

FINAL REPORT
of the
Fordham Boulevard Safety Work Group Study
Prepared for Town of Chapel Hill, N.C.

by

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Executive Summary

The Town of Chapel Hill has recently experienced several fatal bicycle and pedestrian collisions. One of these occurred on Fordham Boulevard (US-15 and 501 and NC-54), near Manning Drive, where UNC Professor David Galinsky was struck down in January 2006 while walking to a UNC basketball game. In response, the Town Council requested that the Manager propose a process for identifying and developing pedestrian safety improvements on Fordham Boulevard between Manning Drive and Old Mason Farm Road. The Manager initiated a work group of local citizens and other interested parties led by two consultants that was tasked with identifying and evaluating possible pedestrian and bicycle safety improvements in this study area. The twenty members of the work group were representative of the residents and institutions in the area and extremely knowledgeable regarding pedestrian, bicycle, and traffic conditions in the area. The work group held a series of meetings between June and October 2006 during which it gathered information on the study area, reviewed literature, reviewed experiences in other places, proposed possible improvements, evaluated those improvements, and developed recommendations.

The study area on Fordham Boulevard is located between Manning Drive and Old Mason Farm Road. In the study area, Fordham Boulevard is a formidable barrier that separates two parts of the University and Town from each other. That section of Fordham Boulevard has two through lanes in each direction with traffic signals at Manning Drive and Old Mason Farm Road. The road carries between 50,000 and 60,000 vehicles per day, which is a very high traffic volume. Many drivers treat Fordham Boulevard approaching the study area as a freeway because of the wide median, wide shoulders, gentle curvature, and surrounding interchanges. There are no sidewalks along Fordham Boulevard., and there is a sidewalk on only one side of Manning Drive west of Fordham Boulevard.

Pedestrian traffic counts at the Manning intersection showed very low volumes and indicate the effectiveness of Fordham Boulevard in separating its two sides. Work group members and facilitators have observed pedestrian and bicycle activity along Fordham Boulevard, particularly between Laurel Hill Road and Old Mason Farm Road during certain periods of the day. Safety for pedestrians and bicyclists who attempt to cross multiple lanes of traffic is further affected adversely at night, due to dark conditions without overhead illumination.

The work group consensus is that the problem in the study area is worse than what is shown from conventional measures, such as collision data, conflict data, and pedestrian and bicycle volume counts. The difficulty in this study area is that the data are very sparse because pedestrians and bicycles are variable by season, weather, time of day and day of the week. Moreover, there are huge upward spikes in crossing and traveling along Fordham Boulevard for events on campus, particularly at the Smith Center. The group asserted that there is latent demand at other times for foot and bike access to the NC Botanical Garden, playing fields, etc. that is discouraged by the current difficulty and danger. The study area traffic problems also increase automobile use at a time when

both University and the Town have stated their intentions to improve conditions for walking and bicycling, reduce traffic congestion, and improve environmental conditions, including reducing carbon emissions.

Group members considered dozens of potential improvements for pedestrians and bicycles in the study area during a comprehensive process. Some of these potential improvements included sidewalks and walkways, roadway illumination, medians and islands, high-visibility crosswalks at signalized locations, ADA-compliant curb ramps, grade separations, increased transit and shuttle services, enforcement measures, and education measures. To help the facilitators gauge the group members' thoughts on potential improvements in the study area, they asked the members to rate the potential effectiveness of those potential improvements. The potential improvements were formed into four clusters, with each cluster representing the improvements that might pertain to one of the major problems identified in the study area:

1. Pedestrian or bicyclist collisions and conflicts while crossing Fordham,
2. Pedestrian or bicyclist collisions and conflicts while moving along Fordham,
3. Rear-end collisions and conflicts between vehicles on Fordham, and
4. Vehicular delay on Fordham.

The group rated a pedestrian and bicycle bridge and underpass highly for treating the crossing problem. The group rated police control before and after major Smith Center events at the Manning intersection highly for treating all four problems. Shared-use paths along Fordham scored well for treating the problems faced by motorists and pedestrians moving along Fordham. The group also gave high marks to several lower-cost treatments like pedestrian countdown signals, flashing beacons, and street lighting.

Considering all of the above input, listed roughly in the order in which the Town can most easily implement them, our recommended treatments in the study area are:

1. **Illumination at the Manning and Old Mason Farm intersections.** Illumination can be an effective countermeasure where there are pedestrians and bicycles crossing or moving along a roadway at night. With the student activity in the area, and fans going to and from Smith Center events at night, that is the case here.
2. **Police control before and after major Smith Center events at the Manning intersection.** In the past, the State Highway Patrol has provided very effective police control for football games. The group believes strongly that a similar level of control is necessary for basketball games and other major Smith Center events, specifically to aid crossing pedestrians at the Manning intersection.
3. **Push-button countdown pedestrian signals and marked crosswalks for all four approaches at the Manning and Old Mason Farm intersections.** Treating just one or two approaches with these measures is faulty, as pedestrians will still try to cross the untreated approaches. The Town should also explore improvements for

safe bicycle crossing in conjunction with the pedestrian improvements, such as signal sensors able to detect bicycles and associated signage and marking.

4. **Stop ahead when flashing beacons on Fordham approaching Manning from the south.** This treatment should be effective for reducing problems with pedestrian crossings, as well as addressing rear-end crashes. The Town should be able to make an excellent case to the NCDOT for this device since the Manning intersection is unique. The Town should implement recommendations 3 and 4 together because without better warning for drivers approaching Manning from the south there would be great risks of more terrible collisions with pedestrians.
5. **Sidewalks or shared-use paths on both sides of Fordham.** This is a classic treatment for problems with pedestrians walking along a road or with bicycles on a road. There are compelling rationales for building pathways on both sides of Fordham. Paths on both sides are part of the Town Bike and Pedestrian Master Plan, would connect large pedestrian generators, and would connect UNC and Chapel Hill to destinations in eastern Orange County and the greater Triangle path network.
6. **Pedestrian and bicycle overpass or underpass across Fordham somewhere in the study area.** An overpass was the top-rated treatment to the worst problem in the study area—crossing Fordham—while an underpass was the third-rated treatment. An overpass could make a powerful architectural statement to thousands of motorists per day about the value UNC and the Town place on pedestrian and bicycle traffic, as other structures on other campuses around the US have done. A case for an overpass or underpass along the following lines is compelling:
 - The location is unique;
 - This connection would tie Chapel Hill and Orange County into the large and growing regional pedestrian and bicycle network;
 - The Town promotes walking and bicycling over motor vehicle travel;
 - In June, the Town and UNC announced a partnership for the specific purpose of reducing carbon emissions; and
 - There is recent and local precedent, with new pedestrian and bicycle bridges over I-440 in Raleigh and US-1/64 in Cary to serve places with non-existent previous pedestrian and bicycle volumes.

The group arrived at this recommended list of improvements independently of the consultants—Grayson Baur from Lappas + Havener, PA and Roy Currin from Ramey Kemp and Associates, Inc.—hired to consider short-term pedestrian and bicycle improvements at problem spots throughout the Town. These consultants investigated the study area throughout the late summer 2006 and reported on their tentative short-term recommendations at the August 24 group meeting. Overall, the Town should gain great confidence from the fact that the short-term recommendations for the study area from Baur and Currin were very similar to those made by this group.

Upon approval of the group's recommendations by the Town Council, implementation will require a vigorous and sustained effort by the Town staff, the Council, and study area citizens. Funding sources include the Town itself and several parts of the NCDOT budget. Close coordination between the Town and the NCDOT will be essential for successful implementation.

Significant changes have been made recently by UNC in or near the study area that have created negative impacts for pedestrians and bicyclists in the study area, and more changes are proposed for the near future. UNC is scheduled to propose a large set of new construction projects to the Town Council in its Development Plan Modification 3 on November 13. The group recommends that the Town make study and funding by UNC of the six recommendations listed above be stipulations to its approval of Modification 3.

The biggest challenge in implementing these recommendations will be for the overpass or underpass due to the high cost. The Town cannot afford to build the structure on its own. The facilitators believe that the following would help make the overpass or underpass a reality:

- Form a permanent Town committee with interests in pedestrian and bicycle improvements in the study area.
- Make an overpass or underpass in the study area (and the larger path network mentioned below) part of all relevant long-term plans.
- Plan a path network from the heart of the UNC campus to the eastern edge of Orange County and beyond that includes an overpass or underpass in the study area.
- Seek funding from non-traditional sources for transportation improvements.
- When substantial improvements to the Fordham corridor are funded, make sure that the designers are sensitive to the need for a shared-use overpass or underpass in the study area.

Introduction and Statement of the Problem

The Town of Chapel Hill has recently experienced in one week three fatal bicycle and pedestrian collisions, in spite of many past efforts to improve the safety of non-motorized travelers on its streets. One of these occurred on Fordham Boulevard (US-15 and 501 and NC-54), at Manning Drive.

The following is a description of the project purpose and background for this project, as taken from the April 10, 2006 memo from W. Calvin Horton, Town Manager, to the Chapel Hill Major and Town Council:

At its February 13, 2006 meeting, the Town Council received and referred an oral petition from Council Member Greene requesting that the Manager propose a process for identifying and developing pedestrian safety improvements on Fordham Boulevard between Manning Drive and Old Mason Farm Road.

At this meeting, several residents also expressed concerns about the safety of pedestrians in this area. Currently, Town and State staff are working together to identify and develop short-term pedestrian and bicycle safety improvements on Fordham Boulevard between Mason Farm Road and Manning Drive. It was thought that identifying and developing comprehensive improvements in this area will require the assistance of consultants to lead a work group of citizens and other interested parties in identifying and evaluating possible pedestrian and bicycle safety improvements on Fordham Boulevard between Manning Drive and Old Mason Farm Road. This process would be similar to the facilitated work group that developed improvements at and in the vicinity of the NC-54 and Hamilton Road intersection. That model proved to be both practical and productive.

To facilitate the study, the town obtained the services of two consultants, Mr. Charles Zegeer, Director of the Pedestrian and Bicycle Information (UNC Highway Safety Research Center in Chapel Hill, N.C.) and Dr. Joseph Hummer, Professor of Civil Engineering at NC State University. Both consultants have extensive experience in working with pedestrian and motor-vehicle safety problems and recommending solutions. The primary duties of the consultants were to provide pedestrian and bicycle safety consulting services to the town of Chapel Hill, including leading the working group meetings, summarizing information shared at the working group meetings, and preparing a report of recommendations for Fordham Boulevard between Old Mason Farm Road and Manning Drive.

Town staff suggested that representatives of the following agencies and groups be invited to apply for participation on the work group:

- Area neighborhoods (including Kings Mill-Morgan Creek, Laurel Hill, Rocky Ridge, Highland Woods, etc.)
- St. Thomas More Catholic Church
- Aldersgate United Methodist Church

- Ronald McDonald House
- The Family House
- UNC Hospitals
- The University:
 - o Department of Public Safety
 - o Athletics Department
 - o NC Botanical Garden
- The Town Transportation Board
- The Town Bicycle and Pedestrian Board

They also suggested that the work group consist of no more than 12-15 appointments to remain manageable. Town staff would provide support for the work group, including data assembly and collection, graphics preparation, meeting site preparations, and similar items.

A series of meetings was held of the citizen work group described above which was moderated by the two Consultant facilitators, Mr. Zegeer and Dr. Hummer. In addition, the Chapel Hill Traffic Engineer Kumar Neppalli, Town Engineer George Small, and Town Planner David Bonk helped to organize and facilitate the meetings, including presenting pertinent information about past, present and future plans and activities on Fordham Boulevard and for the town. The work group was appointed in May of 2006 and consisted of Patricia Brooks, Heidi Chapman, Shelley Day, Chris Exton, Matt Ferguson, Spence Foscue, Barbara Gordon, Loren Hintz, Garth Johnson, Rudy Juliano, David Love, Douglas MacLean, Betsy Malpass, Marty Pomerantz, Mary Reeb, Gary Richman, Tom Smith, William Scroggs, Nancy Tripoli, and Jim Ward.

Eight meetings of the work group were held including:

- June 15, 2006- Kickoff meeting. An initial meeting with the committee members to listen to their initial concerns and ideas and finalize the agenda for the remainder of the process.
- June 28- Included discussions of pedestrian and traffic problems on Fordham Boulevard.
- July 13, 2006- Presentation by Grayson Baur and Roy Currin concerning the NC-86 Bicycle and Pedestrian Implementation Study. Discussion continued on existing conditions at the site. Dr. Hummer gave a presentation of possible changes in street design, including the superstreet.
- July 27, 2006- Presentation by Mr. Zegeer on a wide variety of potential pedestrian treatments related to design, signs, signals, and markings.
- August 10, 2006- Work group conducted detailed evaluations of remaining solution ideas. Jim Ward made a presentation on plans for improving the NC Botanical Garden site.
- August 24, 2006- Specific recommendations were discussed and rated by the work group members.
- September 28, 2006- Work group provided detailed input and discussion on the Initial Fordham Boulevard Draft Report.

- October 19, 2006- Discussion was held on the Second Fordham Boulevard Draft Report, and detailed comments were received on the report.

Additional meetings were also held, which involved discussing the draft report and preparing the presentation to the Mayor and Town Council.

Study Methodology

The process used to study the pedestrian safety problems and recommend appropriate potential safety treatments was identified, and included the following steps:

- Hold a series of approximately eight town meetings to gain input from the public on specific types of safety problems for pedestrians and bicyclists, as well as potential safety treatments. Summarize the results of the meetings for use in the final report.
- Conduct site visits and inspections. Mr. Zegeer and Dr. Hummer made several site visits and inspections during the project period. The purpose of these visits was to observe the behavior of motorists, pedestrians, and bicyclists during different days of the week and times of day and to determine the nature of the safety problems which need to be addressed.
- Review the latest literature and information. Identify various types of innovative and traditional improvements which might be candidates for implementation along this section of Fordham Blvd.
- Write the draft final report. This report was written by Mr. Zegeer and Dr. Hummer, with considerable input from the work group and Town officials (Traffic Engineer Kumar Neppalli, Town Engineer George Small, and Town Planner David Bonk).
- Make presentation to Mayor and Town Council and finalize report. This presentation will be made by Mr. Zegeer and Dr. Hummer with work group participation at a Town Council meeting. Comments and questions received on this presentation and the report will be considered, and final changes will be made to the report.

Throughout this report, references will be made to northbound Fordham Boulevard and southbound Fordham Boulevard. Although Fordham Boulevard does, in fact, run in a generally north/south direction from Durham in the north toward Chatham County in the south, it is recognized that Fordham Boulevard in the study section actually curves to more of an east-west direction. However, for the sake of consistency and clarity to the reader, the report will refer to the northbound direction (toward Durham) and southbound direction (toward Chatham County). Also, Manning Drive will be referred to as eastbound (direction from UNC toward Fordham Boulevard) and westbound (direction from Fordham toward UNC).

Identification of Specific Safety and Operational Problems on Fordham

The study area on Fordham Boulevard is located between Manning Drive and Old Mason Farm Road in Chapel Hill, NC. That section of Fordham Blvd has two through lanes in each direction with traffic signals at Manning Drive and Old Mason Farm Road. A sketch of the study area is given in Figure 1 below.

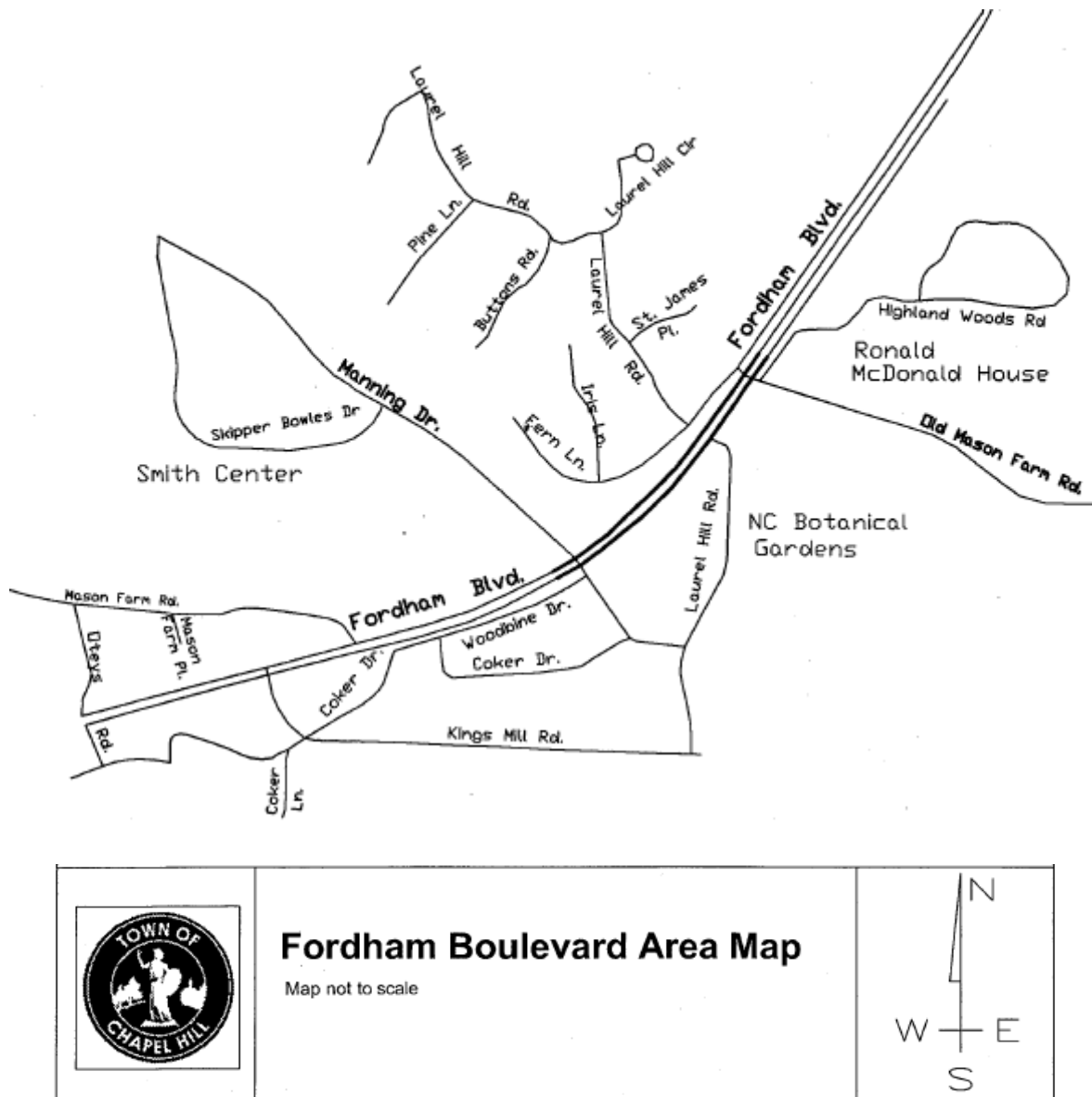


Figure 1. Sketch of the Fordham Boulevard study area.

At the Manning Drive intersection, two left turn lanes allow Fordham Boulevard traffic northbound to turn left onto Manning toward UNC Hospitals, Kenan Stadium, the Dean Smith Center, etc. Two left turn lanes are also provided which allow Manning Drive

traffic exiting the UNC campus to turn left onto Fordham Boulevard northbound toward Durham (US 15-501 to I-85) and Raleigh (NC 54 to I-40). In addition, single right turn slip-lanes allow a) southbound Fordham Boulevard traffic to turn right onto Manning Drive toward UNC Hospitals , and b) Manning Drive traffic coming down the hill to turn onto southbound Fordham Boulevard toward Pittsboro/Carrboro. Thus, Fordham Boulevard is seven lanes wide, and Manning Drive is six lanes wide at the intersection. This can pose serious challenges for pedestrians to cross Fordham Boulevard, particularly during heavy traffic periods and at night. Motorists turning right in the slip lanes do not have to make a full stop on a red light, but face a "Yield" sign. Figure 2 shows an aerial photograph of the intersection of Fordham Boulevard and Manning Drive. Photographs of the intersection are given in figure 3.



Figure 2. Aerial photo of Fordham Boulevard at Manning Drive.



Figure 3. Traffic at the intersection of Fordham and Manning.
(Photos by C. Zegeer.)

At the Old Mason Farm intersection, single left turn lanes also exist for traffic exiting Fordham Boulevard to turn onto Old Mason Farm Road from either direction. This makes six lanes of traffic on Fordham for pedestrians to cross there. Vehicular traffic on Fordham Boulevard backs up regularly at both the Manning and Old Mason Farm intersections weekday mornings and afternoons when St. Thomas More school opens and closes, when employees go to and from work at UNC and UNC Hospitals, when traffic lights at the two intersections get out of sync, and when there is a ball game or special event at one of the University's sports venues. Figure 4 provides an aerial photograph of the intersection of Fordham Boulevard at Old Mason Farm Road. Figure 5 shows photos of the intersection.



Figure 4. Aerial photo of Fordham Boulevard at Old Mason Farm Road.



Figure 5. Traffic at the intersection of Fordham and Old Mason Farm.
(Photos by C. Zegeer.)

Fordham Boulevard carries between 50,000 and 60,000 vehicles per day (both directions combined). The North Carolina Department of Transportation (NCDOT) considers Fordham Boulevard a “strategic highway” (Corridor 39), as listed on the NCDOT web site at:

<http://www.ncdot.org/doh/preconstruct/tpb/SHC/corridors/>

Therefore, there is interest in preserving reasonably fast travel times through Chapel Hill on Fordham Boulevard. In the study area, Fordham is designated as US-15, US-501, and NC 54. It is a major connecting route for north/south motorists between Chatham County and I-40 and between west Chapel Hill/Carrboro and US15-501 to Durham. It also connects motorists to I-85 and points north, as well as east/west between Burlington/west Chapel Hill/Carrboro and UNC Hospitals, Research Triangle Park (RTP), RDU Airport, and Raleigh. This road was originally built as a bypass. Growth in

the surrounding and immediate areas--in particular northern Chatham County, the large planned urban development of Southern Village just south of town, UNC-Chapel Hill's south campus, and UNC Hospitals (the latter both served by Manning Drive)--has increased traffic significantly, even in the short time since Fordham Boulevard has been expanded to four lanes.

Along Fordham Boulevard coming from Carrboro, there are a horizontal curve and a hill that peaks approximately 500 yards from Manning Drive. This limited sight distance, and the long downgrade toward the intersection increases motorist stopping distance. There are no sidewalks along Fordham Boulevard and a sidewalk on only one side of Manning Drive west of Fordham Boulevard. There is a narrow median along Fordham Boulevard, which shrinks to approximately 18 inches wide at the intersection.

Fordham Boulevard is a formidable barrier that separates two parts of the University from one another and cuts off one part of the Town from the rest. This separation is especially pronounced at the intersection under study. On the west (northwest) side lies the University main campus including the Smith Center, Kenan Stadium, student dorms, family student housing, tennis courts, most classroom buildings, and UNC Hospitals, a major magnet for townspeople and visitors. Also on that same side are downtown Chapel Hill, government buildings, retail establishments, and churches including St. Thomas More Catholic Church and School and Aldersgate Methodist Church. On the other side--the east (southeast) side--are University destinations including the including the NC Botanical Garden, student practice fields, Finley golf course, the Ronald McDonald House, the soon-to-be Family Center of UNC Hospitals, as well as several neighborhoods (Kings Mill-Morgan Creek, Laurel Hill and Highland Woods).

Just northeast of the Fordham Boulevard study area (on the south side of NC-54) are Glenwood Elementary School and Glenwood Square Shopping Center; on the north side of NC-54 is the Glen Lenox Shopping Center. Further east on NC-54, the Friday Center and the UNC Wellness Center at Meadowmont are already connected by the Meadowmont Greenway to each other and to the Glenwood Square and Glen Lenox Shopping Centers. Eventually, this route should extend to connect Chapel Hill to the Triangle Bike and Pedestrian System which is already under development.

The low pedestrian traffic counts at the Manning intersection (the Old Mason Farm Road intersection, used by athletic teams and most joggers, was not counted) indicate the effectiveness of Fordham Boulevard in separating its two sides and restricting mutual access primarily to automobile riders. Strong motivation, such as attending campus activities (e.g., 15 home basketball games, six home football games, concerts, and other special events) is required to attempt the crossing. Student athletes and joggers cross in the study area on a regular basis, dodging traffic. However, area residents and Ronald McDonald guests, including retired people and school children, have a more difficult time.

Work group members and facilitators have observed pedestrian and bicycle activity along Fordham Boulevard, particularly between Laurel Hill Road and Old Mason Farm

Road, during certain periods of the day. The study committee was formed in response to the death of a UNC professor who lived in a neighborhood on one side of Fordham Boulevard and attempted to walk to a UNC basketball game on the other side. Safety for pedestrians and bicyclists who attempt to cross multiple lanes of traffic is further affected adversely at night, due to dark conditions without overhead illumination.

The work group consensus is that the problem in the study area is worse than what is shown from conventional measures, such as collision data, conflict data, and pedestrian and bicycle volume counts. The difficulty in this study area is that the available data are very misleading, because pedestrians and bicycles are variable by season, weather, time of day, and day of the week. Moreover, there are huge upward spikes in crossing and traveling along Fordham Boulevard for events on campus, particularly at the Smith Center. There are also many conflicts between vehicles and pedestrians or bicycles in the study area that do not result in collision reports filed by the police. The study work group asserted from personal experience that there is a considerable amount of latent demand at other times for foot and bike access to the NC Botanical Garden, playing fields, etc. that is discouraged by the current difficulty and danger. The latent foot and bicycle traffic demand is not adequately accommodated because of barriers to safe walking and bicycling, which results in increased motor-vehicle use. Currently, many potential pedestrians and bicyclists are discouraged from even making the attempt to move through the study area due to the current difficulty and danger of the crossing.

The study area traffic problems increase automobile use at a time when both the University and the Town have stated their intentions to improve conditions for walking and bicycling, reduce traffic congestion and improve environmental conditions, including reducing carbon emissions. Some local residents drive away from their destinations to catch park-and-ride buses at the Friday Center, University Mall, or Carrboro Plaza. Others put their bicycles on carriers and drive to places from which they can bicycle safely. Each trip increases the traffic entering and exiting Fordham Boulevard, making the crossing problems worse. It is also expected that plans for future development by UNC and also any possible DOT plans to widen Fordham in the future would be associated with increases in traffic volumes and further aggravate conditions for pedestrians and bicyclist in the area.

Literature Review of Potential Pedestrian Safety Treatments

During the course of this study, the study facilitators, Zegeer and Hummer, reviewed the pedestrian and traffic safety literature to identify some of the latest knowledge and information from the U.S. and abroad on measures which may be appropriate for use on the type on traffic and roadway conditions that exist on Fordham Boulevard near the section of interest. Numerous information sources were used and referenced for input to the study committee and which helped to guide the recommendations in this report. These sources include:

1. "A Policy on Geometric Design of Highways and Streets," American Association of State Highway and Transportation Officials, 2004.
2. "Guide for the Planning, Design, and Operation of Pedestrian Facilities," American Association of State and Highway Officials, July 2004.
3. "An Analysis of Factors Contributing to Walking Along Roadway Crashes: Research Study and Guidelines for Sidewalks and Walkways," by P. McMahon, C. Zegeer, C. Duncan, R. Knoblauch, R. Stewart, and A. Khattak, UNC Highway Safety Research Center for FHWA, March 2002.
4. "PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System," by D. Harkey and C. Zegeer, UNC Highway Safety Research Center, UNC Highway Safety Research Center, September, 2004.
5. "How to Develop a Pedestrian Safety Action Plan," by C. Zegeer, L. Sandt, M. Ronkin, M. Cynecki, and P. Lagerwey, UNC Highway Safety Research Center, for Federal Highway Administration, February, 2006.
6. "A Guide for Reducing Collisions Involving Pedestrians," Volume 10, by C. Zegeer, J. Stutts, H. Huang, M. Cynecki, R. Van Houten, B. Alberson, R. Pfefer, T. Neuman, K. Slack, and K. Hardy, UNC Highway Safety Research Center, National Cooperative Highway Research Program, Report Number 500, Washington, D.C., 2004.
7. "Designing for Pedestrians- Chapter 13," The Traffic Safety Toolbox, by C. Zegeer and C. Seiderman, for the Institute of Transportation Engineers, 1999.
8. "A Review of Pedestrian Safety in the U.S. and Abroad," by B. J. Campbell, C. Zegeer, H. Huang, and M. Cynecki, by UNC Highway Safety Research Center, for Federal Highway Administration, Washington, D.C., 2004.
9. Web site for the Pedestrian and Bicycle Information Center (PBIC) found at: www.walkinginfo.org. This web site has thousands of pages of information on how to improve safety and mobility for pedestrians. The web site was developed for FHWA by the PBIC, which is a Center within the UNC Highway Safety Research Center. The PBIC Director is Charles Zegeer.
10. "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines," by C. Zegeer, R. Stewart, H. Huang, and P. Lagerwey, UNC Highway Safety Research Center, Federal Highway Administration, March, 2002.
11. "Manual on Uniform Traffic Control Devices for Streets and Highways," 2003 Edition, Federal Highway Administration.

12. "Traffic Control Devices Handbook," Institute of Transportation Engineers, 2001.

The reports and publications listed above provided a considerable amount of useful information on the types of pedestrian facilities which are likely to be effective in improving pedestrian safety on high-speed, high-volume multi-lane arterial roads such as Fordham Boulevard. The following is a brief discussion of some of these potential treatments. Reference numbers (from the reference list above) are given in parentheses.

1. Sidewalks and walkways- Sidewalks and walkways provide a space for pedestrians to walk outside of the travel lanes. When designed properly with adequate separation for the travel lane, sidewalks can promote safer walking conditions (see AASHTO and ADA Guidelines, ref. 1). A 2002 study for FHWA by UNC HSRC (3) found that having sidewalks or walkways on both sides of the road can reduce pedestrian "walking along roadway" crashes by approximately 88%. Sidewalks should be placed on both sides of the road, since having sidewalks on only one side of the road will cause an increased need for pedestrians to cross the road to use the sidewalk. Sidewalks should be equipped with proper curb ramps, slopes, driveway connections, and other accommodations to meet ADA requirements. In rural areas, wide paved shoulders may be adequate for pedestrians if designed with adequate width, surface, clearances from roadside obstacles, etc. Shared-use paths (for bicyclists and pedestrians) are appropriate in many situations to also encourage safer travel by foot and by bike (refs. 4,5,6,7; also see Figure 6).



Figure 6. Illustration of sidewalk used to provide for pedestrian travel.

2. Roadway Illumination- Studies show that pedestrian crashes are over-represented during periods of poor lighting, including dusk and night conditions. Double-sided illumination is recommended along arterial streets to illuminate sidewalks and roadway for safety and security during pedestrian use. Light uniformity is also important to minimize dark areas, and lighting is appropriate not only at intersections but along roadways where pedestrians walk at night. Furthermore, providing overhead nighttime lighting could give some drivers a visual indication to drivers that they are passing from a rural to a suburban area and hopefully increase their alertness, as well as their ability to see pedestrians (4,5,6).
3. Medians and pedestrian crossing islands are one of the most effective treatments available for improving pedestrian safety on multi-lane roads. Well-designed medians and refuge islands break up an otherwise difficult crossing maneuver for pedestrians into two easier steps, instead of having to cross the entire width of the street at once. With raised medians or islands at a midblock or unsignalized location, a pedestrian finds an acceptable gap in traffic to the left, crosses to the median, and then waits for an acceptable gap to the right and completes the crossing (4,5,8,9). Research conducted for the Federal Highway Administration (10) found that raised medians or refuge islands on multi-lane roads can reduce pedestrian crossing crashes by approximately 40 percent (see figure 7).



Figure 7. Well-designed pedestrian crossing islands contribute to safer pedestrian crossings at intersections.

4. Adding high-visibility (e.g., ladder or continental-style) crosswalks at signalized locations will increase the visibility of the crosswalk to motorists and such crosswalk markings are used by some cities instead of the parallel-line crosswalks. Research shows that such high-visibility crosswalks do not result in any negative safety consequences for pedestrians (10). Furthermore, in areas of pedestrian crossings, adding pedestrian warning signs may be appropriate to help alert motorists of pedestrian crossings ahead (11,12). Therefore, there are situations on multi-lane roads where it is appropriate to add marked crosswalks, signing and other crosswalk enhancements at locations where there is pedestrian demand to cross the street (refs. 4,10,11,12; also see figure 8).



Figure 8. High-visibility crosswalks can make the crosswalk more visible to approaching motorists.

5. On multi-lane (four-or more lanes), high-speed, high-volume roads (e.g., average daily traffic volumes above 15,000 and/or where vehicle speeds exceed 40 mph) it is not appropriate to add a marked crosswalk alone, since pedestrian crash risk will increase (10). Under such conditions, pedestrians need much greater protection to cross the street more safely, such as having traffic and pedestrian signals (if warranted) or possibly a grade-separated crossing. Under such high-speed, high-volume conditions, motorists typically are unable to stop safely in time to avoid a pedestrian crossing in front of them. If a traffic signal is not warranted but there is still demand for pedestrians to cross, other measures may be considered, such as an overpass or underpass (refs. 8 and 10; also see figure 9).



Figure 9. Marked crosswalks alone are not recommended at high-volume multi-lane streets without other substantial pedestrian measures.

6. At locations on high-speed, high-volume arterial streets where traffic signals already exist, some of the intersection design features that can be beneficial to pedestrians include tighter intersection turn radii, properly-designed “pork-chop” islands, ADA-compliant curb ramps, and well-marked crosswalks (2, 4, 5, 6, 7). Pedestrian (WALK/DON’T WALK) signals should also be provided at traffic-signalized locations in urban and suburban areas (5). For wide crossings, countdown pedestrian signals are preferred, and pedestrian push-buttons may also be appropriate where there are intermittent crossing volumes throughout the day (refs. 5 and 9; also see figure 10). Certain pedestrian signal timing options may also benefit pedestrian safety, such as protected left turn phasing (where pedestrians get the WALK signal when left turn traffic is stopped on a red left turn arrow), all-red phasing (to provide a few additional seconds of all-red after each cycle), leading pedestrian intervals (which minimizes the conflicts between pedestrians and right-turning motorists), and/or prohibition of right-turn-on-red (to help reduce conflicts between pedestrians and vehicles turning right on red) (4,5,6,7,9). Advance “Stop Ahead When Flashing” or “Signal Ahead” signs are sometimes helpful to help reduce red-light violations on high-speed approaches to signalized intersections, particularly where there is poor terrain (such as vertical and horizontal curves) on the intersection approaches (7,11,12).



Figure 10. Pedestrian countdown signals can help pedestrians understand when they should begin crossing.

7. On roadway corridors along transit routes, some measures to help reduce risks to pedestrians include having buses stop on local streets (instead of on the arterial street), having the bus stop on the far side of the intersection (instead of the near side), having well-designed transit shelters and paths (sidewalks) leading from neighborhoods and along the route to the bus stops, placing bus stops only at locations where it is safe for pedestrians to cross the street, and providing adequate lighting at the bus stop (and street crossing) location. Transit agencies should work with town officials to review all transit stop locations to insure that they are adequately safe for transit users (refs. 4,5,7; also see figure 11).



Figure 11. Bus stop locations should be carefully planned and designed to help optimize pedestrian safety for transit riders.

8. Grade-separations such as overpasses or underpasses may be a viable solution under certain conditions (1,2,4). It is true that grade-separation is very costly and may not be used by most pedestrians at some locations. However, if properly planned, designed, and located to meet pedestrian crossing needs across high-speed, high-volume roadways, grade-separation may be justified in certain situations. A careful analysis should be made of pedestrian demand, the risk to pedestrians of crossing the roadway, as well as cost and practical issues (e.g., where and how the facility would be constructed, the type of design, potential sources of funding, etc.). See refs. 2, 4, and 5 and figure 12.



Figure 12. Pedestrian overpasses or underpasses may be appropriate in certain situations to provide for safer pedestrian crossings.

9. In addition to engineering treatments, other important ingredients which should be considered to solve a pedestrian safety problem are enforcement and education measures. For example, selective police enforcement is often needed to reinforce laws related to speed limits, motorists yielding to pedestrians in marked crosswalks or while turning at intersections, red-light running, and drunk driving. Enforcement of pedestrian behavior may be appropriate in certain situations, but may cause public relations problems if not done properly. The use of neighborhood watch programs, radar speed trailers, photo-enforcement, and citizen-complaint hot-lines may also be part of the solution. Police can be a very effective way to control motorist and pedestrian traffic before and after sporting and other public events (refs. 4,5,6,8,9; also see figure 13).



Figure 13. Police enforcement programs are an important ingredient in providing for enhanced pedestrian safety in an area.

10. Education programs that may be beneficial in helping to reduce pedestrian crashes on a local level include public awareness campaigns, which may educate pedestrians about safety risks and explain the meaning and proper use of crosswalks, pedestrian signals, medians, and other pedestrian facilities. Campaigns may be targeted to specific groups, such as older adults, children, and motorists. Public education campaigns and programs (including targeting incoming students to UNC, for example) can be an effective way to promote safer pedestrian and motorist behavior (5,6). Using special transit vehicles (buses) to transport people to special events (e.g., to sporting events) can reduce the number of pedestrians crossing arterial streets and therefore may also help supplement other pedestrian safety measures (see figure 14).



Figure 14. Pedestrian safety education aimed at motorists and pedestrians is important to supplement engineering and enforcement measures.

Consideration of Potential Treatments

Through previous meetings, the Fordham Boulevard work group offered personal experience, firsthand observations, and opinions regarding the potential effectiveness of numerous possible improvements in the study area. Meeting minutes, available on the Town web site, document the discussion. Several general themes emerged from these contributions, including strong support for:

- Immediate planning for a bridge or tunnel for pedestrians and bicycles to cross Fordham somewhere in the study area as the optimal solution for maximum pedestrian and bicyclist safety with no impact on traffic flow;
- Pedestrian signals, crosswalks, overhead lighting, flashing warning beacons, and other improvements for crossing Fordham at Old Mason Farm and Manning as soon as possible; and
- A sidewalk or shared use path along Fordham in the study area.

The group thought that those three types of improvements would make an overall logical integrated solution for the study area. The highlight of one meeting, in fact, was an outstanding presentation by a group member of pedestrian and bicycle bridges on university campuses across the US. She made the case, and group members agree, that a pedestrian and bicycle bridge or tunnel across Fordham would be effective, could be beautiful, and could make strong statements about the priority given to non-motorized travel by the University, Town, and State.

To help the facilitators gauge the group member's thoughts on potential improvements in the study area, they asked the members to rate the potential effectiveness of those potential improvements. Appendix A shows the rating form. Group members were asked to rate the effectiveness of each potential improvement on a scale from 0 to 10, where 0 meant no improvement and 10 meant complete effectiveness. The potential improvements were formed into four clusters, with each cluster representing the improvements that might pertain to one of the major problems identified in the study area:

1. Pedestrian or bicyclist collisions and conflicts while crossing Fordham,
2. Pedestrian or bicyclist collisions and conflicts while moving along Fordham,
3. Rear-end collisions and conflicts between vehicles on Fordham, and
4. Vehicular delay on Fordham.

All potential improvements that had been mentioned in the minutes of the first four group meetings or that were discussed in FHWA's *How to Develop a Pedestrian Safety Action Plan* (5) were included in the rating form. This included 34 improvements for crossing Fordham, 36 improvements for moving along Fordham, 16 improvements for rear-end conflicts, and 7 improvements for delay on Fordham.

This rating exercise was limited in several important ways, so the results only provided rough guidance toward the recommendations presented below. The group was asked not to consider cost, ease of implementation, or potential negative side effects in providing ratings, just effectiveness in addressing the stated problem. The group was also asked to consider each listed measure separately, even though it might naturally be implemented as part of a larger package. Thirteen group members returned rating forms, which represents a majority of the group but not the entire group.

Appendix B shows the mean and standard deviation of the ratings for each potential improvement. The results of the rating exercise provided in Appendix B generally confirmed the sense of the group reported above. The group rated a pedestrian and bicycle bridge and underpass highly for treating the crossing problem. The group rated police control before and after major Smith Center events at the Manning intersection highly for treating all four problems. Shared-use paths along Fordham scored well for treating the problems faced by motorists and pedestrians moving along Fordham. The group also gave high marks to several lower-cost treatments like pedestrian countdown signals, flashing beacons, and street lighting.

Readers should note that there were several other potential countermeasures offered during the sixth group meeting, after these ratings had been compiled. A group member observed that much of the need for pedestrian improvements in the study area was to get fans to games and other events at the Smith Center, so he suggested a vehicle to shuttle fans across Fordham to games. With a short distance to travel, the vehicle may be able to make several trips with short waiting times before and after games. Group members commented that such a service would be welcome. The current bus service, originating from a mall not in the study area, is impractical for study area residents. Other comments from group members were that the bus departure times would limit people's flexibility, that other neighborhoods will want the service too, and that a shuttle does not solve the separation of the neighborhood from the rest of the Town imposed by Fordham, particularly during days without games. Other potential countermeasures described by group members were signals at Oteys Drive and Fordham, southwest of the study area, and at Skipper Bowles Drive and Manning, west of the study area. The Oteys signal would probably help traffic and pedestrian flow to and from an expanded UNC family student housing project. The Skipper Bowles signal would help pedestrian traffic to and from Smith Center events and would potentially connect with the Pinetum trail, offering another pedestrian and bicycle route to events on campus. Note that OWASA, in connection with their upcoming water reuse pipeline construction project, may be willing to construct a pedestrian and bicycle bridge along their pipeline route across Meeting of the Waters Creek between the Pinetum trail and Manning Drive near this point.

Recommended Treatments

With the potential improvement ratings by the group in hand, the facilitators considered several other factors to arrive at a list of recommended countermeasures. First, they were guided by their knowledge of the literature in pedestrian and bicycle safety and their experience on previous projects. Second, they considered the factors group members were asked to ignore in producing the ratings shown above: cost, ease of implementation, potential negative side effects, and potential to be included as part of a larger package. Third, they considered the relative importance of each of the four problems outlined above. The consensus was that the order in which the problems were listed above was the order of importance to the group. Finally, the facilitators considered the potential effectiveness of an improvement on more than one of the problems in the study area.

Considering the above, listed roughly in the order in which the Town can most easily implement them, our recommended treatments in the study area are:

1. Illumination at the Manning and Old Mason Farm intersections,
2. Police control before and after major Smith Center events at the Manning intersection,
3. Push-button countdown pedestrian signals and marked crosswalks at the Manning and Old Mason Farm intersections,
4. Stop ahead when flashing beacons on Fordham approaching Manning from the south,
5. Sidewalks or shared-use paths on both sides of Fordham, and
6. Pedestrian and bicycle overpass or underpass across Fordham somewhere in the study area.

The next few paragraphs provide more detail on each recommendation.

1. Illumination at the Manning and Old Mason Farm intersections

Illumination of both intersections rated highly as a treatment for the top three problems. The facilitators agree that illumination can be an effective countermeasure where there are pedestrians and bicycles crossing or moving along a roadway at night. With the student activity in the area, and fans going to and from Smith Center events at night, that is the case here. Low visibility was cited as a possible cause of the nighttime fatal collision at the Manning crossing. The Town is already moving forward with illumination of this intersection, so this group recommends completion of those plans and addition of a similar set of lights at Old Mason Farm. This relatively low-cost countermeasure could be implemented within a year. The group recommends midblock illumination in conjunction with shared-use paths or sidewalks between Manning and Old Mason Farm.

2. Police control before and after major Smith Center events at the Manning intersection

In the past, the State Highway Patrol has provided police control for football games and local police have regulated traffic for Smith Center events, especially basketball games. The tactics of the two law enforcement groups seem to differ. For football games, a strong police presence--multiple parked patrol cars with flashing lights, an officer in the middle of the intersection controlling traffic, and stopping all traffic to usher pedestrians across--call attention to the need for driver awareness. For Smith Center events, a policeman controls the traffic signal from a patrol car parked on a side street. This serves the goal of facilitating traffic movement through the intersection, not aiding pedestrians. The pedestrian death at the Manning intersection occurred before a basketball game when an officer was on duty. The officer was unaware that the collision had happened. The group and facilitators recognize that traffic control from the middle of an intersection is dangerous and unpleasant for officers. Nonetheless, a

sizeable majority of the group feels that since a way has been found to provide police control at Manning and Fordham during UNC football games, a way could be found to do so for basketball games and other major Smith Center events. Therefore the group, which knows traffic patterns in the study area better than anyone else, rated police control as potentially high in effectiveness on all four problems and strongly recommends that police who control traffic specifically aid crossing pedestrians at the Manning intersection before and after Smith Center events. The cost of this treatment is relatively low and it could be implemented in time for this basketball season.

The group also notes that police put the signal at Fordham and Old Mason Farm on flash after major sporting events and other events at the Smith Center. With the signal on flash it is virtually impossible for pedestrians or vehicles to cross or turn left at the intersection. Furthermore, group members have observed that the signal often remains on flash long after event traffic has dissipated. The group recommends that the traffic signal remain in a red/green cycle unless an officer regulates traffic from the center of the intersection.

3. Push-button countdown pedestrian signals and marked crosswalks at the Manning and Old Mason Farm intersections

The group recommends a package of push-button countdown pedestrian signals and marked crosswalks across all approaches at the Manning and Old Mason Farm intersections. The group ranked push-button countdown pedestrian signals high for treating the problems in crossing and moving along Fordham. Treatments at Manning rated higher than at Old Mason Farm, and treatments crossing Fordham rated higher than crossing Manning or Old Mason Farm. Nonetheless, the facilitators believe that treating just one or two approaches with these measures is faulty, as pedestrians will still try to cross the untreated approaches. The new pedestrian signals should provide enough time, when activated, for pedestrians walking at a moderate pace to complete their crossings. The Town should insure that proposed changes at the Old Mason Farm and Fordham intersection do not make implementation of this package of treatments more difficult. The Town should also explore improvements for safe bicycle crossing in conjunction with the pedestrian improvements, such as signal sensors able to detect bicycles and associated signage and marking. Overall this is another relatively low-cost treatment package that could be implemented within two years or so.

4. Stop ahead when flashing beacons on Fordham approaching Manning from the south

The group's recommendations include a stop ahead when flashing beacon on Fordham. The group rated this treatment as relatively effective for reducing problems with pedestrian crossings, as well as to address problems with rear-end crash potential. The facilitators agree that this treatment could be effective in the study area and recommend it on the northbound Fordham approach to Manning, at the top of the crest near the intersection with Oteys. The group has observed that many drivers treat Fordham Boulevard as a freeway because of the wide median, wide shoulders, and gentle

curvature. Traffic approaching the study area from the south on US 15-501 has just merged on an upgrade via an interchange ramp onto Fordham joining a traffic stream approaching Chapel Hill from the west on NC-54 that has not seen a signal since the other side of Carrboro. The drivers accelerate to surmount the crest near Oteys and then, suddenly, around a curve and at the bottom of a hill these drivers are confronted with the signal at Manning. Nearby residents have become accustomed to the sound of squealing brakes and tires from this movement. The group and facilitators agree that the current set of warning signs on Fordham are inadequate in overcoming this mentality, but a relatively new and rare active device would get more attention. This is another relatively low-cost treatment package that could be implemented within two years or so. The NCDOT, owner and operator of Fordham Boulevard, may need to be convinced of the effectiveness of such a device. However, the group feels that the Manning intersection is unique and is confident that the Town will be able to make an excellent case for the device, given the huge and growing traffic volume, large number of rear-end collisions, freeway-like feeling for drivers on Fordham, crest curve obscuring vision to the signal, and need to prevent additional pedestrian collisions.

The group strongly encourages the Town to implement recommendations 3 and 4 together. The group's concern is that pedestrian countdown signals and crosswalks at Manning would encourage higher pedestrian volumes across Fordham, but without better warning for drivers approaching Manning from the south there would be great risks of more terrible collisions with pedestrians.

5. Sidewalks or shared-use paths on both sides of Fordham

The group recommends a sidewalk or shared-use path on both sides of Fordham. A shared-use path is paved, off the road, at least ten feet wide, and designed to accommodate both pedestrians and bicycles. This is a classic treatment for problems with pedestrians walking along a road or with bicycles on a road. The group rated paths or sidewalks along Fordham high for treating the problems of users moving along Fordham. These are also part of the Town Bike and Pedestrian Master Plan and connect to the greater Triangle path network as well as destinations in eastern Orange County.

The idea that the existing shoulders on Fordham serve as a bicycle or pedestrian facility was roundly derided by the group in light of the huge volume of fast vehicular traffic. The narrow paved shoulders are often encroached on by vehicular traffic and there are large water-filled pot holes along the natural portion of the shoulders that are barriers to bikers and pedestrians in daylight and hazards after dark. There are simply no pedestrian connections available along this section of Fordham at this time.

There are compelling rationales for building pathways on both sides of Fordham. A path on the northwest side would be part of a direct path to large pedestrian generators like the Smith Center and UNC family student housing, and a connection to a future NC Botanical Garden "Campus to Garden" path through the OWASA right-of-way toward Ridge Road. The shared-use path on the northwest side of Fordham should be

continued from Manning to at least Oteys Drive to accommodate demand from the expanded housing complex in that area, and to connect with the recently constructed sidewalk along the north side of Mason Farm Road.

A path on the southeast side would connect Glenwood Elementary, the Highland Woods neighborhood, the Ronald McDonald House, and the soon-to-be Family Center of UNC Hospitals to the NC Botanical Garden, UNC Hospitals, and Smith Center events. The shared-use path on the southeast side of Fordham should be continued northward along Fordham from Old Mason Farm Road toward Glenwood Elementary School. UNC owns property suitable for the route from Old Mason Farm Road (at the NC Botanical Garden entrance), and the Town should request UNC to incorporate the link into the University's Development Plan (Modification Number 3). The group developed an idea for a facility on new fill next to the NC Botanical Garden to help overcome the fact that there is little available flat space. A boardwalk-type facility could be separated from Fordham by the existing guardrail and from the Garden by a new version of the existing sound wall. The NC Botanical Garden, as a stipulation for closing part of Laurel Hill Road during its expansion, will maintain a ten-foot wide shared-use path connecting Coker Drive to Old Mason Farm Road. This path will serve bicyclist needs on the southeast side of Fordham pretty well, so some group members feel that only a sidewalk needs to be built on this side of Fordham. This will make it easier to find and create the space for the new facility.

These measures could be costly and might take several years to implement. If priority must be given to the sidewalk or pathway on one side of Fordham Boulevard., it should be done in concurrence with how the pedestrian crossing signals are installed at the intersections of Fordham with Manning Drive and Old Mason Farm Road to create a continuous safe pathway through the study area.

Good opportunities to cross Fordham at Manning and Old Mason Farm will allow all users to take advantage of all paths on both sides of Fordham.

6. Pedestrian and bicycle overpass or underpass across Fordham somewhere in the study area

The final group recommendation is for a pedestrian and bicycle overpass or underpass across Fordham in the study area. An overpass was the top-rated treatment to the worst problem—crossing Fordham—while an underpass was the third-rated treatment. The group is not making a recommendation on the location of the crossing or whether it should be an overpass or underpass, recognizing that those are difficult decisions requiring far more detailed study than was performed here. The facilitators believe that an overpass has more potential for success in general, since it would appear more secure and could be an attractive structure. In fact, an overpass could make a powerful architectural statement to thousands of motorists per day about the value UNC and the Town of Chapel Hill place on pedestrian and bicycle traffic, as other structures on other campuses around the US have done. The group and facilitators are aware of the high cost of an overpass or underpass (several million dollars in construction costs) and the

engineering and architectural difficulties associated with insuring that either was secure and attractive. Nonetheless, the group and facilitators believe that a case along the following lines is compelling:

- The location is unique, with a high-speed arterial with an enormous traffic volume separating the bulk of a town and a huge state university from other parts of that town and university;
- There is a chance with this connection to tie Chapel Hill and Orange County into the large and growing network of pedestrian and bicycle networks that Durham, Chatham, and Wake Counties are developing, removing US-15/501 and NC-54 as a formidable obstacle;
- Chapel Hill is a place that emphasizes and promotes walking and bicycling over motor vehicle travel;
- In June, the Town and UNC announced a partnership for the specific purpose of reducing carbon emissions; and
- There is recent and local precedent, with new pedestrian and bicycle bridges over I-440 in Raleigh and US-1/64 in Cary to serve places with non-existent previous pedestrian and bicycle volumes.

Other Discussion on Recommendations

The facilitators arrived at their recommended list of improvements independently of the consultants hired to consider short-term pedestrian and bicycle improvements at problem spots throughout the Town. These consultants—Grayson Baur from Lappas + Havener, PA and Roy Currin from Ramey Kemp and Associates, Inc.—investigated the study area throughout the late summer 2006 and reported on their tentative short-term recommendations at the August 24 group meeting. At the Fordham and Manning intersection Baur and Currin are recommending:

- A crosswalk and pedestrian countdown signal for crossing Fordham on the south side of Manning;
- An enlarged island on the southwest corner to allow a shorter pedestrian crossing of right turns;
- An enlarged center median refuge (eight feet or so) created by narrowing the dual left lanes to 11 feet each and shifting northbound Fordham lanes to the east;
- Upgraded flashers and advanced warning signs on Fordham;
- Cutting back vegetation a bit on the northwest corner for sight distance; and
- Lighting for the entire intersection.

At Fordham and Old Mason Farm, they are recommending a package of pedestrian countdown signals and crosswalk, lighting, and beacons that is very similar to the Manning intersection. The crosswalk would be on the south side of Old Mason Farm.

The group heartily endorsed the ideas presented by Baur and Currin for enlarging the island and median at Fordham and Manning. These were not included in the ratings form. However, the group felt that the lanes should be moved to the northwest (toward

the Family Practice) not toward the southeast (toward Woodbine). Overall, the Town should gain great confidence from the fact that the short-term recommendations for the study area from Baur and Currin were very similar to those made by this group.

The recommended treatments encompass the bulk of the treatments that the group rated highly, but there were a few highly-rated possible treatments that were not recommended in the end. Providing a lower speed limit for Fordham received a relatively high effectiveness score from the group to address the problem of rear-end vehicular collisions. However, the facilitators do not believe that a lower speed limit is realistically enforceable with conventional police tactics, given the freeway mentality described earlier. The group thought that controlling traffic demand through the area would be relatively effective for rear-end collisions and conflicts and for delay. The facilitators again do not believe that this treatment is realistic, especially since much of the traffic growth is likely generated outside Chapel Hill and Orange County.

Some members of the group also rated reconfiguration of Fordham as a superstreet as relatively effective in treating rear-end collisions and conflicts and delay. While the facilitators agree that the superstreet would be effective at treating those problems (and they are eagerly anticipating results from the new superstreet at US-15/501 and Erwin Road) they recognize that it will likely be a long time before the funding would be available to rebuild Fordham so thoroughly. When funding looks to be available, a superstreet configuration should be considered.

Next, the group thought that developing other routes from Chatham to I-40 would be relatively effective in treating delay. The facilitators agree, depending on the quality of the route. They recommend that the Metropolitan Planning Organization (MPO) should examine widening NC-751 from US-64 to I-40 as just such a route. The group noted, however, that no alternate route would help during campus and Smith Center events.

Finally, the shuttle vehicle to and from games proposed by a committee member is a creative solution that makes sense in treating problems on game days. The shuttle would be a service to all pedestrians desiring it, not just to the neighborhood. However, the group believes that the package of treatments outlined above, including police control at Manning and shared-use paths along Fordham, would be more effective on game days at the Smith Center. In the interim until the full package of treatments is in place a shuttle service would be a helpful alternative for some fans.

Implementation

Upon approval of the group's recommendations by the Town Council, implementation will require a vigorous and sustained effort by the Town staff, the Council, and study area citizens. Funding sources include the Town itself and several parts of the NCDOT budget. The Town has an annual budget for sidewalk construction, for example, and the staff and area citizens should make sure that the paths recommended here are included in the considerations of the committee that oversees that budget. Staff, Council, and citizens should make sure that these recommendations are presented to

NCDOT Division 7 staff, the Transportation Board member responsible for Division 7, and applicable headquarters units like safety and pedestrians and bicycles. A presentation to the MPO would also be important. Once funding has been arranged, the NCDOT will have an active role in the design of any changes to state-owned roads like Fordham Boulevard. Close coordination between the Town and the NCDOT will be essential for successful implementation.

Significant changes have been made recently by UNC in or near the study area, and more changes are proposed for the near future. These changes have been accelerated by the availability of funding from bond issues over the last four years or so. They include the construction of 294 two-bedroom Family Student Housing apartments, six high-rise dormitories, expansion of Kenan Stadium, a new Student Academic Services Center, additional medical buildings in the UNC Hospitals complex, and numerous additional parking facilities, all on the Manning Drive corridor. These changes have had and will continue to create negative impacts for pedestrians and bicyclists in the study area. UNC is scheduled to propose a large set of new construction projects to the Town Council in its Development Plan Modification 3 on November 13. The group recommends that the Town make study and funding by UNC of the six recommendations listed above be stipulations to its approval of Modification 3.

The biggest challenge in implementing these recommendations will be for the overpass or underpass due to the high cost. The Town cannot afford to build the structure on its own. The facilitators believe that the following would help make the overpass or underpass a reality:

- Form a permanent Town committee with interests in pedestrian and bicycle improvements in the study area. This will also help with implementation of the other recommendations.
- Make an overpass or underpass in the study area (and the larger path network mentioned below) part of all relevant long-term plans, including general transportation and specific pedestrian and bicycle plans at the Town and MPO levels.
- Develop a plan for a path network from the heart of the UNC campus to the eastern edge of Orange County and beyond (connecting to the greater Triangle path network if possible) that includes an overpass or underpass in the study area. A path connection from the study area to the Meadowmont Greenway (which runs on both sides of NC-54 and connects the Friday Center, UNC Wellness Center at Meadowmont, three shopping centers, and the Durham County line) seems like a great first link that could be built now. This same route would link safely to the housing and sports venues on the UNC campus when the pedestrian and bicycle underpass or overpass is constructed, creating a true alternative transportation system on the east side of Chapel Hill.

- Seek funding from non-traditional sources for transportation improvements, such as the University, alumni, and health, environmental, and philanthropic foundations. Also seek funding from all possible Federal sources.
- In the longer term, the MPO and NCDOT will likely desire substantial improvements to the Fordham corridor on vehicular safety and delay grounds some day. When that project is designed and funded, make sure that the designers are sensitive to the need for a shared-use overpass or underpass to connect the main UNC campus to its venues across Fordham Boulevard and to the neighborhoods and shopping centers on the east side of town. If alternative transportation systems are to be viable, this in-town strategic highway must be crossed safely.

Appendix A—Potential Countermeasure Effectiveness Rating Form

August 10, 2006

How effective would each of these be, if implemented individually, in alleviating **pedestrian and bicyclist** collisions and conflicts **crossing** Fordham Boulevard in the study area? Rate each from 0 being completely ineffective (no help for the current situation) to 10 being completely effective.

- ___ Illumination at Manning intersection
- ___ Illumination at Old Mason Farm intersection
- ___ Illumination mid-block
- ___ Push-button countdown ped signal at Manning intersection
- ___ Push-button countdown ped signal at Old Mason Farm intersection
- ___ Mid-block push-button countdown traffic signal
- ___ Mid-block pedestrian-activated in-pavement flashing lights
- ___ Redesign islands for tighter right-turn radii at Manning intersection
- ___ Provide ideal curb ramps at Manning intersection
- ___ Marked crosswalk at Manning intersection
- ___ Marked crosswalk at Old Mason Farm intersection
- ___ Marked crosswalk mid-block
- ___ Lengthen green phase crossing Fordham at Manning intersection
- ___ Lengthen green phase crossing Fordham at Old Mason Farm intersection
- ___ Prohibit right-turn-on-red at Manning intersection
- ___ Prohibit right-turn-on-red at Old Mason Farm intersection
- ___ Traffic calming measures like narrower lanes and textured crosswalks on Fordham
- ___ Radar speed trailers on Fordham
- ___ Extra police enforcement of speed limit on Fordham
- ___ Photo enforcement of speed limit on Fordham
- ___ Police control before and after major Smith Center events at Manning intersection
- ___ Area-wide Heed the Speed program
- ___ Area-wide public awareness campaign
- ___ Lower speed limit on Fordham
- ___ Pedestrian and bicycle bridge

...pedestrian and bicyclist crossing (continued):

- ___ Pedestrian and bicycle underpass
- ___ Clear sight lines to existing warning signs on Fordham
- ___ Better signal ahead signs on Fordham
- ___ Better pedestrian warning signs on Fordham
- ___ Stop ahead when flashing beacon on Fordham
- ___ Build interchange at Fordham and Manning
- ___ Additional bus service to area
- ___ Build superstreet on Fordham
- ___ Develop other through routes from Chatham to I-40
- ___ Control travel demand growth through area

How effective would each of these be, if implemented individually, in alleviating collisions and conflicts by **pedestrians and bicyclists moving along** Fordham Boulevard in the study area? Rate each from 0 being completely ineffective (no help for the current situation) to 10 being completely effective.

- ___ Sidewalk on the northwest side of Fordham
- ___ Sidewalk on the southeast side of Fordham
- ___ Sidewalks on both sides of Fordham
- ___ Shared-use path on the northwest side of Fordham
- ___ Shared-use path on the southeast side of Fordham
- ___ Shared-use path on both sides of Fordham
- ___ Bicycle lane on southwest-bound Fordham
- ___ Bicycle lane on northeast-bound Fordham
- ___ Illumination at Manning intersection
- ___ Illumination at Old Mason Farm intersection
- ___ Illumination mid-block
- ___ Redesign islands for tighter right-turn radii at Manning intersection
- ___ Provide ideal curb ramps at Manning intersection
- ___ Marked crosswalk across Manning
- ___ Marked crosswalk across Old Mason Farm

...pedestrians and bicyclists moving along (continued):

- ___ Push-button countdown ped signal across Manning
- ___ Push-button countdown ped signal across Old Mason Farm
- ___ Lengthen green phase crossing Manning
- ___ Lengthen green phase crossing Old Mason Farm
- ___ Change to lagging left turn signal phasing at Manning
- ___ Change to lagging left turn signal phasing at Old Mason Farm
- ___ Prohibit right-turn-on-red at Manning intersection
- ___ Prohibit right-turn-on-red at Old Mason Farm intersection
- ___ Police control before and after major Smith Center events at Manning intersection
- ___ Area-wide Heed the Speed program
- ___ Area-wide public awareness campaign
- ___ Lower speed limit on Fordham
- ___ Clear sight lines to existing warning signs on Fordham
- ___ Better signal ahead signs on Fordham
- ___ Better pedestrian warning signs on Fordham
- ___ Stop ahead when flashing beacon on Fordham
- ___ Build interchange at Fordham and Manning
- ___ Additional bus service to area
- ___ Build superstreet on Fordham
- ___ Develop other through routes from Chatham to I-40
- ___ Control travel demand growth through area

How effective would each of these be, if implemented individually, in alleviating **rear-end vehicular** collisions and conflicts on Fordham Boulevard in the study area? Rate each from 0 being completely ineffective (no help for the current situation) to 10 being completely effective.

- ___ Illumination at Manning intersection
- ___ Illumination at Old Mason Farm intersection
- ___ Illumination mid-block
- ___ Police control before and after major Smith Center events at Manning intersection
- ___ Area-wide Heed the Speed program
- ___ Area-wide public awareness campaign
- ___ Lower speed limit on Fordham
- ___ Clear sight lines to existing warning signs on Fordham
- ___ Better signal ahead signs on Fordham
- ___ Better pedestrian warning signs on Fordham
- ___ Stop ahead when flashing beacon on Fordham
- ___ Build interchange at Fordham and Manning
- ___ Widen Fordham to six through lanes
- ___ Build superstreet on Fordham
- ___ Develop other through routes from Chatham to I-40
- ___ Control travel demand growth through area

How effective would each of these be, if implemented individually, in alleviating **vehicular delay** in the study area? Rate each from 0 being completely ineffective (no help for the current situation) to 10 being completely effective.

- ___ Police control before and after major Smith Center events at Manning intersection
- ___ Build interchange at Fordham and Manning
- ___ Build new entrance to university facilities on Fordham southwest of Manning
- ___ Widen Fordham to six through lanes
- ___ Build superstreet on Fordham
- ___ Develop other through routes from Chatham to I-40
- ___ Control travel demand growth through area

Appendix B-- Potential Countermeasure Effectiveness Rating Summary

Pedestrian and Bicycle Conflicts and Collisions While Crossing Fordham		
<i>Description</i>	<i>Mean</i>	<i>Std. Dev.</i>
Pedestrian and bicycle bridge	8.85	1.68
Police control before and after major Smith Center events at Manning intersection	8.31	2.50
Pedestrian and bicycle underpass	7.69	3.20
Push-button countdown ped signal at Manning intersection	7.62	2.47
Push-button countdown ped signal at Old Mason Farm intersection	7.46	2.60
Stop ahead when flashing beacon on Fordham	7.23	2.83
Illumination at Manning intersection	7.08	2.66
Marked crosswalk at Manning intersection	7.00	2.89
Illumination at Old Mason Farm intersection	6.38	2.47
Marked crosswalk at Old Mason Farm intersection	6.33	3.03
Extra police enforcement of speed limit on Fordham	6.23	2.62
Build superstreet on Fordham	5.92	2.23
Clear sight lines to existing warning signs on Fordham	5.85	3.78
Better signal ahead signs on Fordham	5.77	3.56
Lengthen green phase crossing Fordham at Manning intersection	5.54	3.36
Better pedestrian warning signs on Fordham	5.46	3.02
Lengthen green phase crossing Fordham at Old Mason Farm intersection	5.38	3.40
Photo enforcement of speed limit on Fordham	4.85	3.69
Traffic calming measures like narrower lanes and textured crosswalks on Fordham	4.77	2.92
Lower speed limit on Fordham	4.77	3.32
Control travel demand growth through area	4.77	3.94
Radar speed trailers on Fordham	4.62	2.60
Develop other through routes from Chatham to I-40	4.31	3.97
Provide ideal curb ramps at Manning intersection	4.25	2.38
Redesign islands for tighter right-turn radii at Manning intersection	4.23	2.68
Area-wide Heed the Speed program	4.15	2.85
Area-wide public awareness campaign	4.08	2.78
Additional bus service to area	3.85	3.87
Illumination mid-block	3.62	3.38
Prohibit right-turn-on-red at Manning intersection	3.46	3.04
Build interchange at Fordham and Manning	3.45	3.05
Mid-block push-button countdown traffic signal	2.92	2.60
Marked crosswalk mid-block	2.31	2.43
Prohibit right-turn-on-red at Old Mason Farm intersection	2.23	1.88
Mid-block pedestrian-activated in-pavement flashing lights	2.08	2.06

Pedestrian and Bicycle Conflicts and Collisions While Moving Along Fordham		
<i>Description</i>	<i>Mean</i>	<i>Std. Dev.</i>
Police control before and after major Smith Center events at Manning intersection	7.77	2.89
Illumination at Manning intersection	7.31	2.84
Shared-use path on the northwest side of Fordham	7.00	3.13
Illumination at Old Mason Farm intersection	6.92	2.75
Sidewalk on the northwest side of Fordham	6.12	3.04
Push-button countdown ped signal across Manning	6.08	3.35
Sidewalks on both sides of Fordham	6.00	3.28
Better pedestrian warning signs on Fordham	6.00	3.56
Push-button countdown ped signal across Old Mason Farm	5.92	3.43
Marked crosswalk across Manning	5.77	4.00
Better signal ahead signs on Fordham	5.77	3.39
Clear sight lines to existing warning signs on Fordham	5.46	3.57
Shared-use path on the southeast side of Fordham	5.42	3.32
Marked crosswalk across Old Mason Farm	5.38	3.69
Lower speed limit on Fordham	5.31	3.35
Stop ahead when flashing beacon on Fordham	5.23	3.09
Build superstreet on Fordham	5.23	2.92
Lengthen green phase crossing Manning	5.00	3.22
Control travel demand growth through area	4.92	3.88
Shared-use path on both sides of Fordham	4.92	3.09
Lengthen green phase crossing Old Mason Farm	4.83	3.27
Bicycle lane on northeast-bound Fordham	4.69	3.57
Sidewalk on the southeast side of Fordham	4.54	3.53
Develop other through routes from Chatham to I-40	4.46	4.05
Bicycle lane on southwest-bound Fordham	3.92	3.40
Area-wide Heed the Speed program	3.92	3.12
Area-wide public awareness campaign	3.92	3.23
Illumination mid-block	3.85	3.24
Build interchange at Fordham and Manning	3.55	2.81
Change to lagging left turn signal phasing at Manning	3.50	2.94
Redesign islands for tighter right-turn radii at Manning intersection	3.46	2.73
Prohibit right-turn-on-red at Manning intersection	3.42	3.03
Change to lagging left turn signal phasing at Old Mason Farm	3.33	2.90
Additional bus service to area	3.25	3.52
Provide ideal curb ramps at Manning intersection	2.83	1.99
Prohibit right-turn-on-red at Old Mason Farm intersection	2.83	2.12

Vehicular Rear-End Conflicts and Collisions on Fordham		
<i>Description</i>	<i>Mean</i>	<i>Std. Dev.</i>
Stop ahead when flashing beacon on Fordham	8.00	1.96
Illumination at Manning intersection	7.08	3.01
Lower speed limit on Fordham	6.69	3.25
Illumination at Old Mason Farm intersection	6.54	3.26
Police control before and after major Smith Center events at Manning intersection	6.38	3.40
Control travel demand growth through area	6.31	3.20
Better signal ahead signs on Fordham	6.23	2.83
Better pedestrian warning signs on Fordham	6.15	3.29
Build superstreet on Fordham	6.00	2.89
Develop other through routes from Chatham to I-40	5.77	3.52
Clear sight lines to existing warning signs on Fordham	5.62	3.20
Build interchange at Fordham and Manning	5.00	2.80
Area-wide Heed the Speed program	4.77	2.59
Area-wide public awareness campaign	4.54	2.88
Illumination mid-block	3.31	3.20
Widen Fordham to six through lanes	1.62	2.26

Delay and Congestion on Fordham		
<i>Description</i>	<i>Mean</i>	<i>Std. Dev.</i>
Police control before and after major Smith Center events at Manning intersection	7.85	2.30
Build superstreet on Fordham	6.92	2.18
Develop other through routes from Chatham to I-40	6.08	3.73
Control travel demand growth through area	5.92	3.57
Build interchange at Fordham and Manning	5.08	2.47
Widen Fordham to six through lanes	3.54	3.20
Build new entrance to university facilities on Fordham southwest of Manning	3.46	3.33