North Dakota State University

Bicycle and Pedestrian Access Study

Final Document

December 2010

Prepared For:

Fargo-Moorhead Metropolitan Council of Governments (METRO COG)
North Dakota State University
City of Fargo

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Part 1
EXECUTIVE SUMMARY

The Fargo/ Moorhead Metropolitan Council of Governments (Metro COG), in partnership with North Dakota State University (NDSU) and the City of Fargo, has identified a need to prepare a Bicycle and Pedestrian Access Plan to improve connections between the main NDSU campus, downtown campus facilities/ downtown core and adjacent residential neighborhoods. This report documents the NDSU Bicycle and Pedestrian Access Plan and will be used to identify infrastructure and capital investments, elements to enhance bicycle and pedestrian travel and access within the project area and beyond, and provides a recommended implementation plan.

Study Purpose

The intent of the study is to gather information on current walking and bicycling behavior between NDSU's main campus and its downtown campus (Barry, Klai and Renaissance Halls).

The Study offers alternatives for bicycling and walking infrastructure in the short, medium and long-term so as to improve the convenience of walking or bicycling to the main and downtown campuses.

Project Boundary

The project boundary for the NDSU Bicycle and Pedestrian Access Study is defined as 17th Avenue N. as the northern boundary, Broadway N as the eastern boundary, and NP Avenue N. as the southern Boundary. The western boundary of the project area begins at the intersection of 14th Street N and NP Avenue. This boundary goes north along 14th Street N. to 8th Avenue N. At 8th Avenue N. the boundary follows Dakota Drive to the intersection of 12th Avenue. At 12th Avenue the boundary heads east to the intersection of 12th and Albrecht Blvd. The boundary line follows Albrecht Blvd. north to the intersection of 17th Avenue.

Project Goals & Objectives

The primary goal of this study is to develop a on and off-road bicycle and pedestrian network that will provide access to the NDSU main campus, the downtown NDSU buildings, the downtown core and the surrounding residential neighborhoods.

Primary Objective

The proposed pedestrian and bicycle connections will safely bridge the gap between the campus areas, promote greater regional connectivity, add economic value to the business community and provide quality of life benefits for residents, students, employees and visitors to the City of Fargo and the NDSU campus.

Guiding Principles

Improve Safety – Recommendations to consider safety of bicycles and pedestrians within the project area and broader context of the Downtown.

Improve Access and Mobility – Make it easier for pedestrians and bicyclists to move throughout the project area and connect to the broader context of Downtown and riverfront.

Increase the Numbers of Pedestrians and Bicyclists - Recommendations to facilitate more pedestrians and bicyclists throughout the year.

Balance the functional needs of pedestrians, transit, trains, motor vehicles, and bicyclists.

Community Support and Livability - Facilitate University and neighborhood input to improve the community as a whole.

Cost effectiveness and Implementation – Recommendations to consider capital costs in addition to long-term operational and maintenance costs.

Project Considerations

Current Planning Projects and Land Use/ Transportation Policies – What is currently in place to support the recommendations of this study. This will include current City of Fargo Capital Improvement Projects (CIP) , County or State roadway work, and current NDSU redevelopment projects.

Current Demand Model - The transit demand model established in the access study identified approximately 3,000 additional daily student commute trips between the main campus and Barry Hall; non-inclusive of the two other downtown NDSU facilities.

Physical Limitations – Prosper Line railroad tracks, high traffic volumes along major streets within the project area, multiple curb cuts, poorly defined crossings, existing conditions and capacity of sidewalks, and limited availability for shared use paths.

Infrastructure and Maintenance – Maintenance practices and budgets, snow & ice storage/removal policies and ordinances, sweeping, surface repairs/ resurfacing, and long-term commitment to maintenance of recommendations.

Public Involvement

Public involvement was a critical component of the NDSU Bicycle and Pedestrian Access Study planning process. The planning process utilized a Steering committee for guidance and developed a series of innovative outreach methods including a project website, online survey, online focus group sessions for agency coordination and public input meetings. All stakeholders were given the opportunity to participate and voice concerns and issues and to vocalize their important design considerations. The Bicycle and Pedestrian Access Plan involved the public in a variety of ways:

- Agency Meetings
- Public Open Houses/ Workshops
- Bicycle Tour
- On-line Survey and Project Website

Policy Recommendations

- Complete Streets: The Bicycle and Pedestrian Access Plan embraces planning for Complete Streets to balance the needs of all users and provide design recommendations to maximize the benefits to all users.

- No Turn on Red: Right turn on red restrictions, which can be limited to certain times of the day or can apply to all hours, prohibit motorists from turning right without a green signal. Restricting this turning movement can reduce conflicts with pedestrians crossing at intersections.

- Education, Encouragement, Enforcement and Evaluation: Both NDSU and the City of Fargo have made use of successful education and encouragement programs in the past to encourage people to ride the bus (NDSU and Matro Area Transit's cooperative effort to provide free bus rides to students) and educate bicyclists and motorists (the educational brochure for the Broadway Shared Lane Markings). Both entities should continue efforts directed at education, encouragement, enforcement and evaluation to increase the numbers of biking and walking trips in the study area.

Infrastructure Recommendations - Bicycle Facility Types

- Bicycle Boulevards: Bike boulevards are bike routes along streets with low volumes of traffic and slow traffic speeds. The streets selected for bicycle boulevards in the study area fit the above criteria and they lead to the many destinations within and surrounding the study area.

- Bike Lanes: Bike lanes are 5 to 6 foot lanes that flow in the same direction as the motorized traffic, they provide a "piece of pavement" for exclusive bicycle use and are generally installed on streets with higher volumes and traffic speeds over 30 mph. Bike lanes are recommended for University Drive and 10th Street N to provide north/south travel between the campuses.

• Shared Use Path: A shared use path is a paved path between 8' and 14' wide, depending on the amount of non-motorized traffic it is expected to carry. The Prosper Line railroad provides an opportunity for a rail with trail project, which will provide an excellent connection between the main campus and the downtown NDSU buildings.

Infrastructure Recommendations - Pedestrian Improvements

• Intersection Improvements: Twenty-four intersections within the study area have been identified for improvement. The exact recommended improvements depend on whether the intersection is signalized or stop sign controlled and whether the intersection is at a major crossroads such as 1st Ave. N. and University Drive or at a minor crossroads such as 12th Ave. N. and 16th St. N.

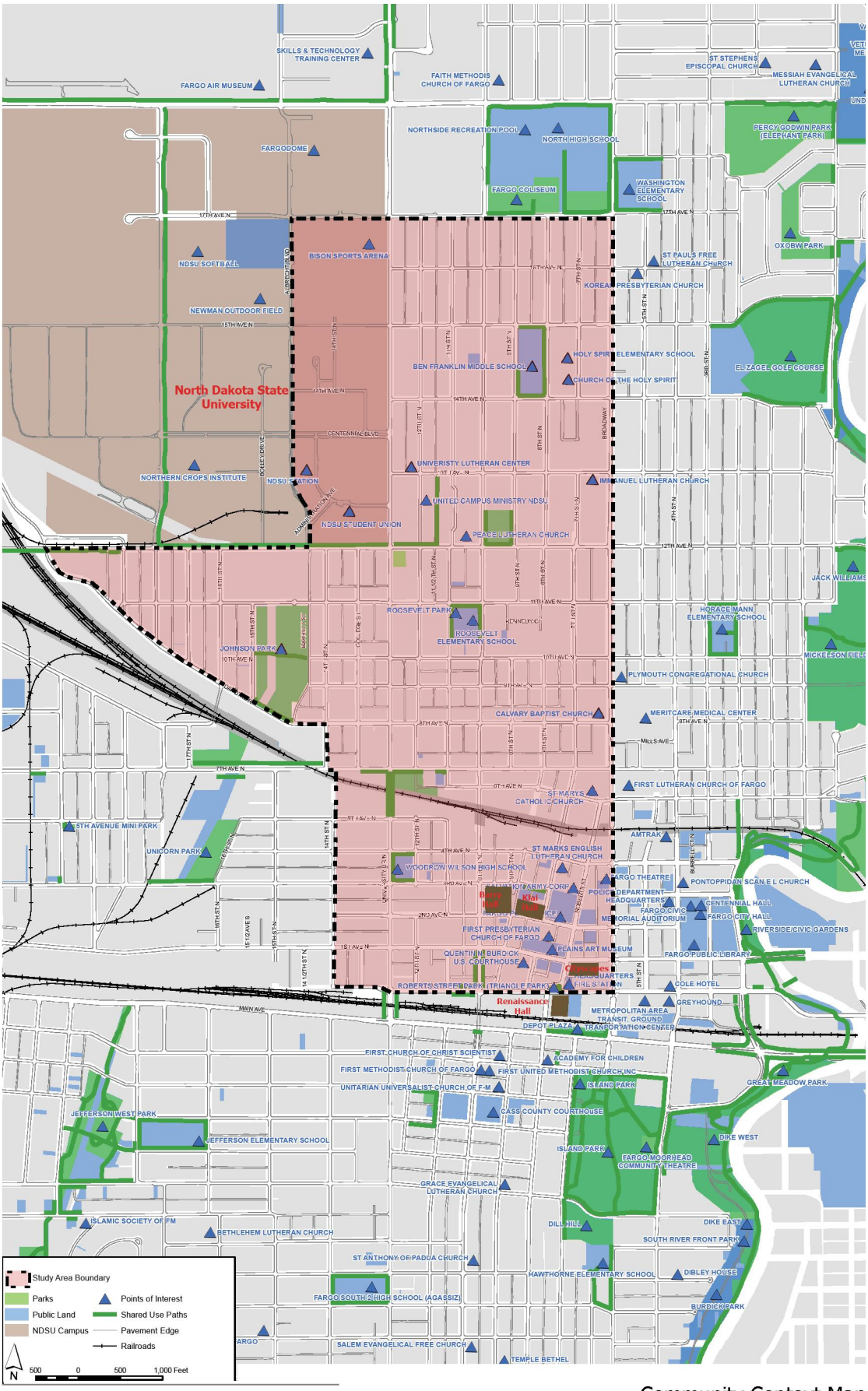
Intersection improvements include such things as pedestrian activated signals, curb extensions, pedestrian crossing signs and more.

Infrastructure recommendations include intersection improvements.

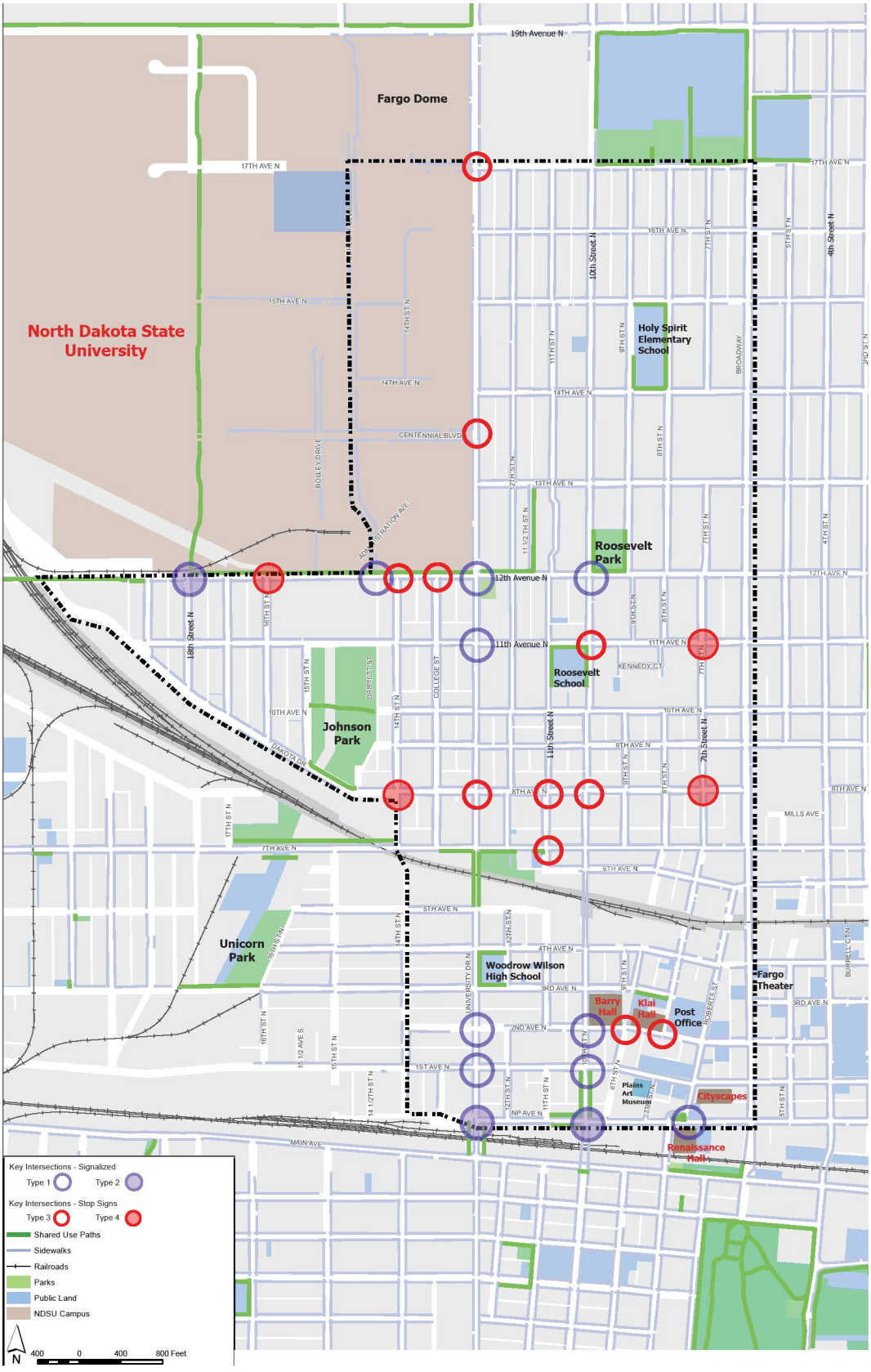
• Speed enforcement will be a key improvement for both biking and walking safety as well as improving the general "livability" of the Roosevelt Neighborhood and NDSU Campus.

• "Yield to pedestrian" in crosswalk enforcement is another key area of law enforcement that will benefit the students, staff and facility, and the neighborhood as a whole. The study recommends that focus on the enforcement of the yield to pedestrians law occur twice per year, in the fall at the beginning of the school year and in the spring as the weather becomes nicer and more people are out walking and biking.

• Snow shoveling ordinance enforcement will be key to keeping the sidewalks clear throughout the year for pedestrian access between the main campus and the NDSU downtown buildings.



Community Context Map



Recommended Intersection Improvements

Signalized Intersections

High Priority Intersection (Type 1)

- All of Type 2 improvements plus:
- Continental crosswalk marking (instead of double line marking)
- Advance stop bars

Stop Sign Intersections

High Priority Intersection (Type 3)

- All of Type 4 improvements plus:
- Continental crosswalk marking
- Parking restrictions
- Curb extensions (where parking is allowed)

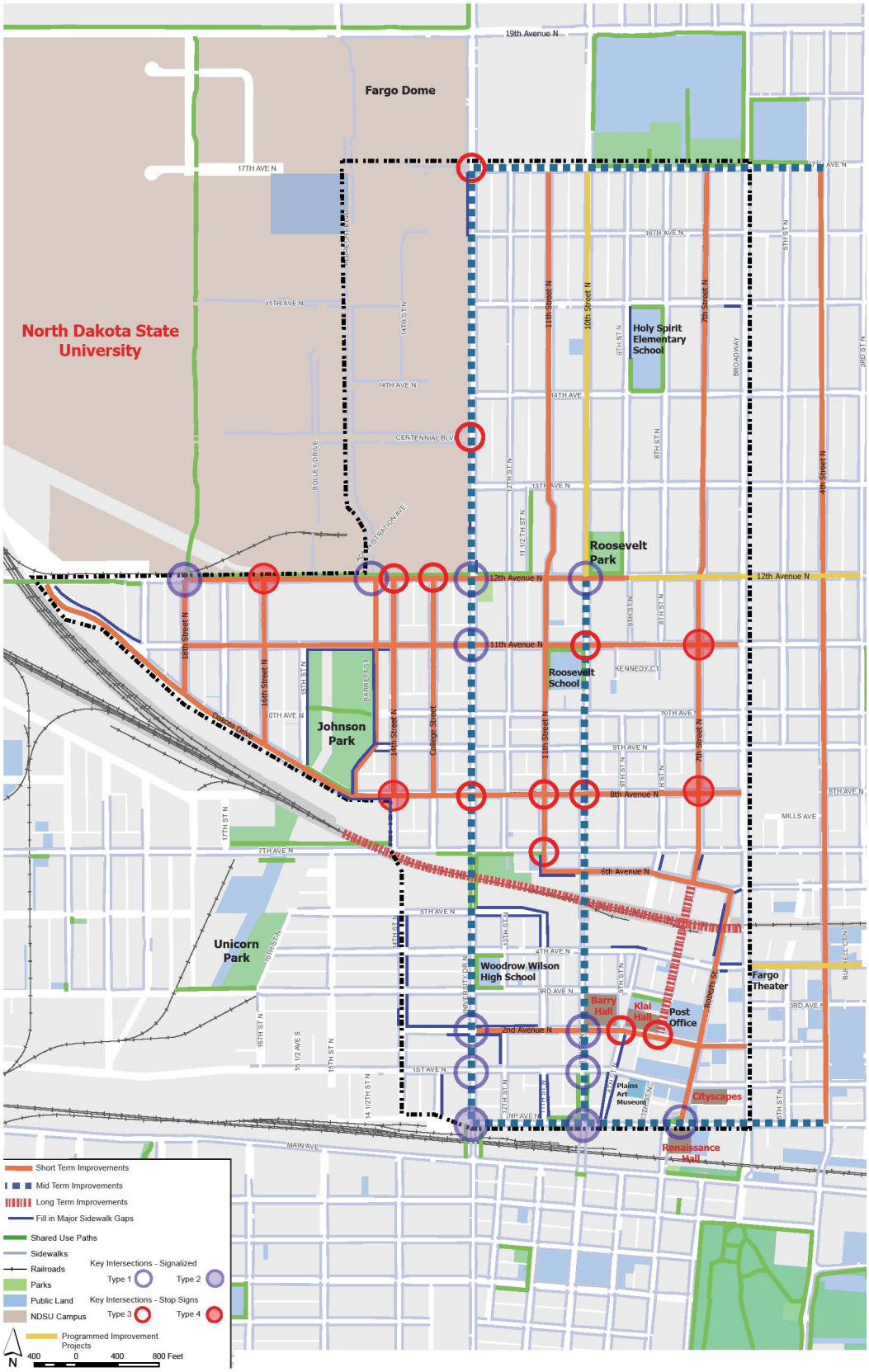
Key Intersection (Type 2)

- Double line crosswalk marking
- Pedestrian signal activation button
- Pedestrian countdown timer
- Parking restrictions
- "No Turn on Red" signs and enforcement
- Curb ramps

Key Intersections (Type 4)

- Double line crosswalk marking
- Curb ramp

Master Plan Recommendations - Intersections



System Network Map - Master Plan Recommendations

Part 2
PROJECT BACKGROUND

The Fargo-Moorhead Metropolitan Council of Governments (Metro COG), in partnership with North Dakota State University (NDSU), NDDOT and the City of Fargo, has identified a need to prepare a Bicycle and Pedestrian Access Plan to improve connections between the main NDSU campus, downtown campus facilities/ downtown core and adjacent residential neighborhoods. This report documents the NDSU Bicycle and Pedestrian Access Plan and will be used to identify infrastructure and capital investments, elements to enhance bicycle and pedestrian travel and access within the project area and beyond, and provides a recommended implementation plan.

The NDSU Bicycle and Pedestrian Access Plan is a direct result of a joint partnership between Metro COG and the City of Fargo, who together developed a refined near-term bikeway facility during the spring of 2009 based on the 2007 NDSU Campus Access Study short-term bikeway alternative. Metro COG staff and City of Fargo planning staff did a field study of the 2007 short-term bikeway alternative. The out and back on-road bicycle route was modified to an on-road loop configuration. Signalization and pavement quality were reviewed and recommendations for signage and signalization improvements were made in the early summer of 2009.

2.1 Project Purpose

The primary purpose of the NDSU Bicycle and Pedestrian Access Study is to gather and document information on current walking and bicycling behavior between NDSU's main campus and its downtown campus (Barry, Klai and Renaissance Halls). The Study will offer alternatives for bicycling and walking infrastructure in the short, medium and long-term so as to improve the convenience of walking or bicycling to the main and downtown campus.

This document represents the completion of a eleven-month process to formulate design recommendations and implementation strategies for the bicycle and pedestrian access study. Included are brief descriptions of the project goals and objectives, descriptions of the overall guiding principles for the project background materials, design recommendations, planning level cost estimates and a recommended implementation strategy. This document should be used as a template to guide future decisions regarding both public and private improvements within the project area.

Project Goals & Objectives

The primary goal of the study is to develop a world-class, on and off road pedestrian/ bicycle facility network connecting the NDSU Main Campus to the NDSU Downtown buildings that allows all users access to the full range of resources and amenities the NDSU campus and City of Fargo has to offer.

Primary Objective

The proposed pedestrian and bicycle connections will safely bridge the gap between the campus areas, promote a greater regional connectivity, add economic value to the business community and add quality of life benefits to residents, students, employees and visitors to the City of Fargo.

Guiding Principles

Improve Safety – Recommendations to consider safety of bicycle, bicyclist, bicycling, walking and pedestrians within the project area and broader context of the Downtown.

Guiding Principles will reinforce study recommendations.

Improve Access and Mobility – Make it easier for bicycle, bicyclist, bicycling, walking and pedestrians to move throughout the project area and connect to the broader context of Downtown and riverfront.

Increase the Numbers of Walkers and Bicyclists - Recommendations to facilitate more bicycle, bicyclist, bicycling, walking and pedestrians throughout the year.

Balance the functional needs of pedestrians, transit, trains, motor vehicles, and bicyclists.

Community Support and Livability - Facilitate University and neighborhood input to improve the community as a whole.

Cost effectiveness and Implementation – Recommendations to consider capital costs in addition to long-term operational and maintenance costs.

Project Considerations

Current Planning projects and Land Use/ Transportation Policies – What is currently in place to support the recommendations to come out of this study. This will include current City CIP projects, County or State roadway

work, and current NDSU redevelopment projects.

Current Demand Model - The transit demand model established in the access study identified approximately 3,000 additional daily student commute trips between the main campus and Barry Hall; non-inclusive of the two other downtown NDSU facilities.

Physical Limitations – Prosper Line railroad tracks, high traffic volumes along major streets within the project area, multiple curb cuts, poorly defined crossings, existing conditions and capacity of sidewalks, and limited availability for shared use paths.

Understanding of key project considerations will help to define recommendations for the Bicycle and Pedestrian Access Study

2.2 Background Reports and Summaries

The planning process for the NDSU Bicycle and Pedestrian Access Study integrated the key findings and objectives defined in numerous related studies. Following is a list of the pertinent studies reviewed as part of the planning process.

- **Fargo-Moorhead Rail Corridor Consolidation Feasibility Study**
As a part of this planning process we utilized this document to gain an understanding of the planning process and recommendations related to the feasibility of a consolidated rail corridor that would eliminate the Prosper subdivision between the Fargo yard and Moorhead junction.

- **2006 Metro Cog Metropolitan Bicycle and Pedestrian Plan**
As a part of this planning process we utilized this document to gain an understanding of the following;
a) Understand the existing bike and pedestrian systems and facilities,
b) Gain an understanding of bicycle and pedestrian issues and needs,
c) Understand primary goals and objectives for bicycle and pedestrian improvements within the community,
d) Gain an understanding of plan recommendations and strategies for project selection and,
e) Implementation strategies and funding opportunities.

- **2007 NDSU Access Study**

As a part of this planning process we utilized this document to gain an understanding of the following;
a) Understand the transportation demands related to the location of the NDSU College of Business in the Downtown core.
b) Gain a better understanding of relevant issues and concerns of bicycles and pedestrians within the project area,
c) Utilize public input, bicycle counts and the Generated Demand model from this planning project to inform our planning process,
d) Understand plan recommendations and strategy to implement preferred improvements

- **2009 NDSU Bicycle and Pedestrian Access Study - Near-Term Bikeway Analysis and Recommendations**

As a part of this planning process we reviewed this document to better understand the following;
a) Understand the planning process and development of a near-term bikeway facility for inclusion in the NDSU Student Transportation Guide.
b) Understand the bikeway plan recommendations and detailed improvements to specific areas for the near-term bikeway.

- **2008 Fargo-Moorhead Metropolitan Area Safe Routes to School Survey Results**

As a part of this planning process we utilized this document to gain an understanding of the planning process, primary project issues/ concerns and recommendations related to the Safe Routes to School Survey.

- **2008 NDSU Campus Master Plan**

We reviewed this planning document to understand future growth and expansion of campus facilities, future infrastructure projects and broader transportation improvements needed.

- **City of Fargo: NP and 1st Avenue North Corridor Development Plan**

We have documented and reviewed issues, opportunities and current recommendations for street improvements related to this on-going project.

- **2009 NDSU Student Transportation Guide**

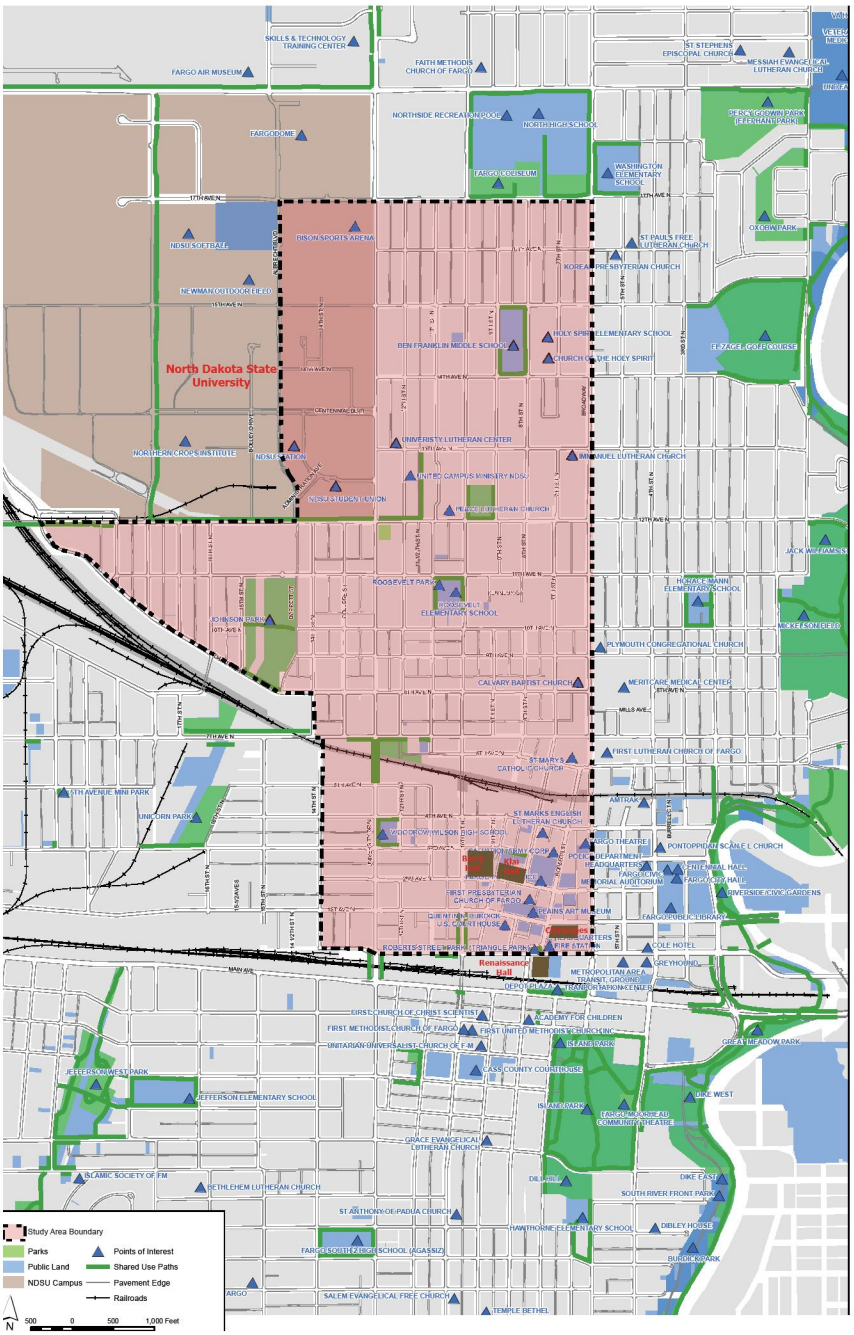
As a part of this planning process we utilized this document to gain an understanding of the transportation options available for students and faculty.

- **2009 Roosevelt Land Use Plan**

We have documented this on-going project to understand what effect future landuse decisions might have on bike and pedestrian needs within the project area and broader neighborhood.

2.3 Existing Conditions

This section provides an analysis of the current conditions within the project area and adjacent Downtown Fargo. The following graphics document and summarize the pertinent issues, key opportunities, and provide a graphic summary of past studies that affect the planning study.



Community Context

The focus of the Community Context analysis is the relationship to the NDSU Study area of the greater Fargo Downtown area.

The project boundary for the NDSU Bicycle and Pedestrian Access Study is defined as 17th Avenue N. as the northern boundary, Broadway Avenue as the eastern boundary, and NP Avenue N. as the southern Boundary. The western boundary of the project area begins at the intersection of 14th Street N and NP Avenue. This boundary goes north along 14th Street N. to 8th Avenue N. At 8th Avenue N. the boundary follows Dakota Drive to the intersection of 12th Avenue. At 12th Avenue the boundary heads east to the intersection of 12th and Albrecht Blvd. The boundary line follows Albrecht Blvd. north to the intersection of 17th Avenue.

The Pedestrian Access and Circulation analysis identifies the existing facilities to support pedestrian access and movements. Included in the analysis are;

a) The existing NDSU circulator bus routes are identified with the locations of designated stops,

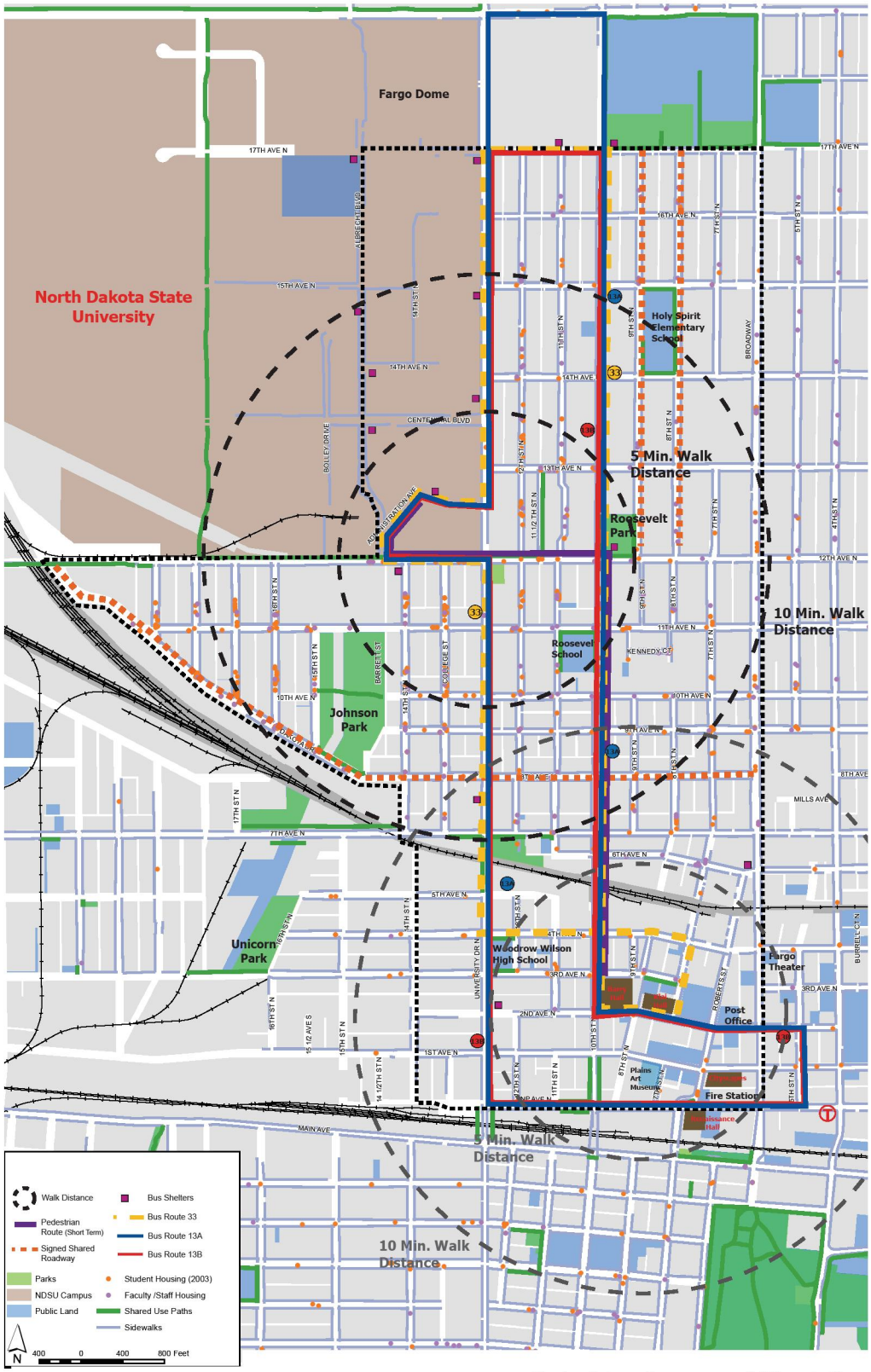
b) Proposed pedestrian route as identified in the 2009 NDSU Bicycle and Pedestrian Access Study - Near-Term Bikeway Analysis and Recommendations,

c) 2003 Student and Faculty Housing to identify housing locations within and adjacent to the study area to document other connections and trips within the project area,

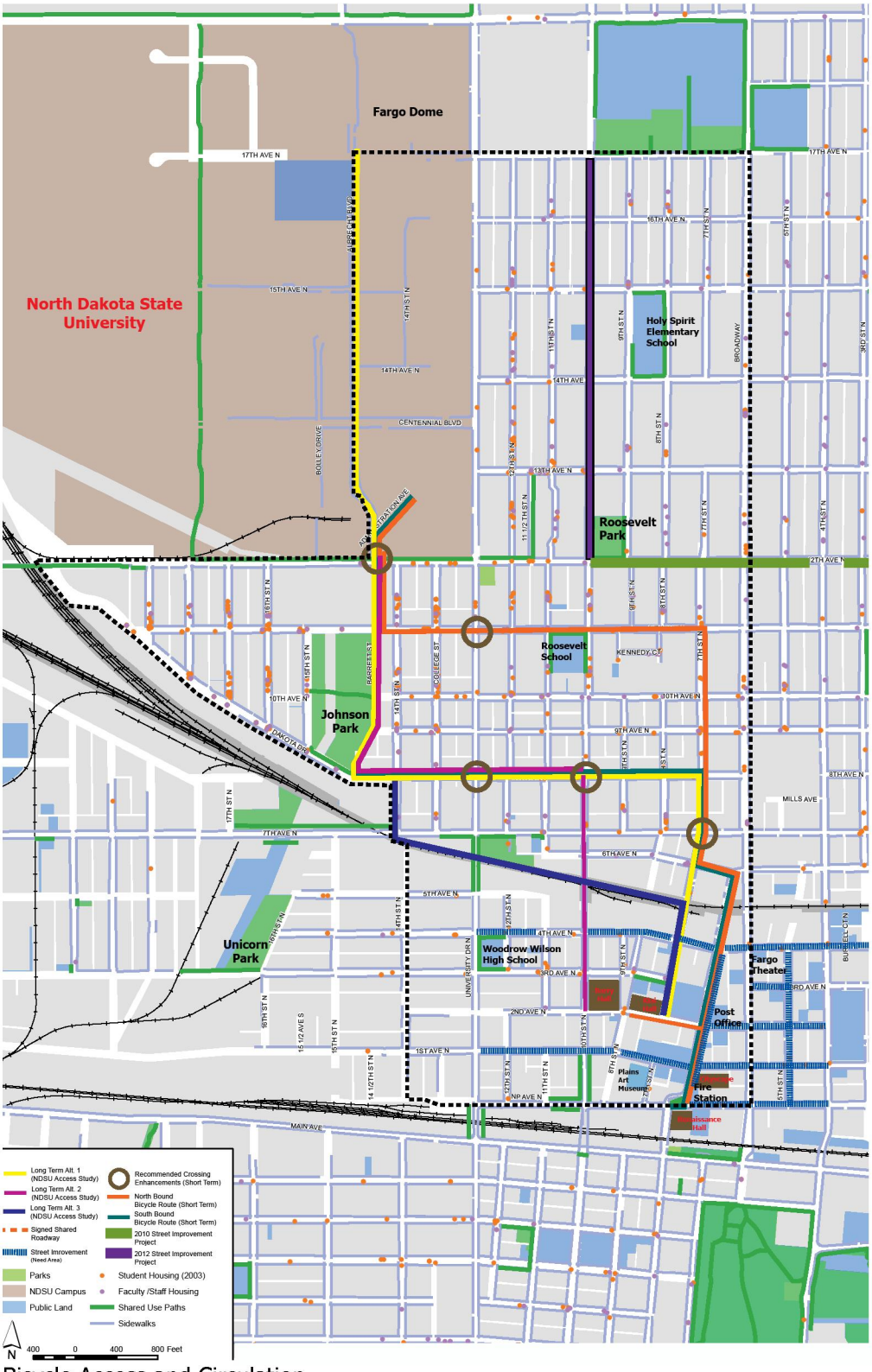
d) 5 and 10 minute walk distances within the project area to document walk distances between the main and Downtown campuses,

e) Current sidewalks and paths to identify gaps in the system,

f) Adjacent community facilities including parks and public uses.



Pedestrian Access and Circulation



Bicycle Access and Circulation

The Bicycle Access and Circulation analysis identifies the previous planning recommendations and existing facilities to support bicycle access and movements within and adjacent to the project area. Included in the analysis are;

a) Proposed short term bicycle routes as identified in the 2009 NDSU Bicycle and Pedestrian Access Study - Near-Term Bikeway Analysis and Recommendations,

b) Bikeway alternatives identified in the 2007 NDSU Access Study,

c) 2003 Student and Faculty Housing to identify housing locations within and adjacent to the study area,

d) Current signed shared roadway along Dakota Drive,

e) Recommended crosswalk enhancements identified in the 2007 NDSU Access Study,

f) Current and future City of Fargo CIP projects related to street reconstruction to identify future projects to include bike improvements,

g) Current sidewalks and paths to identify gaps in the system,

h) Adjacent community facilities including parks and public uses.

The Vehicular Access and Circulation analysis identifies the existing facilities related to the functional needs to support vehicular access and circulation within and adjacent to the project area. Included in the analysis are;

a) On-street parking locations and and regulations are identified throughout the project area,

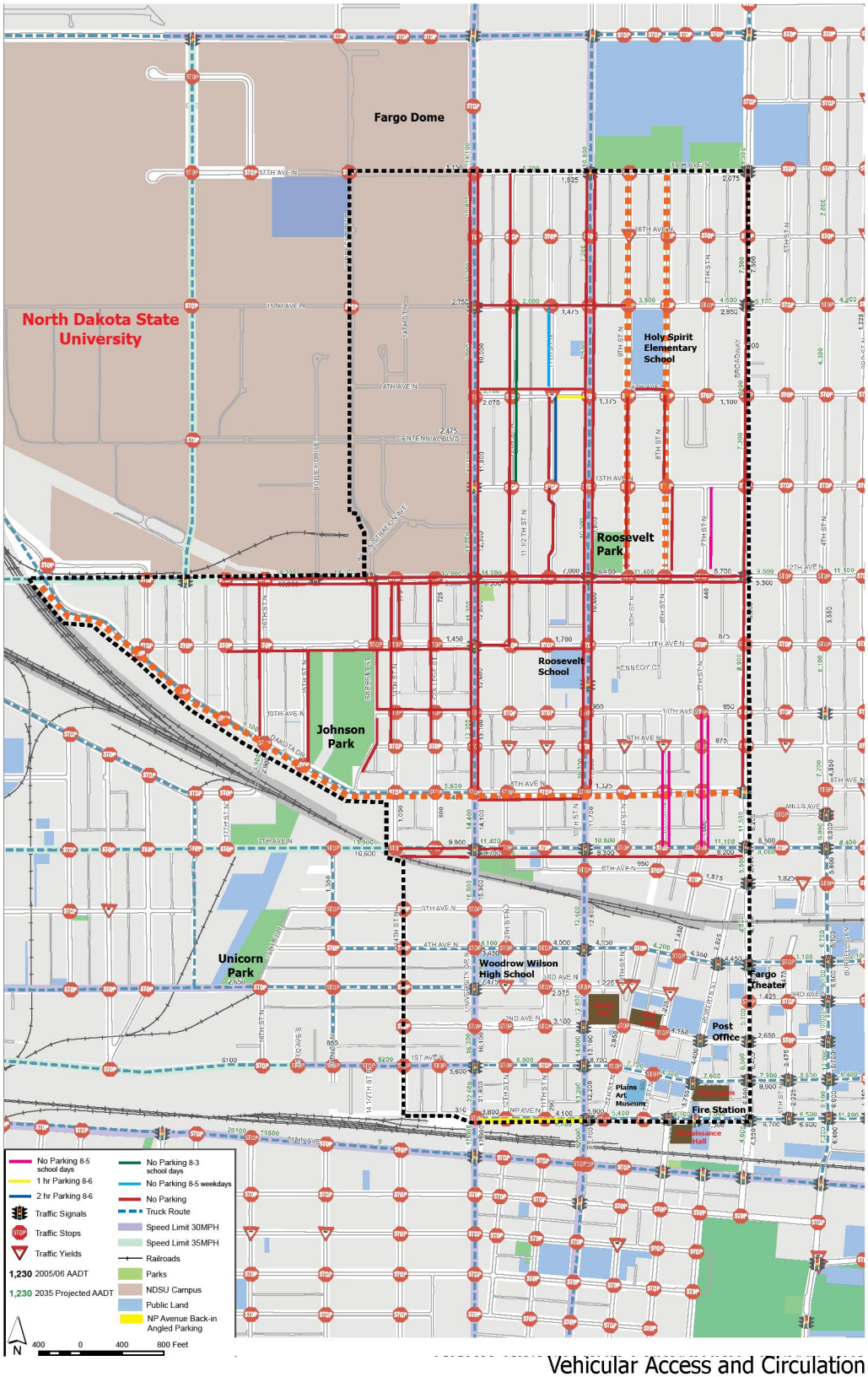
b) Traffic control at all intersections within the project area are identified,

c) 2005/ 2006 ADT's and projected 2035 ADT's are identified for all streets within the project area,

d) Speed limits for streets within the project area are identified,

e) Existing truck routes are identified,

f) Adjacent community facilities including parks and public uses.



Vehicular Access and Circulation

2.4 PUBLIC INPUT- PLANNING PROCESS

Public involvement was a critical component of the NDSU Bicycle and Pedestrian Access Study planning process. The planning process utilized a Steering committee for guidance and developed a series of innovative outreach methods including a project website, online survey, online focus group sessions for agency coordination and public input meetings.

The NDSU students and faculty, along with community residents, are the specific users and have the most relevant knowledge of how the streets and sidewalks operate for the bicyclists and pedestrians.

The intent of this design process was to collaborate with NDSU students and faculty and the broader neighborhood and Downtown community to create a responsive bicycle and pedestrian access plan. The planning process was designed to assist the participants with reaching informed decisions regarding the type of improvements, costs, benefits and implementation concerns associated with the proposed recommendations.

NDSU students and faculty as well as the broader community stakeholders had pportunities at each stage in the process to comment and participate in the formulation of recommendations and creation of the final plans.

Steering Committee Meetings

The project Steering Committee was comprised of staff from NDSU, the City of Fargo, NDDOT and Metro COG. The role of the Steering Committee was to provide insight into University and City policies, provide guidance and review of suggested recommendations. A series of three staff meetings were held, as well as additional online meetings with specific staff members during the planning process.

Public Input Meetings

A series of three public input meetings were scheduled and designed to involve a wide variety of NDSU stakeholders, neighborhood residents, interest groups and citizen organizations. The Public Input meetings were typically held on the same days as the steering committee meetings to provide the opportunity for additional input.

The public input meetings were held on the following dates:

February 3rd, 2010
April 22nd, 2010
October 26th, 2010

Public Information Meeting

The first two public input meetings were held during the background and design recommendation phases and served as venues to present background information and potential design recommendations, as well as solicit public input and to compile issues, concerns and general project questions. Both meetings were well attended by the bicycling, campus and neighborhood stakeholders. The third public input meeting featured the draft planning document with recommendations for system bicycle and pedestrian improvements. Final comments and questions were gathered at this public input meeting and integrated into the final document.

Bike Tour

Bike Tour

The bike tour was held on April 22nd and cris-crossed the study area. Tour attendees visited various streets and intersections to consider ideas for bicycle and pedestrian improvements. The tour began downtown traveled north under the railroad bridge at 8th Avenue.

Community Survey

Community input was also solicited using Survey Monkey – an online survey tool. For a full summary of survey results please see the Appendix. The purpose of the survey was threefold: to inform the final document and route alternatives, to inform the demand model and to gain insight into the current behavior of students, faculty and staff. Of specific interest was determining how students and staff made the trip between the Main Campus and the Downtown campus and their associated neighborhoods. The survey was "live" for about two months and took approximately 5 minutes to complete. Links to the survey were posted on the NDSU website, City of Fargo website and the Fargo-Moorhead Metro COG website.

During the two-month period, 451 responses were collected. Students made up 67% of the respondents, and faculty and staff another 26%. Travel behavior and frequency were measured and of the 443 respondents who answered the question, 84% had traveled between the main campus and downtown for shopping/entertainment reasons at least" less than once per week" and 54% traveled to the downtown campus for classes or work at least" less than once per week". Thirty percent of respondents traveled downtown for shopping / entertainment several times a week and 35% traveled downtown for school/work several times a week.

The greatest number of respondents used the bus as their mode choice between campuses (32%), followed by riding alone in a car (28%), riding a bike (22%), carpooling (11%) and walking (7%). Respondents were then asked to identify the roadways they most commonly used when walking or biking between campuses and the following is a list of the top 8 routes used, in order of popularity:

- University
- 10th Street
- Broadway
- 12th Avenue
- 7th Avenue
- Roberts Street
- 6th Street
- 14th Street

The survey also sought information regarding both east/west and north/south routes that were perceived to be too busy or dangerous for pedestrians or cyclists to use.
The top five east/west routes selected (in order of highest percentage to lowest) were:

- 12th Avenue North
- NP Avenue
- 1st Avenue North
- 7th Avenue North
- 2nd Avenue North

The top five north/south routes selected (in order of highest percentage to lowest) were:

- University Drive North
- 10th Street North
- Roberts Street
- College Street North
- 12th Street North

The final part of the survey consisted of questions regarding potential improvements and their impact on travel patterns. Specifically, respondents were asked if the presence of certain bicycle facilities would be likely to change how they traveled between the two campuses. Multiple choices were allowed and of 401 respondents, 79% indicated that they would be more likely to utilize their bicycles if there was a bicycle path (10' wide separated trail) that connected the main and downtown campus.

Other potential facilities selected that would affect future travel were:

- Bicycle boulevard (66%)
- Bicycle lanes (60%)
- Wider sidewalks (52%)
- Traffic signals at intersections (35%)
- Bicycle route signage (27%)

2.5 DEMAND MODELING

By estimating the future number of bicyclists and pedestrians traveling between main campus and the downtown buildings, Metro COG can provide support for the construction of bikeways and pedestrian facilities. Estimating bicycle and pedestrian demand relies on existing data, which is much less available than transit and automobile data.

This demand model estimates the number of future bicyclists and pedestrians, by proposed facility type, using data collected from the 2009 Campus Access Survey (CAS) and the 2009 Metro COG Long-Range Transportation Plan.

The model methodology strives to estimate the number of new bicyclists and pedestrians per improvement, i.e. bikeway, sidewalks and improvements to intersections and streetscapes. Of course many other factors influence peoples' propensity to walk and bicycle. These factors include, but are not limited to changes in land use, the economy, population, weather and driver behavior and acceptance of bicyclists and pedestrians. Using population growth data from the 2009 Metro COG Long-Range Transportation Plan, the model also estimates the number of new bicyclists and pedestrians for every five years until 2035.

The CAS asked respondents if inclement weather influenced their propensity to walk or bike to campus. This data shows 50 percent of people would bike or walk during inclement weather. This is not surprising since other cold weather cities experience moderate or even high bicycle and pedestrian demand during inclement weather. For example, Minneapolis, which has similar weather patterns to Fargo, ranks number two among big cities in the nation for the most people that bicycle to work and number 10 for those that walk. It also ranks number two in bicycle and pedestrian dollars spent per capita, which is no doubt a contributing factor to high bicycling and walking rates.

Estimated Number of New Bicycles and Pedestrians

As mentioned above, estimating bicyclist and pedestrian demand for new facilities is challenging, especially when data is limited. The intent of the estimation is to apply the CAS results to all 20,067 campus users, which include students, faculty and staff.

Bicyclists

The CAS found that roughly 2/3 of campus bicycle users do not currently bike "every- or most times". This means that of the 20,067 campus users, an estimated 15,050 do not bicycle to campus. Of these non-bicycling campus

users, 60, 63 and 79 percent would bicycle if a bicycle boulevard, lane or path were built, respectively. In other words, there are potentially 9,030 bicycle boulevard users, 9,933 bike lane users and 11,890 bicycle path users.

Of the campus users that do bicycle, most use 12th Avenue N, 8th Avenue N, 10th Street N, and University Drive, as found from the CAS. However, bicyclists do not use these streets equally. The model uses CAS data to find the distribution of bicycle trips among these four identified roadways.
Next, the model applies the following factors: "attraction", "campus access frequency", and "inclement weather". Results are recorded in Table 1.

The attraction factor is derived from bicyclist level of preference of intersection type, i.e. signalized, stop controlled, uncontrolled. The campus access frequency factor assumes that all campus users access campus three out of five weekdays. Additionally, 50 percent of non-bicyclists living within biking distance would bike in inclement weather.

The construction of a shared use path along the active Prosper Line right-of-way will potentially attract the most bicyclists. However, the estimation of 5,707 daily bicycle trips cannot consider existing demand because no bicycle trips are currently made on the ROW. Further, the propensity of bicyclists to use the path is likely to depend on the bicyclist's level of experience and trip purpose. Novice and recreational riders will likely use the path much more than experienced commuters looking for the most direct route.

Table 1: Daily and Hourly Bicyclist Demand

Improvement	*Raw Estimate with Attraction Factor*	*Daily Estimate **	*Per Hour During Spring / Fall ****	*Estimate accounting for Inclement Weather (0.5)***	*Per Hour during Winter*****
12th Ave N Bike Blvd	1,105	663	55	332	33
8th Ave N Bike Blvd	1,024	614	51	307	31
University Dr Bike Lanes	2,459	1,476	123	738	74
10th St N Bike Lanes	1,783	1,070	89	535	54
Rail with Trail	5,707	3,324	285	1,712	171

** Assumes that people access campus three out of five days*
*** 50% of drive/carpool/bus survey respondents that are within walking/biking distance and would not walk/bike due to inclement weather (CAS N= 341)*
****This column assumes that people are biking during daylight hours and uses an average of 12 hours of day light for fall and spring.*
*****This column assumes that people are biking during daylight hours and uses an average of 10 hours of day light for winter.*

Bicyclists - 25 Year Outlook

The model output estimates the number of bicyclists if the facilities are built by 2015. Many factors may lead to increased bicycling rates in the future. NDSU is growing and had its largest enrollment in 2009 and the Metro COG estimates population growth of six percent every five years until 2035. Bicycling rates will likely mirror population growth, resulting in a 26 percent increase in bicycling by 2035. The projected increase in bicycling and walking informs the project recommendations detailed in Part 3; as the number of pedestrians and cyclists is projected to increase along with the population, the demands on existing facilities can be expected to increase, as well as the number of cyclists using other streets. Investments in bicycling and walking facilities will help to accommodate new user demand and improve safety and mobility. This could be even larger if bicycling is promoted through encouragement and education programs, increased densities in core areas and implementation of roadways that accommodate all users.

The Appendix provides detailed model methodology.

Pedestrians

The high mobility of pedestrians, who are not tied to the roadway network, challenges estimates of pedestrian trips. Further, most everyone walks at some point in their day, from their car to the classroom, from home to the transit station, etc. It is for this reason that the model uses existing drivers as the potential pedestrian pool.

The CAS found 29 percent of campus users drive to campus. Of these 5,819 individuals, 36 percent would walk if either lighting, crosswalks, signals or sidewalks are installed or improved. Because pedestrian facility locations are not identified, the model assumes that they will be built in tandem with the identified bicycle facilities.

Using the same methodology as the bicycle demand estimate, the pedestrian demand model estimates pedestrian trip distribution and attraction along the identified roadways, the results of which are shown in Table 2.

As discussed in the bicycle estimate, the shared use path along the active Prosper Line presents a host of unknowns that challenge estimating pedestrian trips. Using the methodology used for the on-street facilities, the model estimates 1,103 daily pedestrians. This estimate does not consider existing pedestrian trips taken along the rail ROW because they do not currently exist.

Table 2: Daily and Hourly Pedestrian Demand

Improvement	*Raw Estimate with Attraction Factor*	*Daily Estimate **	*Per Hour During Spring / Fall ****	*Daily Estimate accounting for Inclement Weather (0.5)***	*Per Hour during Winter*****
12th Ave N	142	85	7	43	4
8th Ave N	142	85	7	43	4
University Dr	701	421	35	210	21
10th St N	417	250	21	125	12
Rail with Trail	1,103	662	55	331	33

** Assumes that people access campus three out of five days*
*** 50% of drive/carpool/bus survey respondents that are within walking/biking distance and would not walk/bike due to inclement weather (N= 341)*
****This column assumes that people are walking during daylight hours and uses an average of 12 hours of day light for fall and spring.*
****This column assumes that people are walking during daylight hours and uses an average of 10 hours of day light for winter.*

Pedestrians - 25 Year Outlook

Regarding pedestrian trip growth rates, the model used the same methodology of applying FM Metro COG's six percent population growth rate, resulting in an approximately 26 percent increase in pedestrian trips by 2035. Like bicycling rates, pedestrian rates hinge on land use density, pedestrian facilities and attractive streetscapes. The Appendix provides detailed model methodology.

BICYCLE COUNTS

To gather data on existing numbers of people bicycling and walking in the study area volunteers were stationed at key intersections on either April 27 or 28 or May 4, 2010. Five of the intersections had morning and afternoon counts; a volunteer counted at 12th Ave. N. and University Drive for the morning segment only.

The volunteers counted 614 pedestrians and 257 bicyclists total at the 6 sites for all counting periods. The weather during the counts varied from grey to clear skies and a temperature range between 50 and 60 degrees.

Location	Date of Count (2010)	Time 1	Time 2	Comment	Pedestrian Counts	Bicycle Counts
NP Ave and 10th St. N	May 4	10 AM to 12 PM	12:30 PM to 2:30 PM	100% of bicyclists counted were on the sidewalk	51	14
2nd Ave N and 10th St N	April 28	10 AM to 12 PM	12:30 PM to 2:30 PM	Highest total number of pedestrians	253	26
8th Ave N and 7th St N	April 27	10 AM to 12 PM	12:30 PM to 1:45 PM	Lowest percent o f sidewalk riders by far (4%)	60	27
8th Ave N and University Dr N	April 27	10 AM to 12 PM	12:30 PM to 2:30 PM	Highest total number of bicyclists	53	104
12th Ave N and 10th St N	April 28	10 AM to 12 PM	12:30 PM to 2:30 PM		35	30
12th Ave N and University Dr N	May 4	10 AM to 12 PM	N/A	2nd highest in totals for both bicycles and pedestrians	162	56

Figure 1, depicts the number of bicyclists seen at each intersection broken down by 15 minute increments. The highest number counted was at 8th Ave. N. and University Dr. between 2 and 2:15 PM with 23 bicyclists passing through this intersection. Close to 50 pedestrians passed through the 12th Ave. N. and University Dr. N. intersection between 10:30 and 10:45 AM as seen in Figure 2, which depicts the pedestrian counts in 15 minute increments.

Bicycle traffic volume at all intersections was much the same during the 4 hour count period, except at the location of 8th Ave N and University Dr. N. Here the number of bicyclists increased considerably in the afternoon between 1 PM and 2:30 PM.

Pedestrian traffic volumes at all intersections was much the same during the 4 hour count period except for traffic at the intersection of 2nd Ave. N. and 10th St. N. Here the pedestrian volumes spiked on a regular basis throughout the count, likely due to student and staff movements between classes.

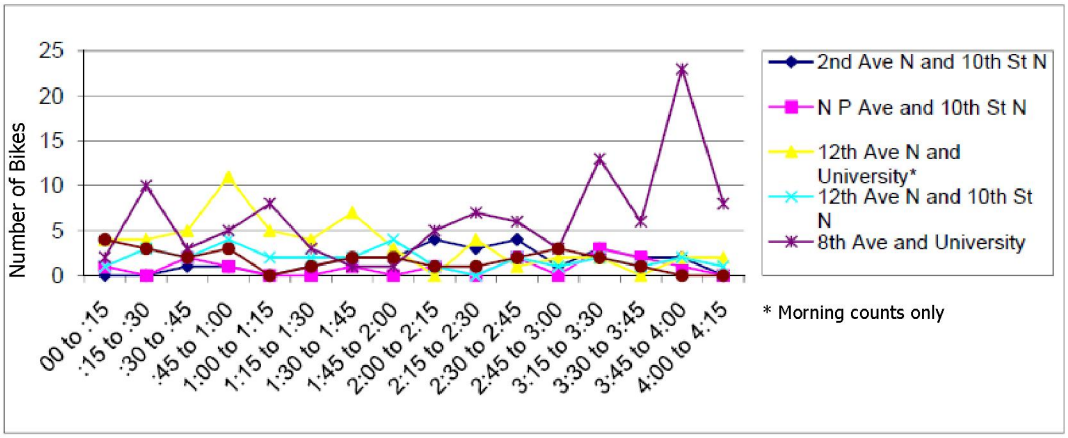


Figure 1: Bicycle Count Totals by 15 Minute Increment

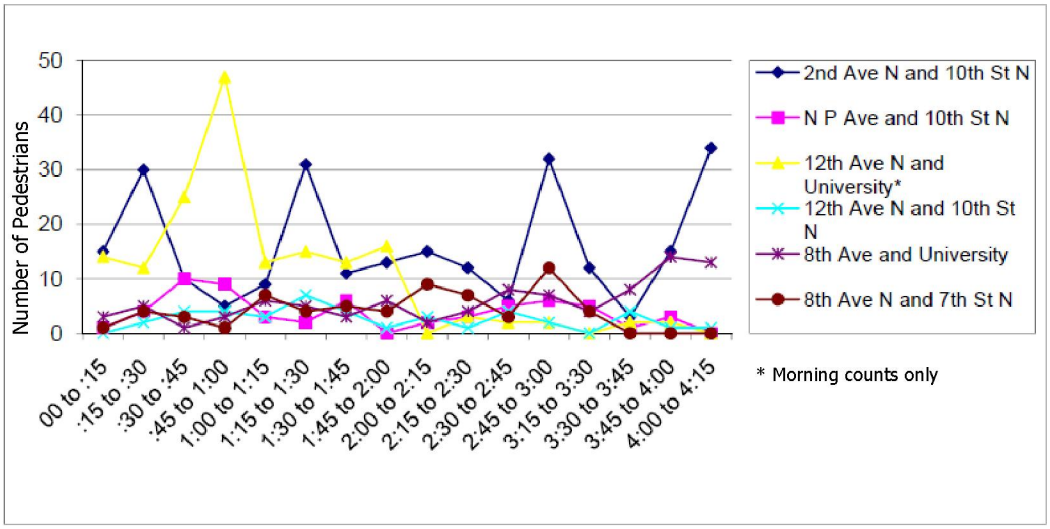


Figure 2: Pedestrian Totals by 15 Minute Increment

Other interesting facts found in the data include:

- 100% of the bicyclists counted at NP Ave. and 10th St. N. were riding on the sidewalk (14 bicyclists total)

- 2nd Ave. N. and 10th St. N. recorded the highest total number of pedestrians (253)

- The lowest percentage of bicyclists on the sidewalk was seen at the 8th Ave. N. and 7th St. N. intersection (1 rider out of 27 bicyclists total)

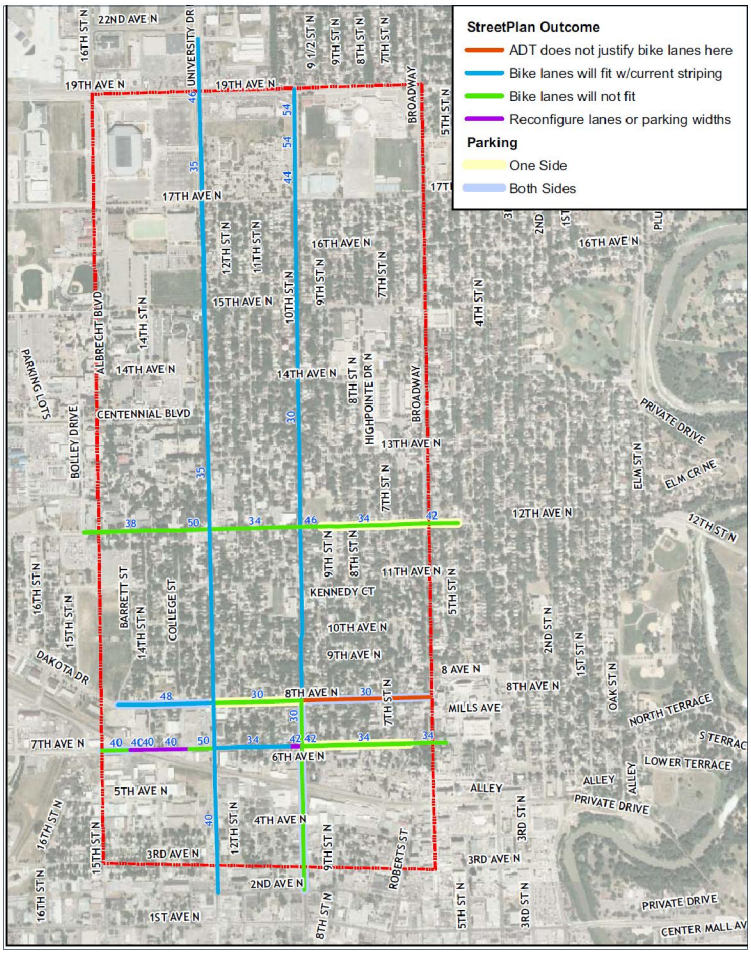
- 8th Ave N and University Dr. N. had the highest number of bicyclists (104)

- The second highest totals for both bicyclists and pedestrians occurred at 12th Ave. N. and University Dr. N.

STREET PLAN

The Alta Team used a tool called "StreetPlan" to determine if certain key streets in the study area could accommodate bike lanes given the existing conditions on the subject streets, including current curb face to curb face width, traffic volumes, etc. The streets studied in this model included:

- 10th St. N. from 2nd Ave. N. to 19th Ave. N.
- University Dr. N. from 2nd Ave. N. to 22nd Ave. N.
- 7th Ave. N. from Broadway to 15th St. N.
- 8th Ave. N. from Broadway to Barrett St.
- 12th Ave. N. from 5th St. N. to Bolley Dr.



The StreetPlan model calculates whether and how bike lanes can be retrofitted on a street segment based on the cross section's total width and element widths, its static attributes such as parking, and its traffic attributes such as volume. Data for the model was provided by the City of Fargo or the Fargo Moorhead Metropolitan Council of Governments.

A note about the railroad underpasses at University Dr. and at 10th St. N. The model does not take into consideration the restraints of the tunnel underpasses located under the Prosper Line. Therefore, although the model output indicates that a bike lane will fit on University Dr. at this location, there are other safety issues to consider at this location and a bike lane alone is not sufficient here to provide a safe bicycle facility.

Outcome of Model by Street

Street	From	To	Outcome	Comments
10th St N	2nd Ave N	8th Ave N	Bike lanes will not fit	Pavement width is too narrow
10th St N	8th Ave N	19th Ave N	Bike lanes will fit with current striping	Bike lanes should be located on the left side of the one-way street due to transit stops on the right
University Dr	2nd Ave N	22nd Ave N	Bike lanes will fit with current striping	Bike lanes should be located on the left side of the one-way street due to transit stops on the right
7th Ave N	Broadway	10th St N	Bike lanes will not fit	Parking is allowed on both sides of 7th Ave N
7th Ave N	10th St N	11th St N	Bike lanes will fit if lanes or parking are reconfigured	
7th Ave N	11th St N	University Dr	Bike lanes will fit with current striping	
7th Ave N	University Dr	14th St N	Bike lanes will fit if lanes or parking are reconfigured	
7th Ave N	14th St N	15th St N	Bike lanes will not fit	
8th Ave N	Broadway	10th St N	ADT does not justify bike lanes here	For the sake of consistency consider bike lanes on this segment
8th Ave N	10th St N	University Dr	Bike lanes will not fit	Parking is allowed on both sides of 8th Ave N
8th Ave N	University Dr	15th St N	Bike lanes will fit with current striping	
12th Ave N	5th St N	9th St N	Bike lanes will not fit	Parking is allowed on both sides of 12th Ave N
12th Ave N	10th St N	Bolley Dr	Bike lanes will not fit	

Part 3
PROJECT RECOMMENDATIONS

Recommendations were developed based upon the input received from the Steering Committee, NDSU stakeholders and community residents. The project team developed and evaluated the alternatives, balancing the impacts and costs/ benefits of each alternative.

This study has two categories of recommendations, policy recommendations which address policy and ordinance issues and infrastructure improvements which include bicycle and pedestrian facilities and intersection improvements.

3.1
Policy Recommendations

Policy and Enforcement Recommendations

- The NDSU Bicycle and Pedestrian Access Plan embraces planning for Complete Streets to balance the needs of all users and provide design recommendations to maximize the benefits to all users.

- Right turn on red restrictions, which can be limited to certain times of the day or can apply to all hours, prohibit motorists from turning right without a green signal. Restricting this turning movement can reduce conflicts with pedestrians crossing at intersections and bicyclists wishing to travel straight through an intersection.

- Both NDSU and the City of Fargo have made use of successful education and encouragement programs in the past to encourage people to ride the bus (NDSU and Matro Area Transit's cooperative effort to provide free bus rides to students) and educate bicyclists and motorists (the educational brochure for the Broadway Shared Lane Markings). Both entities should continue efforts directed at education, encouragement, enforcement and evaluation to increase the numbers of bicycle, bicyclist, bicycling, walking and pedestrian trips in the study area.
- Speed enforcement will be a key improvement for bicycle, bicyclist, bicycling, walking and pedestrian safety as well as improving the general "livability" of the Roosevelt Neighborhood and NDSU Campus.

• Yield to pedestrian in crosswalk enforcement is another key area of law enforcement that will benefit the students, staff and facility and the neighborhood as a whole. The study recommends that focus on the enforcement of the yield to pedestrians law occur twice per year: in the fall at the beginning of the school year and in the spring as the weather turns nice and more people are out walking and biking.

• Snow shoveling ordinance enforcement will be key to keeping the sidewalks clear throughout the year for pedestrian access between the main campus and the NDSU downtown buildings. See Maintenance Issues for a more detailed discussion on this topic.

3.2 Infrastructure Improvements

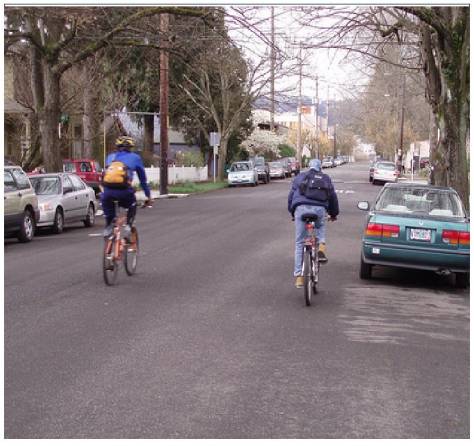
This section documents the recommended infrastructure improvements for the NDSU Bicycle and Pedestrian Access Study, which include bicycle and pedestrian facilities and intersection improvements.

3.2.1 Bicycle Facilities Definitions

The NDSU Bicycle and Pedestrian Access Study recommends an on-street bikeway network which includes the following facilities.

Bike Boulevard

Bicycle boulevards are low-volume streets that have been optimized for bicycle travel through traffic calming and diversion, signage and pavement markings, and intersection crossing treatments.

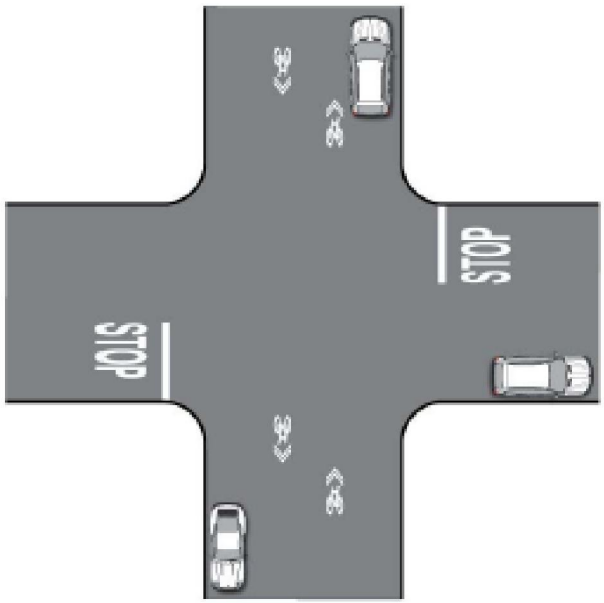


Bicycle boulevards are shared roadway facilities that, when correctly implemented, are comfortable and attractive to cyclists with a wide range of abilities and ages but are inconvenient for through automobile use.

Cities with robust bicycle boulevard networks include Berkeley (CA), Eugene (OR), Palo Alto (CA), Portland (OR), San Luis

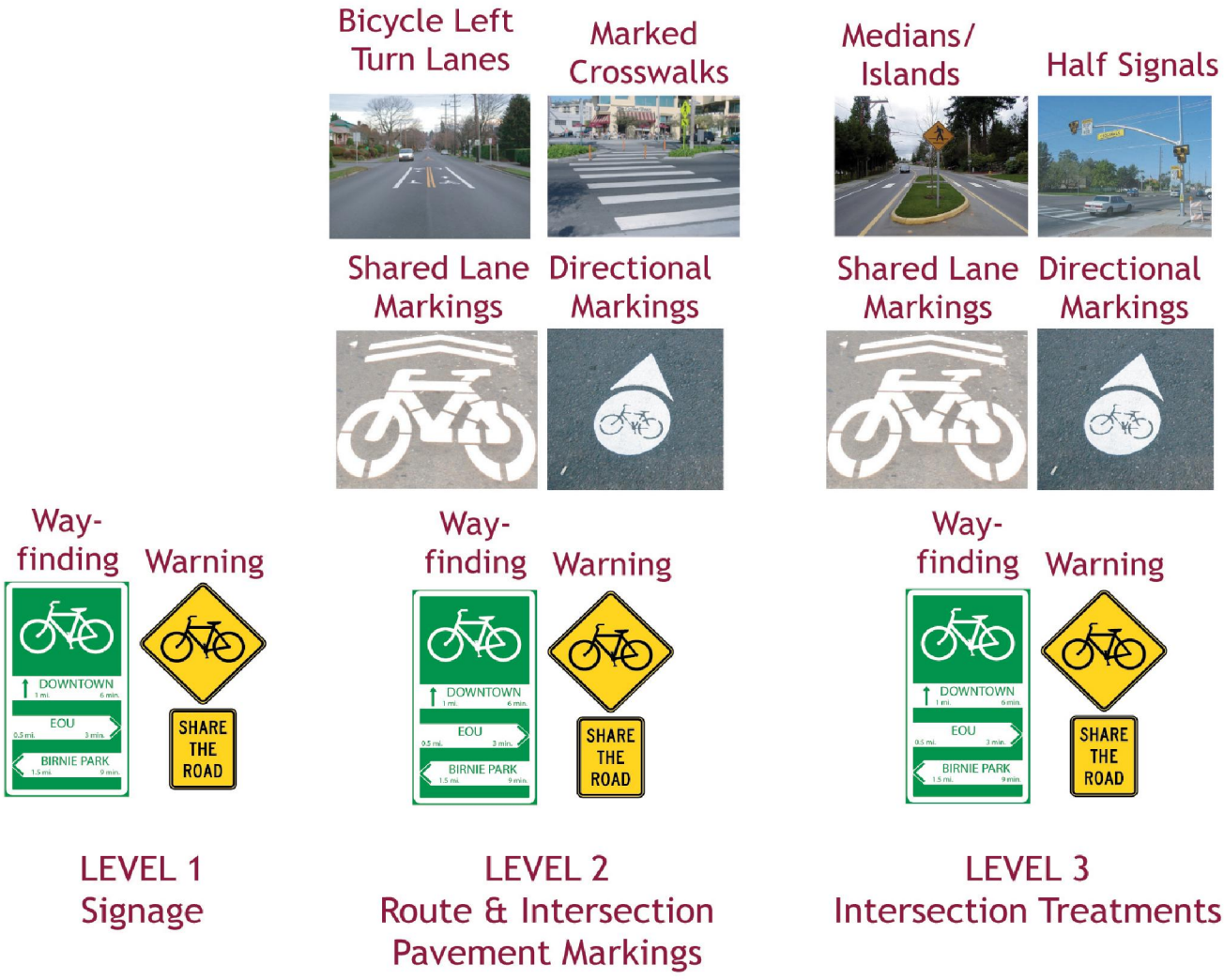
Obispo (CA), and Vancouver (BC).

Bicycle boulevards should be located on routes that serve major origins, destinations, and travel corridors (often paralleling an arterial); are as direct and intuitive as possible; and are low-volume facilities to begin with.

Bike Boulevard		
Purpose	Bike boulevards are bikeways on low volume roadways that encourage bicycle use with a variety of traffic calming treatments, e.g. traffic diverters, traffic circles and bulb-outs. Some Cities paint oversized stencils of bikes in the center of the travel lane to notify motorists that bicyclists are prioritized. Bike boulevards typically provide parallel routes to roadways that do not have bikeways or may be uncomfortable for some bicyclists. Traffic controls along bike boulevards assign priority to through bicyclists while encouraging motorized traffic to use alternate routes.	 Bike Boulevard
Guidelines	**Average Daily Traffic Volume and Posted Speed:** Roadways should have low traffic volumes and posted speeds 25 miles per hour or less. Bike boulevards maybe developed on roadways where residents and public agencies desire less traffic and slow traffic speeds. **On-Street Parking:** Roadways may have on-street parking and "Shared Lane Markings" maybe used as a bike boulevard treatment. **Roadside Development:** Residential areas **Right of Way Availability:** No additional ROW is needed, however, the agency with jurisdiction should support the construction of traffic calming treatments that effectively reduce traffic volumes and speed. **Topography:** Bike boulevards should be flat with minimal or no grades. **Expected User Type:** All skill levels, especially novice and children.	

Bicycle Boulevard Application Levels

BICYCLE BOULEVARD APPLICATIONS



Signed Shared Bikeway

Intensity of Treatments (varies based and area

on roadway conditions characteristics)

Bicycle Boulevard

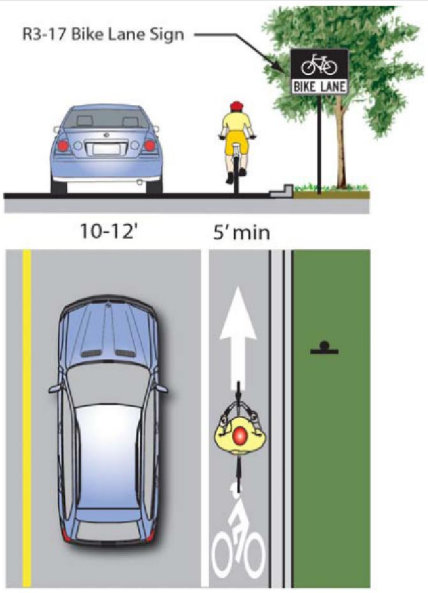
Bike Boulevard

This graphic represents the defined levels of treatment for the bike boulevards as recommended in this project.

Each Bike Boulevard level defines all treatments (signage, pavement markings, intersection treatments, traffic calming and traffic diversion) associated with the recommended improvements.

Bike Lanes

Designated exclusively for bicycle travel, bike lanes are separated from vehicle travel lanes with striping and are indicated by pavement stencils and signage. The lanes are intended to increase the comfort of bicyclists and remind motorists that bicyclists have a right to the road. Bike lanes are desirable for bicycle commute routes on major roadways where higher traffic volumes and speeds indicate a need for greater separation. One key consideration in designing bike lanes in an urban setting is providing sufficient bicycle and parking lane width for bicyclists to avoid car doors that may open.

<table>
<tr><th colspan="3">Bike Lane</th></tr>
<tr><td>Purpose</td><td colspan="2">Bike lanes are dedicated portions of a roadway for bicycle use only, indicated by white lane striping and pavement markings. Bike lane widths should be five feet or wider if along parked cars or on roadways with traffic speeds greater than 35 miles per hour.
  </td><td> 

Bike Lane</td></tr>
<tr><td>Guidelines</td><td colspan="2">Average Daily Traffic Volume and Posted Speed: Generally, high traffic volumes warrant bike lanes. However, existing roadway width and posted speeds should also be considered.

On-Street Parking: Minimizing parking lane widths greater than nine feet should be considered to provide more space between parked cars and the bike lane. Painting parking “T”s will help align cars close to the curb. Bike lanes are not recommended on roadways with angled parking because motorists are unable to see on-coming traffic and could collide with bicyclists.

Roadside Development: Roadways with roadside development that encourages automobile travel may be appropriate for bike lanes. Land uses such as shopping areas and office parks can be attractive to bicyclists if bike lanes are provided.

Right of Way Availability/Road Diet: Bike lanes are typically striped within the existing right of way. Lane widths are narrowed or lanes are removed to reallocate space for bike lanes. So called “road diets” require a combination of public agency and community support along with an expected future demand.

Topography: Bike lanes should be considered on uphill sections of roadway so that bicyclists are not slowing automobile traffic. If roadway space is available, bike lanes can be installed on downhill sections, though they are not necessary because bicyclists can minimize their speed differential with motorists.

Expected User Type: Novice to intermediate riders feel the most comfortable on bike lanes because they are provided with a designated lane.</td></tr>
</table>

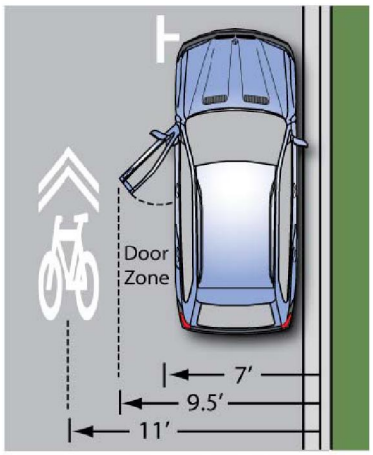
Shared Lane

On any roadway where a bicycle may legally be operated, bicycles may need to share a travel lane with motor vehicles if the road does not have a bike lane, paved shoulder or separate shared-use path. A shared travel lane may be an appropriate bikeway on some low-speed, low volume streets or roads. Where a shared lane is intended to be part of a bike route, it should be signed as a bikeway.

Shared Lane Markings

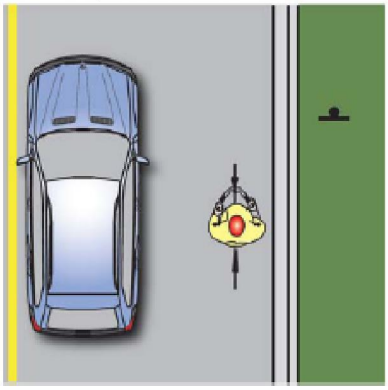
A marking used on streets where cars and bicycles are expected to share a lane. The marking serves two purposes; it informs the cars to expect bicycles in the lane and it helps bicyclists to better position themselves in the lane to avoid car doors. Where parking is not present the marking helps bicycles to position themselves in the lane so that a passing driver does not try to "squeeze by" within the lane.

Shared Lane Markings

Purpose	Shared lane markings (also known as "sharrows") are high-visibility pavement markings that help position bicyclists within the travel lane. These markings are often used on streets where dedicated bike lanes are desirable but are not possible due to physical or other constraints. Sharrows are placed strategically in the travel lane to alert motorists of bicycle traffic, while also encouraging cyclists to ride at an appropriate distance from the "door zone" of adjacent parked cars. Placed in a linear pattern along a corridor (typically every 100-200 feet), sharrows also encourage cyclists to ride in a straight line so their movements are predictable to motorists. These pavement markings have been successfully used in many communities throughout the U.S. Shared lane markings made of thermoplastic tend to last longer than painted ones. . 	 Shared lane marking placement guidance for streets with on-street parking  Shared lane markings can be used on minor and major roadways
Guidelines	**Door Zone Width:** The width of the door zone is generally assumed to be 2.5 feet from the edge of the parking lane. **Recommended Placement:** • At least 11' from face of curb (or shoulder edge) on streets with on-street parking • At least 4' from face of curb (or shoulder edge) on streets without on-street parking	

Wide Outside Lanes

A wide outside lane is similar to a shoulder bikeway, without the outer line indicating a separate shoulder area. Wide outside lanes may be sufficient accommodation for bicyclists on streets with insufficient width for bike lanes but which do have space available to provide a wider (14'-16') outside travel lane.

Bike Route – Shared Wide Outside Lane or Shoulder		
Purpose	Bike routes are roadways signed bikeways. Typically, bike routes are on roadways that are generally pleasant to bicycle on.	
		 Bike Route – Shared Wide Outside Lane
Guidelines	**Average Daily Traffic Volume and Posted Speed:** Roadways with approximately 11,000 ADT maybe candidates for bike routes with wide outside lanes or shoulders. However, existing roadway width and posted speeds should also be considered. Generally, selecting a bikeway based on ADT should be inversely proportional to posted speed, i.e. roadways with high ADTs should have low traffic speeds. **On-Street Parking:** Roadways may have on-street parking. **Roadside Development:** Bike routes with wide outside lanes or shoulders are typically in sparsely developed areas, i.e. rural and industrial, and connect to regional destinations. **Right of Way Availability:** Bike routes do not require additional ROW. **Topography:** Bike routes do not require a particular topography, however, they may be provided on the downhill direction of a roadway with uphill bike lanes. This scenario maybe used when ROW only provides space for one bike lane. **Expected User Type:** Intermediate and experienced bicyclists should be expected to use bike routes, especially when traffic volumes or speed are high.	

Signed Bike Routes

Shared roadways include roadways on which bicyclists and motorists share the same travel lane. Signed shared roadways are designated and signed as bicycle routes and provide continuity with other bicycle facilities or designate a preferred route on low traffic speed and volume streets where greater separation is not warranted.

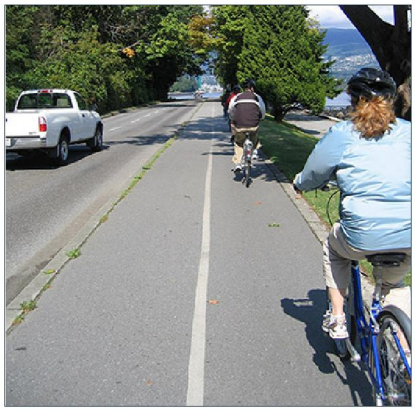
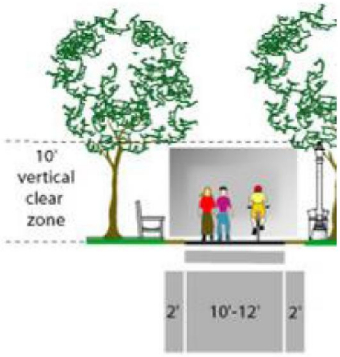
It is important to note that bicycles are permitted on most roads, except on interstates and where otherwise restricted by signs or ordinance. As such, the majority of street networks are effectively the community's bicycle network, regardless of whether or not a bikeway stripe, stencil, or sign is present on a given street. The designation of certain roads as bike routes is not intended to imply that these are the only roadways intended for bicycle use, or that bicyclists should only use these routes.

Shared Use Path

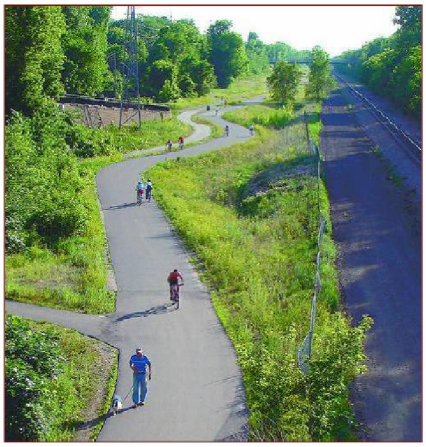
A shared-use path is a bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared-use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and non-motorized users.

<table>
<tr><th colspan="3">Shared-Use Paths</th></tr>
<tr><td>Purpose</td><td>Shared-use paths can provide a desirable facility particularly for novice riders, recreational trips, and cyclists of all skill levels preferring separation from traffic. Shared-use paths should generally provide new travel opportunities.

Shared-use paths serve bicyclists and pedestrians and provide additional width over a standard sidewalk. Facilities may be constructed adjacent to roads, through parks, or along linear corridors such as active or abandoned railroad lines or waterways.

  </td><td> 

Recommended shared-use path design

 
Shared use paths (also referred to as "trails" and "multi-use paths") are often viewed as recreational facilities, but they are also important corridors for utilitarian trips</td></tr>
<tr><td>Guidelines</td><td colspan="2">Shared-use paths can be categorized as greenways, side paths, and connectors:
A greenway is a facility that has an exclusive right of way
A side path is a two-way trail on one side of the road that is located within the road right-of-way
A connector is a shorter connection, usually between residential area and a larger trail or park.
Basic design elements remain the same for all types of shared-use paths, although additional considerations should be noted for side paths.</td></tr>
</table>

3.2.2 Pedestrian Facilities/ Intersection Improvements

Twenty four intersections within the study area have been identified for improvement as part of the recommended System Network. The intersections were classified first as either stop sign controlled or signalized and then as either "high priority" or "key" intersections.

A "high priority" intersection is a location were much bicycle and pedestrian activity is anticipated and the highest level of pedestrian accommodation is recommended. A "key" intersection is one that is in the system network and pedestrian/bicycle traffic is anticipated but it is not a crossroads, were we would expect very high volumes. See the table below for a list of improvements for each type of intersection.

Recommended Intersection Improvements

Signalized Intersections

High Priority Intersection (Type 1)

- All of Type 2 improvements plus:
- Continental crosswalk marking (instead of double line marking)
- Advance stop bars

Stop Sign Intersections

High Priority Intersection (Type 3)

- All of Type 4 improvements plus:
- Continental crosswalk marking
- Parking restrictions
- Curb extensions (where parking is allowed)

Key Intersection (Type 2)

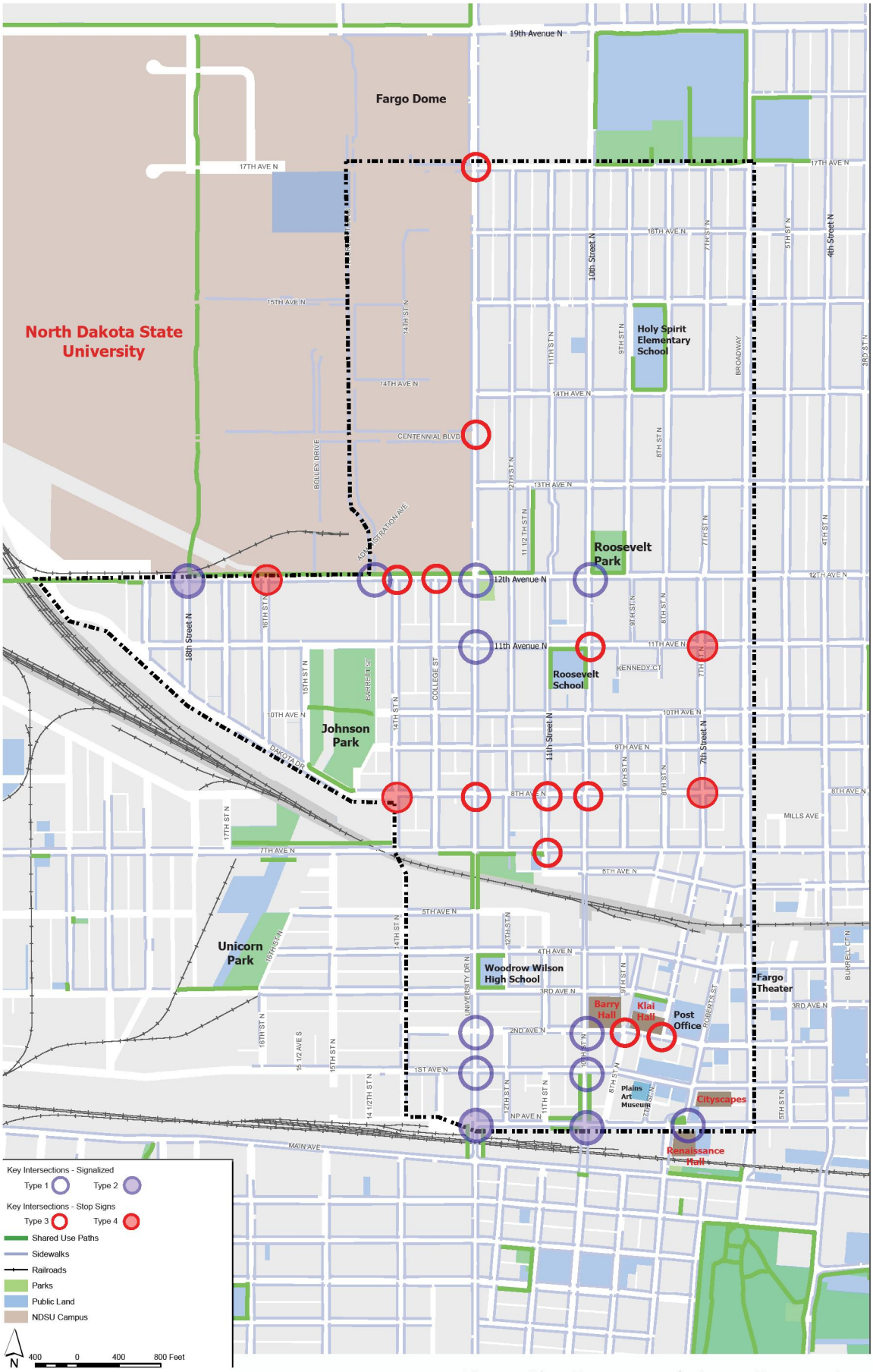
- Double line crosswalk marking
- Pedestrian signal activation button
- Pedestrian countdown timer
- Parking restrictions
- "No Turn on Red" signs and enforcement
- Curb ramps

Key Intersections (Type 4)

- Double line crosswalk marking
- Curb ramp

Master Plan Recommendations - Intersections

Key Intersection	Controlled By	Recommended Improvement
NP Ave N and 10th St N	Signal	Type 2
NP Ave N and Roberts St N	Stop Sign	Type 3
NP Ave N and University Drive	Signal	Type 2
1st Ave N and 10th St N	Signal	Type 1
1st Ave N and University Drive	Signal	Type 1
2nd Ave N and 7th St N	Stop Sign	Type 3
2nd Ave N and 10th St N	Signal	Type 1
2nd Ave N and University Drive	Signal	Type 1
7th Ave N and 11th St N	Stop Sign	Type 3
8th Ave N and 7th St N	Stop Sign	Type 4
8th Ave N and 10th St N	Stop Sign	Type 3
8th Ave N and 11th St N	Stop Sign	Type 3
8th Ave N and University Dr N	Stop Sign	Type 3
8th Ave N and 14th St N	Stop Sign	Type 4
11th Ave N and University Dr N	Stop Sign	Type 3
11th Ave N and 10th St N	Stop Sign	Type 3
11th Ave N and 7th St N	Stop Sign	Type 4
12th Ave N and University Drive	Signal	Type 1
12th Ave N and 10th St N	Signal	Type 1
12th Ave N and College St	Stop Sign	Type 3
12th Ave N and 14th St N	Stop Sign	Type 3
12th Ave N and Barrett St	Signal	Type 1
12th Ave N and 16th St N	Stop Sign	Type 4
12th Ave N and 18th St N	Signal	Type 2



Master Plan Recommendations - Intersections

3.3 System Network Map - Master Plan Recommendations

Based on the input received and information gathered, this plan recommend a series of improvements that will result in improved bicycle and pedestrian safety throughout the study area.

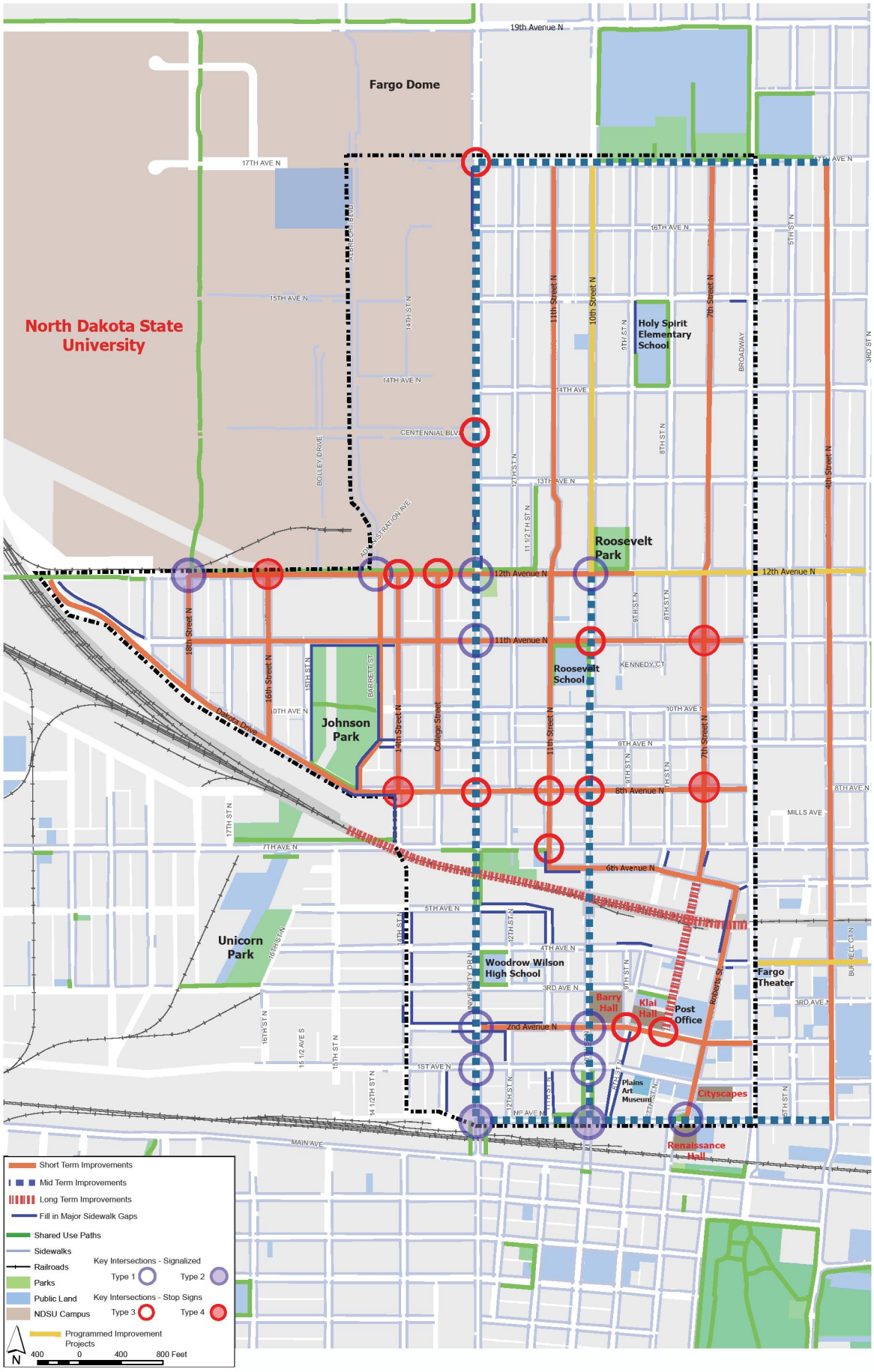
The recommendations include short-term improvements that can be installed within the next two years, mid-term improvements that can be installed in 2 to 5 years and long-term improvements that may take 5 or more years to complete. The facility types in the network include intersection improvements, shared lane routes, bike lanes and shared use paths. Recommendations are also provided to improve access under the Prosper rail road line.

When the system network is in place the area located between the main NDSU campus and the new downtown buildings will contain bicycle and pedestrian friendly streets with a variety of options for travel. Access to downtown Fargo will be improved as well as access to the neighborhoods and residences surrounding the university properties.

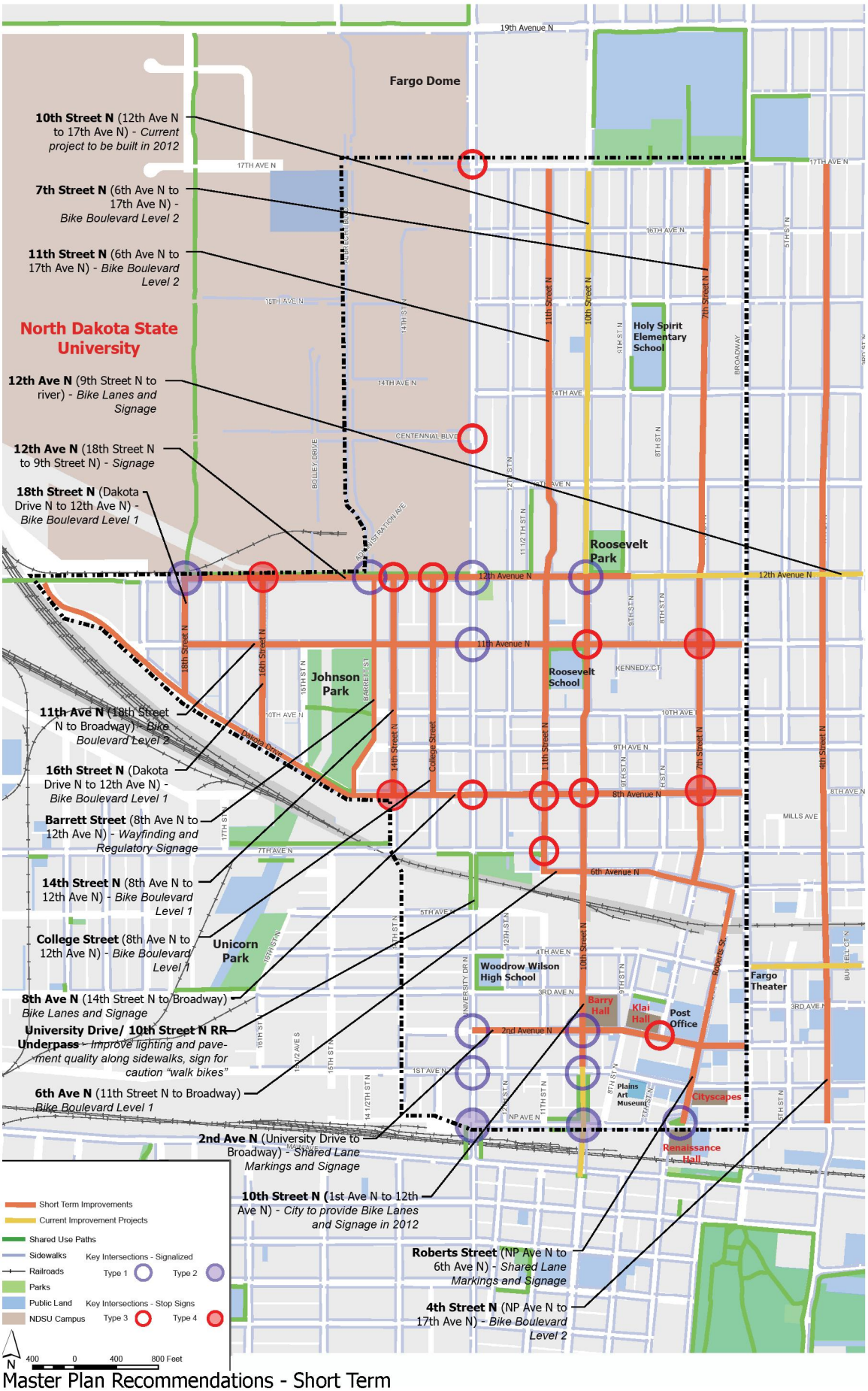
Project relationship to Future Bike and Pedestrian Improvements within the Community

It is important that connections to the NDSU Bicycle and Pedestrian Access study area be considered when streets leading to the study area are improved. As streets surrounding the study area are improved it is important to use the criteria used in for the NDSU Bicycle and Pedestrian Access Study to determine how to improve bicycle and pedestrian accommodations. The design criteria will enhance the connectivity, livability and overall character of these connections to provide safe and accessible pedestrian and bicycle routes.

Recent examples to leverage design recommendations for future projects include the 10 Street S. (overpass and street improvement project) and NP & 1st Ave N Corridor Improvement Project. These public work projects either connect to or overlap with the study area.

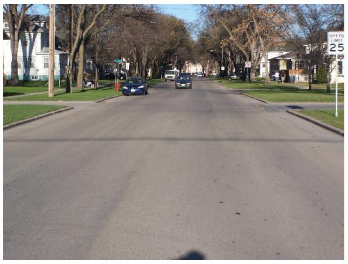


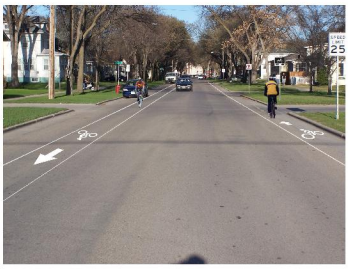
System Network Map - Master Plan Recommendations



Master Plan Recommendations - Short Term

Master Plan Recommendations





8th Avenue N. Improvements

Short-Term Improvements

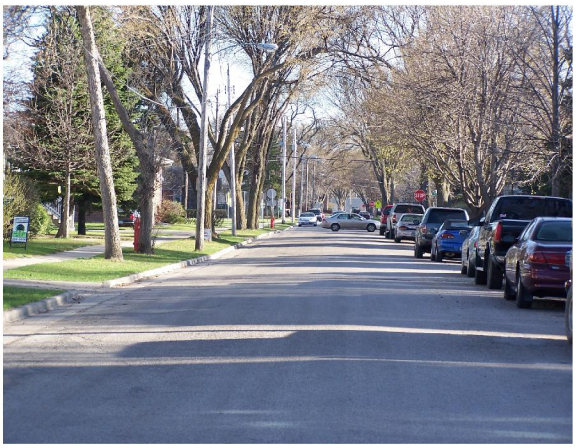
The short-term improvements are relatively easy and inexpensive to install and maintain. Once completed the system will provide bicycle and pedestrian streets in a dense north/south and east/west pattern across the study area. Defined levels of treatments associated with each recommendation can be found on pages 1-34 and 1-35.

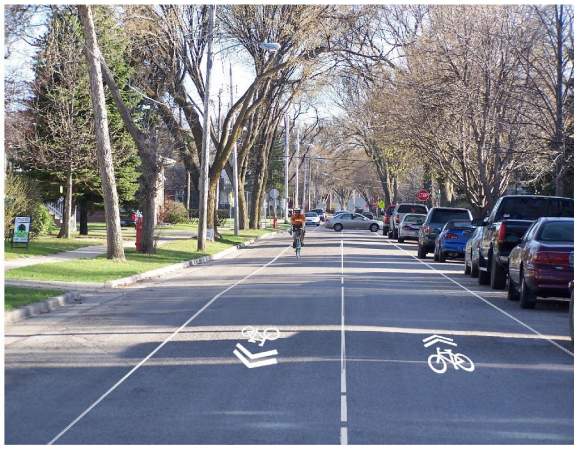
North/South Streets

- 4th St. N (NP Ave to 17th Ave N) Bike Boulevard - Level 2
- Roberts St. (NP Ave to 6th St. N) Shared Lane Markings and Signage - Bike Boulevard Level 3
- 7th St. N (6th Ave N to 17th Ave N) Bike Boulevard - Level 2
- 8th St. N (NP Ave to 2nd Ave N) Bike Boulevard - Level 1 Also fill in major sidewalk gaps
- 11th St. N (6th Ave N to 17th Ave N) Bike Boulevard - Level 2
- College St. (8th Ave N 12th Ave N) Bike Boulevard - Level 1
- 14th St. N (8th Ave N to 12th Ave N) Bike Boulevard - Level 1
- Barrett St. (8th Ave N to 12th Ave N) Bike Boulevard - Level 2
- 16th St. N (Dakota Drive to 12th Ave N) Bike Boulevard - Level 1
- 18th St. N (Dakota Drive to 12th Ave N) Bike Boulevard - Level 1

East/West Streets

- 2nd Ave N (University Dr. to Roberts) St. Shared Lane Markings and Signage - Bike Boulevard Level 3
- 6th Ave N (11th St. to N Broadway) Bike Boulevard - Level 1
- 8th Ave N (14th St. to N Broadway) Bike Lanes and Signage
- Dakota Drive (12th Ave N to 14th St. N) Bike Lanes and Signage
- 11th Ave N (18th St. to N Broadway) Bike Boulevard - Level 2
- 12th Ave N (Dakota Dr. to 9th St. N) Addition of Bike Route Signage
- 12th Ave N (9th St. N to 1st St. N) Bike Lanes and Signage
- 14th Ave N (University Dr. to Broadway) Bike Boulevard - Level 1





11th Avenue N. Improvements

Mid-Term Improvements

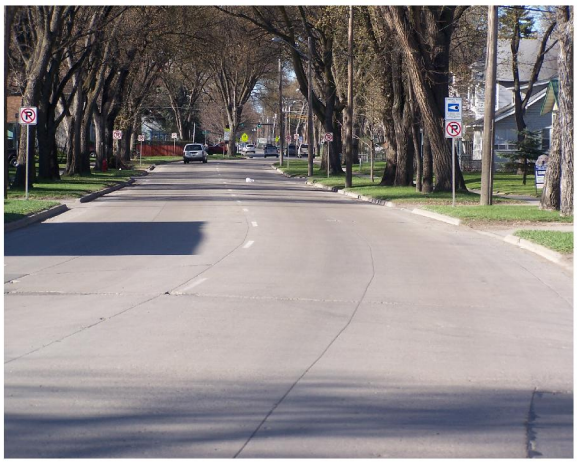
The mid-term improvements include important bicycle facilities along University Drive and 10th Street N as well as NP Ave N. The mid-term recommendations provide bike lanes along these popular routes where bicyclists are currently using the sidewalks as routes and endangering pedestrians. Along with the bike lanes on 10th St. N and University Drive, the tunnels under the Prosper Line will need to be addressed.

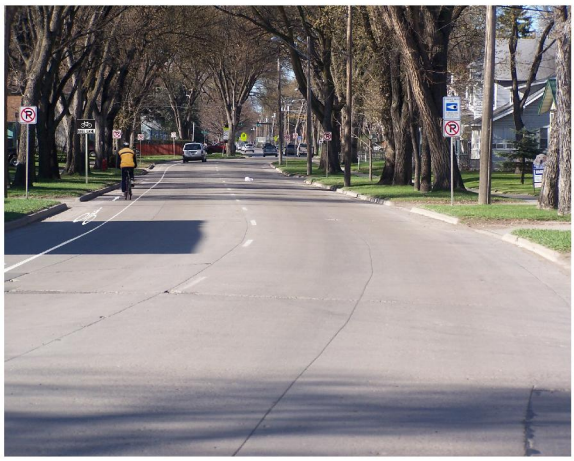
North/South Streets

- 10th St N (NP Ave to 17th Ave N) One Way Bike Lane Northbound in Western Curb Lane
- University Drive (NP Ave to 17th Ave N) One Way Bike Lane in Southbound Eastern Curb Lane

East/West Streets

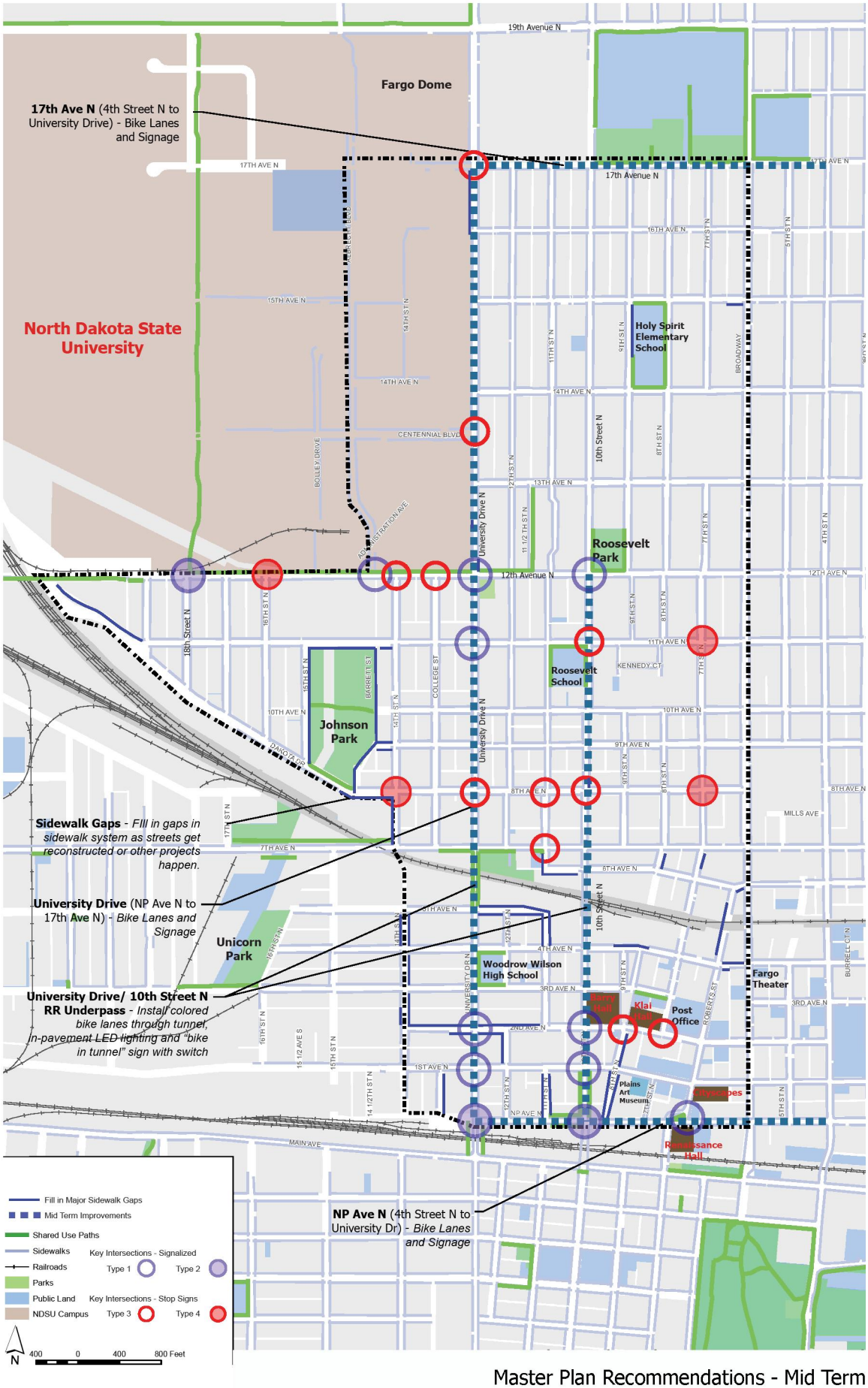
- NP Ave N (University Dr to 4th St N) Bike Lanes and Signage



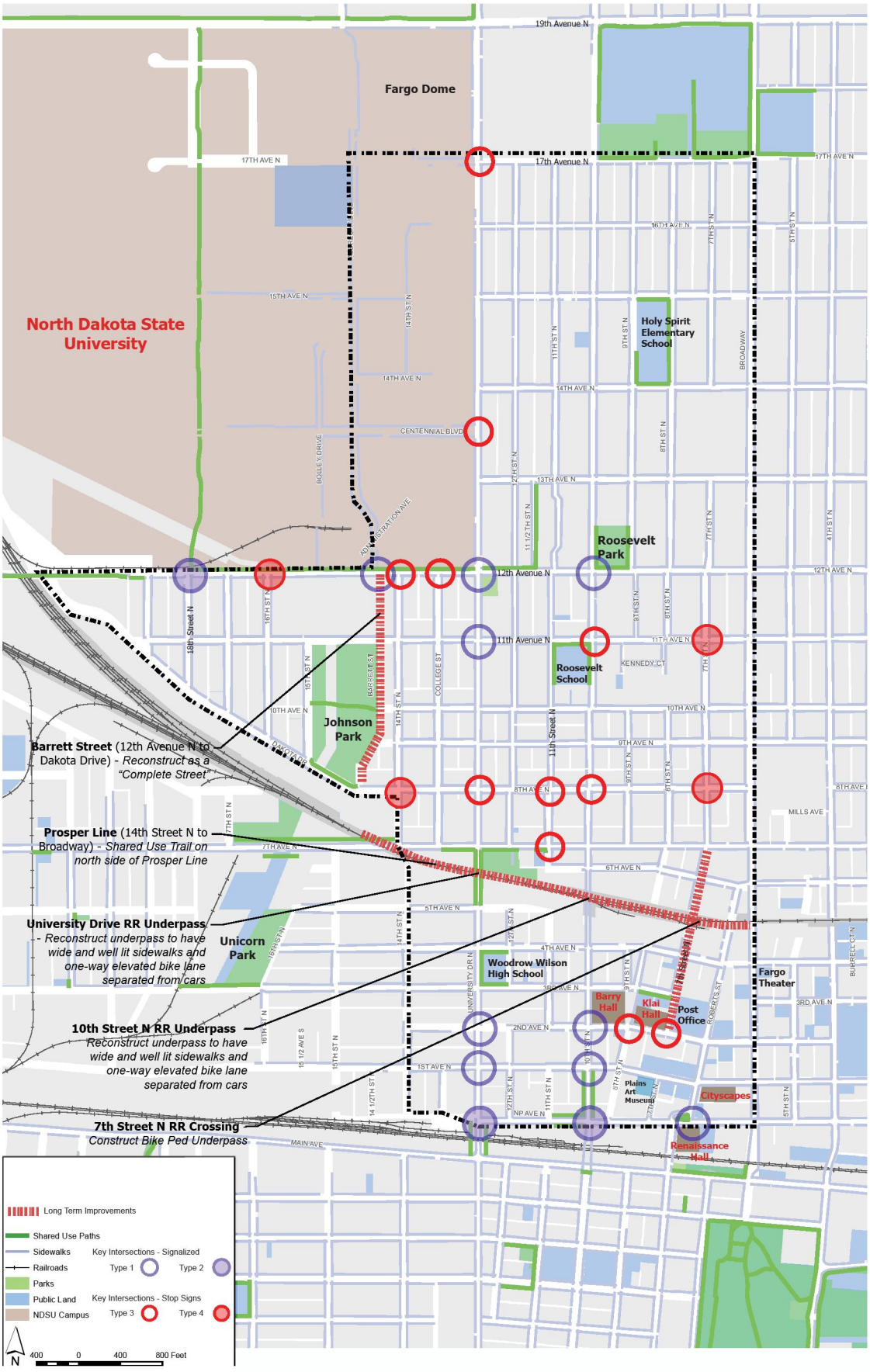


10th Street N. @ 8th Avenue N. Improvements

University Drive N. Improvements



Master Plan Recommendations - Mid Term



Master Plan Recommendations - Long Term

Long-Term Improvements

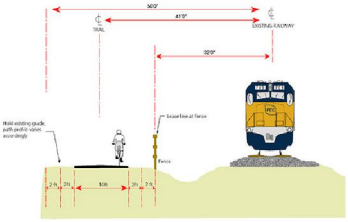
The long-term improvements will fill out the system network with shared use paths along Barrett Street and along the Prosper Line (a rail with trail). Improvements are also recommended along 7th St. N from 7th Ave N to 2nd Ave N. These improvements will only be necessary when the crossing of the Prosper Line is opened up perhaps with an underpass.

North/South Streets

- 7th St. N (2nd Ave N to 6th Ave N) Bike Boulevard - Level 2 Only needed if RR crossing happens in the future.
- Barrett St. (8th Ave N to 12th Ave N) When reconstructed build a complete street with bikes/pedestrians given priority over cars

East/West Streets

- Prosper Line Rail from Barrett St. to Broadway Shared Use Path - 10 to 12' wide asphalt path on north side of tracks



Prosper Rail Line - Shared Use Path

Access Under the Prosper Line

The Prosper Line railroad track forms a barrier between the new campus buildings to the south of the line and the NDSU main campus to the north. Improving bicycle and pedestrian access at the existing tunnels and providing another crossing at 7th St. N will be key to increasing the number of people biking or walking between campuses.

University Drive and 10th Street N Underpasses

When these two underpasses are rebuilt in the future they should be rebuilt similar to the design for the University Drive and Main Avenue railroad underpass. The wide sidewalks, open abutments, excellent lighting and design detailing make this underpass a bicycle and pedestrian-friendly place.

Future analysis will be required to further define the improvements to the underpasses. The improvements will not go to the extent of complete reconstruction include improved pedestrian lighting, a bike lane, warning lights when a bicyclist is in the tunnel, improved sidewalk pavement and possibly a new bike-only tunnel on the west side of 10th St. N.

7th Street N. Underpass

Currently this crossing is closed to all traffic, cars, bicyclists and pedestrians. While it is a bit to the east of destinations such as Barry and Klai Halls a pedestrian/ bicycle underpass at this location would be a terrific addition to the system network. The underpass would have as much natural light as possible, modeled after the underpass at Lakeshore Drive connecting Grant Park to the Museum Campus in Chicago. By going under, rather than over, the necessary elevation change is lessened considerably, and if done properly, the use of the underpass would be a natural choice and therefore used by most bicyclists and walkers attempting the cross the railroad in this area. Further engineering studies are required to completely understand the long-term implications to construct a pedestrian/ bicycle underpass at this location.

Shared Use Path Along Prosper Rail Line

The Prosper Line railroad provides an opportunity for a shared use path project, which will provide an excellent connection between the main campus and the downtown NDSU buildings. Public input gathered for this study indicates that bicyclists and walkers traveling between campuses prefer this off-road route. Shared use paths adjacent to rail lines are not unusual in the United States but they are difficult to implement due to the necessary negotiations with a railroad and the extra design necessary to make them safe for all users. This study provides a sketch of the proposed shared use path's location in relation to the existing rail line and some guidance on next steps. If it is decided to pursue this project, a much more detailed study will be required.

While bicycle and pedestrian facility advocates embrace the idea of a path located in the same right of way as an active railroad, railroad companies have an opposing view. Shared use path planners view railroad property, often located in scenic areas with favorable topography, as a better alternative than bike lanes on roadways. They know that legal protections of varying degrees exist in all States, and that a number of successful bicycle facilities provide comfort.

Railroads generally oppose shared use paths for the following business reasons:

- The trails are not related to railroad operations and generally do not generate revenue for the railroads;
- Railroad rights-of-way may be needed for future enhancements to system capacity;
- Poor design or maintenance of trails could lead to increased trespassing, with consequent increases in injuries and deaths;
- Narrowing the railroad's portion of the right-of-way drives up the cost of maintaining track and structures (including complicating safety protection for railroad workers);
- And significant new populations of pedestrians close to the active track structure may result in additional stress on train crews seeking to ensure the safety of train movements.

Railroad company representatives respond to assurances of legal protections by noting that the court system has not yet tested the lease and/or use agreements for existing shared use paths. Railroads have borne the burden of litigation for many incidents on their property, even for crashes with at-fault trespassers or automobile drivers who ignored obvious warning systems. Further, they

note that the railroad may be determined by civil courts to owe a higher duty of care to trail users than to trespassers, particularly at new, designated crossings.

Prosper Line (Shared use path adjacent to the Prosper Line) Development Process

The current shared use path development process varies from location to location, although common elements exist. Bicycle and pedestrian facility advocacy groups and public agencies often identify a desired shared use path as part of a bikeway master plan. They then work to secure funding prior to initiating contact with the affected railroad. However, it is never too early to contact the railroad and begin discussions. The railroad agency or company typically lacks an established, accessible review and approval process. While some shared use path move forward quickly (typically those where the shared use path development agency owns the land), many more are outright rejected or involve a lengthy, contentious process. Shared use path processes typically take three to ten years from concept to construction.

Bicycle and pedestrian facility managers should undertake a comprehensive feasibility analysis of proposed shared use paths. A shared use path feasibility study should describe the setting, relationship to local planning documents, land ownership patterns, railroad activity, and other information necessary to determine feasibility. The study should identify and evaluate multiple alternative alignments, including at least one that is not on the railroad right-of- way, and determine a preferred alignment.

Much of the discussion above was summarized from FHWA's report on RWT titled "Rails with Trails: Lessons Learned". This document is an excellent source of guidance for the development and implementation of a RWT project. This report can be found online at http://transitsafety.fta.dot.gov/publications/safety/Rails-WithTrails/Default.asp

Prosper Line Shared Use Path - Concept Plan

3.4 Maintenance Issues

Problem Overview

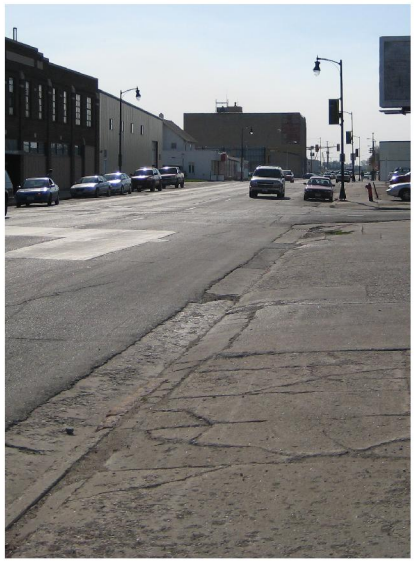
Bicyclists and pedestrians are affected by lack of maintenance to the streets, and sidewalks and shared use paths they use for transportation and recreation. Potholes, sidewalk upheaval, sand, glass and grit gathered along the curb can pose problems for the bicyclists and pedestrians. In short, the level and detail of maintenance needed for biking and walking facilities is greater than that typically necessary for automobile and truck traffic.

Maintenance Objectives

- Maintain roadways, bikeways and sidewalks in the study area to a relatively hazard-free standard
- Encourage bicyclists and pedestrians to report maintenance hazards and problems and respond in a timely fashion
- Include maintenance costs and clearly spell out maintenance procedures in all bicycle and pedestrian facility projects

On-Street Bikeway Maintenance

While implementing bikeway facilities is important, keeping them in good condition is equally important. When a bicycle lane becomes filled with debris, cyclists are forced into the motor vehicle lane. Poor bikeway maintenance can contribute to accidents and deter potential cyclists unwilling to risk flat tires and skidding on roadways. Periodic checks should be made of the on-street bikeway network with repair work being confined to spot fixes and damage response. Street sweeping of on-street facilities will need to be coordinated with the management agency's roadway maintenance program to ensure that the roadway is cleared curb to curb. Activities could also be driven by maintenance requests from the public.



Sidewalk Maintenance

The ongoing maintenance of sidewalks and promenades is key to providing safe and convenient access to recreational opportunities in and around developed areas. It should be the ultimate goal of management agencies to clear all sidewalks in winter and summer to enhance mobility, access to recreational

opportunities, local schools and destinations as well as public safety. Sidewalk maintenance is typically the responsibility of a Public Works Department and should be achieved either through ordinance or the creation of new assessment districts. Recreational trails funding should not be used for sidewalk maintenance purposes. Sidewalk maintenance refers to crack and heaving repair as well as snow removal in the winter. City ordinance usually places the responsibility of sidewalk snow removal on the adjoining property owner and these ordinances are usually enforced based on complaints.

Typical Maintenance Concerns

Surface Problems

- Potholes, Ridges, Cracks and Other Surface Irregularities-Most bicycles lack suspension and therefore the bicyclists can be badly shaken up by even relatively small potholes. Ridges and cracking, especially longitudinal cracks can catch a narrow bicycle tire and throw the rider, possibly into traffic. Streets that are part of the bikeway system should be monitored for surface irregularities on a regular basis but especially in the spring after the snow melt to check for damage caused over the winter.

  Patching and repair need attention to detail as well so as not to add surface irregularities by the repair itself.

- Debris – Debris such as glass, sand, salt and litter tend to gather along the curb line in streets and at the curb, jersey wall or guardrail of bridges and underpasses. Bicyclists trying to avoid such debris may find themselves dangerously out in the traffic lane. Bicyclists riding through the debris risk sliding and or a flat tire. Therefore, the sweeping of streets with bike lanes, bikeways and shared use trails is very important and will need to be done on a more regular basis than on a street without bicycle traffic.

- Snow Removal –
  - Snow removal from sidewalks is the responsibility of the adjacent landowner and typically enforcement of the snow removal ordinance is done on a complaint basis. Due to the high levels of pedestrian traffic it is recommended that a more proactive approach to the enforcement of the snow removal ordinance be taken in the study area. Fargo City Code states that the owner or occupant of any building must clear sidewalks of snow or ice by 9:00 pm. on the day of the snowfall or ice build-up. Failure to remove the snow or ice from sidewalks can result in the City removing it. The cost for this removal will be chargeable to the owner, and can be assessed against the

property. To report a problem property where snow is not being removed as required by the regulations, contact the Fargo Street Department at snow@cityoffargo.com or 701-241-1453.

Intersections need special attention as they often pile high with snow and the adjacent land owner may only clear a narrow passage or none at all, this practice makes it impossible for wheelchairs or strollers to pass. Warning notices should be sufficient reminders to landowners to clear snow from their walks and corners.

- Shared use paths that are intended for commuting traffic as well as recreation use need to be cleared of snow quickly, just as streets are cleared after a snow fall for motorized traffic. To effectively clear snow from these narrow paved surfaces many city maintenance crews use bobcats with either brushes or blades or 4 wheel drive, all terrain vehicles with a brush or blade. Often the parks department is responsible for the clearing of snow from shared use paths, which works well as the streets crew are usually very busy clearing the roadways.

- On-street facilities for bicycles also need to be cleared of snow. Unfortunately, on-street facilities such as bike lanes will sometimes be used as snow storage areas. Curb to curb snow removal on bikeway streets without bike lanes such as on streets with shared lane markings is critical as well as the snow can pile up and effectively narrow the lanes providing less room for bicyclists and motorists to maneuver. It is important to work with the agencies and crews responsible for street snow removal to encourage them to clear the snow curb to curb on bikeway streets.

Encroaching Vegetation

Overgrown vegetation can cause many problems along shared use paths, on-street bikeways and sidewalks.
Pedestrians and bicyclists may be forced out into the traffic lane by encroaching vegetation and reduced sight lines prevent motorized and non- motorized traffic from seeing one another. As with snow removal, overgrown vegetation issues are usually dealt with on a complaint basis but within the study area a more proactive approach is warranted.
Landowners and city agencies should trim back trees and shrubs to allow at least two (2) feet clearance between the edge of pavement and the vegetation.

Signage and Marking

- Trail and On-Road Bicycle Related Signage – Due to their sometimes remote location trail signs may be subjected to vandalism or theft. Regular inspection/ inventory and replacement of the signs along the

shared use path is necessary, this is especially true of warning or regulation signs. Wayfinding signage along the on-street bikeways and on shared use paths is helpful for both commuting and recreational use of the facility; a street sign with the trail name and the cross street name at each intersection is recommended. Special bicycle signs (regulatory, warning or information) should be maintained in the same manner as roadway signs. Special attention should be given to bike route signs at decision points and warning signs at particular hazards.

- Shared use path and On-Road Bicycle Pavement Markings – Pavement markings, whether on a shared use path or on a roadway, wear out. The lifetime of a pavement marking is dependent on the type of paint or thermo-plastic tape, the location in the traffic lane and the movement of the cars over the marking. Locating bicycle related markings outside the wheel path of the motorized vehicles whenever possible is a good policy. Pavement markings related to bicycle and pedestrian use should be maintained in the same manner as motorized traffic pavement markings.

Temporary Bicycle and Pedestrian Facility Closures

Shared use paths, sidewalk or roadway sections may be closed from time to time during periodic maintenance of the facility or environmental issues such as flooding. Non motorized users will need to be notified during these closures. The procedural policies that should be followed prior to the closing of the shared use path or street are listed below.

- The management agency should post signs at all shared use path/street entrances on the impacted segments to be closed indicating the duration of the closure.

- The management agency should do everything reasonably possible to keep the public informed and make every effort to keep the closure period as short as possible.

- The management agency should physically block the path/street that is being closed with barriers and post "Path/Street Closed" signs.

- The management agency should provide "Detour" signs describing alternate routes.

The management agency should not re-open the shared use path/street until it has been inspected to ensure that the trail/street is in usable condition including sweeping of mud and debris left by the flood. Where obstructions remain, the management agency should provide warning signs for trail users to slow down or dismount where needed.

Part 4
DESIGN GUIDELINES

The following design guidelines will provide general information for consideration while Fargo and NDSU implement the system network. As each facility is considered for a segment of roadway, the design guidelines should be referenced to determine the best approach to that specific facility. While the guidelines will not answer all questions related to the implementation, they should provide the guidance necessary to result in consistency between the facility types system-wide.

4.1 BICYCLE FACILITY GUIDELINES

The design concepts presented here are based on current bikeway and trail design guidelines provided in the American Association of State Highway and Transportation Officials' (AASHTO)'s Guide for the Development of Bicycle Facilities (1999), the Manual of Uniform Traffic Control Devices (MUTCD) 2009, Part 9 Traffic Controls for Bicycle Facilities, and best practices from several communities throughout the country. The Guide for the Development of Bicycle Facilities is currently being updated, and the new document cannot be quoted at the time of this writing. Many of the facilities under consideration for the update are included in the following pages.

The following are key principles for these bicycle guidelines:

- The bicycling environment should be safe. Bicycle routes and crossings should be designed and built to be free of hazards and to minimize conflicts with external factors such as noise, vehicular traffic and protruding architectural elements.

- The bicycle network should be accessible. Bicycle routes should increase the mobility of all users by accommodating the needs of people regardless of age or ability.

- Bicyclists have a range of skill levels, and facilities should be designed for use by experienced cyclists at a minimum, with a goal of providing for in experienced / recreational bicyclists (especially children and seniors) to the greatest extent possible. In areas where specific needs have been identified (e.g., near schools) the needs of appropriate types of bicyclists

should be anticipated.

• The bicycle network should connect to places people want to go. The bicycle network should provide continuous, direct routes and convenient connections between destinations, including homes, schools, shopping areas, public services, recreational opportunities and transit.

• The bicycling environment should be clear and easy to use. Bicycle facilities should be designed so people can easily find a direct route to a destination and delays are minimized.

• The bicycling environment should be well designed. Good design should enhance the feel of the bicycle environment. A complete network of on- street bicycling facilities should connect seamlessly to the existing and proposed off-street pathways to complete recreational and commuting routes around the city.

• Bicycle improvements should be economical. Bicycle improvements should be designed to achieve the maximum benefit for their cost, including initial cost and maintenance cost, as well as reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce and connect with adjacent private improvements.

• Design guidelines are intended to be flexible and can be applied with professional judgment by designers. Specific national and state guidelines are identified in this document, as well as design treatments that may exceed these guidelines.

4.2 NATIONAL AND STATE GUIDELINES / BEST PRACTICES

National and State Guidelines / Best Practices

The following is a list of references and sources utilized to develop these design guidelines. Many of these documents are available online.

• AASHTO Guide for the Development of Bicycle Facilities, 1999. American Association of State Highway and Transportation Officials, Washington, DC. *www.transportation.org*

• AASHTO Policy on Geometric Design of Streets and Highways, 2001. American Association of State Highway and Transportation Officials,

Washington, DC. *www.transportation.org*

• Manual on Uniform Traffic Control Devices (MUTCD), 2003, Updated 2007. Federal Highway Administration, Washington, DC.
http://mutcd.fhwa.dot.gov

• Iowa Department of Transportation Design Manual, 1995, Updated 2006.
http://www.iowadot.gov/design/dmanual/manual.html?reload

• Bicycle Facility Selection: A Comparison of Approaches. Michael King, for the Pedestrian and Bicycle Information Center. Highway Safety Research Center, University of North Carolina – Chapel Hill, August 2002
http://www.bicyclinginfo.org/pdf/bikeguide.pdf

• Bicycle Parking Design Guidelines.
http://www.bicyclinginfo.org/pdf/bikepark.pdf

• City of Chicago Bike Lane Design Guide.
http://www.bicyclinginfo.org/pdf/bike_lane.pdf

• The North Carolina Bicycle Facilities Planning and Design Guidelines, 1994. NCDOT Division of Bicycle and Pedestrian Transportation.
http://www.ncdot.org/transit/bicycle/projects/resources/projects_facilitydesign.html

• Wisconsin Bicycle Facility Design Handbook. 2004. Wisconsin Department of Transportation.
http://www.dot.wisconsin.gov/projects/bike.htm

• Florida Bicycle Facilities Planning and Design Handbook. 1999. Florida Department of Transportation.
http://www.dot.state.fl.us/safety/ped_bike/ped_bike_standards.htm#Florida%20Bike%20Handbook

• Oregon Bicycle and Pedestrian Plan. 1995 Oregon Department of Trans portation.
http://www.oregon.gov/ODOT/HWY/BIKEPED/planproc.shtml

• City of Portland (OR) Bicycle Master Plan for 2030. City of Portland (OR) Office of Transportation.
www.portlandonline.com/transportation/index.cfm?c=44597&a=289122

Part 5
COST ESTIMATES AND IMPLEMENTATION

The implementation of the NDSU Bicycle and Pedestrian Access Plan does not require complete roadway reconstruction and can be easily included once funding becomes available. The primary components of the Bicycle and Pedestrian Access Plan include some new pavement markings and roadway signage.

5.1
Project Purpose Preliminary Planning Level Cost Estimates for Alternatives/Improvements

A preliminary planning level cost estimate has been developed for the major components of the Bicycle and Pedestrian Access Plan recommendations.

The following is included as part of the individual costs related to the specific recommendations:

- Poly-preform ground-in pavement markings
- Black masking behind longitudinal pavement markings on the concrete pavement sections
- Roadway and wayfinding signs (bicycle related)
- Final design and engineering services (10 percent of construction costs)
- Miscellaneous city expenses

Street/Path	Segment		Description	Bicycle Bou
	Cost			$9
	Unit			LF
Proposed Bike Blvd (North/ South Streets)				
4th St N	NP Ave to 17th Ave N		Bike Boulevard - Level 2	0
7th St N	6th Ave N to 17th Ave N		Bike Boulevard - Level 2	5,320
7th St N	2nd Ave N to 6th Ave N		Bike Boulevard - Level 2	1,330
8th St N	NP Ave to 2nd Ave N		Bike Boulevard - Level 1	830
11th St N	6th Ave N to 17th Ave N		Bike Boulevard - Level 2	5,860
College St	8th Ave N to 12th Ave N		Bike Boulevard - Level 1	2,390
14th St N	8th Ave N to 12th Ave N		Bike Boulevard - Level 1	2,380
Barrett St	8th Ave N to 12th Ave N		Bike Boulevard - Level 2	1,860
16th St N	Dakota Drive to 12th Ave N		Bike Boulevard - Level 1	1,410
18th St N	Dakota Drive to 12th Ave N		Bike Boulevard - Level 1	1,020
Proposed Bike Blvd (East/West Streets)				
6th Ave N	11th St N to Broadway		Bike Boulevard - Level 1	1,740
11th Ave N	18th St N to Broadway		Bike Boulevard - Level 2	4,480
14th Ave N	University Dr to Broadway		Bike Boulevard - Level 1	0
Proposed Bike Lane (North/ South Streets)				
10th St N	NP Ave to 17th Ave N		One Way Bike Lane (NB)	
University Drive	NP Ave to 17th Ave N		One Way Bike Lane (SB)	
Proposed Bike Lane (East/ West Streets)				
NP Ave N	University Dr to 4th St N		Bike Lanes and Signage	
8th Ave N	14th St N to Broadway		Bike Lanes and Signage	
Dakota Drive	12th Ave N to 14th St N		Bike Lanes and Signage	
12th Ave N	Dakota Dr to 9th St N		Wide Outside Lane (with Signage)	
12th Ave N	9th St N to 1st St N		Bike Lanes and Signage	
Proposed Bike Lanes/Sharrows				
2nd Ave N	University Dr to Roberts St		Shared Lane Markings and Signage	
Roberts St	NP Ave to 6th St N		Shared Lane Markings and Signage	
Other Bicycle Improvements				
Barrett St	8th Ave N to 12th Ave N		Build a complete street with bikes/peds given priority over cars	
Prosper Line Rail	Barrett St to Broadway		Shared Use Path - 10 to 12' wide asphalt path on north side of tracks	

Planning Level Cost Estimates - On-Street enhancements

e Boulevard	Shared Use Path	Roadway Re-Striping	Shared Lane Markings	Shoulder Widening	subtotal	Engineering/Design	Construction Mangement	Contingency	Cost Opinion
$27	$3.02	$0.80	$8						
LF	LF	LF	LF			15%	10%	20%	
					$0	$0	$0	$0	**$0**
					$45,341	$6,801	$4,534	$9,068	**$56,676**
					$11,335	$1,700	$1,134	$2,267	**$14,169**
					$7,074	$1,061	$707	$1,415	**$8,842**
					$49,943	$7,491	$4,994	$9,989	**$62,429**
					$20,369	$3,055	$2,037	$4,074	**$25,462**
					$20,284	$3,043	$2,028	$4,057	**$25,355**
					$15,852	$2,378	$1,585	$3,170	**$19,815**
					$12,017	$1,803	$1,202	$2,403	**$15,021**
					$8,693	$1,304	$869	$1,739	**$10,866**
					$14,830	$2,224	$1,483	$2,966	**$18,537**
					$38,182	$5,727	$3,818	$7,636	**$47,727**
					$0	$0	$0	$0	**$0**
									$304,901
			8,220		$65,760	$9,864	$6,576	$13,152	**$82,200**
			8,220		$65,760	$9,864	$6,576	$13,152	**$82,200**
	2,310				$6,976	$1,046	$698	$1,395	**$8,720**
	2,795				$8,441	$1,266	$844	$1,688	**$10,551**
	3,980				$12,020	$1,803	$1,202	$2,404	**$15,025**
	3,875				$11,703	$1,755	$1,170	$2,341	**$14,628**
	2,400				$7,248	$1,087	$725	$1,450	**$9,060**
									$222,384
		2,560			$2,048	$307	$205	$410	**$2,560**
		1,400			$1,120	$168	$112	$224	**$1,400**
									$3,960
1860					$50,964	$7,645	$5,096	$10,193	**$63,705**
3250					$89,050	$13,358	$8,905	$17,810	**$111,313**
									$175,018
								TOTAL	**$706,262**

The following is included as part of the individual costs related to the specific intersection recommendations:

- High visibility crosswalks/ pavement markings
- Pedestrian Activated Push Button
- Pedestrian Signal Indicators
- Roadway stop bars
- Roadway, regulatory and wayfinding signs (bicycle related)
- Final design and engineering services (10 percent of construction costs)
- Miscellaneous city expenses

Key Intersection	Controlled By	Recommended Improvement	Cost Estimate
NP Ave N and 10th St N	Signal	Type 2	$35,000
NP Ave N and Roberts St N	Stop Sign	Type 3	$75,000
NP Ave N and University Drive	Signal	Type 2	$35,000
1st Ave N and 10th St N	Signal	Type 1	$120,000
1st Ave N and University Drive	Signal	Type 1	$120,000
2nd Ave N and 7th St N	Stop Sign	Type 3	$75,000
2nd Ave N and 10th St N	Signal	Type 1	$120,000
2nd Ave N and University Drive	Signal	Type 1	$120,000
7th Ave N and 11th St N	Stop Sign	Type 3	$75,000
8th Ave N and 7th St N	Stop Sign	Type 4	$13,000
8th Ave N and 10th St N	Stop Sign	Type 3	$75,000
8th Ave N and 11th St N	Stop Sign	Type 3	$75,000
8th Ave N and University Dr N	Stop Sign	Type 3	$75,000
8th Ave N and 14th St N	Stop Sign	Type 4	$13,000
11th Ave N and University Dr N	Stop Sign	Type 3	$75,000
11th Ave N and 10th St N	Stop Sign	Type 3	$75,000
11th Ave N and 7th St N	Stop Sign	Type 4	$13,000
12th Ave N and University Drive	Signal	Type 1	$120,000
12th Ave N and 10th St N	Signal	Type 1	$75,000
12th Ave N and College St	Stop Sign	Type 3	$75,000
12th Ave N and 14th St N	Stop Sign	Type 3	$75,000
12th Ave N and Barrett St	Signal	Type 1	$120,000
12th Ave N and 16th St N	Stop Sign	Type 4	$13,000
12th Ave N and 18th St N	Signal	Type 2	$35,000
TOTAL			**$1,702,000**

Planning Level Cost Estimates - Intersection enhancements

5.2 Implementation Plan

The overall implementation of the NDSU Bicycle and Pedestrian Access Plan does not require any significant road or sidewalk reconstruction and can generally be included as part of the City of Fargo or NDSU capitol improvement planning or as other funds become available.

The implementation of recommendations for the Pedestrian and Bicycle Access Plan should be prioritized as follows:

High Priority (2010 - 2013)

North/South Streets

- 4th St. N (NP Ave to 17th Ave N) Bike Boulevard - Level 2
- Roberts St. (NP Ave to 6th St. N) Shared Lane Markings and Signage - Bike Boulevard Level 3
- 7th St. N (6th Ave N to 17th Ave N) Bike Boulevard - Level 2
- 8th St. N (NP Ave to 2nd Ave N) Bike Boulevard - Level 1 Also fill in major sidewalk gaps
- 11th St. N (6th Ave N to 17th Ave N) Bike Boulevard - Level 2
- College St. (8th Ave N to 12th Ave N) Bike Boulevard - Level 1
- 14th St. N (8th Ave N to 12th Ave N) Bike Boulevard - Level 1
- Barrett St. (8th Ave N to 12th Ave N) Bike Boulevard - Level 2
- 16th St. N (Dakota Drive to 12th Ave N) Bike Boulevard - Level 1
- 18th St. N (Dakota Drive to 12th Ave N) Bike Boulevard - Level 1

East/West Streets

- 2nd Ave N (University Dr. to Roberts St. Shared Lane Markings and Signage - Bike Boulevard Level 3)
- 6th Ave N (11th St. N to Broadway) Bike Boulevard - Level 1
- 8th Ave N (14th St. N to Broadway) Bike Lanes and Signage
- Dakota Drive (12th Ave N to 14th St. N) Bike Lanes and Signage
- 11th Ave N (18th St. N to Broadway) Bike Boulevard - Level 2
- 12th Ave N (Dakota Dr. to 9th St. N) Wide Outside Lane and Bike Route Signage
- 12th Ave N (9th St. N to 1st St. N) Bike Lanes and Signage
- 14th Ave N (University Dr. to Broadway) Bike Boulevard - Level 1

Medium Priority (2013 - 2017)

North/South Streets

- 10th St. N (NP Ave to 17th Ave N) One Way Bike Lane Northbound in Western Curb Lane
- University Drive (NP Ave to 17th Ave N) One Way Bike Lane in South bound Eastern Curb Lane

East/West Streets

- NP Ave N (University Dr. to 4th St. N) Bike Lanes and Signage

Low Priority (2013 - 2020)

North/South Streets

- 7th St. N (2nd Ave N to 6th Ave N) Bike Boulevard - Level 2 Only needed if RR crossing happens in the future.
- Barrett St. (8th Ave N to 12th Ave N) When reconstructed build a complete street with bikes/pedestrians given priority over cars

East/West Streets

- Prosper Line Rail from Barrett St. Broadway Shared Use Path - 10 to 12' wide asphalt path on north side of tracks

Infrastructure Projects

- Access Under the Prosper Line
- University Drive and 10th Street N Underpasses. (Further analysis is required to understand the full extent of a project).
- 7th Street N Underpass

Bicycle and Pedestrian Awareness

Enhancing the physical environment to make it safer and more pleasant for pedestrians and bicyclists is vital for increasing non-motorized travel. However, the enhancements need to be coupled with dedicated and on-going promotion and awareness efforts.

Awareness of the benefits of walking and bicycling, maintenance of the walking and bicycling facilities, and the availability of reliable transit options are essential to increasing mode share. The promotion of components should be implemented on a University and City wide level in order to be successful.

The following provides a summary of a few additional elements that may be considered in the promotion of bicycling and walking:

- Promote University and community education classes to teach the fundamentals of safe bicycling and walking.

- Host bicycle and pedestrian outreach events coordinated with University orientation/ events or to coincide with larger City of Fargo events. A "bike to class day" is the type of potential event that can be coordinated with Earth Day.

- Distribute and provide easy access to digital bicycle, sidewalk and bus route maps via Metro COG, NDSU or City of Fargo as well as local bicycle and walking advocacy groups and other interested parties. New students should receive these maps as part of summer orientation sessions.

- Bicycle ride leaders should be sought to lead rides on some of the proposed improved bicycle routes so as to familiarize students with proposed improved routes and on-road riding behaviors. These guided rides can be offered during the first three weeks of a new Fall semester. Possible sources for experienced bicycle ride leaders would be the NDSU Cycling Club, Great Northern Bicycle Company, Paramount Sports and Scheels.

- Refer to 2006 Metro Bike and Pedestrian Plan for additional information related to on-going promotion and awareness efforts.

Community Involvement Recommendations

The process of developing the NDSU Bicycle and Pedestrian Access Plan has brought together community members in a productive way that was not foreseen when the project began. The members of the public who have participated in the Plan's review and comment period have a unique understanding of the issues facing NDSU and a deep investment in the Plan's success. The following recommendations are intended to facilitate ongoing community involvement in the Plan's future success. These actions will also lay the groundwork for an organized approach to the long term bicycle and pedestrian advocacy that is so key to the success of a community in its efforts to become more bicycle and pedestrian friendly.

1. Peer outreach
Interested citizens can support the Plan by helping the public understand the process and recommendations through outreach efforts. Citizens are encouraged to write letters to the editor, communicate with elected officials, comment on local blogs, and request presentation time at neighborhood associations, churches, and other community groups, both in preparation for adoption of the plan, and as the adopted plan is implemented. They can speak about the study purpose, the goals and objectives that were developed, how the public was nvolved, how the Plan's recommendations serve the community, and why implementing the plan should be a priority.

This outreach can go beyond showing support for the plan by showing support for biking and walking as a mode of transportation. Reaching out to the general public to educate them on the fact that people bicycling and walking are indeed part of the transportation system and have rights and responsibilities similar to motorists.

2. Metropolitan Bicycle and Pedestrain Committee (MBPC)
Metro COG staff will work with associated stakeholders and the existing MBPC to implement recommendations that support biking and walking in the Fargo/ Moorhead region.

3. Web Resources for Education
http://www.streetfilms.org/category/bicycles/ -Short educational videos on many topics
http://www.flickr.com/groups/cdotbikes/pool/with/4942291866/ -
Chicago brochures for public education of how to treat bicyclists they encounter on the road
http://chicagobikes.org/video/index.php?loadVideo=sidewalk –
Short videos on safe riding by the City of Chicago
http://chicagobikes.org/video/index.php?loadVideo=buses_and_bicycles –
Short video to educate bicyclists and bus drivers on safe interaction

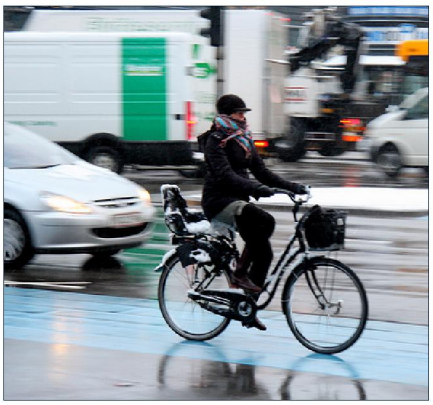
http://chicagobikes.org/video/index.php?loadVideo=police_training_2009 – Short video on traffic enforcement for police officers
http://bicyclesafe.com/ - Tips on safe cycling for the rider
http://www.bicyclinginfo.org/ - A national clearinghouse for all things related to bicycle and pedestrian planning and design

Bicycle and Pedestrian Maintenance Plan

Development and adoption of a routine and regular maintenance program for non-motorized facilities is very important. Pedestrians, and specifically bicyclists are sensitive to maintenance problems (e.g., potholes, debris, damaged sidewalks, snow/ ice removal, etc.) since they are directly exposed to the environment.

Key elements and objectives of the maintenance program may include:

- Define a plan for routine maintenance and cleaning of sidewalks and bikeways to a standard void of hazards.



- Design and construct sidewalks and bikeways to minimize the potential for the collection of debris and other hazards.

- Identify shared funding sources (University, City and private) for developing a maintenance program.

- Review and refine the snow and ice removal policy within the City to promote winter pedestrian and bicycle usage. Coordinate with property owners on timing and snow removal policies. The City and NDSU should also review the ice removal methods and materials. Numerous de-icing options are available which are less harmful to the environment and infrastructure than standard road-salt application.

- Maintain signs, pavement markings, pedestrian ramps and traffic control devices.

- Refer to AASHTO Guide for the Development of Bicycle Facilities, 1999 for additional information related to recommended bicycle and pedestrian maintenance practices.

- Refer to 2006 Metro Bike and Pedestrian Plan for additional information related to recommended bicycle and pedestrian maintenance practices.

Important Numbers to Know:

Snow Removal - *City of Fargo Street Department* 241-1453

Snow Removal Assistance Program- *City of Fargo Planning Department* 241-1474

Trees Overhanging into Sidewalk - *City of Fargo Forestry Department* 241-1465

Sidewalks in disrepair - *City of Fargo Engineering Department* 241-1545

Garbage overflowing onto Streets or Dumpsters Blocking Walks - *City of Fargo Solid Waste Department* 241-1449

Parking of Vehicles on Street - *City of Fargo Police Department* 451-7660

Speeding - *City of Fargo Police Department* 451-7660

Street Lights Out - *City of Fargo Traffic Engineering Department* 241-1545