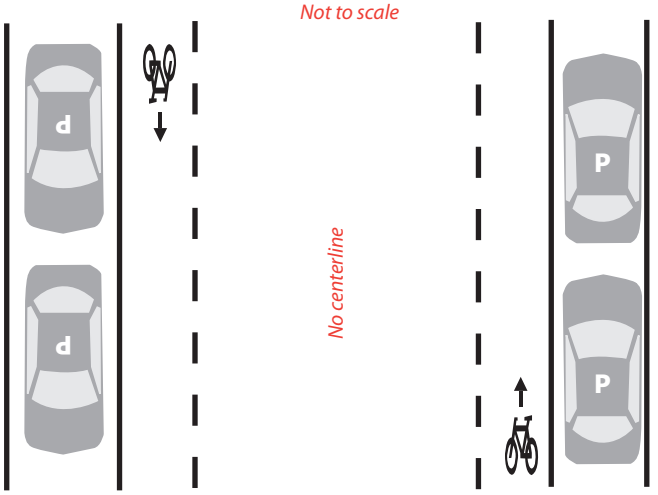
Supporting Literature

Batten, George and Andrew Wyatt. "White Line Carriageway Markings." Report to the Wiltshire County Council Overview and Scrutiny Management Committee. April 30, 2004. Agenda Item No. 7.

Furth, Peter, et. al. "More Than Sharrows: Lane-Within-A-Lane-Bicycle Priority Treatments in Three U.S. Cities. Presented at the 2011 Annual Meeting of Transportation Research Board.

Typical Layout

Not to scale



FHWA 6 - Enhanced Shared Lane Markings

Authority: FHWA Approval for Experimentation
Experiment Title: 9(09)-6 (E) - Bike Markings and Signals Minneapolis
Sites: 1
Locations: LaSalle Ave, Oak Grove Street to W Franklin Ave
Video Location: LaSalle Ave

Problem Identification

LaSalle Avenue is a two-lane, one-way street with parking on both sides. The corridor exits downtown and connects to the Blaisdell Avenue bike lane that runs through south Minneapolis. The portion of LaSalle Avenue between Oak Grove Street and West Franklin Avenue is a narrow-right-of-way and climbs a steep grade. It is anticipated that bicyclists will slow down when negotiating the grade and could result in increased impatience or frustration for motorists.

The desired allocation of right-of-way did not allow for the application of standard bike lanes. Also, motor vehicle traffic volumes were considered too high for the application of regular shared lane markings. Instead, the standard shared lane marking was enhanced to include dotted lines to simulate an advisory path for bicyclists within the travel lane. The new shared lane marking module contains a bike symbol with a double chevron with dotted white lines on either side. The entire module is five feet wide and 20 feet long. The dotting aims to increase the conspicuousness of the shared lane markings and create an advisory path for bicyclists to ride in.

Intended Use

Bicyclists: It is expected that bicyclists will ride in the path of the enhanced shared lane markings (where applicable) or in the assumed path of the enhanced shared lane markings (where not applicable).

Motorists: It is expected that motorists will follow the roadway as normal, but will use extra caution when overtaking bicyclists. Minnesota Statute requires a motorist to leave at least three feet of clearance when overtaking a bicyclist.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
LaSalle at Oak Grove Street	510	7,500

Research Questions and Summary Table

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Where do bicyclists tend to ride? Does this vary by the presence of parked vehicles?	Observed Behavior	After	Video
1c	Where do motorists tend to drive? Does this vary by the presence of parked vehicles or bicyclists?	Observed Behavior	After	Video
1d	Do motorists give bicyclists a safe passing distance (at least 3 ft)? Does this vary by the presence of parked vehicles?	Observed Behavior	After	Video

2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts
3a	Are bicyclists using the treatment as intended?	Observed Behavior	Before/After	Video
3b	Are motorists using the treatment as intended?	Observed Behavior	Before/After	Video
4a	Do bicyclists feel safer with the addition of the enhanced share lane markings?	Perception	After	Surveys
4b	Do motorists understand the purpose of the enhanced share lane markings?	Comprehension	After	Surveys

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. Bicyclist and motorist behavior will be observed to respond to questions 1b-d. To address question 2, before and after traffic counts will be conducted at or near treatments. To gauge user perception surveys will be administered to motorists and bicyclists after the treatment is installed.

Evaluation Designs

The evaluation of advisory bike lanes will follow a before and after method. All measures of effectiveness will be analyzed is this manner except for certain types of user behavior and user surveys, which will only be administered after installation. Before user behavior will not be collected due to significant changes made to the corridor.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Video will be used to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users. Surveys will be administered to users in order to gauge perception and comprehension.

Evaluation Components

Information to come

Supporting Literature

City of Minneapolis. "Hennepin Avenue Green Shared Lane Study." Minneapolis Public Works Department. August 2011.

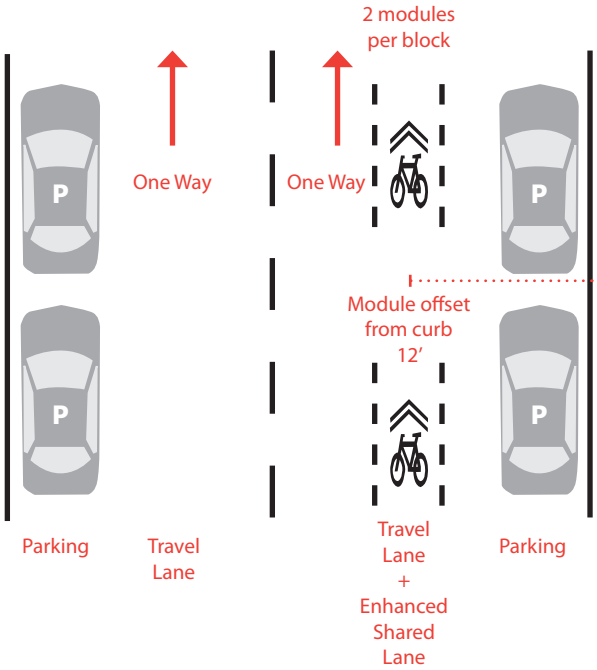
Furth, Peter, et. al. "More Than Sharrows: Lane-Within-A-Lane-Bicycle Priority Treatments in Three U.S. Cities. Presented at the 2011 Annual Meeting of Transportation Research Board.

Hunter, William W. "An Evaluation of Red Shoulders as a Bicycle and Pedestrian Facility." Florida Department of Transportation. July 1998.

San Francisco Department of Parking and Traffic and Alta Planning & Design. "San Francisco's Shared Lane Pavement Markings: Improving Bicycle Safety." February 2004.

Typical Layout

Not to scale



FHWA 7 - Bike Traffic Signal

Authority: FHWA Approval for Experimentation
Experiment Title: 9(09)-6 (E) - Bike Markings and Signals Minneapolis
Sites: 1
Location: 5th St NE at Broadway St NE
Video Location: 5th St NE at Broadway St NE

Problem Identification

The intersection of Broadway Street Northeast and 5th Street Northeast is home to Minnesota's first bike traffic signal. Broadway Street Northeast is a four-lane undivided roadway carrying approximately 16,000 daily vehicles. The intersection was a previously a three leg intersection with a concrete diverter disconnecting the south leg of the intersection. To provide a continuous bicycle corridor along 5th Street Northeast, the existing concrete diverter was opened to allow for bicycle passage and crossing of Broadway Street Northeast.

During the project planning process, a field study was conducted to determine the existing number of traffic gaps available for safe pedestrian and bicycle crossing of Broadway Street Northeast. The study found the average delay for pedestrians to be between three and 10 minutes and the average delay for bicyclists to be more than one minute. To ensure a safe crossing and reduce delays for bicyclists and pedestrians, a traffic signal was proposed for the intersection.

Because of the difference in time required to cross the full street width between a bicyclist and a pedestrian, it is undesirable and an inefficient operation to require the bicyclist to cross on the pedestrian interval. In addition, the northbound approach will facilitate only bicycle traffic. It is desired to locate the bicycle curb cut with the alignment of the bicycle facility on 5th Street Northeast, and to keep the bicycle and pedestrian movements separate.

Intended Use

Pedestrians: It is expected that pedestrians will activate the accessible pedestrian signal push button and wait for a walk signal.

Bicyclists: It is expected that bicyclists will activate the accessible pedestrian signal push button and wait for a green bike signal.

Motorists: It is expected that cross traffic will stop when there is a red signal for traffic on Broadway Street Northeast. Southbound motorists on 5th Street NE will yield to northbound or southbound pedestrians when a green signal is illuminated.

Research Questions and Summary Table

No.	Research Question	Measure	Design	Method
1a	Have any bicyclist-motorist crashes or pedestrian-motorist crashes occurred at the intersection since the signal was installed?	Crashes	After	Reported Crashes
1b	Has bicyclist delay been reduced?	Observed Behavior	Before/After	Video/Manual Observations
1c	Has pedestrian delay been reduced?	Observed Behavior	Before/After	Video/Manual Observations
1d	What is the rate of bicyclist usage and compliance?	Observed Behavior	After	Video/Manual Observations
1e	What is rate of pedestrian usage and compliance?	Observed Behavior	After	Video/Manual Observations

1f	What is the rate of southbound motorist compliance?	Observed Behavior	After	Video/Manual Observations
2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts
3a	Are pedestrians using the treatment as intended?	Observed Behavior	Before/After	Video
3b	Are bicyclists using the treatment as intended?	Observed Behavior	Before/After	Video
3c	Are motorists using the treatment as intended?	Observed Behavior	Before/After	Video
4a	Do bicyclists feel like the signal allows for a safe and timely crossing?	Perception	After	Surveys
4b	Do pedestrians feel like the signal allows for a safe and timely crossing?	Perception	After	Surveys
4c	Do southbound motorists understand the purpose of the signal?	Comprehension	After	Surveys

Measures of Effectiveness

To address research question 1a, the number of crashes will be analyzed since the treatment was installed. Bicyclist, pedestrian and motorist behavior will be observed to respond to questions 1b-f. To address question 2, before and after traffic counts will be conducted at 5th Street NE and 13th Avenue NE (one block north of the traffic signal). To gauge user perception surveys will be administered to bicyclists, pedestrians and southbound motorists after the treatment is installed.

Evaluation Designs

Traffic counts and user delay will follow a before and after method. All other measures will only be collected after the signal is installed, including crashes, usage, compliance and user perception.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist and pedestrian-motorist crashes. Video, and possibly manual observations will be used to tabulate and analyze user behavior. Traffic counts will be conducted to measure the number of users and surveys will be administered to users in order to gauge perception and comprehension.

Evaluation Components

Information to come

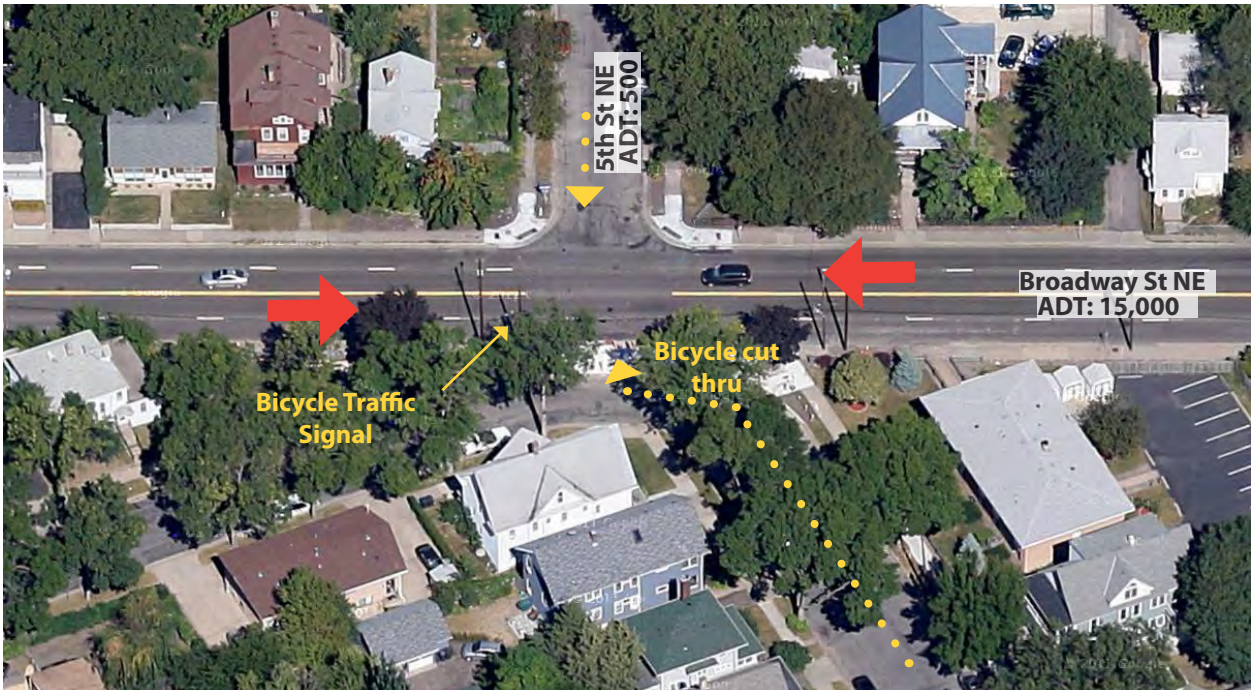
Supporting Literature

Bustos, Timothy. "Bicycle Countermeasure Selection System: Bicycle Signal Heads - Davis, California." Federal Highway Administration. www.bicyclinginfo.org/bikesafe/index.cfm

Oregon Department of Transportation. "Bicycle Signal Phases." Traffic Signal Policy and Guidelines. 2006. Addendum No. 2 (January 2010).

Pelz, Timothy, et. al. "The Use of Bicycle Signal Heads at Signalized Intersections." City of Davis, California. July 1, 1996.

Wolfe, Michael, et. al. "Bike Scramble Signal at N Interstate & Oregon." Portland State University. Department of Civil and Environmental Engineering. November 30, 2006.


5th St NE
ADT: 500
Broadway St NE
ADT: 15,000
Bicycle cut thru
Bicycle Traffic Signal

BICYCLE SIGNAL

MnDOT 1 - Bike Lane in Lieu of 2nd Motorized Vehicle Lane on One-Way Street

Authority: MnDOT Federal Aid Design Exception
Experiment Title: Design Exception SP 141-091-020
Sites: 1
Locations: 1st Ave S, E 40th St to E 33rd St

Problem Identification

1st Avenue South between East 40th Street and East 33rd Street is a northbound one-way street with one parking lane, one travel lane and a buffered bike lane. Prior to the current configuration, the street had one parking lane and two travel lanes. In order to accommodate a bike lane on 1st Avenue South, a design exception was needed. According to MnDOT Federal Aid Design Standard 8820.9936, one-way streets must have at least two through travel lanes. The in lieu of design includes a seven-foot bike lane, a four to five-foot buffer, and an 11-foot travel lane.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
1st near E 33rd St	240*	1,800

*Estimated – Count conducted at 1st Ave S and E 16th St

Research Questions and Summary Table

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Where do bicyclists tend to ride?	Observed Behavior	After	Manual Observations
1c	Where do motorists tend to drive?	Observed Behavior	After	Manual Observations
2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. Bicyclist and motorist behavior will be observed to respond to questions 1b and 1c. To address question 2, before and after traffic counts will be conducted at or near treatments.

Evaluation Designs

The evaluation of advisory bike lanes will follow a before and after method. All measures of effectiveness will be analyzed is this manner.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Manual observations will be used to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users.

Evaluation Components

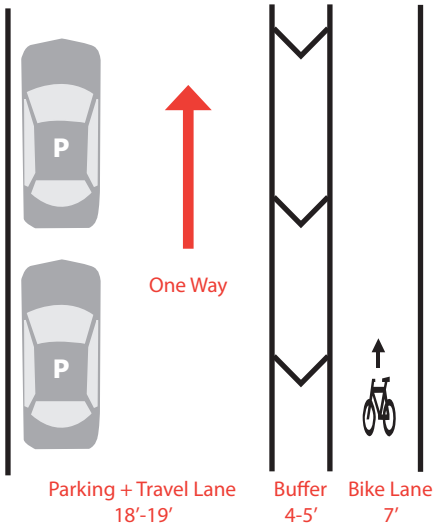
Information to come

Supporting Literature

Information to come

Typical Layout

Not to scale



MnDOT 2 - One Travel Lane Plus Buffer Lane on One-Way St in Lieu of Two Travel Lanes - Weekend Only

Authority: MnDOT Federal Aid Design Exception
Experiment Title: Design Exception SP 141-091-020
Sites: 1
Locations: 1st Ave S, E 40th St to E 33rd St

Note: This design is exception is nearly the identical to "MnDOT 2." However, in this case, parking is allowed in the bike lane on weekends.

Problem Identification

Monday through Friday, 1st Avenue South between East 40th Street and East 33rd Street is a northbound one-way street with one parking lane, one travel lane and a buffered bike lane. On weekends, parking is permitted in the bike lane and bicycle traffic is permitted in the buffered area. Prior to the current configuration, the street had one parking lane and two travel lanes. On weekends, parking was permitted on both sides of the street. In order to accommodate a bike lane on 1st Avenue South, a design exception was needed.

According to MnDOT Federal Aid Design Standard 8820.9946, one-way streets must have at least two through travel lanes. While there was a desire to have a bike lane on 1st Avenue S, there was not a desire to change the parking practices due to the proximity of Martin Luther King Park, a large recreational facility, disability zones and an adjacent church. The in lieu of design includes a seven-foot parking lane, a four to five-foot buffer, and an 11-foot travel lane.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
1st near E 33rd St	240*	1,800

*Estimated – Count conducted at 1st Ave S and E 16th St

Research Questions and Summary Table

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Where do bicyclists tend to ride?	Observed Behavior	After	Manual Observations
1c	Where do motorists tend to drive?	Observed Behavior	After	Manual Observations
2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. Bicyclist and motorist behavior will be observed to respond to questions 1b and 1c. To address question 2, before and after traffic counts will be conducted at or near treatments.

Evaluation Designs

The evaluation of advisory bike lanes will follow a before and after method. All measures of effectiveness will be analyzed is this manner.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Manual observations will be used

to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users.

Evaluation Components

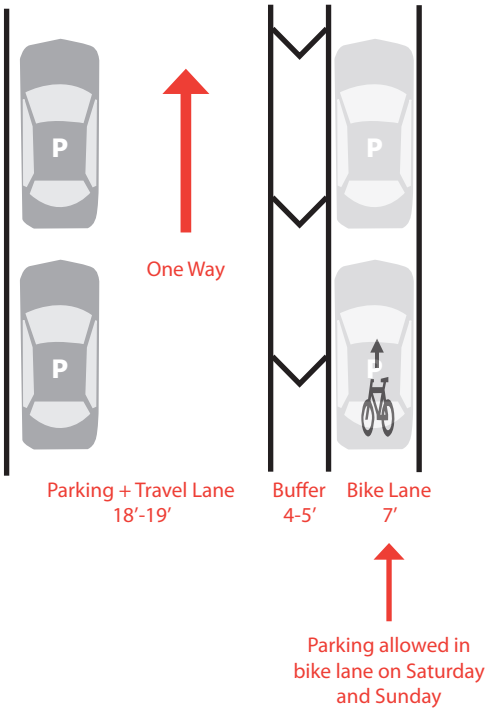
Information to come

Supporting Literature

Information to come

Typical Layout

Not to scale



MnDOT 3 - Two-Way Width with Parking on One-Side, 1.5' Reaction Distance in Lieu of 2'

Authority: MnDOT Federal Aid Design Exception
Experiment Title: Design Exception SP 141-091-020
Sites: 1
Locations: 1st Ave S, E 28th St to E Franklin Ave

Problem Identification

1st Avenue South between East 28th Street and East Franklin Avenue is a two-way street with two travel lanes, one northbound bike lane and one parking lane in the northbound direction. The roadway width varies from 35 to 36 feet. Prior to the current configuration, the street had two travel lanes, one parking lane in the northbound direction and no bike lane. In order to accommodate a bike lane on 1st Avenue South, a design exception was needed.

According to MnDOT Federal Aid Design Standard 8820.9946, two-way, two-lane collector streets with an ADT less than 10,000 must have a minimum width of 32 feet comprised of two feet curb reaction, two 11-foot travel lanes and an eight-foot parking lane. The in lieu of design includes a 10.5 to 11 foot travel lane southbound with 1.5 foot curb reaction distance (gutter) and a seven-foot northbound parking lane. This is in lieu of an 11 foot travel lane with two –foot curb reaction distance (gutter) and an eight-foot northbound parking lane.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
1st near E Franklin Ave	240	4,900

Research Questions

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Are parked vehicles encroaching on the bike lane?	Observed Behavior	After	Manual Observations
2	Have traffic volumes changed at the treat-ment?	Traffic Counts	Before/After	Traffic Counts

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. A particular emphasis will be placed on sideswipe crashes and head-on crashes. Parked vehicle observations will be conducted to respond to questions 1b. To address question 2, before and after traffic counts will be conducted at or near treatments.

Evaluation Designs

The evaluation of advisory bike lanes will follow a before and after method. Most measures of effectiveness will be analyzed is this manner. Parked vehicle observations will only be conducted after.

Evaluation Methods

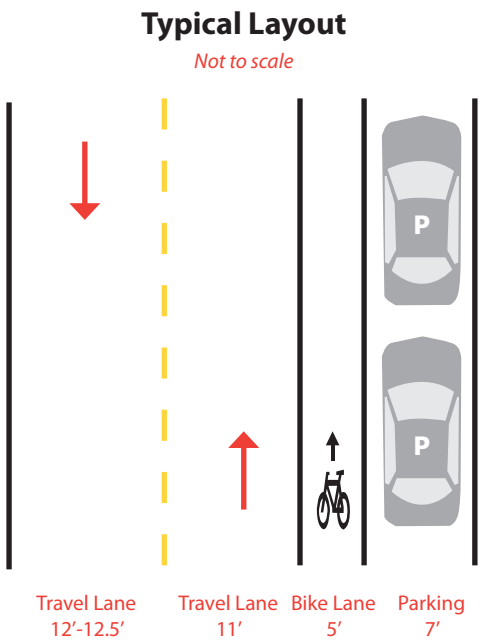
Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Manual observations will be used to conduct parking counts and traffic counts will be conducted to measure the number of users.

Evaluation Components

Information to come

Supporting Literature

Information to come



MnDOT 4 - Two-Way Width with Parking on Both Sides, 10.5' Travel Lanes with Adjacent Bike Lanes

Authority: MnDOT Federal Aid Design Exception
Experiment Title: Design Exception SP 141-091-020
Sites: 2
Locations: Oak Grove Street, Oak Grove St to Nicollet Ave S

Problem Identification

Oak Grove Street between Oak Grove Street and Nicollet Avenue S is a two-way street with two travel lanes, bike lanes in both directions and parking on both sides of the street. Prior to the current configuration, the street had two travel lanes, one parking lane in the northbound direction and no bike lane. In order to accommodate a bike lane on West 15th Street, a design exception was needed.

According to MnDOT Federal Aid Design Standard 8820.9946, two-way, two-lane collector streets with an ADT less than 10,000 with parking on both sides must have a minimum width of 38 feet comprised of two 11-foot travel lanes and two eight-foot parking lane. The in lieu of design includes a 10.5 to 11 foot travel lanes with 7-7.5 foot parking lanes and 5-5.5' bike lanes. This is in lieu of two, 11 foot travel lane and two eight-foot parking lanes.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
15th at LaSalle Ave	830	8,000

Research Questions

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Are parked vehicles encroaching on the bike lane?	Observed Behavior	After	Manual Observations
2	Have traffic volumes changed at the treat-ment?	Traffic Counts	Before/After	Traffic Counts

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. Parked vehicle observations will be conducted to respond to questions 1b. To address question 2, before and after traffic counts will be conducted at or near treatments.

Evaluation Designs

The evaluation of advisory bike lanes will follow a before and after method. Most measures of effectiveness will be analyzed is this manner. Parked vehicle observations will only be conducted after.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Manual observations will be used to conduct parking counts and traffic counts will be conducted to measure the number of users.

Evaluation Components

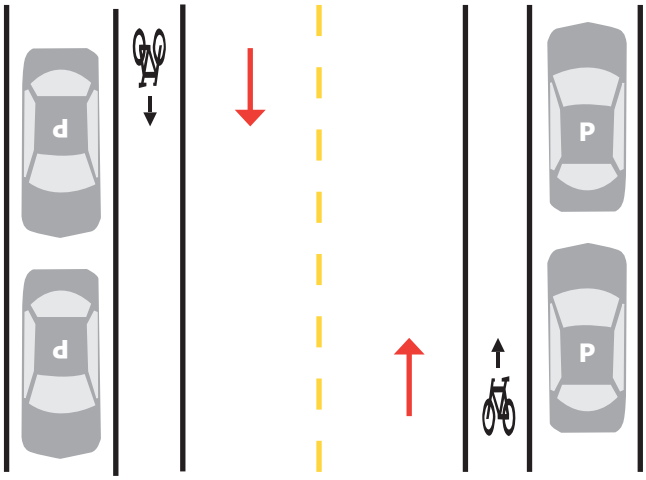
Information to come

Supporting Literature

Information to come

Typical Layout

Not to scale



MnDOT 5 - Two-Way Width with Parking on Both Sides, 10.5' Travel Lanes with Adjacent Bike Lanes

Authority: MnDOT Federal Aid Design Exception
Experiment Title: Design Exception SP 141-091-020
Sites: 2
Locations: Como Ave SE, 10th Ave SE to 15th Ave SE
Video Location: Como Ave SE, 10th Ave SE at 13th Ave SE

Before data collection and analysis was conducted by a U of M student group led by Dr. Greg Lindsey. See "Pre-Treatment Evaluation and Assessment of Experimental Bicycle Facilities in Minneapolis, Minnesota" for initial findings. It is currently assumed that Dr. Lindsey and a student team will continue with post-treatment evaluation. When the evaluation resumes, Dr. Lindsey and the student team will meet with DPW and TLC to draft a work plan. The evaluation will likely resemble the approach of "MnDOT 4."

MnDOT 6 - Bike Lane in Lieu of 2nd Motorized Vehicle Lane on One-Way Street

Authority: MnDOT Federal Aid Design Exception
Experiment Title: Design Exception SP 141-091-020
Sites: 2
Locations: Fremont Ave N, Plymouth Ave N to Lowry Ave N
Video Location:

Problem Identification

Fremont Avenue North between Plymouth Avenue North and Lowry Avenue North is a southbound one-way street with one parking lane, one travel lane and a buffered bike lane. Prior to the current configuration, the street had one parking lane and two travel lanes. In order to accommodate a bike lane on Fremont Avenue North, a design exception was needed. According to MnDOT Federal Aid Design Standard 8820.9936, one-way streets must have at least two through travel lanes. The in lieu of design includes a seven-foot bike lane, a four to five-foot buffer, and an 11-foot travel lane.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
Fremont at Lowry Ave N	60	4,200

Research Questions

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Where do bicyclists tend to ride?	Observed Behavior	After	Manual Observations
1c	Where do motorists tend to drive?	Observed Behavior	After	Manual Observations
1d	Have the speeds of motorists decreased?	Motor Vehicle Speed	Before/After	Speed Study
2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. Bicyclist and motorist behavior will be observed to respond to questions 1b and 1c. To address question 1d, a speed study will be conducted and before and after traffic counts will be conducted to address question 2.

Evaluation Designs

The evaluation of advisory bike lanes will follow a before and after method. All measures of effectiveness will be analyzed is this manner.

Evaluation Methods

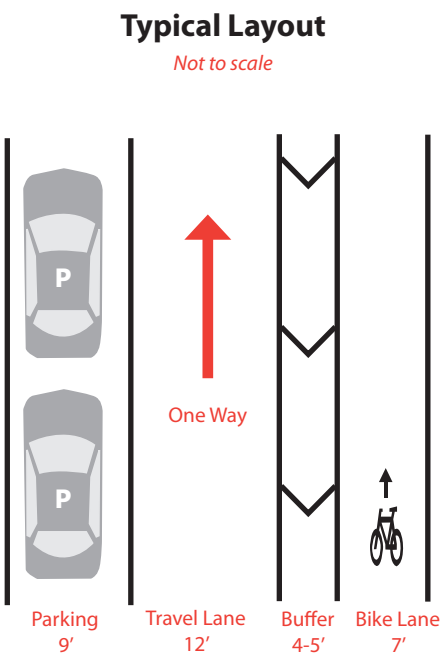
Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Manual observations will be used to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users.

Evaluation Components

Information to come

Supporting Literature

Information to come



MnDOT 7 - Two-Way Width with Parking on One-Side, 7' Parking and 11' Travel Lanes

Authority: MnDOT Federal Aid Design Exception
Experiment Title: Design Exception SP 141-091-020
Sites: 2
Locations: Fremont Ave N, 33rd Ave N to Webber Pkwy

Project Canceled. No Evaluation Required.

DPW 1 - 25 MPH Speed Study

Authority: Internal Public Works Experimentation
Experiment Title: None - Internal Evaluation
Sites: 3
Locations: 15th Ave SE, Oak Grove Street, E 14th St

Information to come

DPW 1 - Colored Green Conflict Zones

Note: This treatment is very similar to "FHWA 1." However, this treatment did not require FHWA approval for experimentation because it was implemented after green colored pavement was issued interim approval for bicycle facilities.

Authority: Internal Public Works Experimentation
Experiment Title: None - Internal Evaluation
Sites: 3
Locations: 15th Ave SE at University Ave SE, SE 4th St, SE 5th St

Problem Identification

There are several locations in Minneapolis that require merging or turning motorists to cross a through bike lane. It is important that both bicyclists and motorists recognize that this portion of the roadway requires a higher degree of care in order to avoid crashes. To emphasis the potential conflict area and convey the message to both bicyclists and motorists, the bike lane is painted a solid green color. The 4th Street Southeast location is of particular importance as there was recently a fatal crash where a through bicyclist was struck by a turning truck.

The colored green conflict zones on 15th Ave Southeast at University Ave Southeast, Southeast 4th Street, Southeast 5th Street are being evaluated separately from the other green conflict zones in this work plan for two reasons. First, these applications did not require FHWA approval as they were applied after the FHWA gave interim approval for the use of colored green pavement markings for bicycle facilities in early 2011. Second, a more durable and visible thermoplastic marking was used at these three locations in place of the standard latex road paint used at the other locations. Lastly, the15th Avenue Southeast is the busiest on-street location for bicycle traffic in the city; making it a unique situation for evaluation.

Intended Use

Bicyclists: It is expected that bicyclists will ride in the bike lane and in the green conflict zone.

Motorists: It is expected that right turning and left turning motorists will use caution when crossing the green conflict zone and yield to any bicyclists approaching or already in the green conflict zone.

Daily Bicyclist and Motor Vehicle Traffic

Location	Bicyclists	Motor Vehicles
15th St SE at University Avenue	3,810	12,000

Research Questions

No.	Research Question	Measure	Design	Method
1a	Have the number of bicyclist-motorist crashes decreased?	Crashes	Before/After	Reported Crashes
1b	Have the number of bicyclist-motorist conflicts decreased?	Observed Behavior	Before/After	Video
1c	Are bicyclists riding in the green conflict area?	Observed Behavior	Before/After	Video
1d	Are bicyclists using caution when entering the green conflict area? (head turning or scanning)	Observed Behavior	Before/After	Video
1e	Are motorists signaling before crossing the green conflict area?	Observed Behavior	Before/After	Video
1f	Are motorists yielding before crossing the green conflict area?	Observed Behavior	Before/After	Video
2	Have traffic volumes changed at the treatment?	Traffic Counts	Before/After	Traffic Counts

3a	Do bicyclists feel safer with the addition of the treatment?	Perception	After	Surveys
3b	Do motorists understand the purpose of the treatment?	Comprehension	After	Surveys

Measures of Effectiveness

To address research question 1a, the number of crashes at all locations will be analyzed before and after the treatment was installed. Bicyclist and motorist behavior will be observed to respond to questions 1b-f. To address question 2, before and after traffic counts will be conducted at or near treatments. To gauge user perception surveys will be administered to both motorists and bicyclists after the treatment is installed.

Evaluation Designs

The evaluation of colored green conflict zones will follow a before and after method. All measures of effectiveness will be analyzed is this manner except for bicyclist motorist surveys, which will only be administered after installation.

Evaluation Methods

Reported crashes will be used to measure crashes at each location. While all reported crashes will be documented, particular emphasis will be placed on bicyclist-motorist crashes. Video will be used to tabulate and analyze user behavior and traffic counts will be conducted to measure the number of users. Surveys will be administered to users in order to gauge perception and comprehension.

Evaluation Components

Information to come

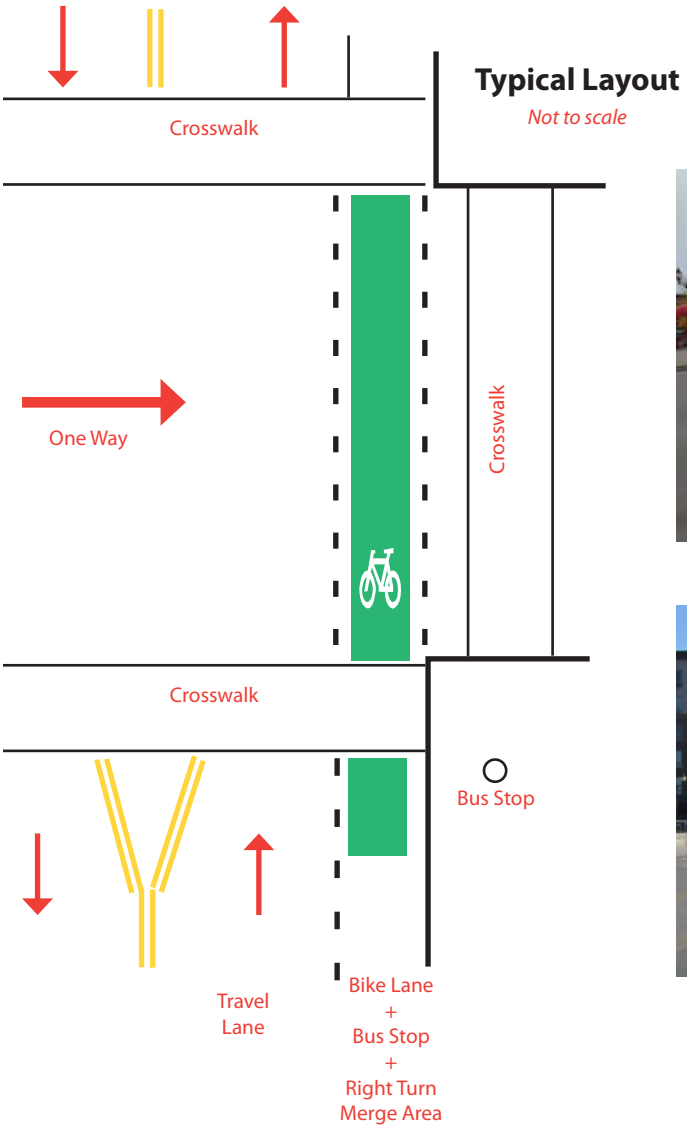
Supporting Literature

Brady, John, et. al. Effects of Colored Lane Markings on Bicyclist and Motorist Behavior at Conflict Areas. Center for Transportation Research. The University of Texas at Austin. August 2, 2010.

Hunter, William H., et. al. Evaluation of Blue Bike-Lane Treatment in Portland, Oregon. Transportation Research Record 1705. Paper No. 00-0456. 2000.

Hunter, William, H. et. al. Evaluation of a Green Bike Lane Weaving Area in St. Petersburg, Florida. University of North Carolina Highway Safety Research Center. September 2008.

15th Ave SE
ADT: 9,000
Bike EDT: 3,810
Green
Conflict
Area
4th St SE
ADT: 15,000


Typical Layout
Not to scale
Crosswalk
One Way
Crosswalk
Crosswalk
Bus Stop
Travel
Lane
Bike Lane
+
Bus Stop
+
Right Turn
Merge Area