CONSERVE BY BICYCLE PROGRAM STUDY

PHASE I REPORT EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Florida is an excellent environment for bicycling. From the northern panhandle with its rolling hills to the coastal plains in the southern part of the state, Florida's topography makes it ideal for riding a bike. Add to this a climate which makes riding a year round activity and the result is that Florida has an enormous potential for recreational, commute, and errand related bicycling. Is it any wonder, then that each year in Florida, millions of bicyclists ride (collectively) billions of miles?

The benefits to Florida of all this bicycling activity are numerous. In addition to providing mobility as a means of transportation, bicycling is a way to experience Florida in a healthy, eco-friendly way. Quite simply, bicycling adds to the quality of life for many Floridians.

Most bicycling trips taken in Florida (about three quarters) are recreational. These trips contribute to the health of Floridians and promote healthy lifestyles. Bicycling provides a low impact exercise alternative to other, sedate recreational activities. By promoting recreational cycling, the State of Florida can contribute to a healthier citizenry and potentially reduce State health care costs.

In addition to recreational purposes, many people bicycle for utilitarian reasons. Commuting to work or school, going to the grocery store, riding to a friend's house, and cycling to a park are all examples of destination oriented trips that might otherwise have been made in a car. These bike trips provide numerous benefits to the cyclists and all Floridians. Utilitarian cyclists are saving money on gas, getting exercise and often just enjoying the ride. Through cycling they also reduce motor vehicle greenhouse gas emissions, congestion, and potentially overall health care costs.

It would seem that bicycling is beneficial for Floridians. So what can the State do to promote cycling and increase the benefits receive from this eco-friendly form of transportation and recreation? Answering this question is the purpose of the *Conserve by*

Bicycle Program Study. Specifically, as established by the Legislature in Section 335.07, F.S., the purposes of the Conserve by Bicycle Program are to:

- conserve energy by increasing the number of miles ridden on bicycles and reducing the usage of petroleum-based fuels,
- increase cycling efficiency by improving interconnectivity of roadways, transit, and bicycle facilities,
- reduce traffic congestion on existing roads,
- increase recreational opportunities in Florida,
- provide healthy transportation and recreation alternatives to reduce obesity and decrease long-term health costs, and
- create safe ways for children to travel to school by supporting the Safe Paths to Schools Program.

To better provide direction for this program, the legislation goes on to ask what the best way to achieve these objectives would be. Answering this question is the focus of this *Conserve by Bicycle Program Study*. The legislation went on to provide specific goals for the *Conserve by Bicycle Program Study*, namely to identify the following:

- where energy conservation and savings can be realized through the improvement of existing bicycle facilities,
- where education and marketing can increase bicycle use and decrease motor vehicle use,
- how, and under what circumstances, the construction of new bicycle facilities can increase recreational use and reduce the adverse health effects associated with a sedentary lifestyle, and
- how partnerships can be created between businesses, state and local government agencies, and environmental groups to enhance the likelihood of success of the program.

A study team consisting of a consultant and three subconsultants was assembled to accomplish these goals. This team was guided by a steering committee and managed by the FDOT's State Pedestrian and Bicycle Coordinator.

As identified in the *Conserve by Bicycle Program Study* scope, Phase I tasks are to

- assemble and meet with a Steering Committee, and conduct public involvement activities,
- complete a literature search,
- select pilot projects and collect data,
- produce a Phase I report (this report), and
- develop an Implementation Plan.

Phase II of the Study, which is expected to get underway in July of 2007, will consist of post-project data collection and evaluation.

The Phase I study included evaluations of programs and research from around the country supplemented with groundbreaking new research. The study team conducted an extensive literature search and reviewed the methods used across the United States to encourage cycling and evaluated the results obtained from these efforts. The team then developed hypotheses on what methods would best work to encourage bicycling in Florida. New research was performed using expert panel interviews, public intercept surveys, and internet questionnaires. The statistical methods and mathematical models were used to create a way to predict increased bicycle travel and activity related to the provision of improved bicycle facilities. Evaluations were performed exploring the extent to which education or marketing programs and partnerships could influence increased bicycling, hence resulting in energy savings and health benefits in the State of Florida. The findings of this *Conserve by Bicycle Program Study* are encouraging in that the statistical models predict increased bicycle travel in response to the provision of bicycle facilities. To better address precisely what programs should be implemented in Florida (particularly in the areas of Safe Routes to School, marketing and educational programs, and partnerships), the collection and analysis of more Florida specific data are needed. Consequently, recommendations for Phase II research are included throughout this *Conserve by Bicycle Program Study Report*.

The improvement of bicycle facilities and the promotion of bicycling through programs and/or partnerships can increase the number of people riding bikes in Florida. The mode shift and induced recreational travel models developed in this first phase of the

Study confirm that more people will ride bicycles when bicycle facilities are built and will thereby reap the aforementioned benefits. Along with an evaluation of previous years' statewide bicycle activity survey data, future potential energy savings and health benefits are documented using analytical modeling of data from a statewide sampling of roadway corridors; these corridors have a variety of facility types and surrounding demographic environments. Phase I study analysis of programs and partnerships indicates, based primarily on evidence of programs outside the State, that properly targeted and funded programs and/or partnerships, paired with human behavior change incentives, are effective in influencing a mode shift from auto to the bicycle mode and in increasing recreation/exercise.

The Phase 1 efforts reveal that an implementation plan for the State of Florida's Conserve by Bicycle Program can significantly increase energy savings and public health improvement within the State. This implementation plan choreographs 1) bicycle facilities construction, with 2) improving the existing transportation network's bicycling accommodation, and strongly links those actions with 3) effective bicycle travel activity encouragement and incentive programs. While the Florida-based data do not conclusively show what constitutes an effective encouragement/incentive program for Florida, effectiveness data from other programs throughout the United States provides excellent direction for the Phase II data collection, research, evaluation and definition for Florida-based programs. Organized below, by recommended implementation actions, are summaries of the data collection, evaluation and findings, and recommendations from this first phase of this Study.

Provision of Bicycle Facilities

It is a widely held belief that providing various types of bicycle facilities, depending on the setting, can influence the number of people choosing to ride bicycles, the frequency of their choice, and the corresponding energy savings and health benefits. To identify these influences with statistical reliability, methods to predict the number of new bicycle trips resulting from the provision of facilities were developed. First, an extensive literature search was conducted for existing methods that were reliable and applicable to Florida settings. None were found meeting this standard, with the exception of the work

currently being performed by FDOT District 7, a study titled *Predicting Non-motorized Trips at the Corridor Level: Bicycle and Pedestrian Mode Shift and Induced Travel Models*.[1] This work was expanded by the *Conserve by Bicycle Program Study* team to include the full range of bicycle facility types and also to expand its database through a larger sampling of environments across the State.

Building upon this important District 7 foundational work and using this Study's Phase I data, the project team identified six factors as influencing shifts from the automobile mode to bicycling or transit within Florida roadway corridors:

- motor vehicle congestion on the roadway (transit factor),
- quality (level of service) of bicycling accommodation on the road,
- transit quality of service along the roadway corridor (transit factor),
- quality and geographic extent of bicycling accommodation in the surrounding transportation network,
- average trip length of all travelers in the roadway corridor, and
- mix and density of both population and employment in the roadway's "travel shed."

Subsequently, mathematical predictive methods for estimating the mode shift to the bicycle mode were then created and tested for the data of the sampled Florida corridors. Estimates were then made with regard to trip making frequency of the corridor travelers. To estimate the specific energy savings and health benefits resulting from the provision of specific facility types in the varying built environments, preliminary computational engine spreadsheets were developed to perform "what if" type analyses. The initial Phase I findings are significant because they predict that energy savings and health benefits will be realized as a result of providing bicycle facilities.

Each bicycle facility that is added to the bicycling network within the State has the potential to increase the number of trips made by bicycling. The interplay of the above-listed factors affects this potential greatly. Most prominent is the perceived level

[1] Sprinkle Consulting, Inc. *Predicting Non-motorized Trips at the Corridor/Facility Level: The Bicycle & Pedestrian Mode Shift and Induced Travel Models*. Submitted to Florida Department of Transportation, February 2007.

of safety and comfort of bicycling accommodation along a specific roadway corridor: a progression from shared use lane, to bike lane or paved shoulder, to shared use path adjacent to roadway, and finally to shared use path in a separate right-of-way increases the number of motorists who will convert to the bicycle for their travel. This provision of a bicycle facility on a single, isolated roadway corridor has its limits. However, as discovered in the mode shift modeling effort of this first phase of the Study, improving the bicycling accommodation in the existing *surrounding* transportation network adds much to the shift from the auto to the bicycle mode of travel in a particular travel corridor. The linkage between these two facility provision actions is important, and the results are pronounced – improvement throughout the transportation network provides a greater benefit than the sum of the parts (streets). **This finding directly confirms that systemwide bicycle facility improvements should be included in funding, planning, design and construction programs if the goal of mode shift to conserve energy is to be realized.**

Consequently, it is recommended public agencies accommodate bicycling on all non-limited access roadways in Florida. Shared use paths adjacent to limited access roadways are recommended where appropriate. The following facility-based recommendations should be implemented subsequent to this first phase of the Study:

Construct New Bicycle Facilities

Specifically:

- Retain the current FDOT policy to provide bike lanes or paved shoulders on road construction (new or reconstruction) projects on state roads.
- In constrained rights of way and in many settings, the common design practice of providing 12-foot wide motor vehicle lanes could be changed; lanes could be narrowed, sometimes down to even 10 feet, in some cases, to make room for paved shoulders or bicycle lanes. This Study provides guidelines for the

conditions in which this design could be done, based on proven research and solid engineering justifications.

- Construct shared use paths along roadways where there are minimal driveway/side street conflicts, particularly in settings where the methods developed in this Phase I Study show a high potential for mode shift. National and state guidance documents, particularly the FDOT District 1 *Sidepath Facility Selection and Design* study, should be carefully consulted, however, when planning and designing these facilities.

The above recommendations apply not only to FDOT, but also to cities and counties who oversee many of Florida's public roads. Meaningful results, in terms of more bicycling resulting in energy savings and health benefits, will depend on the cooperation of cities and counties. As a matter of fact, in recent years, many cities and counties in Florida have adopted their own policies to provide bike lanes.

The direct construction of bicycle facilities is not enough to bring about a mode shift from auto to bicycle. The way Florida plans its development and roadways must change as well. Therefore, development and roadway plans must change to realize energy savings and long-term health improvement to Florida residents.

Improve the Existing Transportation Network (and Land Development Patterns) to Better Accommodate Bicycling

Efforts should be made to:

- establish minimum Level of Service (LOS) standards for bicycle accommodation on roadways,
- retrofit bicycle facilities onto the existing roadway and street system,
- relax motor vehicle Level of Service standards and increase Bicycle Level of Service standards in areas with mixed land-use, especially where employment and residential population are dense,
- adopt land use policies that encourage mixing of higher-density residential and employment uses, and
- continue research regarding provision of end-of-trip facilities (such as secure bicycle parking and showers at trip destinations) for bicyclists.

While the provision of bicycle facilities will increase the number of people riding for utilitarian purposes, recreational (and would-be recreational) users also benefit from the provision of bicycle facilities. The impact of providing bicycle facilities on recreational riding is discussed below.

Increases in Recreation, Exercise and Health Benefits

A literature search was also conducted to find methods of predicting the impacts of bicycle facilities on bicycle activity, particularly for recreation or exercise. No methods were found that allowed reliable predictions for Florida settings, nor what health benefits would result, save for the aforementioned preliminary work by District 7. Therefore, a preliminary method was developed and tested in Phase I of the Study. "Before" and "after" data were collected on corridors nominated by members of the Steering Committee to predict how many people will be induced to the bicycle mode for recreational purposes as a function of bicycle facility type and environmental setting. Subsequently, the following five factors were identified using statistical modeling methods. Using the Phase I data, these factors were found statistically significant, as influencing recreational/exercise bicycle trip activity:

- type of bicycle facility provided
- length of bicycle facility
- amenities/points of interest along route
- scenery/aesthetics
- density/distribution of surrounding population

As a result of this Phase I work, the following recommendations are made based on the findings of the modeling. These are in addition to the facility provision recommendations discussed earlier.

Require Recreational Infrastructure in New Residential Developments This Phase I Study research shows that provision of bicycle facilities will increase the number of people among the nearby population who can achieve the level of physical activity recommended by the national Centers for Disease Control (CDC); therefore, it is recommended that the State of Florida mandate, via growth management provisions, the inclusion of infrastructure in new residential developments adequate to allow residents of all ability levels to reach their CDC-recommended levels of physical activity (30 minutes of moderate activity on 5 days of each week). Shared use pathways are examples of such infrastructure and are highly recommended as strategies to fulfill this requirement. They cost-effectively provide opportunities for numerous forms of exercise (biking, walking, in-line skating, etc.) that have relatively low cost thresholds for participation and are available to a broad range of Florida's population. Bicycle lanes and a network of connecting low-volume, low-speed streets can encourage more bicycling for fitness.

Build New Shared Use Paths, Especially in Scenic Areas and Near Population Centers

This Phase I study research shows that provision of bicycling facilities for recreation/exercise, such as shared use pathways, will result in increased levels of physical activity and provide measurable public health benefits. The research also shows that shared use pathways will attract more users if they are situated near areas of higher population and/or if they are situated in scenic or aesthetically pleasing environments. Therefore it is recommended that the State fund the development of shared use pathways with special emphasis on areas of scenic interest and/or near population centers.

Bicycle Activity Encouragement & Incentive Programs

The findings of this first phase of the Study indicate that encouragement of bicycling activity can be achieved through *effective* programs and/or partnerships targeted to

distinct populations: school children, commuters, and all groups of people for recreation and exercise activity promotion. The paucity of before-and-after data for existing Florida-based programs limits some of the recommendations; however, the out-of-state programs provide clear direction for Phase II study and evaluation. Regardless, Phase I findings do provide direction for implementing[2] programs and partnerships in Florida to achieve energy savings and improved public health through bicycling travel and recreation/exercise activity.

Safe Routes to School

Safe Routes to Schools Programs were also evaluated to determine how they can reduce school-related commuter traffic, thereby reducing energy consumption and improving the health of children throughout the state. The measurable criterion for evaluating the Safe Routes to Schools programs is mode shift. A literature search was conducted to evaluate Safe Routes to School programs state and nationwide. Only one program was found to have a documented mode shift, and that was not in Florida. Accordingly, data collected in Phase II of the program are necessary to accurately quantify the effects of the FDOT's new Safe Routes to School program.

This Phase I evaluation of Safe Routes to Schools programs suggests that a number of approaches need to be taken at Florida schools to increase the number of students riding to school. Evidence could not be found to demonstrate that Florida bicycle traffic safety programs alone increase the amount of students cycling to school (although they may improve the safety of those already riding to school). Facility based,

[2] "Implementing" also includes providing funding to existing programs as well as enhancing current programs for more targeted response to the specific objectives of Conserve by Bicycle Program set by the Legislature.

or engineering measures, will result in improvements for those who are already riding to school and may induce some mode shift from bus or personal vehicle to bicycling. The Phase I data indicate that encouragement or incentive programs, such as contests, events, and promotional materials may have a significant impact on bike riding to schools, particularly when combined with the provision of facilities.

Within the findings of Phase I of this Study, to increase the possibility that more students will ride bicycles to school, Safe Routes to School programs in Florida should implement the following activities:

- Incorporate education, engineering, encouragement, and enforcement. For illustration, the Florida programs in Brevard County and Duval County focused on delivering bicycle safety education to children. Marin County, California, however, with a documented increase in bicycling and a decrease in automobile trips, went beyond safety education to include infrastructure improvements, promotional/incentive events, and crossing guards.[3]
- Target children's attitudes towards wearing bicycle helmets. The local Bicycle/ Pedestrian Coordinator in Brevard County, FL attributed the lack of an increase in the percentage of students riding bicycles to the bike helmet law (some children chose not to ride instead of having to wear a helmet because they thought that it was not "cool" to wear a helmet).
- Conduct before and after program evaluation within the same school year, so that the effects of program activities on bicycle mode share among the target audience can be observed.

While the researchers were not able to establish (using the Phase I data) which aspects of the successful programs will accomplish the specific objectives of the

[3] It should be noted that Florida is nationally recognized leader with regards to training crossing guards and creating procedures addressing their placement. In Florida, crossing guard training focuses on how to cross children safely across a roadway. Including crossing guards in promotional or informational campaigns is not a typical feature of Safe Routes to School Programs in Florida; nor is it recommended crossing guards be included in these Safe Routes programs if such inclusion would inhibit their ability to perform their primary function safely.

Conserve by Bicycle Program, it is recommended that Safe Routes to School programs implementing the various elements mentioned above continue to be sponsored. It is also recommended that Phase II study exactly which components are essential to increase bicycling and exercise, thereby helping to counter the current trend towards obesity in Florida.

It is also recommended that the State explore ways to influence the selection of school sites (and configuration of their "sending zones" affected by barriers such as limited access roadways without parallel shared use pathways) by local school boards, so that selection criteria include the density of residential development planned in the area near the school and the provision of bicycle facilities (appropriate to the age groups served by the school) connecting the school to the residential areas around it.

Implement Education and Marketing Programs to Promote Bicycle Commuting

The effectiveness of marketing and education programs targeted at converting motor vehicle trips into bicycle trips was studied. An education and marketing program results in energy savings and health benefits if the implementation of that program results in individuals choosing to ride bicycles over driving cars. Consequently, mode shift was chosen as the measurable criteria for this evaluation. Again, a literature search was performed to determine what education and marketing programs to promote bicycling had been implemented in Florida and across the United States. The researchers were specifically looking for programs that could document a mode shift. Only one relevant study was found in Florida, however, a number of reports from national and international sources were evaluated for effectiveness. To accurately quantify the benefits of these types of programs in Florida settings, data will need to be collected during Phase II of the Study.

However, the Phase I research of the quantified out-of-state programs has shown that education and marketing programs can be effective in increasing levels of bicycle commuting if they include certain elements: a coordinator or other staff person dedicated to the operation of the program; the use of incentives, such as commuting rewards and other forms of recognition for participants; a continuing schedule of events that promote bicycle commuting; and partnerships with employers and other enterprises. **It is recommended that both private employers and public agencies fund the implementation of education and marketing programs that include these elements that are essential to achieving the Conserve by Bicycle objectives.**

To increase the possibility that more people will choose to bicycle, the researchers recommend that education and marketing programs in Florida implement the following activities:

- Incorporate a comprehensive range of program activities that appeal to a wide audience.
- Undertake an extended marketing effort. This extended time period allows each program to reach more of its target audience and affords residents an opportunity to change their travel behavior. For programs aimed at commuters, an extended effort lasting several months, or possibly having several bike months throughout the year, may sustain bicyclist interest and participation, and thereby result in greater energy savings and health benefits.
- Offer incentives for participants, such as commuting rewards and other forms of recognition.
- Select areas that already have good bicycling infrastructure for encouragement efforts. People are more likely to ride bicycles if they perceive that it is safe to do so, as when bicycle lanes, shared use paths adjacent to roadways, or independent alignments are present.

- Dedicate paid and volunteer staff.
- Conduct before and after program evaluation so that the effects of program activities on the level of bicycling among the target audience can be observed. While bike-to-work programs can potentially have lasting impacts, few such programs conduct follow-up surveys of participants.

Form Effective Partnerships

Partnerships are components of successful education and marketing campaigns. Healthy partnerships can increase the chances of success for the program and help achieve the goal of reducing the consumption of fuel and bettering Floridians' health. The measurable criterion used in the study of partnerships was mode shift. No applicable case studies were found in Florida through the literature search of partnership programs. Quantifiable data would have to be obtained from Phase II of this Study, as none were available for the first phase.

To increase the possibility that more people will choose to bicycle, the researchers recommend that partnership programs in Florida implement the following activities:

- Incorporate a comprehensive range of program activities that appeal to a wide audience.
- Create and maintain multiple partnerships. The additional resources (such as dollars, staffing, and incentives) that partners bring can serve to expand the scope of program activities.
- Dedicate paid and volunteer staff.
- Conduct before and after program evaluation, so that the effects of program activities on the level of bicycling among the target audience can be observed. These data are needed to calculate energy savings and health benefits.