

# **Pavement Markings and Signing to Support Delaware Senate Bill 120**

## **Final Project Report**

Funded by the Delaware Department of Transportation (DelDOT)

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# Table of Contents

1.0 Introduction.....	3
1.1 Acknowledgements.....	3
2.0 Methodology.....	4
3.0 Survey Results.....	6
3.1 Analysis of Comments on Question 2.....	8
3.2 Mode Share Analysis from Survey Results.....	9
4.0 Field Test Methodology.....	10
4.1 Site A Results and Analysis.....	12
4.2 Site B Results and Analysis.....	15
4.3 Site D Results and Analysis.....	16
5.0 Future Research.....	19
Appendix A - Striping Plans Used for Surveys.....	20
Appendix B - Survey Questions and Results.....	24
Appendix C - Striping Plans Used for Field Tests (Graphical).....	63
Appendix D – Striping Plans Used for Field Tests (Actual).....	66
Appendix E – Final Implementation Memorandum and Striping Plans.....	69
Figure 1 - Striping and signing options A, B, C, D.....	5
Figure 2 - Distribution of preferences between five options.....	6
Figure 3 - Strong preference (4).....	7
Figure 4 - Moderate Preference (3).....	7
Figure 5 – Summary of correct responses to question 2.....	8
Figure 6 – Comparison of understanding of each option’s intent.....	8
Figure 7 - Clarity of pavement markings.....	9
Figure 8 - Frequency of travel time by group.....	9
Figure 9 - Actual mode share.....	10
Figure 10 - Desired mode share.....	10
Figure 11- Site A - Option A Test Markings.....	12
Figure 12 - Before and After Lane Choices - Option A.....	13
Figure 13 - Before and After Through Lane Positioning - Option A.....	13
Figure 14 - Before and After Right Turn Positioning – Option A.....	14
Figure 15 - Site B - Option B Test Markings.....	15
Figure 16 - Site D - Option D Approaching Test Markings.....	16
Figure 17 - Site D - Option D Test Markings in Lane.....	16
Figure 18 - Before and After Lane Choices - Option D.....	17
Figure 19 - Before and After Through Lane Positioning - Option D.....	17
Figure 20 - Before and After Right Lane Positioning - Option D.....	18
Table 1 - Survey locations and quantities.....	5

## 1.0 Introduction

Senate Bill 120, signed into law by Delaware Governor Jack Markell on January 26, 2012, allowed bicyclists to use the shoulder and to travel straight through an intersection from a lane otherwise designated as a right-turn only lane. This research investigated signing and striping options for intersections in support of this bill. The Delaware Manual on Uniform Traffic Control Devices specifies five basic requirements for a traffic control device – fulfill a need; command attention; convey a clear, simple meaning; command respect from road users; and give adequate time for proper response. This research worked under these five basic principles in developing new markings to meet the requirements of Senate Bill 120.

Although new designs of intersections typically include separate bicycle lanes, the vast majority of existing intersections do not. This was a significant concern for Delaware’s biking community. Many roadways have paved shoulders between intersections, but often this space is converted to a right-turn only lane at the intersection.

Although the state code was changed, there was a question as to whether special traffic control devices (including signing and striping) were needed to convey the message to both drivers and bicyclists that bicyclists are allowed to be in the right-turn only lane (even if they are traveling through the intersection). If special traffic control devices were needed, what form should they take? Should the striping specifically funnel bicyclists towards the left side of a right-turn only lane? Should a neutral striping configuration be used which does not show a preference as to where the bicyclists should laterally position themselves?

Four signing and striping options were developed by DelDOT. These designs were presented to the Delaware public and bicycle communities in the form of a survey. Based on the results of the survey, three options were modified and selected for field testing, where before-and-after studies were conducted. The combination of the survey results and field studies were used by DelDOT to develop and issue interim guidance for the Delaware MUTCD, Chapter 9 on April 27, 2015.

This research benefited from the use of an advisory panel which included representatives of DelDOT Planning Division and Traffic Sections, the UD research team and the Delaware cycling community, including members of Bike Delaware, White Clay Bicycle Club, Sussex Cyclists and the Delaware Bicycle Council.

### 1.1 Acknowledgements

This project has been supported by many organizations: Delaware Department of Transportation (DelDOT), Bike Delaware, Newark Bike Project, White Clay Bicycle Club, Sussex Cyclists, Wilmington Area Planning Council (WILMAPCO), Delaware Bike Council, and the University of Delaware. Their time and support has made this research possible and has provided valuable input. Members from these groups supported and guided this research through and Advisory Committee. The Advisory Committee met three times 1) prior to the conduct of the survey to review/edit survey questions and help determine survey locations, 2) after the survey to review results and help develop options for field testing, and 3) after the field testing to review results and help develop final recommendations.

## 2.0 Methodology

The Delaware Department of Transportation (DelDOT) proposed four striping and signing alternatives for consideration. The fifth striping and signing option was to maintain the existing practice. MUTCD –type figures for the four options are included in Appendix A, and edited images showing the four options are shown below. A survey was developed to examine driver and cyclist opinions of the current striping and signing practices as well as the four proposed alternative designs. The survey is included in Appendix B. The survey was intended to collect data from bicyclists and drivers to identify if the markings provided a clear and unambiguous message and if the message isn't clear, what else could the marking indicate. The survey also included side-by-side comparisons of the striping and signing options to see which have preference with each group. The side-by-side consisted of modified images showing comparisons of two treatments. Based on the survey results, this report is being prepared to present the findings and to aid in determining the next course of action.





Figure 1 - Striping and signing options A, B, C, D

This survey was conducted between September 7, 2012 and October 3, 2012. The survey was given on eight separate occasions at five different locations as noted in Table 1. 136 surveys were collected and 132 completed surveys were used in this analysis. Four surveys were removed because they did not meet survey protocol.

Table 1 - Survey locations and quantities

Date	Location	Number Completed
9/7/12	Delaware Bike Summit. Dover, DE	38
9/10/12	White Clay Bicycle Club meeting. Newark, DE	8
9/12/12	Newark Bike Project/DelDOT Safety Check Point. Newark, DE	34
9/17/12	UD Trabant Student Center, Table B. Newark, DE	8
9/17/12	Newark Bike Project/DelDOT Safety Check Point. Newark, DE	20
9/19/12	UD Trabant Student Center, Table B. Newark, DE	13
9/24/12	UD Trabant Student Center, Table B. Newark, DE	9
10/3/12	Delaware Bicycle Council meeting. Dover, DE	6

Question 1 of this survey measured respondent's preference for five pavement marking options. The first option was no change and the following four options, A through D, were presented as possible changes. Each of the five options were presented in pairs totaling ten pairs. Survey takers were asked to choose one option from each pair by responding with "left" or "right." If they had no preference they could respond with "about the same." For example, option A compared with option B, option A compared with option C, and continuing for each possible combination.

After all the surveys were collected the results were analyzed to find the most popular choices and to measure how consistent respondents were in choosing options. The results were entered into a matrix that measured the level of consistency a person had in choosing each of the five options. This method of analyzing the data provided more insight than presenting only a person's first

choice. If someone consistently chose one option, they would score a 4 for the strongly preferred option. If someone had mixed preference between two options they would score a 3 for the moderately preferred options. It is highly possible for a single person to score a 4 for one option and a 2 for another option; therefore, only scores of 3 and 4 were used.

### 3.0 Survey Results

Figure 2 shows the number of respondents that scored a 3 (moderate preference) or 4 (strong preference). Figures 3 and 4 display the same data as a percentage. Each pie chart shows the percentage of either strong or moderate scores per option.

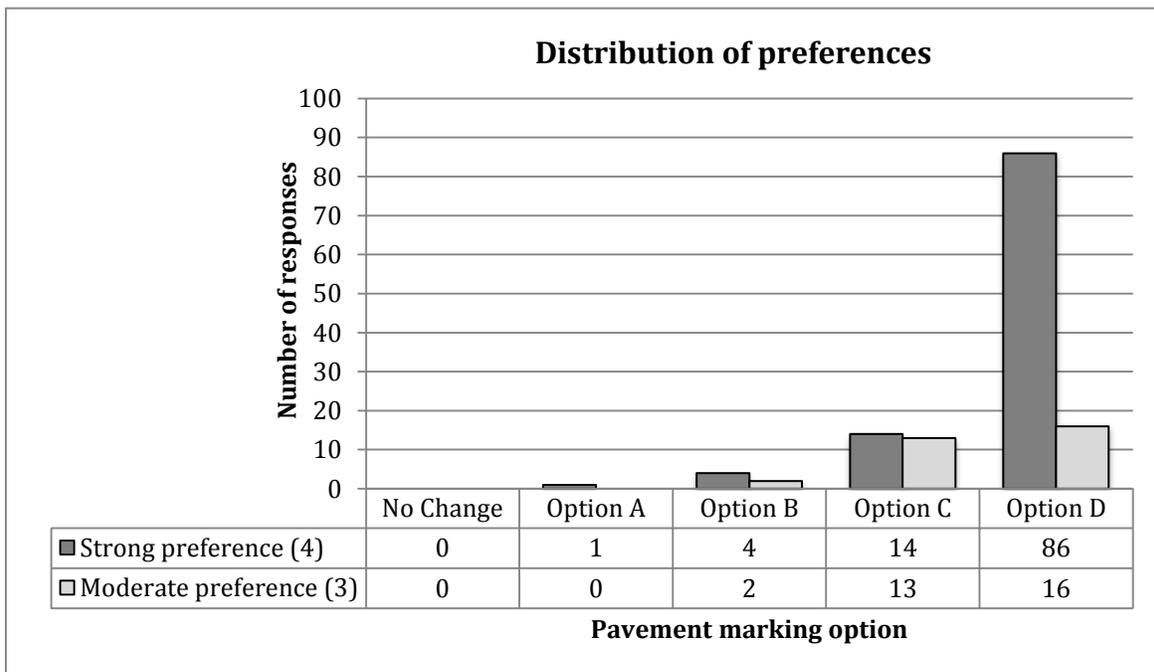
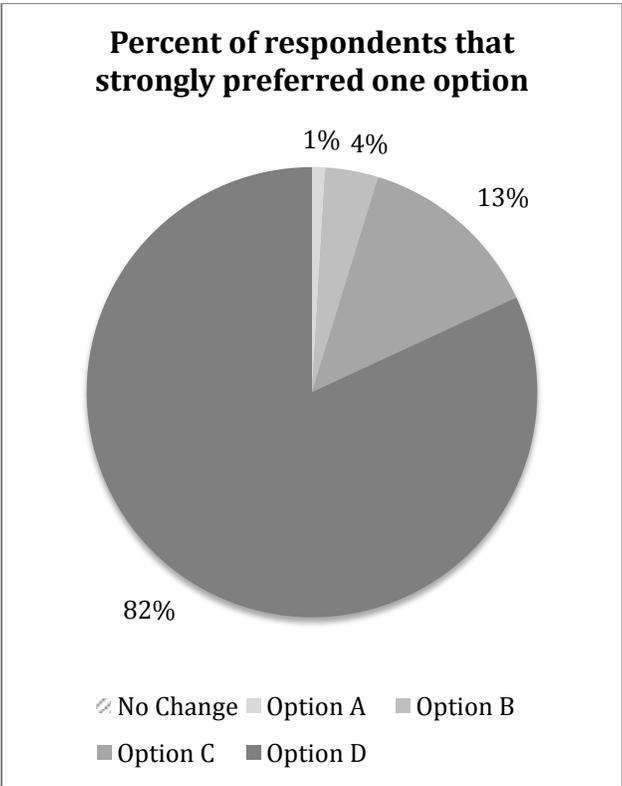
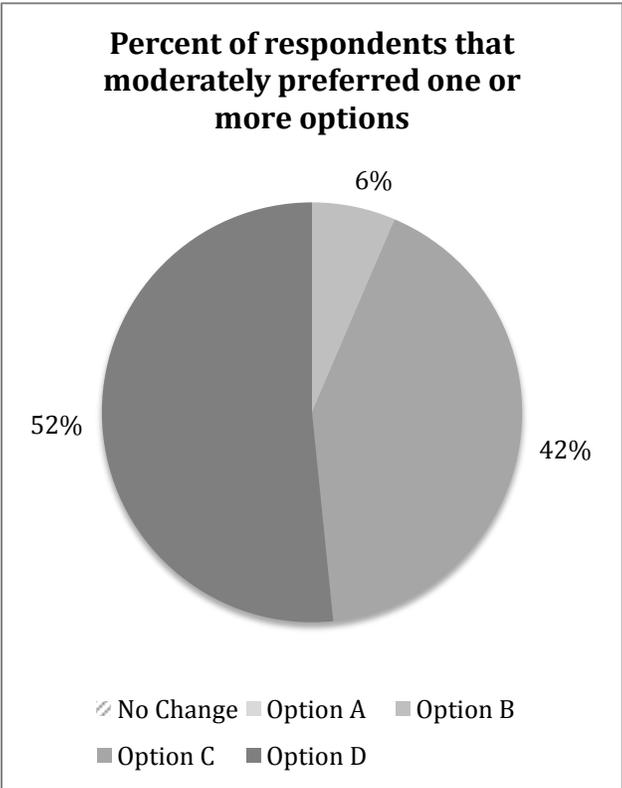


Figure 2 - Distribution of preferences between five options



**Figure 3 - Strong preference (4)**



**Figure 4 - Moderate Preference (3)**

### 3.1 Analysis of Comments on Question 2

During further analysis of the data, the comments received for questions 2.c.iii. and 2.d.iii were divided into correct and wrong answers. These questions asked, “What do you think these markings are trying to convey?” regarding options C and D. As stated on the cover page of the survey, the markings should convey “bicyclists [are permitted] to both use the shoulder, as well as travel straight through an intersection from a lane otherwise designated as a right-turn only lane.” An answer to these questions was classified as correct if it was clear that the person taking the survey understood this intent. The analysis is summarized in Figures 5, 6, and 7. ‘Club membership’ refers to membership in a Delaware cycling club. A complete list of written responses to question 2 are included in Appendix C.

	Option C		Option D	
	Correct	Wrong	Correct	Wrong
Driver (All)	26	15	28	13
Driver (club membership)	3	4	4	3
Cyclist (All)	9	13	16	7
Cyclist (club membership)	1	2	1	3
Total	35	28	44	20

Figure 5 – Summary of correct responses to question 2

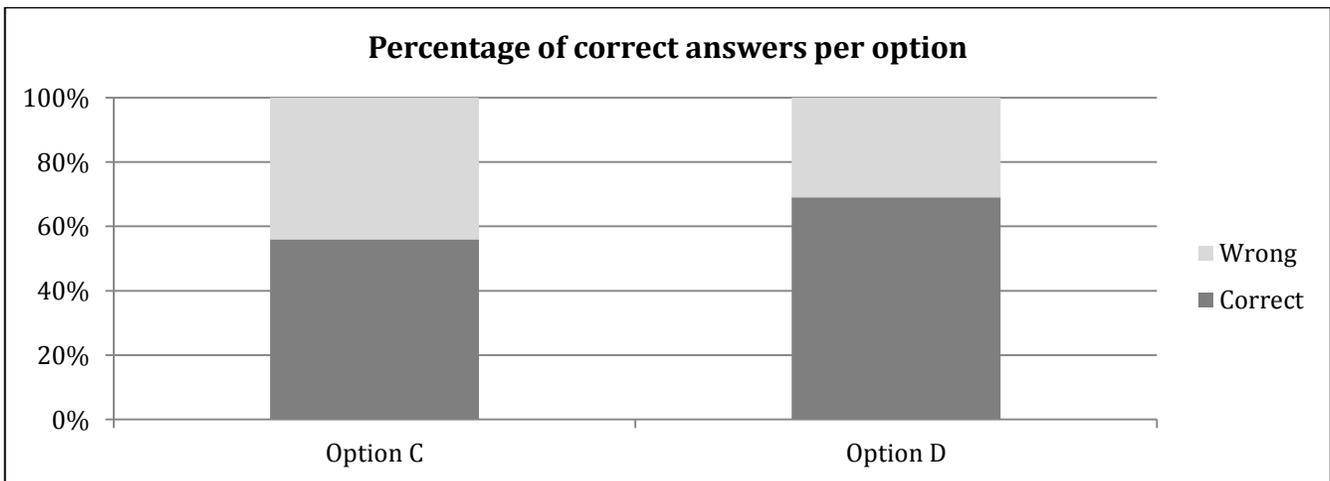


Figure 6 – Comparison of understanding of each option’s intent

The majority of people taking the survey said that the pavement markings in Options C and D were clear. However, a much smaller proportion of these people were correct in their understanding of what the markings were trying to convey. 93% of respondents that commented on Options C and D said that both of the pavement markings were clear as presented in Figure 7. Figure 6 shows that 44% of answers were wrong for option C and 31% of answers were wrong for Option D. Showing that the survey takers understood the intent of Option D slightly better than Option C. There is no evidence in this data that cyclists or members of cycling clubs have a better understanding of the proposed pavement markings as compared to drivers and non-members. A summary of this data is presented in Figure 5.

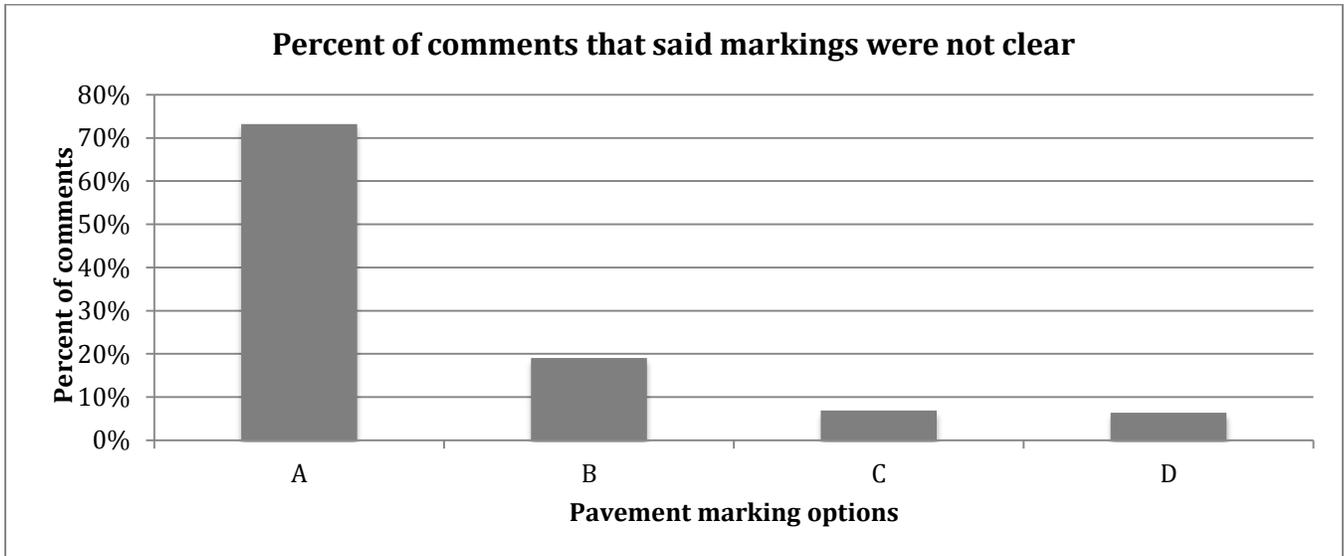


Figure 7 - Clarity of pavement markings

### 3.2 Mode Share Analysis from Survey Results

Survey respondents were divided into two categories, Cyclists and Drivers, based on their primary mode of transportation. Question 9 and 10 of the survey asked them to report their frequency of travel time for driving or cycling. This data is presented in Figure 8.

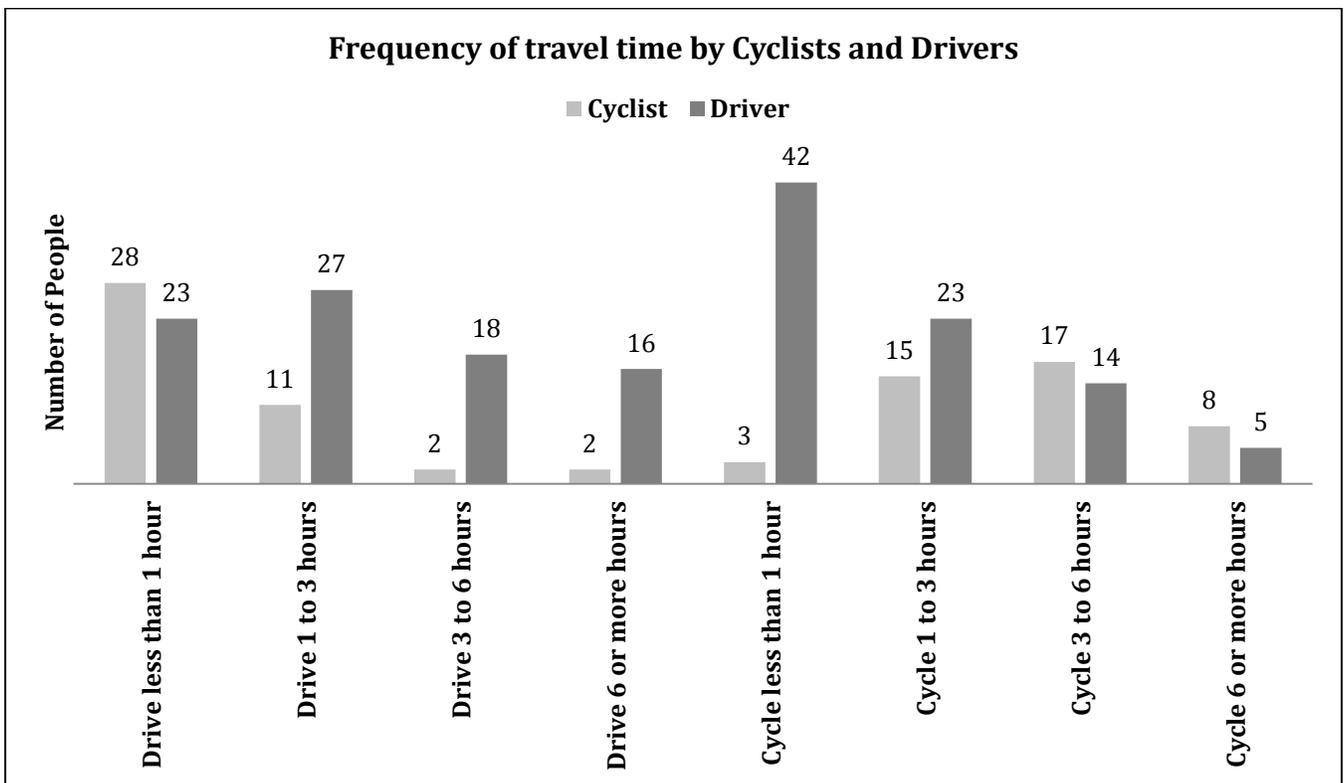


Figure 8 - Frequency of travel time by group

Questions 7 and 8 asked survey takers what mode of transportation they primarily use for local commutes and which mode they would use if they had a choice. The results are outlined in Figures 9 and 10 below.

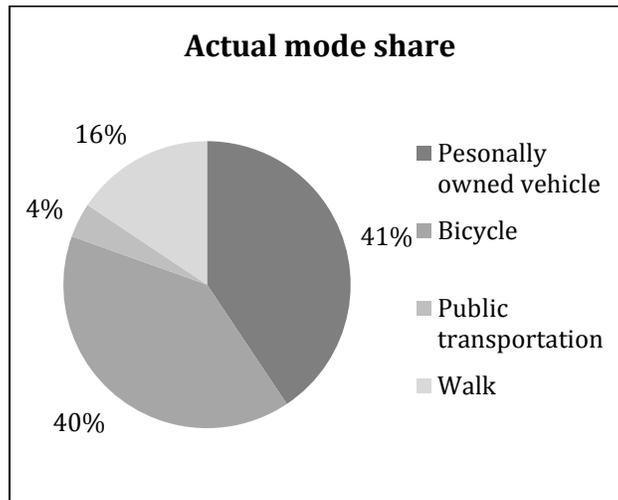


Figure 9 - Actual mode share

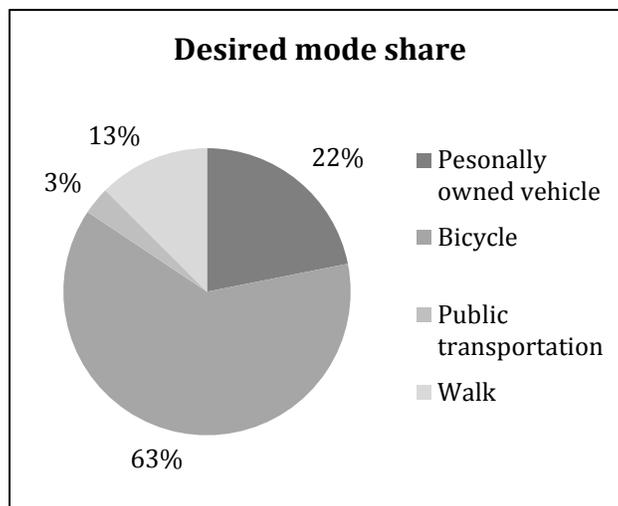


Figure 10 - Desired mode share

The largest change in mode share was amongst people who use personally owned vehicles. Approximately half of the people who said they use a personally owned vehicle as their primary mode of transportation would use a bicycle if they had the choice.

#### 4.0 Field Test Methodology

Based on the survey results, the advisory committee met and it was decided to field test three of the proposed treatment options with modifications. Option A, which included the dotted taper line and sign R4-4 was modified to include the helmeted cyclist bike lane symbol and arrow before the start of the dotted taper. It was felt by the advisory committee that these additions would provide additional visual cues to the cyclist. This option became Modified Option A. In addition to the

signing and marking proposed by the original Option A, a shared lane marking (“sharrow”) along the right side of the line dividing the through and right turn lanes. Modified Option B moved the shared lane marking to the center of the right turn lane. It was decided to not field test option C. Option D was left unchanged from the original proposed. MUTCD –type figures for these three options are included in Appendix D. The committee looked at a variety of test sites where the marking options could be tested. Three sites were chosen based upon the existing traffic patterns and volumes and the expected amount of bike traffic in that area. It was decided to apply Modified Treatment A to the northbound leg of the intersection of Marrows Road and Whitechapel Drive in Newark, DE; Modified Treatment B to the eastbound leg of the intersection of Old Baltimore Pike and Salem Church Road, Newark, DE; and D to the northbound leg of the intersection of State Road 1 and State Road 26 in Bethany Beach, DE. While it would have been desirable to collect data from more sites with additional variability of conditions at those sites, the available budget for this project did not allow for more sites. Drawings of the lane markings and signing at each intersection is shown in Appendix E.

After ensuring that each of the three desired field locations provided acceptable “Before” conditions and met MUTCD standards, the Delaware Department of Transportation (DelDOT) began developing the detailed signing and striping plans that would be required to implement each of the experimental Right-Turn Only Lane conditions. From July through September of 2013, video cameras were used to capture the behavior of cyclists prior to the application of the experimental conditions. Over five hundred hours of footage was captured and later analyzed to determine the proportion of cyclists using the through lane, right-turn only lane, shoulder, and the sidewalk. The positioning of cyclists within these lanes was then also noted. In keeping with the goals of Senate Bill 120, it was deemed most desirable for cyclists to position themselves in the center or left-hand side of the right-turn only lane. It was considered less desirable but acceptable for cyclists to be in the right-hand side of the through lane (essentially these cyclists were straddling the lane line). It was considered somewhat problematic for cyclists to be positioned in the right-hand side of the right-turn only lane, or in the shoulder (possible chance for a “right-hook” crash”). The least desirable positioning was considered to be the center or left-hand side of the through lane (highest chance for a rear end collision from a motor vehicle). The results of this analysis are presented in Sections 4.1, 4.2, and 4.3-TBD.

By mid-November of 2013, the experimental right-turn only lane conditions, or “After” conditions, were fully implemented at all three test locations. Beginning in Spring 2014 and ending Fall 2014, video surveillance recorded the behavior of cyclists approaching the newly marked intersections. In total, four hundred fifteen hours of video was captured and later analyzed for comparison to the “Before” condition controls. The results of this analysis are also presented in Sections 4.1, 4.2, and 4.3-TBD.

#### 4.1 Site A Results and Analysis



**Figure 11- Site A - Option A Test Markings**

Prior to the restriping at Site A, Marrows and White Chapel, 78 cyclists were observed using the through lane and right-turn only lane to go straight ahead. Of these observed roadway users, a majority chose to use the designated through lane, with the remaining electing to use the right-turn only lane. No cyclists were observed using the right-shoulder or the sidewalk.

After restriping the intersection and adding the necessary signage, the large majority of cyclists that had been using the through-lane instead chose to use the right-turn only lane, with a sizeable portion also now choosing to use the right-shoulder and sidewalk. Of the 156 cyclists observed going straight through the intersection, nearly two-thirds now chose to use the right-turn only lane and just over one-fifth elected to use the right-shoulder.

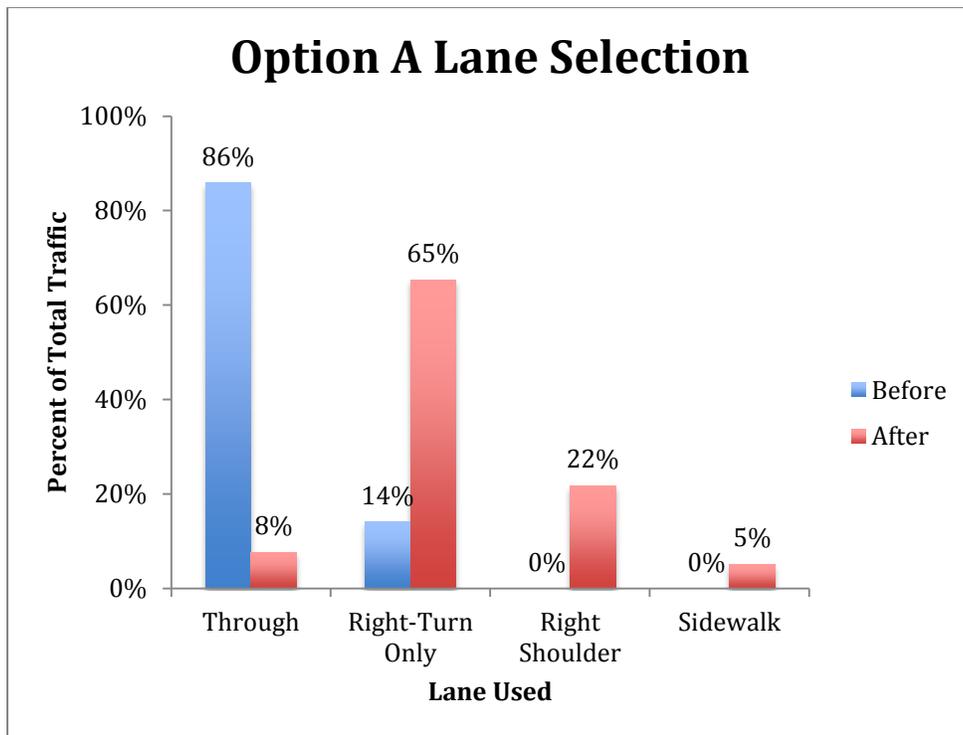


Figure 12 - Before and After Lane Choices - Option A

Of the cyclists choosing to use the through lane prior to the applied changes, most aligned themselves on the right-hand side of the lane. Cyclist alignment was relatively evenly distributed across the lane with roughly one-third lining up on the left-hand side and nearly as many lining up in the center. After restriping the right-turn only lane at Marrows and Whitechapel, cyclist behavior reflected a dramatic shift towards the right-hand side of the through lane. This shift in behavior is illustrated in the figure below showing three-quarters of cyclists to position themselves on the right-hand side of the lane and the remaining cyclists lining up in the center.

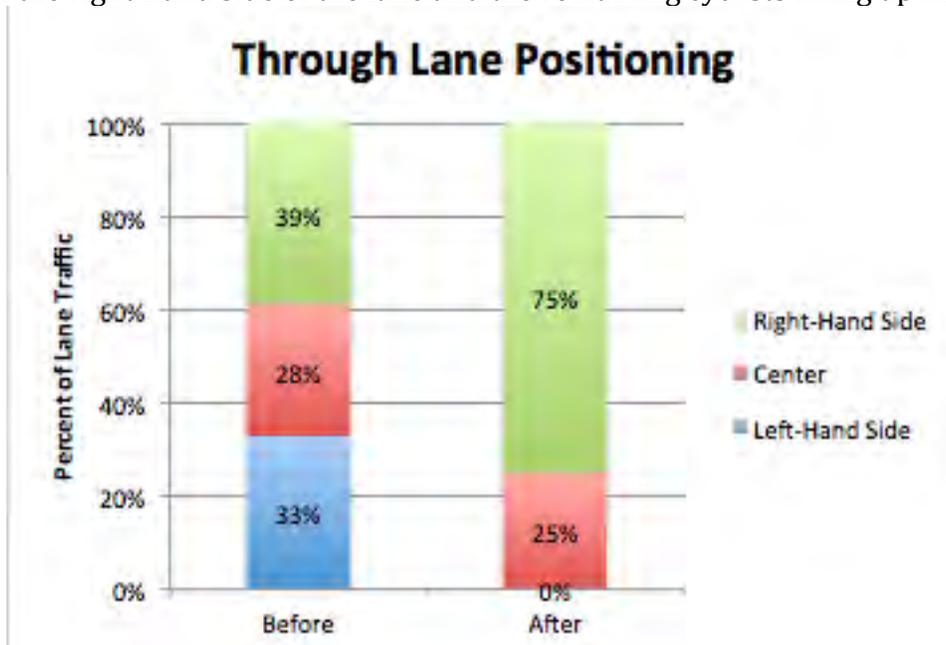


Figure 13 - Before and After Through Lane Positioning - Option A

Cyclists choosing to use the right-turn only lane prior to the restriping aligned themselves in the center of the lane most often. For comparison, roughly a quarter of cyclists positioned themselves on the left-hand and right-hand sides of the right-turn only lane. Similar to the change in behavior observed in the through lane after restriping the roadway, cyclist positioning in the right-turn only lane shifted towards the right-hand side of the lane.

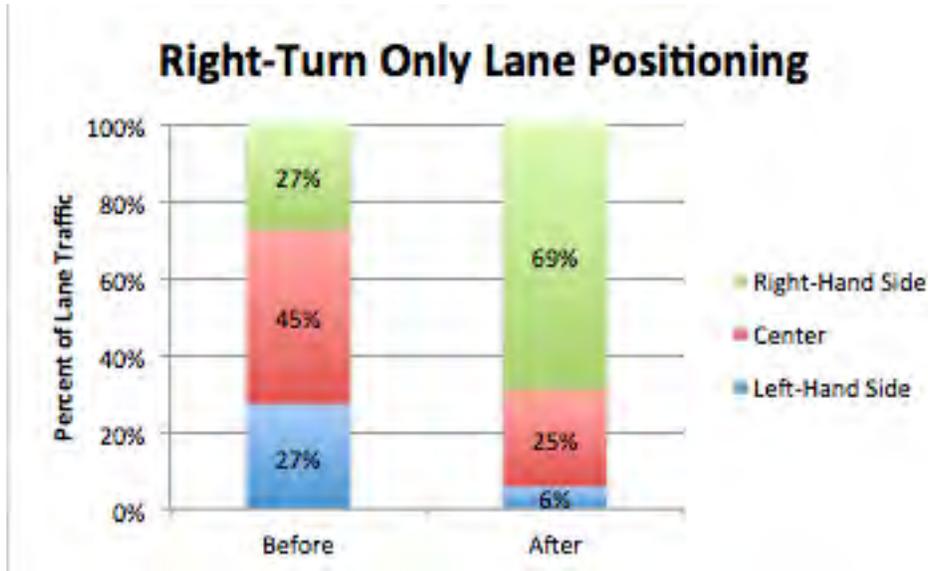


Figure 14 - Before and After Right Turn Positioning - Option A

The lane restriping and additional signage at Site A yielded both desired and unexpected changes in cyclist behavior. The increase in the proportion of cyclists using the right-turn only lane and right-shoulder signals that the restriping was both visible and well respected. Cyclists’ new tendency to stay to the right of the through lane also reflects a desired outcome for the intersection. This demonstrates a rudimentary understanding of the new pavement markings by roadway users. Unfortunately, there were not enough driver-cyclist interactions to make any further significant conclusions.

Due to the increase in cyclists positioning themselves on the right-hand side of the right-turn only lane, Option A’s pavement markings will be modified moving forward. With this change the hope will be to encourage cyclists to align themselves with the left-hand side or center of the right-turn only lane. Option A’s modified pavement markings are shown in Appendix C.

## 4.2 Site B Results and Analysis



**Figure 15 - Site B - Option B Test Markings**

At Site B, Old Baltimore Pike and Salem Church Rd., 21 cyclists were observed prior to the restriping and 19 cyclists were observed after the changes were complete. Prior to restriping the roadway, 15% (3 cyclists) of cyclists used the through-lane with 52% (11 cyclists) and 33% (7 cyclists) using the right-turn only lane and right shoulder, respectively. After making the intended changes to the roadway, 42% (8 cyclists) of cyclists were observed using the through lane, 21% (4 cyclists) used the right-turn only lane, 5% (1 cyclist) used the right-shoulder, and 32% (6 cyclists) used the sidewalk.

Due to the low volume of observed cyclist traffic at Site B, it was determined that proper analysis could not be conducted. For analysis of cyclist behavior at this site, further data will need to be collected.

### 4.3 Site D Results and Analysis



Figure 16 - Site D - Option D Approaching Test Markings

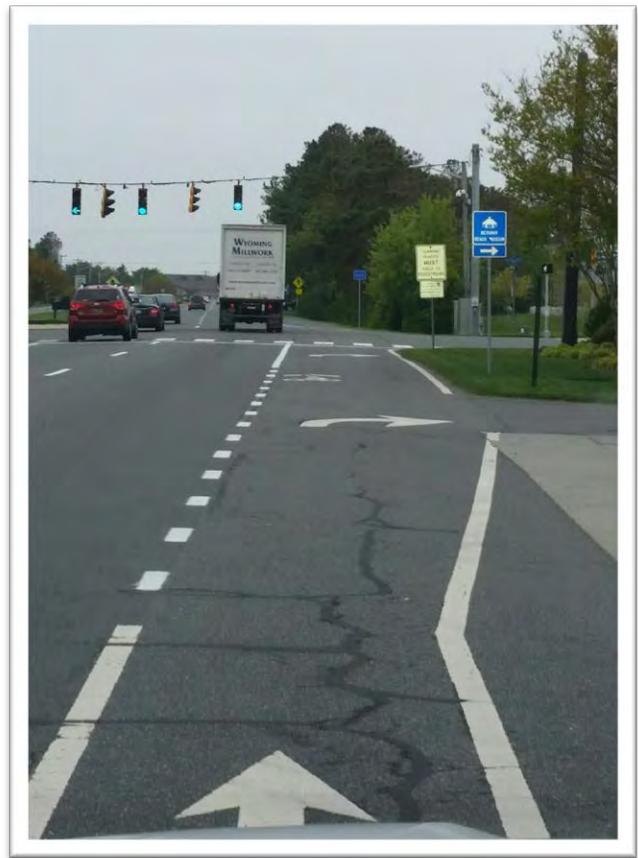


Figure 17 - Site D - Option D Test Markings in Lane

Prior to restriping Site D, SR 1 and SR26 and Bethany Beach, over 600 bicyclists were observed proceeding straight through the intersection. Of the 637 total cyclists recorded, 28% (180 cyclists) used the through lane and 72% (457 cyclists) used the right-turn only lane. No cyclists were observed using the right shoulder or the sidewalk.

After applying changes to the roadway consistent with Figure 13, a fairly dramatic change in cyclist behavior was observed. In comparison to the 28% of cyclists that previously used the through lane, now roughly 50% (316 cyclists) of cyclists were choosing to use the lane. The right-turn only lane was selected by 306 cyclists out of the 639 that were observed in total, or about 48% of cyclists. The right shoulder and sidewalk also saw a change in usage with 2 cyclists (0% of total) and 15 cyclists (2% of total), respectively.

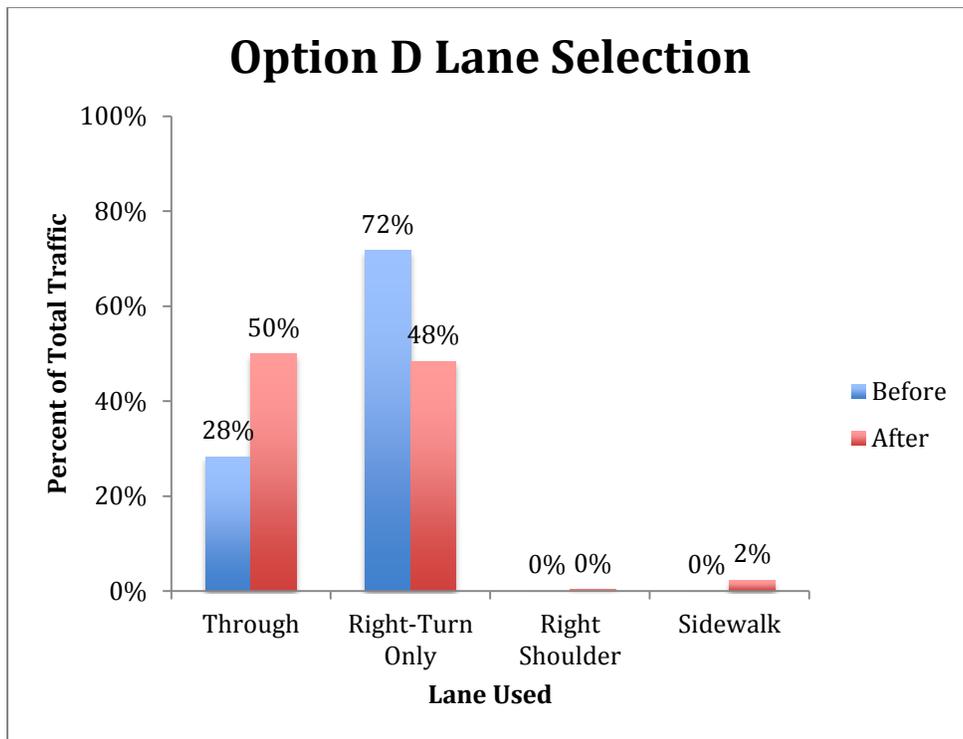


Figure 18 - Before and After Lane Choices - Option D

Prior to the restriping at SR1, SR26, and Bethany Beach, roughly two thirds of cyclists using the through lane positioned themselves on the lane’s right-hand side. After implementing the changes to the striping, just about all (99%) cyclists using the through lane elected to position themselves on the right-hand side of the lane, and no cyclists positioned themselves on the left-hand side.

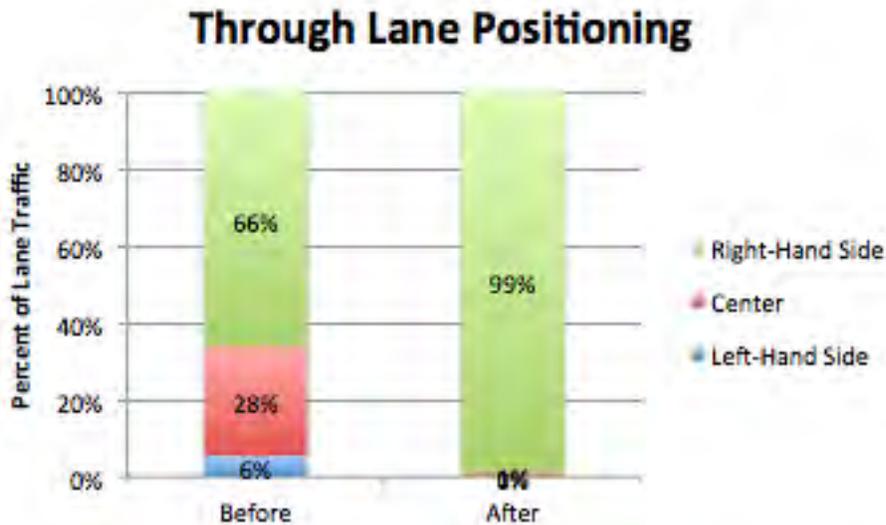


Figure 19 - Before and After Through Lane Positioning - Option D

After completing the alterations at Site D, there was a large spike in cyclist use of the center of the right-turn only lane and just as significant of a drop in the use of the lane’s right-hand side. Initial observations showed cyclists to line up on the right-hand side (54% of cyclists) and the left-hand side (46% of cyclists) without much discrimination. Following the lane’s restriping, cyclists

proved to slightly favor the center of the lane (42% of cyclists) over the lane’s left-hand side (36% of cyclists). Though nearly a quarter of cyclists still chose to position themselves on the lane’s right-hand side, the observed changes in behavior came the closer to the desired outcome than they did at Site A.

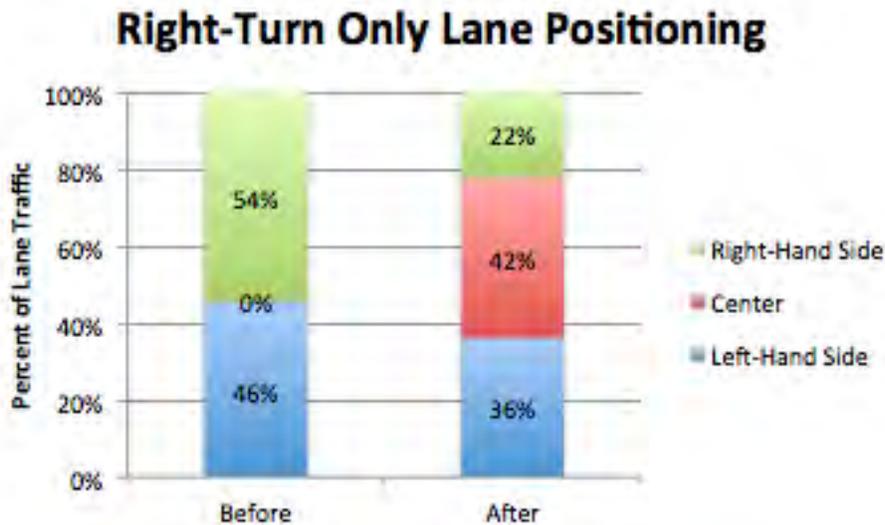


Figure 20 - Before and After Right Lane Positioning - Option D

Though the changes to the pavement markings resulted in a lower proportion of cyclists using the right-turn only lane, cyclists choosing to use it aligned themselves on the right hand side of the lane far less. Though unintended, this desirable result indicates a degree of comfort with and acknowledgement of the new traffic pattern. Speaking further to the clarity of the new markings are the 99% of cyclists that used the right hand side of the through lane after the changes had been made.

Following the applied changes at Site D, new interactions between motorists and cyclists also proved to be encouraging. As a result, motorists yielded to cyclists almost 15% more of the time, allowing users to better share the road and making the road safer for all users.

#### 4.4 Commentary

The Advisory Committee was pleased to see that the field tests led to marked changes in cyclists’ behavior, although the changes were somewhat unexpected. Option A resulted in a significant increase in cyclists using the right-turn lane (positive – out of conflict with higher speed through motor vehicles), but also an increase in the percentage of cyclists using the right-hand side of the right-turn lane (negative – higher possibility of “right-hook” crashes). Option B showed mixed results but a lower than expected number of cyclists. The results were inconclusive but the Advisory Committee did not show a lot of enthusiasm for this option, regardless. Option D had the unexpected outcome of a higher percentage of cyclists using the through lane, but almost all of those cyclists were on the right-hand side of the through lane (essentially on the lane line). The cyclists in the right-turn only lane were better distributed to the center and left-hand side of the lane compared to the before conditions. The Advisory Committee generally viewed this option favorably. In addition, the Advisory Committee felt that Option D best conveyed the message to

both motor vehicle and bicycle users that bicyclists were legally allowed to be in the lane. The consensus of the Advisory Committee was that the research results were mixed, that neither Options A nor D would be detrimental to road user safety, and that either Option A or Option D would be beneficial in better conveying to all road users the legal use of the right-turn only lane by cyclists.

Based on the research and input from the Advisory Committee, DelDOT issued interim guidance to designers on this topic on April 27, 2015 (see Appendix E). With slight modifications, Option A was adopted for use on routes designated as “suggested connectors,” while Option D with slight modifications was adopted for use on routes designated as “state or regional bicycle routes.”

The modification to Option A was to change the taper line from fully dotted to half dotted/half solid. The intent was to better direct cyclists to the center or left-hand side of the right-turn only lane. The modification to Option D was to eliminate the sharrow. The thought was that in this application some cyclists may actually be avoiding the sharrow symbol, and that it was not critical to the striping design. Furthermore, DelDOT has generally been reserving sharrows for locations with on-street parking, since that is the application studied in the majority of the research on sharrows. It was decided to use both options (rather than select just one) because the research results were inconclusive and to allow less striping in areas with fewer expected cyclists (for asset management purposes).

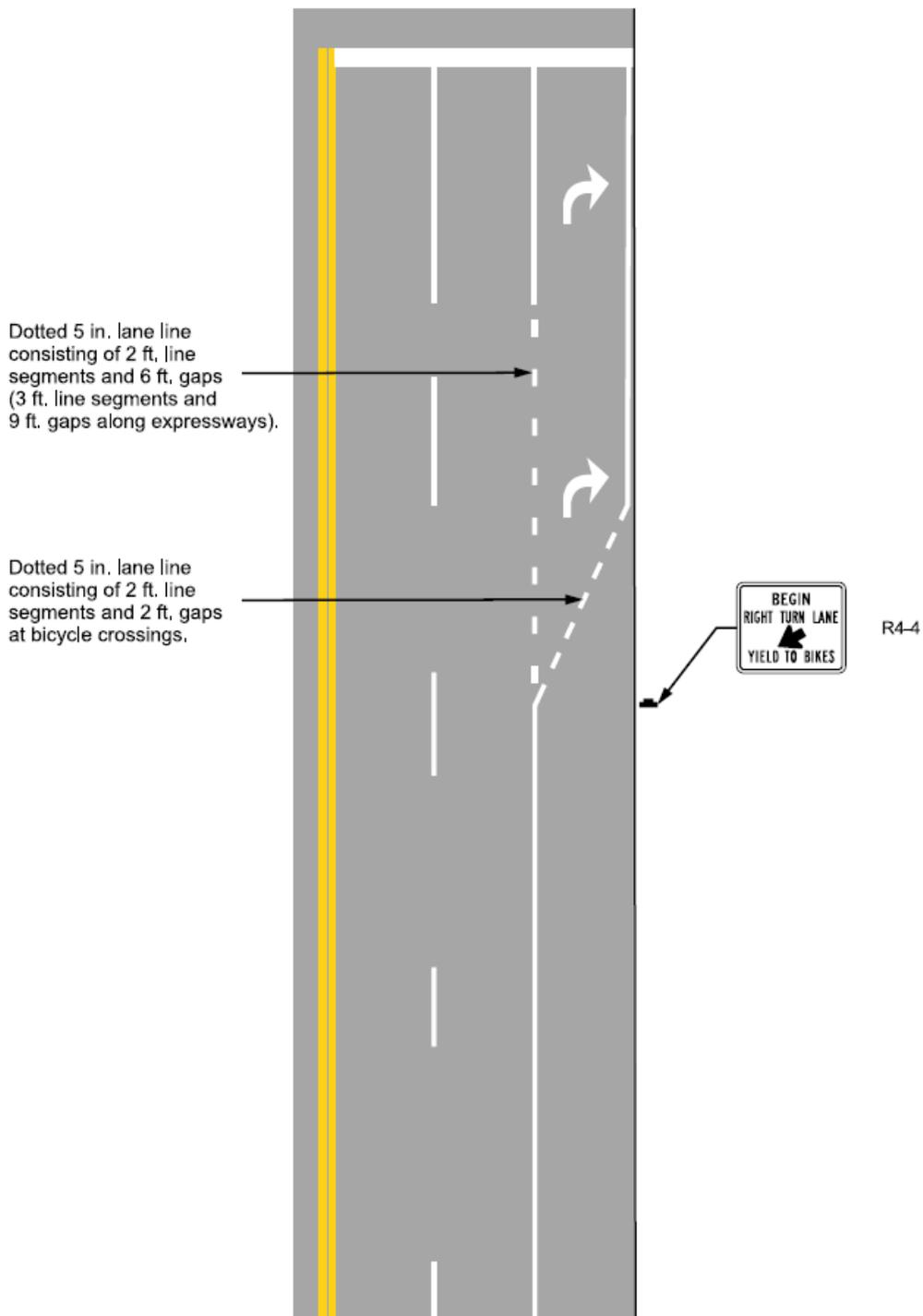
## 5.0 Future Research

. Moving ahead, based on the interim guidance (see Appendix E), locations throughout Delaware will be striped with the two options noted above. Future research could include additional study of locations with significantly more data. Some of the variables that could be studied might include high vs. moderate bicycle volumes, high vs. moderate vehicle volumes, high vs. moderate vehicle speeds, and urban vs. suburban locations. This example set of variables would result in eight test sites. Research efforts similar to those employed in this effort could then be used to further review the effects of these options. Using one of the striping options at multiple locations might result in observing more significant effects at some locations. It might be seen that with traffic volumes above some value, one option is preferred over others. The difference in impact might also be observed with urban vs. rural locations. A table could be developed that would indicate the best marking based on the specifics of a location.

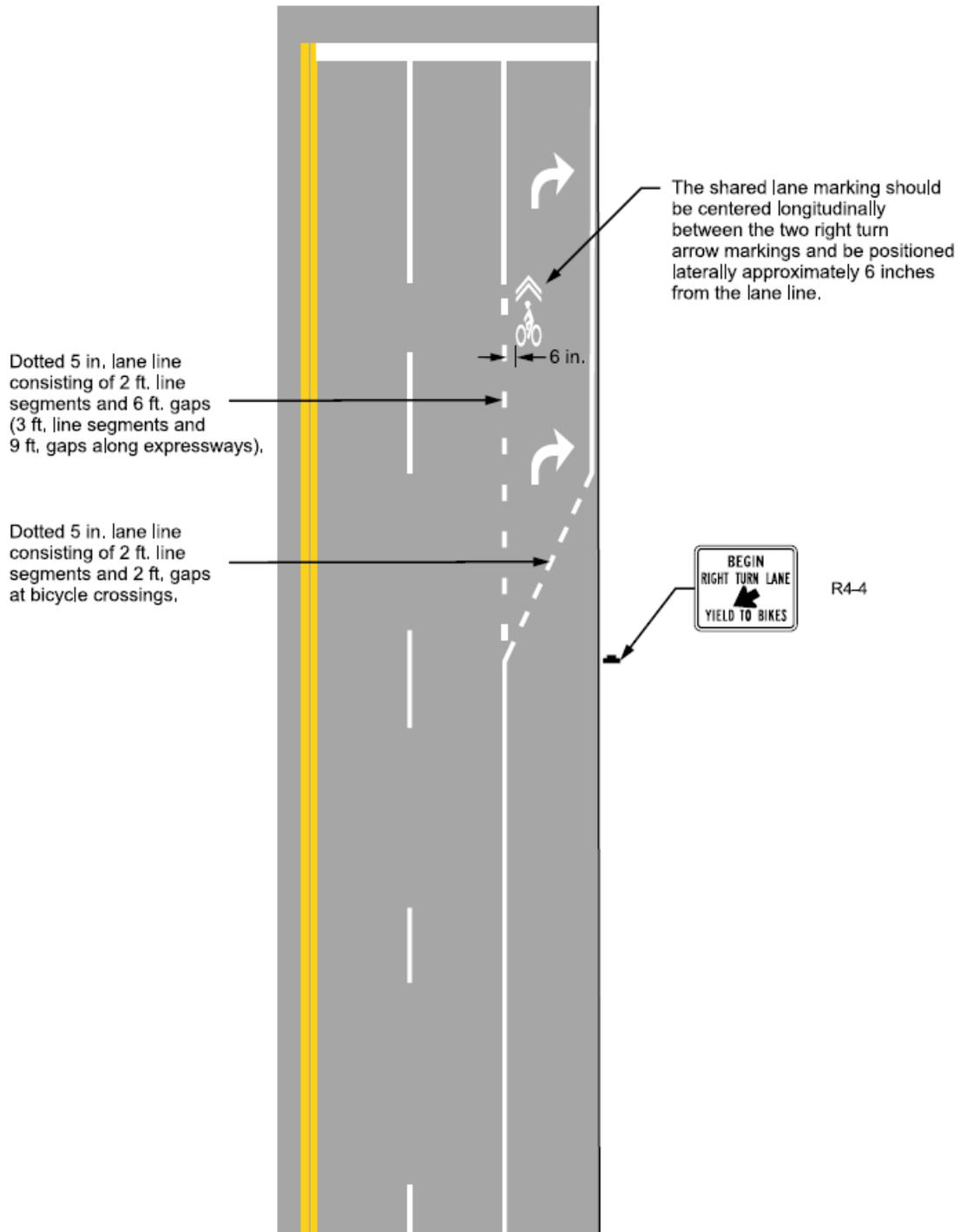
The results of all the surveys, interviews and video analysis will be prepared into a final report and delivered to DelDOT. This work will be done with the assistance of groups like Bike Delaware and the responsible departments within DelDOT.

# Appendix A - Striping Plans Used for Surveys

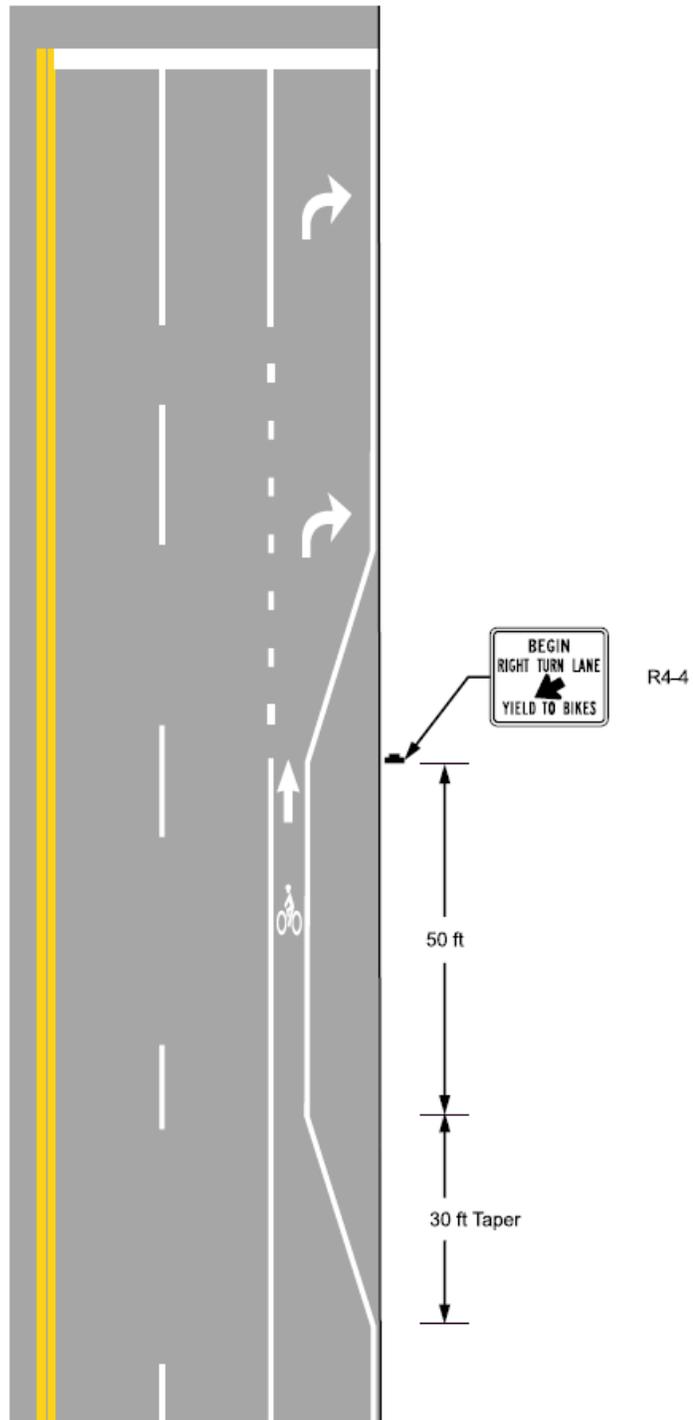
## Option A - Dotted Taper, No Bike Symbol



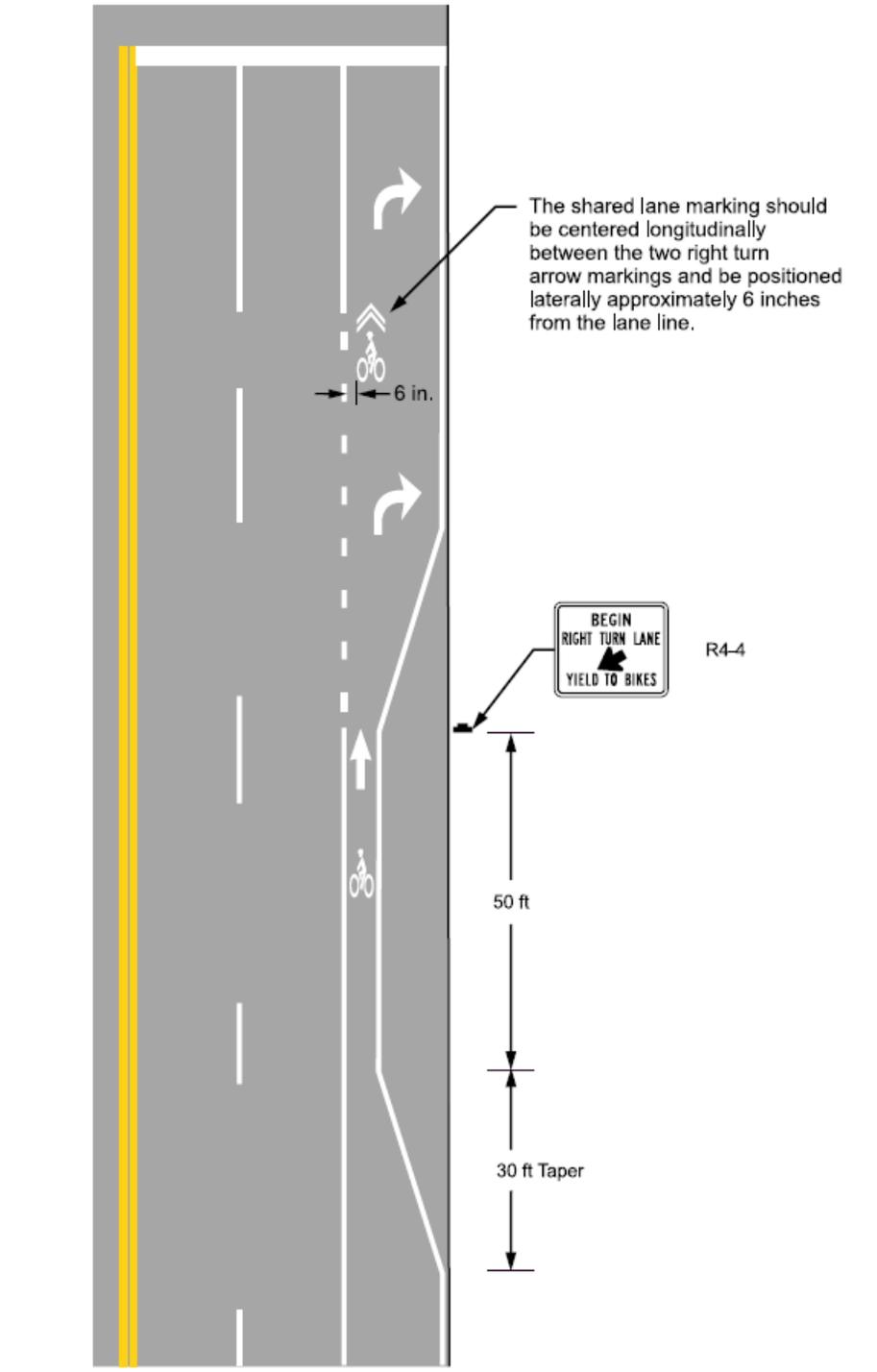
## Option B - Dotted Taper, with Shared Lane Symbol



**Option C - Funnel, with Bike Symbol**



**Option D - Funnel, with Bike and Shared Lane Symbols**



# Pavement Markings Survey

## Statement of consent

This survey is being conducted to collect information for the Delaware Department of Transportation to determine new signing and striping procedures to support Senate Bill 120 which was recently signed into law. This bill changed the motor vehicle code to allow bicyclists to both use the shoulder, as well as travel straight through an intersection from a lane otherwise designated as a right-turn only lane.

This project is also being funded by DeIDOT and all results of the survey will be presented to them. This survey will take about 10 minutes to complete. Your participation is voluntary and you may withdraw from completing the survey at any time. No personal information will be collected that could be used to identify you specifically and the responses you give. You will not receive any form of compensation for completing this survey. If you are under the age of 18 you cannot participate. If you agree with these conditions, we will continue with the survey.

## Instructions to persons taking survey

The questions on the first page correspond with images that will be shown to you. On the second page, read each question carefully and provide a response. For questions that are not multiple-choice, write your response legibly in the space below the question. For multiple choice questions, circle the letter that corresponds with your answer choice.

Thank you for your time. Your honest answers and participation are appreciated.



1. Pavement markings are designed to fulfill a need; command attention; convey a clear, simple meaning; command respect from all road users; and give adequate time for proper response.

You will now be shown pairs of images of options being considered to support this new law.

Please tell us which provides a clearer message or if you feel they are about the same.

(Circle your choice)

- a. Left – Right – About the same
- b. Left – Right – About the same
- c. Left – Right – About the same
- d. Left – Right – About the same
- e. Left – Right – About the same
- f. Left – Right – About the same
- g. Left – Right – About the same
- h. Left – Right – About the same
- i. Left – Right – About the same
- j. Left – Right – About the same



2. For each option (A-D), please tell us why you like it or what could be done to improve it.

**a. Option A**

i. Like about it

ii. Could be improved

iii. What do you think these markings are trying to convey?

iv. Are they clear?

**c. Option C**

i. Like about it

ii. Could be improved

iii. What do you think these markings are trying to convey?

iv. Are they clear?

**b. Option B**

i. Like about it

ii. Could be improved

iii. What do you think these markings are trying to convey?

iv. Are they clear?

**d. Option D**

i. Like about it

ii. Could be improved

iii. What do you think these markings are trying to convey?

iv. Are they clear?



3. Before today were you aware of Senate Bill 120?
4. What is your age?
5. Are you Male or Female?
  - a. Male
  - b. Female
6. In what ZIP code is your primary place of residence located? If you are a student living away from home, please list your local Zip code.
7. What is your primary mode of transportation for local commutes?
  - a. Personally owned vehicle (Car, Motorcycle, Truck, Van)
  - b. Bicycle
  - c. Public Transportation (DART, SEPTA, AMTRAK, MARC, etc.)
  - d. Walk
8. If you had the choice, which mode of transportation would you chose for local commutes?
  - a. Personally owned vehicle (Car, Motorcycle, Truck, Van)
  - b. Bicycle
  - c. Public Transportation (DART, SEPTA, AMTRAK, MARC, etc.)
  - d. Walk
9. On an average week, how many hours do you spend driving?
  - a. Less than 1 hour
  - b. 1 to 3 hours
  - c. 3 to 6 hours
  - d. 6 hours or more
10. On an average week, how many hours do you spend riding a bicycle?
  - a. Less than 1 hour
  - b. 1 to 3 hours
  - c. 3 to 6 hours
  - d. 6 hours or more
11. Do you posses a valid US State issued drivers license?
  - a. Yes
  - b. No
12. If yes, how many years have you possessed the license?
13. Do you consider yourself primarily a Cyclist or a Driver?
  - a. Cyclist
  - b. Driver
14. When you ride a bicycle what is your primary purpose?
  - a. Transportation
  - b. Exercise / Recreation
15. Are you a member of Bike Delaware or other Delaware Cycling Club?
  - a. Yes
  - b. No



## Written Responses to Question 2

### Question 2 as presented in survey:

"2. For each option (A-D), please tell us why you like it or what could be done to improve it."

### **Option A: What do you like about it?**

"Yield to Bikes"
Allows bikes to enter RTOL "legally"
At least a sign is there!
Barrier
Because it's clear
Breaks in the turn lane indicate something is going to change, street sign
Broken line indicates something can cross it
Bus yield sign & dotted line
Clear Sign Before Turn
Communicates that a vehicle can enter the turn lane from the shoulder
Conveys that people could pass through the shoulder into the turn lane
Conveys to bicyclists that they can pass straight through
Different than normal turn lane
Don't
Don't like
Don't like it for bikes
Dotted line for bicyclists to cross
Dotted line shows merge
Dotted line sign
Dotted lines
Dotted lines made it more clear
Draws attention that turn lane is different
Familiar marking
Gives some indication
Gives some space for bikes
Has the road sign
I like the posted "Yield to Bikes"
I like the sign
I like the sign saying yield to bikes
Indicates well
It shows legal ability to cross line from shoulder to travel lane
It shows people that bikes can be here
It shows where to yield to bikes and keeps us safe
It's clear where Right turn begins

It's unclear
Less cluttered
Markings
Markings how on road. Sign will not help
Merge lines are there
Not much
Not much
Not a ton
Not much
Nothing
Nothing else
Nothing Really
Nothing really
Nothing-Driver will not notice anything
Reminds cars that bikes will be there
Shows bike can go straight
Sign
Sign are too far right
Sign indicates yield to bike
Sign is good
Sign on Right
Sign stating yield to bikes
Signage
Signage
Signals something to bikers
Signs
Simple
Simple
Simple
Simple
The awareness that the driver has because of the sign
The barriers
The sign
The sign
The sign
The sign indicating bikes
The sign says yield to bikes
Turning lane for rights
Width of lanes
Yield to bike sign

**Option A: What could be improved?**

?
A bike lane with sharrows
A ground symbol
A painted bike symbol
Absolutely
Add bike image
Add bike logo
Add bike symbol on road
Advanced warning that bikes use lane too
Another lane for bikes could be used
Be more clear that bikes will be merging
Bicycle symbol clear separation for bike area
Bicyclist pavement marking
Bike Lane?
Bike Painting
Bike pavement marking, bike sign "bikes may use full lane"
Bike signs
Bike symbol
Break in line: What does it mean?
Bright markings
Bright markings
Buffered bike lane best!
By adding a 'cyclist' image/outline, to indicate what the change is for
Clarity of what dashed white lines that are curved means
Clearer Markings
Construct bike lane
Could be more obvious
Could possibly be a little more noticeable for more ignorant drivers
Could show bike signs to be clear purpose
Could use a bike insignia
Could use at least one bicycle symbol
Dashes->Bright Green, Yellow lines
Definitely needs road markings
Doesn't communicate about cyclists. Many motorists won't even think about cyclists
Don't really see any change
Draw Bike Lane for Clarity
Driver may not know biker has the right to be in turning lane
Easily overlooked
Give clue as to what can/might cross it
Graphical sign (image of bike)
Have a bigger sign
I like the pavement marking & sign

I like when there's a distinct bike lane
It doesn't clearly mark bike use
It lacks a bike lane marking
Lines are difficult to determine intent
Longer lane for bikers
Marking usability
More bicycle signs
More indication that spaces are for bikes
More markings
More markings on the road
More signs painted on road
More visible bike lane with picture
More warning for vehicle drivers
Need a bike symbol
Need a sharrow or bike image or sign
Need sign on pavement
Needs a painted bike lane
Needs bike logo
Needs graphic
Needs markings or even better divider
Needs more markings for bicyclists
Needs signage
Needs to be more clear that it shares lane with bikes
No bike lane shown
Not clear that it's for bikes
Not very clear
Nothing about bikes, would need prior knowledge of meaning
Picture of biker
Picture of cyclist showing I can turn there
Point leading up to turn
Road Markings
Road Markings
Sign could have a picture of a bike on it to let people know it applies to bikes
Sign is barely visible, lines would confuse me but not necessarily make me change my driving
Sign is not enough
Signs on the road
Smaller, more hatched lines
Some markings
Start segments earlier
Still leaves danger that cars will be unaware of bicyclists
Striping
Take marks away

The gray markings confuse me. I liked the road bike image
The markings on the actual road
The sign is not very eye catching
There should be more markings
They need bike symbols
Too east to not see rectangles on line to vague
Unclear meaning
Vague for drivers to understand intent
w/more road signage (on the road) altering motorists
What dotted line means
With an image of a biker
Yes
Yes
Yes
Yes
Yes, definitely
Yes, the distinct bike lines in other pictures would clarify

**Option A: What do you think these markings are trying to convey?**

A vehicle entering lane
Bicyclists can cross
Bicyclists may enter from shoulder
Bike in right lane should be allowed to merge with cars
Bike/cars can cross that line
Bikers can go through with cars
Bikers merge
Bikes
Bikes can continue straight through
Bikes or other vehicle will/may cross through
Bikes use the road
Cars can cross the "dotted" line bikes can cross the "dashed" line
Cars must not go too soon
Cars to yield to bikes
Cars yield to bikes
Confusion
Don't Know
Drivers will not "see" or understand
Either the cars can merge into turn lane earlier pending traffic
Entry
I am not sure why the line is dashed
I don't know
I have no idea

I probably wouldn't be sure
I'm not really sure
Interchangeable lanes
It doesn't give a good indication
It is crossable by smaller vehicles
Lane merge
Lane unclear
Merge lane
Merge of bikes + cars
Merging
Merging traffic into right lane
No cars
No idea coverage for bikers
Not clear
Not clear if I wasn't told
Not Sure
On the ground - not sure, thru lane for bikes
Possible convergence point
Right Turn Lane for Vehicles
Right turn movement only at approach to light
Seeing & alert for bikes
Slots for bike
Something is permitted to pass, but what?
Tells car where to begin merge for right turn
That bicyclists have the same right as cars
That line can be crossed by bikers
That the right lane begins and to beware of bikers
That the right lane is different than a normal one
The image suggests car may turn into shoulder sooner
There are very little markings except for the lane being dotted
This road is intended for cars only
Too vague not conveying any info
Turning Lane
Unclear
Unsure
Unsure



No
No, need picture or arrows
No, one could mistake it for poor maintenance
Nope
Nope
Not as clear as possible
Not at all
Not clear
Not clear no logo
Not completely
Not entirely. Indicate convergence clearly with arrows?
Not much
Not on the road but on the sign yes
Not really



A little better than A
Ai + sharrow conveys to motorists that bicycles are allowed within turn lane
At least it catches your eye
Because it shows where the biker is supposed to go
Better
Better an A
Better markings
Better than option A
Bicyclist marking
Bike image and dotted line
Bike logo
Bike marker
Bike marking helps bring attention
Bike markings
Bike markings more visible
Bike paving informs cyclists to go straight
Bike picture
Bike showing
Bike sign
Bike symbol
Bike symbol
Bike symbol shows bike can move in
Biker Image & Dotted Line
Biker picture
Can identify bicycle
Cars must yield
Clear
Clearly communicates to both cars and bikes that bikes may continue straight through the turn lane
Describes bike potential conflict
Different than normal lane
Displays bike lanes location
Don't Like
Getting Better
Gives some space for bikes
Good width before turn lane
Has a picture of a bicyclist & an arrow to let people know that a bicyclist could be going straight there
Has sign on the road
Has the bike symbol
Have the bike image "explaining" the dashed line
Increased signage

Indicates that bikes are merging
It has the bike marking on the pavement
It's clear where Right Turn Begins
Makes it clear that bikers belong in lane
Marking is clear
Marking on road for cars to see
Markings on road and sign
More clear to motorists and bikers
More describing and shows the beginning of turn lane
More directive than a
More Understandable
Much clearer because of the image of the bike & rider
Neutral
No, not for bikes
Not much
People look at the ground & will see it
Relatively Simple but a bit more than A
Road marking makes it clearer
Road sign
Road sign and painted bike
Sharrow is more obvious to drivers
Sharrows
Shows Bike Lane
Shows bikes
Shows that bikes can be there
Shows that bikes share the turn lane and can go straight
Shows where to turn
Sign and bike image on road
Sign on road plus pavement
Signage & Striping
Signs & Striping
Simple
Simple & clear
Some markings
Strong icon
Tells me something about bikes
That bike lane is marked & continuous
The addition of the visual one of a 'cyclist' outline, street sign
The awareness that the driver has because of the sign
The bike sign
The bike symbol
The bike symbol

The bike symbol reminds cars to watch and let room for bikes
The biker sign
The bikers symbol
The picture of the bike and arrows
The sign and bike mark on the road
The visual
There is a bike to help you know where to go
Turning Lane For Rights
Yes

**Option B: What could be improved?**

A biker lane
Add a lane
Add bike lane
Adding Designated Lane for Cyclist
Additional sign as road closer to intersection
Another bicycle symbol
Area before turn markings
Bicyclist lane
Bigger
Bigger bike sign
Bike lane
Bike lane
Bike marking can be bigger; may be covered by other cars
Clarity of what dashed white lines that are curved means
Clearer
Clearer lines
Confusing, cluttered
Connect to bike lane before the shoulder
Could have bike lane
Create a full biker lane
Cyclist outline may not give enough warning
Do not like or understand bike symbol
Does not give driver notice before they're already in lane
Draw in a biker lane
Earlier symbols
Earlier warning
Earlier warning
Good
Gray markings confusing
Have a separate and small lane for bikes
Have the lane start farther back

Lacks the ongoing awareness of the presence of bikes along the roadway
Lane Designations
Larger indicated lane
Like
Longer lane for bikers
Longer marking farther back from turn
Longer markings
Make it larger
Make it larger
Marks in turn lane
Maybe words too, "Biker merge"
Might be confused
Might want warning before they get to the turn
More indication that spaces are for bikes
More of the bike image
More on pavement
More pictures closer to the road
More road markings, bike lane
More warning for vehicle driver
Move it away from traffic; a divider would be better. Inattentive drivers tend to drift
Need a lane
Needs a full bike lane painted in
Needs extended lane before turn lane
Next option is better!
No symbol before the turn lane to make drivers aware that cyclists are on the shoulder and may go straight
None
Not obvious that bikers can travel straight
Not real clear with preceding bike lanes
Not really
Not sure
Picture in advance
Provide markings earlier on road (same as A)
Road markings are tiny, maybe a color to offset white
Separate bike lane/area
Sharrows better than nothing at all
Signage alerting bikers to merge
Slightly shift sharrowed forward to avoid excessive wear due to traffic
Smaller mark in turn lane indicating bikes may continue
Sooner on the street
Still needs marked bike lane
Still too discrete

Striping Longer
Symbol needs to be bigger
Usability
Warning to motorist earlier up lane
With bike lanes marked up
Would like a bike symbol before the turn lane
Yes
Yes combining the options from the left and right
Yes dash line on right side of bike
Yes keep bike lane before turn lane
Yield sign for bikes

**Option B: What do you think these markings are trying to convey?**

?
A bike can enter the turning lane
A bike can go thru
A Route for the Rider
Allow bikes to pass
Bicyclist's right to utilize travel lane/turn lane
Bike can go straight through
Bike cart way
Bike entry
Bike lane merging
Bike lane position
Bike Lane?
Bike use and turning movement
Bike will be in lane
Biker should move to turn lane even if going straight
Biker turning right
Bikers allowed
Bikers are allowed to ride there
Bikers can only turn right
Bikers can pass
Bikers may be coming
Bikers merging
Bikes
Bikes are able to go through
Bikes can be here
Bikes can be on the turn lane
Bikes can travel in turn lane
Bikes have same rights as cars for turning
Bikes here

Bikes in turn lane
Bikes need to share with cars
Bikes should ride to the left of turning car
Bikes to turn right
Bikes use the road
Car & bike share lane
Car & bike share lane
Cars can cross the "dotted" line bikes can cross the "dashed" line and added benefit of reminding motorists that bike may be there
Cars must be aware of cyclists
Cycles in turn lane
Cyclist position
Cyclists belong here too
Cyclists can travel straight thru that space in the right turn lane
Making Drivers aware that bikes may be turning
Merge with bikes
Merging for bikes
Merging of bike
Not sure
Not Sure
Not Sure
Opening for bikes with bikes merging
Path cyclists should use
Possible convergence point
Right lane only for bikes
Same as A
Share road
Share the lane
Share with bikes
Shared lane. Don't know about gray markings
Shared travel lane
Sharing
Space for bikes turning
That a bicyclist could be going straight there. Maybe the dotted lines show that the bike lane merges with car lanes
That a bike can use this lane but not really follow through
That bikes can do the same step as cars
That bikes can turn at right lane
That bikes share the lane
That the bikes can be in the turning lane too
The beginning of the right turn lane
The bike lane continues into the turn lane





Yes
Yes but not on the approach
Yes implies bikes go straight thru
Yes to me

17 of 89 comments were no or a similar answer

**Option C: What do you like about it?**

A clear bike lane!
Advanced notice picture
All
Allows room for bikes
Because it shows a clear path for the rider
Better - Cars/Drivers can "see"
Bike and arrow
Bike has own lane
Bike have an established presence
Bike image arrow & sign & bike lane
Bike lane & arrow
Bike Lane clearly marked
Bike lane connect to turn lane
Bike Lane is marked
Bike Lane. Soft line
Bold, biker symbol, arrow
Broader
Check
Clear
Clear
Clear
Clear and Concise
Clear bike land
Clear bike lane
Clear Bike Lane
Clear bike lane
Clear cycling lane
Clear idea
Clear markings leading up to turn
Clear signage of bike lane
Clearly
Clearly defined bike lane
Clearly defines bike path and turn lane sharing
Clearly marked for both vehicles and bikes
Clearly shows bicyclists will be riding in this lane
Clearly shows bike merge
Conveys that cyclists are present and entering the turn lane
Could use more pavement marking
Creates bike lane and shared turn lane
Cyclist stencil is located farther back, gets driving thinking sooner
Don't like
Earlier warning of bike lane

Entails a biker lane
Even clearer what purpose for striped line is
Everything
Everything
Everything
Everything, bicyclist lane
Gives bikes an actual lane
Gives drivers prior warning that bike may be in turning lane
Has bike lane
Has bike lane clearly marked
Heads up that bikes can be proceedings straight
I like that the printed bike lane gives clear indication to motorists prior to the intersection that bicyclists could be present
I think this is very clear
Increased signage to bikers
Indicates better
It has a designated bike lane
Its something, not much
Lane for bikes
Like it the best
Like Sharing Bike Lane
Like the bike lane markings
Love the bike lane
Makes clear bikes ride on road
Marked ok
Marking gives advanced warning
More obvious about the biking lane and right turn
Most effective, clear and provides directions w/o being too cluttered and confusing
No, but more than A
Picture
Positive: Bike lane. Negative: not all Bike lanes created equally
Quite clear where bike can merge
Separate bike lane
Separate section for bike
Shows bike can enter before they get to the turn
Shows Cyclist Path
Sign plus pavement
Simply obvious to both bikes and cars where bikes might be
Striping
The bike lane
The Bike Lane
The bike lane and arrow visible early

The 'cyclist' outline as a visual cue, street sign
The lane
The longer lane
There is a bike lane
This is the best because of the lane
Very clear
Very clear
Very clear
Very clear & delineates clear path for bike
Very descriptive
Visibility
Welcomes bikes on the roadway
Yes

**Option C: What could be improved?**

A sharrow within the turn lane (option D)
Additional marking to suggest bike can go straight
Another cyclist symbol in turning lane
Begin right turn lane would be a fluorescent color to be more eye catching, also could extend dedicated lane up to the light
Better than C
Bike lane
Bike lane is present but barely marked
Bike lane should continue in the middle of both cars
Bike symbol in turn lane
Continuation of where bike should go
Continue Striping
Continue the bike image
Continued signage at light
Continues through intersection
Dictate convergence point clearer
Difficult to tell there is merging
Doesn't indicate that cyclists may be going straight in the turn lane
Dotted lane markers continuing straight
Dotted line for bicyclists to cross
Dotted line helps
Extend the lane into the turning lane
Extension of bike lane
Good
Had to know on use and to turn
Have a bikers own turning lane
I prefer it on the right side by the curb rather than in the middle of the road

Indication that right lane can be used for bikes
It works
Make it option D
Make it wider
Makes turn lanes a dangerous place for bikes
Marking is a bit small and only once
Markings in turn lane
May need additional cue closer to intersection for additional guidance
Maybe, but I think this is the best option
More clarity in turn lane of where bike should go
More defined merge lane
More merging info
More of a warning for drivers
More pictures!
More thru symbol
Multiple Markings
My favorite, balances simplicity & clarity
N/A
Need to continue through intersection
No
No, I think this is the best option
Not really
Not Really
Not Sure Continue Thru
Nothing
Nothing
Nuthin'
Only a divider
Perfect
Share row may not be obvious to motorists
Show bikes can go straight or Right turn
Sign easily missed, no other indicator for drivers to yield
Sign on ground alerting cars
The right turn lane is unclear about where cyclists should be
Too much
Warn drivers prior what will happen w/ bike lane so they aren't slamming on breaks b/c they don't realize
Where do the bikes go after the special lane ends? Next to cars? Behind cars?
Why does it end?
Wider bike lanes, only clear to bikers
Wider bike section
Wider lane turn lane needs icon

With an image showing that the bike lane continues
Yes
Yes

**Option C: What do you think these markings are trying to convey?**

2 Transportation Systems
A route for the bicycle rider
Bicyclists must stay in their lane
Bike accessible lane
Bike can use turn lane
Bike entry
Bike is going straight
Bike Lane
Bike Lane
Bike lane
Bike lane continues through the turn lane
Bike lane is present
Bike Lane merge
Bike Lane-Vehicles watch for bikes
Bike merge looks confusing
Bike only space
Bike use
Biker can enter turning lane
Biker can go straight
Bikers can only use right turning lane
Bikers can ride there
Bikers come along with cars
Bikers merging
Bikers turning right
Bikers will be in turn lane too
Bikes and merging with car lane
Bikes can go straight in right lane
Bikes entering
Bikes may ride in this lane/shoulder
Bikes travel in bike lane
Bikes will be traveling straight through in that lane
Blending of the bike lane into the turn lane. Bicyclist's legal right to enter turn lane
Car & bike share lane
Car & bike share lane
Carry Markings throughout the lane
Cars should enter the RTOL at the dotted line, bikes from their marked lane
Continuation of bike lane

Cycle lane
Cyclist is not limited to shoulder
Cyclists can travel straight through that space in the right turn lane
Dedicated Bike Lane ends at turn lane where bikes and cars need to share
Indicates bike lane and need to shift to travel lane
Label for sage turning bikes
Let bikes use the lane, cars shouldn't turn until end
Mark a clear lane
Marking through turn lane
Merge
Presence of bikes on road
Provides cyclist position on road
Right turn lane for bikes
Same as A, B
Same as B
Same as other options
Separate Bike Lane
Share with/look out for bikes
Slots for bike
Stay to right of traffic but stay to left in turn lane to go straight
Suggest bikes should stay in turn lane but is not clear that they may continue straight
That bikes turning right have their own lane
That biking lane and right turn lane are combining
That there is a bike lane
The upcoming lane allows bikes to turn
There is a bike lane
There was a bike lane. LOL
This is a bike lane so be careful
Thru lane possible bike turn
To yield to bikes
Watch for bikes
Where bike lane is
Where to ride
Yield for bikes
Yield to bikers
Yield to cyclists

**Option C: Are these markings clear?**

Bikes can go straight
Definitely
I think so
More than B





6 of 87 responses said no or a similar answer

**Option D: What do you like about it?**

2 Pictures
3 markings, sign and road
All
All clear but presents future confusion
Ample/adequate visual cues, street sign
Best
Best Choice
Best one see bike symbol throughout whole road not just front or back
Best Option
Best option
Best option
Best option of those presented
Best yet! It shows more clearly that bikes may be going straight ahead or turning right!
Best, clearly drawn lines for bikes
Bike has own lane
Bike lane and thru imagery & bike on road image
Bike lane show continuation
Both bike lane and turn lane are clearly marked
Check
Clear
Clear
Clear
Clear markings on road
Clear that they are for bikes
Clear, biker symbol
Clarity
Clearly marked
Clearly marked
Clearly shows bike lane & continuation

Closer to intersection
Combination of B+C is good
Continues from shoulder to right turn lane
Conveys message
Conveys that cyclists are present approaching lane and can go straight in lane
Don't like
Early warning and continued signage
Ever better
Everything
Everything
Everything but symbol in Right turn lane
Explicitly Clear
Extra lane, turn lane
Gives cyclists a path to follow shows motorists that bikes area allowed
Good Markings
Great
Has bike images, arrows, & bike lane
Heavy presence of Markings
I like this one
I think this one is the clearest
If you miss the first bike logo, the second should be easily spotted
Indicates best
It's the best option & the clearest
Like it best out of all options
Like Sharing Bike Lane
Love the bike lane
Makes most clear that bikes use road and the turn lane
Marked ok
Markings in turn & before turn
More clear
More markings
More marks
Most Clear and Visible
Most descriptive about biking and turning lane combining
Most markings
Much better to understand
Multiple mentions of bikes and turns
Obvious where bikes & cars should be
Really Illustrates that cyclists are taken seriously
Same as above (Very Clear)
Same as C
Same as C and B

Shows cyclist is not limited to shoulder
Shows directly where to turn
Shows origin of bike lane and direction
Shows that cyclists are allowed in the shoulder and in Right Turning Lane
Shows the clearest route for the rider
The best
The Best Design
The many bike symbols directing cyclists
The two signs
The visual
There is a continuing bike lane & mark in the turn lane
This is also good, but the bike marks in the turning lane seem unnecessary
This is my favorite. Lane, merge line tells cars about bikes.
This is the best option, increasing awareness of bikes on the road and turn lanes
This is the best.
This looks great! Very biker friendly
Two ground signs and a pole sign
Two pictures
Two sets of sharrows
Very clear
Very clear to be aware of cyclists
Very clear where the bike can go
Very clear!
Well marked throughout intersection
Yes
Yes

**Option D: What could be improved?**

?
A bit busy, but I think it's worth it to convey the message
A little redundant
A little repetitive
Adequate
Adequate
Be nice to have bike lane in the turn lane
Bike lane + marking in turn lane
Bike lane should continue into lane
Bike symbol
Bike symbol at far right of turn lane
Brighter color for yield to bikes sign?
Clarity of the lines
Clearest Markings

Continue bike lane straight, dotted
Continue sign into intersection
Continue Striping
Continued bike lane into bike
Continuous bike lane would be better than downgrading to sharrows
Dash Lines on right side of bike lane in right turn lane
Don't like
Dotted line at merge
Dotted line continues into turn lane
Explain turn symbol and it's very confusing
Extend the bike lane white line. Move turning lane over more. Green paint on lane
Good
Larger words on sign
Looks good
May be confusing if a cyclist is turning right
More clear sign?
More signals to drivers
N/A
N/A
No
No!
No, preferable for me
Nope
Not sure I need to see more
Not sure seems okay or overkill with striping
Nothing
Only by a divider
Own biker lane
Right hand side instead of middle of road
Same as B
Same as C
Show bikes can go straight or Right turn
Take out loop showing turning lane
The best improvement is a separated bike lane off the road but this is good for shared roads
The bike symbol and the sharrow seems more complicated than necessary
This is good.

Thought was a grey line
Too busy
Too cluttered
Too much
Too much marking
Too Much paint
Turn lane is a little busy
What do bicyclists do who want to turn left?
Wider bike lane
Working on sign too small
Yes, less symbols
You can always have more pictures

**Option D: What do you think these markings are trying to convey?**

?
Allows both vehicles & Bikes to know where to go
Better sign
Bicyclist right of way
Bike can be in lane and turn lane
Bike can go straight through
Bike entry
Bike Lane
Bike Lane
Bike Lane and they may be going straight or turning
Bike lane merge
Bike lane that is merging with traffic
Bike merges into right lane
Bike only space and yield
Bike path direction/presence
Bike Ride in the lane & may continue in turn lane
Bike thru lane or turn
Bike will be here
Bike with traffic
Biker can enter right turning lane
Biker lane and merge
Bikers Merging
Bikers share lane
Bikers turning right
Bikes can go straight in right lane
Bikes can use road and continue down turn lane
Bikes continue through & have right to road
Bikes have legal right to the road

Bikes in bike lane will be entering right turn lane
Bikes should travel to the left of turning cars
Bikes turning right have their own lanes
Car & bike share lane
Car & bike share lane
Cars should enter the RTOL at the dotted line and bikes from their marked lane
Caution to both cars and bikes about merge
Clear where bicycles are supposed to go
Continuation of bike lane within turn lane
Convergence point
Cycle lanes & cycles in turn lanes
Cyclists can travel straight thru that space in the right turn lane
Cyclists should stay in bike lane thru turn area
Don't like
Everything
How about dashed lines through lane
Implies Straight thru
It's very clear where the bike lane
Looks like bike only lane
Maybe repeating
Merge
Merge with biker
N/A
Need to share w/ cars
Not sure what double arrow means
Only option that conveys bikes can go straight or turn
Right Turn Lane for Bikes
Same as B
Same as c
Same as C
See above
Share
Share the road bikes turning with vehicles
Share with/watch out for bikes
Sharing Lane
Stay to right of car lane left of turn lane to go straight
That bikers move into the turn lane too, so slow down
That bikers will be present in that lane
That bikes are eligible to go
That bikes are left of turning area
That bikes share the lane
That the lanes are merging

To Driver- slow down. To casual cyclist-clear indicator of where they should be
Upcoming lane allows bike turns
Where bike can merge
Where bikes can go and that they don't have to veer off at turn lanes. Also, that this road in particular is a sage route for bicyclists.
Where bikes ride
Yield for bikes
Yield to bikers
Yield to bikes
Yield to cyclists

**Option D: Are these markings clear?**

A little bit confusing
Begins
Better
Clear Enough
Clearest
More so than others, yes
More so than option c
No
No, could be confused for bike only lane
Perfect!
Pretty much
Same as C
Somewhat
Sort of but don't show where to be if going straight
This is probably the best option of the extra markings
Very
Very
Very
Yeah
Yes

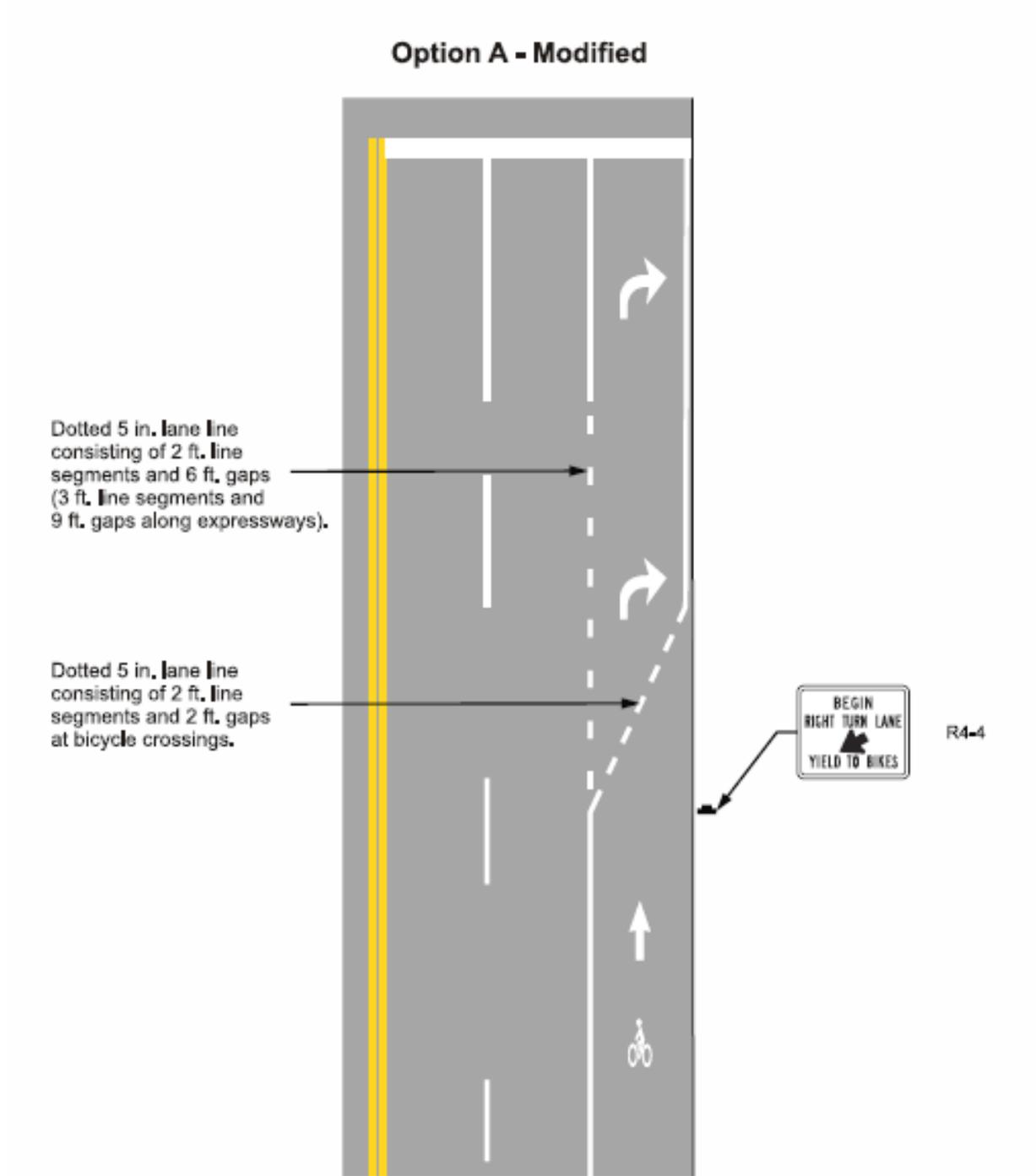


Yes
Yes but there might be too much going on.
Yes!
Yes, best one
Yes, but cluttered
Yes, but cluttered
Yes, could under the road sign more eye catching
Yes, extremely clear
Yes.
Yes. As a bicyclist who moved to DE from another state, these turn lanes convinced me that bicycling was not safe on DE roads and that the presence of bikes was an afterthought. I'm glad to see safety improvements.

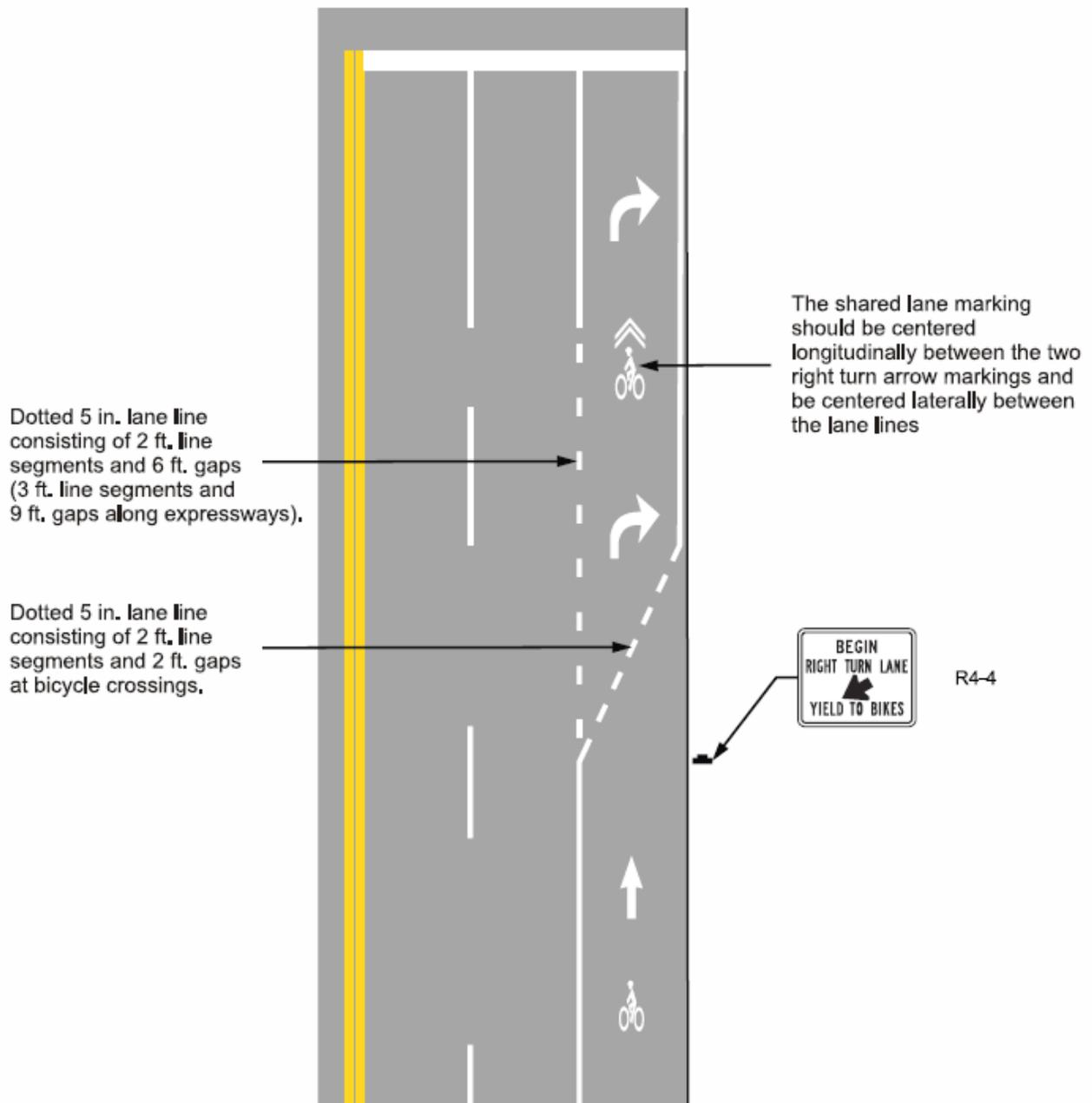
6 of 94 responses said no or a similar answer

## Appendix C - Striping Plans Used for Field Tests (Graphical)

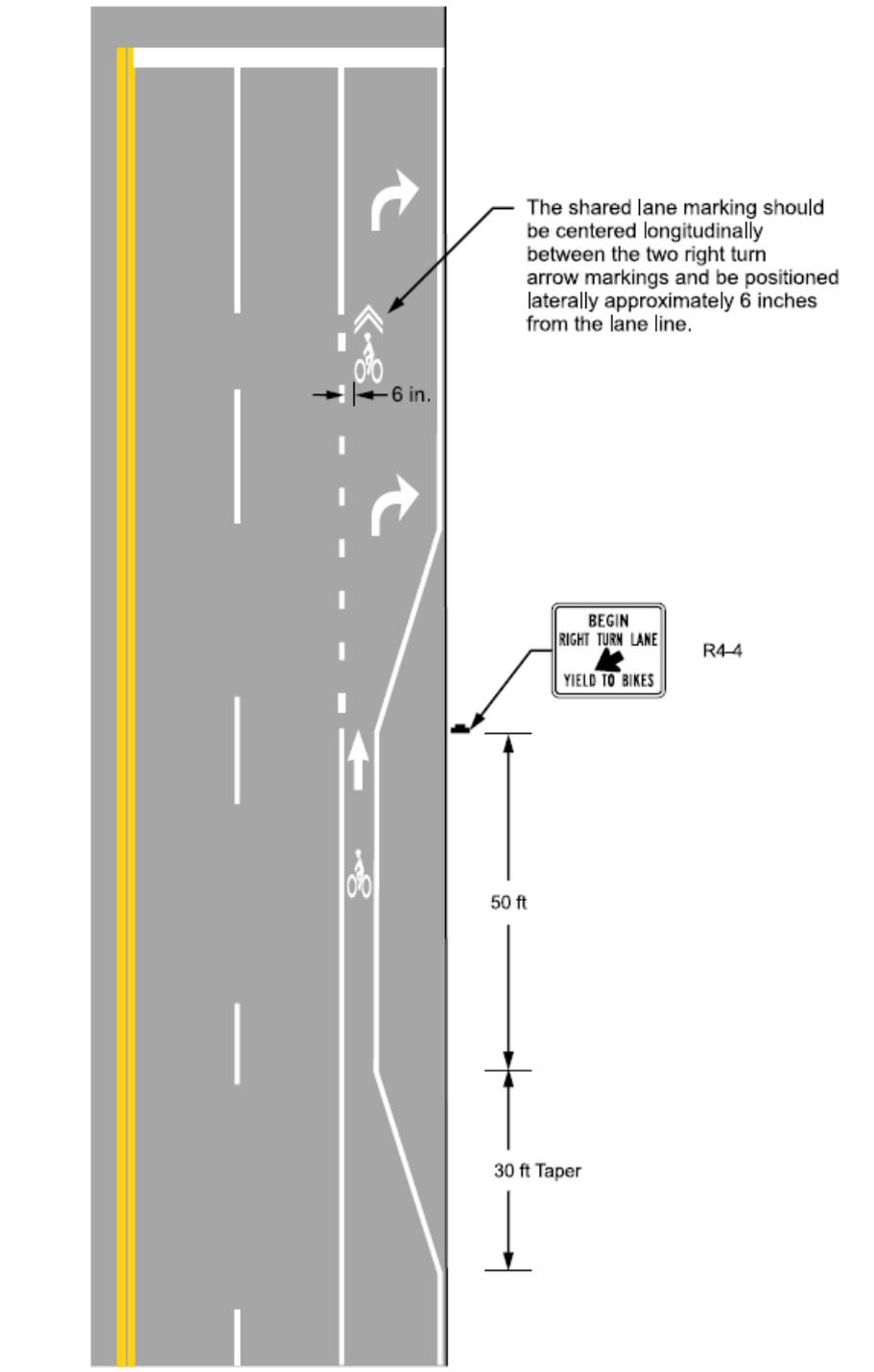
### Modified Pavement Markings



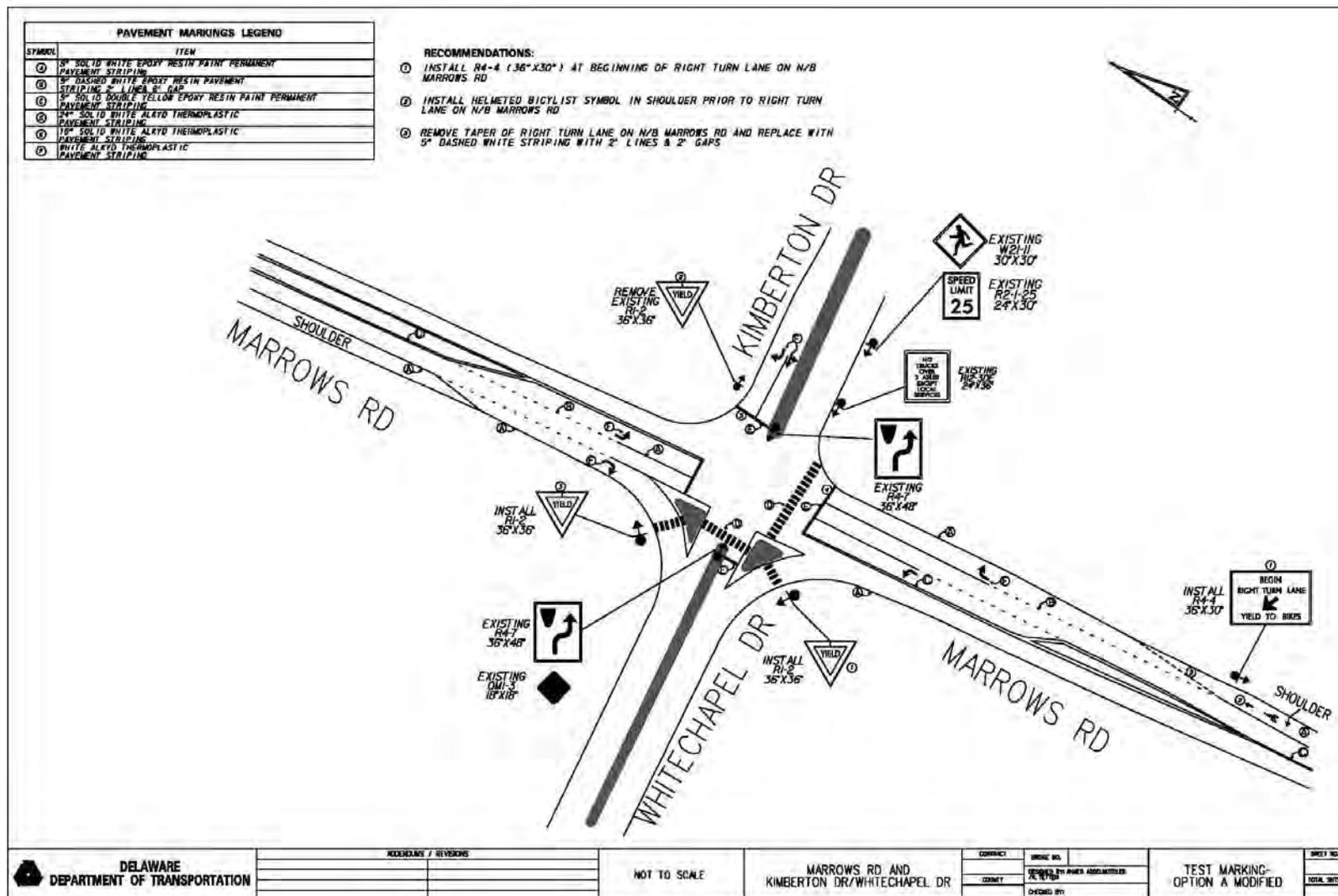
### Option B - Modified



### Option D



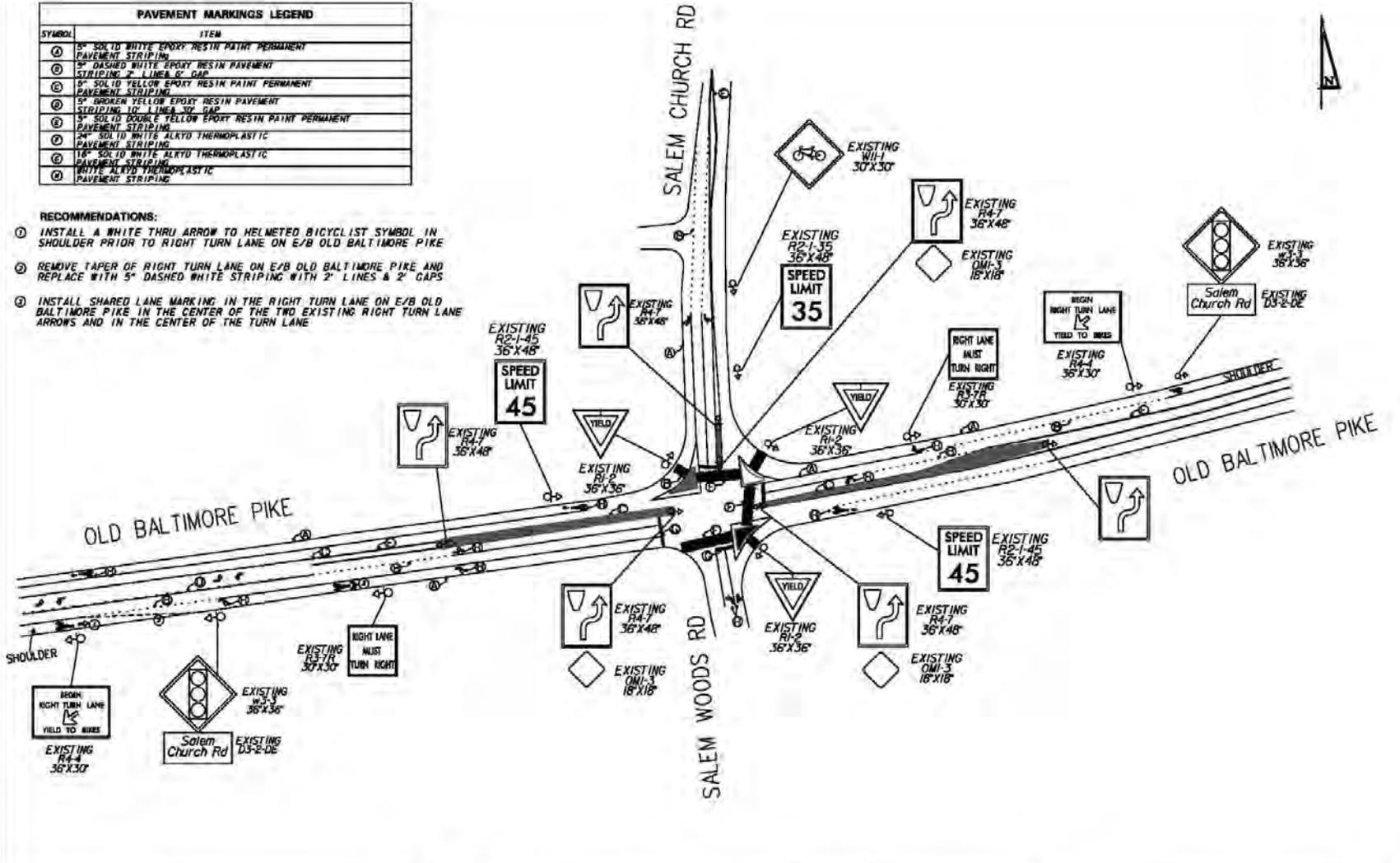
# Appendix D – Striping Plans Used for Field Tests (Actual)



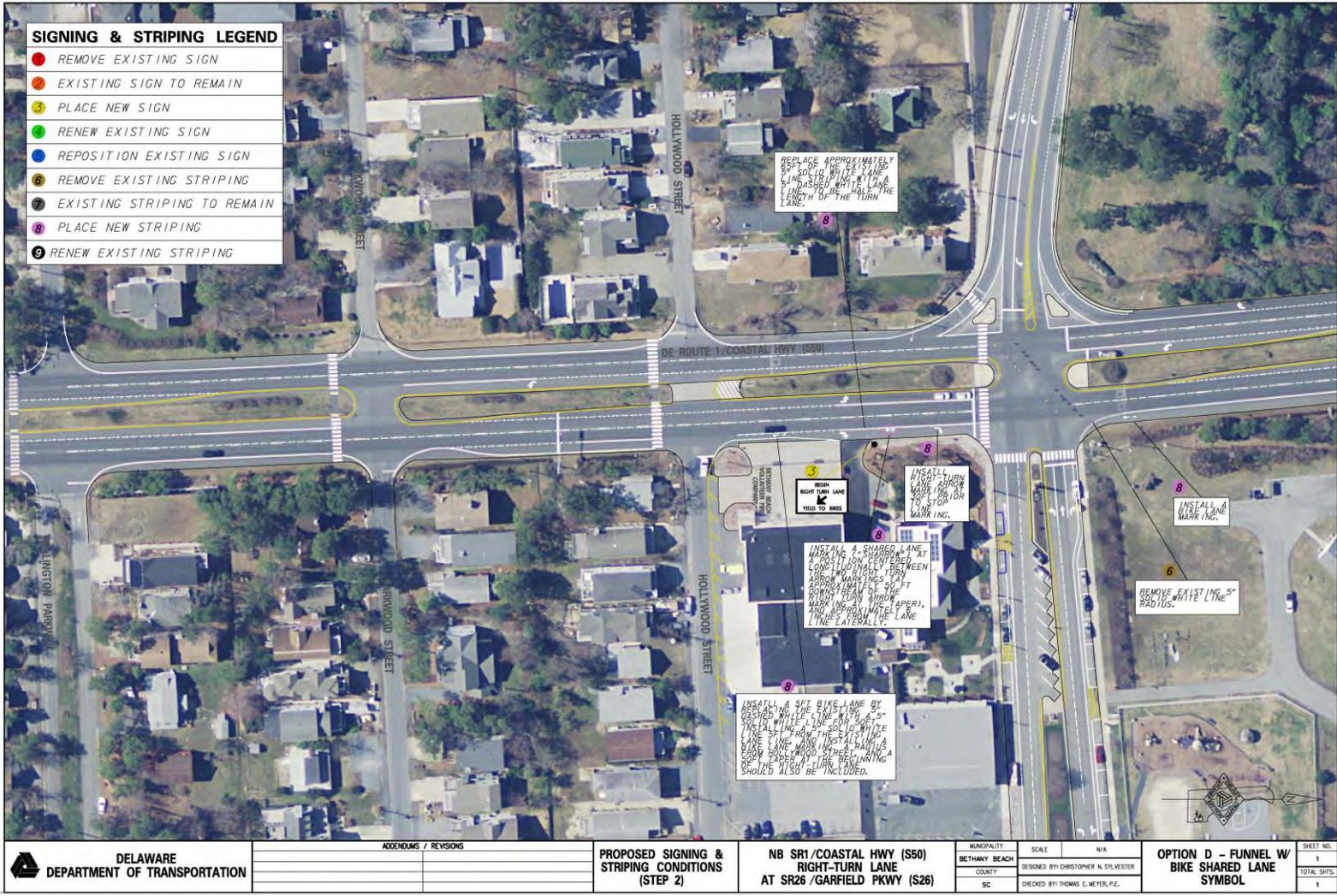
PAVEMENT MARKINGS LEGEND	
SYMBOL	ITEM
①	5" SOLID WHITE EPOXY RESIN PAINT PERMANENT PAVEMENT STRIPING
②	5" DASHED WHITE EPOXY RESIN PAVEMENT STRIPING 2" LINES & GAP
③	5" SOLID YELLOW EPOXY RESIN PAINT PERMANENT PAVEMENT STRIPING
④	5" BROKEN YELLOW EPOXY RESIN PAVEMENT STRIPING 1" LINES NO GAP
⑤	5" SOLID DOUBLE YELLOW EPOXY RESIN PAINT PERMANENT PAVEMENT STRIPING
⑥	24" SOLID WHITE ALKYD THERMOPLASTIC PAVEMENT STRIPING
⑦	16" SOLID WHITE ALKYD THERMOPLASTIC PAVEMENT STRIPING
⑧	16" SOLID WHITE ALKYD THERMOPLASTIC PAVEMENT STRIPING

**RECOMMENDATIONS:**

- ① INSTALL A WHITE THRU ARROW TO HELMETED BICYCLIST SYMBOL IN SHOULDER PRIOR TO RIGHT TURN LANE ON E/B OLD BALTIMORE PIKE
- ② REMOVE TAPER OF RIGHT TURN LANE ON E/B OLD BALTIMORE PIKE AND REPLACE WITH 5" DASHED WHITE STRIPING WITH 2" LINES & 2" GAPS
- ③ INSTALL SHARED LANE MARKING IN THE RIGHT TURN LANE ON E/B OLD BALTIMORE PIKE IN THE CENTER OF THE TWO EXISTING RIGHT TURN LANE ARROWS AND IN THE CENTER OF THE TURN LANE



 <b>DELAWARE</b> DEPARTMENT OF TRANSPORTATION	ADDITIONS / REVISIONS	NOT TO SCALE	OLD BALTIMORE PIKE & SALEM CHURCH RD/SALEM WOODS RD	CONTRACT	SHEET NO.	TEST MARKING- OPTION B MODIFIED	SHEET NO.
	COUNTY			DESIGNED BY:	TOTAL SHEETS		
	CHECKED BY:			DATE:			



**DELAWARE**  
DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS	

**PROPOSED SIGNING & STRIPING CONDITIONS (STEP 2)**

**NB SR1/COASTAL HWY (S50)  
RIGHT-TURN LANE  
AT SR26 /GARFIELD PKWY (S26)**

MUNICIPALITY	SCALE	N/A
BETHANY BEACH	DESIGNED BY	CHRISTOPHER N. SILVESTER
COUNTY	CHECKED BY	THOMAS E. MEYER, P.E.
SC		

**OPTION D - FUNNEL W/  
BIKE SHARED LANE  
SYMBOL**

SHEET NO.	1
TOTAL SHEETS	1

# Appendix E – Final Implementation Memorandum and Striping Plans



STATE OF DELAWARE  
**DEPARTMENT OF TRANSPORTATION**  
800 BAY ROAD  
P.O. BOX 778  
DOVER, DELAWARE 19903

JENNIFER COHAN  
SECRETARY

## MEMORANDUM

**TO:** All Users of the Delaware Manual on Uniform Traffic Control Devices

**VIA:** Mark Luszcz, P.E., PTOE  
Chief Traffic Engineer *ML*

**FROM:** Adam Weiser, P.E., PTOE  
Safety Programs Manager *AW*

**DATE:** April 27, 2015

**SUBJECT:** Interim Guidance; Part 9, Right-Turn Lane Markings for Bicycles

This Interim Guidance to the Delaware Manual on Uniform Traffic Control Devices (MUTCD) provides new figures which depict markings for right-turn lane treatments where space does not exist to provide a dedicated bicycle lane to the left of a right-turn only lane. Bicycles traveling through an intersection are able to travel within the right-turn only lane and continue through the intersection, even if a dedicated bicycle lane does not exist to the left of the right-turn only lane. The markings depicted in the attached figures provide additional guidance to cyclists as they approach these conditions.

Should you have questions concerning the information contained in this interim guidance, please contact my office at (302) 659-4060.

### Added Language

#### **Section 9C.04 Markings for Bicycle Lanes**

*Add the following language after paragraph 14 of Section 9C.04:*

Support:

15 (DE Revision) Title 21, §4196(a)(3) clarifies the position of a bicyclist when operating a bicycle upon a roadway and proceeding straight within a right-turn only lane and allows a bicyclist to travel through an intersection from within a lane designated for right-turns only. Figures 9C-4B and 9C-4C are examples of pavement markings for bicycle movements through a right-turn only lane where space does not exist to provide a separate bicycle lane to the left of the right-turn only lane.



*Guidance:*

16 (DE Revision) *If a right-turn only lane does not exist, the markings shown in Figures 9C-4B and 9C-4C should not be used.*

17 (DE Revision) *If a right-turn only lane exists on a route identified on the State of Delaware Bicycle Map and there is no space available to provide a separate bicycle lane to the left of the right-turn only lane, the markings shown in Figures 9C-4B or 9C-4C should be used to position bicycles approaching and traveling through an intersection.*

18 (DE Revision) *Use Figure 9C-4B for bicycle routes designated as "Suggested Connectors".*

19 (DE Revision) *Use Figure 9C-4C for bicycle routes designated as "State Bicycle Routes" and "Regional Bicycle Routes".*

*Option:*

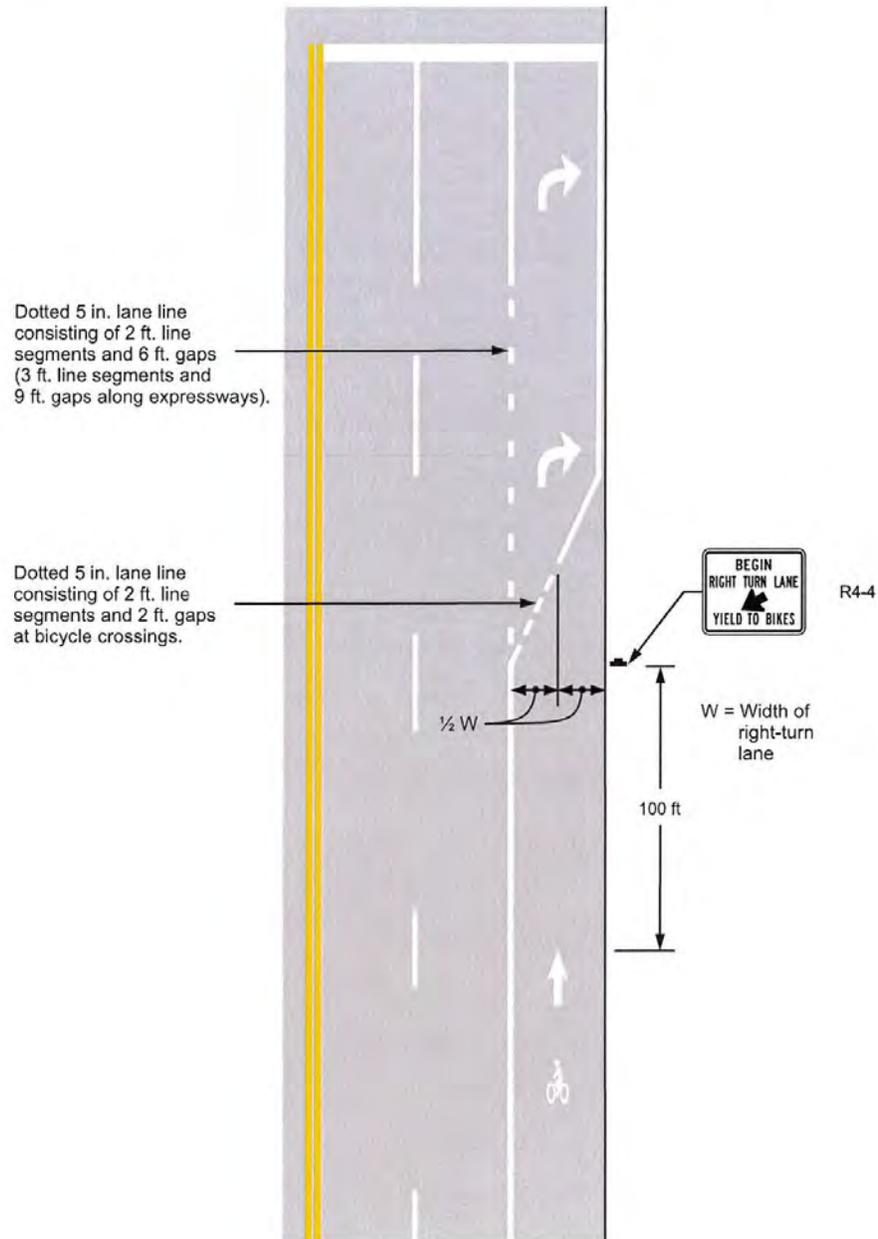
20 (DE Revision) *The placement of pavement markings for bicycle movements through a right-turn only lane on roadway not designated as bicycle routes may be based on Engineering Judgment. If used on these roadways, the markings may be placed in accordance with Figure 9C-4B.*

*Support:*

21 (DE Revision) *The State of Delaware bicycle map can be found at: <http://www.bikemap.com/de/>*



**Figure 9C-4B.**  
**Example of Bicycle Lane Treatment at a Right-Turn Only Lane with Shoulder**  
**(Delaware Revision)**



**Figure 9C-4C.**  
**Example of Bicycle Lane Treatment at a Right-Turn Only Lane with Shoulder**  
**(Delaware Revision)**

