

Harding Town Center Transportation Plan

Prepared for



Metropolitan Government of Nashville - Davidson County

Prepared by



In association with

F i s c h b a c h
Transportation Group, Inc.
Traffic Engineering and Planning

October 2004

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Executive Summary

The Harding Road and White Bridge Road intersection is located approximately four miles southwest of Nashville's Central Business District, in the heart of a growing activity center. Mixtures of commercial, office and retail land uses are prominently featured in the area surrounding the intersection. Providing transportation infrastructure for the existing and future traffic needs of this growing area is important. For this reason, the Davidson County-Nashville Metro government initiated a detailed neighborhood plan for the area. As a part of that effort, a transportation plan was developed to provide for transportation needs within the context determined by the community vision for the area.

Purpose of the Transportation Plan

The purpose of the transportation plan is to develop a community-based, context sensitive transportation plan for the Harding Road / White Bridge Road area that:

- Balances needs for local access with needs for travel through the corridor.
- Enhances the use of alternative travel modes, including transit, pedestrian and bicycle.
- Incorporates strategies that encourage fewer vehicular trips.

Transportation Goals and Objectives

The future vision for the area, as identified in the detailed neighborhood plan, includes developing a walkable Town Center with emphasis on mixed use development with improved transportation infrastructure and increased emphasis on pedestrian and transit travel modes.

In order to address the existing and future transportation needs, a series of transportation goals were developed through interaction with the coordinating committee and community:

- *Goal 1: Provide acceptable travel times for movement of vehicles through the area by fully utilizing existing arterials and improving capacity of main roadways.*
- *Goal 2: Serve critical intersection movements with minimal queuing and delay by improving critical intersection operations.*
- *Goal 3: Facilitate local connections and circulation without accessing the primary roadway network, while discouraging the use of local residential streets for through-traffic movement.*
- *Goal 4: Maximize pedestrian travel between Hospital Sub-district and Village Center Sub-district by implementing local pedestrian paths and connections and providing safe and effective pedestrian crossings.*



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- *Goal 5: Encourage pedestrian and bicycle trips between adjacent neighborhoods and the Village Center and Hospital Sub-districts by providing regional greenway and neighborhood pedestrian /bicycle connections and bicycle travel capability throughout the study area.*
- *Goal 6: Encourage walking within the Village Center by making sidewalks safe, pleasant, and comfortable for pedestrians.*
- *Goal 7: Increase transit use in the area by providing regional transit connections, facilitating local transit circulation, and improving bus travel time on the arterial street network.*
- *Goal 8: Reduce vehicle demand through the application of travel demand management (TDM) strategies with major employers in the area.*

Implementable actions (referred to as improvement objectives) were then identified based on traffic analysis to support the defined goals. These goals and objectives are described in detail in Chapter 6. Key transportation recommendations include:

- Construct Connector Road between White Bridge Road and the Northeast Quadrant.
- Widen Harding Road to Provide six through lanes.

- Relocate the Harding Road at Kenner Avenue traffic signal further east.
- Provide a circulation roadway to serve local travel.
- Provide a network of pedestrian and bicycle facilities.
- Implement transit circulator.
- Form Transportation Management Agency (TMA) for local coordination of design standards and improvement implementation.

Project Implementation by Phase

A phasing plan was developed to provide decision makers with a starting point to use in prioritizing the recommended strategies and projects for funding and implementation. The recommended improvements and projects were grouped into the following three implementation time periods:

- Short-Range (2005-2010)
- Mid-Range (2011-2015)
- Long-Range (2016-2025)

Implementation costs and potential funding sources are identified for each recommended improvement. The total cost of implementing all of the recommended goals and improvement objectives is estimated at \$21,932,000.



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Agency Coordination

Successful implementation of the transportation improvements within the land use context defined in the detailed neighborhood plan requires coordination between a variety of agencies, including:

- Metro Planning
- Metro Public Works
- Nashville Area Metropolitan Planning Organization (MPO)
- Tennessee Department of Transportation (TDOT)
- Nashville Metropolitan Transit Authority (MTA)
- Regional Transportation Authority (RTA)
- Business Community
- Neighborhood Organizations

The implementation plan, provided in Chapter 7, identifies lead, support, and advisory agencies to assist in implementation.



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Chapter 1 Introduction

An examination of transportation conditions in the Harding Road / White Bridge Road study area requires consideration of the various transportation modes available, including roadway, transit, pedestrian, and bicycle travel. The Harding Town Center study area currently contains a mixture of land uses, though mostly separate from each other and heavily reliant on vehicular travel. With heavy congestion already existing during peak periods, the congestion is likely to worsen as the area redevelops its office, retail and hospital land uses as planned. Transportation improvements are needed to provide for the effective movement of people through, to, and within the study area to compliment the community-based vision for the area developed by Metropolitan Planning Commission of Nashville-Davidson County (Metro) staff.

The transportation modifications recommended in this plan support the existing and planned future development within the activity center and focus on multimodal transportation to reduce traffic congestion. These transportation system improvements, combined with enhancements to the activity centers, will create opportunities to live, work, shop, and recreate within the study area.

The Harding Town Center Transportation Plan provides information on transportation needs and opportunities, evaluation of major capacity improvements, recommended improvements, and implementation. Existing conditions information, analysis results and traffic data are provided in the appendices.

Study Area

The Harding Road and White Bridge Road intersection is located approximately four miles southwest of Nashville's Central Business District, in the heart of a growing activity center. Figure 1 provides a location map that defines the boundaries of the detailed neighborhood plan focus area along with the broader area examined to understand areawide traffic flow patterns. The detailed neighborhood plan focus is the condensed area immediately around the intersection while the surrounding study area contains land adjacent to the focus area that also affects the character of the intersection.

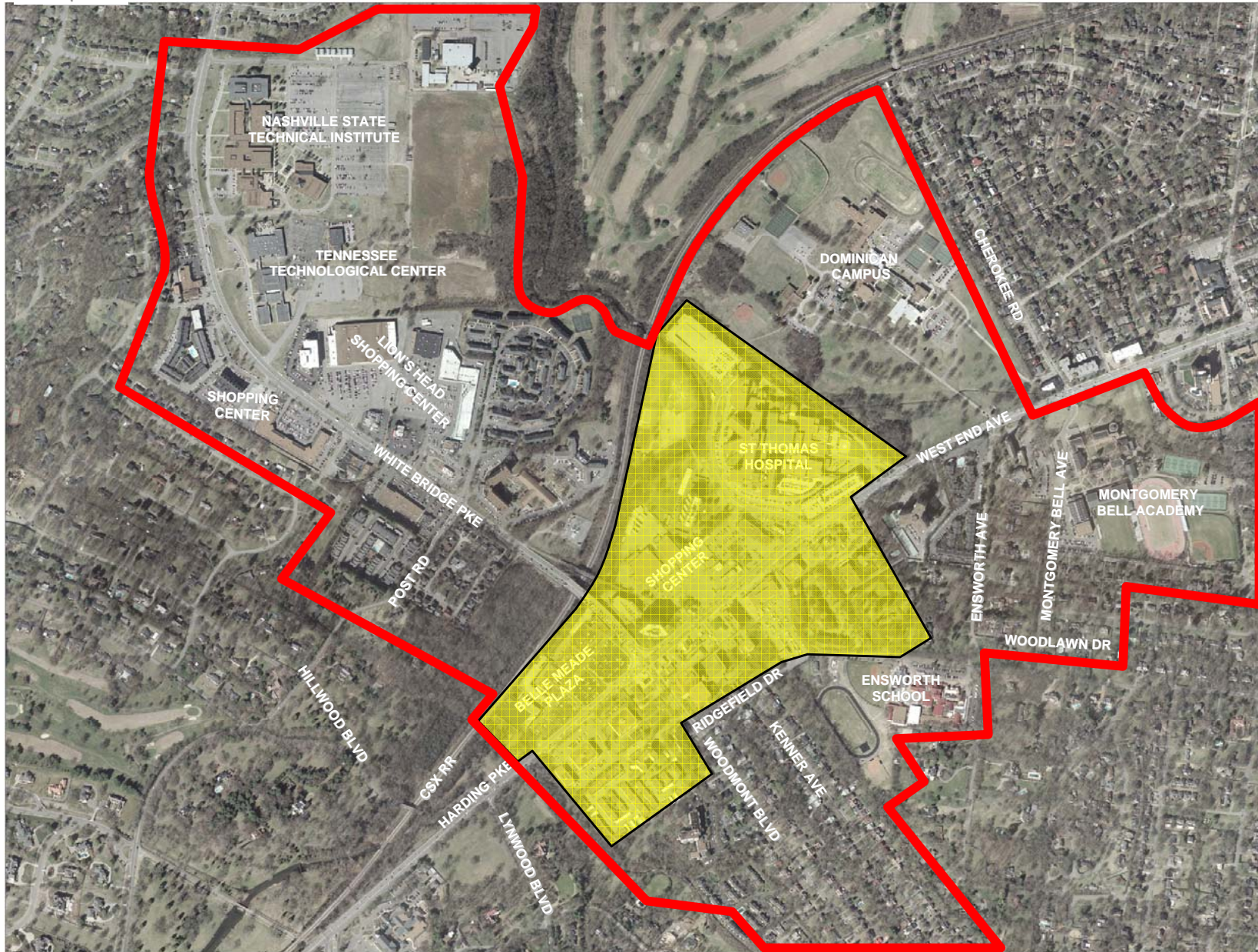
Mixtures of commercial, office and retail land uses are prominently featured in the area surrounding the intersection. Large areas of residential land use, particularly single-family dwellings, are present along the edges of the overall study area. Additionally, the overall study area includes regional destinations such as:

- St. Thomas Hospital
- Ensworth School
- Montgomery Bell Academy
- Schools of the Dominican Campus



These land uses combine with office, retail, and surrounding residential communities to form a major activity center for southwestern Nashville.



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**Figure 1:
Study Area Map**

-  Detailed Neighborhood Plan Focus
-  Overall Study Area



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Harding Road is an urban arterial roadway that serves as a radial route from the Central Business District to southwestern Davidson County. White Bridge Road, also an urban arterial roadway, provides connections to I-40 and Briley Parkway. Due to the nature of the roads, the location of the intersection, and the mixture of land uses in close proximity, traffic congestion exists at this intersection during the morning and afternoon peak periods.

Additional growth and redevelopment of existing land uses is planned for the area in the near future. This growth will increase the size of the activity center and add to traffic demand and critical traffic flow patterns.

Study Purpose

With existing congestion and future growth planned along Harding Road and White Bridge Road, providing transportation infrastructure for the existing and future traffic needs of the area is critical. For this reason, the Davidson County-Nashville Metro government initiated a detailed neighborhood plan for the area. As a part of that effort, a transportation plan was developed to provide for transportation needs within the context determined by the community vision for the area.

Thus, the purpose of this study is to develop a community-based, context sensitive transportation plan for the Harding Road / White Bridge Road area that:

- Balances needs for local access with needs for travel through the corridor.
- Enhances the use of alternative travel modes, including transit, pedestrian and bicycle.
- Incorporates strategies that encourage fewer vehicular trips.

This transportation plan supports the community-based vision for the neighborhood plan focus area detailed in the neighborhood plan.

Combined Study of Transportation and Land Use

This transportation study was conducted in coordination with the efforts of the Metro to create a context sensitive urban design plan for the Harding Road / White Bridge Road area. Community involvement was sought to gauge the vision and desires for transportation and land use in the area. The joint Metro staff and consultant study team worked together during a week-long charrette in February 2004 to match transportation modifications to land use and urban design characteristics. The study team continued coordination through development of the neighborhood plan and supportive transportation plan.



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Chapter 2 Study Methodology

The Harding Town Center is a dynamic and growing area in metropolitan Nashville. As this area continues to grow, additional vehicle trips will be generated, adding to the existing traffic congestion in the area. To address the issues of traffic congestion and plan for the long range growth anticipated in the area, Metro is developing a neighborhood plan to include land use and urban design features. The consultant study team has developed a transportation plan to support the neighborhood plan and provide transportation system modifications to address anticipated growth and current congestion. The following paragraphs describe the methodology used to develop the Harding Town Center Transportation Plan.

Defining the Plan Context through Community-Based Vision

The first step in developing improvements to transportation within a community is determining how transportation fits within it. This requires input from the community and stakeholders to determine a vision for the area. This input was initially gathered through the week-long design charrette process in February 2004. During this week, the combined transportation and land use team worked together to gather information from the community and stakeholders, perform preliminary analysis, and provide initial improvement ideas for review and comment. The community-based vision for the area was a product of the charrette process.

Many aspects of the community vision addressed transportation issues, including:

- Accommodating through traffic to relieve existing congestion and improve state route service for those traveling through the area.
- Fostering a walkable community that reduces vehicle trips and enhances the quality of life for residents.
- Preserving the adjacent neighborhoods and preventing cut-through traffic.
- Facilitating local traffic movement.
- Accommodating future growth without further degradation of the transportation system.
- Encouraging travel by alternative travel modes including transit, walking, and bicycling.
- Connecting the planned greenway trail to the residential communities through the study area.
- Mitigating or limiting the effects of growth on the transportation system.



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Following the charrette, the study team continued analysis of transportation and land use and sought additional input from the community and stakeholder agencies. The following stakeholder agencies participated as a part of the project coordinating committee:

- Metro Planning
- Metro Public Works
- Nashville Area Metropolitan Planning Organization (MPO)
- Tennessee Department of Transportation (TDOT)
- Nashville Metropolitan Transit Authority (MTA)
- Regional Transportation Authority (RTA)
- Coordinating Committee Charrette Meeting #2 - February 26, 2004
- Community Charrette Meeting #3 - February 27, 2004
- Coordinating Committee Meeting - April 1, 2004
- Community Meeting - April 1, 2004
- Community Meeting - June 22, 2004

Meetings with the community and stakeholder agency coordinating committee provided insight and direction to guide development of the Harding Town Center Transportation Plan. These meetings included:

- Coordinating Committee Meeting - January 29, 2004
- Community Charrette Meeting #1 - February 23, 2004
- Coordinating Committee Charrette Meeting #1 - February 24, 2004
- Community Charrette Meeting #2 - February 25, 2004

The community vision was translated into a plan for land use and urban design as a part of the neighborhood plan. Supporting this process, potential transportation solutions were identified and considered. These potential solutions were developed into a list of transportation goals and implementable transportation improvements (identified as supporting objectives).

Examination of Existing Conditions

In order to effectively plan for future growth in the Harding Town Center area, it is important to understand the existing transportation conditions. This includes a multimodal assessment of existing transportation infrastructure and services to determine how the various modes of travel are currently used.

In this stage, it is important to define the opportunities for transportation use as well as the needs. In many cases, people may not use a certain transportation mode or facility due to a



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minor barrier or perceived difficulty. Addressing these barriers can often provide implementable, low cost solutions to combine with more extensive major improvements, where necessary, to allow a fuller utilization of the overall transportation system.

The study team conducted an inventory of the existing roadway network, pedestrian and bicycle facilities, transit routes and ridership. Existing Travel Demand Management (TDM) measures, such as carpooling, teleworking, and flexible work hours, were also identified. Observations of traffic conditions were made for the AM, Noon, and PM peak travel periods. This information on existing conditions and observed traffic operations is described in further detail in Appendices A and B.

In addition to the inventory of conditions and analysis of available data, the study team collected additional traffic flow data, including 24-hour traffic volume counts and AM and PM peak hour turning movement counts. Travel time runs were performed along Harding Road and White Bridge Road to gauge the severity of congestion along the corridors.

The existing traffic conditions were analyzed with Synchro software, which utilizes algorithms for measuring intersection delay based on the methodology defined in the Highway Capacity Manual, (HCM) 2000 edition, by the Transportation Research Board. Traffic conditions at the intersections were related to level of service (LOS) based on the amount of delay experienced. This delay-based level of service provides a rating scale, A through F, to define the severity of congestion at an intersection.

The following is a summary of the LOS conditions based on descriptions in the HCM, Chapter 10:

- Conditions with LOS A through C represent good signal system progression with most vehicles arriving on the green. At LOS C, all vehicles may not clear the intersection on each cycle of the signal (some vehicles wait more than one cycle).
- When LOS D conditions are reached, the influence of congestion is more noticeable. Many of the vehicles stop each cycle and many vehicles wait more than one cycle. With a maximum delay of 55 seconds per vehicle, LOS D represents the upper limit of acceptable delay for most drivers.
- LOS E conditions occur as delay increases to 80 seconds per vehicle, resulting in additional stops and more vehicles waiting multiple cycles of the signal.
- LOS F conditions occur with delay greater than 80 seconds per vehicle. At this level of service, oversaturation often occurs, when the arrival of vehicles is much greater than the capacity available to move them through the intersection. This results in extended delay for critical movements and can cause long queues to build if conditions persist for many signal cycles.

Intersection delay and the associated level of service is a key performance measure often used to evaluate the effectiveness of roadway and intersection improvements.



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Projection of Future Conditions with Anticipated Development

The roadway network is currently congested during the morning rush hour and from mid-afternoon until early evening. The focus of the transportation plan is to provide transportation system modifications to improve or at least maintain the existing level of operations with planned growth. Increased traffic volumes along Harding Road are caused by growth, which affects various trip patterns:

- Growth in areas surrounding the immediate study area causes an increase in vehicles traveling through the Harding Town Center area.
- Growth within the study area causes an increase in trips to and from the Harding Town Center area.
- Growth within the study area that is complementary to other trips needs within the study area increases local trip making (trips remaining within the study area).

Mixed use development strategies attempt to maximize local trip making between compatible uses. Local trips have the potential to be captured by pedestrian travel modes or channeled to local roadway connections, reducing their impact on the arterial roadway network. Major capacity expansions over long lengths of roadway best address increases in through trips.

In areas experiencing road congestion, one strategy for controlling traffic growth is to hold to existing zoning requirements so that additional intensity is limited along the corridor. While this strategy can sometimes be effective, there are several properties in the Harding Town Center area that are permitted additional development intensity under their current zoning.

This transportation plan assumes future conditions with buildout to the maximum limit of current zoning along, with currently proposed building programs provided by property owners, within the detailed neighborhood plan area. This results in additional trip generation in each quadrant of the Harding Road at White Bridge Road intersection. The study team estimated the additional trips generated by the possible future development based on trip generation rates provided in Trip Generation, 7th Edition, by the Institute of Transportation Engineers. These additional trips were assigned to the roadway network.

The Nashville MPO's Travel Demand Model was used to determine a growth rate for through traffic in the study area. These traffic volumes were combined with the projected trip generation to estimate future traffic in the study area for year 2015, assumed to correspond with the potential development buildout in the area. Appendix C provides additional detail regarding the projected traffic growth.

The projected future traffic volumes were analyzed using Synchro software with HCM based LOS thresholds. This analysis used the same methodology used to assess the existing conditions.



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Determining Context Sensitive Improvement Strategies

Applying transportation solutions in a way that is compatible with the surrounding community and environment is complex in a congested area such as the Harding Town Center. Not only are existing roadways operating near or over capacity, but the available roadway right-of-way has been efficiently utilized, leaving fewer options for expansion of transportation capacity.

Planning a system to improve existing conditions and provide for future growth requires careful consideration of both the transportation needs and opportunities. For example, improving access or usability of an alternative travel mode could encourage people to use that mode instead of an automobile for travel.

LOS D is typically considered to be the upper limit of acceptable delay for most urban areas. Metro typically uses the LOS D standard as a goal for the Nashville-Davidson County roadway network. However, Metro recognizes that in some areas, LOS D may be difficult to achieve when balancing the needs of the community with the need to serve through traffic. Particularly in growing areas, where right-of-way is limited and expensive to obtain, providing improvements to maintain the existing level of operations in the face of growing demand may be the transportation goal that best satisfies the community's overall needs.

In some cases, implementation of major capacity improvements in congested areas can attract people to use the

improved route, increasing demand for the road and thereby congestion. These rerouted trips reflect drivers that currently take other routes to avoid the congestion. For this reason, major long distance capacity improvements are typically examined and scrutinized at a regional level prior to implementation.

The study team examined the various transportation modes (including automobile, pedestrian, bicycle, and transit) available in the study area and combined them with potential transportation improvements to address the growing demand for travel into the future. Transportation improvement goals were developed through interaction with the coordinating committee and community. These goals provide the framework for defining specific improvement objectives.

Potential transportation system modifications were identified and tested to determine their effectiveness in addressing the transportation needs in support of the identified transportation goals. A series of performance measures were applied to compare the results of alternative strategies and gauge the overall success of the proposed improvements. These performance measures played an important role in evaluation of major capacity improvement alternatives (refer to *Chapter 5 - Evaluation of Major Capacity Improvement Alternatives*). The performance measures were considered in developing an overall improvement strategy that incorporates improvement goals and implementable objectives (refer to *Chapter 6 - Recommended Transportation Goals and Improvement Objectives*).



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Chapter 3 Overview of Transportation Needs and Opportunities

The Harding Road corridor is an important link for travel between the urban business centers east of I-440 and residential areas to the west. In the vicinity of White Bridge Road, the Harding Road corridor serves a considerable volume of traffic traveling to and from adjacent retail, office, and institutional destinations.

The area in the vicinity of the key Harding Road and White Bridge Road intersection serves a mixture of land uses and contains some higher density developments, including some mid-rise office and residential buildings and St. Thomas Hospital. In addition, several schools are located along the Harding Road corridor east of White Bridge Road, including Ensworth School, Montgomery Bell Academy, and the schools of the Dominican Campus.

The area of mixed land use and higher density development forms the Harding Town Center, which is the focus of the neighborhood plan and associated transportation plan. As this area continues to grow into the future, additional demands will be placed on the already congested roadway system. The transportation plan examines existing transportation needs and determines future needs based on projected corridor growth and adjacent development. As important as identifying needs, the plan examines potential improvement opportunities to define a series of implementable actions.

Defining Congestion along Harding Road

Drivers can identify conditions they consider to be congested and can often agree when they are experiencing severe congestion. For example, most drivers would agree the ten-minute delays and mile-long queues frequently experienced along Harding Road during the peak hours are congestion. However, drivers are less consistent in their definition of the conditions when traffic congestion begins:

- Does waiting through more than one signal cycle constitute congestion?
- Does congestion occur when the ability to change lanes freely is reduced?
- Is congestion a series of long or unpredictable delays?

The following paragraphs discuss how congestion is defined for purposes of the Harding Town Center Transportation Plan, as well as the implications of operating under congested conditions.

Criteria for Identifying Congestion

For purposes of the Harding Town Center Transportation Plan, congestion has been related to intersection delay and level of service at critical intersections. In this way, congestion is



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related to the queuing and length of time needed to travel through critical intersections. Since people have different tolerance levels for delay based on their personal preferences and experience, relating congestion to a strict LOS D criteria will not provide a universal measure of congestion. However, application of these quantifiable measures of performance allows for comparison of improvements and assessment of recommended improvements based on accepted criteria.

In examining the Harding Road area, it was necessary to compare potential improvements in cases where critical intersections operated with high delay and queuing. These conditions resulted in estimated delay worse than LOS D conditions (considered by most motorists as the upper limit of acceptable delay). In these cases, the number of vehicles that would need to be removed from the through movement to result in LOS D conditions was calculated. This was referred to as the unmet demand at LOS D. This performance measure was particularly useful because it is directly related to trip reduction that could occur using strategies such as transit and travel demand management (TDM) or rerouting of traffic to other facilities. It can also be used comparatively to reflect the relative level of additional delay and queuing that must be endured if trip reductions do not take place.

Implications of Congested Operations on Route Selection

The high delays and long queuing experienced along Harding Road during the AM and PM peak hours cause many drivers to seek alternative routes for travel through the study area. Although shifting to other parts of the arterial roadway network is desirable, shifting to collector roads and local streets is more direct in many cases, providing drivers with shorter overall

travel times. This additional through traffic load can degrade the operations along these facilities and create concerns with the community that the roads are no longer functioning in a manner compatible with the surrounding residential character of the area. Once improvements are made to a congested facility, some traffic that had previously rerouted may return to the facility, reducing the intended effect of the improvement.

Existing and Future Congestion

Traffic congestion is a regular occurrence on the Harding Road corridor today and due to planned growth is expected to increase in the future. The following paragraphs describe the existing and future congested conditions.

Existing Congestion

The Harding Road corridor experiences long travel times and high levels of delay not only during the AM and PM peak hours, but also throughout the afternoon and early evening. Appendix B describes the traffic conditions observed along the corridor. As these observations indicate, a severe capacity constraint exists at the intersection of Harding Road and White Bridge Road, resulting in frequent travel times of over ten minutes from Belle Meade Boulevard eastbound through the White Bridge Road intersection.

The reverse direction (westbound) backs up more severely in the PM peak hour, resulting in frequent queues extending from White Bridge Road to I-440, requiring over 17 minutes to clear the critical White Bridge Road intersection. The following paragraphs describe some of the factors contributing to traffic congestion along Harding Road and nearby roads.



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Higher Traffic Volumes are Present in the Afternoon and Early Evening

Traffic volumes are higher during the afternoon and early evening hours than during other times of day. This is because of additional activity at nearby retail establishments during the afternoon and evening combined with commuter traffic patterns.

Drivers Exiting Hospital Fill Available Gaps in Traffic Queue

The westbound directionality of traffic during the afternoon and evening hours allows drivers exiting from St. Thomas Hospital to fill available gaps in the traffic queue. This increases the total travel time for vehicles traveling all the way through the area on Harding Road. As the northeast quadrant of the Harding Road at White Bridge Road intersection develops further, careful signal progression and allocation of green time must be performed to ensure through traffic is not delayed excessively in favor of traffic accessing the road from adjacent parcels.

PM Westbound Traffic Volumes are Heavy for Several Hours of the Day

The westbound directional PM peak travel period is spread over many hours, all of which operate with volumes near the overall roadway capacity. If traffic volume demand exceeds capacity, continued high volumes over a sustained period will increase the length of the traffic queued to pass through the critical intersection (in this case the intersection of Harding Road at White Bridge Road).

A mixture of properties that let out traffic at one time is present along Harding Road, including the schools and St. Thomas Hospital. By spreading the shifts with one ending at 3:00 PM and one ending at 5:00 PM, the heavy exiting traffic load from the hospital is effectively divided. This reduces the severity of congestion, but increases the duration of congested conditions.

Heavy Competing Demands Reduce Harding Road Through Capacity at White Bridge Road

The intersection of Harding Road at White Bridge Road serves heavy traffic demands for both arterial roads. Harding Road serves heavy traffic movement east to west for traffic traveling through and to the study area. Another pair of heavy intersection movements includes traffic traveling between White Bridge Road north of Harding Road and Harding Road east of White Bridge Road. This movement results in southbound left turning volumes as high as 800 vehicles per hour (vph) during the AM and PM peak hours. Serving these heavy side street turning movements requires green time that is then unavailable to serve through traffic along Harding Road. The result is that Harding Road is allocated only 44% and 35% of the signal green time to serve the heavy east/west travel movements during the AM and PM peak hours, respectively. This constrained volume reduces the available intersection through capacity below that of other intersections, making this intersection act as the bottleneck along the corridor.

Adjacent Intersections East of White Bridge Road Contribute to Harding Road Congestion

The adjacent intersections of Harding Road at Kenner Avenue and Bosley Springs Road also contribute to congestion along



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the corridor. Due to its proximity to White Bridge Road, the Kenner Avenue signal contributes to congestion problems in the area. This is most evident during the AM peak hour. During this time, the heavy southbound left turn from White Bridge Road combines with the heavy eastbound through movement on Harding Road to produce a combined demand for green time that is greater than that available at Kenner Avenue. Due to the short stacking distance between the intersections, there is little room for queued vehicles to begin moving efficiently through the Kenner Avenue signal before the eastbound traffic from White Bridge Road reaches the back of the queue. This results in lost eastbound green time at White Bridge Road while vehicles wait for those ahead at Kenner Avenue to begin moving.

The intersection of Bosley Springs Road at Harding Road serves heavy side street traffic demands resulting in reduced available through green time. This contributes to congestion in the vicinity of the intersection during the PM peak hour.

Future Congestion

Growth in the Harding Town Center and surrounding areas is projected to increase congestion in the future. Under existing conditions, approximately 400 peak hour trips would need to be removed from the peak travel direction on Harding Road to allow LOS D conditions. By year 2015, that deficiency is projected to double to 800 peak hour, peak direction trips without improvements. This indicates that the congestion and related queuing and delay will increase significantly without improvements to increase capacity for critical movements or reduce demand.

Future Transportation Needs and Opportunities

The transportation system in the Harding Road corridor operates under congested conditions through the AM and PM peak hours. Future growth planned in the area will add to the levels of congestion. More intense development of land within in the Harding Town Center area is permitted under current zoning. This additional development will add to the traffic to be accommodated along the Harding Road and White Bridge Road corridors. Development within the current zoning will result in generation of the following additional daily trips:

- Northeast Quadrant – 19,000 trips
- Northwest Quadrant – 4,500 trips
- Southeast Quadrant – 2,200 trips
- Southwest Quadrant – 1,000 trips
- Total – 26,700 new trips per day

In addition, growth in trips traveling through the Harding Town Center area will add an additional 2,100 trips per day to Harding Road. Refer to Appendix C for additional information on development generated traffic. This additional traffic creates the need to address various travel patterns, as described in the following text.



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Through Traffic

Through traffic is best accommodated by improvements to overall corridor capacity and regional trip reduction techniques. Strategies that could address through traffic needs include:

- Improving the operational efficiency of the Harding Road corridor
- Widening Harding Road
- Improving parallel facilities
- Providing transit for through trips
- Providing regional TDM approaches

Travel to/from Harding Town Center

The presence of St. Thomas Hospital and other significant developments accounts for a large percentage of travel to and from the area. During the AM peak hour, 57% of eastbound traffic present just east of White Bridge Road turns off Harding Road prior to or at Cherokee Street. In the PM peak hour, 35% of westbound traffic arriving at the White Bridge Road intersection has entered the roadway at or after Cherokee Street to the west.

Travel to and from the Harding Town Center area is expected to grow in the future as additional development occurs. With the existing St. Thomas Hospital and office and retail land uses, the northeast quadrant currently generates the most

external trips using Harding Road in the study area. With the planned growth in this quadrant, it is expected to generate the most additional trips as well. Many of these trips will use the Harding Road corridor, but several will also use White Bridge Road for access to I-40 and residential areas to the north. The presence of the railroad and adjacent stream and wetlands results in no direct connection between the northeast quadrant and White Bridge Road. However, the movement between these roads contributes to the heavy southbound left turn at the critical Harding Road at White Bridge Road intersection.

The list of potential strategies to address travel needs to/from the Harding Town Center includes:

- Improving the operational efficiency of the Harding Road corridor.
- Providing transit for trips to/from Harding Town Center.
- Providing TDM approaches for employers within Harding Town Center.
- Providing pedestrian and bicycle connections to adjacent neighborhoods.
- Connecting the quadrants of the Harding Road at White Bridge Road intersection to both arterials.
- Widening Harding Road.



Harding Town Center Transportation Plan

Local Traffic Traveling Within Harding Road / White Bridge Road Area

Study area growth alone will cause some increases in local trips within the Harding Town Center area. In addition, implementation of a complementary mix of development will maximize the potential for local travel within the study area. The mixture of uses between and within developments already occurs in the Harding Town Center and is being emphasized in the neighborhood plan. If the appropriate interactions between land uses occurs, generated traffic can be accommodated through local trips rather than requiring use of the arterial roadway network. Thus, the mixture of land uses and urban design features planned in the Harding Town Center Neighborhood Plan will all help to reduce trips to and from the Harding Town Center, increasing local trips by automobile, pedestrian, and bicycle modes.

The list of potential strategies to address local travel needs within the Harding Town Center includes:

- Improving the operational efficiency of the Harding Road corridor

- Providing local transit circulation for trips within Harding Town Center
- Providing pedestrian and bicycle routes and streetscape amenities within Harding Town Center
- Improving pedestrian crossings of Harding Road to encourage people to park once and walk between local destinations
- Providing interparcel access for vehicles to keep local trips off the arterial roadway system

Improvements to enhance local trip making will also foster a pedestrian oriented environment in Harding Town Center, which was identified as a key element in the community's vision for the area.



Chapter 4 Transportation Improvements Previously Considered

The intersection of Harding Road and White Bridge Road (and the surrounding areas) has been examined in several previous studies and reports. Metro publishes planning documents related to geographic districts of Davidson County. The Harding Road / White Bridge Road overall study area is split between two of these planning reports: *Sub-Area 7 Report and Sub-Area 10 Report*. Sub-Area 7 includes the southwestern portions of Harding Road and the majority of White Bridge Road north of the Harding Road intersection. Sub-Area 10 includes the eastern portion of Harding Road, including the intersection with White Bridge Road and Woodmont Boulevard south of the intersection.

These sub-area reports contain a variety of information related to the study area. The transportation section of *Sub-Area 7 Report* recommended widening Harding Road to six lanes from Hillwood Boulevard to Bosley Springs Road. Additionally, the *Sub-Area 7 Report* suggests that White Bridge Road be widened to six lanes with median in commercial areas and four lanes with median in residential areas. Grade separating the Harding Road intersection with White Bridge Road was also suggested in this report.

The *Sub-Area Report* also references a 1992 study, *White Bridge Road Transportation Plan*, which made several recommendations involving facilities in both Sub-Area 7 and Sub-Area 10. These recommendations included:

- Implementing an aggressive Travel Demand Management (TDM) program to reduce the total number of vehicular trips, especially in peak periods.
- Grade separating White Bridge Road and Harding Road intersection.
- Constructing a Woodmont/Kenner street-ramp to Harding Road.
- Adding lanes to White Bridge Road at the north and south ends.
- Constructing an outer bypass road between Harding Road and White Bridge Road.

The feasibility of grade separating the intersection was further explored in TDOT's *Advance Planning Report Harding Road & White Bridge Road Intersection*. This study produced the following three alternatives:

- Alternative 1 – Install triple left turn lanes on White Bridge Road SB approach; accommodate heavy WB right turn via Old White Bridge Road; widen Harding Road to seven lanes near White Bridge Road; widen Woodmont and Kenner Avenue NB approaches.



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- Alternative 2 – Install triple left turn lanes on Old White Bridge Road SB approach rather than at White Bridge Road (otherwise same as Alternative 1).
- Alternative 3 – Install single point interchange at Harding Road and White Bridge Road; widen Woodmont Boulevard further to the south than in Alternatives 1 and 2; widen Harding Road to seven lanes near White Bridge Road; widen Kenner Avenue NB approach.

All three alternatives included an option of eliminating the Kenner Ave NB approach to Harding Road by using a cul-de-sac.

The Nashville-Davidson County MPO identified two projects within the broader overall study area as part of the *2025 Nashville Area Long Range Transportation Plan*. This plan calls for widening White Bridge Road from five to six lanes by 2015, as well as an intersection improvement at Harding Road and White Bridge Road by 2025.

In addition to vehicular related studies and recommended roadway improvements, the *Metro Nashville-Davidson County Strategic Plan for Sidewalks and Bikeways* proposed and prioritized the locations for future bikeways and sidewalks throughout Davidson County and within the study area. Also, the *Nashville-Davidson County Metropolitan Parks and Greenway Master Plan* identifies the area surrounding Richland Creek, behind the development fronting the north side of Harding Road, as a future greenway.



Chapter 5 Evaluation of Major Capacity Improvement Alternatives

Developing a transportation plan for the Harding Town Center involves consideration of multimodal improvement strategies, including automobile, pedestrian, bicycle, transit, and TDM. The following paragraphs provide a discussion of the need for major capacity improvements, a comparison of major capacity improvement alternatives, and presentation of major capacity improvement recommendations.

Need for and Limitations of Major Capacity Improvements

The high levels of delay and severe queuing present along Harding Road during the AM and PM peak hours has prompted consideration of major capacity improvements along the corridor. Improvement of the Harding Road at White Bridge Road intersection is currently included in the *2025 Nashville Area Long Range Transportation Plan*. Also, though no improvement is currently planned, Harding Road is functionally classified as a six-lane urban arterial, indicating the potential for consideration of a wider cross section.

Traffic operations on the existing roadway network result in conditions over LOS D capacity. A total of 400 vehicles per hour would need to be reduced from the peak hour peak direction traffic flow to reduce queuing to LOS D levels (referred to as unmet demand). This level will allow all vehicles to clear the critical Harding Road at White Bridge Road intersection on most signal cycles. Projected development will increase traffic demand on Harding Road, doubling the amount of trip reduction necessary to reduce

queuing and delay to 800 vehicles per hour in the peak hour peak direction. Due to this large deficiency in roadway capacity, major improvements were considered..

Implementation of major capacity improvements has implications to operation of the roadway network for other modes of transportation, particularly pedestrians. The roadway improvements are being considered in concert with the development of a neighborhood plan. This neighborhood plan is based on an area vision developed through coordination with the community. The vision included reducing traffic congestion and delay along Harding Road within the context of developing a pedestrian oriented town center. Therefore, the compatibility of roadway improvements with a pedestrian oriented town center is a key component to selection of major capacity improvements.

Comparison of Major Capacity Improvement Alternatives

The following paragraphs describe the major capacity improvement alternatives considered for the study area. Figure 2 indicates the alternatives considered on a map of the Harding Town Center.

Aiding through movement in the study area is a goal of the transportation plan. Several alternatives were developed to improve through movement, the first of which is to improve traffic operations on the existing network. This is accomplished by managing the access points onto Harding



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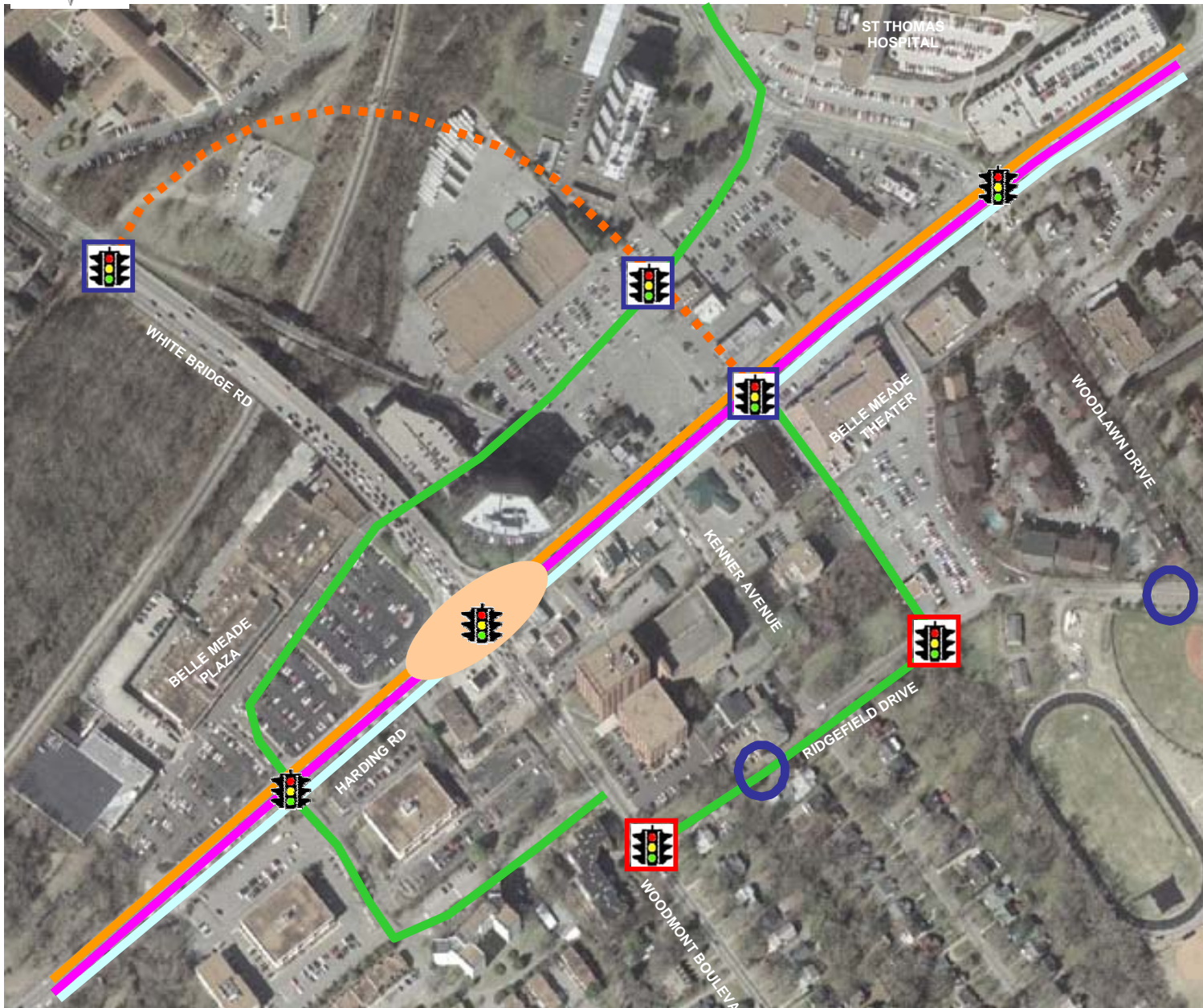


Figure 2: Major Roadway Alternatives

- 5-lane section with wide shoulders and streetscape
- 7-lane section with wide shoulders and streetscape
- 2-lane tunnel with 4-lane local section and streetscape
- 3-lane NE Quadrant Connector
- Local circulation roadway with parking and streetscape
- Single Point Interchange with Harding Overpass
- Roundabout location
- Existing traffic signal
- Proposed/relocated traffic signal
- Future traffic signal (When warranted)



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Road, modifying the existing signal phasing schemes, relocating the Kenner Avenue signal eastward, and adding pavement markings and signage as needed. This option alone has a relatively low cost and does not require major construction; however, it will require additional solutions that ensure access to properties that currently benefit from the existing Kenner Avenue signal. An analysis of this option with year 2015 conditions, including background growth and trips generated by planned development, demonstrated that 800 trips were unmet in the AM period and 700 trips in the PM period.

Since optimizing the existing system will not improve future conditions to an acceptable level, several options were considered that relied on building additional roadway to relieve the traffic congestion in the area. These included:

- Installing a single point interchange at Harding Road's intersection with White Bridge Road.
- Tunneling underneath Harding Road to separate through traffic from local traffic.
- Widening Harding Road from four to six through lanes with center median and left turn lane.
- Constructing a northeast quadrant connector road to link Harding Road to White Bridge Road.

Single Point Interchange

As mentioned, the single point interchange is an option previously studied in a TDOT advanced planning report. This

option would allow the through traffic along Harding Road to move freely over or under the White Bridge Road intersection. The previous TDOT study examined elevating White Bridge Road/Woodmont Boulevard as a free-flow facility over Harding Road. This configuration is favored by the local topography. However, the traffic flow patterns indicate the best benefits are achieved by maintaining Harding Road as a free flow facility. This requires bridging over White Bridge Road or providing a large single point interchange footprint on the elevated section of White Bridge Road.

An overpass of White Bridge Road would be constructed along with at-grade ramps leading from Harding Road to the existing White Bridge Road. The ramps would consist of a single lane at the exit and entry points to Harding Road, with the exception of the ramp that accommodates the left turn movement from southbound White Bridge Road to eastbound Harding Road, which would be two lanes. As the ramps intersect White Bridge Road, the ramps divide into left turn and right turn lanes. The left turning lanes curve inward towards the underpass while the right turning lanes flair outward. Due to the nature of the interchange, all the left turning movements can be accommodated in a single signal phase as opposed to requiring two points of control like a traditional interchange.

There are several disadvantages to implementation of this alternative, including high implementation cost (\$14 – \$19 million including estimated construction and right-of-way costs) and significant land acquisition. Note, right-of-way costs are based on a typical cost of \$12.00 per square foot for right-of-way in an urban environment (as was used for evaluation of other alternatives). If specific properties are severely damaged or must be purchased, the actual right-of-



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way costs could be significantly greater. The interchange would leave a large footprint in the area and restrict access to some existing development. The configuration of ramps and heavily channelized right turns would make pedestrian activity difficult. Also, it is likely that this option would just relocate the traffic congestion further downstream to the next signal.

An analysis of this option with year 2015 conditions, including background growth and trips generated by planned development, demonstrated that 600 trips will be unmet in the AM period and 400 trips in the PM period.

Tunnel

The tunnel option involves adding a two-lane tunnel under Harding Road from east of Bosley Springs Road to west of Belle Meade Plaza. The tunnel would satisfy those vehicles with trip destinations outside the study area, while additional lanes dedicated to local trips would be located along the existing Harding Road. The big advantage of this alternative is that vehicle delay associated with through movements on Harding Road is eliminated along the tunnel section, which contains the key intersections contributing to the major congestion. Additionally, local vehicular circulation is improved with the tunnel option due to the absence of the through traffic. A roundabout could be used in place of the existing intersection of Harding Road and White Bridge Road. Pedestrians and bicyclists are also aided with this option because crossing the key intersections in the area would become easier due to more crossing gaps and shorter crossing distances. Though installation of a tunnel provides benefits, this alternative also has several drawbacks, most notably cost. The tunnel is estimated to cost \$31 – \$41 million, with

significant right-of-way needed at the entrance and exit points to the tunnel. In addition, utility location required to construct the tunnel would be extensive, and construction impacts would likely be severe as well. Tunneling underneath the existing Harding Road would likely result in considerable, if not full, lane closures during the construction period.

An analysis of this option with year 2015 conditions, including background growth and trips generated by planned development, demonstrated that all trips were met at the critical Harding Road at White Bridge Road intersection. However, it is likely that congestion would occur downstream when the tunnel lanes merge with the local lanes, though this congestion would likely be less than that found with other major capacity improvement alternatives.

Widening of Harding Road

Widening Harding Road from four to six through lanes from St. Thomas Hospital to beyond Belle Meade Plaza would provide additional roadway capacity for through movement and local trips. This option would cost \$6 – \$8 million and require an additional 40-feet of right-of-way. A median and left turn lane would limit left turns onto and off Harding Road to selected locations. A disadvantage to this alternative is that the widened roadway would discourage pedestrian crossings due to the longer crossing distance.

An analysis of this option with year 2015 conditions, including background growth and trips generated by planned development, demonstrated that 200 trips will be unmet in the AM period and 600 trips in the PM period.



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Northeast Quadrant Connector Road

The construction of the Northeast Quadrant Connector road would provide improved access to a key area within the study area. This road would align with the relocated Kenner Avenue traffic signal on Harding Road, run north through the redeveloping HG Hills Shopping Center, turn towards the northwest as it crosses over the CSX Railroad, Richland Creek and the proposed greenway, then follow a westerly path before connecting to White Bridge Road, approximately 520 feet south of the Post Road intersection. A new traffic signal would be placed at the intersection of this connector and White Bridge Road. The connector road would consist of two southbound through lanes, one northbound through lane (with an additional right turning lane near the White Bridge intersection) and sidewalks to accommodate pedestrians. The two southbound lanes would allow the connector road to efficiently receive the southbound dual left turn lanes, accommodating the heavy left turn movement without spilling back to the Post Road intersection.

Implementation of the connector roadway would reduce the heavy left turn volume from southbound White Bridge Road to eastbound Harding Road during the morning peak period, which would allow additional green time for Harding Road. The construction of this route would require 60 feet of new right-of-way, which would be coordinated with the *Nashville-Davidson County Greenway Plan* and the northeast quadrant development. The cost of this roadway is estimated to be \$5 – \$7 million.

An analysis of this option with year 2015 conditions, including background growth and trips generated by planned

development, demonstrated that 400 trips will be unmet in the AM period and 500 trips in the PM period.

Widening of Harding Road in Combination with the Northeast Quadrant Connector

Either widening Harding Road to six lanes or constructing the Northeast Quadrant Connector will improve current year AM peak hour traffic operations, resulting in conditions with development generated traffic that is similar to those currently experienced. However, these alternatives result in additional delay and queuing for year 2015 conditions over that currently experienced. Therefore, implementation of both alternatives was considered. These alternatives together result in LOS D conditions at the critical Harding Road at White Bridge Road intersection during the AM peak hour and provide only 100 vehicles per hour unmet during the PM peak hour. The combined cost of implementing both improvements is \$11 - \$15 million, less than half the cost of the tunnel alternative.

Summary of Recommendations

The various recommended improvement alternatives provide varying degrees of congestion reduction along Harding Road for various implementation impacts and costs. Table 1 provides a comparison of the recommended alternatives. Based on the comparison of alternatives, implementation of the widening of Harding Road to provide six through lanes for the limited section from St. Thomas Hospital to beyond Belle Meade Plaza is recommended, in conjunction with implementation of the Northeast Quadrant Connector road.



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Table 1
Summary of Major Capacity Improvement Alternatives

Improvement Options	Unmet Through Trips ¹		Right-of-way Required	Local Circulation/ Pedestrian Effects	Estimated Cost
	AM Peak (EB)	PM Peak (WB)			
Traffic Operations on Existing Network - 2004 (Existing Conditions)	400	300	None	* Enhanced local circulation and pedestrian facilities needed	N/A
Traffic Operations on Existing Network - 2015 (Future Year Conditions with No Improvements)	800	700	None	* Enhanced local circulation and pedestrian facilities needed	N/A
Single Point Interchange with Harding Road Free Flowing - 2015 Conditions	600	400	Extensive near interchange	* Ramp configuration and heavy channelized right turns make pedestrian activity more difficult * Local circulation is reduced by presence of ramps which limit access to properties near interchange	\$14 - \$19 million
Tunnel Section along Harding Road - 2015 Conditions	None in study area; may cause congestion point downstream		40' additional where tunnel meets roadway	* Local circulation improved where traffic demand at key intersections is reduced * Allows shorter pedestrian crossing distance at key intersections	\$31 - \$41 million
Six-Lane Section with Left Turn Lane - 2015 Conditions	200	400	40' additional	* Increased pedestrian crossing distance limits pedestrian trips across Harding Road which would otherwise reduce local automobile trips	\$6 - \$8 million
Northeast Quadrant Connector Road - 2015 Conditions	400	500	May interfere with Greenway trailhead	* Provides additional access to key area * Removes traffic flow from congested Harding and White Bridge intersection * Reduces EB left turning volumes from Harding Road to NE quadrant * Allows shorter pedestrian crossing distance at key intersections	\$5 - \$7 million
Six-Lane Section Combined with Northeast Quadrant Connector Road - 2015 Conditions	0	100	May interfere with Greenway trailhead and 40' additional right-of-way	* Provides additional access to key area * Removes traffic flow from congested Harding and White Bridge intersection * Reduces EB left turning volumes from Harding Road to NE quadrant * Increased pedestrian crossing distance limits pedestrian trips across Harding Road which would otherwise reduce local automobile trips	\$11 - \$15 million

1 - Indicates the volume that would need to be reduced (using another travel route or mode of transportation) to result in LOS D or better conditions.



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Chapter 6 Recommended Transportation Goals and Improvement Objectives

Providing transportation improvements to support the vision for a pedestrian oriented town center along Harding Road requires implementation improvements to multiple transportation modes. These improvements provide for traffic flow through, to/from, and within the Harding Town Center, which is located in the vicinity of the congested intersection of Harding Road at White Bridge Road.

It is desirable to improve roadway conditions to provide LOS D conditions, which is the roadway network standard for Nashville-Davidson County. However, Metro recognizes that LOS D may be difficult to achieve, particularly in growing areas where right-of-way for capacity expansion is limited and expensive to obtain (such as along Harding Road near White Bridge Road). In these cases, maintaining the existing levels of congestion as growth occurs may best balance the needs of the community with the need to serve through traffic.

A series of transportation goals was developed through interaction with the coordinating committee and community:

- *Goal 1: Provide acceptable travel times for movement of vehicles through the area by fully utilizing existing arterials and improving capacity of main roadways.*
- *Goal 2: Serve critical intersection movements with minimal queuing and delay by improving critical intersection operations.*
- *Goal 3: Facilitate local connections and circulation without accessing the primary roadway network, while discouraging the use of local residential streets for through-traffic movement.*
- *Goal 4: Maximize pedestrian travel between Hospital Sub-district and Village Center Sub-district by implementing local pedestrian paths and connections and providing safe and effective pedestrian crossings.*
- *Goal 5: Encourage pedestrian and bicycle trips between adjacent neighborhoods and the Village Center and Hospital Sub-districts by providing regional greenway and neighborhood pedestrian /bicycle connections and bicycle travel capability throughout the study area.*
- *Goal 6: Encourage walking within the Village Center by making sidewalks safe, pleasant, and comfortable for pedestrians.*



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- **Goal 7: Increase transit use in the area by providing regional transit connections, facilitating local transit circulation, and improving bus travel time on the arterial street network.**
- **Goal 8: Reduce vehicle demand through the application of travel demand management (TDM) strategies with major employers in the area.**

Implementable actions (referred to as improvement objectives) were then identified based on traffic analysis to support the defined goals. The traffic analysis assumes buildout of development to the maximum allowed under current zoning. It also includes traffic generated by the planned expansion of St. Thomas Hospital, as provided to Metro in February 2004. If development is proposed which is greater than the assumed amounts, additional analysis is recommended to determine the need for additional transportation improvements.

The recommended configuration including key improvements is shown in plan view on Figure 3. Cross sections of the recommended roadway modifications are shown in Figures 4, 5, and 6. The following is a summary of key improvements included in the Transportation Plan recommendations:

Construct Connector Road between White Bridge Road and the Northeast Quadrant

The proposed connector between the northeast quadrant of the Harding Town Center and White Bridge Road is one of the primary elements for accommodating future traffic growth in

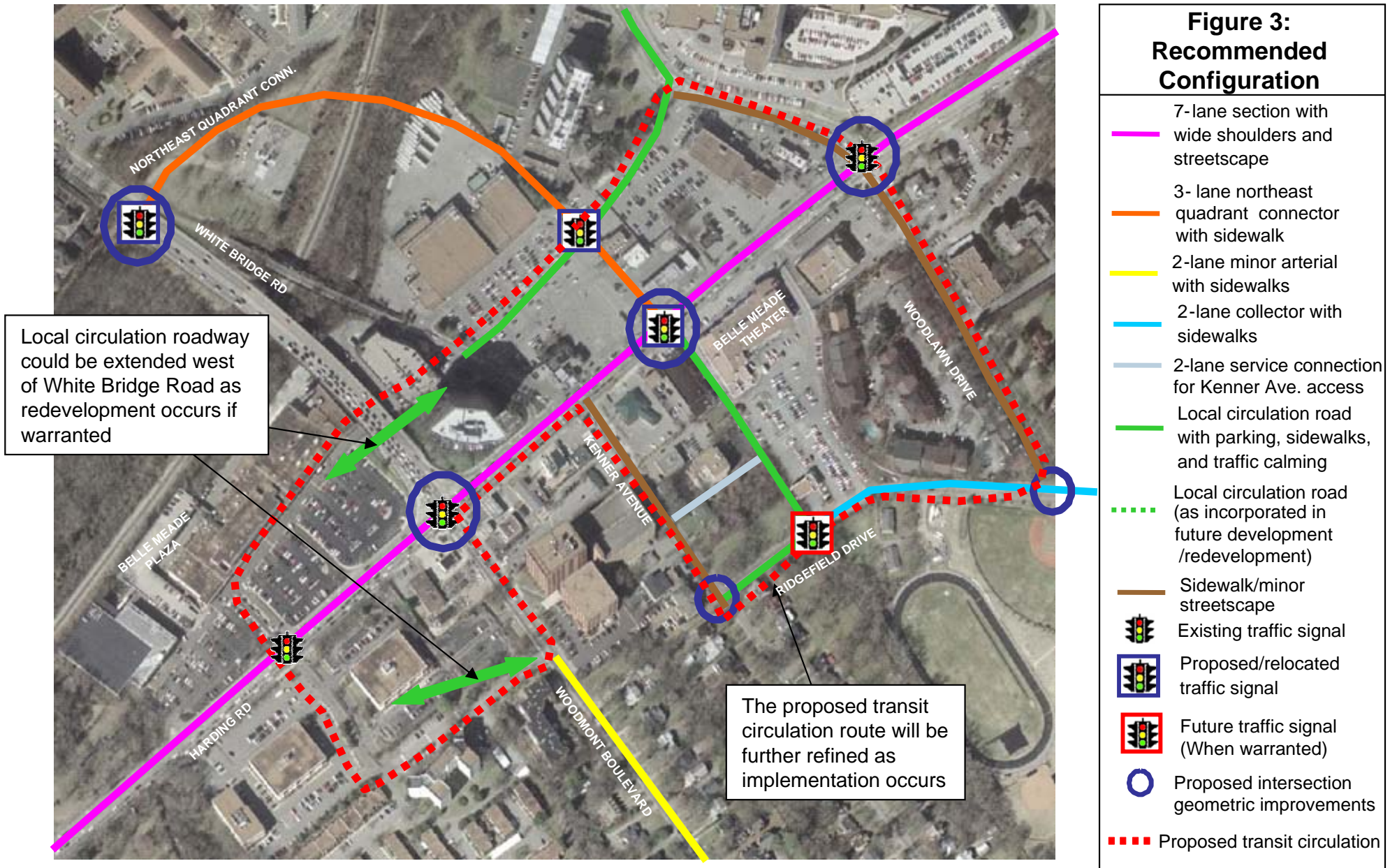
the area. The heavy turning movements between Harding Road east of White Bridge Road and White Bridge Road north of Harding Road contribute to delay at the critical Harding Road at White Bridge Road intersection. With planned redevelopment of the H. G. Hills property and expansion of St. Thomas Hospital, the northeast quadrant will account for 70% of the new trip generation anticipated in the Harding Town Center area through year 2015. Implementation of a connector road between the northeast quadrant and White Bridge Road will reduce the impact of new development on the critical Harding Road at White Bridge Road intersection.

Although the proposed Northeast Quadrant Connector will provide a continuous route from Harding Road to White Bridge Road, it is not intended as a bypass for long trips. However, in addition to new development trips, this road will likely accommodate some of the traffic currently generated in the northeast quadrant traveling to/from White Bridge Road. To facilitate the use of this road for travel to/from the northeast quadrant, implementation of a local circulation road within the quadrant will allow trips using the Northeast Quadrant Connector to reach their final destinations within the quadrant.

Implementation of the Northeast Quadrant Connector will provide a signalized intersection along White Bridge Road just south of Post Road. To facilitate signal operations with the close intersection spacing, the northbound Connector Road will operate with a right turn only signal phase operated concurrently with southbound through and dual left turn signal phases. With this configuration southbound traffic will not be stopped at the intersection, reducing the possibility of queue spillback to Post Road.



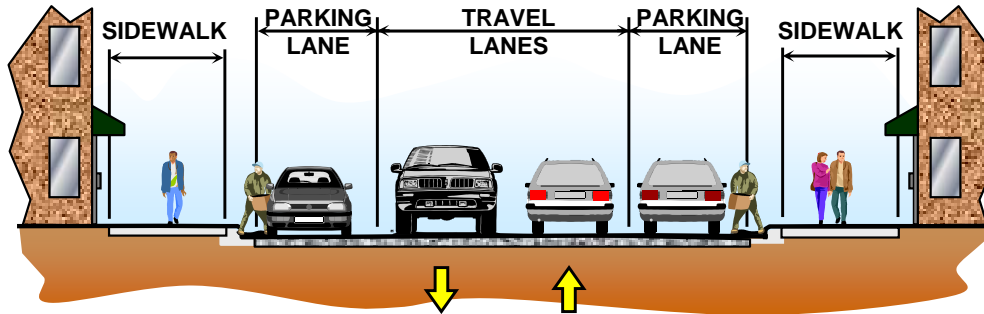
Harding Town Center Transportation Plan





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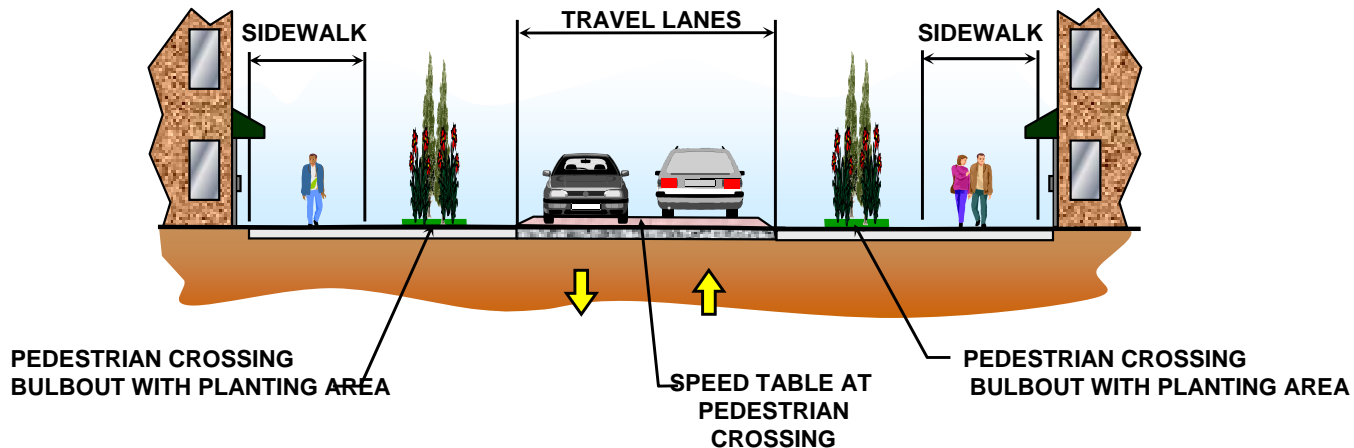
Local Circulation Roadway



**Figure 4:
Recommended
Local Circulation
Road Cross-
Sections**

Note: The design concept for the local circulation roadway includes appropriate traffic calming (such as raised pedestrian crossings or other appropriate measures).

Local Circulation Roadway at Pedestrian Crossing

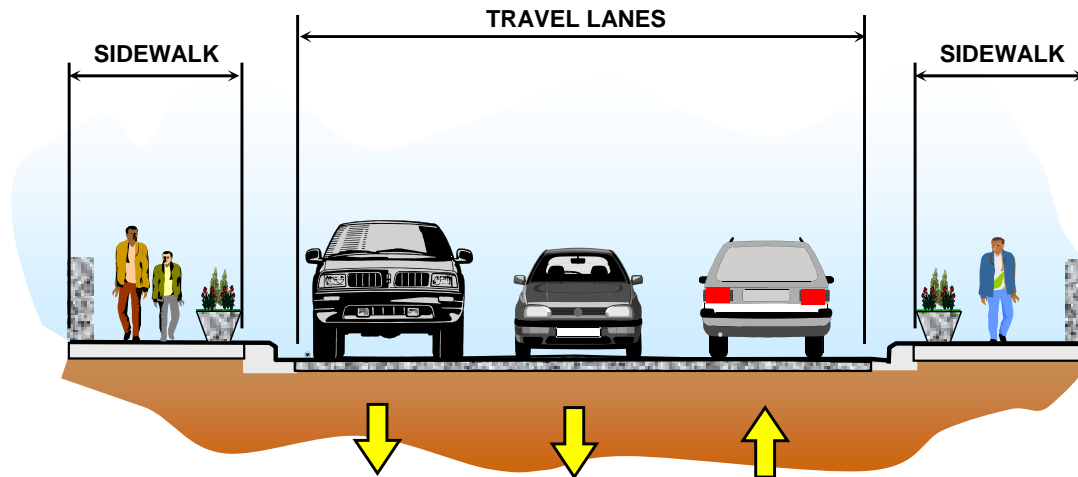




Harding Town Center Transportation Plan

**Figure 5:
Recommended
Northeast Quadrant
Connector
Cross-Section**

Northeast Quadrant Connector Roadway

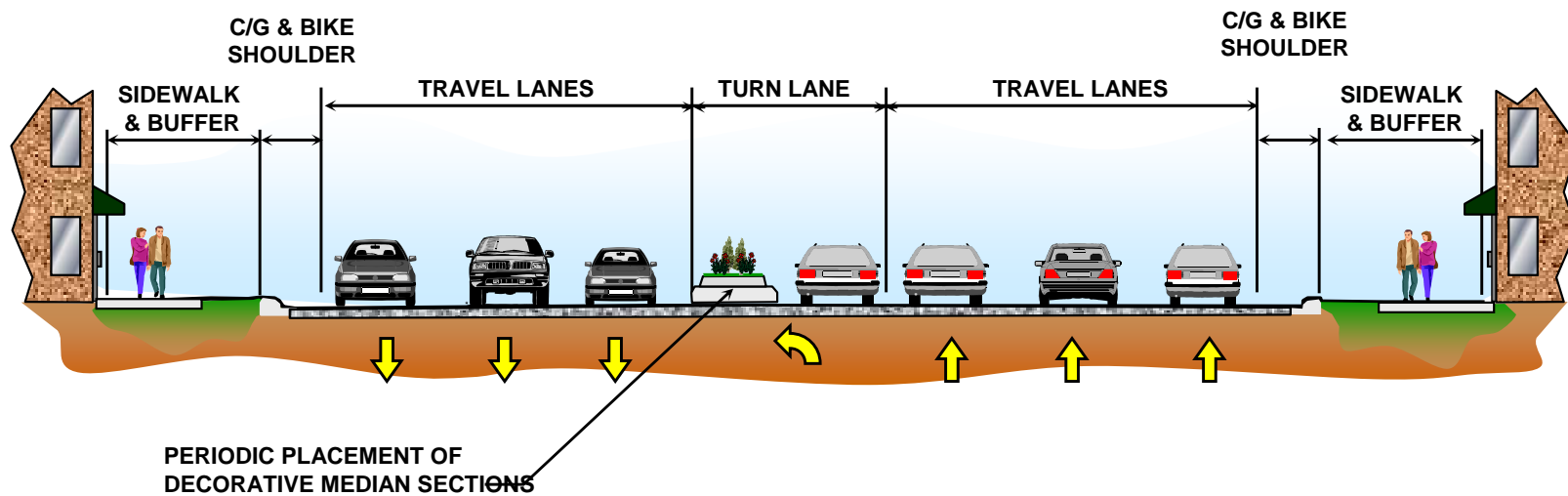




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Figure 6:
Recommended
Harding Road
Cross -Section

Widened Harding Road Section – 6-Lane with Center Turn Lane





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Widen Harding Road to Provide Six Through Lanes

The Harding Road corridor is severely congested under current conditions. In addition, the planned growth along the corridor is expected to provide a significant increase in traffic demand. Implementation of operational improvements and multimodal solutions alone are not expected to reduce traffic demand to the level where congestion is eliminated along Harding Road.

Therefore, several options were examined to provide additional roadway capacity along Harding Road, including:

- Single point interchange with Harding Road free-flowing
- Tunnel section from east of Bosley Springs Road to west of Belle Meade Plaza
- Six-lane section with left turn lane
- Implementation of Northeast Quadrant Connector
- Six-lane section with Northeast Quadrant Connector

Based on analysis of these alternative improvements to determine their impacts on congestion, implementation of a widening cross section to provide six through lanes with a center turn lane is recommended.

Relocate the Harding Road at Kenner Avenue Traffic Signal Further East

The heavy White Bridge Road southbound left turn contributes to traffic congestion at the intersection of Harding Road at White Bridge Road. This heavy movement requires significant queuing distance downstream to prevent left turning vehicles

from queuing back to the White Bridge intersection. This need for a downstream receiving area is particularly important during the AM peak hour, when the downstream signal's coordinated green phase for eastbound movement must serve heavy eastbound through traffic. The adjacent signal east of White Bridge Road at Kenner Avenue does not allow sufficient spacing to prevent queuing between the intersections. Therefore, relocation of this signalized access to provide even spacing between White Bridge Road and Bosley Springs Road is needed. The overall recommended roadway network includes connection of this relocated Kenner Avenue signal to the Northeast Quadrant Connector and a proposed road south of Harding Road connecting to Ridgfield Drive via the Belle Meade Theater site.

In relocating the Kenner Avenue traffic signal, it is important to maintain access to properties that currently utilize the existing signal. Preserving this access can be accomplished through joint use easements and/or agency control of the Northeast Quadrant Connector and/or local circulation roads.

Provide a Circulation Roadway to Serve Local Travel

One method of preserving through capacity along the congested Harding Road corridor is to reduce the vehicle demand at the critical White Bridge Road intersection. Implementation of a local circulation system will provide a means for short trips to be satisfied without impact to the main roadway network.

The local circulation roads are a key component to the overall Transportation Plan. These roads provide for travel by



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multiple modes, as well as on-street parking supply. The recommended routes provide circulation and access to adjacent development while discouraging cut-through traffic.

The local circulation road is intended to facilitate local movement between adjacent quadrants of the Harding Town Center area, not for movement of through traffic. In keeping with the intended use, the local circulation road would be designed to facilitate the slow movement of traffic, with an emphasis on access to parking and pedestrian movement along and across the road. The following features support this use, emphasizing access and service for multiple travel modes:

- Narrow two-lane design
- On-street parking
- Traffic calming (such as raised pedestrian crossings or other appropriate measures)
- Access to adjacent parking areas
- Sidewalks to facilitate pedestrian movement
- Transit stops to service transit circulation route

As the St. Thomas Hospital further develops, it will be interconnected with the H. G. Hills property, providing direct access for movement by all modes. This interconnection is important to facilitate local movement and provide access to the planned Northeast Quadrant Connector road. To limit the potential for cut-through traffic, lanes would be allocated and the signal phased and timed to balance traffic access in and out of the village via local circulation roadways with improved through traffic flow along Harding Road.

Implementation of a moveable barrier (bollard) system between the Belle Meade Plaza and Ingram properties can also be considered, if needed to prevent cut-through traffic during the AM and PM peak hours. This movable bollard system would allow the beneficial interparcel connectivity during other hours of the day.

Provide a Network of Pedestrian and Bicycle Facilities

Pedestrian facilities are the key element to providing a Town Center that encourages pedestrian activity. To promote walking as a major mode of transportation, implementation of useful and attractive sidewalks on all streets is necessary. This requires implementation of sidewalks, streetscape, and pedestrian crossings. To encourage use of bicycle travel, implementation of wide shoulder lanes for use by cyclists along Harding Road is recommended. In addition, providing access to the Richland Creek Greenway trailhead is important to allow users within Harding Town Center to access this facility without the need for automobile travel.

Implement Transit Circulator

Implementation of a transit circulator in the Harding Town Center area provides an additional travel mode to accommodate local trips through the corridor. By expanding the walking trip to greater distances through use of a transit circulator operating at regular intervals, trips that would otherwise be made by automobile can be captured within the Harding Town Center. This transit circulator is combined with improvements to the existing bus route into the Vanderbilt area, including implementation of priority signal control for buses to provide a travel time advantage for transit.



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Form Transportation Management Agency (TMA)

Implementation of a variety of transportation plan and detailed neighborhood plan recommendations requires coordination between local property owners, TDOT, MTA, and Metro. Many of the aesthetic standards and local circulation recommendations require application by property owners. To facilitate interaction and coordination of these improvements, implementation of a Transportation Management Agency (TMA) is recommended. In addition, the TMA could facilitate discussion and agreement regarding truck routing for deliveries to local businesses and agreements regarding the use of shared parking to allow businesses to take advantage of different peak parking times for compatible land uses.

Transportation System Goals and Objectives

The paragraphs below indicate the preferred package of improvements (referred to as implementation objectives) to achieve multimodal transportation goals which are compatible with the vision for the area. For each improvement objective, a reference number is provided to assist in identification of the improvement project through discussion of implementation.

The recommended improvements include phased implementation over the following time periods:

- Short-Range (2005-2010) - **Theme:** Implement a package of actions to address the primary transportation attributes of the vision (pedestrian movement, local traffic circulation, full utilization of existing infrastructure, and trip reduction).

- Mid-Range (2011-2015) - **Theme:** Implement significant new transportation projects and initiatives in concert with potential redevelopment.
- Long-Range (2016-2025) - **Theme:** Expand trip capacity along Harding Road to satisfy unmet trip needs.

Further details regarding recommended implementation of goals and objectives is provided in *Chapter 7 – Implementation Plan*.

Goal 1: Provide acceptable travel times for movement of vehicles through the area by fully utilizing existing arterials and improving capacity of main roadways.

Short-Range Improvement Objectives

- Modify signal timing of all signals along Harding Road to meet current traffic demands. (1.1)
- Conduct a study of traffic flow to/from the south via Woodmont Boulevard and Woodlawn Drive (and including other parallel roads as appropriate) between Harding Road and Hillsboro Road / I-440 to determine the potential need for operational improvements or capacity expansion for application in the long-range transportation planning process. (1.2)



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Mid-Range Improvement Objectives

- Modify signal timing of all signals along Harding Road to meet changing demands as redevelopment occurs. (1.3)
- Implement far-side bus pulloffs on private property for stops near critical intersections. (1.4)
- Install Northeast Quadrant Connector with traffic signal at White Bridge Road south of Post Road and at Harding Road at the relocated Kenner Avenue traffic signal. (1.5)

Long-Range Improvement Objectives

- Widen Harding Road from east of Bosley Springs Road to west of Belle Meade Plaza to provide six through-lanes with a two-way left turn lane. (1.6)

Goal 2: Serve critical intersection movements with minimal queuing and delay by improving critical intersection operations.

Short-Range Improvement Objectives

- Relocate Kenner Avenue signal approximately 350' to the east and provide access to businesses which currently use the existing Kenner Avenue signal via a two-lane service access road. (2.1)

Long-Range Improvement Objectives

- Provide additional turning lanes at Bosley Springs Road/Harding Road intersection with addition of lanes on Harding Road (side street dual left turns northbound and southbound). (2.2)
- Modify intersection geometry at Harding Road at White Bridge Road intersection to provide two northbound through lanes on intersection approach and convert westbound free flow right turn into a channelized right turn. Improvements to be performed in conjunction with implementation of the Northeast Quadrant Connector. (2.3)

Goal 3: Facilitate local connections and circulation without accessing the primary roadway network, while discouraging the use of local residential streets for through-traffic movement.

Short-Range Improvement Objectives

- Install local circulation roadway, as depicted on the concept plan, as properties redevelop (east of White Bridge Road). (3.1)
- Modify Ridgefield Drive from Woodlawn Road to Kenner Avenue to serve as a portion of the local circulation roadway and an urban residential street. (3.2)



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- Consider installation of a traffic signal along Ridgefield Drive at the new roadway connection to Harding Road, providing access to Harding Road via the relocated Kenner Avenue signal. (3.3)
- Connect the local circulation roadway from Ridgefield Drive to Harding Road at the relocated Kenner Avenue signal location. (3.4)
- Install intersection geometric improvements/traffic calming along Ridgefield Drive at Kenner Avenue and Woodlawn Drive. (3.5)
- Investigate traffic calming along Woodlawn Drive to provide a consistent travel speed that is compatible with the residential character of the area and a collector roadway. (3.6)
- Investigate traffic calming along Post Road to provide a consistent travel speed that is compatible with the residential character of the area and a collector roadway. (3.7)
- Utilize Kenner Avenue as a pedestrian friendly vehicular access when the Kenner Avenue signal is relocated. (3.8)
- Limit private curb cuts and driveways along Harding Road as development occurs, and encourage use of the internal street system in order to reduce the number of vehicles turning onto and off of Harding Road within the Village Center. (3.9)

Mid-Range Improvement Objectives

- Design the intersection of the local circulator roadway with the Northeast Quadrant Connector to limit any peak hour cut-through traffic desiring to use the circulator as a bypass of the Harding Road / White Bridge Road intersection. (3.10)
- Incorporate service lanes and frontage roads as appropriate in conjunction with development and truck access needs. (3.11)
- Consider the continuation of the local circulation roadway, as depicted on the concept plan, as properties redevelop (west of White Bridge Road). (3.12)

Goal 4: Maximize pedestrian travel between Hospital Sub-district and Village Center Sub-district by implementing local pedestrian paths and connections and providing safe and effective pedestrian crossings.

Short-Range Improvement Objectives

- Install crosswalks at all signalized intersections within the Village Center. (4.1)
- Provide pedestrian signals on all sides of signalized intersections and install high visibility crosswalks. (4.2)



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- Install wide sidewalks along Harding Road from St. Thomas Hospital to Sugartree Creek as development occurs. (4.3)
- Install sidewalks along new street from Harding Road at the relocated Kenner Avenue signal to Ridgefield Drive as redevelopment occurs. (4.4)
- Install sidewalks along local circulation roadway. (4.5)
- Install sidewalk of appropriate width along other streets intersecting Harding Road within the Village Center as redevelopment occurs. (4.6)

Long-Range Improvement Objectives

- Consider installation of pedestrian bridges across Harding Road in the Village Center area, in conjunction with future redevelopment only, where such structures would connect compatible land uses at the bridge level. (4.7)
- Implement streetscape improvements along Harding Road to create a pedestrian oriented environment in conjunction with additional travel lanes. (4.8)

Goal 5: Encourage pedestrian and bicycle trips between adjacent neighborhoods and the Village Center and Hospital Sub-districts by providing regional greenway and neighborhood pedestrian /bicycle connections and bicycle travel capability throughout the study area.

Short-Range Improvement Objectives

- Install sidewalk along Woodlawn Drive from Harding Road to Ridgefield Drive. (5.1)
- Connect neighborhoods south of Harding Road to the Village Center with sidewalks. (5.2)
- Implement pedestrian wayfinding along the local circulator. (5.3)
- Continue planned greenway from the foot of the Old White Bridge to Harding Road and construct a greenway trailhead at the terminus of the greenway trail with shelter, seating, and signage. (5.4)
- Provide nearby parking in the Village Center for the proposed greenway trail. (5.5)
- Implement the Greenways Master Plan by constructing trails along Richland Creek as development occurs. (5.6)

Mid-Range Improvement Objectives

- Install sidewalk along Woodmont Boulevard from Harding Road to Woodmont Circle. (5.7)
- Designate the local circulator as a mixed-traffic bike route on signage, bike route mapping, and greenway trailhead information. (5.8)



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Long-Range Improvement Objectives

- Implement pedestrian wayfinding along Harding Road in conjunction with additional travel lanes. (5.9)
- Implement wide outside lanes for bicycles along Harding Road in conjunction with additional traffic lanes. (5.10)

Goal 6: Encourage walking within the Village Center by making sidewalks safe, pleasant, and comfortable for pedestrians.

Short, Mid, and Long-Range Improvement Objectives

- Create a clear separation between pedestrians and automobiles along all streets within the village by providing street trees and on-street parking as appropriate. (6.1)
- Construct all sidewalks with appropriate widths to accommodate the pedestrians projected to be generated by proposed uses, as well as those pedestrians who are projected to walk to the village from the surrounding area. (6.2)
- Install a system of lighting with new development that will provide for safe bicycle and pedestrian movement, and at the same time will help encourage pedestrian activity at night within the village area. (6.3)

- Provide pedestrian amenities such as street furniture, public art, bicycle and consolidated media racks, and attractive planters along sidewalks as increased pedestrian activity occurs in the area. (6.4)
- Provide designated routes within the village for delivery truck traffic that are separated from routes with high pedestrian traffic. (6.5)
- Bury overhead utilities within the village area as new development occurs, or at a minimum, consolidate utility poles in order to reduce clutter and obstacles in pedestrian pathways. (6.6)

Goal 7: Increase transit use in the area by providing regional transit connections, facilitating local transit circulation, and improving bus travel time on the arterial street network.

Short-Range Improvement Objectives

- Enhance bus stop locations (shelters and waiting areas), and coordinate signage with local wayfinding. (7.1)
- Implement Harding Road express bus service with priority signal control. (7.2)

Mid-Range Improvement Objectives

- Implement transit circulator to serve local trips within the focus area and trips to adjoining areas. (7.3)



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- Interface express bus services with planned bus rapid transit (BRT) east of I-440. (7.4)
- Study long-range needs for significant expansion of transit services, including Harding Road / White Bridge Road area and Nashville Tech area. (7.5)

Long-Range Improvement Objectives

- Implement results of mid-range study of significant transit expansion to provide for unmet travel demand, including consideration of BRT, light rail, or express bus options. (7.6)

Goal 8: Reduce vehicle demand through the application of travel demand management (TDM) strategies with major employers in the area.

Short-Range Improvement Objectives

- Form Transportation Management Association (TMA) and implement area-wide TDM strategies in coordination with Nashville's RTA and MPO. (8.1)
- Consider expanded role of TMA to address local funding through the establishment of a Community Improvement District (CID) or Tax Increment Finance District. (8.2)

Long-Range Improvement Objectives

- Expand TMA role and TDM programs as additional development occurs. (8.3)

Evaluation of Performance for Recommended Improvements

The recommended package of improvements addresses existing and future transportation needs in the Harding Town Center area and makes use of improvement opportunities. For each transportation goal identified in the plan, a series of performance measures was defined. Some of these measures were used in the detailed assessment and comparison of major capacity improvement alternatives. Other performance measures provide a more general assessment to identify improvements to key transportation system characteristics to foster use of multiple travel modes. Some of the performance measures, such as the actual number of pedestrian trips realized in the study area, are identified for later measurement by Metro as implementation of improvements is performed.

Table 2 provides a summary of the performance measures for the Harding Town Center area. As this table shows, implementation of recommended improvements provides benefits over current year (2004) and future year (2015) with the existing transportation network (no additional improvements).



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Table 2
Summary of Performance Measures In Harding Town Center Transportation Plan

Goal/Performance Measure	Existing Network - 2004		Existing Network - 2015		Recommended Improvements - 2015		Note Reference
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
Goal 1: Provide acceptable travel times for movement of vehicles through the area							
• Total intersection delay time for movement through corridor in peak direction (Cherokee Ave. through Belle Meade Blvd.)	5.9 min	7.2 min	11.5 min	16.1 min	3.8 min	6.7 min	1
• Unmet travel demand (in vehicles per hour) at LOS D for peak direction	400	300	800	700	0	100	2
Goal 2: Serve critical intersection movements with minimal queuing and delay							
• Intersection delay at Critical Harding Road at White Bridge Road Intersection	80 sec	118 sec	128 sec	118 sec	48 sec	59 sec	3
• Intersection LOS at Critical Harding Road at White Bridge Road Intersection	E	F	F	F	D	E	4
access the primary roadway network							
• Percent of generated trips in areas served by local roadway network or interparcel connections	8%		8%		15% - 20%		5
• Residential corridors with measures to discourage cut-through traffic	None		None		Two		6
Goal 4: Maximize pedestrian travel between Hospital Sub-district and Village Center Sub-district							
• Quadrants with direct access to pedestrian facilities with buffer from high speed/high volume traffic	Northwest		Northwest		All		7
• Increased pedestrian traffic volumes	minimal		minimal		TBD		8
Goal 5: Encourage pedestrian and bicycle trips between adjacent neighborhoods and the Village Center and Hospital Sub-districts							
• Number of connections between neighborhoods and commercial areas within walking/cycling distance	Two		Two		Five		9
• Increased pedestrian and bicycle traffic volumes	minimal		minimal		TBD		10
Goal 6: Encourage walking within the Village by making sidewalks safe, pleasant, and comfortable for pedestrians.							
• Increased pedestrian traffic volumes	minimal		minimal		TBD		10
Goal 7: Increase transit use in the area							
• Transit stops within walkable distance (1/4 mile) of major destinations	Yes		Yes		Transit circulator provides additional stop locations		11
• Total trip time to major destinations along route	43 min		57 min		39 min		12
• Ridership on transit line servicing the study area	500/day each direction		TBD		TBD		13
Goal 8: Reduce vehicle demand through application of TDM strategies							
• Employees within area with access to TDM programs	0		0		4450 people		14
• Potential peak hour volume reduction with availability of TDM strategies	0		0		220 trips		15



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Notes from Table 2:

1. Existing intersection delay is field measured travel time minus travel time along the corridor (1.25 miles) at free-flow speed. Future delay is adjusted by difference in peak direction intersection delay at all intersections from existing to future conditions based on HCM values of LOS.
2. Unmet travel demand at LOS D is the peak direction volume that must be reduced at the critical Harding Road at White Bridge Road intersection to provide LOS D conditions.
3. Intersection delay is the number of seconds vehicles are stopped at an intersection determined based on HCM methodology.
4. Intersection LOS is the level of service rating (A-F) based on intersection delay determined from HCM threshold values.
5. The existing percent of trips generated using the local roadway network is estimated based on the volume of traffic using the existing interparcel connection under White Bridge Road compared to the overall volume of external trips using side streets in each quadrant. The future estimate is based on typical mixed use trip capture rates using the recommended local circulation roadway and interparcel connections.
6. The recommended plan includes measures to reduce the speeds of cut-through traffic on Post Road and Woodlawn Drive.
7. The northwest quadrant (Belle Meade Plaza) has sidewalk access along the pedestrian activity areas within the quadrant along the storefronts. This sidewalk separated from Harding Road is not continuous in other quadrants.
8. Increased pedestrian traffic volumes can be measured over time to gauge the success of the plan, once implemented.
9. This indicates the number of connections to adjacent neighborhoods that are accessible via sidewalk or bicycle access. The existing area has a pedestrian connection across the Old White Bridge and pedestrian connections along the edges of Kenner Avenue south of Ridgefield Drive.
10. Increased pedestrian and bicycle traffic volumes can be measured over time to gauge the success of the plan, once implemented.



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11. Transit stops along Harding Road provide access to transit throughout the Harding Town Center area within ¼ mile of destinations. Recommended implementation of a transit circulator to use the local circulation road will decrease the distance to bus service for riders traveling from adjacent parcels.
12. The existing trips time reflects average scheduled bus travel times between the Belle Meade Park and Ride Lot and West End Avenue at 31st Street during the AM and PM peak hours. The 2015 no-build conditions reflect an increased travel time of 14 minutes to reflect a doubling of typical delay along the entire section of Harding Road. The 2015 recommended conditions reflect an estimated 10% overall reduction in bus travel time, reflecting a 7% reduction in travel time due to reduced arterial demand and an additional 3% reduction in travel time due to priority signal control for bus operations.
13. Increased transit ridership can be measured over time to gauge the success of the plan, once implemented.
14. The number of people with access to TDM options is based on the number of daytime hospital employees, half the medical office employees, and half of the non-retail employment in TAZ 103 with future projected employment levels.
15. Estimates of future traffic reductions due to TDM assume 5% of employees with TDM available will make use of the strategies.



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Chapter 7 Implementation Plan

Implementation of transportation improvements requires coordination of financial resources, planning and engineering efforts, and construction capabilities. Projects must be coordinated to ensure improvements are compatible and complementary as their implementation is phased over time. The following paragraphs describe the recommended implementation plan for the Harding Town Center Transportation Plan.

Project Implementation by Phase

Although several transportation improvements have been recommended, it is not practical to implement all of the improvements at one time. A phasing plan was developed to provide decision makers with a starting point to use in prioritizing the recommended strategies and projects for funding and implementation. The recommended improvements and projects were grouped into three implementation time periods, as described below.

- Short-Range (2005-2010): Improvements that are of a high priority. Projects either have a committed funding source or are anticipated to be funded in the near term.
- Mid-Range (2011-2015): Improvements that are not as high priority and require longer term planning, design and coordination.

- Long-Range (2016-2025): Improvements that are not currently needed, but are anticipated with future conditions. In addition, these improvements require significant lead time for funding and/or right-of-way acquisition.

The specific improvements and projects recommended for the short-range, mid-range and long-range improvement phases were identified in *Chapter 6 – Recommended Transportation Goals and Improvement Objectives*.

Inclusion in Planning and Programming Efforts

Transportation improvements arising from this planning effort will need to be reviewed as part of the Nashville Area MPO's long-range transportation planning efforts. Specific projects included in the long-range transportation plan will need to be programmed for implementation in the Transportation Improvement Program (TIP). The TIP presents a prioritized program of transportation projects to be implemented over the next five years, with the funding source for each project noted. Development of a TIP is required as a condition for local governments to receive federal transit and highway funds. The projects will also need to be included in TDOT's State Transportation Improvement Program (STIP), which presents a prioritized program of statewide transportation projects.



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Summary of Project Costs and Potential Funding Sources

Order of magnitude cost estimates were prepared to provide a planning level estimate of the resources needed for implementation of the transportation plan improvement objectives (projects). The estimates may be considerably higher or lower than actual costs based on a number of factors, including complexity of the design, utility relocation, property values, and environmental considerations.

Table 3 presents a summary of the improvement costs for each of the eight transportation goals. The total cost of implementing all of the recommended goals and improvement objectives is estimated at \$21,932,000. Tables 4 through 11 show the implementation period, estimated cost, and potential funding sources for each improvement objective.

Agency Coordination

A number of agencies and groups will be involved in implementation of the recommended improvements. Table 12 presents the agency and/or group recommended as the lead for coordinating each of the recommended strategies and projects, as well as agencies that have support and advisory roles. Metro and TDOT are the two agencies performing a lead role. MTA would act as the lead agency for implementing transit improvements related to existing services and coordinating future transit needs.

Table 3
Estimated Improvement Cost by Transportation Goal

Goal	Estimated Cost
Goal 1: Provide acceptable travel times for movement of vehicles through the area.	\$15,522,000
Goal 2: Serve critical intersection movements with minimal queuing and delay.	\$130,000
Goal 3: Facilitate local connections and circulation without accessing the primary roadway network.	\$2,075,000
Goal 4: Maximize pedestrian travel between Hospital Sub-district and Village Center Sub-district.	\$1,315,000
Goal 5: Encourage pedestrian and bicycle trips between adjacent neighborhoods and the Village Center and Hospital Sub-districts.	\$330,000
Goal 6: Encourage walking within the Village by making sidewalks safe, pleasant, and comfortable for pedestrians.	with other tasks
Goal 7: Increase transit use in the area by providing regional transit connections.	\$1,510,000
Goal 8: Reduce vehicle demand through the application of travel demand management (TDM) strategies.	\$1,050,000
Total Cost	\$21,932,000



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Table 4

Estimated Cost and Recommended Implementation

Goal 1: Provide acceptable travel times for movement of vehicles through the area

Ref. No.	Transportation Improvement Objective	Implementation Period	Estimated Cost	Potential Funding Source			
				Metro	State	Federal	Local/Private
1.1	Modify signal timing of all signals along Harding Road to meet current traffic demands.	Short-Range	\$36,000	X	X		
1.2	Conduct a study of traffic flow to/from the south via Woodmont Boulevard and Woodlawn Drive (including other parallel roads as appropriate) between Harding Road and Hillsboro Road / I-440 to determine the potential need for operational improvements or capacity expansion for application in the long-range transportation planning process.	Short-Range	\$50,000	X			
1.3	Modify signal timing of all signals along Harding Road to meet changing demands as redevelopment occurs.	Mid-Range	\$36,000	X	X		
1.4	Implement far-side bus pulloffs on private property for stops near critical intersections.	Mid-Range	\$400,000	X	X	X	
1.5	Install Northeast Quadrant Connector with traffic signal at White Bridge Road south of Post Road and at Harding Road at the relocated Kenner Avenue traffic signal.	Mid-Range	\$7,000,000	X	X	X	X
1.6	Widen Harding Road from east of Bosley Springs Road to west of Belle Meade Plaza to provide six through-lanes with a two-way left turn lane.	Long-Range	\$8,000,000	X	X	X	
Total Cost for Goal 1			\$15,522,000				

¹ Installation of the Northeast Quadrant Connector does not include cost for purchase of the BP station along Harding Road, modification of substation along White Bridge Road, or relocation of Richland Creek Greenway Trailhead.

Table 5

Estimated Cost and Recommended Implementation

Goal 2: Serve critical intersection movements with minimal queuing and delay

Ref. No.	Transportation Improvement Objective	Implementation Period	Estimated Cost	Potential Funding Source			
				Metro	State	Federal	Local/Private
2.1	Relocate Kenner Avenue signal approximately 350' to the east and provide access to businesses which currently use the existing Kenner Avenue signal via a two-lane service access road. ¹	Short-Range	\$130,000	X	X		X
2.2	Provide additional turning lanes at Bosley Springs Road/Harding Road intersection with addition of lanes on Harding Road (side street dual left turns northbound and southbound).	Long-Range	With 1.6	X	X	X	
2.3	Modify intersection geometry at Harding Road at White Bridge Road intersection to provide two northbound through lanes on intersection approach and convert westbound free flow right turn into a channelized right turn. Improvements to be performed in conjunction with implementation of the Northeast Quadrant Connector.	Long-Range	With 1.6	X	X	X	
Total Cost for Goal 2			\$130,000				

¹ Relocation of the Kenner Avenue signal does not include cost for purchase of the BP station property on the north side of the intersection or extension of Northeast Quadrant Connector to Harding Road intersection.



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Table 6
Estimated Cost and Recommended Implementation
Goal 3: Provide acceptable travel times for movement of vehicles through the area

Ref. No.	Transportation Improvement Objective	Implementation Period	Estimated Cost	Potential Funding Source			
				Metro	State	Federal	Local/Private
3.1	Install local circulation roadway, as depicted on the concept plan, as properties redevelop (east of White Bridge Road).	Short-Range	\$525,000	X			X
3.2	Modify Ridgefield Drive from Woodlawn Drive to Kenner Avenue to serve as a portion of the local circulation roadway and an urban residential street.	Short-Range	\$280,000	X	X		X
3.3	Consider installation of a traffic signal along Ridgefield Drive at the new roadway connection to Harding Road, providing access to Harding Road via the relocated Kenner Avenue signal.	Short-Range	\$160,000	X	X		
3.4	Connect the local circulation roadway from Ridgefield Drive to Harding Road at the relocated Kenner Avenue signal location.	Short-Range	\$220,000				X
3.5	Install intersection geometric improvements/traffic calming along Ridgefield Drive at Kenner Avenue and Woodlawn Drive.	Short-Range	\$200,000	X	X		X
3.6	Investigate traffic calming along Woodlawn Drive to provide a consistent travel speed that is compatible with the residential character of the area and a collector roadway.	Short-Range	\$50,000	X			X
3.7	Investigate traffic calming along Post Road to provide a consistent travel speed that is compatible with the residential character of the area and a collector roadway.	Short-Range	\$25,000	X			X
3.8	Utilize Kenner Avenue as a pedestrian friendly vehicular access when the Kenner Avenue signal is relocated.	Short-Range	\$10,000	X			X
3.9	Limit private curb cuts and driveways along Harding Road as development occurs, and encourage use of the internal street system in order to reduce the number of vehicles turning onto and off of Harding Road within the Village Center.	Short-Range	Coordination Only	X	X		X
3.10	Design the intersection of the local circulator roadway with the Northeast Quadrant Connector to limit any peak hour cut-through traffic desiring to use the circulator as a bypass of the Harding Road / White Bridge Road intersection	Mid-Range	\$80,000	X			X
3.11	Incorporate service lanes and frontage roads as appropriate in conjunction with development and truck access needs.	Mid-Range	Coordination Only	X			X
3.12	Consider the continuation of the local circulation roadway, as depicted on the concept plan, as properties redevelop (west of White Bridge Road).	Long-Range	\$525,000	X			X
Total Cost for Goal 3							
			\$2,075,000				



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Table 7
Estimated Cost and Recommended Implementation
Goal 4: Maximize pedestrian travel between Hospital Sub-district and Village Center Sub-district

Ref. No.	Transportation Improvement Objective	Implementation Period	Estimated Cost	Potential Funding Source			
				Metro	State	Federal	Local/Private
4.1	Install crosswalks at all signalized intersections within the Village Center.	Short-Range	\$120,000	X	X		X
4.2	Provide pedestrian signals on all sides of signalized intersections and install high visibility crosswalks.	Short-Range	with 4.1				X
4.3	Install wide sidewalks along Harding Road from St. Thomas Hospital to Sugartree Creek as development occurs.	Short-Range	with development				X
4.4	Install sidewalks along new street from Harding Road at the relocated Kenner Avenue signal to Ridgefield Drive as redevelopment occurs.	Short-Range	with 3.4				X
4.5	Install sidewalks along local circulation roadway.	Short-Range	with 3.1	X			X
4.6	Install sidewalk of appropriate width along other streets intersecting Harding Road within the Village Center as redevelopment occurs.	Short-Range	\$195,000	X			X
4.7	Consider installation of pedestrian bridges across Harding Road in the Village Center area in conjunction with future redevelopment only where such structures would connect compatible land uses at the bridge level.	Mid-Range	\$1,000,000	X	X	X	X
4.8	Implement streetscape improvements along Harding Road to create a pedestrian oriented environment in conjunction with additional travel lanes.	Long-Range	With 1.6	X	X	X	X
Total Cost for Goal 4			\$1,315,000				



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Table 8

Estimated Cost and Recommended Implementation

Goal 5: Encourage pedestrian and bicycle trips between adjacent neighborhoods and the Village Center and Hospital Sub-districts

Ref. No.	Transportation Improvement Objective	Implementation Period	Estimated Cost	Potential Funding Source			
				Metro	State	Federal	Local/Private
5.1	Install sidewalks along Woodlawn Drive from Harding Road to Ridgefield Drive.	Short-Range	\$60,000	X			X
5.2	Connect neighborhoods south of Harding Road to the Village Center with sidewalks.	Short-Range	with 4.6	X			X
5.3	Implement pedestrian wayfinding along the local circulator.	Short-Range	\$30,000	X			X
5.4	Continue planned greenway from the foot of the Old White Bridge to Harding Road and construct a greenway trailhead at the terminus of the greenway trail with shelter, seating, and signage.	Short-Range	\$35,000	X	X		X
5.5	Provide nearby parking in the Village Center for the proposed greenway trail.	Short-Range	\$45,000	X			X
5.6	Implement the Greenways Master Plan by constructing trails along Richland Creek as development occurs.	Short-Range	Cost is part of other projects already programmed	X	X	X	X
5.7	Install sidewalks along Woodmont Boulevard from Harding Road to Woodmont Circle.	Mid-Range	\$160,000	X			X
5.8	Designate the local circulator as a mixed traffic bike route on signage, bike route mapping, and greenway trailhead information.	Mid-Range	with 5.3	X	X		X
5.9	Implement pedestrian wayfinding along Harding Road in conjunction with additional travel lanes.	Long-Range	with 1.6	X	X		X
5.10	Implement wide outside lanes for bicycles along Harding Road in conjunction with additional traffic lanes.	Long-Range	with 1.6	X	X	X	X
Total Cost for Goal 5			\$330,000				



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Table 9
Estimated Cost and Recommended Implementation
Goal 6: Encourage walking within the Village by making sidewalks safe, pleasant, and comfortable for pedestrians

Ref. No.	Transportation Improvement Objective	Implementation Period	Estimated Cost	Potential Funding Source			
				Metro	State	Federal	Local/Private
6.1	Create a clear separation between pedestrians and automobiles along all streets within the Village Center by providing street trees and on-street parking as appropriate.	Short, Mid, and Long-Range	with 4.8	X	X	X	X
6.2	Construct all sidewalks with appropriate widths to accommodate the pedestrians projected to be generated by proposed uses, as well as those pedestrians who are projected to walk to the Village Center from the surrounding area.	Short, Mid, and Long-Range	with 4.8	X	X	X	X
6.3	Install a system of lighting with new development that will provide for safe bicycle and pedestrian movement, and at the same time will help encourage pedestrian activity at night within the Village Center area.	Short, Mid, and Long-Range	with 4.8	X	X	X	X
6.4	Provide pedestrian amenities such as street furniture, public art, bicycle and consolidated media racks, and attractive planters along sidewalks as increased pedestrian activity occurs in the area.	Short, Mid, and Long-Range	with 4.8	X	X	X	X
6.5	Provide designated routes within the Village Center for delivery truck traffic that are separated from routes with high pedestrian traffic.	Short, Mid, and Long-Range	with 3.11	X	X	X	X
6.6	Bury overhead utilities within the Village Center area as new development occurs, or at a minimum, consolidate utility poles in order to reduce clutter and obstacles in pedestrian pathways.	Short, Mid, and Long-Range	with 4.8	X	X	X	X
Total Cost for Goal 6			\$0				



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Table 10
Estimated Cost and Recommended Implementation
Goal 7: Increase transit use in the area by providing regional transit connections

Ref. No.	Transportation Improvement Objective	Implementation Period	Estimated Cost	Potential Funding Source			
				Metro	State	Federal	Local/Private
7.1	Enhance bus stop locations (shelters and waiting areas), and coordinate signage with local wayfinding.	Short-Range	\$40,000	X	X	X	X
7.2	Implement transit circulator to serve local trips within the focus area and trips to adjoining areas.	Short-Range	\$270,000	X	X	X	X
7.3	Implement Harding Road express bus service with priority signal control.	Mid-Range	\$1,080,000	X	X	X	
7.4	Interface express bus services with planned bus rapid transit (BRT) east of I-440.	Mid-Range	Costs to be determined	X	X	X	
7.5	Study long-range needs for significant expansion of transit services, including Harding Road / White Bridge Road area and Nashville Tech area.	Mid-Range	\$120,000	X	X		
7.6	Implement results of mid-range study of significant transit expansion to provide for unmet travel demand, including consideration of BRT, light rail, or express bus options.	Long-Range	Not known until study completed	X	X	X	X
Total Cost for Goal 7			\$1,510,000				

Table 11
Estimated Cost and Recommended Implementation
Goal 8: Reduce vehicle demand through the application of travel demand management (TDM) strategies

Ref. No.	Transportation Improvement Objective	Implementation Period	Estimated Cost	Potential Funding Source			
				Metro	State	Federal	Local/Private
8.1	Form Transportation Management Association (TMA) and implement area-wide TDM strategies in coordination Nashville's RTA and MPO.	Short-Range	\$150,000	X	X	X	X
8.2	Consider expanded role of TMA to address local funding through the establishment of a Community Improvement District (CID) or Tax Increment Finance District.	Short-Range	\$300,000	X			X
8.3	Expand TMA role and TDM programs as additional development occurs.	Long-Range	\$600,000	X	X	X	X
Total Cost for Goal 8			\$1,050,000				



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Table 12
Recommended Agency Coordination

Ref. No.	Transportation Goal / Improvement Objective	Metro	MPO	TDOT	MTA	RTA	Business Community	Neighborhood Orgs.
1	Provide acceptable travel times for movement of vehicles through the area							
1.1	Modify signal timing of all signals along Harding Road to meet current traffic demands.	Lead		Support				
1.2	Conduct a study of traffic flow to/from the south via Woodmont Boulevard and Woodlawn Drive (including other parallel roads as appropriate) between Harding Road and Hillsboro Road / I-440 to determine the potential need for operational improvements or capacity expansion for application in the long-range transportation planning process.	Lead	Support				Advisory	Advisory
1.3	Modify signal timing of all signals along Harding Road to meet changing demands as redevelopment occurs.	Lead		Support			Advisory	
1.4	Implement far-side bus pulloffs on private property for stops near critical intersections.	Support	Support	Advisory	Lead		Advisory	Advisory
1.5	Install Northeast Quadrant Connector with traffic signal at White Bridge Road south of Post Road and at Harding Road at the relocated Kenner Avenue traffic signal.	Lead	Support	Support	Advisory		Support	Advisory
1.6	Widen Harding Road from east of Bosley Springs Road to west of Belle Meade Plaza to provide six through-lanes with a two-way left turn lane.	Support	Support	Lead				Support
2	Serve critical intersection movements with minimal queuing and delay							
2.1	Relocate Kenner Avenue signal approximately 350' to the east and provide access to businesses which currently use the existing Kenner Avenue signal via a two-lane service access road. ¹	Lead	Support	Support			Support	Advisory
2.2	Provide additional turning lanes at Bosley Springs Road/Harding Road intersection with addition of lanes on Harding Road (side street dual left turns northbound and southbound).	Support	Support	Lead			Advisory	Advisory
2.3	Modify intersection geometry at Harding Road at White Bridge Road intersection to provide two northbound through lanes on intersection approach and convert westbound free flow right turn into a channelized right turn. Improvements to be performed in conjunction with implementation of the Northeast Quadrant Connector.	Support	Support	Lead			Advisory	Advisory



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**Table 12 (continued)
Recommended Agency Coordination**

Ref. No.	Transportation Goal / Improvement Objective	Metro	MPO	TDOT	MTA	RTA	Business Community	Neighborhood Orgs.
3	Facilitate local connections and circulation without accessing the primary roadway network							
3.1	Install local circulation roadway, as depicted on the concept plan, as properties redevelop (east of White Bridge Road).	Support	Support	Advisory	Advisory		Lead	Advisory
3.2	Modify Ridgefield Drive from Woodlawn Drive to Kenner Avenue to serve as a portion of the local circulation roadway and an urban residential street.	Lead	Support	Advisory			Advisory	
3.3	Consider installation of a traffic signal along Ridgefield Drive at the new roadway connection to Harding Road, providing access to Harding Road via the relocated Kenner Avenue signal.	Lead		Support			Support	
3.4	Connect the local circulation roadway from Ridgefield Drive to Harding Road at the relocated Kenner Avenue signal location.	Support	Support	Advisory	Advisory		Lead	Advisory
3.5	Install intersection geometric improvements/traffic calming along Ridgefield Drive at Kenner Avenue and Woodlawn Drive.	Lead	Support				Advisory	
3.6	Investigate traffic calming along Woodlawn Drive to provide a consistent travel speed that is compatible with the residential character of the area and a collector roadway.	Lead	Support				Advisory	
3.7	Investigate traffic calming along Post Road to provide a consistent travel speed that is compatible with the residential character of the area and a collector roadway.	Lead	Support				Advisory	
3.8	Utilize Kenner Avenue as a pedestrian friendly vehicular access when the Kenner Avenue signal is relocated.	Lead	Support				Support	Advisory
3.9	Limit private curb cuts and driveways along Harding Road as development occurs, and encourage use of the internal street system in order to reduce the number of vehicles turning onto and off of Harding Road within the Village Center.	Lead	Support	Support			Support	
3.10	Design the intersection of the local circulator roadway with the Northeast Quadrant Connector to limit any peak hour cut-through traffic desiring to use the circulator as a bypass of the Harding Road / White Bridge Road intersection	Lead	Support	Advisory			Support	
3.11	Incorporate service lanes and frontage roads as appropriate in conjunction with development and truck access needs.	Lead	Support	Advisory			Support	
3.12	Consider the continuation of the local circulation roadway, as depicted on the concept plan, as properties redevelop (west of White Bridge Road).	Support	Support	Advisory	Advisory	Advisory	Lead	Advisory
4	Maximize pedestrian travel between Hospital Sub-district and Village Center Sub-district							
4.1	Install crosswalks at all signalized intersections within the Village Center.	Lead	Advisory	Support	Advisory		Advisory	Advisory
4.2	Provide pedestrian signals on all sides of signalized intersections and install high visibility crosswalks.	Lead	Support	Support	Advisory		Support	Advisory
4.3	Install wide sidewalks along Harding Road from St. Thomas Hospital to Sugartree Creek as development occurs.	Lead	Support	Support	Advisory		Support	Advisory
4.4	Install sidewalks along new street from Harding Road at the relocated Kenner Avenue signal to Ridgefield Drive as redevelopment occurs.	Lead	Support	Advisory			Advisory	Support
4.5	Install sidewalks along local circulation roadway.	Lead	Support	Advisory	Advisory		Support	Advisory
4.6	Install sidewalk of appropriate width along other streets intersecting Harding Road within the Village Center as redevelopment occurs.	Lead	Support	Advisory			Support	Support
4.7	Consider installation of pedestrian bridges across Harding Road in the village area in conjunction with future redevelopment only where such structures would connect compatible land uses at the bridge level.	Lead	Support	Support	Advisory		Support	
4.8	Implement streetscape improvements along Harding Road to create a pedestrian oriented environment in conjunction with additional travel lanes.	Lead	Support	Support	Advisory		Support	Support



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Table 12 (continued)
Recommended Agency Coordination

Ref. No.	Transportation Goal / Improvement Objective	Metro	MPO	TDOT	MTA	RTA	Business Community	Neighborhood Orgs.
5	Encourage pedestrian and bicycle trips between adjacent neighborhoods and the Village Center and Hospital Sub-districts							
5.1	Install sidewalks along Woodlawn Drive from Harding Road to Ridgefield Drive.	Lead	Support		Advisory			Support
5.2	Connect neighborhoods south of Harding Road to the Village Center with sidewalks.	Lead	Support		Advisory		Advisory	Support
5.3	Implement pedestrian wayfinding along the local circulator.	Lead	Support		Advisory		Support	Advisory
5.4	Continue planned greenway from the foot of the Old White Bridge to Harding Road and construct a greenway trailhead at the terminus of the greenway trail with shelter, seating, and signage.	Lead	Support				Advisory	Advisory
5.5	Provide nearby parking in the Village Center for the proposed greenway trail.	Lead	Support		Advisory		Support	Advisory
5.6	Implement the Greenways Master Plan by constructing trails along Richland Creek as development occurs.	Lead	Support				Support	Advisory
5.7	Install sidewalks along Woodmont Boulevard from Harding Road to Woodmont Circle.	Lead	Support		Advisory		Advisory	Advisory
5.8	Designate the local circulator as a mixed traffic bike route on signage, bike route mapping, and greenway trailhead information.	Lead	Support	Advisory	Advisory		Support	Advisory
5.9	Implement pedestrian wayfinding along Harding Road in conjunction with additional travel lanes.	Lead	Support	Support			Support	Advisory
5.10	Implement wide outside lanes for bicycles along Harding Road in conjunction with additional traffic lanes.	Support	Support	Lead	Advisory		Advisory	Advisory
6	Encourage walking within the Village by making sidewalks safe, pleasant, and comfortable for pedestrians							
6.1	Create a clear separation between pedestrians and automobiles along all streets within the Village Center by providing street trees and on-street parking as appropriate.	Lead	Support	Support	Advisory		Support	Support
6.2	Construct all sidewalks with appropriate widths to accommodate the pedestrians projected to be generated by proposed uses, as well as those pedestrians who are projected to walk to the Village Center from the surrounding area.	Lead	Support	Support	Advisory		Support	Support
6.3	Install a system of lighting with new development that will provide for safe bicycle and pedestrian movement, and at the same time will help encourage pedestrian activity at night within the Village Center area.	Lead	Support	Support	Advisory		Support	Support
6.4	Provide pedestrian amenities such as street furniture, public art, bicycle and consolidated media racks, and attractive planters along sidewalks as increased pedestrian activity occurs in the area.	Lead	Support	Support	Advisory		Support	Support
6.5	Provide designated routes within the Village Center for delivery truck traffic that are separated from routes with high pedestrian traffic.	Support	Support	Support	Advisory		Support	Lead
6.6	Bury overhead utilities within the Village Center area as new development occurs, or at a minimum, consolidate utility poles in order to reduce clutter and obstacles in pedestrian pathways.	Lead	Support	Support	Advisory		Support	Support



Harding Town Center Transportation Plan

Table 12 (continued)
Recommended Agency Coordination

Ref. No.	Transportation Goal / Improvement Objective	Metro	MPO	TDOT	MTA	RTA	Business Community	Neighborhood Orgs.
7	Increase transit use in the area by providing regional transit connections							
7.1	Enhance bus stop locations (shelters and waiting areas), and coordinate signage with local wayfinding.	Support	Support		Lead	Advisory	Support	Advisory
7.2	Construct all sidewalks with appropriate widths to accommodate the pedestrians projected to be generated by proposed uses, as well as those pedestrians who are projected to walk to the village from the surrounding area.	Support	Support		Lead	Support	Support	
7.3	Install a system of lighting with new development that will provide for safe bicycle and pedestrian movement, and at the same time will help encourage pedestrian activity at night within the village area.	Support	Support	Support	Lead	Advisory	Advisory	Advisory
7.4	Provide pedestrian amenities such as street furniture, public art, bicycle and consolidated media racks, and attractive planters along sidewalks as increased pedestrian activity occurs in the area.	Support	Lead		Support	Support	Advisory	Advisory
7.5	Provide designated routes within the village for delivery truck traffic that are separated from routes with high pedestrian traffic.	Support	Lead		Support	Support	Advisory	Advisory
7.6	Bury overhead utilities within the village area as new development occurs, or at a minimum, consolidate utility poles in order to reduce clutter and obstacles in pedestrian pathways.	Support	Support		Lead	Support	Advisory	Advisory
8	Reduce vehicle demand through the application of travel demand management (TDM) strategies							
8.1	Form Transportation Management Association (TMA) and implement area-wide TDM strategies in coordination Nashville's RTA and MPO.	Support	Lead		Advisory	Support	Support	Advisory
8.2	Consider expanded role of TMA to address local funding through the establishment of a Community Improvement District (CID) or Tax Increment Finance District.	Support	Support		Advisory	Advisory	Lead	Advisory
8.3	Expand TMA role and TDM programs as additional development occurs.	Support	Support		Advisory	Support	Lead	Advisory



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Funding

A number of potential funding sources could be utilized to finance the various recommended improvements. The most likely funding sources for each improvement and project, based on the agency identified as responsible, are also presented in Table 12.

Several federal funding sources are available for transportation systems meeting eligibility criteria, including:

- National Highway System Funds: For projects within congressionally approved National Highway System corridors, including roads, park and ride lots, and bicycle/pedestrian facilities.
- Surface Transportation Program Funds: For a wide variety of projects, including roads, transit and other modes.
- Transportation Enhancement Set-aside Funds: For a broad range of enhancement related activities, such as facilities for pedestrian and bicycles, landscaping, and historic preservation.
- Safety Construction Set-aside Funds: For hazard elimination on public roadways and at railroad crossings, as well as other safety issues.
- Transit Bus and Bus Related Capital Funds: For a broad range of transit projects, including buses, transfer centers, passenger amenities, and transportation centers.

Nashville's MPO is responsible for allocating several of these funds and typically works with Metro to coordinate the application to TDOT. MTA liaises with the Federal Transit Administration (FTA) and TDOT on transit funds in coordination with the MPO. Each funding program has a non-federal match requirement in order to receive funds, which is typically 20%.

TDOT provides some transportation funding, including funding for projects that do not qualify for federal highway funds, as well as matching funds for many projects on the state route system. There are several possible funding sources which can be explored at the local level to finance transportation improvements aside from general operating funds, including:

- Developer Funding: Assistance from developers in funding transportation improvements directed at satisfying the additional demands placed on the transportation system generated by the proposed development.
- Traffic Impact Fees: Other areas have enacted traffic impact fee ordinances to help pay the cost of transportation infrastructure improvements associated with major developments. Impact fees (or concurrency fees) are collected to fund improvements needed to handle the additional traffic generated by the development.



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- Public/Private Partnerships: Another avenue for implementing key components of projects that can provide important benefits to both the public and private sectors. Promotion of transit services is an example of this type of partnership.
- Tax Increment Financing (TIF): This option is typically used in revitalizing areas to finance infrastructure costs related to development. The additional property taxes that are generated by the development are transferred away from the community's established tax base and then used to pay for certain development expenses, such as roads, sidewalks, and recreational facilities.
- Establishing a Community Improvement District (CID): This type of funding involves action by the business community in the Harding Town Center area. The business owners would agree to have an additional property tax imposed on them to be used for improvements within the community improvement district.

As Metro, together with TDOT and MPO, work toward implementation of the recommended improvements, further evaluation of these alternative funding sources and determination of the most appropriate financing mechanisms for the community will be needed.