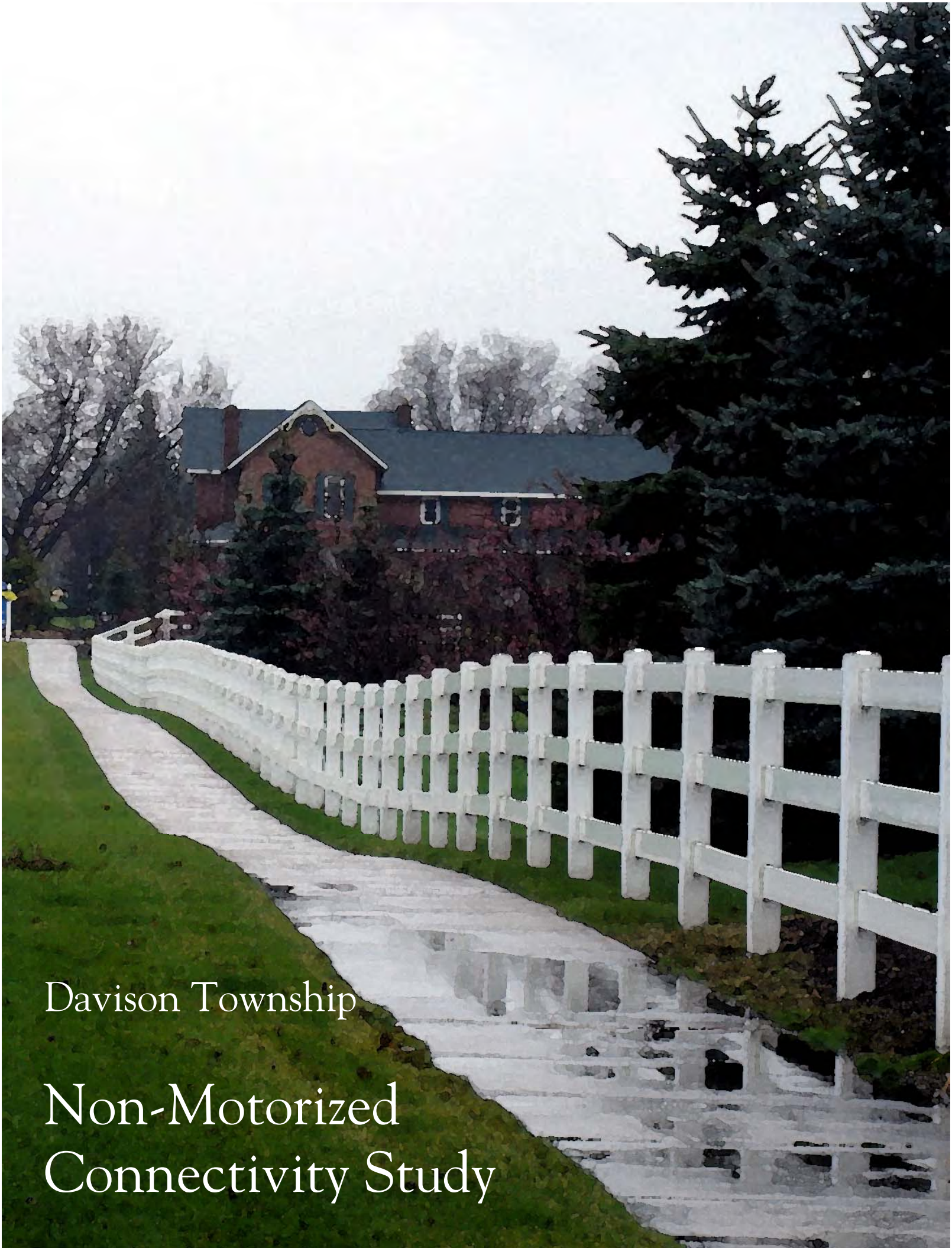

Davison Township

Non-Motorized Connectivity Study

Davison Township

Non-Motorized Connectivity Study

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Introduction

Non-motorized systems that are safe, accessible, and aesthetically pleasing attract people. People walk, pedal, or roll for many reasons: to go to a neighbor's house, to run errands, to go to school, or to get to a business meeting. People also walk, pedal, or roll for recreation and health benefits or for the enjoyment of being outside. The physical environment of the Township plays an important role in facilitating or discouraging non-motorized travel. Transportation corridors, gaps in a sidewalk system, expansive road crossings, etc., can place formidable barriers to moving from place to place.

The Township is working toward providing a walkable community to encourage increases in physical activity, economic development incentives and opportunities, and quality of life, to create a sense of place, to provide Safe-Routes-To-School as well as connections to adjacent communities, and to support the concepts of Active Living.

> Active Living is a way of life that integrates physical activity into daily routines. The goal is to accumulate at least 30 minutes of activity each day. Individuals may achieve this by walking or bicycling for transportation, exercise or pleasure; playing in the park; working in the yard; taking the stairs; and using recreation facilities.
>
> www.activelivingbydesign.org

Many factors contribute to achieving this goal, including land use patterns, transportation systems, community design, etc. All of these elements must be addressed and considered to ensure a walkable environment, however, this study focuses on the provision and connectivity of non-motorized systems within the study area.

The goal of this study is to evaluate the existing non-motorized system within the focus area, to gather public input regarding key destinations and preferred routes, and to make recommendations that will prioritize physical improvements to provide a continuous, safe, and attractive non-motorized system.

Land use patterns greatly affect the viability of non-motorized transportation. There is a general consensus that three key issues determine how supportive an environment is to walking, bicycling, and transit: density, diversity, and design.[1]

- Density
  The density of a residential population determines if an area is capable of economically supporting a transit system. Increased population density introduces a critical mass of pedestrians who provide comfort and security to each other with their combined presence. It has been noted that a key indicator of the vitality of a place is the presence of pedestrians.

- Diversity
  The diversity of land uses determines if a commercial business or office building is within range of foot or bicycle traffic. Especially important is neighborhood retail. A diversity of services at key public transportation stops allows users to minimize their travel and combine many errands at one location.

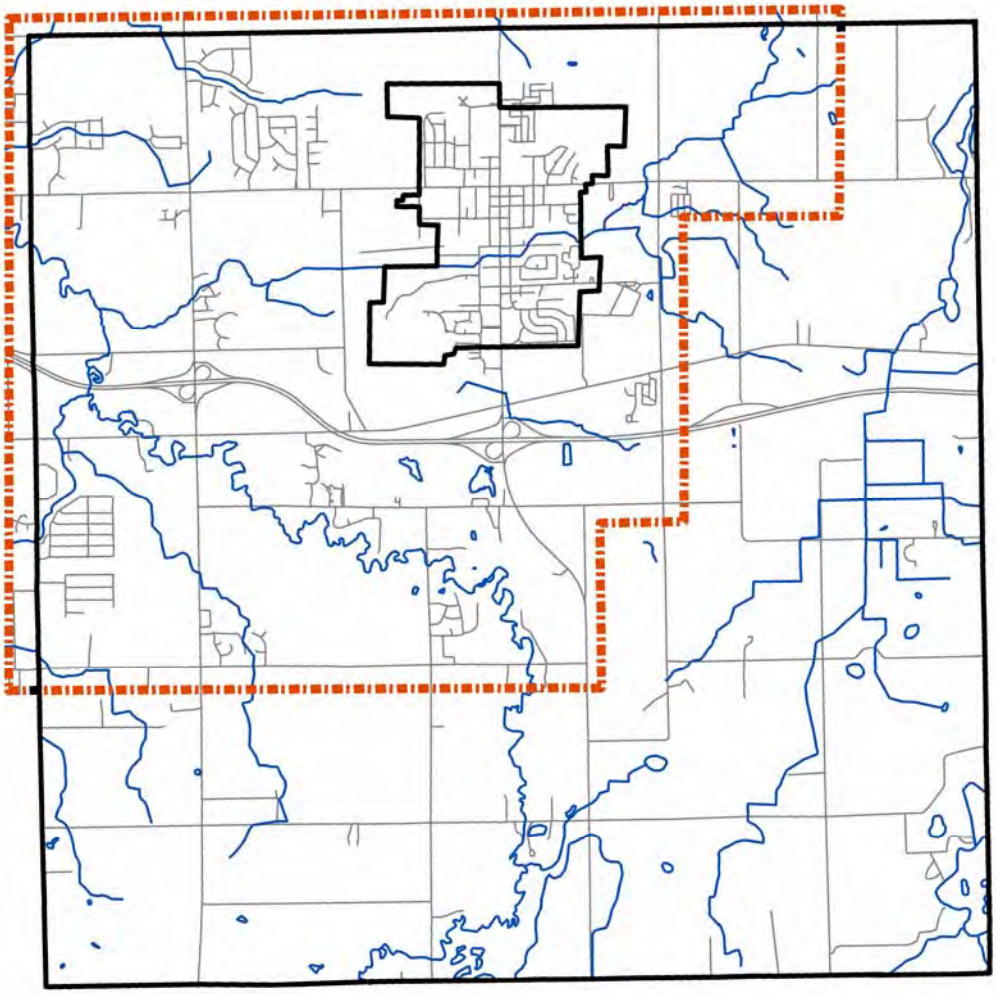
- Design
  The design of the transportation system and its support facilities determine if a pedestrian, bicyclist, or transit user's trip will be safe, comfortable, and convenient. Design is important on both a macro and micro scale. On a macro scale, the directness and interconnectedness of the transportation network is critical for allowing quick access to adjacent diverse land uses. On a micro scale, an

[1] Smart Growth Tactics. Michigan Society of Planning Issue Number 8: Mobility Options.

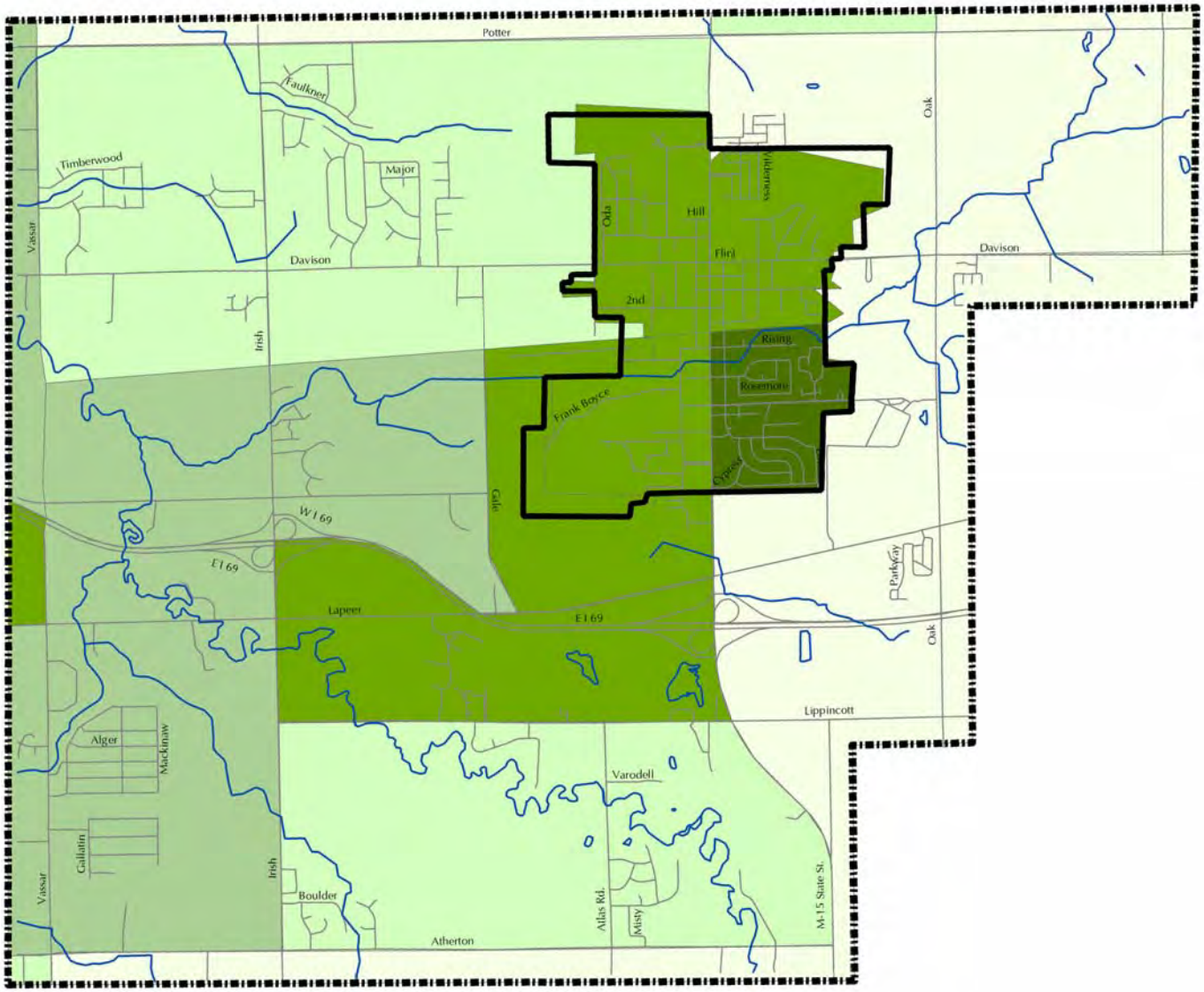
environment that rewards the users with safe and pleasant surroundings encourages use.

Density, diversity, and design must all work in concert to make an environment that supports alternative transportation. The absence of one element has the ability to negate the positive aspect of the presence of the other two.

As is illustrated in the Township Master Plan and Zoning Ordinance, Davison Township has been directing growth to the northern and western portions of the community. Therefore, the focus of this non-motorized connectivity study is generally bounded by Atherton to the south, M-15 and Oak to the east, Potter to the north, and Vassar to the west as is depicted in the map of Davison Township below. The map on page 6 illustrates that this area of the Township contains the greatest density of population (2000 Census) and would be well-served as the primary target area for a connected, non-motorized system. The Future Land Use map on page 7 further illustrates that the greatest density and intensities of development are planned to occur within this study area.



Population Density By Block Group
(2000 Census)

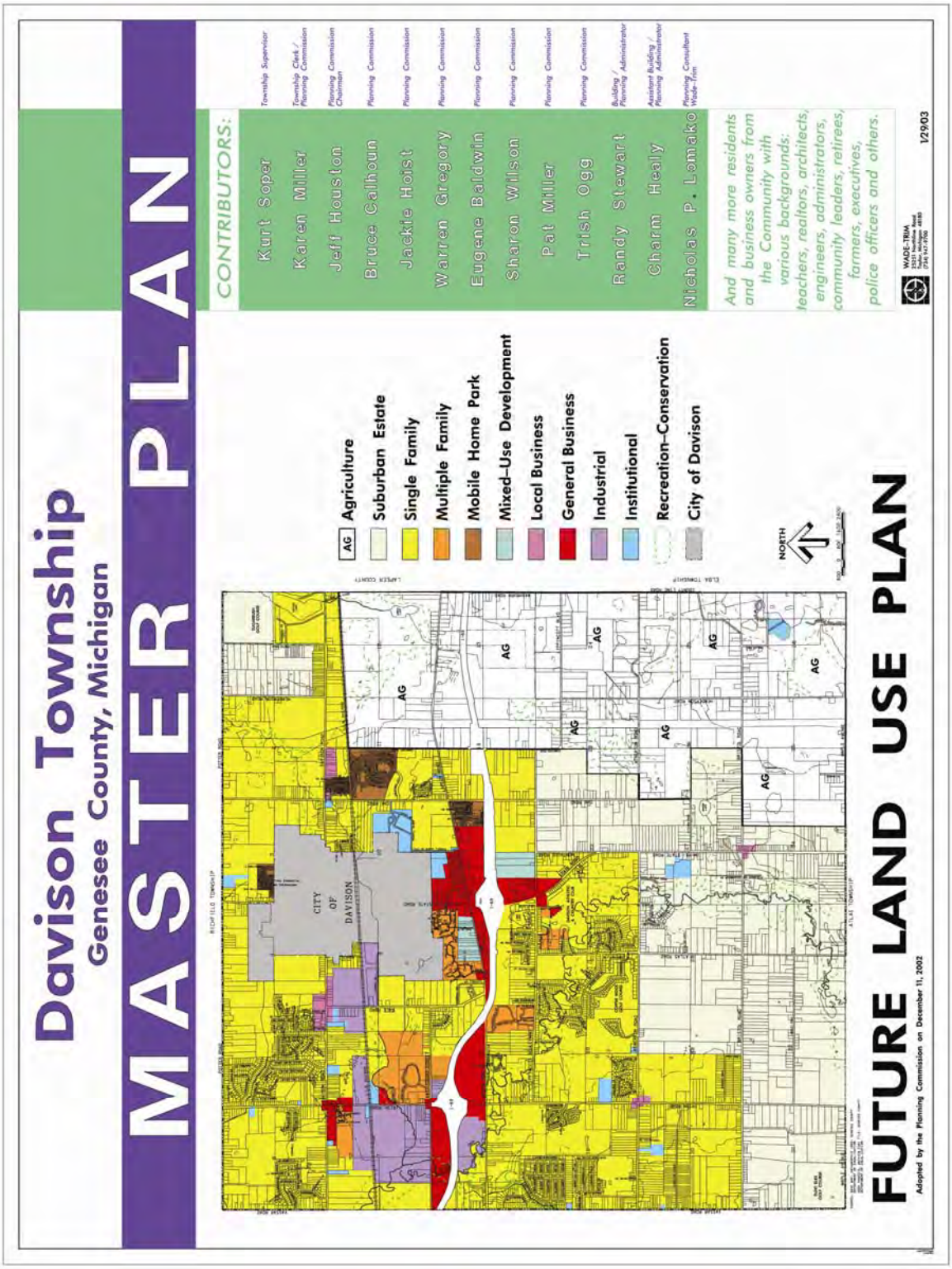


Legend

- Project Boundary
- City of Davison
- Water Courses

Population by Block Group (2000 Census)

- 130.5 - 478.3
- 478.4 - 882.0
- 882.1 - 1332.5
- 1332.6 - 2783.1
- 2783.2 - 4973.6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MASTER PLAN
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WADE-TRIM
1/2903
Agriculture
Suburban Estate
Single Family
Multiple Family
Mobile Home Park
Mixed-Use Development
Local Business
General Business
Industrial
Institutional
Recreation-Conservation
City of Davison
NORTH
CITY OF DAVISON
AG
FUTURE LAND USE PLAN
Adopted by the Planning Commission on December 11, 2002

It is envisioned that this study will be used in the following ways:

- To provide guidelines to the County and/or MDOT to communicate where sidewalk and non-motorized travel accommodations are desired by the Township so that they can be included in the design for road reconstruction and improvement projects

- To work in conjunction with the Township Zoning Ordinance to provide guidance to developers to incorporate non-motorized accommodations in their development plans

- To provide a plan with priorities where specific funding can be directed to fill gaps in the emerging non-motorized system

Three major tasks were part of this Non-Motorized Connectivity Study:

1. **Evaluate Existing System**
   A windshield survey of the study area was conducted on November 4, 2004. Utilizing maps of the Township, various conditions were noted including:
   - Locations of the existing non-motorized system and noted gaps in the existing network
   - Significant destination points and planned improvements
   - Potential conflicts

2. **Determine Non-Motorized Demand and Support**
   After the initial evaluation and draft recommendations were completed, a workshop with the public was held on February 22, 2005 to present the results and to confirm non-motorized demand, priority destinations, and preferred routes. A public hearing on the draft plan was held on July 13, 2005 in front of the Planning Commission to gather additional comments, determine support, and discuss priority routes.

3. **Recommended Improvements and Guidelines**
   Based on the results of the field evaluation and the public workshop, recommended improvements were developed that include:
   - Recommended zoning ordinance, standards, or policy modifications that would provide guidance for developers, the County, and MDOT to incorporate the recommendations
   - Graphics that illustrate the location of the desired non-motorized system
   - Typical cross-sections of various pedestrian system types (i.e., sidewalks, trail systems, inter-neighborhood connections, etc.)
   - Typical traffic calming solutions for road intersection to ensure a pedestrian-friendly environment

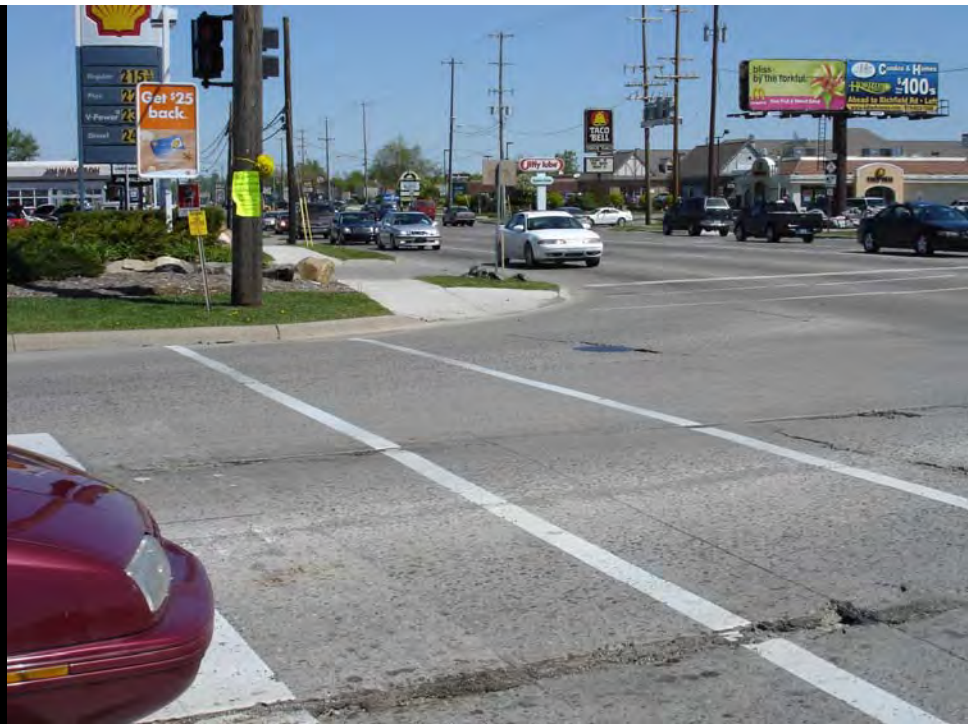
Evaluation of Existing Non-Motorized System

A windshield survey of the study area was conducted on November 4, 2004. Utilizing maps of the Township, various conditions were noted including:

1. **Locations of the existing non-motorized system and noted gaps in the existing network**
   The pedestrian system within the City of Davison consists of varying widths of sidewalks and is relatively complete and continuous. The pedestrian system within Davison Township is, for the most part, in the very early stages of development. In recent years, as new developments have come to the Township Planning Commission and Board, the installation of sidewalks along major thoroughfares and within residential developments has become a requirement. As a result, there are a handful of small segments of sidewalk along the major thoroughfares that have been constructed in the Township in anticipation that these small segments will be joined together in the future as development occurs, as road widening and reconstruction projects are completed, and as funds become available.

Irish Road looking north from Township Hall

The largest continuous segment of sidewalk within the Township is on both sides of State Street (M-15), from Lapeer Road to the City limits. This sidewalk, which was constructed in 2003-2004, connects into the City's system providing non-motorized access along this primary north-south corridor.



State Street (M-15) looking north from Lapeer Road

In the vast majority of the Township, the existing road system serves both non-motorized and motorized modes. Even in poor weather conditions during the existing conditions evaluation, people were seen utilizing the street system to walk and ride, either as a way to get from one point to another or for exercise and pleasure. Shared use of the road by vehicles and pedestrians may be adequate where vehicle speeds and traffic volumes are very low, such as within the older, small residential subdivisions. However, as vehicle speeds and volumes increase, it is important that separate pedestrian facilities be provided for safety and operational reasons (with the exception of on-road bike lanes).

The primary built non-motorized system is illustrated on the Existing Conditions map. It should be noted that this study did not include inventorying or evaluating the non-motorized system within the city limits. However, the City of Davison, and its amenities and destinations are significant and have been noted as such. Within the City, the two primary thoroughfares, State Street, and Flint/Davison Street both have sidewalks on both sides. In the City, there is also a new non-motorized (off-road) trail within Abernathy Regional Park.

Within the Township, primary non-motorized facilities were noted along major thoroughfares including small segments along Irish Road (south of Lippincott, and between the Township Hall and Davison), Davison (near Gale), and Lapeer Road, approaching the M-15 intersection. It should also be noted that, in recent years, the Township has required sidewalks to be constructed within new residential developments.

Pedestrian Utilizing Neighborhood Road

Pedestrian Utilizing Main Thoroughfare

2. **Significant destination points and planned improvements**
It is important to understand what is currently occurring in and around the study area prior to planning for and/or developing preferred non-motorized routes. The following describes destinations within the study area as well as improvements planned for the future that will affect the creation of a connected, non-motorized system. The following map illustrates the location of each.

Significant Destinations
It is important to understand the primary destinations within the community in order to best understand potential non-motorized routes. Significant destinations with the Davison community include:

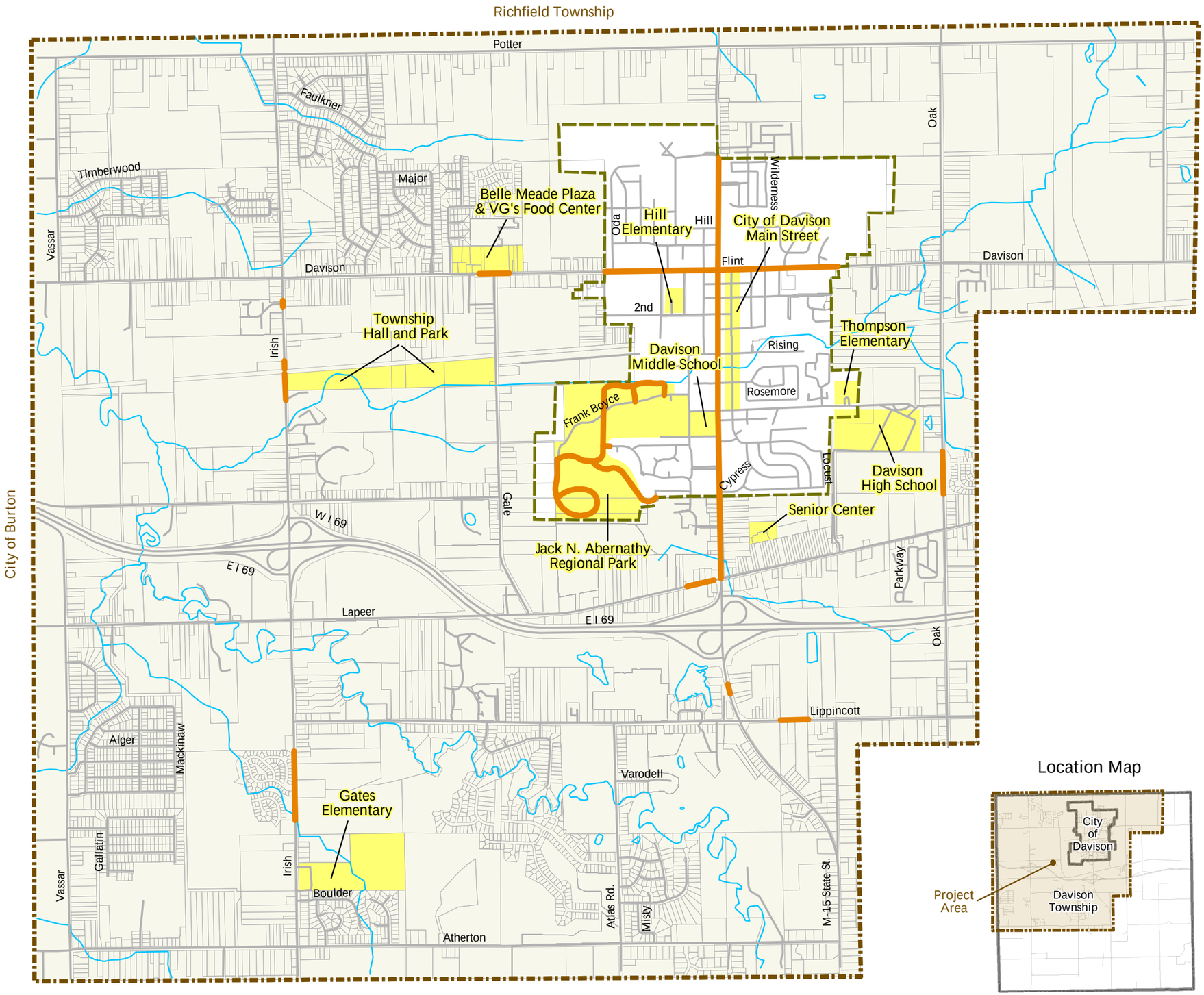
- *Downtown Davison*
  Downtown Davison is recognized as a commercial center serving the local consumer population. Due to the types and densities of land uses within the City, the downtown area is a primary destination for the surrounding area.

- *Township Hall and Park*
  The Township Government offices, Memorial Park, and associated park land along Irish Road is a destination within the community.

Memorial Park at Township Hall

- *Jack Abernathy Regional Park*
  Abernathy Park is a local and regional destination due to the size of the parkland (132 acres), and the amenities it provides. On Labor Day Weekend of 2003, a traffic count showed 5,500 vehicles going into the park over a 72-hour period. The park includes ball diamonds, basketball courts, cross country skiing, horseshoe, nature trails, picnic areas, playgrounds, pavilions, restrooms, skating rink, tennis courts and volleyball courts. The recent construction of a paved trail within the park has the potential to connect into nearby uses and destinations and is expected to attract recreational users.

Existing Conditions



Location Map

Legend

- Project Area
- City of Davison
- Existing Non-Motorized System
- Destinations
- Water Courses

Note: This study did not inventory or evaluate existing sidewalks or non-motorized systems within the city limits.

0 500 1,000 2,000 3,000 Feet

Davison Township
Connectivity Study

Wade-Trim

DVT6220.01T/GISdata/Projects/Existing_Conditions.mxd
August 2005

- *Davison-Richfield Senior Center*
  The Senior Center is located north of Lapeer Road and East of M-15 in the Township. The Mission of the center is to provide, with the help of its staff and volunteers, information and a range of services, activities and volunteer opportunities which promote personal growth, health, friendship and independence for older persons in the Davison Area. The center is operated by the City of Davison, Davison Township and Richfield Township under the direction of an Authority Board. The new center was opened in 2001 and includes 11,000 square feet of multipurpose space. The center offers classes, workshops, seminars, clinics, etc.

- *Schools*
  Schools within the study area are a significant destination within the community. The study area includes Davison Middle School, Thompson and Hill Elementary within the City limits, as well as the High School, and Gates Elementary within the Township. Schools serve a community purpose, not only educating the youth during the week day, but also providing space for recreation, enrichment classes, and meeting space for the community as a whole. The recently passed bond millage that will include a new weight and exercise room open to the public, will make the High School an even more desirable destination. The provision of Safe-Routes-To-School is a goal of the community.

- Belle Meade Plaza Shopping Area
  The Belle Meade Plaza and surrounding businesses along Davison Road near Gale Road is a significant shopping and retail destination within the Township. It is in close proximity to several residential neighborhoods and includes uses such as a dollar store tanning salon, grocery store, and travel store.

Planned Improvements
Several projects and/or improvements are in various stages of development and design that will have a direct affect on improving the non-motorized connectivity of the community.

- In 2005, the Genesee County Road Commission will be reconstructing/ widening Davison Road between Vassar and Irish Roads in the northwestern portion of the study area. Sidewalks within the right-of-way are planned on both sides of the road.

- The Genesee County Road Commission will be reconstructing the Lapeer Road and Irish Road intersection in 2005. Intersection improvements include curb cuts for future pedestrian accommodations. Ensuring the accommodation of non-motorized connections and design features is essential in furthering the Township's objectives.

- The Township has plans to construct a non-motorized, off-road trail from the Township Hall, east to Gale Road. Discussions are also taking place regarding the future extension of this trail, across Gale Road and into the Jack Abernathy Regional Park.

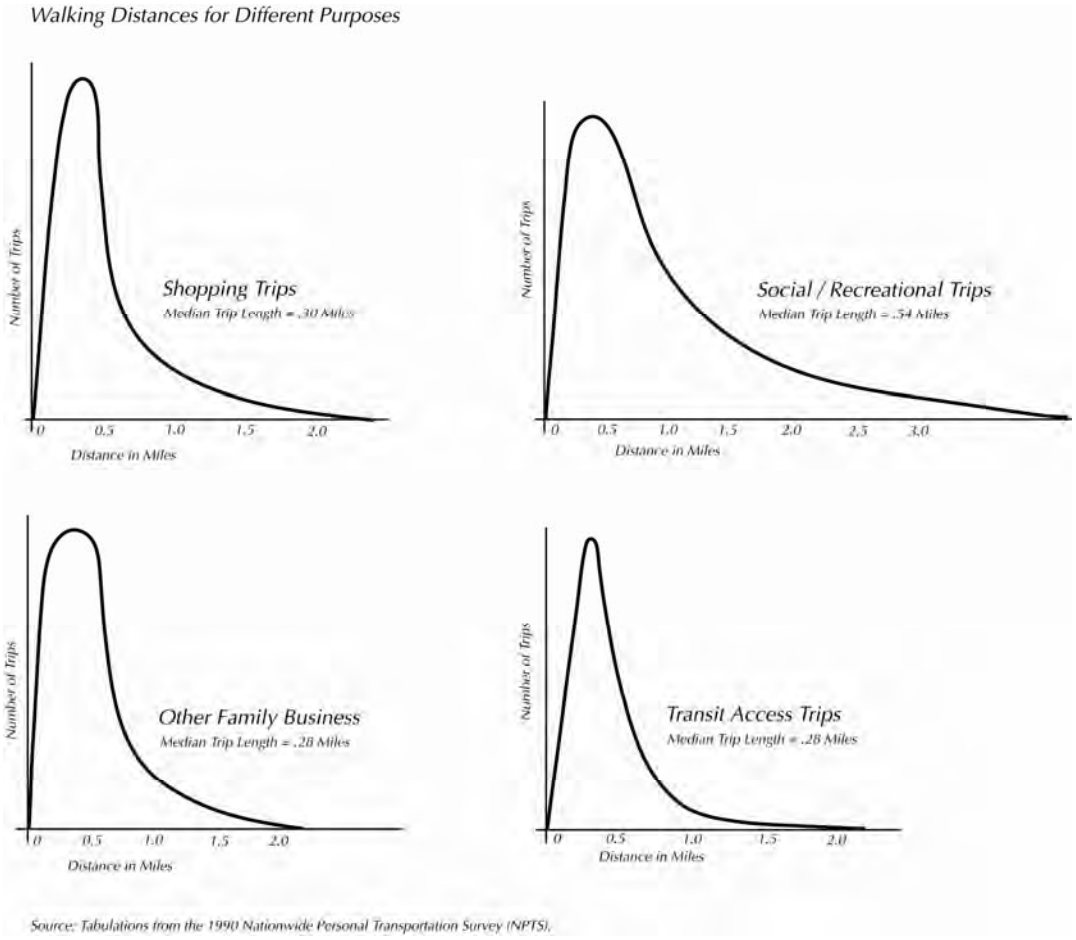
- M-15, from Bay City to Clarkston, was designated as a Michigan Recreational Heritage Route in 1996. The Michigan Heritage Route Program, created by the Public Act 69 of 1993, is designed to identify, inventory, protect, enhance, and in some cases, promote state trunk lines and adjacent land with distinctive or unique scenic, cultural, or historic qualities. The Recreational Heritage Route designation indicates that the route is maintained not only to serve the driver, but also to capture the recreational setting of the facility or area itself, and set the mood for the recreational experience. The M-15 Heritage Route Committee has developed a Trail Feasibility Study to examine the construction of a non-motorized facility along

M-15 from Bay City at M-25, south to Clarkston at US-24. The City of Davison, Davison Township, and MDOT have each pledged $57,000 as local match toward a potential Scenic Byways Grant that would fund a non-motorized Heritage Trail within the Study Area. From the south, the proposed route will be along M-15, east on Lippincott, north on Oak, west past the High School to Main Street in downtown Davison. It will then continue north to Flint Street, west on Davison and back north along M-15. (See M-15 Heritage Route Corridor Trail Feasibility Study: Spring 2003 for more details)

- There have been long-term discussions about widening sections of Irish Road due to the high volumes of traffic. The Township is not aware of any immediate plans, but when and if they do occur, it would be desirable to ensure that non-motorized connections be provided.

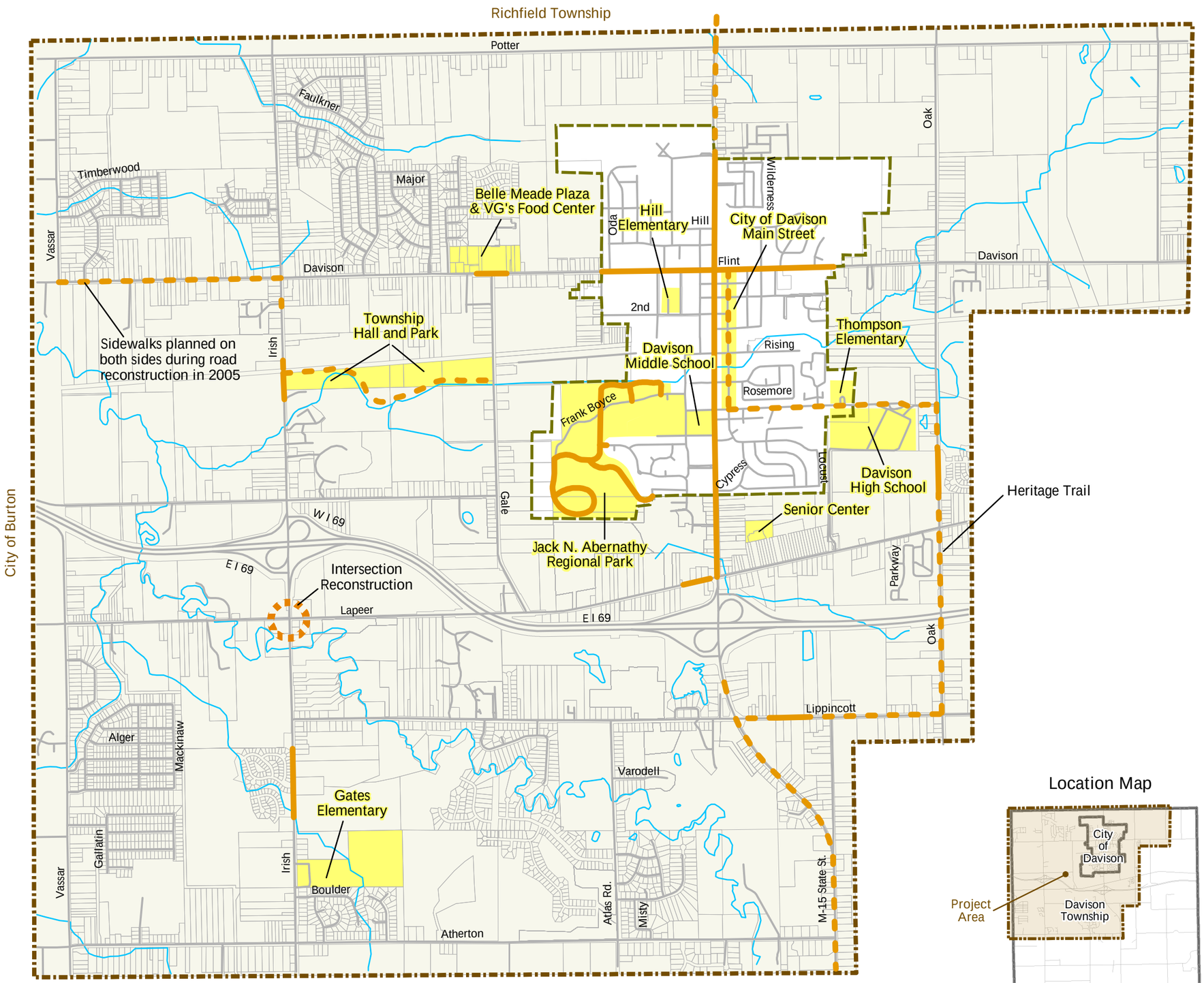
3. Potential Conflicts

Walking is a comparatively slow mode of transportation, and therefore, most trips that are taken by pedestrians are limited to short distances. The likelihood that people will choose walking as a form of transportation drops off significantly for trips over 1.5 miles and is negligible for trips over three miles.[2] Pedestrians will also take the shortest possible route available and are not willing to go far out of their way.



[2] Smart Growth Tactics. Michigan Society of Planning Issue Number 8: Mobility Options.

Planned Connections - Near Future

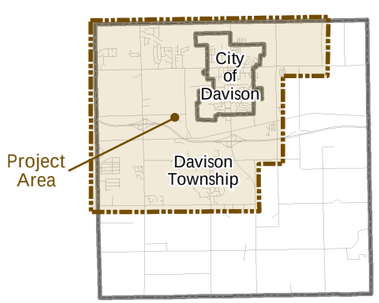


Legend

- Project Area
- City of Davison
- Existing Non-Motorized System
- Planned Non-Motorized Improvements
- Destinations
- Water Courses

0 500 1,000 2,000 3,000 Feet

Location Map



Davison Township
Connectivity Study

Wade-Trim

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August 2005

One of the most important factors affecting a pedestrian trip is exposure to motor vehicles and the speed at which the motor vehicles are moving. The key factors that affect pedestrian quality/level of service along a roadway are:[3]

- Presence of a sidewalk
- Separation of pedestrians and motorized vehicles
- Lateral separation of pedestrians and motorized vehicles
- Presence of physical barriers and buffers (including parking) between automobiles and pedestrians
- Motorized vehicle volume
- Motorized vehicle speed

Bicyclists, for the most part, are granted the same rights and follow the same regulations as motorists. Most experienced cyclists prefer to ride in the roadway versus on the sidewalk. A significant drawback to bicycling on the sidewalk, as opposed to bicycling in the roadway, is the loss of right-of-way when traveling down collectors and arterials. When riding on a sidewalk, the bicyclist ends up yielding to vehicles entering, and exiting driveways and side streets. Often times, these turning vehicles will be positioned such that they are blocking the way of the cyclist on the sidewalk. This is an inherently dangerous way to travel and is the underlying cause of the majority of bicycle and motor vehicle crashes. *While this plan does not specifically address on-road bike lanes, they should be considered where appropriate and possible.*

Young children, and inexperienced riders, will most likely continue to ride on the sidewalk even if on-road facilities are provided. The risks previously mentioned still hold true, but factors such as unfamiliarity with traffic and the limited depth perception typical of young children come into play. In general, the lower speeds that children ride help offset some of the dangers of sidewalk bicycling. For bicyclists who are traveling in the roadway, the key factors affecting Bicycle Quality/Level of Service, in order of significance, are:[4]

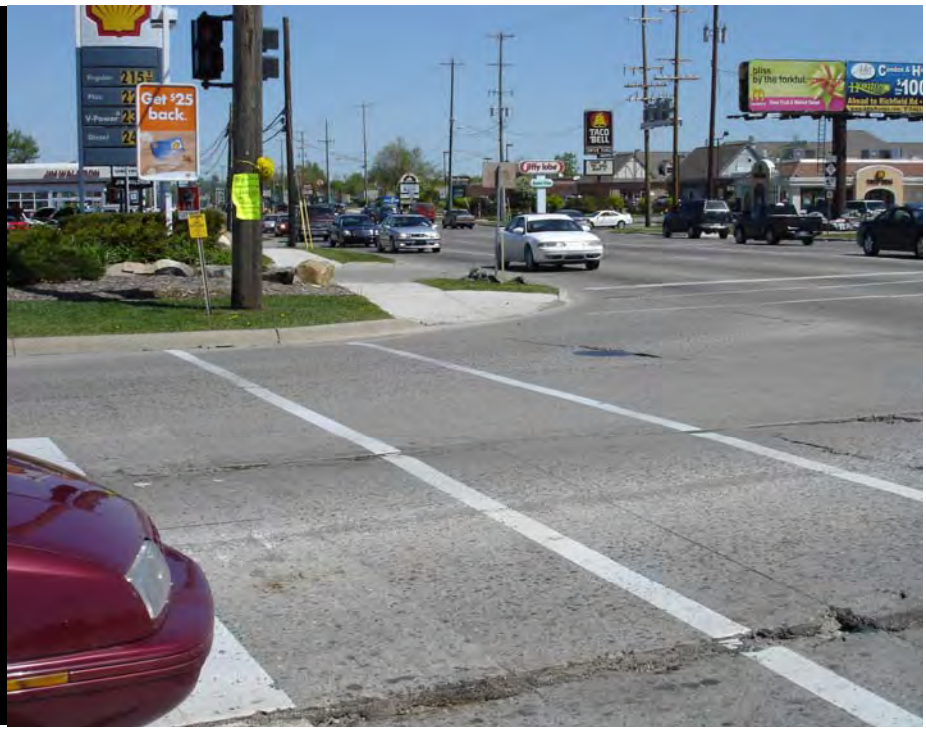
- Presence of bicycle lane or paved shoulder
- Proximity of bicyclists to motorized vehicles
- Motorized vehicle volume
- Motorized vehicle speed
- Motorized vehicle type (percent truck/commercial traffic)
- Pavement condition
- Percent on-street parking

All of the elements listed above are potential conflicts and deterrents to non-motorized travel. In addition to those already discussed, there are several specific conflicts noted within the study area including:

- Railroad Crossings
  The GTW Railroad traverses the study area from east to west. While crossing railroads with non-motorized facilities requires specific design considerations and coordination, it is an issue that can be overcome.

[3] Pedestrian Level of Service Model developed by Bruce Landis, PE, AICP, of Sprinkle Consulting, Inc., for the Florida Department of Transportation.
[4] Ibid.

- Road Intersections
  Each time a non-motorized user must cross a vehicular roadway, a potential conflict is created. Some intersections or crossings will prove more problematic then others. During design and construction of road intersections and crossings, there are multiple solutions that can be utilized to provide for a non-motorized friendly environment. An example of an unfriendly intersection is at Lapeer and M-15. Recently, sidewalks were constructed along M-15, however, the painted pedestrian crossing markings and push button features do not line up with the sidewalks. This creates a confusing situation for both pedestrian and driver.



State Street (M-15) looking north from Lapeer Road

- Water Courses and Wetlands
  The Township has several open drains, creeks, and wetlands that are a natural resource, amenity, and source of pride in the community. These areas are often times preferable for non-motorized facilities because they can be separated from vehicular traffic and provide scenic, educational opportunities. However, consideration and potential impacts of the project to the natural environment must be considered to balance recreational, transportation, and interpretive opportunities against the protection of the greenway's environmental assets.

- Structures
  An overpass, underpass, bridge, or facility on a highway bridge may be necessary to provide connectivity and continuity to the developing non-motorized system. Retrofitting a freeway underpass, such as the Irish Road/I-69 intersection, will entail detailed design considerations and likely increased cost, however, modifying similar underpasses to accommodate non-motorized facilities has been successful in many areas of the state and country.

Determine Non-Motorized Demand and Support

After the initial evaluation and draft recommendations were completed, a workshop with the public was held on February 22, 2005 at the Davison Township Hall. Approximately 40 people were in attendance for the workshop to:

- Present an overview of the study purpose and scope
- Present existing conditions findings and confirm destinations within the community
- Discuss potential solutions to various conflicts such as railroads, stream crossings, etc.
- Present initial thoughts and ideas for preferred route locations and priorities

Attendees represented a broad cross-section including Senator Cherry's office, Planning Commissioners, Township staff, Board members, the Township Police Chief, developers, and residents of the Township, City of Davison, City of Burton, and Richfield Township. The Township encouraged everyone to participate and provide input so the plan reflects the desires and needs of the community.

A presentation was given discussing the purpose for the study, key issues for non-motorized environments, the study area boundary and why it was chosen, how the study will be used, and the primary tasks involved in the study. The findings of the existing conditions study were presented and described including the emerging, yet unconnected, network and the major destinations within the study area. Projects that have been discussed at varying stages included the Heritage Trail, reconstruction of Davison Road between Vassar and Irish, reconstruction of the Lapeer/Irish Road intersection, and an off-road trail from the Township Hall east toward Gale Road. Existing examples of potential conflicts within the Township including railroads, road intersections, wetlands, water courses, and structures such as freeway overpasses were also discussed. Potential solutions utilized throughout the country were illustrated through photographs for the potential conflict areas. Finally, potential route locations and connections were discussed within the study area including non-motorized systems within rights-of-way, between existing and future neighborhoods, within utility corridors, between neighborhoods and schools, and on public land such as the Township property and Abernathy Park.

After the presentation, participants were asked to confirm the existing conditions and destinations and to discuss their concerns, issues, desires and priorities related to establishing a non-motorized system. Good discussion occurred and information was given and received. Comments included:

- How can we cross vacant land?
- Include emergency access in design of system.
- Consider a tax credit for existing parcel that needs a sidewalk built.
- Inter-connection of neighborhoods and destinations is important.
- Use easements? Purchase of property?
- In terms of priorities, use existing system and build out from there - City and outward.
- Connect City Park to Township Hall.
- Identify "trail heads" with parking facilities so people can access the system that don't live along or near it.
- Ensure new developments have connections with each other.
- Potter Road sidewalks probably not necessary. Maybe just improvements to the shoulders so it's safer to walk along.
- Connect Heritage Trail into Richfield Township.
- Heritage Trail will likely need to be spearheaded by each community in terms of financing.
- Concerned with liability issues within the new developments (outside of R.O.W.). Limit liability concerns with good design.
- Utilize homeowner associations to maintain, etc.
- Need to address maintenance of sidewalks and trails. Site maintenance agreements are in place now in the City. Shoveling not addressed currently.

- Property owners maintaining sidewalks doesn't always work.
- Welcome support to maintain rather then forcing maintenance requirements on people.
- Ideas need support from the community "buy in".
- Increase desirability to live here. Quality of life.
- Richfield Township would like to interface with Davison to form connections.
- Consider providing loops to hike/bike rather then linear only.
- Major intersections along M-15 will be improved and widened but not widening the actual road in the near future.
- Commercial growth is on the cusp of coming to the area.
- There would be different requirements for sidewalks/trails depending on where you are in the community.
- Would like to connect to VG's shopping center.
- Would like to connect to Nature center and arboretum to the west in Burton
- Inter connect communities: Burton – Richfield destinations.
- Davison/Belsay intersection not currently safe for pedestrians (in Burton).
- Subdivisions on Oak and Henderson going in late this year need connected.
- Safety concerns between areas.
- Private property issues and concerns.
- Lighting along system?
- Emergency phones? Call boxes?
- Irish Road/I-69 intersection-can't envision how it would work to have only on one side.
- Setback issues/zoning need to be addressed to be able to accommodate the system.
- Density should help to set priorities.
- Assessments?
- Liability issues and concerns.
- As new subs go in, sometimes there is high density and no room for sidewalks.
- Davison is growing quickly (207 homes this past year).
- Want a community where people can get out and move around.

Overall, attendees were very positive and enthusiastic about working toward having a community where you don't need a car to go to school, shop downtown, or to go to a friends' house in the adjacent neighborhood.

Public Hearing
A public hearing was held in front of the Township Planning Commission on July 13, 2005. Approximately 56 people were in attendance for a public hearing at the Davison Township Hall to:

- Present an overview of the study purpose and scope
- Present existing conditions findings and confirm destinations within the community
- Present recommended non-motorized vision and priorities
- Present example design solutions for various typical situations within the focus area
- Gather final input on the draft plan

The Planning Commission Chair opened the meeting, welcomed everyone and indicated that the purpose of the meeting was to listen to an overview of the study, gather final public input and comments and for the Planning Commission to consider adopting the plan.

A presentation was given which discussed the purpose for the study, key issues for non-motorized environments, the study area boundary and why it was chosen, how the study will be used, and the primary tasks involved in the study. The findings of the existing conditions study were presented and described including the emerging, yet unconnected, network and the major destinations within the study area. Projects that have been discussed at varying stages including the Heritage Trail, reconstruction of Davison Road between Vassar and Irish, reconstruction of the Lapeer/Irish Road intersection, and an off-road trail from the Township Hall east toward Gale Road were also discussed. Potential design solutions for a variety of "typical" situations within

the Township were reviewed as concepts to help communicate the Township's vision. Finally, the non-motorized vision for the study area was reviewed and discussed as were the priorities, and recommended action items.

After the presentation, the Planning Commission opened the public and gathered the following comments:

- Post copy of presentation on community website.
- Estimates of costs to the community?
- Paths need crosswalks across roads to ensure safe crossings.
- Handicapped accessibility and use of "scooters" should be permitted. ATV/snowmobiles not allowed (should pay a fine for violations) but may need to cross when there are sufficient snow depths.
- Reflective stickers periodically to delineate trail location.
- Enforcement of crosswalks to protect pedestrians.
- Use composite materials for boardwalk construction – better maintenance and maybe cheaper.
- Walking to schools is not going to happen.
- Who will maintain the sidewalks? Property owner? Township? Who will be responsible?
- If busing is not available in the future, there may be more walkers.
- How much ROW will be needed? Elevation changes? Trees? Will need to be designed on a site specific basis.
- Address issues of area near: Irish Village, Irish Estates, Bell Meade. Very concerned about value of property – there is only 15 feet from homes to ROW.
- Existing subs will need to be retrofitted. If/when it could happen.
- Major focus will be new developments and construction along main roads.
- What will process be when there is an easement and someone wants to connect but others do not?
- Concerned with safety and policing and property values.
- Connecting existing neighborhoods is a concern. No sidewalks currently exist and there isn't space to provide connections.
- No one in Townline East wants sidewalks inside the neighborhood.
- Patrolling or public safety issues?
- Safety of crossing Davison and Irish Road not even safe for vehicles at this point.
- Issue of security needs to be improved in the document. Communication crime issues.
- Planning after the fact won't work.
- Plan for security now – not later.
- Plan should be a model for security and safety at the forefront.
- Thank you for developing a plan and being progressive.
- Plan should be flexible enough to go beyond the focus area.
- Enhances livability.
- Good start.
- Aging society that can utilize sidewalks/trails.
- Maintenance and liability issues.
- Existing subdivisions would need to come to the Board to request sidewalks.
- Governmental immunity may come into play within the ROW.
- Email received by the Township from Senator Cherry supporting the efforts.

Overall, attendees were in general support of providing sidewalks along the major thoroughfares. Primary concerns revolved around sidewalks and connections within older neighborhoods that were not originally built or designed for non-motorized facilities. Several concerns were also noted regarding safety and security.

After the public hearing and discussion by the Planning Commission, the Planning Commission adopted the Non-Motorized Connectivity Study by resolution including the official minutes of the public hearing. The resolution included the recommendation that the Township Board adopt the plan.

Non-Motorized Vision

The recommendations and long-term connections represent the current non-motorized connectivity vision for the study area for the next 20 years. At the time of this study, the proposed route locations and corridors included only a conceptual level review of feasibility. Prior to any project moving forward, more detailed study, analysis and design will be required including right-of-way widths, property ownership, soils, wetland identification, and coordination with the public, and agencies such as MDOT, the County and City of Davison.

Potential Long-Term Connections
The following map illustrates the proposed long-term non-motorized network within the study area. The graphic was developed based the existing system, planned projects, location of destinations, and public and staff input.

Four (4) primary categories of planned non-motorized connections:

- Non-Motorized system within right-of-way on *both* sides of the road
- Non-Motorized system within right-of-way on *one* side of the road
- Non-Motorized *off-road* system
- Non-Motorized neighborhood connection

Non-Motorized System Within Right-of-Way
Sidewalks and/or trails are proposed within the right-of-way along the majority of the primary road network within the study area. Many of the primary roads within the study area, such as Lippincott, Davison, and Lapeer Roads are planned to have non-motorized facilities on *both* sides of the road. There are a few instances were the graphic illustrates non-motorized facilities on only one side of the road. For the most part, this is due to the cost and/or feasibility of construction, or due to the Township limits or development pattern in the area.

Systems Proposed On One Side of Road

- Oak (between Davison and Clark)
  Proposed on east side only due to the severe grade changes at the railroad crossing and the proximity and density of existing and planned development.

- Vassar Road (between Lapeer and Atherton)
  Proposed on east side due to Township jurisdictional limits.

- Atherton Road (between Vassar and M-15)
  Proposed on north side due to existing and planned land use pattern and density of development.

With the exception of the Heritage Trail Route (10-foot wide), and those sections funded with grants that require specific minimum design standards, it is envisioned that the majority of these non-motorized facilities will be a minimum of 5-foot wide, concrete sidewalks.

Heritage Trail Route
It should be noted that in most cases, the Heritage Trail Route within the Township is planned to be 10-foot wide. The Heritage Trail Route extends within the Township beyond the boundaries of the study area for this Connectivity Study. The route that *is* within this study area is proposed on one side of the road in some areas, and on both sides of the road in others. Reference should be made to the M-15 Heritage Route Corridor Trail Feasibility Study: Spring 2003, for more details regarding the proposed locations, widths, and materials.

Non-Motorized Off-Road System
There are two proposed "off-road" non-motorized facilities within the study area. The primary off road connection is between the Township Hall and associated property, east to Jack Abernathy Park within the Davison City limits. The Township has completed planning-level analysis of a non-motorized trail between Irish Road and Gale Road (on Township property) and would like to further investigate continuing the trail east of Gale to connect into the new trail system within Abernathy Park as well as Davison Middle School and downtown Davison.

A Consumers Energy gas pipeline corridor traverses the west side of the Township from north to south. The potential exists to further investigate the construction of an off-road non-motorized connection within the corridor, from south of Potter Road south to East Court Street. This could assist in providing a non-motorized connection between existing and planned neighborhoods. The section between Davison Road and East Court would include a railroad and creek crossing.

It is envisioned that these off-road connections will be designed and constructed at a minimum of 10-foot wide asphalt.

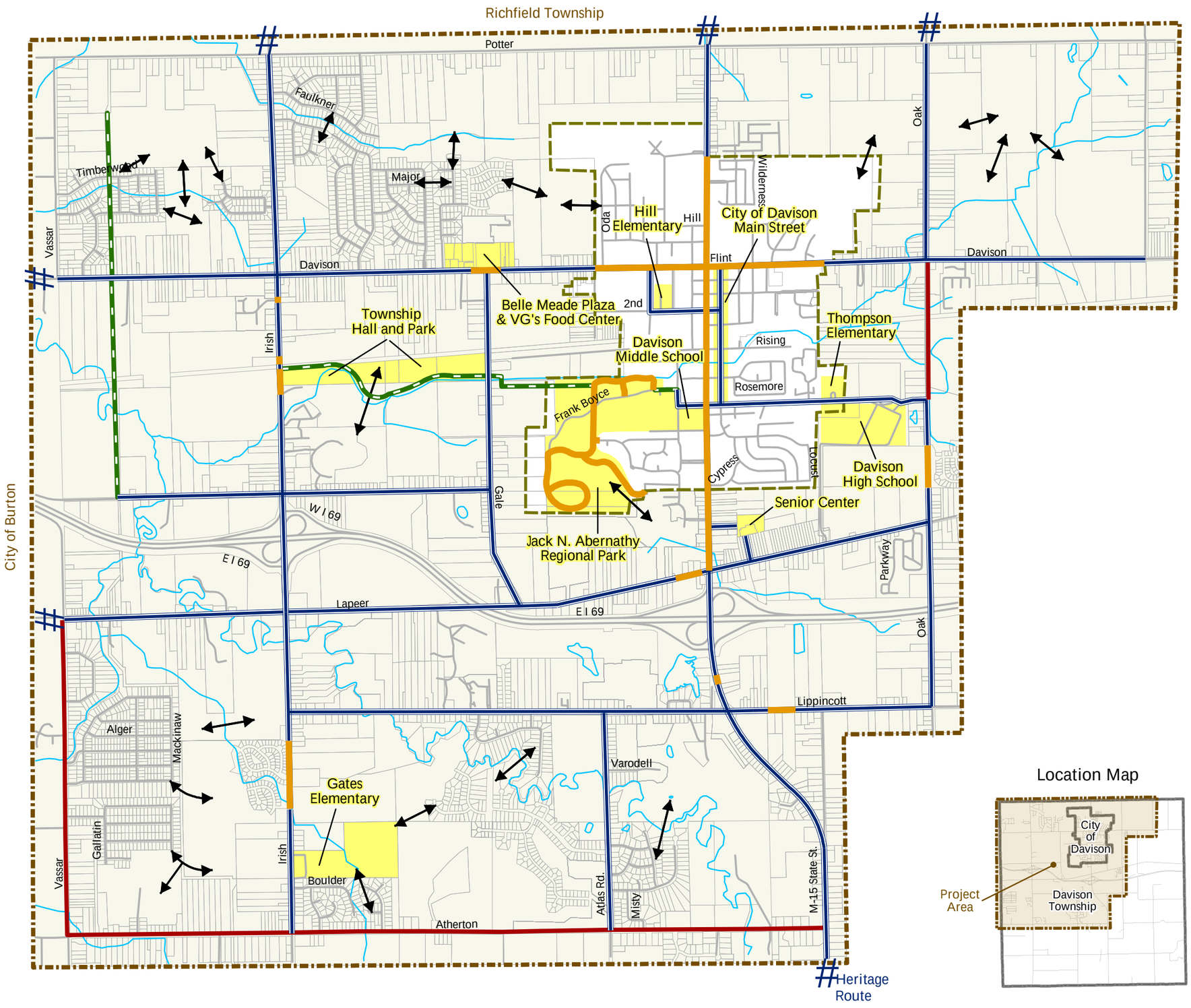
Non-Motorized Neighborhood Connections
It is a primary goal of the Township and this study to provide connections between existing and planned neighborhoods. The current zoning ordinance requires all new subdivisions to incorporate sidewalks within the development, and many times the newer subdivisions are connected via a road network, and therefore have sidewalk connections as well. However, there are several neighborhoods that were constructed prior to the sidewalk requirements. Several of these older neighborhoods have large tracts of property adjacent to them that will likely be developed during the life of this study (next 20 years). Non-motorized connections (even in the absence of road connections) from the older neighborhoods to the new developments should be provided wherever possible and feasible. This desire is illustrated on the "Potential Long-Term Connections" map, however, the graphics on the map should not be considered all inclusive because the precise locations of the connections have not been identified due to unknown factors and conditions related to potential future development.

> It is the goal of the Township to have all existing and new residential developments connected to one another via non-motorized connections so as to provide continuity, and the ability to walk or ride from one area to another without the need to access a primary road.

It is envisioned that the neighborhood connections will be designed and constructed at a minimum of 5-foot wide sidewalk, however, it may be possible in some locations to provide a 10-foot wide asphalt connection, or, it may be necessary to construct an elevated boardwalk due to soils and/or wetlands, or even a pedestrian bridge due to drains, creeks, and water bodies.

Non-Motorized Connections To Adjacent Communities
In addition to providing connections within the community, Davison Township is also interested in ensuring long-term connections with adjacent municipalities. Connecting to the City of Davison, the City of Burton, and Richfield Township is essential to the long-term viability of the non-motorized system. Each of these communities has destinations and points of interest that add to the quality of life of the region.

Potential Long-Term Connections



Legend

- Project Area
- City of Davison
- Existing Non-Motorized System
- Non-Motorized System within ROW on both sides of road
- Non-Motorized Off Road System
- Non-Motorized System within ROW on one side of road
- Non-Motorized Neighborhood Connection
- Destinations
- Water Courses

0 500 1,000 2,000 3,000 Feet

Location Map

Davison Township
Connectivity Study

Wade-Trim

DVT6220.01T/GISdata/Projects/LongTerm_Connections.mxd
August 2005

Implementation Strategy

Implementing the entire vision for a connected and continuous non-motorized network will take focus, commitment, funding, and time. This study is intended to serve as a foundation and decision-making tool as the Township continues to work toward establishing a walkable community, to encourage increases in physical activity, promote economic development opportunities, to create a sense of place, to provide Safe-Routes-To-School, to support the concepts of Active Living, and to provide non-motorized connections to adjacent communities.

This connectivity study should be reviewed and updated every 5 years (at a minimum) as development pressures change or shift, as costs and funding opportunities change, as priorities shift, and as recommended actions are completed.

It's highly likely that the majority of non-motorized connections will be constructed during one of the following scenarios:

- As roads, intersections, and bridges are reconstructed, widened and/or altered
- As new developments are approved and constructed
- As the Township can secure funds to construct sidewalks and trails and close gaps in the network

Priority Segments

Based on the findings and results of this study, several priority projects have been identified. These are in addition to the improvements that are already under design or will be constructed in 2005 such as Davison Road (between Vassar and Irish), intersection improvements at Lapeer and Irish, and planned MDOT improvements of I-69.

Priority Non-Motorized Segments

- Heritage Trail (throughout Davison Township)
- Trail Connecting Township Hall to Abernathy Park
- Davison Road (between Irish and the City limits)
- Davison Road (between the City limits and Oak)
- Irish Road from Township Hall north to Davison Road
- Safe Routes to Schools

Although these segments are priorities for the Township, this will not preclude other connections being considered or constructed, particularly as they relate to County or MDOT work within the community, or connections associated with new developments. These priority segments merely provide a focus for the next 1 to 5 years. (See estimated construction costs for priority segments in Appendix)

Recommended Actions

The following recommended actions will assist in working toward a connected and continuous non-motorized network within the study area.

- Raise the level of awareness of the plan and vision internally and externally including the Planning Commission, the Genesee County Metropolitan Planning Commission, Zoning Board of Appeals, Planner, Engineer, the County Road Commission, MDOT, the City of Davison, and adjacent communities.
- Remain aware and involved in road and bridge improvement projects that are occurring or which are planned to occur within the Township to ensure non-motorized facilities are considered and accommodated *early* in the design process. The table on page 23 identifies planned and/or proposed Transportation Improvement Projects within the Study Area. These have the potential to be prime opportunities to incorporate non-motorized facilities.

- Revise existing zoning ordinance language to address the recommendations of this plan.
- Work with developers to ensure and encourage the inclusion of pedestrian and non-motorized connections as part of their development. Ensure the smaller, internal system is connected, or can be connected in the future, to the larger planned and emerging non-motorized system.
- Work with the School District to develop, encourage and promote a Safe-Routes-To-School Program for the community.
- Develop a comprehensive and consistent Way-Finding Plan to ensure the ability of a person to find his or her way to the various destinations and connections and efficiently navigate throughout the community and surrounding area. This could include elements such as kiosks, directional signage, historic markers, interpretive signs of environmental resources, and maps.
- Begin to develop a financing and funding approach to implement the identified priority projects. Consider instituting an annual non-motorized construction program to construct new segments of the system based on existing gaps and priorities.
- Consider developing an ongoing inspection, replacement, and maintenance program to ensure safe conditions of the system. An adopt-a-trail program may also be considered to assist in maintenance and beautification.
- Secure recognition and promotion of the Township's efforts through the state's Designing for Healthy and Livable Communities initiative.
- As was detailed in the Introduction Chapter, creating a walkable community requires the consideration of more than just non-motorized facilities. The Township will need to consider land use, density, diversity and design to ensure a truly walkable environment.

Zoning Ordinance Amendments

In addition to the Davison Township Master Plan, the Davison Township Zoning Ordinance (Ord. 80) is a primary tool for regulating development within the community. The adoption of this Non-Motorized Connectivity Study and the desire to work toward achieving its' goals and vision can be supported by amending various sections of the Township Zoning Ordinance. In particular, revisions are likely necessary to:

- **Section 1733. Compliance with Area Development Plans**
  This section indicates that site plans and building permits must be in general compliance with the recommendations of adopted improvement plans or redevelopment plans. The section goes on to identify several examples. This section could be strengthened to also specifically identify "non-motorized connections".

- **Section 1735. Sidewalk and Street Lighting Requirements**
  This section stipulates sidewalk and lighting requirements both within a development and within the public right-of-way. This section can be broadened to provide additional detail and consistency with the recommendations of the Non-Motorized Connectivity Study. Items that may be addressed in the ordinance include, but are not limited to, recognition of various widths, materials, and design standards.

- **Section 1801.1.c. Site Plan Review**
  This section can be amended to include a statement that will require the applicant to illustrate on their site plan how their project will provide non-motorized points of connection with adjacent properties.

- **Additional Element**
  The opportunity may exist to require developers to contribute through construction or the escrowing of monies for non-motorized connections that benefit their project but also provide a community-wide benefit. For example, if a development is occurring in close proximity to the planned Heritage Route, the developer may be required to assist in the implementation of the Heritage Route.

Planned/Proposed Transportation Improvement Projects

Project	Limits	Description	ID	MDOT ID	Year	Federal	State	Local	Total
2004-2006 Genesee County Transportation Improvement Program									
Davison Rd.	Vassar to Irish	Road reconstruction and widening to 5 lanes, curb and gutter, storm sewer, drive improvements, traffic signals	20	N/A	2005	$900,000	$0	$225,000	$1,125,000
Irish/Lapeer Intersection	Irish and Lapeer Rd. Intersection	Construct left turn lane and traffic signal upgrade 04 flex	370	N/A	2004	$670,000	$0	$173,000	$843,000
I-69	Center to Irish	Reconstruction	305	60478	2006	$7,302,273	$811,364	$0	$8,113,637
I-69	EB and WB Bridges over M-15	Deep overlay	307	73742	2006	$952,245	$238,060	$0	$1,190,305
I-69	Irish to M-15	Concrete inlay	306	56984	2006	$6,960,525	$773,392	$0	$7,733,917
2007-2008 Unfunded Projects									
Irish Rd.	Davison to Potter	Road reconstruction and widening to 5 lanes, curb and gutter, storm sewer, drive improvements, traffic signals	N/A	N/A	2007	$0	$0	$0	$0

Source: 2004-2006 Genesee County Transportation Improvement Program
2007-2008 Unfunded Projects in Priority Order

In addition to the transportation improvement projects noted above, the Township is aware of two bridge projects within the study area. The accommodation and/or provision of non-motorized facilities should be completed in concert with these bridge projects.

Near Future Bridge Improvement Projects	**Anticipated Timeline**
▪ Oak Road Bridge (north of Davison Road)	2005 Construction
▪ Atherton Road Bridge (between Atlas and M-15)	Improvements Likely in Next Several Years

Potential Funding Sources
The following are potential funding sources for those segments of the system that are beyond what will be constructed as development occurs and as the County and/or MDOT design and construct road and bridge improvement projects. Funding sources change and evolve on a regular basis and requires continuous monitoring. A few of the more common funding sources have been detailed here as a reference and resource.

Michigan Natural Resources Trust Fund
The MNRTF provides funding for both the purchase of land (or interests in land) for recreation or protection of land because of its environmental importance or scenic beauty and the appropriate development of land for public outdoor recreation use. Goals of the program are to: 1) protect Michigan's natural resources and provide for their access, public use and enjoyment; 2) provide public access to Michigan's water bodies, particularly the Great Lakes, and facilitate their recreation use; 3) meet regional, county and community needs for outdoor recreation opportunities; 4) improve the opportunities for outdoor recreation in Michigan's urban areas; and, 5) stimulate Michigan's economy through recreation-related tourism and community revitalization.

Any individual, group, organization, or unit of government may submit a land acquisition proposal. However, only state and local units of government can submit development proposals. All proposals for grants must include a local match of at least 25% of the total project cost. There is no minimum or maximum for acquisition projects. For development projects, the minimum funding request is $15,000 and the maximum is $500,000. Applications are typically due in April and August.

Land and Water Conservation Fund
The Land and Water Conservation Fund (LWCF) is a federal appropriation to the National Park Service who distributes funds to the Michigan Department of Natural Resources for land acquisition and development of outdoor recreation facilities. Due to limited funds within this program, the MDNR has focused funding on outdoor development projects. Applications are due in April and the LWCF program requires a 50% local match. The LWCF program utilizes the same application as the MNRTF program.

Transportation Enhancement Funds (MDOT)
The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) established a fund for Transportation Enhancement Activities. Transportation Equity Act for the 21st Century (TEA-21) of 1998 continued this program through the year 2003. Legislation for a new Transportation Bill is currently under negotiation at the Congressional level. The Transportation Equity Act for the 21st Century (TEA-21) defines a bicycle transportation facility as "a new or improved lane, path, or shoulder for use by bicyclists and a traffic control device, shelter, or parking facility for bicycles." To be eligible for TEA-21 funds, projects must either be associated with a roadway and consist of:

- Paved shoulders 4 or more feet wide
- Curb lane width greater than 12 feet
- Bike lanes; and/or,
- Pedestrian facilities

or be separate from roadways and consist of:

- Multi-use paths at least 10 feet wide;
- Path/trail user amenities;
- Facility grade separations; and/or,
- Bicycle parking facilities

A minimum 20% local match is required for proposed projects and applications are accepted on an on-going basis with awards made twice a year. Eligible Transportation Enhancement work items include:

- Property acquisition
- Grade separation structures
- Grade preparation and surfacing
- Pavement marking and signage
- Trail heads

Currently, applications can be submitted at any time utilizing the MDOT online application process.

Assessment
An assessment is a tax or levy imposed against only specific parcels, as opposed to a general tax on the entire community. In an assessment program, property owners along the proposed route are notified of the Township plans to install sidewalks and the cost (or some portion of it) is paid by the property owners through a special assessment on their property.

Millage
Funds can be raised by levying a millage (tax) on the entire community. A dedicated millage can be voted upon by residents for implementation and maintenance of a connected non-motorized system. An approved millage would provide a consistent, annual funding source for implementing gaps and priorities in the network.

Surface Transportation Program (STP)
STP is the main federal funding program for highway infrastructure under the current Transportation Equity Act for the 21st Century. Program categories applicable to Davison Township include the following:

- STPE (Surface Transportation Program – Enhancement)
  This provides federal funds for landscaping, beautification, and non-motorized improvements. Ten percent of the total STP funding is set aside for enhancement projects.

- STPS (Surface Transportation Program – Safety)
  This provides federal funds for turn lanes, traffic signal improvements, guardrails, railroad crossings, and other features that enhance motorist and pedestrian safety. Ten percent of the total STP funding is set aside for safety projects.

CMAQ (Congestion Mitigation Air Quality Program)
CMAQ is a federal program with a primary purpose of funding projects and programs to reduce transportation related emissions. CMAQ includes funds designed to improve air quality through traffic signal improvements, intersection improvements, non-motorized projects that provide alternatives to auto travel, etc.

Safe-Routes-To-School Program
The Safe-Routes-To-School Program is a national movement to make it safe, convenient and fun for children to bicycle and walk to school. When routes are safe, walking or biking to and from school is an easy way to get the regular physical activity children need to succeed. In Michigan, the program is sponsored by the Michigan Governor's Council on Physical Fitness. In Michigan, the program has gained momentum over the past few years. The passage of a new federal transportation bill may provide increased funding levels to the program.

A recent poll found that while 71 percent of adults walked or bicycled to school when they were young, only 18 percent of their children do so.

NCBW Forum Article 3-7-05 (March 2005)

Design Considerations

Designing and constructing non-motorized systems can be as complicated as building roads. There are a number of agencies, property owners, and interested stakeholders that need to be involved in the planning and design process. The following pages provide guidance and example cross-sections for typical non-motorized sections and situations proposed within the study area. These are intended as guidelines only, although they are based on standards established by the American Association of State Highway and Transportation Officials (AASHTO), and other state agencies and non-motorized organizations. All mandated standards (outside of this document) that are required for construction, should be referenced at the time of design as they change and are updated.

Nearly every accepted design guideline has exceptions, necessitated by local conditions, community desire, changing trends, intensity of use, and many other factors. However, design guidelines offer an easy-to-use summary of extensive expertise that allows for flexibility in dealing with site-specific issues without the rigid process associated with mandated standards.[5]
The guidelines on the following pages are not all inclusive, instead, they represent and highlight those situations in the Township that are likely to be encountered as this plan progresses into implementation.

Non-Motorized Design Resources

Guide for the Development of Bicycle Facilities, American Association of State Highway and Transportation Officials (AASHTO), 1999.

Manual on Uniform Traffic Control Devices,2003 Ed.

A Policy on Geometric Design of Highways and Streets "Green Book", AASHTO.

Recommendations for Accessibility Guidelines: Outdoor Developed Areas, US Architectural and Transportation Barriers Compliance Board (US Access Board), 1999.

Designing Sidewalks and Trails for Access: Part II of II: Best Practices Design Guide, Federal Highway Administration (FHWA), 2000.

Selecting Roadway Design Treatments to Accommodate Bicycles, Federal Highway Administration, 1994.

Michigan Non-Motorized Transportation Facilities Best Practices CD, MDOT Intermodal Policy Division, 2002.

Downriver Linked Greenways: Wayside Companion, City of Woodhaven, DTE Energy, National Park Service, 2004.

Designing Sidewalks and Trails for Access: Part II Best Practices Design Guide, FHWA.

Universal Access to Outdoor Recreation: A Design Guide, USDA Forest Service.

PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System, FHWA, September 2004.

Typical Situations
General guidelines are provided for non-motorized systems that are within road rights-of-way but separated from traffic, off-road systems such as through a Township Park or utility corridor, as well as guidelines for on-road bike lanes. Although this study does not specifically address on-road bike lanes, guidelines are provided as a reference and future consideration. The Appendix also includes probable cost estimates for typical non-motorized elements for reference.

Shared Use Non-Motorized Systems (Pedestrians and Bicyclists)
The mix of pedestrian and bicycles on multi-purpose systems and trails is not without problems and can result in conflicts between different user groups. However, when design treatments are employed to address these potential conflicts, the majority of user problems can generally be avoided. Paths shared by pedestrians and bicyclists need to be designed in accordance with

[5] Iowa Trails 2000: Design Guidelines

AASHTO design requirements. In particular, the following design considerations should be used in planning for a shared-use facility.

- Horizontal and vertical alignment to ensure clear sight lines.
- Wide shoulders and clearance, two feet minimum on each side, to provide stopping and resting areas and allow for passing and widening at curves.
- Avoid view obstructions at edges of the trail by placing signs, poles, utility boxes, waste receptacles, trenches and other elements away from the edge of the path and using low-growing shrubs and groundcovers or high-branching trees.
- Use bicycle speed limits.
- Use delineation and separation treatments such as colored paving, textured paving, pavement markings, and signing.
- Use directional signing.
- It is recommended to sign and mark a four-inch wide solid line at the center of the path as well as edge lines when curves with restricted sight distances are experienced.

The minimum width of a shared path is 10 feet and possibly a 12- or 14-foot minimum in more heavily-used sections.

Shared Use System Within Utility Corridor
(Example Rendering North of Davison Road)

10′ to 14′ non-motorized systems are necessary for shared uses between pedestrians and bicyclists. Utility corridors and easements can often provide a contiguous area suitable for a non-motorized connection. Coordination with the respective utility agency will be essential to discuss design, construction, and long-term maintenance requirements.

Neighborhood Connections

As was stated previously, it is a goal of the Township to have all existing and new residential developments connected to one another via non-motorized connections so as to provide continuity and the ability to walk or ride from one area to another without the need to access a primary road. These connections are likely to vary considerably in terms of width, material, location and length depending on the specific situation and site conditions.

Neighborhood Connection
(Example Rendering North of Atherton, East of Vassar)

Where open space exists at the edges of neighborhoods and developments, the potential may exist to provide a non-motorized connection to adjacent (existing or future) developments. These connections should be 5-feet wide at a minimum. It will be important during site plan review that non-motorized connections be considered and provided.

Neighborhood Connection
(Example Rendering Near Gates Elementary)

Providing connections and safe routes to schools is a primary goal of this study. Again, connections should be a minimum of 5-feet wide. Where neighborhoods already exist, adequate space (including area for setbacks and screening) will likely be necessary.

Shared Use Within Road Rights-of-Way

The driving rationale for placing a non-motorized system within an existing right-of-way is typically, single, continuous ownership as well as access to various destinations. However, conflicts at intersections and driveways are a major concern on paths located adjacent to roadways. Motorists will often not see bicyclists or pedestrians coming toward them on the right, since they do not expect to see them going against the flow of traffic. AASHTO has documented numerous concerns related to this type of environment and several elements need to be considered during planning and design.

- A minimum of five feet horizontal separation, or a physical barrier (concrete divider and railing minimum of 3.5 feet high) from motor vehicle traffic.

- Shared use within a road right-of-way should only be considered if the development of separate bike lanes and sidewalks as an alternative is not feasible or permitted.

Shared Use System Within Right-of-Way
(Example Rendering Oak Road)

Elevated boardwalks may be necessary where wetlands or extensive grade issues exist. Coordination with the MDEQ may be necessary if planned within wetlands. If accommodating shared uses, and if using federal or state funding, it may be necessary for 14-feet of clearance (10-foot path and 2-foot clearance on either side). Railings and barriers should be at least 42" high.

- There are no reasonable alternative alignments for bikeways and sidewalks on nearby parallel routes.

- The path can be terminated onto streets with good bicycle and pedestrian facilities at each end.

- There are popular origins and destinations throughout the corridor.

- The path can be constructed wide enough to accommodate all types of users, with delineation and separation techniques to minimize conflicts between users. (10 to 12 feet wide is desirable)

Pedestrian Systems Within Right-of-Way
The primary focus of this document is the provision of a system of connected pedestrian facilities within the study area. Several example renderings are found on the following pages to illustrate the variety of "typical" situations that are found within the Township. For the most part, the Township is planning to have all collector and arterial streets include a minimum of a five foot sidewalk on both sides of the street; however, where space is available, wider sidewalks and landscaped buffers may be necessary in locations with higher pedestrian or traffic volumes, and/or higher vehicle speeds. At intersections, sidewalks may need to be wider to accommodate accessible curb ramps.

It should again be noted that utilizing sidewalks as a shared use (bikes and peds) is undesirable. Sidewalks are typically designed for pedestrian speeds and maneuverability and are not safe for higher speed bicycle use.

Sidewalks are the primary transportation facility for walking and therefore must be continuous and provide access to all pedestrian destinations. The sidewalk corridor is usually parallel to the road from corner to corner. It encompasses the area from the edge of the road to the property line and provides an area for walking, separated from vehicle traffic, and additional space for signs, streetscaping, and amenities. It must be adequately maintained to remain useful.[6]

Criteria for a Good Sidewalk Corridor

Accessibility – Sidewalks should be easily accessible to individuals of all ability levels.

Continuity and Connectedness – As the primary transportation facility for walking, the sidewalk route should be clear to users and should not be interrupted by gaps and intervening obstacles and conflicting uses.

Safety – Sidewalks should be adequately separated from traffic, well lighted and free of dangerous surface irregularities.

Landscaping – Trees and landscaping within the sidewalk corridor should be used to contribute to physical, psychological and visual comfort.

Social Space – The social aspect of sidewalk corridors should not be ignored so that standing, sitting, visiting and children's play can occur.

Community Form – Sidewalk corridors should be recognized as a community asset and used to contribute to the character of neighborhoods and business districts, and to strengthen community identity.

IDOT Trails Plan 2000.

Additional Concerns

- The Americans with Disabilities Act (ADA), requires that a useable area of at least 3 feet be provided within the walkway and that it should have a cross slope of no more than 2 percent.
- Surface should be firm, stable and resistant to slipping.
- Sidewalks should cross driveways; the sidewalk surface and grade should be maintained across the driveway.
- Pavement markings and/or traffic controls can further demarcate the pedestrian zone.

[6] Iowa Department of Transportation: Trails Plan 2000.

Pedestrian System Within Right-of-Way
(Example Rendering Lippincott)

The study area includes several areas where open storm drains currently exist and the right-of-way is fairly narrow. Some areas will require the storm drain to be enclosed and buried. A 5-foot wide sidewalk system should not be constructed on top of the enclosed storm drain if possible. Coordination will be necessary with Genesee County.

Pedestrian System Within Right-of-Way
(Example Rendering Irish Road South of Twp Hall)

Several drain and creek crossings exist within the study area. One solution may be to install a pre-fabricated bridge with sidewalk/path connections on either side. Actual widths may be dependent on funding sources.

Pedestrian System Within Right-of-Way
(Example Rendering Gale Road)

A minimum 2-foot wide graded area with a maximum 1:6 slope should be maintained on both sides of the sidewalk. Where the facility is adjacent to canals, ditches or slopes steeper than 1:3, a wider separation should be considered.

Pedestrian System Within Right-of-Way
(Example Rendering Davison Road)

A minimum 2-foot clearance must be maintained between the non-motorized system and any structures.

A buffer zone of 4 to 6 feet is desirable to separate pedestrians from the street.

Street lighting should be considered to enhance safety and security. Landscaping, benches, and other amenities should also be considered early in the design process.

Pedestrian System Within Right-of-Way
(Example Rendering Irish Road at Gates Elementary)

Providing safe routes to schools is a major priority in the Township. These areas should include a minimum 5-foot wide sidewalk.

Where space permits, interest can be added by creating a serpentine look rather then a straight line.

Landscaping and other amenities may also be desirable.

Pedestrian Considerations for Intersections
A wide variety of measures are used to improve the safety and mobility of non-motorized users at intersections.[7] Important considerations for using these features include:

- **Sidewalks** – Provides appropriate walking environment for pedestrians within the public right-of-way and improves pedestrian safety. While a continuous sidewalk system along the road is desirable, intersections should be designed or retrofitted when reconstructed to include sidewalks. Sidewalks along the road can occur in future phases of reconstruction.

- **Curb Ramps and Radius Reduction**

Curb Ramp and Radius
PBIC Image Library

Curb ramps provide access for people using wheelchairs, strollers, skates, and bicycles. The ramps must be designed to ADA standards.

Reducing the curb radius will also improve pedestrian safety by reducing the speeds of right-turn vehicles and reducing the crossing distance.

The shorter crossing distance can result in providing more signal timing for vehicles. This treatment is typically used at neighborhood street intersections instead of at major arterial street intersections. Curb radii should be designed to accommodate any on-street parking and/ bicycle lanes. In addition, it is important to consider the turning needs of emergency vehicles and large vehicles such as busses.

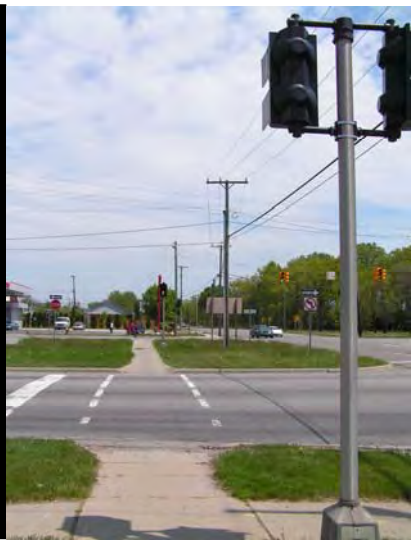
- **Marked Crosswalks**

Marked Crosswalks
City of Battle Creek

Marked crosswalks provide a preferred crossing path to the pedestrian and warns motorists to anticipate pedestrian crossings.

Other pedestrian accommodations such as sidewalks, curb ramps, signing, and signalization are usually needed to improve pedestrian safety.

- **Pedestrian Signals** – Major considerations include making sure that the signals are visible to pedestrians, providing a walk interval for every signal cycle, and placing push buttons in a convenient location for all users.



Pedestrian Signals
City of Riverview

On higher volume roads, pedestrian signals along with sidewalks, marked crossings, and other pedestrian accommodations are used to improve the safety of non-motorized users.

Pedestrian signals provide a gap in vehicular traffic so users can cross the street.

- **Right-Turn-On-Red Restrictions** – The purpose of this measure is to increase pedestrian safety and decrease crashes with right-turn vehicles at intersections. While the prohibition of right-turn-on-red is simple, consideration should first be given to part-time prohibitions during peak periods. It is also important that the sign be clearly visible to right-turn motorist.

- **Lighting** – Provides illumination to enhance the safety and security of pedestrians, especially in urban areas and commercial districts. Design considerations include making sure pedestrian walkways and crosswalks are well lit, installing lighting on both sides of wide streets, and using uniform lighting levels.

- **Advanced STOP Lines** – Provides for improved safety by increasing the visibility of pedestrians. The effectiveness of the measure is dependent upon motorist compliance with stopping at the line. The STOP line should be placed in close proximity to a marked crosswalk.

- **Signs** – Traffic regulatory, warning and directional signs provide important information to all road users. Care should be given to follow the guidelines and standards in the *Manual on Uniform Traffic Control Devices - 2003 Edition*, to ensure that the proper messages are given to the users. Overuse of signs can breed noncompliance and lead to visually obstructing the most important messages.

[7] *PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System*, Federal Highway Administration, September 2004.

Considerations for Crosswalks

Marked crosswalks are installed to indicate to the pedestrian the best place to cross the street, to inform the motorist of potential pedestrian crossings, and to clarify that a legal crosswalk exists at the location[8].

Crosswalks should be placed at locations that are convenient so the pedestrian does not have to travel out of the way, and at locations that offer the safest place to cross the road. Crosswalk pavement markings used alone may not improve pedestrian safety. Measures such as signs, signals, design enhancements, etc. are typically required to supplement pavement markings.

Marked crosswalks are typically used under the following conditions:

- At STOP sign-controlled and signal-controlled intersections where vehicular traffic might block pedestrian traffic.
- At non-signalized street crossings in school zones where other features such as school signs, adult crossing guards, etc. are used to improve safe crossings by children.
- At non-signalized locations where engineering judgment indicates that crosswalks, used with other devices, would enhance traffic and pedestrian safety.
- Marked crosswalks should be supplemented with other treatments under the following conditions:
  - Where the speed limit exceeds 40 miles per hour.
  - On roads with four or more lanes without a raised median where the average daily traffic volume is 12,000 vehicles per day or greater.
  - On roads with four or more lanes with a raised median or crossing island that has an average daily traffic volume of 15,000 vehicles per day or greater.

Criteria for Good Crosswalks

Clarity – It is clear where to cross and easy to understand possible conflict points with traffic.

Visibility – Pedestrians can see and be seen by approaching traffic lighting is adequate and obstacles and the location of the crosswalk do not obscure the view.

Appropriate Intervals – The potential demand for crossing is reasonably well served by available crossing opportunities.

Adequate Crossing Time – The pedestrian is allotted or can take an adequate amount of time to cross and does not need to wait an unreasonably long time to begin crossing.

Limited Exposure – The distance required to cross is short or it is divided into shorter segments with median refuges.

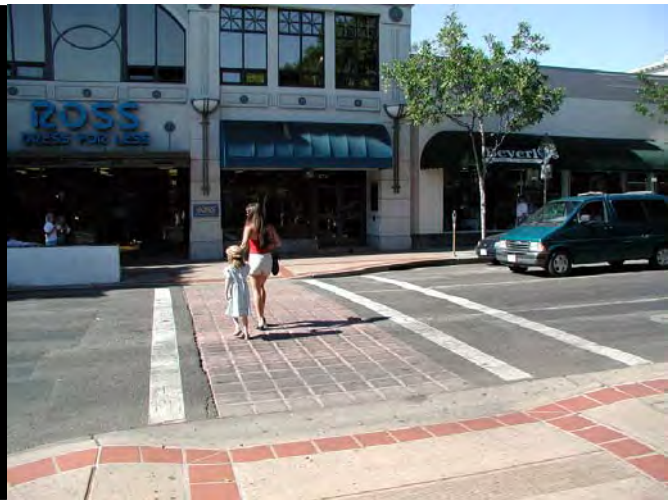
Continuous Path – The crosswalk is a direct extension of the pedestrian travel path and is free of obstacles and hazards.

IDOT Trails Plan 2000.

[8] *PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System*, Federal Highway Administration, September 2004.

Pedestrian Crosswalk at Intersection
(Example Rendering Irish Rd at Davison Rd)

Marked crosswalks, appropriate traffic signing, and pedestrian signals enhance safety and crossing opportunities for pedestrians at intersections. Correctly aligned sidewalks and curb ramps also clearly delineate the crossing path and provide access for persons with disabilities. It is important that all markings, signs, and signals conform to the MUTCD.



Textured Crosswalk
PBIC Image Library

Painted crosswalk markings in combination with the brick surface clearly delineate the crossing path for pedestrians and motorists.

It is important that crossings be placed in areas that minimize crossing time and exposure to vehicles, where it is convenient for pedestrians, and where there is adequate sight distance.

Generally, marked mid-block crosswalks should not be used in close proximity to signalized intersections as crossing at the signal is a preferred practice. In addition, as a rule-of-thumb, marked crosswalks should be considered, in conjunction with other treatments, when a minimum of 20 pedestrians use the crosswalk during the peak hour.

School Crossing
Covington Road, Oakland County

Non-signalized street crossings in school zones are denoted by signs and painted crosswalks.

In addition, school crossing guards are frequently used on higher-volume streets to provide positive guidance to children.

Considerations for Traffic Calming

Traffic calming involves the use of physical road design measures arranged to limit vehicle speed.[9] The physical and visual cues offered by traffic calming measures encourage motorists to drive at lower speeds thus reducing or eliminating the need for enforcement. When appropriately applied for site-specific conditions, traffic calming is effective in reducing vehicle speeds, the number and severity of crashes, and vehicle noise levels. Major considerations for the general use of calming techniques include:

- Vehicle speeds are more critical than the movement of large volumes of traffic.
- The needs for the measures are understood and are endorsed through community involvement.
- The measures fit into and enhance the street environment.
- The design is easy to understand by motorists and other road users.
- Traffic calming measures with multiple functions, such as a raised crosswalk, are more acceptable than a measure with a single function such as a speed hump.
- The design must accommodate emergency vehicles.
- To be effective, the devices must be appropriately spaced along the entire street instead of being concentrated at a few points.
- All traffic calming measures should accommodate pedestrian and other non-motorized traffic including persons with disabilities.
- Consideration should be given to ensuring that the design does not divert the traffic to other streets which may just shift the problem from one location to another.

A few examples of typical traffic calming measures are shown in the following illustrations.

Curb Extension
PBIC Image Library

Curb extensions improve safety for pedestrians by increasing their visibility to motorists and by reducing the crossing distance at an intersection.

Curb extensions also reduce the speed of turning vehicles and prevent drivers from parking at corners which improves sight distance.

[9] Ibid.

Chicane
PBIC Image Library

Chicanes are curb extensions that are used to change the vehicle path. The purpose of the chicane is to slow traffic.

Care must be exercised in the design to ensure that the curbs are clearly visible to motorists.

Crossing Island
PBIC Image Library

Crossing islands are pedestrian refuges constructed between opposing traffic lanes to provide space for non-motorized users to wait for an appropriate gap in traffic.

The center island improves safety by highlighting the user and reduces approaching vehicle speeds.

Pedestrian Accommodations
Bagley Road, Berea, OH Wade Trim

Landscaping along with lane reduction, marked crosswalks, revised signal timing, and other traffic management devices improve the visual environment, reduce vehicle speeds, and improve pedestrian safety.

Bike Lanes and Paved Shoulders

On-Road Bike Lane
www.pedbikeimages.org

On-road bike lanes, and/or paved shoulders should be considered where appropriate and possible. The most critical variable affecting the capability of a roadway to accommodate the bicycle is road width. Two means to provide adequate road width for both vehicular and bicycle travel are paved shoulders and striped bike lanes. Bike lanes are typically 5-feet wide, with a 6-inch, white stripe delineating the bike lane from vehicular traffic. A wide lane of six to eight feet is recommended when motor vehicle volumes are high and when higher vehicle speeds are permitted. A smooth riding surface should be provided. Several design features of roadways can be made more compatible to bicycle travel including bicycle-safe drainage grates, bridge expansion joints, rail crossing treatments, pavement textures, sight distances and signal timing. Bike lanes should be one-way facilities and carry bike traffic in the same direction as adjacent motor vehicles. Bike lane pavement markings should never extend through the intersection and never cross pedestrian crosswalks. Retrofitting roads to accommodate bike lanes is typically most successful when vehicle travel lanes are 15 feet or greater.

Estimated Cost For Retrofitting Existing Road Sections for Bike Lanes

Pave Shoulder Per Mile	
4 feet each side	$70,000
Bike Lane Per Mile	
5 feet each side with curb and gutter	$281,000
Wide Curb Lane Per Mile	
2 feet each side	$50,000

Source: Adapted from Virginia Department of Transportation, 2000.

Roads are often designed with a wide shoulder to enhance the service life of the road, facilitate drainage and maintain adequate sight distances. Paving and widening of shoulders is many times an effective way to prevent edge deterioration of road surfaces as well as accommodate bicycle travel. For more rural roads not likely to serve extensive development, a shoulder at least 4 feet in width, preferably 8 feet on primary highways, should be provided. Surface material should provide a stable, mud-free walking and riding surface.

Structures

An overpass, underpass, bridge, or facility on a highway bridge may be necessary to provide connectivity and continuity within the study area. For new structures, the minimum clear width should be the same as the approach paved shared use trail, plus the minimum 2-foot wide clear areas. As an example, a 10-foot wide paved path would require a 14-foot wide bridge to provide the required clearance areas. Access by emergency, patrol and maintenance vehicles should also be considered in establishing design clearances of structures along a non-motorized system. A vertical clearance of 10-feet is desirable for adequate vertical distance. On all bridge decks, special care should be taken to ensure that bicycle-safe expansion joints are used, and that decking materials that become slippery when wet are avoided.

Shared Use System Within Right-of-Way
(Example Rendering Lapeer Road over I-69)

A shared use path across a bridge can be installed where 1) the bridge facility will connect to a path at both ends, 2) sufficient width exists or can be obtained, and 3) provisions are made to physically separate non-motorized traffic from vehicular traffic. Design should consider adequate heights for structures and railings separating pedestrians from vehicles.

Pedestrian System Within Right-of-Way
(Example Rendering M-15 at I-69)

Coordination with MDOT will be necessary to provide non-motorized facilities within MDOT right-of-way.

Adequate separation and barriers between pedestrians and vehicles is necessary. Attention should be paid to pedestrian crossings at on- and off-ramp access to I-69.

Pedestrian System Within Right-of-Way
(Example Rendering Irish Road at I-69)

Graphic on following page illustrates conceptual plan view of this rendering.

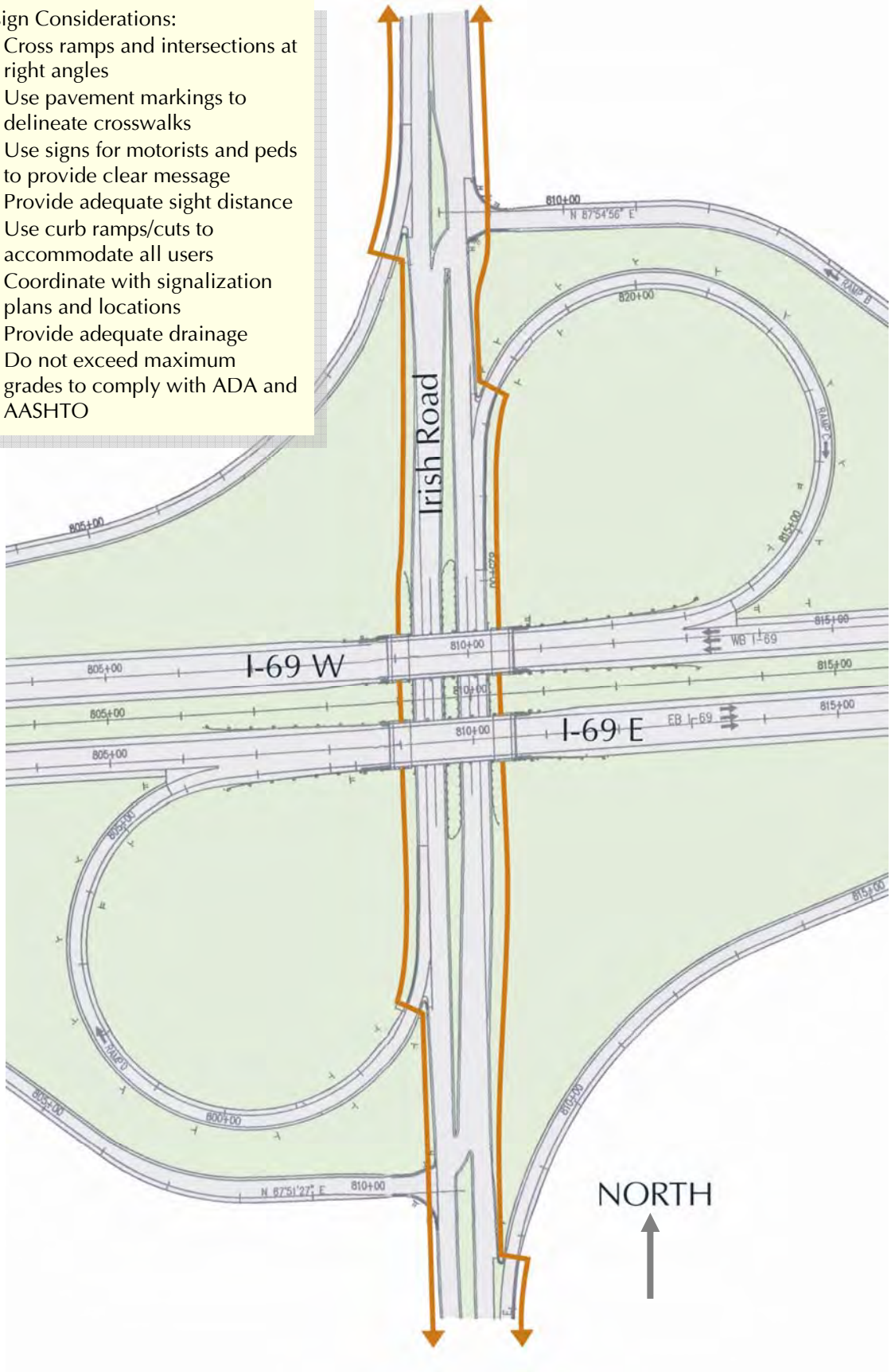
Grades of non-motorized facilities greater than 5 percent are undesirable.

Lighting and landscaping can contribute to creating a walkable environment.

Conceptual Non-Motorized Accommodations at I-69 and Irish Rd

Design Considerations:

- Cross ramps and intersections at right angles
- Use pavement markings to delineate crosswalks
- Use signs for motorists and peds to provide clear message
- Provide adequate sight distance
- Use curb ramps/cuts to accommodate all users
- Coordinate with signalization plans and locations
- Provide adequate drainage
- Do not exceed maximum grades to comply with ADA and AASHTO



Railroad Crossings
When railroad crossings are required, the trail should cross at a right angle to the tracks as much as possible. If this is not possible, consideration should be given to the following options:

1. Widening the approaching roadway, bike lane or shoulder will allow the user to cross at approximately 90 degrees without veering into the path of overtaking traffic. The minimum amount of widening should be six feet; however, eight feet is desirable, depending on the amount of available right-of-way. Adequate tapers should be provided.

2. On low-speed, lightly-traveled railroad tracks, commercially available flangeway fillers can eliminate the gap next to the rail. The filler normally fills the gap between the inside railbed and the rail. When a train wheel rolls over it, the flangeway filler compresses. This solution, however, is not acceptable for high-speed rail lines, as the filler will not compress fast enough and the train may derail.

3. If no other solution is available, warning signs and pavement markings should be installed in accordance with the Michigan Manual of Uniform Traffic Control Devices (MMUTCD). A warning sign with an appropriate subpanel message (e.g., Bike Cross at Right Angle) may provide sufficient warning for bicyclists.

Pedestrian System Within Right-of-Way
(Example Rendering Oak Road, South of Davison Rd)

Railroad crossings should ideally be at a right angle to the rails. It is also important that the approach be at the same elevation as the rails. Warning signs and pavement markings should be installed in accordance with MUTCD.

Where railings, fences, or barriers are needed, they should be a minimum of 42 inches high.

Materials
Hard, all-weather pavement surfaces are usually preferred over those of crushed aggregate, sand, clay or stabilized earth. These materials provide a much lower level of service and require higher maintenance. However, operating agencies that have chosen crushed aggregate as their surface material have found that they can achieve a completed path in less time and at less cost than with asphalt or concrete. In areas that are subjected to frequent or even occasional flooding or drainage problems, or in areas with steeper terrain, unpaved surfaces will often erode and are not recommended.

Designing and selecting pavement sections for shared-use paths is in many ways similar to designing and selecting highway pavement sections. A soils investigation should be conducted to determine the load-carrying capabilities of the soil. Paths should be designed to sustain, without damage, wheel loads of occasional emergency, patrol, maintenance and other motor vehicles expected to use or cross the path. Pavements should be machine laid; soil sterilants should be used where necessary to prevent vegetation from breaking through the pavement. On Portland

Cement concrete, the transverse joints necessary to control cracking, should be saw cut to provide a smooth ride. However, skid resistance qualities should not be sacrificed for the sake of smoothness. Broom finish or burlap drag concrete surfaces are preferred.

Estimated Cost Per Mile For Non-Motorized Facility Construction

Surface Material	Cost Per Mile	Longevity
Granular Stone	$60-$100K	7 to 10 Years
Asphalt	$200-$300K	7 to 15 Years
Concrete	$300-$500K	20 + Years
Boardwalk	$1.5-$2 Million	7 to 15 Years
Resin Stabilized	Varies Based On Application	7 to 15 Years
Wood Chips	$65-$85K	1 to 3 Years

Source: "Trails for the 21st Century", Rails-to-Trails Conservancy, 2001.

Signs and Way-Finding

Coordinated and consistent signage and way-finding is an essential element for a successful non-motorized system. Signage and way-finding can provide educational and/or interpretive directional, informational, regulatory, awareness, or warning messages. All traffic control devices must conform to the "Manual on Uniform Traffic Control Devices" (MUTCD) and most will need to be coordinated with the Genesee County Road Commission and/or MDOT. In addition to being coordinated and approved by the applicable road agency, all signing and pavement marking plans should also be reviewed by a traffic engineer.

Maintenance[10]

Developing maintenance guidelines and standards will be essential in assuring the safety and continued life of the non-motorized system. Repairs may be as minor as fixing a pothole in an asphalt trail or as major as the complete renovation of an entire section of elevated boardwalk. Low areas that hold or channel water need to be repaired as soon as possible. Areas that have not held or channeled water in the past may begin to due to increased runoff from nearby development. If not addressed immediately, these areas can spread and damage large sections of the non-motorized system. Adequate funds for on-going, short and long-term maintenance activities should be anticipated and budgeted for when designing various segments of the system.

Routine Maintenance Tasks

Routine maintenance tasks are all directed to extending the life expectancy of the non-motorized system, and providing a high quality product and ensuring safety for users. Routine maintenance and inspection of the non-motorized system also minimizes repair and renovation costs.

- Inspection
  Inspection must occur on a routine basis. Inspections should include the surface, any culverts and water crossings, all amenities, signs, and surrounding vegetation. User safety should always be the primary consideration of any inspection. Potential safety problems should always take precedence when scheduling maintenance. Vandalism left unattended encourages more of the same and should likewise be a high priority for maintenance. Inspections may also need to be done after severe weather events or storms.

[10] Fairfax County Trail Maintenance Standards.

- Mowing
  Mowing should be done on a regular basis. Brush and grass that grow along trails should not be allowed to grow to excessive heights within two feet of the edge of the non-motorized surface.

- Tree and Brush Pruning
  Pruning is performed for the safety of the user and to protect the non-motorized surface and other assets located along the route. Proper pruning also allows mowing operators to do a thorough and safe job. Inspectors need to be trained to identify potential hazards and to determine what can be handled by staff and what will require the attention of a private contractor.

- Leaf and Debris Removal
  Keeping the surface clean is one of the most important aspects of trail maintenance. Mud and other sediment should be removed along with fallen leaves and branches to ensure the safety of users and to increase the life expectancy of the non-motorized system.

- Snow and Ice Removal
  Decisions should be made early on as to whether trails and sidewalks will be cleared of snow and ice. Snow and ice should be removed, particularly along routes used by children going to and from school sites.

- Cleaning and Replacement of Culverts
  Culverts often become clogged with trash and debris that must be removed to prevent flooding and undercutting of trail and sidewalk surfaces. Culverts may also need to be upgraded in size or replaced because of deterioration or increased storm water flow due to increased surrounding development.

- Maintenance of Water Crossings
  Water crossings can be bridges, fair weather crossings, or open box culverts. Debris needs to be removed on an as-needed basis from these structures to allow for free flow of water and to reduce the risk of flooding. These structures need to be inspected on a regular basis for erosion control and action taken accordingly to preserve or replace the structure.

- Repairs to Signs and Other Amenities
  These repairs may include kiosks, wood and metal signs, benches, etc. These amenities need to be kept in safe and aesthetically pleasing condition. Items that fall into disrepair often become the target of vandals. Repairs should be completed as quickly as possible to discourage vandalism.

Typical Annual Maintenance Costs For One-Mile Paved System

Drainage and storm channel maintenance	$500
Sweeping/blowing debris	$1,200
Pick-up/removal of trash	$1,200
Weed control and vegetation management	$1,000
Mowing of grass shoulder	$1,200
Minor repair to trail furniture/safety features	$500
Maintenance supplies for work crews	$600
Equipment fuel and repairs	$600
Total Estimated Cost Per Mile	$6,500

Safety and Security Considerations

Safety considerations should be at the forefront of design decisions for any non-motorized project. Several design guidelines and suggestions have been made within this chapter as they relate to improving and ensuring safety for users. The combination of a multitude of factors assists in developing and maintaining a safe non-motorized system. These include elements such as bicycle safe drainage grates, lighting, and providing adequate clearance along the edges of trails, sidewalks and bike lanes. Considering pavement textures, sight distances, design speeds, proper striping and signage help make non-motorized systems safe. Choosing an appropriate type of trail based on the situation and conditions is also important. Providing access points and adequate room for emergency and maintenance vehicles is also important to safety. Proper and regular maintenance of non-motorized systems is essential when it comes to providing a safe and enjoyable system. In addition, routine officer patrol of trails improve the overall security of the system.

Appendix

Estimated Construction Costs for Priority Segments
Probable Cost Estimates for Typical Non-Motorized Elements
Resolutions of Adoption

Costs on the following pages are probable estimates that can change depending on bidding climate as well as numerous field conditions. These should be used only to understand magnitude of costs. Potential projects and non-motorized segments should be reviewed by an Engineer to develop more detailed and accurate cost estimates for implementation.

Construction Cost Estimates For Priority Segments

Heritage Trail (Atherton to Potter, Township segments only)
Based on routes and conditions as noted in M-15 Trail Feasibility Study Report (Spring 2003)

M-15 - Atherton to Lippincott Road (Heritage Trail on west side)						
Approximately 5,240 feet (10-foot wide asphalt trail including base, grading, prep)	5,240	lf	$	60.00	lf	$314,400
Approximately 40 feet of elevated boardwalk	40	lf		$500	lf	$20,000
2 road crossings w/ signage	2	ea	$	1,500.00	ea	$3,000
Sub Total						*$337,400*
Contingency 15%						*$50,610*
Total Preliminary Construction Cost Estimate						**$388,010**
Design Engineering						*$31,041*
Survey, Geotech, Coordination						*$9,312*
Complete Plans and Specs						**$40,353**
Lippincott Road to Oak Road (Heritage Trail on north side)						
Approximately 5,000 feet (10-foot wide asphalt trail including base, grading, prep)	5,000	lf	$	60.00	lf	$300,000
1 road crossing w/ signage	1	ea	$	1,500.00	ea	$1,500
Sub Total						*$301,500*
Contingency 15%						*$45,225*
Total Preliminary Construction Cost Estimate						**$346,725**
Design Engineering						*$27,738*
Survey, Geotech, Coordination						*$8,321*
Complete Plans and Specs						**$36,059**
Oak Road from Lippincott to Rosemore Street to City Limits (Heritage Trail on both sides)						
Approximately 6,300 feet (5-foot wide, concrete on both sides)	63,000	sf	$	3.25	sf	$204,750
Approximately 1000 feet of elevated boardwalk (14' wide)	14,000	sf		$50	sf	$700,000
Approximately 2,000 feet widen existing walk to 10 ft along Rosemore	2,000	lf		$17	lf	$34,000
I-69 Crossing (railing, striping, signage- 5ft. Wide bike lanes)	1	ls		$15,000	ls	$15,000
3 road crossings w/ signage	3	ea	$	1,000.00	ea	$3,000
Sub Total						*$956,750*
Contingency 15%						*$143,513*
Total Preliminary Construction Cost Estimate						**$1,100,263**
Design Engineering						*$88,021*
Survey, Geotech, Coordination						*$26,406*
Complete Plans and Specs						**$114,427**
M-15 from City limits north to Potter (Heritage Trail on east side)						
Approximately 2,800 feet (10-foot wide asphalt trail including base, grading, prep)	2,800	lf	$	60.00	lf	$168,000
Reposition Culvert	1	ea	$	5,000.00	ea	$5,000
Sub Total						*$173,000*
Contingency 15%						*$25,950*
Total Preliminary Construction Cost Estimate						**$198,950**
Design Engineering						*$15,916*
Survey, Geotech, Coordination						*$4,775*
Complete Plans and Specs						**$20,691**
Total Heritage Route (In Study Area) Preliminary Construction Cost Estimate						**$2,033,948**
Total Plans and Specifications						**$211,531**

Assumes no major utility relocations or upgrades
Assumes tree removal of 6" or less only

Construction Cost Estimates For Priority Segments

Trail Connecting Township Hall to Abernathy Park						
Approximately 7,920 feet (10-foot wide asphalt trail including base, grading, prep)	7,920	lf	$	60.00	lf	$475,200
Tree Removal Estimate (large trees over 6")	1	ls	$	5,000.00	ls	$5,000
Removable Bollards	4	ea	$	600.00	ea	$2,400
1 road crossing (at Gale)	1	ea	$	1,000.00	ea	$1,000
1 drain crossing (east of Gale)	1	ea		$70,000	ea	$70,000
Sub Total						*$553,600*
Contingency 15%						*$83,040*
Total Preliminary Construction Cost Estimate						**$636,640**
Design Engineering						*$50,931*
Survey, Geotech, Coordination						*$15,279*
Complete Plans and Specs						**$66,211**

Davison Road (between Irish and the City limits)						
Approximately 7,920 feet (5-ft wide concrete sidewalks on both sides)	79,200	sf	$	3.25	sf	$257,400
Concrete sidewalk ramps	12	ea		$500	ea	$6,000
Pavement markings (crosswalk striping)	3	ea	$	1,000.00	ea	$3,000
Sub Total						*$266,400*
Contingency 15%						*$39,960*
Total Preliminary Construction Cost Estimate						**$306,360**
Design Engineering						*$24,509*
Survey, Geotech, Coordination						*$7,353*
Complete Plans and Specs						**$31,861**

Assumes no major utility relocations or upgrades.
Does not include costs to relocate business signs.

Davison Road (between the City limits and Oak)					
Approximately 2,640 feet (5-ft wide concrete sidewalks on both sides)	26,400	sf	$3.25	sf	$85,800
Concrete sidewalk ramps	4	ea	$500	ea	$2,000
Drain crossing (both sides of Road, west of Oak)	2	ea	$70,000	ea	$140,000
Pavement markings (crosswalk striping)	3	ea	$1,000	ea	$3,000
Sub Total					*$230,800*
Contingency 15%					*$34,620*
Total Preliminary Construction Cost Estimate					**$265,420**
Design Engineering					*$21,234*
Survey, Geotech, Coordination					*$6,370*
Complete Plans and Specs					**$27,604**

Assumes no major utility relocations or upgrades.
Assumes tree removal of 6" or less only

Irish Road from Township Hall north to Davison Road)					
Approximately 2,440 feet (5-ft wide concrete sidewalks on both sides)	24,400	sf	$3.25	sf	$79,300
Railroad crossing (both sides of Irish, north of Twp Hall)	2	ea	$1,500	ea	$3,000
Sub Total					*$82,300*
Contingency 15%					*$12,345*
Total Preliminary Construction Cost Estimate					**$94,645**
Design Engineering					*$7,572*
Survey, Geotech, Coordination					*$2,271*
Complete Plans and Specs					**$9,843**

Assumes no major utility relocations or upgrades.
Assumes tree removal of 6" or less only

Estimated Costs for Variety of Non-Motorized Elements

Shared Use Trail		
Non-Motorized Trail (10-ft wide, asphalt includes clearing & grading)	$60	LF
Pre-Fab Pedestrian Bridge (15 ft wide, 45 ft long, steel truss)	$70,000	EA
Sidewalks and Crosswalks		
Concrete curb and gutter	$15	LF
Concrete sidewalk	$3.50	SF
ADA curb ramp w/ tactile warning	$200-$500	EA
Painted crosswalk, regular two lines	$325	EA
Painted crosswalk, ladder crosswalk	$500	EA
Patterned concrete crosswalk	$3,000	EA
Bike Lanes		
Painted bicycle lanes	$5,000-$30,000	Mile
Painted shoulders to reduce lane width	$1,000	Mile
Restriping to reduce number of lanes	$3,100 to $12,400	Mile
Traffic Calming		
Add raised median	$15,000-$30,000	100 Ft
One-way to two-way conversion	$20,000 to $200,000	Mile
Reduce curb radius	$2,000-$20,000	per corner
Construct mini-roundabout	$45,000 to $150,000	EA
Construct mini-circle	$6,000	EA
Modify T-intersection to reduce speeds	$20,000 to $60,000	EA
Install intersection median barrier	$10,000-$20,000	EA
Construct curb extension	$2,000-$20,000	per corner
Install lane choker	$5,000-$20,000	EA
Install speed hump	$1,000	EA
Install pedestrian table	$2,000-$15,000	EA
Construct intersection diverter	$15,000-$45,000	EA
Signalization and Signs		
Install traffic signal	$30,000-$140,000	EA
Install pedestrian signal	$20,000-$40,000	EA
Right-Turn-On-Red Restrictions	$200	per sign
Install pedestrian signs	$50-$150	per sign
Miscellaneous		
Tree Removal 6 to 12-inch dia	$200	EA
Tree Removal 13 to 24-inch dia	$350	EA
Storm Sewer, 12-inch	$45	LF
Storm Manhole for 18-inch and under sewer (0 to 8 feet deep)	$1,800	EA
Standard Storm Inlet	$1,500	EA

Source: Wade Trim and PEDSAFE Manual

Costs are probable estimates that can change depending on bidding climate as well as numerous field conditions. These should be used only to understand magnitude of costs. Potential projects should be reviewed by an Engineer to develop accurate cost estimates for implementation.

Resolutions of Adoption by:

Planning Commission
Township Board

WADE TRIM