# PLANNING AND DESIGNING A DEMONSTRATION BIKEWAY

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Rather than install an entire network of bikeway corridors, which would be costly and time-consuming, the Seattle bikeway committee developed a demonstration bikeway program that designated three bikeways. The purpose of the program was to test known design techniques and to devise methods unique to the constraints in Seattle. This paper discusses the first of the three demonstration bikeways and describes the incremental approach used to solve individual design problems.

•WITH the enactment of a law in 1972 Washington became the second state in the nation to provide funds for the development of bicycle paths. This legislation, very similar to the landmark bicycle bill of Oregon, requires all governmental entities to spend a minimum of ½ percent of their motor vehicle funds each year for the establishment of facilities for pedestrians, equestrians, or bicycles. A comprehensive plan dealing with one or more of these areas of community interest must be approved before the funds are available for that purpose. The intended facility must be within the highway right-of-way or meet a highway purpose and satisfy the needs of public safety, be part of the approved comprehensive plan, and be cost effective.

Shortly after the enactment of the state law, the city of Seattle began a study of the feasibility of developing commuter bikeways. The study report, Preliminary Commuter Bicycle Study, recommended that the city develop a comprehensive plan for a citywide bikeway network with strong emphasis on the needs of the commuting bicyclist. A committee of bicycling city employees was formed to use the community interest generated by the study as a base for developing a comprehensive bikeway plan.

The comprehensive bikeway plan, approved by the mayor and city council early in 1973, designated the entire network of bikeway corridors within the city and established priorities for implementation. It also covered, in a very general fashion, the method of establishing priorities for bikeway installations; tentative design standards; potential local, state, and federal funding sources; legal aspects of developing bikeways in Seattle; and some thoughts on bicycle registration, licensing, safety, and education.

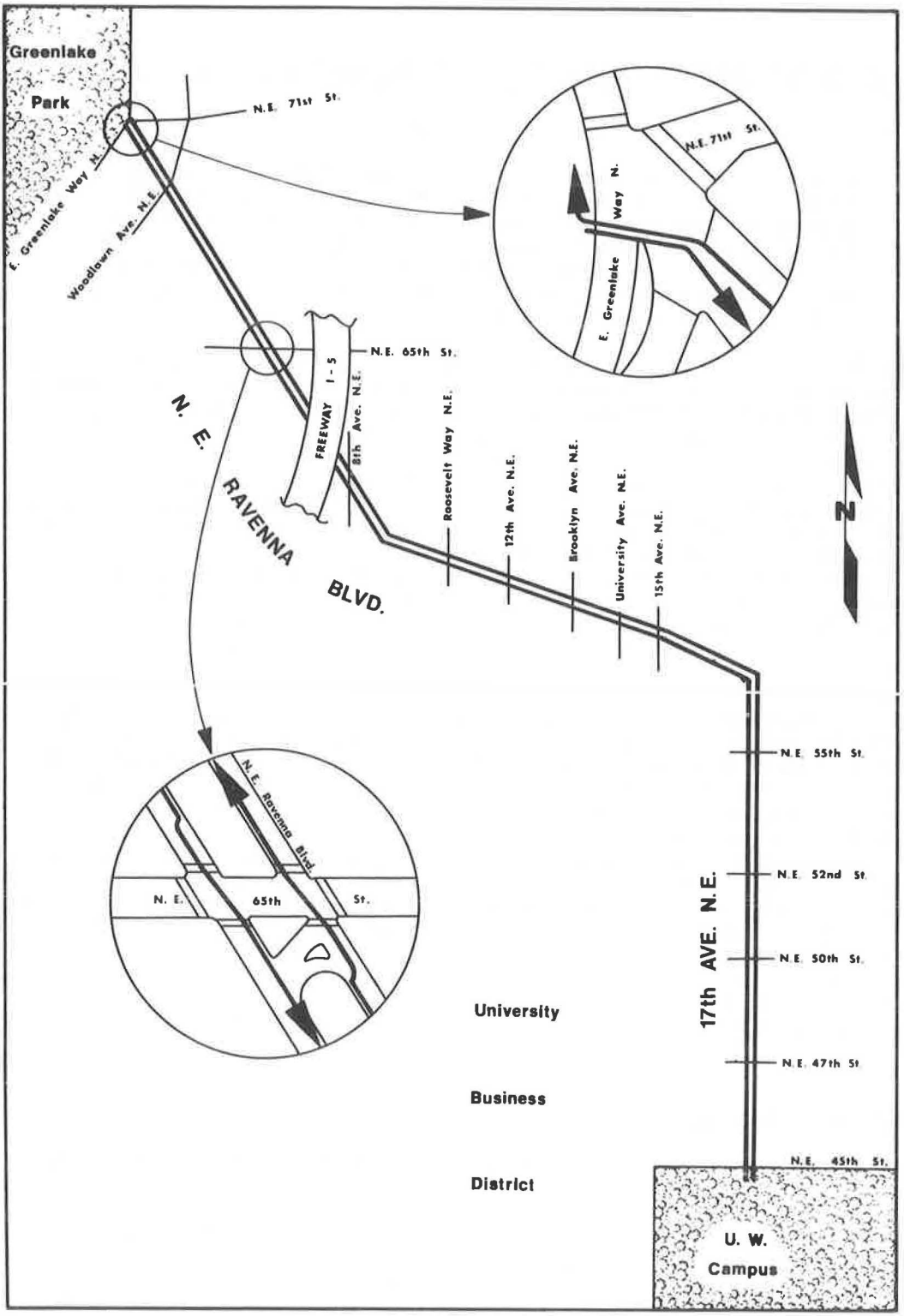
It became apparent even before the committee's work was complete that to install the first bikeway as envisioned in the plan would delay its opening until 1974. In addition, the limited design knowledge gathered from other communities needed to be tested to determine its applicability in Seattle. The bikeway committee developed a demonstration bikeway program that allowed work to begin immediately on three bikeways to test known design techniques and to devise unique methods to satisfy the conditions in Seattle. The first of these bikeways along Ravenna Boulevard and 17th Avenue N. E. from Green Lake Park to the University of Washington campus opened in the middle of August 1973 (Figure 1).

## PLANNING PROCESS

The committee chose the first route because of its known high bicycle usage. A survey of 320 persons conducted at the University of Washington in October 1972 indicated that about 16 percent of the bicycle commuters used this route to and from school. A 12-hour cordon count held the following May refined this figure to almost 20 percent of the 7,000 total bicycle trips entering and leaving the campus area.

Although no similar counts of recreational bicycle volumes were taken, a video tape and visual observation were made of recreational activities along this route. Impres-

Figure 1. Demonstration bikeway one.



sions were gathered on the breakdown of users by sex and age and riding maneuvers at various locations. The route survey and observations, although limited in scope and detail, pointed out one significant item: The number of commuter bicycles traveling west along Ravenna Boulevard increased substantially until the underpass at Interstate 5. From there, until the flow turned south at 17th Avenue N. E., many riders left the mainstream of bicycles only to reenter it on 17th Avenue N. E. before arriving at the campus. It was hoped that the establishment of a designated bikeway would encourage many more bicyclists to remain with the majority of bicyclists and thereby decrease the accident potential in the surrounding neighborhood.

Establishing a demonstration bikeway along this route gave the city an opportunity to study various ways of designing a bikeway to fit within a parkway. Although Seattle does not have an abundance of parkways, the knowledge gained through this design effort will be applicable to other roadways or in analogous situations, e.g., using available open space versus placing a facility on the existing pavement. This route selection also provided a major commuter and recreational link between two important activity centers.

During the initial phases of planning the bikeway, a method evolved that can best be described as an incremental approach. Each specific design element was viewed in isolation from all others. All possible solutions were developed for that element, and the advantages and disadvantages of the solutions were identified. A recommendation was made for each solution based on its advantages and disadvantages and established planning and design criteria. A matrix of all feasible design solutions, disregarding the recommendations, was created that tied all possible solutions together in a continuous fashion along the route. An analysis of this matrix and the sketches depicting geometric design solutions quickly eliminated many combinations because they were unsafe, costly, or unfeasible from a traffic operation standpoint or did not meet the planning or design criteria.

## DESIGN APPROACH

An example of the approach used to solve a specific design problem and the interaction of route elements can best be presented by discussing the bikeway crossing at N. E. 65th Street. Possible bikeway crossings of this intersection included the following:

1. Bikeway against median curb throughout intersection (Figure 2),
2. Median curb bikeway crossing to median grass (Figure 3),
3. Median curb bikeway moved to center lane approaching intersection and crossing to median curb (Figure 4),
4. Right curb bikeway crossing to right curb or sidewalk (Figure 5), and
5. Right curb bikeway moved to center lane of roadway approaching intersection and crossing to right curb (Figure 6).

To accept one of the first three solutions required a determination that a median lane bikeway was acceptable at this point on the roadway. A study of the traffic flow at the intersection and to the southeast at the on-ramp to I-5 showed that this was the most acceptable conclusion. Placing the bikeway at the right curb or on the sidewalk would necessitate an interaction between bicycles and motor vehicles at a point where the motor vehicles were moving at a high speed and the motorist was concentrating on entry to the freeway ramp. Placing the bikeway in the median lane moved the point of conflict closer to the intersection where the motorist's attention normally was in the direction of the approaching bicycle and where the motor vehicle was moving more slowly.

A study of motor vehicle traffic flow and volume characteristics at this intersection highlighted the need to place the bikeway so that bicyclists will not impede left-turning motorists. Bicyclists in Seattle tend to move along the right side of a string of stopped cars at a traffic signal. Not only can this irritate some motorists, but also it places

Figure 2. Bikeway against median.

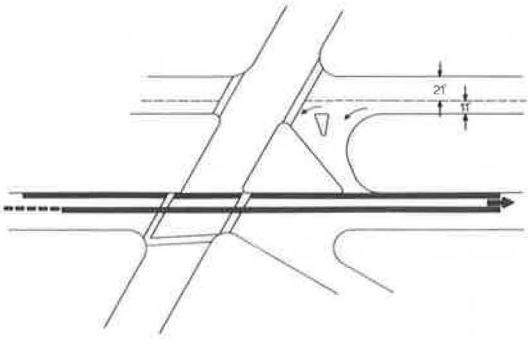



Figure 3. Bikeway located from median curb to median grass.

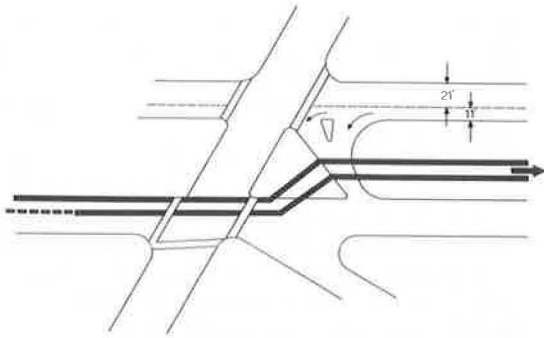



Figure 4. Bikeway located between left-turn bay and through and right-turning motor vehicle traffic and crossing to median curb.

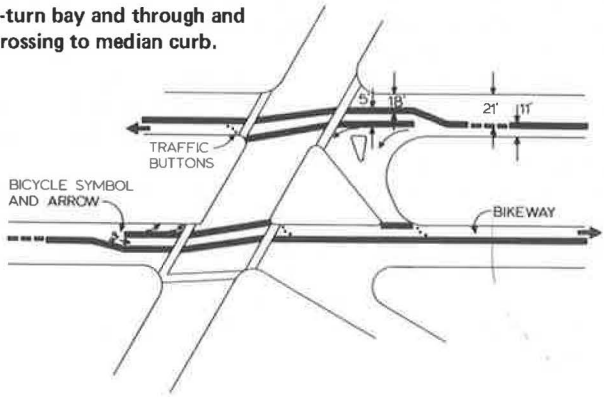



Figure 5. Bikeway located along right curb and crossing to right curb or sidewalk.

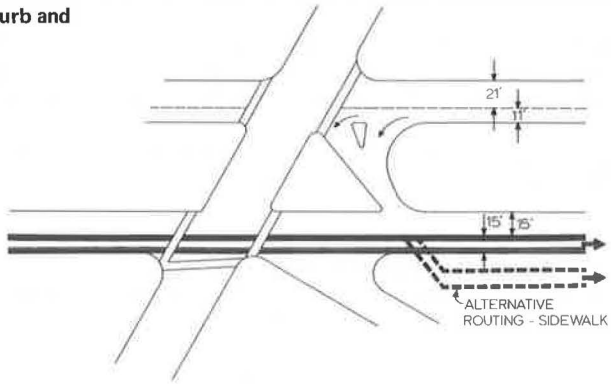
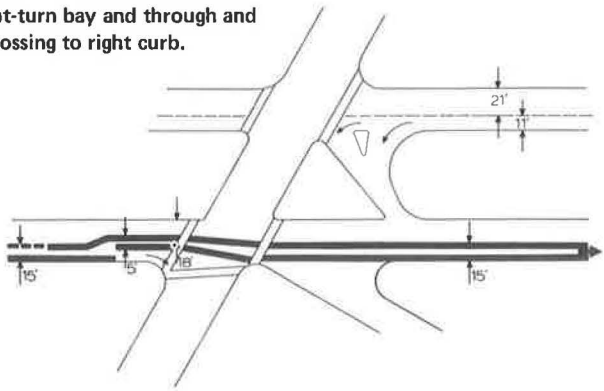



Figure 6. Bikeway located between right-turn bay and through and left- turning motor vehicle traffic and crossing to right curb.



the bicyclist in a narrow, unsafe position if accomplished from the median lane bikeway shown in Figure 2.

Therefore, the decision to use the median lane bikeway and to provide sufficient left-turn capacity for motor vehicles depended on motor vehicle traffic flow characteristics in and beyond the intersection and knowledge of motorist and bicyclist behavior. The incremental approach identified the acceptable solutions for one small area. But it was not until the solutions for each element were linked together that decisions were knowledgeably made. The selected intersection design is shown in Figure 4. The design shown in Figure 3 was rejected because it did not meet the cost criteria and also required the elimination of some of the median grass, a negative aesthetic impact.

Some of the other bikeway design decisions that were made and the basic thought that led to their acceptance follow.

1. Strong yellow green boundary line paint was chosen because it is a unique roadway color. This unusual color draws the attention of passing motorists to this new facility and emphasizes the messages of the special bikeway signs. The choice was made from the unassigned colors in the Manual on Uniform Traffic Control Devices.
2. Left-turning vehicles are allowed to enter the bikeway before reaching an intersection. This maneuver is permitted by mandatory signs, but the motorist must yield the right-of-way to bicycles. This arrangement causes less conflict than allowing left turns across the bikeway from the adjacent traveled lane.
3. At one point along the route a short section of path was constructed within the median. Although this was counter to the cost and aesthetic criteria, it was necessary for bicycle safety. Without this path, bicyclists would have been required to remain exposed to the arterial traffic they were crossing for a substantially longer time.
4. Where the roadway width narrowed and eliminated the possibility of a designated bicycle lane, signing was used to alert motor vehicle drivers to the fact that bicycles have preference on the entire roadway. Regulatory signing requiring motor vehicles to to yield to bicycles was used. Low traffic volumes and vehicular speeds, high parking density, and a low parking turnover rate supported this decision.
5. At all intersections where motor vehicles may enter the traffic lane adjacent to the bicycle lane, traffic control buttons were placed across the bikeway. Although these constitute a potential hazard to bicyclists, a much greater danger would be created by motor vehicles that might inadvertently enter the bicycle lane.

## CONCLUSION

Since the completion of this bikeway in 1973, it has been visited by many observers from across the country. Some of the design decisions remain controversial, but in general its performance has exceeded the goals of those who worked to make it a reality. More bicyclists use the designated path now than used the same route before the green lines were painted and signs appeared. Its existence encourages bicycle use throughout the year even during the wet dark days of winter.