



City of Bellevue Sharrows Project Pilot Study for 161st Ave SE



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March 11, 2009

FHWA Reference: 9-106 (E) – Shared-Lane Markings- Bellevue, WA (HOTO-1)

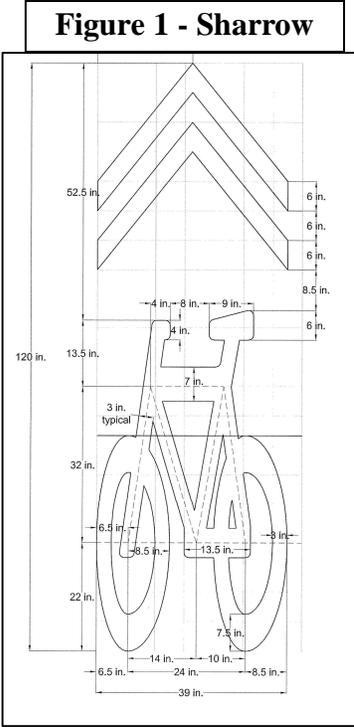
Introduction

The City of Bellevue’s Transportation Department initiated a pilot project in the Fall of 2008 to implement a relatively new type of pavement marking intended to promote and enhance safety for street system users, particularly bicyclists. Since pavement markings are considered to be traffic control devices and can have consequences in the behavior of system users affecting safety, the Federal Highway Administration (FHWA) must approve experimentation of devices not already incorporated in the Manual on Uniform Traffic Control Devices (MUTCD). The City of Bellevue sought and received approval to experiment with the new markings in the Summer of 2008 (See Appendix A). The following report describes the background, need, observations and findings associated with the use of the new pavement markings.

Background and Project Need

The City of Bellevue, situated in the Puget Sound area of Washington State, has a resident population of approximately 120,000. The region has experienced significant growth in recent years and is characterized by a metropolitan urban environment which includes Seattle and numerous other neighboring cities combining to a population of nearly 3 million. With increased growth and the expected increases in congestion into the future, alternative modes of travel to the single occupant car must be considered when developing solutions for the mobility needs of the region. Taking initiatives to enhance the comfort, safety and use of bicycle facilities is a key role an agency can have in this endeavor.

Incorporated in 1953, a good portion of Bellevue’s street system is already built with sidewalk and curb adjoining developed land uses, thus limiting the extent of widening possible for many streets within the city. In most instances, retaining on-street parking and vehicle travel lanes is a necessity for the community and leaves little option for creating new accommodations of bicycle facilities. Other densely populated communities, such as San Francisco, have found similar constraints and have in recent years begun experimenting with a shared lane marking which can be applied within the confines of the existing travel way to promote the safety and use of the roadway as a bicycle route. With these early trials, Bellevue has joined in evaluating the effectiveness of the shared lane bicycle marking, termed “Sharrow”. The Sharrow is a thermoplastic (or painted) white pavement marking showing a bicycle and chevrons as depicted in Figure 1. In general, the Sharrow describes the intended direction and riding placement for the bicyclists and also reminds motorists of the presence of bicyclists and the need to share the roadway under state law.



To further assist in planning for near and long term bicycling accommodations, Bellevue recently updated its Pedestrian and Bicycle Plan. Contained in this Plan is specific guidance on

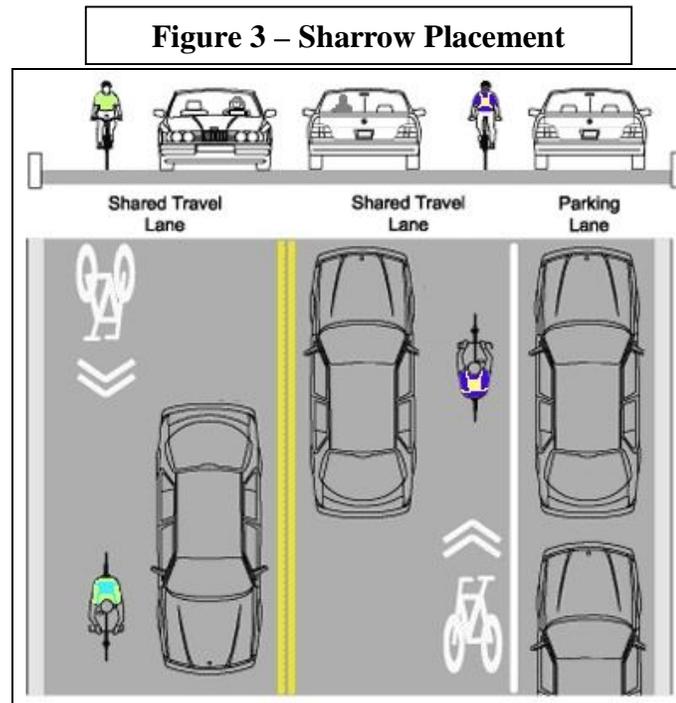
Bellevue's Transportation Department conducted a *before and after study* to consider the benefits and effectiveness of these markings and to further assist in future applications of this treatment. The findings of this evaluation follow:

Before and After Study

Because the use of bicycle shared lane markings, or Sharrows, is not yet recognized by the state of Washington as an approved traffic control device, it is necessary that Bellevue conduct the experimentation of these markings in cooperation with the Federal Highway Administration. Under this guidance, and the City's interest in knowing the benefits of such a marking, a before and after study was conducted by City staff. The focus of the study was to evaluate the behavioral changes that might occur with the new shared lane markings. Unfortunately, due to the timing of implementation occurring in the fall months, some of the post implementation data is not entirely comparable to the pre-implementation period which occurred in late summer. It is intended that further observations will be made as weather improves in the spring and summer of this year. However, a general sense of performance can be gleaned from the data and observations gathered thus far which is described in this report.

Project Design/layout

Several slight variations exist for the Sharrow symbol and layout used by other agencies to date. However, they all generally follow the symbolic layout of a bicycle and chevrons depicted in Figure 3. The placement of this symbol within the travel way is intended to align the bicyclist, in cases where parked cars exist, to ride where the door swing would not pose a hazard. The selected corridor in Bellevue has parking on one side of the street and no parking on the other side. This has offered a unique opportunity to evaluate the Sharrow on the same roadway with a parking and no-parking condition.



The Sharrow pavement markings were placed within the travel way at a spacing of 250 to 500 feet which is consistent with Bellevue's current standards for bicycle lane markings (see Appendix A - FHWA letter). The exact placement within the roadway was based on engineering judgment and marked in the field for the installation crews to follow. In general, placement of the Sharrow is about 11 feet from face of curb where parking exists. For the side with no parking, the Sharrow was placed about 3 feet out from the curb as measured from the center of symbol. This configuration allows much of the vehicle traffic with a wheel base of 6-7 feet to travel comfortably in the lane without running across the Sharrow marking (lane being generally 11 to 12 feet wide). Because maintenance of these markings is a consideration, placement to minimize wear from tires was also a consideration where it could be placed effectively and not compromise safety. The behavior of motorists and bicyclists arising from the placement of the Sharrows is described in the analysis that follows.

Observations and Analysis

A fairly extensive data and observations effort was conducted as part of the City's evaluation of performance for the Sharrows. Tube counters were set in place to record motorized vehicle traffic both before and after the installation. Motorized vehicular speeds were obtained from the tube collection efforts. Video recordings were also made to record the behavior of bicyclists and motorists traveling in the corridor. As a verification check, the tube information on bicycle counts were compared against the video observations and found to be similar but the bicycle data described in this report reflects the observational recordings and not tube information due to its higher accuracy. Staff also had numerous conversations with users of the roadway to gain further perspective on the project.

Unfortunately, due to seasonal variations inherent with bicycle activity, it is challenging to fully judge at this time the effect of the project on bicycle use. The Before data collection effort was conducted under warm weather conditions in late August 2008 while the After data collection effort was conducted in cooler weather conditions in early November 2008. This progress report provides a preliminary look at the operation of the roadway with the new pavement markings and it is our intent to further evaluate the operations during more comparable weather conditions in Spring/Summer 2009.

Thus, the data and comparisons that follow should be considered with measured caution so as to not draw inappropriate conclusions of the Sharrow's affects.

Motor Vehicular Traffic Volumes - Motor vehicular traffic counts were taken within the project limits to determine if shifts in traffic might occur as a result of Bicycle Shared Lane Markings. Table 1 shows the daily and pm peak hour motorized traffic volumes conducted at a location about midpoint on the project. Relatively minor changes in motorized vehicular traffic occurred before and after the project.

Due to the September installation of the markings and time lapse between the Before and After data, it is believed that these relatively minor changes are not statistically significant. The After data's variations are more likely due to typical fluctuations in motorized traffic from

summer (Before data) to late fall(After data) rather than installation of the Bicycle Shared Lane Markings.

Table 1 – Motor Vehicular Traffic Volumes*

	Before	After	Change
Weekday			
AM	144	133	-11
PM	230	203	-27
Daily	2065	1921	-144
Saturday			
AM	132	150	+18
PM	164	145	-19
Daily	1803	1632	-171
*AM and PM represent peak hour periods for two way motorized traffic. Daily represents average 24 hour two way motorized traffic.			

Bicycle Volumes - Bicycle activity was recorded for the before and after study periods. As noted earlier the before data reflects video observations taken in late August 2008 while the after data reflects video observations occurring in early November 2008. The video observations were generally taken during daylight hours from 8:00am to 6:00 pm and are summarized in Table 2.

Table 2 – Bicycle Volumes*

	Before	After	Change
Weekday			
Daylight	56	8	-48
Saturday			
Daylight	N/A	14	N/A
* Daylight is generally 8:00 am to 6:00 pm for study period. Volume above indicates total bicyclists on roadway passing screenline in both directions. Note seasonal influence on data variation.			

The bicycle volumes in Table 2 reflect the number of bicyclists traveling in both directions across a single point located about midpoint on the project. For the weekday data, a series of days (Monday through Friday) were observed by video during daylight hours to arrive at an average weekday volume. No night-time observations were conducted, therefore, the total daily bicycle volume is likely slightly higher than presented here.

Before installation of the Sharrows there was an average of 56 bicyclist on a typical weekday and following installation there were an average of 8 bicyclists on a weekday (the Saturday data was only collected on one day following the installation). As might be expected, the cooler months data in November reflects fewer bicyclists on the roadway and it will be

necessary to revisit this during more warmer seasonal conditions to better compare against the Before data collection efforts.

Motor Vehicular Travel Speeds - The posted speed limit within the project limits is 25 mph. Travel speeds for motorized vehicles were recorded before and after installation of the Sharrows. Although some observation of speed can be made for motorized vehicles and bicyclists from the video recordings it is not readily quantifiable. Therefore, Table 3 below reflects only the speeds of motorized vehicles passing a tube collector gathering speeds in a traditional manner about midpoint in the project. The results in Table 3 reflect the commonly reported term 85th percentile speed (15% of motorists are traveling beyond this speed). These actual travel speeds are typical for the posted speed limit condition and no changes in travel speeds occurred with the project.

Table 3 – Motor Vehicular Speeds (mph) *

Direction	Before		After		Change
	SB	NB	SB	NB	
Speed	31	32	31	32	0
*Speeds reflect 85 th percentile.					

Bicycle Travel Speeds - Gathering travel speeds for bicycles were initially attempted with tube recorders on the pavement but the data was not usable. Additional efforts to gather data on bicycle speeds will be made in the coming months.

Road Area Usage Observations – Prior to the installation of the Sharrows, a video camera was set up in the corridor to record observations of road users with a primary focus on the cyclist position within the roadway. The roadway was divided into five segmented areas for tracking purposes so that rider position in the roadway could be observed and compared for the before and after conditions. Figure 4 shows these segmented areas.

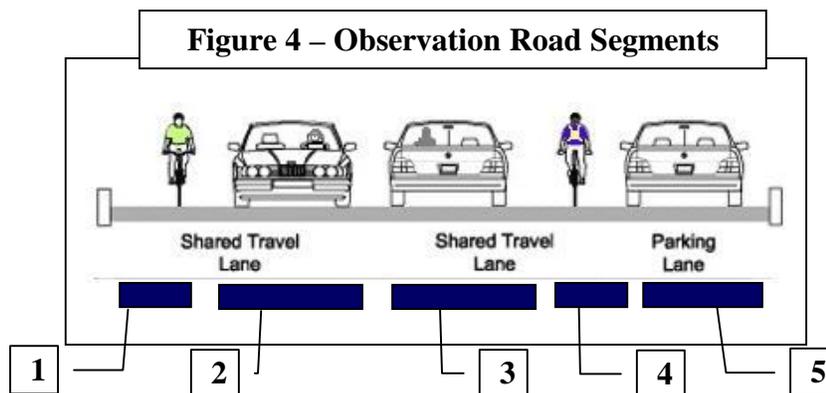


Table 4 describes the placement of cyclists within the roadway for the before and after condition. It is important to note that the designated parking lane in the northbound direction (right side of picture in Figure 4) is adjacent to single family homes and during most of the daylight hours parked vehicles are infrequent along the route, thus allowing bicycle use over much of the parking lane area.

Table 4 – Cyclist Position within Roadway

Road Areas*					
Study Period	Area 1	Area 2	Area 3	Area 4	Area 5
Before	39 (27%)	11 (8%)	3 (2%)	33 (23%)	57 (40%)
After	25 (36%)	2 (3%)	1 (1%)	12 (42%)	12(18%)

* Before data was collected over 3 weekdays, Wednesday, Thursday and Friday during daylight hours. The After data includes all data collected over a Thursday through Tuesday period. A comparison of weekday vs. weekend for the after data was conducted and the general trend was similar.

As shown in Table 4, on a percentage basis, cyclists appear to be riding more so over the areas of the Sharrows increasing from 50% to 78% following their installation (areas 1 and 4). The percentage of bicyclists riding in the travel lanes went from 10% to 4% (areas 2 and 3) after implementation of the Sharrows. Further, cyclists riding in the parking lane also decreased from 40% to 18% after the Sharrow installation.

Although these results tend to reflect positive shifts in use and improvements in eliminating undesirable behaviors, caution must be exercised to not overstate the affect of the Sharrow in these circumstance. There remain some unintentional discrepancies between time periods of when the data was collected, i.e. weekday vs. weekend and summer weather vs. fall weather conditions. It is hoped some of this will be better normalized in future data collection efforts to have a more consistent comparison of before and after conditions. Additional observations will occur in the approaching months as well as another trial site being selected for implementation in 2009. This additional site will offer more opportunities to compare before and after conditions in Bellevue.

Accident Review – Accident history was reviewed within the project limits using Bellevue’s accident database which tracks recorded police reports for incidents occurring within the public right-of-way. Because accident occurrence often tends to be sporadic, it can be difficult to establish trends or contributing factors in very short timelines as we have for the follow-on time period of the Sharrows. Nonetheless, a 4-month period of review was conducted for before the installation and after the installation to verify there were no safety concerns with the application of Sharrows. The accident data, albeit limited, did not show any areas of concern. In fact, there have been no accidents in the 4 month timeline following the Sharrow project. While in the prior 4 month timeframe there were 2 accidents, neither of which were bicycle related. A review of a more extended period of time was also conducted for the corridor prior to the installation and no reoccurring trends or concerns arose. In the coming months, as a longer study period becomes available, an update of the accident review will be conducted.

Anecdotal Observations – Bellevue is fortunate to have the capacity to video tape conditions over an extended period of time and log the specific occurrences of bicyclist and motorists activity for later playback. With engineering staff viewing the selected log times, we were able to readily observe various behaviors in the roadway.

From the video recordings the following reflects a few of the observations made:

BEFORE:

- Bicyclists riding southbound in the northbound vehicle travel lane
- Young age bicyclists riding in middle of roadway
- Bicyclists riding on sidewalk
- Bicyclists riding on shoulder and swerving around parked vehicles
- Large groups of riders using entire vehicle lane
- Riders jumping back and forth between sidewalk and shoulder/roadway

AFTER:

- Fewer instances of riding around parked cars
- Fewer instances of wrong way direction riding
- Drivers more aware of cyclists on roadway as observed providing more buffer while passing
- Groups of riders tend to ride more single file than previously
- Cyclists providing more buffer/space to parked cars

Although, fewer bicyclists were observed following the Sharrow installation due to seasonal conditions, there is a sense from the observations that the Sharrow markings have improved safety for bicyclists by making motorists more aware of the corridor as a bike route and assisting in improving buffer spaces between cars and bicyclists. More observations will be made in the coming months to complement the work conducted thus far.

Other Candidate Sites and Next Steps

As described in the City's application to experiment with Sharrows, two other candidate corridors are being considered for the next implementation stages. The likely candidate for the next Sharrow project will be further north of this initial pilot project along the same corridor alignment. The exact limits are yet to be determined but is generally described in the map in Appendix A. The Transportation Department anticipates implementing this next project in the summer of 2009.

Findings and Conclusion

Bicycle shared lane markings, or Sharrows, are a relatively new treatment intended to raise driver awareness of the presence of cyclists within the roadway as well as help guide bicyclists in terms of desired rider placement to improve safety and operating conditions for all roadway users. Although the application of these markings has only been implemented by a handful of agencies across the country, many are finding that it is achieving the desired intention. Studies from other agencies are documenting the success of these markings and Bellevue's initial trial of Sharrows appear, thus far, to be very much in keeping with the experiences of these other agencies.

The application of Sharrows on a roadway with parking on one side and no-parking on the other has offered a unique perspective for observation of motorists and cyclist behavior. However, much of this behavior is difficult to fully quantify and staff in preparing this report has interjected some observations from viewing many hours of video tapings for the before and after conditions. General trends can be determined from the observations as well as identifying areas for improvement. Perhaps a closer spacing of the Sharrow markings or introduction of signing to compliment the corridor as a bike route may be considered in future assessments of this and other corridors. With more time and observation, additional conclusions can be made on the benefits and areas for improvement.

It is important to recognize, Sharrow markings are not intended to be a replacement of a bike lane where one can reasonably and cost effectively be provided. However, where constraints exist that limit the ability for additional road widening, the Sharrow can be a measured improvement over existing conditions as found in the early review of this project and other agencies' applications of the treatment.

In summary, the application of Sharrow markings are showing promising results and give rise to continuing this application on other roadways that are not feasible for widening. Early indications, primarily by way of numerous observations, are that it does promote the increased comfort and safety of cyclists while affirming to motorists the need to share the roadway with bicyclists under state law and reduce the friction between motorists and cyclists often experienced under shared travel lane facilities.

APPENDIX A

- FHWA Request to Experiment Letter from City (May 30, 2008)
- FHWA Approval Letter to Experiment (June 13, 2008)
- Public informational flyer to surrounding community (September 2008)
- Bellevue Transportation Commission Memorandum on Sharrow Status (November 4, 2008)



Post Office Box 90012 • Bellevue, Washington • 98009 9012

May 30, 2008

Federal Highway Administration
Office of Transportation Operations
400 Seventh Street, SW, HOTO
Washington, DC 20590

SUBJECT: Request for Permission to Experiment with Installation of Shared Lane Bicycle Markings (Sharrows)

To whom it may concern:

Pursuant to the Manual on Uniform Traffic Control Devices (MUTCD) Section 1A.10, the City of Bellevue requests permission to experiment with installation of pavement markings commonly referred to as Sharrows. The subject pavement markings are a combined bike and chevron symbol that delineates where both bicyclists and motorists will share a travel lane.

The following information outlines the project proposal and provides the information required in the MUTCD for Section 1A.10 Interpretations, Experimentations, Changes and Interim Approvals.

A. Nature of the Problem:

The City of Bellevue is a fast growing suburb with diverse land uses in employment, residential and commercial/retail areas. The resident population is about 120,000 with a daytime workforce exceeding 130,000. There exists many opportunities for non-motorized connecting trips both within the city and connections to neighboring cities.

Incorporated in 1953, Bellevue spent its first few decades building its transportation infrastructure with relatively little emphasis on providing designated bicycle lanes or pavement markings to support bicycle travel. This older infrastructure, with its built-out sidewalks and on-street parking on occasion, have limited the ability to retrofit and fully accommodate bicycle travel in certain corridors. In some instances, this older infrastructure precludes reconstructing sidewalk or making other street modifications to accommodate bicycle travel via a striped bicycle lane or facility.

In recent years, the City of Bellevue has made an increasing commitment to enhancing and promoting bicycle travel. Bellevue is currently updating its Pedestrian and Bicycle Plan which identifies many routes throughout the city to not only be inclusive of bicycle use but promote greater awareness and safety for bicyclists. This plan will also be the building block for funds allocation and roadway treatment options benefiting bicyclists.

The City of Bellevue currently utilizes traffic control devices such as bike signing and bicycle symbols for its bicycle lanes as allowable in the MUTCD. However, for certain older more

established streets it would be impractical to modify the street in a manner that would utilize the limited treatments in the current MUTCD. An alternative from the currently adopted bicycle treatment standards is clearly needed in certain street segments.

Some cities across the country have begun experimenting with various pavement marking treatments to improve safety and raise awareness of bicycle use in a corridor where standard bicycle lanes can not be provided. Based on trials currently in progress by other city's, the City of Bellevue's Transportation Department finds merit in considering a new pavement marking treatment, which is not available in the current MUTCD, in an effort to improve safety and operating conditions for bicyclists. This alternative treatment would be a shared lane bicycle marking legend commonly referred to as a Sharrow. It is our understanding that the Sharrow is being considered for the next edition of the MUTCD but that it may be considerably more time before it is adopted as a standard. Hence, this request for experimentation of the shared lane bicycle marking.

B. Description of Proposed Experiment:

The City of Bellevue has identified three street segments within its jurisdiction which would be candidates for the Sharrow pavement marking treatment. The attached map in Figure 1 shows the location of the corridors and the approximate limits affected. Figure 2 depicts the Shared Lane Bicycle Marking or Sharrow.

The Sharrow pavement markings are proposed to be placed within the travel way at spacings of about 250 to 500 feet which is consistent with Bellevue's current standards for bicycle lane symbol markings. The placement within the roadway would vary depending on the presence of on-street parking, lane width and other factors.

An example of a possible Sharrow placement is depicted in Figure 3 where on-street parking exists. This is a conceptual layout and small deviations based on Engineering Judgment may occur when implemented. Placement of the Sharrow at 11 feet from face of curb, as depicted in figure 3, is consistent with other cities practices. This placement encourages bicyclists to ride outside the door swing of parked cars while reminding drivers that they are required by Washington state law to share the roadway with bicyclists.

Bellevue's Transportation Department intends to prepare project plans and specifications for use by a contractor to install the Sharrow pavement markings. It is our intent that the three street segments be implemented in three distinct yearly cycles giving an opportunity to review and assess the conditions of prior implementation efforts. This phasing sequence is described in more detail below.

C. Illustration of Shared Lane Bicycle Marking (Sharrow):

See Figure 2 for an illustration of the Sharrow.

D. Supporting Data on Development and Use

An increasing number of cities across the country have or are currently experimenting with shared lane bicycle markings on roadways. One study in particular, performed for the City of San Francisco (CA), demonstrated the shared lane bicycle markings had a positive impact on

motorist and bicyclist behavior, position and safety. The study also resulted in the adoption of the Sharrow pavement legend as an allowable marking treatment by the California Traffic Control Devices Committee.

In recent months, the City of Seattle (WA) located immediately west of the City of Bellevue has implemented approximately 12 miles of these pavement marking treatments with plans for additional coverage in the coming year. Thus far, the use of these markings have been well received by bicyclists and the community at large.

E. Patent and Copyright Statement

The Shared Lane Bicycle Marking (Sharrow) as depicted in Figure 2 is not copyrighted. Cities including Denver (CO), Portland (OR), San Francisco (CA), Gainesville (FL), Cambridge (MA), Fort Collins (CO), Oakland (CA), Alexandria (VA), and Seattle (WA) have experimented with this marking, which would imply there is no patent protection for this symbol. The latest proposed revisions to the MUTCD have included this symbol as well which also support unrestricted (but guided) use of the symbol in the future assuming these revisions are maintained in later adopted versions of the MUTCD.

F. Time Period and Locations for Experimentation

The City of Bellevue proposes to separate the three candidate corridors in timeline so the first street segment selected has the greatest opportunity for success and acceptance by the public. As shown in Figure 1, the first segment would be the 161st Ave SE corridor. This segment has two travel lanes with on-street parking which is striped on one side of the road. Bellevue's Transportation Department intends to implement this first segment this year with the other two street segments (i.e., Main Street and 164th Ave) considered for implementation following our assessment of the initial corridor's performance.

These streets were chosen with consideration given to the following factors:

- Selection of at least one key North/South and one key East/West corridor in the City's updated Pedestrian/Bicycle Citywide Plan
- Opportunities for use of a shared lane marking symbol where current street infrastructure is effectively built out and modification of the roadway section is impractical to include marked bike lanes
- Posted speed limit of 30 mph or less.
- Opportunity for evaluating a shared lane marking in conjunction with on-street parking
- Traffic volumes below 10,000 ADT.
- Relatively active bicycle use in corridor.

G. Research and Evaluation Plan

The City of Bellevue Transportation Department will conduct the experiment placing the Sharrows on the aforementioned candidate streets and in the timeline expressed herein.

The planned monitoring and evaluation process is as follows:

1. The City of Bellevue will install Sharrows on 161st Ave SE within the limits shown on Figure 1.
2. Legends will be applied at a typical rate of 250 to 500 foot spacing depending on specific characteristics of the segment.
3. Signs specifically associated with the Sharrows will not be placed at each legend at this time in keeping with common practice of other agencies experimenting with the legends. However, an introductory or informational sign may be provided at beginning and end of the project limits. The sign colors and messaging, if used, would be consistent with allowable guidance already contained in the MUTCD.
4. Bicycle lane markings consistent with Bellevue's standard practices and depicted in Figures 4 and 5 will be pursued in several segments. There are portions of some streets which afford the ability of marking the travel way with a designated bike lane. This will be beneficial in observing driver and bicyclists behavior within the same corridor and under the two distinct pavement marking treatments.
5. Data collection will be conducted for time periods before and during the experimentation. Data will include traffic volumes, speed studies, and observations. The City's Transportation Department will video record at least one segment to include both directions of travel for later playback and observation of activity in the roadway. Observations of driver and bicyclists behavior will be noted and summarized.
6. Progress statements will be prepared as necessary to document the ongoing conditions of the experimentation. A final report will be prepared by Bellevue's Transportation Department and submitted to FHWA.

H. Application Restoration

The City of Bellevue Transportation Department agrees to restore the affected areas within three months following the end of the time period of the experiment and terminate the experiment as required in Section 1A.10 if an unsafe condition develops. If the experiment appears successful, the City of Bellevue may apply Shared Lane Bicycle Markings (Sharrows) to additional streets in its bicycle network plan to test similar conditions. In addition, the City of Bellevue may further support the inclusion of these markings in the next edition of the MUTCD.

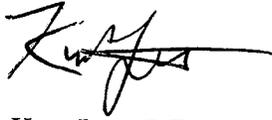
I. Progress Reports

The City of Bellevue agrees to provide progress reports as necessary during the term of the experimentation. A final report will also be prepared and submitted to FHWA within 3 months following completion of the experimentation.

In closing, the goal of this project is to improve safety and operations for bicyclists where bicycle lanes are not feasible. The City of Bellevue intends to utilize shared lane bicycle markings (Sharrows) only after other possibilities that would allow marked bicycle lanes to occur have been explored.

We appreciate FHWA's review of this matter and if there are any questions, I can be reached at 425-452-6020 or email klatt@bellevuewa.gov.

Sincerely,



Kurt Latt, P.E., PTOE
Senior Transportation Engineer
Bellevue Traffic Engineering Division

Attachments:

- Figure 1 – Sharrow Bicycle Corridors
- Figure 2 – Sharrow (Shared Lane Marking)
- Figure 3 – Example Placement of Sharrows
- Figure 4 – Bellevue Standard Drawing TE-17 Bicycle Lane Channelization
- Figure 5 – Bellevue Standard Drawing TE -20 Bike Lane Marking

cc: Goran Sparrman, P.E., Director, City of Bellevue Transportation Department

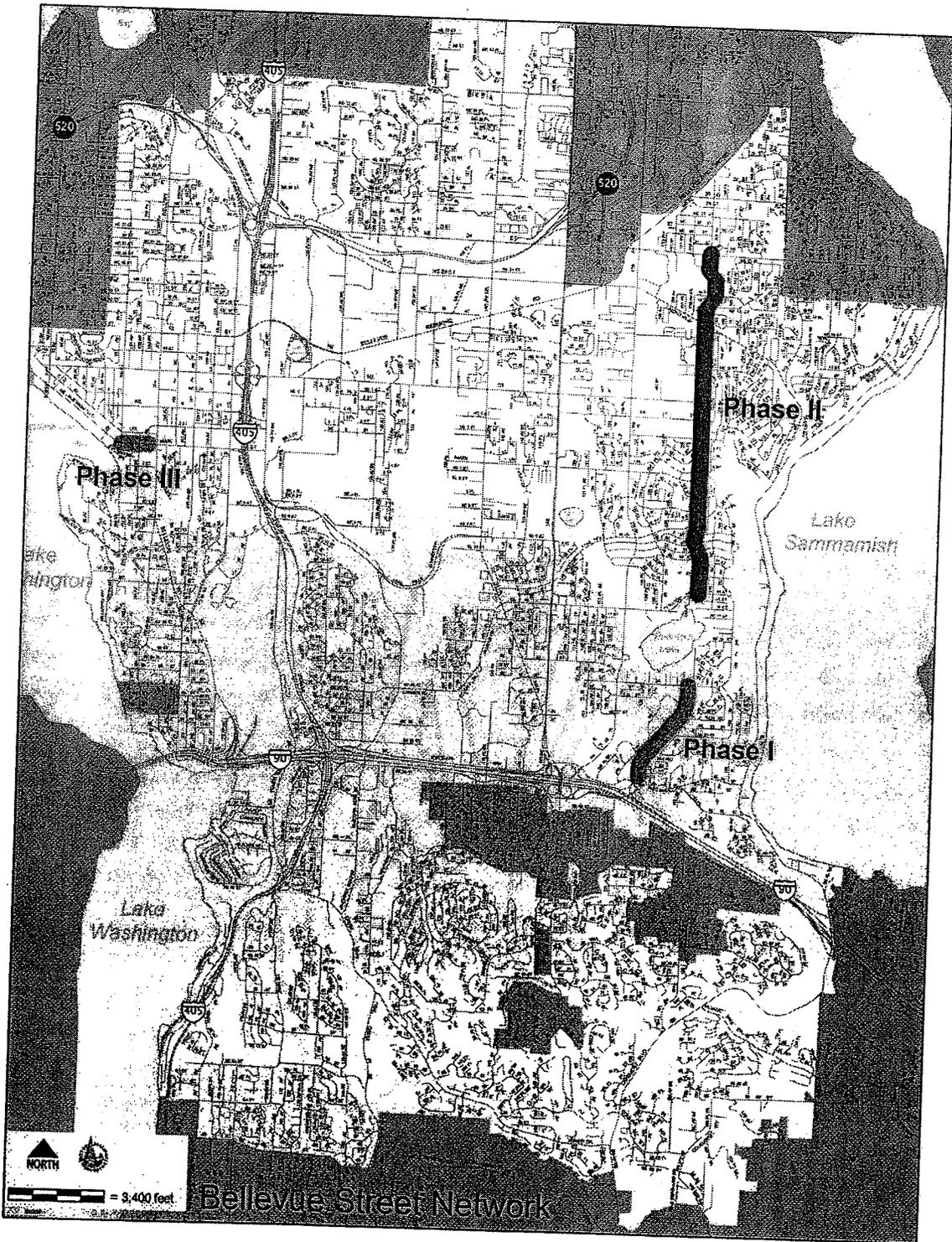


Figure 1
Sharrow Bicycle Corridors

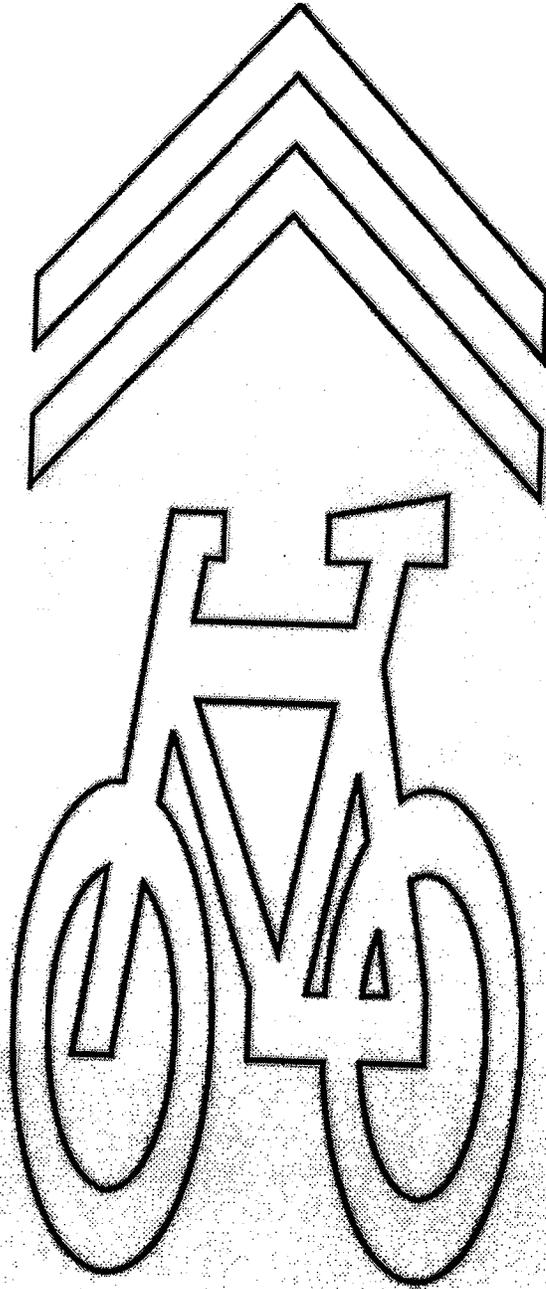


Figure 2
Sharrow
(Shared Lane Marking)

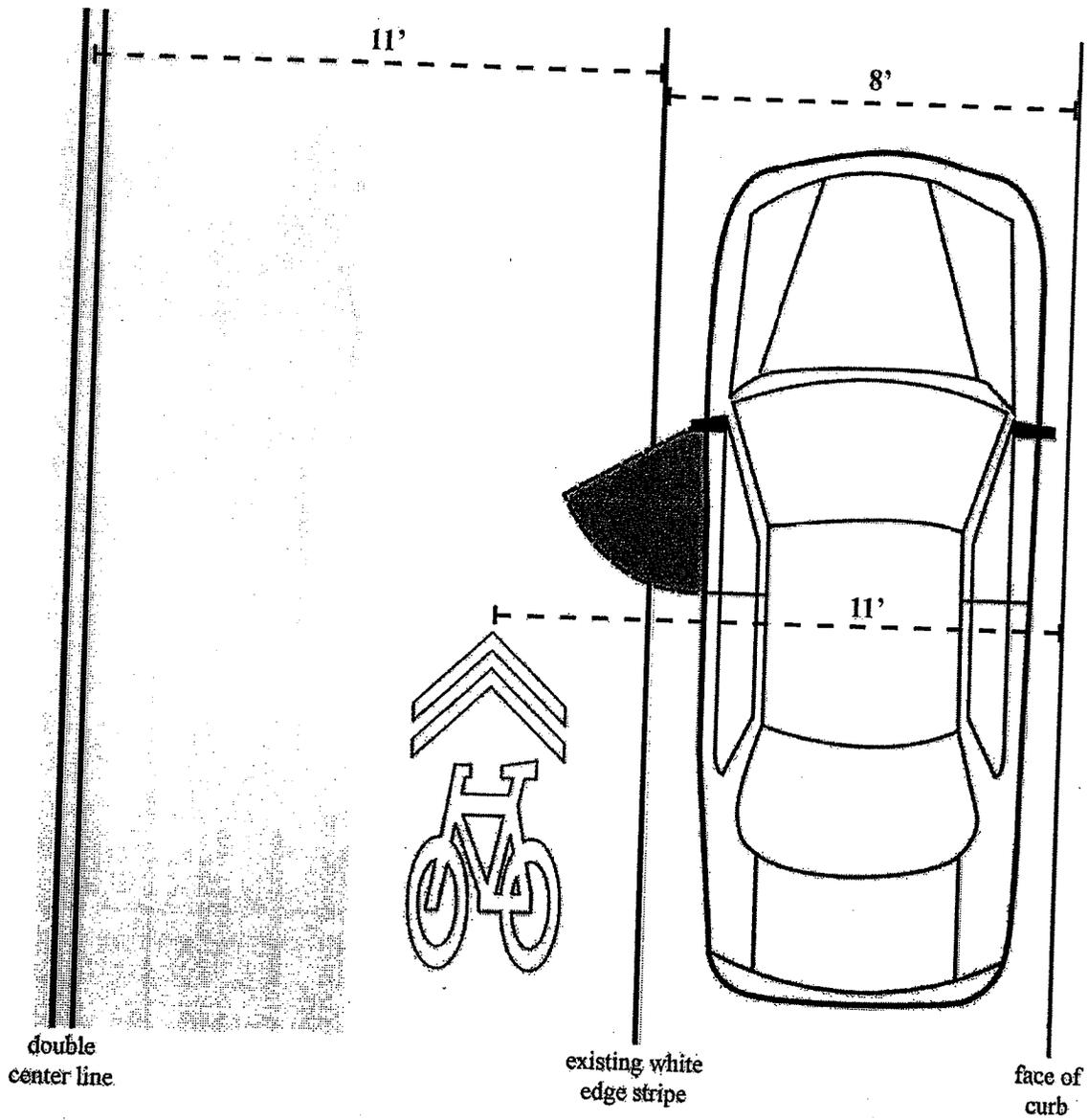
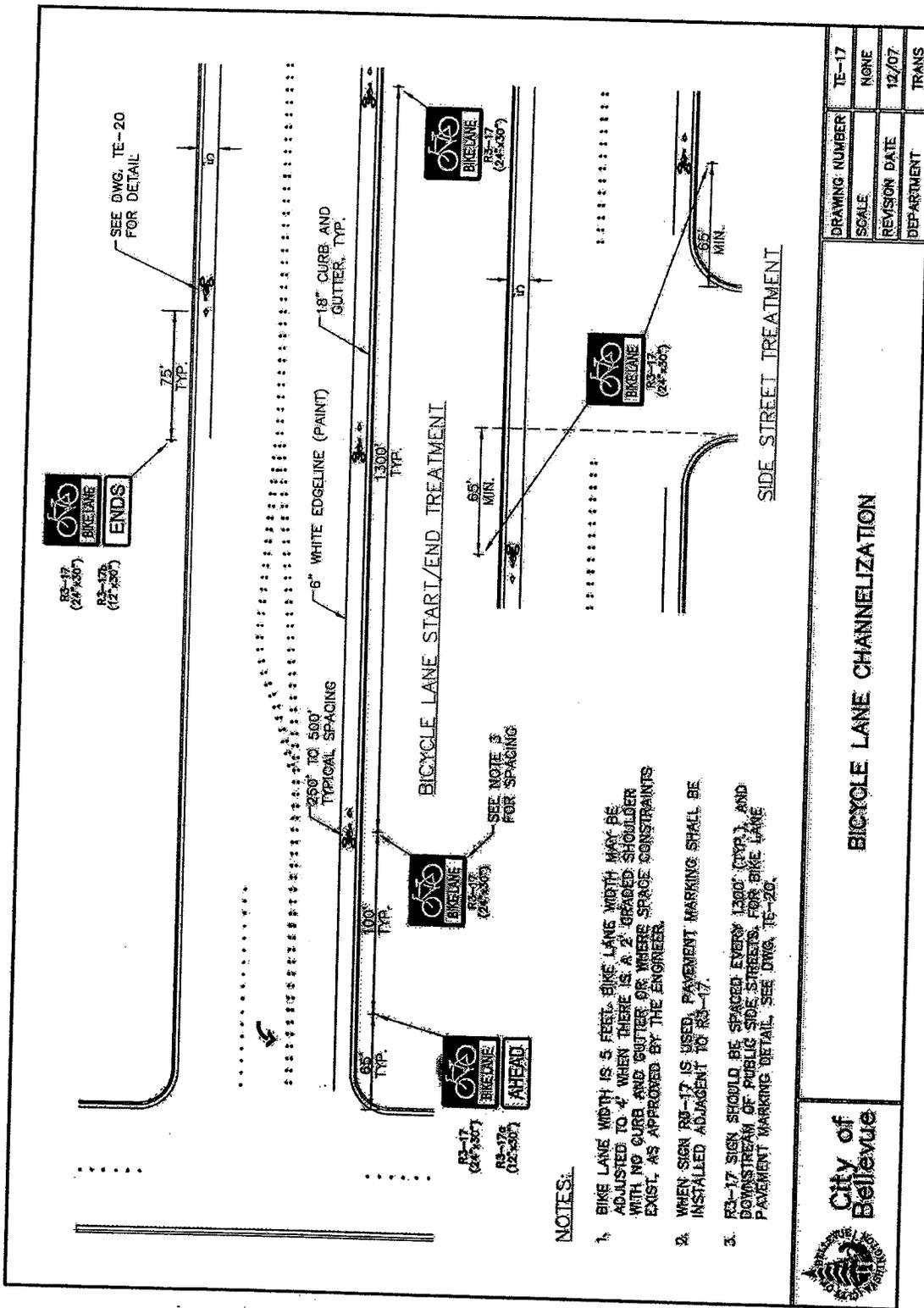


Figure 3
Example Placement of Sharrows



DRAWING NUMBER	TE-17
SCALE	NONE
REVISION DATE	12/07
DEPARTMENT	TRANS

BICYCLE LANE CHANNELIZATION

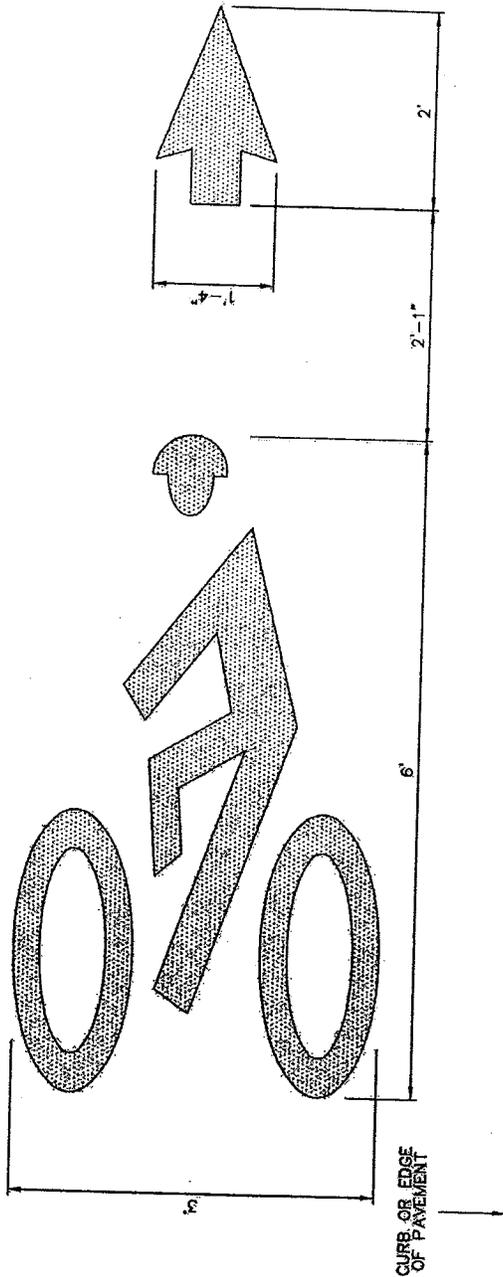


- NOTES:**
1. BIKE LANE WIDTH IS 5 FEET. BIKE LANE WIDTH MAY BE ADJUSTED TO 4' WHEN THERE IS A 2' BARED SHOULDER WITH NO CURB AND OUTER OR WHERE SPACE CONSTRAINTS EXIST, AS APPROVED BY THE ENGINEER.
 2. WHEN SIGN RS-17 IS USED, PAVEMENT MARKING SHALL BE INSTALLED ADJACENT TO RS-17.
 3. RS-17 SIGN SHOULD BE SPACED EVERY 1300' (TYP.) AND DOWNSTREAM OF PUBLIC SIDE STREETS. FOR BIKE LANE PAVEMENT MARKING DETAIL, SEE DWG. TE-20.

Figure 4
Bellevue Typical Bike Lane Channelization

NOTES:

1. BICYCLE LANE MATERIAL SHALL BE LOW PROFILE PREFORMED THERMOPLASTIC (90 MIL.).
2. DIMENSIONS: ADJUSTMENTS TO DIMENSIONS SHALL BE APPROVED BY THE ENGINEER.



BIKE LANE MARKING

DRAWING NUMBER	TE-20
SCALE	NONE
REVISION DATE	12/07
DEPARTMENT	TRANS

Figure 5
Bellevue Bike Lane Markings



U.S. Department
of Transportation
**Federal Highway
Administration**

1200 New Jersey Avenue, SE.
Washington, DC 20590

June 13, 2008

In Reply Refer To: HOTO-1

Kurt Latt, P.E., PTOE
Senior Transportation Engineer
City of Bellevue
Post Office Box 90012
Bellevue, WA 98009-9012

Dear Mr. Latt:

Thank you for your May 30, 2008 letter requesting permission to experiment with shared-lane symbol pavement markings on three street segments in the City of Bellevue.

We have reviewed your request. Your request for experimentation is approved, and we look forward to receiving your quarterly progress reports and your final evaluation report at the end of the study period. For recordkeeping purposes, we have assigned the following official experimentation number and title: "9-106(E)—Shared-Lane Markings – Bellevue, WA." Please refer to this number in future correspondence.

Thank you for your interest in improving the operational capability and traffic safety for bicyclists through the use of the shared-lane markings.

Sincerely yours,

/s/ *Hari Kalla*
(for)

Robert Arnold
Director, Office of Transportation
Operations

MOVING THE
AMERICAN
ECONOMY





Here's What's Happening

SEPTEMBER 2008

COMING SOON to 161st Avenue SE: SHARROWS



Sharrows are pavement markings installed within travel lanes, alerting motorists they should expect to see and share the lane with bicyclists. In addition, sharrows help bicyclists position themselves in the lanes, in such a way that motorists are able to safely pass them.

The Transportation Department will begin a pilot project installing sharrows on 161st Avenue SE between SE 24th Street and Eastgate Way by the end of October, weather permitting. The markings, which include a bicycle legend with arrows at the top, will be placed every few hundred feet on the pavement. There will be no other striping, signing or parking changes.

Bellevue recognizes the importance of improving bicycle safety while maintaining on-street parking in certain areas. Sharrows offer a promising way of accomplishing this at a relatively low

cost. These markings have been successfully used in other cities across the country, including Seattle, and will be evaluated here in Bellevue over the next six months.

For more information: Contact Kurt Latt, senior transportation engineer, at 425-452-6020 or email klatt@bellevuewa.gov.

What do sharrows mean for bicyclists and drivers?

Bicyclists:

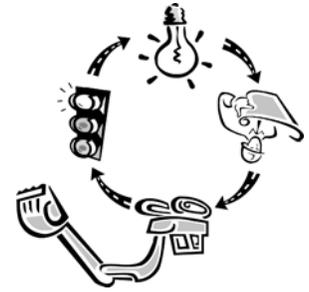
- Use the sharrow to guide where you ride within the lane – generally through the center of the sharrow when safe to do so.
- Remember not to ride too close to parked cars – watch for opening doors
- Be aware of your surroundings and follow the rules of the road

Drivers:

- Expect to see bicyclists on the street
- Remember to give bicyclists space when passing
- Be aware of your surroundings and follow the rules of the road



ECRWSS POSTAL CUSTOMER

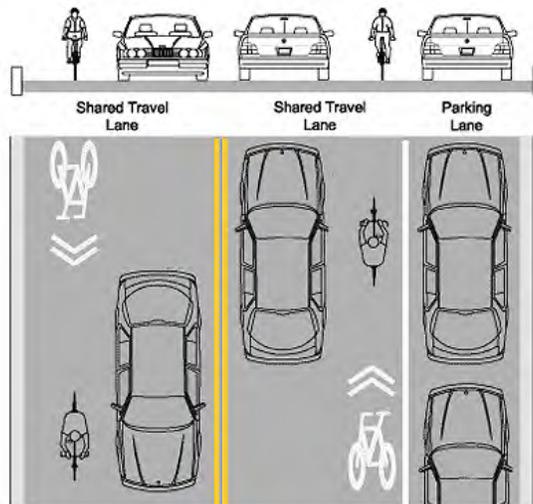


Sharrows
161st Avenue SE

PRSRF STD
US Postage
PAID
Bellevue, WA
Permit No. 61

City of Bellevue
Transportation Department
PO Box 90012
450 110th Avenue NE
Bellevue WA 98009-9012

What will sharrows look like on 161st Avenue SE?



Existing travel lanes and parking do not change
(Heading north on 161st)

Title VI Notice to the Public It is the City of Bellevue's policy to assure that no person shall on the grounds of race, color, national origin or sex, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participating in, be denied the benefits of, or be otherwise discriminated against under any of its federally funded programs and activities. Any person who believes his/her Title VI protection has been violated may file a complaint with the Title VI Coordinator. For Title VI complaint forms and advice, please contact the Title VI Coordinator at 425-452-4270.



MEMORANDUM

TO: Transportation Commission
FROM: Kurt Latt, P.E., PTOE, Senior Transportation Engineer
DATE: November 4, 2008
SUBJECT: Bicycle Shared Lane Markings – *SHARROWS* Pilot Project

Introduction

This memorandum provides a brief summary of a pilot project in Bellevue which installed bicycle shared lane markings, commonly referred to as Sharrows, on 161st Ave SE between SE 24th St and Eastgate Way SE. The picture below shows the recent Sharrow installation.



Sharrow Install in Bellevue
Looking Southbound on 161st Ave SE

This project was initiated to provide additional options for raising awareness of bicycle use along certain corridors and improve the safety and operating conditions of designated bicycle routes. The Sharrow project recently implemented in September of this year is the first use of this type of pavement marking in Bellevue. Early observations of the Sharrows are promising which may lead to more use of these markings in other key bicycle routes. The background for Sharrow use, initial performance and possible future plans are further described in this memorandum.

Background

Prompted by the update of the City's Pedestrian and Bicycle Plan and increasing interest to improve safety and operating conditions for bicycle travel throughout the city, staff have been exploring various options to expand upon its "toolbox" of traffic control devices. State, County, and City agencies are required to follow the practices outlined in the Manual On Uniform Traffic

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Control Devices (MUTCD) when implementing features such as signs and pavement markings. Because the Sharrow is not yet an approved device in the MUTCD, the City of Bellevue sought and received permission from the Federal Highway Administration (FHWA) to perform a pilot project with the Sharrows. About a dozen cities across the country have also performed similar Sharrow projects which has made the approval process more streamlined than other exceptions to the MUTCD. Other agency experiences with the Sharrows are still being documented in many cases as it is a relatively new application and staff continues to research information as it becomes available. The attached letter to FHWA (May 30, 2008) better describes the background, placement of Sharrows, planned monitoring, and other aspects required within the standard format submission to FHWA.

Project Status

The City's first Sharrow project was implemented for the segment of 161st Ave SE between SE 24th St and Eastgate Way SE in September 2008. The public outreach for the project included community flyer distribution (attached), door hangers, project listing in the city paper as well as numerous one-on-one conversations arising from the various field visits while designing the project.

As described in the letter to FHWA, this segment of 161st Ave SE was selected as a candidate site considering such factors as:

- consistency with the Ped/Bike Plan update and its key north/south, east/west corridors;
- constraints such as existing sidewalk, on-street parking, or native growth areas which would severely limit road widening in the future;
- traffic volumes which are not excessively high (below 10,000 ADT), yet sufficiently heavy to merit additional improvements. This essentially precludes Major Arterials and very low volume residential streets as candidates;
- relatively active bicycle use in corridor. It's important, particularly with the first use of the Sharrow, that the project be conducted on a roadway where drivers routinely see bicycle use.

With the above in mind, 161st Ave SE became a uniquely favorable candidate to observe the City's initial test for the Sharrow pavement marking. A key consideration was 161st Ave SE having on-street parking in the northbound direction only. This has allowed study of the Sharrow on the same roadway for a parking and non-parking condition. The Transportation Department has installed a temporary camera to video tape the "before" installation condition and is in the process of collecting the "after" condition observations and data.

One of the performance measures being considered is assessing the area being ridden by bicyclists within the travel way. With the "before" video taping, there were some bicyclists riding opposite direction to traffic or near parked car doors. The Sharrow depicts a type of chevron/arrow which should help reduce wrong way travel behaviors. The Sharrows are also placed in a manner that guides separation from the parked car doors swing to remind bicyclists of this potential hazard. In regards to the motorists, the Sharrow should remind drivers of the presence of bicyclists and to

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encourage drivers to provide adequate separation while passing bicyclists. Additionally, online feedback from other agencies using Sharrows suggests the markings promote greater good will between drivers and bicyclists and reduce confrontational or adverse behaviors.

Research on other agencies using Sharrows as well as initial observations are encouraging so far. Some positive feedback has been provided by bicyclists as well as nearby residents which appreciate the City's recognition for the importance of maintaining parking in these neighborhoods while promoting bicycle safety.

It must be emphasized, however, in light of the initial positive findings, that the Sharrow should not be considered an easy remedy applicable to improving many of the shortcomings of the broader bicycle system. Like any traffic control device, it has an appropriate place and circumstance for use with limitations on its benefits. The Sharrow does not substitute for a five-foot wide marked bike lane, for instance, where one can reasonably be provided in a highly used bicycle route. Having the separation afforded by a bike lane in certain corridors is important for the integrity of the system and caution must be exercised by staff, elected officials and the community to not overstate the applicability or benefit of a shared lane marking such as the Sharrow.

Future Activities

Having been in place for about one month, it is too early to fully ascertain the benefits or possible negative aspects associated with the Sharrow markings. Since we are entering the winter season, it will be necessary to continue the review into early Spring as bicycle activity increases to fully evaluate conditions. Following our assessment in the Spring, additional candidate street segments will be considered if found to be an appropriate application and beneficial to system users.

The next candidate segment being considered, as identified in the letter to FHWA, is 164th Ave NE between NE 24th St and SE 14th St. The actual implementation of the Sharrows within this corridor may include only a portion of the length depending on circumstances as the review moves forward. It is also possible as additional assessments, research, feedback and design work are conducted, other candidate segments might present a more favorable option to implement. The current target is to implement another Sharrow project during the summer of 2009 should the initial pilot project prove to be of benefit to system users.

Commission Action:

No action is required at this time. This memorandum is provided as information for Transportation Commission's use. If you have any questions regarding the use of Sharrows, please contact me (Kurt Latt) at 425-452-6020 or by email at klatt@bellevuewa.gov.