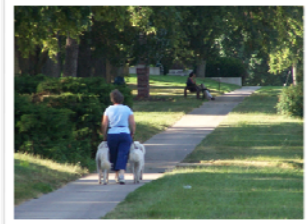
LINCOLN MPO
2040 LONG RANGE TRANSPORTATION PLAN

BICYCLE AND PEDESTRIAN CAPITAL PLAN



Why are we Doing a Bicycle and Pedestrian Capital Plan?

- Quality of Life
- Providing Choice for those that Cannot Drive
- Latent Demand
- Benefits to the Individual and Family
- Ideal Topography and Geography
- Economic Vitality
- Environmental Benefits

Plan Overview

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Assessment of Existing Conditions	Guidelines for Plan Development	Bicycle and Pedestrian Plan	Prioritization and Implementation

EXISTING CONDITIONS

Bicycle

- The system of bicycle trails, lanes, and routes provides the framework for a good bicycle system to serve the community. Supplemental facilities will need to be developed to provide the opportunity for a comprehensive bicycle network, particularly in areas of new development and in areas where biking is more likely if a good network is available.

- Many of the existing bicycle routes have been neglected and have missing signs and route designations. There are also many areas of the City where bicycle routes are missing. This lack of a maintained bicycle network limits bicycle mobility and travel.
  - Some bicycle facilities begin and end erratically. These often are associated with new development. Many additional planned improvements have an unknown timeframe for completion.
- Many of the bicycle facilities have missing segments or intersect with a high volume arterial with no traffic controls for the bicyclist to cross.
- Many of the City's bicycle facilities are in need of repair and require basic maintenance such as sweeping or removing tree overhangs.

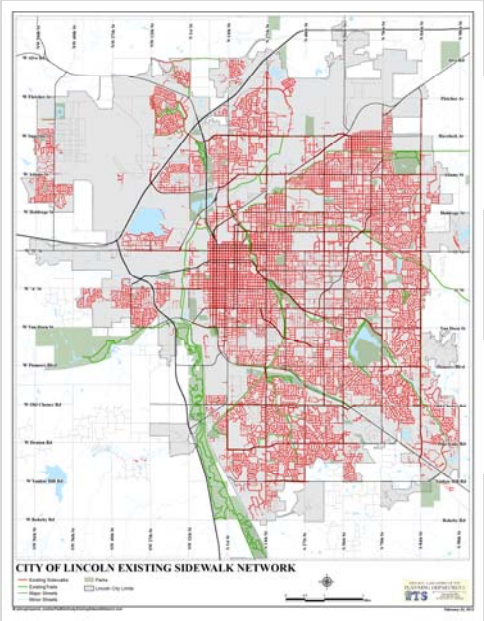
In review of the existing system, the existing bicycle network primarily serves the experienced commuter and not the recreational rider or children. The existing trail system provides very good facilities for the recreational rider, but its accessibility for convenient use in many neighborhoods is limited.

Pedestrian

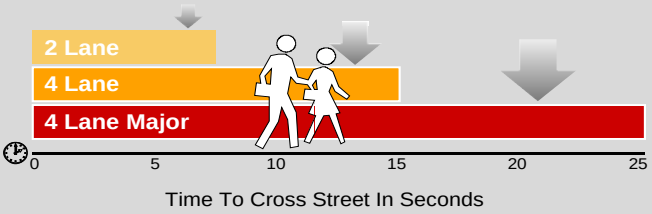
- In general, the City of Lincoln has an excellent sidewalk network. As presented in the map below, almost all neighborhood streets and arterials have sidewalks along both sides. This is because the City has for years required new development to include sidewalks on both sides of the street.

- It should also be noted that the City of Lincoln has a very strong grid system with short blocks and relatively narrow streets, especially in older areas. The narrow streets increase the safety for pedestrians because traffic travels slower and the pedestrian has reduced exposure to the automobile crossing a narrow street.
- The barrier for pedestrian travel tends to be crossing higher volume arterial streets at locations that do not have signalized traffic control.
- The presence of frequent vehicular curb cuts in some areas also inhibits pedestrian activity by creating more points for pedestrian and vehicle conflict and because the sidewalk must slope to allow for vehicle access.
- The lack of trees and landscaping in some areas can also create an uncomfortable microclimate for pedestrians because there is no shade and the pavement creates an urban heat island effect. However, the City's Design Standards that require street trees limits this negative condition in many instances.
- Many of the older areas of the City are experiencing sidewalks that have developed cracks and heaving pavement and require maintenance. This can be particularly difficult for those with disabilities.

The ideal pedestrian system is best described as a grid system of streets with sidewalks on both sides that provide easy and direct connections between the trip origin and destination. The ideal pedestrian system should also provide for convenient and safe street crossings and include some basic amenities, such as sidewalks separated from streets and shade from trees.



Conflicts In Traffic Flow



Guidelines for Plan Development

Evaluation Tools

Bicycle and Pedestrian Level of Service

- Directness
- Continuity
- Street Crossings
- Visual Interest and Amenities
- Bicycle and Pedestrian Security

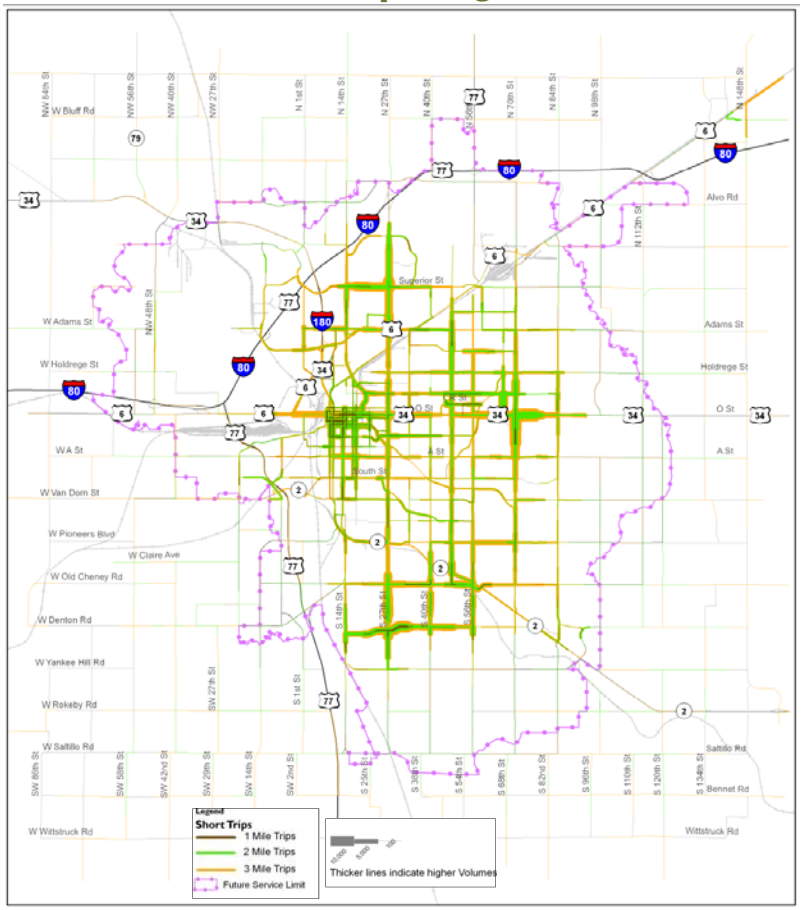
Locating Bike Lanes and Routes

- Low Volume Roadway
- Continuity
- Spacing
- On or Within ¼ Mile of Arterials
- Street Crossings
- Across to Major Destinations

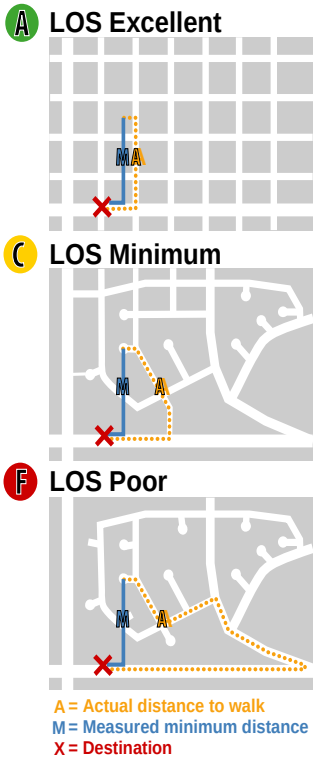
Bicycle and Pedestrian Destinations

- Park & Rec Facilities
- School & Universities
- Major Medical & Hospitals
- Commercial Centers
- Transit Routes

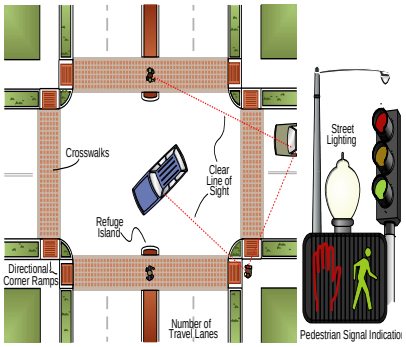
Short Trip Assignment



Level of Service



Street Crossings



Stakeholder Charrette

A primary work effort was completed through an all day Saturday workshop charrette where members of the Mayor's Pedestrian and Bicycle Advisory Committee and city staff collectively discussed and mapped bicycle and pedestrian improvements that would help generate a vision plan for bicycle and pedestrian improvements.

There were many different inputs provided at the workshop including a map of existing bicycle facilities and sidewalks, destination spatial analysis, field survey results, short trip assignment and other relevant information.

The process for developing the Bicycle Plan started with a large aerial map with existing bicycle facilities, working around the city from one area to another, discussing what was good and what segments and improvements were missing, discussing various options and documenting the collective suggested bicycle improvements for that area.

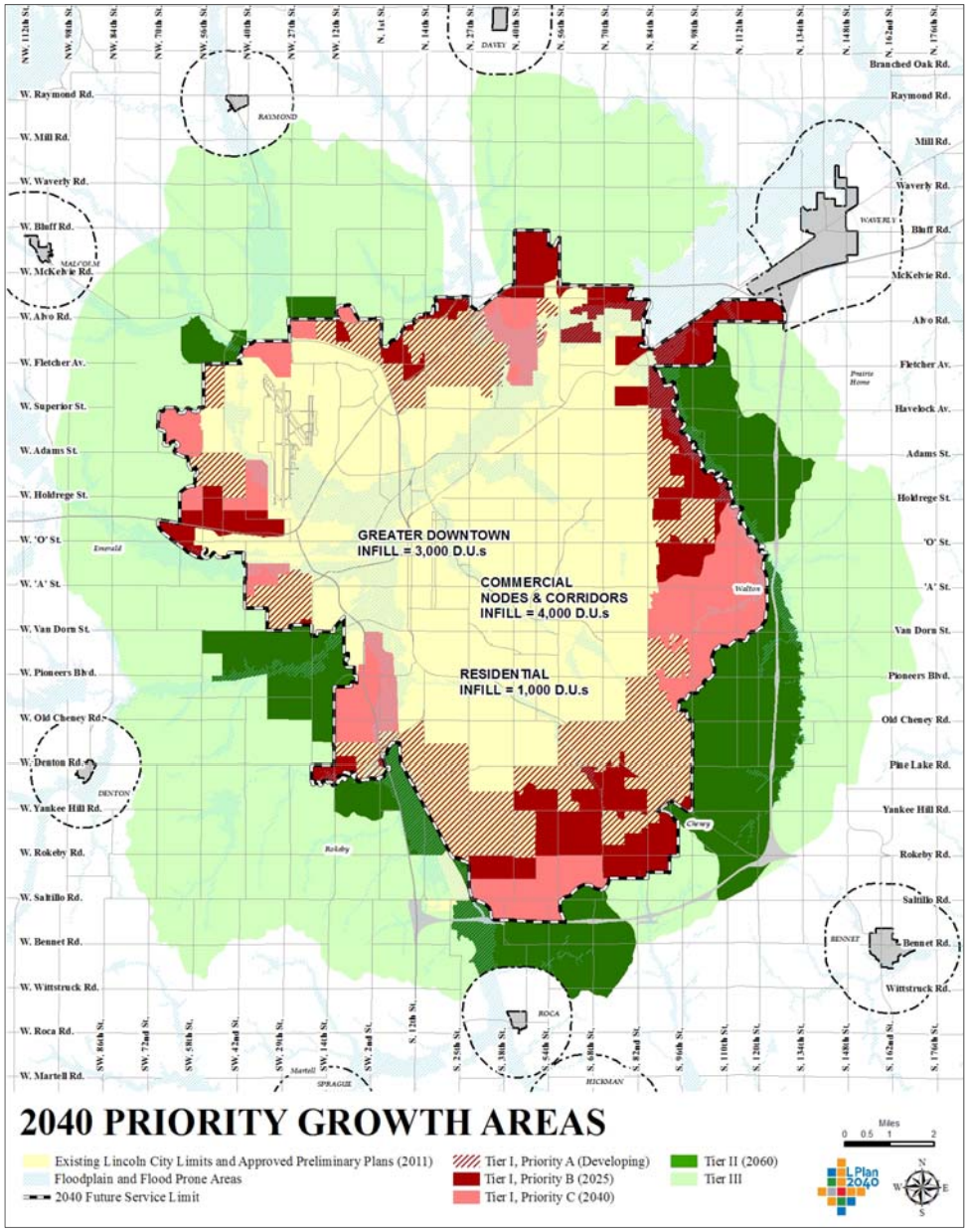
In regards to the pedestrian network, it was recognized that the sidewalk system is very good, but programs and policies to strategically identify improved street crossings and a well funded maintenance plan for the sidewalk network should be the pedestrian plan objectives, not a map.

Guidelines for Plan Development

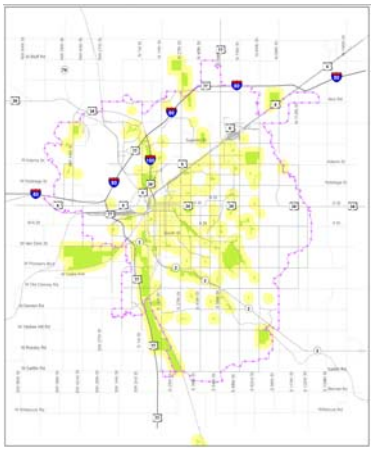
Bike Routes, Lanes, and Paths – How Are They Different?

Bikeway	• A general term for any street or trail which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designed with bike lanes for the exclusive use of bicycles or are to be shared with other transportation modes.
Recreational Trails/Shared-Use Paths	• This is a shared use bicycle and pedestrian facility that is physically separated from motor vehicle traffic by open space or a barrier and is either within the road right-of-way or within an independent right-of-way. These are also referred to as a shared-use or multi-use paths or recreation trails.
Recreational Trails/ Shared-Use Paths	• **Recreational Trails** are located off-street and typically follow a recreational or open space easement, such as along a river or between development areas or along old railroad rights of way. **Shared-Use Paths** are also separated from street but are adjacent to roadways and typically within the dedicated street right-of-way.
Protected Bikeway (Cycle Track)	• These are bicycle lanes that have some physical separation through the use of bollards or raised curb to keep the cyclist separated from the automobile traffic.
Bicycle Lane	• This is a bikeway on a portion of a street that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicycles.
Bicycle Route/Sharrow	• A segment of a system of roadways signed for the shared use of automobiles and bicyclists without lane markings. Bike routes are accompanied by bicycle route signs and possibly sharrow pavement markings that provide designation as a preferred bike route.
Striped Shoulder	• A paved shoulder on a rural road that provides *an* edge line that separates the vehicle from the bicyclist.
Rural Road Shoulder	• A shoulder on a rural road that is at least four feet wide from edge line to pavement edge that provides a separation between the vehicle and bicyclist.

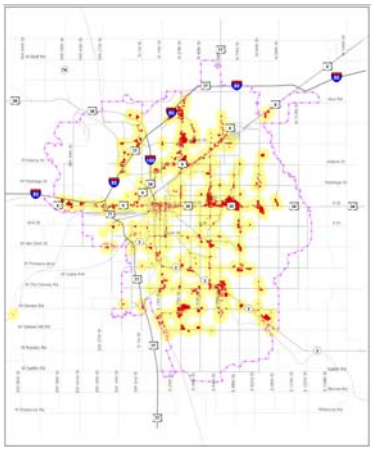
Growth Areas Used to Guide Plan Development



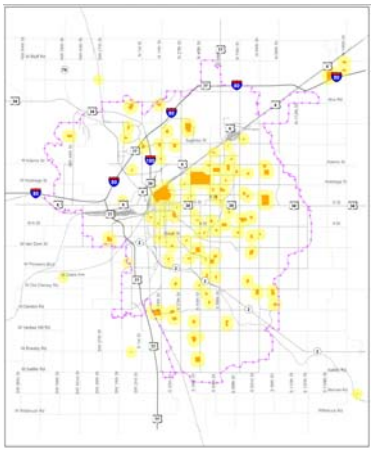
Destinations & ¼ Mile Walking Radius



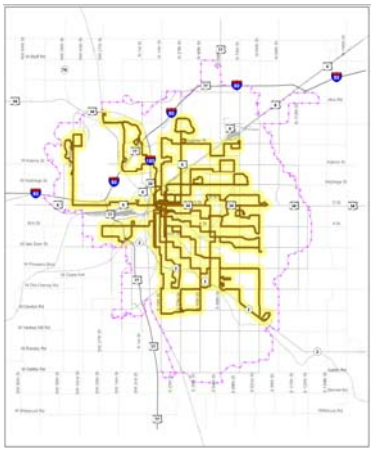
Parks & Recreation



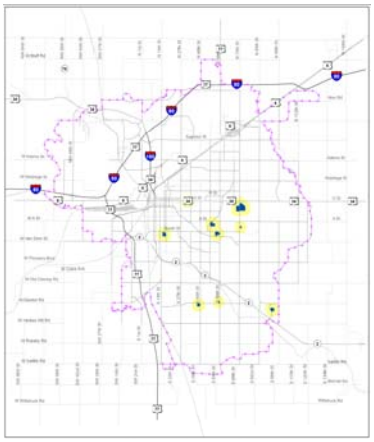
Commercial Centers



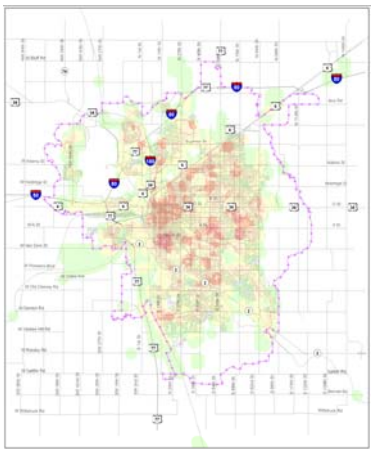
School Sites & Universities



Transit

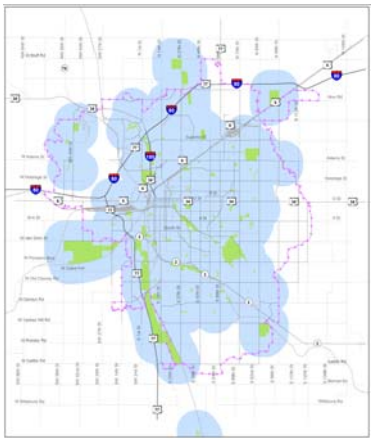


Major Medical & Hospitals

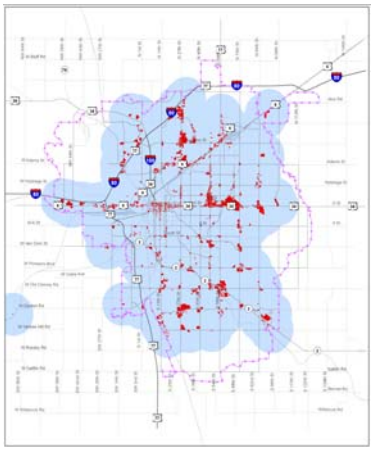


Composite of Destinations with Sidewalk Overlay

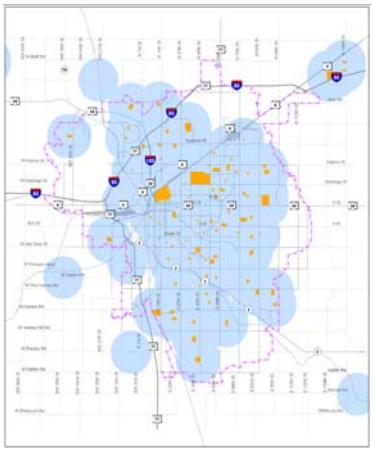
Destinations & 1 Mile Bicycle Radius



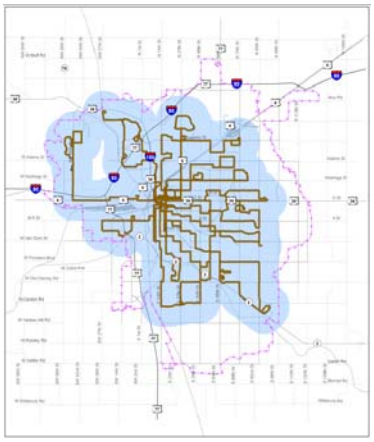
Parks & Recreation



Commercial Centers



School Sites & Universities



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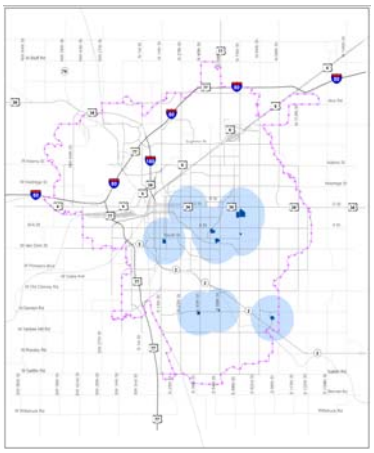


Major Medical & Hospitals

Composite of Destinations

Proposed Bicycle Plan

On-Street Bike Routes

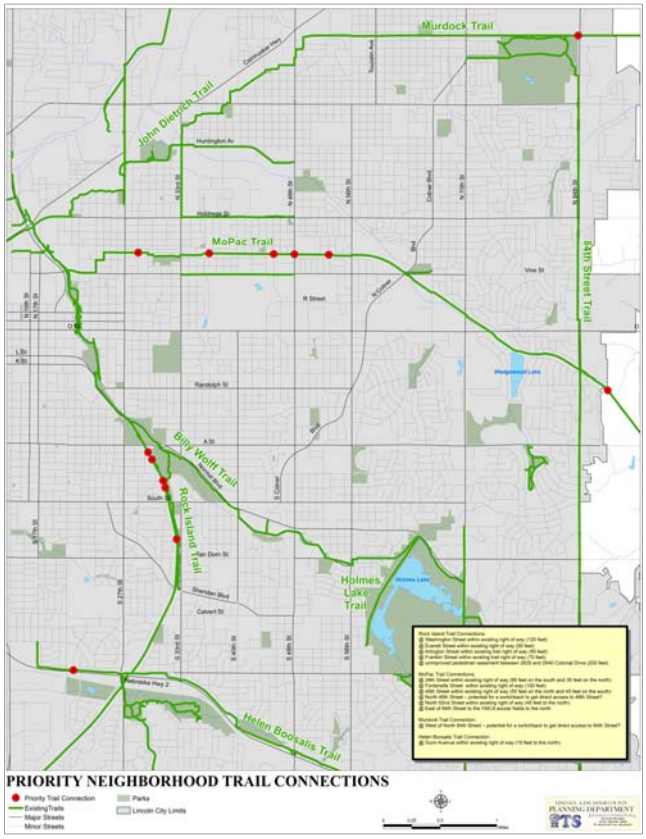
The on-street bike routes provide the local grid to connect the resident with their destinations and the trail system. Bike Routes are located on residential streets and low volume collector roadways where the automobile and bicyclist share the travel lane. These facilities are signed with bike route signs on both sides of the street at approximately five per mile or when a bike route might begin, end, turn on to an intersecting street, or intersect with another bicycle facility.

In addition to the bike route sign, some higher volume collector roadways might benefit with a pavement marking defined as a sharrow. Sharrows are becoming a popular form of bike route pavement marking and include the following benefits:

- Encourage motorists to be more aware of bicycles.
- Increase the distance between bicyclists and parked cars.
- Increase the distance between bicyclists and passing vehicles.
- Reduce the number of sidewalk riders.
- Significantly reduce the number of wrong-way riders.

Similar to bike route signs, the sharrow marking should accompany the bike route signs on both sides of the street at about five per mile. It should further be noted that the addition of the sharrow has both the higher initial installation cost and needs to be replaced more frequently than the bike route sign alone. Potential bike routes that should be considered for sharrow markings include 8th Street, 11th Street, 14th Street, Sumner, J, and Holdrege.

Priority Neighborhood Trail Connections



- Rock Island Trail Connections
- Washington Street within existing right-of-way (120 feet)
- Everett Street within existing right-of-way (50 feet)
- Arlington Street within existing trail right-of-way (50 feet)
- Franklin Street within existing trail right-of-way (70 feet)
- Unimproved pedestrian easement between 2626 and 2640 Colonial Drive (200 feet)
- MoPac Trail Connections
- 29th Street within existing right-of-way (85 feet on the south and 35 feet on the north)
- Fontenelle Street within existing right-of-way (100 feet)
- 45th Street within existing right-of-way (50 feet on the north and 45 feet on the south)
- North 48th Street – potential for a switchback to get direct access to 48th Street? (225 feet is an estimate)
- North 52nd Street within existing right-of-way (45 feet to the north). This is an important connection to make the 52nd Street bike route continuous north and south of the trail.
- East of 84th Street to the YMCA soccer fields to the north. Land is owned by Lincoln Public Schools so coordination with them would be needed. Length of connection is undetermined due to range of locations to make such a connection. Grades may be an issue. (660 feet is an estimate)
- Murdock Trail Connection
- West of North 84th Street –potential for a switchback to get direct access to 84th Street? (225 feet is an estimate)
- Helen Boosalis Trail Connections
- Dunn Avenue within existing right-of-way (15 feet to the north)

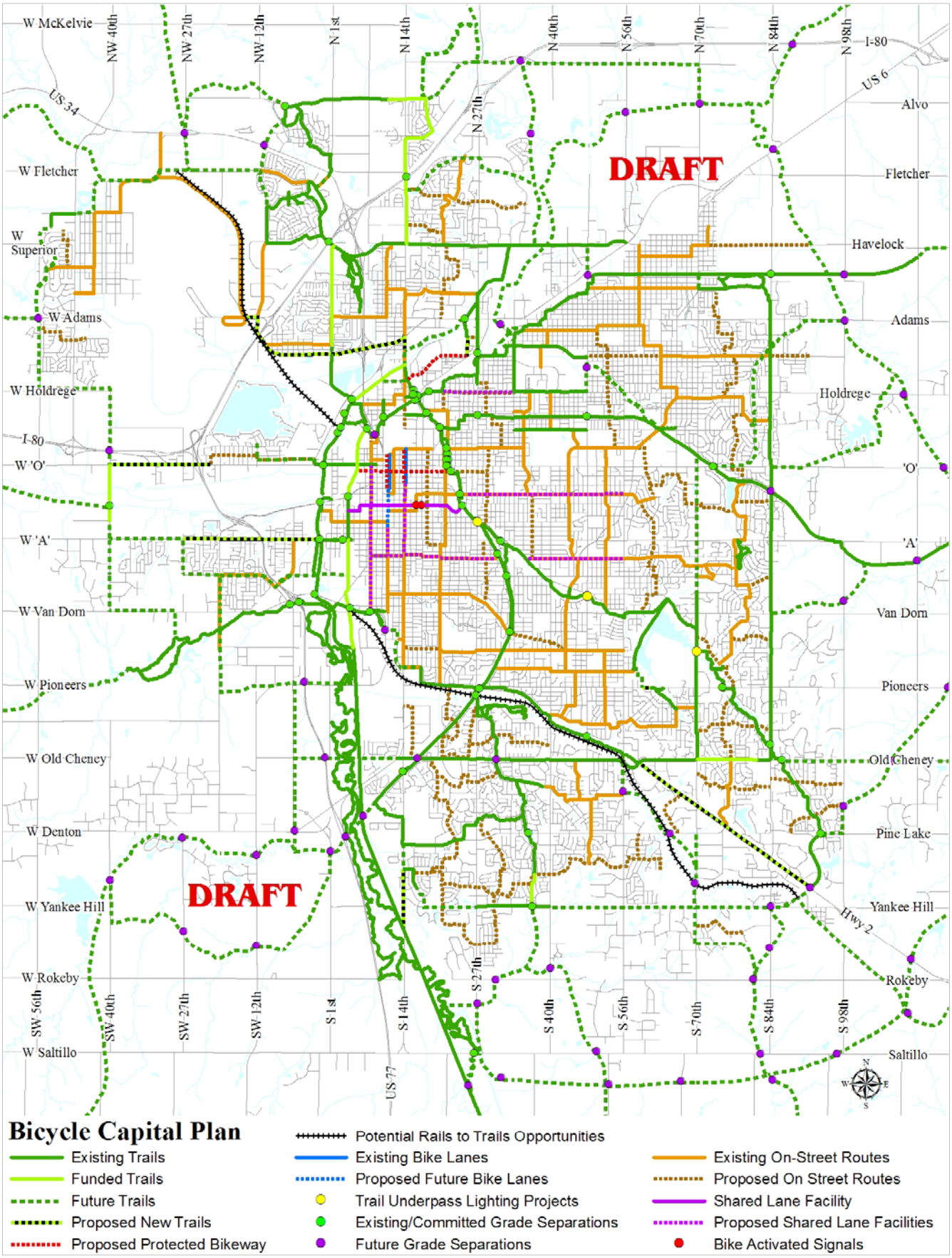
Existing and Future Miles of Bicycle Facilities

Facility Type	Existing	Future	Change
Trails - Existing	148	291.9	+143.9
Trails -Funded	9.5		
Cycle Tracks	0.0	2.2	+2.2
Bike Lanes	0.9	0.5	- 0.4
Bike Routes	82	135.1	+53.1
Sharrows	1.7	11.2	+9.5
Total	232.6	440.9	208.3

10.1 Miles of Identified Additional Trail Projects

- Highway 2 Trail extension
- Holmes Lake/Pioneers Boulevard trail connection
- Jamaica North/Yankee Hill Road/South 14th Street trail connection
- West A Street trail extension
- West O Street trail extension
- Theresa Street trail extension
- Cornhusker Highway trail from North 14th to North Park Road

Proposed Bicycle Plan



Proposed Bicycle Plan

Bike Lanes

A bicycle lane is a bikeway on a portion of a street that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicycles. These bike lanes are five feet or wider. Because of the additional 10 feet or more for bike lanes on two sides of a street, they have limited opportunity of use within the City given the available right-of-way. As streets are developed in the outlying areas, the use of bicycle lanes should be considered along corridors where it may make sense.

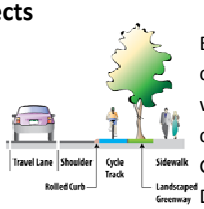
Bicycle Activated Signals

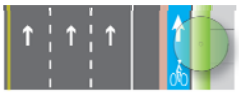
R10-22

Higher volume bike route corridors that intersect with a signalized intersection should be considered for installation of in-pavement signal loop detectors that detect bicycles. Ideally this would be done with a street overlay maintenance project when all signal loops are replaced. Another option is bicyclist activated signal buttons just off the street so the biker does not need to leave the street to activate it. This would be particularly important for an intersection that currently only has automobile activation and no pedestrian push buttons. An example of such a project that should be given priority is along G Street at both 17th and 16th Streets.

Protected Bikeways

Potential Bike Lane and Protected Bikeway Projects





Extend 11th Street bike lane concept from K Street to C Street with lanes in both directions. This concept is included in the Greening America's Capitals plan. Details of this facility need to be worked out, especially interaction with on-street parking.

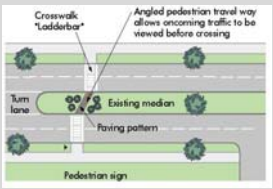
Protected bikeway facility on N Street from the West Haymarket trail to the Antelope Valley Trail. Details of this facility need to be worked out with the implementation of the project based on the approved Downtown Master Plan Update.

Potential protected bikeway facility in the Innovation Campus development connecting the Antelope Valley Parkway to the eastern terminus of the campus roadway connection at Salt Creek Roadway. Details of this facility need to be worked out with the development.

There is potential for a future protected bikeway on 11th and 14th Streets where bike lanes exist today. Details of this facility need to be worked out with the implementation of the project based on the approved updated Downtown Master Plan. These improvements would be installed after the N Street facility is installed and considered a viable option for additional application.

At-Grade Crossings

Mid-Block Crossings with Median Refuge Island



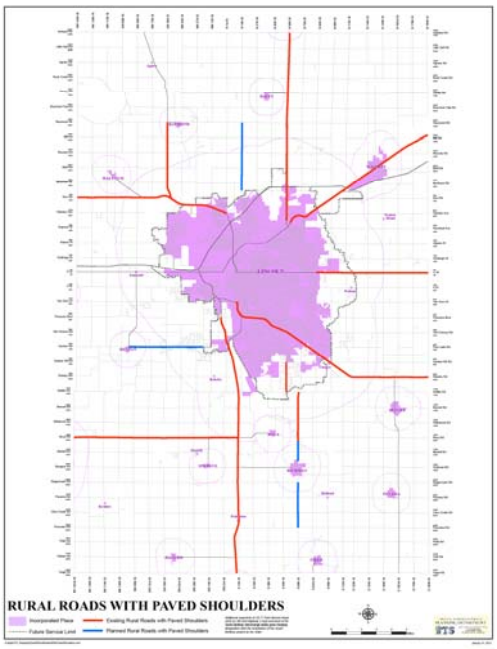
Mid-block crossings should be provided where there is an existing or potential pedestrian demand to cross at higher volume roadways or streets where existing crossings are more than 800 feet away. Ideally, these crossings should be accommodated with a refuge island. Where mid-block crosswalks are installed at uncontrolled locations (i.e., where no traffic signals or stop signs exist), crossing islands should be considered as a supplement to the crosswalk in order that the pedestrian or bicyclist will only cross one direction of traffic at a time.

Painted medians offer little refuge other than getting the pedestrian out of a lane of traffic. Substantive raised medians of significant width with a cut through provide some increase in security for the crossing pedestrian. For arterials with four or greater lanes, a raised median refuge island should be designed for all intersections and mid-block crossings. Center crossing islands allow pedestrians to deal with only one direction of traffic at a time, and enable them to stop partway across the street and wait for an adequate gap in traffic before crossing the second half of the street. Providing an angled pedestrian travel way across the median allows oncoming traffic to be better viewed before crossing, further improving safety.

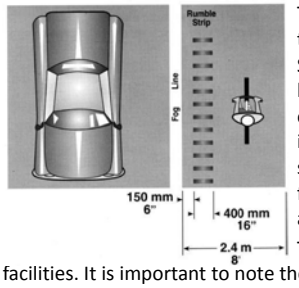
Pedestrian Actuated Rectangular Rapid Flashing Beacon (RRFB)

An alternative to a traffic signal when a signal is not warranted is the Pedestrian Actuated Rectangular Rapid Flashing Beacon special LED flashing device installed below a crosswalk sign and placed at marked and signed but unsignalized crosswalk locations. The RRFB increases pedestrian visibility by attracting driver attention with the flashing beacons and making them aware of the pedestrian's presence. The MoPac trail crossing of North 33rd Street is identified as a first use of this enhanced crossing treatment. Other trail crossings of major streets that could benefit from this treatment may be identified in the future.

Proposed Bicycle Plan



Paved Shoulders



The pavement edge line with a paved shoulder provides a separated space for the bicyclist much like a bike lane. Such facilities are most useful in rural settings. Shoulders four feet wide are considered the minimum width to accommodate bicycle traffic. Experienced riders will benefit from shoulder widths as narrow as one to two feet, but these facilities should not be signed for bicyclists. Surface irregularities such as rumble strips, textured paving, and raised lane markers should be avoided on routes intended for bicyclists. AASHTO recommends that four feet of ride-able surface be present for bicyclists if rumble strips are used on a shoulder.

The map to the left indicates those roadways that include paved shoulder facilities. It is important to note the need to address impacts on bicycle facilities in the rural part of Lancaster County when the South Beltway is constructed and Highway 77 becomes a freeway, a facility that will no longer allow bicyclists on its paved shoulders. As part of the South Beltway and Highway 77 project, a plan for adding paved shoulders to rural roadways and paving off-street rural trails will be needed to offset the adverse impact to bicyclists as a result of this major project.

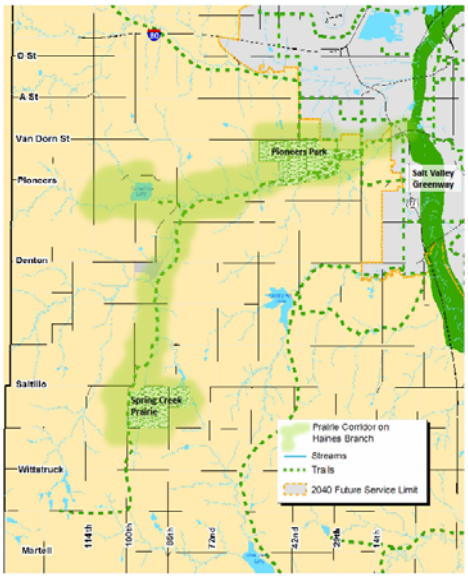
Lighting

A key requirement of the bicycle network is security, which is associated with whether the bicyclist can be seen, particularly at night. There is the need to "light" bike trail underpasses where they are not yet lighted or where there is not sufficient daylight access designed into the underpass. In addition, there are some key locations along the bike trail system that should have some night lighting:

- Trail underpass at 70th Street near Holmes Lake;
- Trail underpass at 48th Street south of Normal Boulevard; and
- Trail underpass at 27th Street and Capital Parkway.

Priority Major Trail Projects

Prairie Corridor Haines Branch Trail Extension



Haymarket Grade Separation

Bicycle Parking and Storage

Short-Term parking is needed where bicycles will be left for short stops. It requires a high degree of convenience (as close to destinations as possible). Some short-term bicycle parking should be protected from the weather (a portion can be unprotected, since demand tends to increase during dry weather). This can use an existing overhang or covered walkway, a special covering, weatherproof outdoor bicycle lockers, or an indoor storage area.

Long-Term parking is needed where bicycles will be left for hours at a time. It requires a high degree of security and weather protection, with well-designed racks in covered areas, lockers, storage rooms, or fenced areas with restricted access. Underutilized spaces in parking garages and inside employment buildings are opportunities for this type of parking.

Proposed Pedestrian Plan

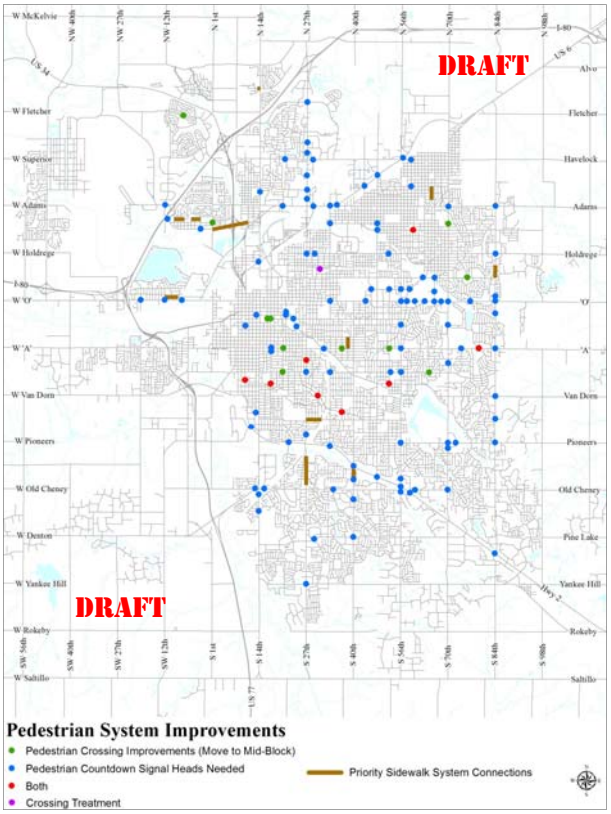
Completing Missing Gaps

Some gaps in the sidewalk network exist and have been identified as priorities related to schools, parks, activity centers, and gaps in the arterial street sidewalk system. These locations include the following:

- West side of South 40th Street south of Highway 2 from Sweetbriar to Wildbriar
- Cornhusker Highway from North 11th Street to North 1st Street
- West side of South 27th Street from Tipperary Trail to Jameson

- Near Holmes Elementary School, North of A Street, install sidewalk along the east side of Fall Creek Road
- Near Kooser Elementary, install a piece of sidewalk on the south side of Humphrey Ave. between 14th and Trinidata Road
- Near Lakeview Elementary, install a sidewalk along the north side of P Street from Capitol Beach Blvd. and Bell Street
- Near Pershing Elementary, install a sidewalk on the east side of 65th Street across from the school site between Knox Street and Fremont Street
- Near Randolph Elementary, install a north/south sidewalk on the west side of 38th Street between A and D Street
- Near Rousseau Elementary, install a sidewalk along the north side of Calvert Street west of Hanson Drive
- Near West Lincoln Elementary, install a sidewalk on the south side of Nance Avenue east of the school between 4th and Chester Street

Proposed Pedestrian System Improvements



Priority Pedestrian Projects

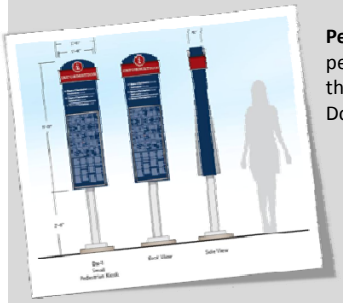
There are a number of priority projects that were identified as part of the field survey and as input from the Mayor's Pedestrian and Bicycle Advisory Committee and City staff. These projects are summarized as follows:

Grade Separation: Provide a grade separation facility between the Haymarket and the UNL campus providing a connection that avoids at-grade crossings of 9th and 10th Streets and provides a significant pedestrian system connection. This is especially important with increased major events at the new West Haymarket arena and for football weekends.

Pedestrian Countdown Signal Heads: It is a goal of the City to have all signalized intersections include pedestrian countdown signal heads. Therefore, the objective is to install pedestrian countdown signals at those signalized intersections that do not yet include such technology as funding is available. It would also be the Plan's policy to install countdown signal heads when a signal is replaced or built new.

Intersection Traffic Control: There are intersections located throughout the City that have relatively high traffic volumes and pedestrian activity but no traffic control to assist the pedestrian to cross. If the traffic volumes do not meet minimum signal warrants volumes, then other potential solutions including the Pedestrian Actuated Rectangular Rapid Flashing Beacon (RRFB) and the Pedestrian Hybrid Beacon- High Intensity Activated Crosswalk (HAWK) should be evaluated and considered.

Mid-Block Pedestrian Crossings: Pedestrians will typically not walk more than a few hundred feet to walk to an intersection to cross an arterial. In situations where block lengths are near 1,000 feet or more and there exists a high demand of pedestrian trips from one side of an arterial to the other, a mid-block pedestrian crossing should be considered and constructed to meet standard design regulations.



Pedestrian Wayfinding: Implement a pedestrian wayfinding system throughout the City with an initial emphasis on Downtown.

Pedestrian Amenities at Transit Stops

A quality pedestrian environment which is visually interesting with pedestrian amenities is critical for an area to promote itself as pedestrian friendly. Through transit enhancement funding sources, potential improvements for installing heightened pedestrian connections, amenities such as lighting and benches/shelters, and wider sidewalk space at bus stops along routes with high ridership could be provided.

Prioritization and Implementation

Total Project Cost Estimates

Facility Type	Number	Units	Cost per Unit	Cost
Cycle Tracks	3.1	Miles	$360,000	$1.12 M
Bike Lanes (striping, marking and signage only)	0.5	Miles	$25,000	$12,500
Existing Bike Routes (signs)	82	Miles	$1,500	$123,000
New Bike Routes (signs)	53.1	Miles	$3,000	$159,300
New Bike Routes with Growth	56	Miles	$3,000	$168,000
Shared Lane Markings	9.5	Miles	$3,000	$28,500
Additional Shared Lane Markings with Growth	20	Miles	$3,000	$60,000
Sidewalk Connections to Trails	1,975	Linear Feet	$25.00	$49,375
Enhanced At Grade Trail Crossings	5	# Crossings	$20,000	$100,000
Trail Underpass Lighting	3	# Underpasses	$20,000	$60,000
Bike Activated Signals	2	# Intersections	$40,000	$80,000
Completing Missing Sidewalk Gaps	18,480	Linear Feet	$25.00	$462,000
Public On Street Bike Parking	12	8 Inverted U/space	$1,600	$19,200
Public Garage Bike Parking	15	# Garages	$15,000	$225,000
Pedestrian Countdown Signal Heads	736	# Signal Heads	$90.00	$66,240
Mid-Block Crossings	18	# Crossings	$80,000	$1.44 M
Pedestrian Wayfinding	1	System	$331,700	$331,700
Total Costs				**$4.5 M**

The total cost to implement the projects identified in the Bicycle and Pedestrian Capital Plan is $4.5 million. Based on limited current funding levels, it will take many years beyond the 2040 planning horizon year to complete all of the bicycle and pedestrian improvements identified in the plan. In order to reasonably complete the Bicycle and Pedestrian Capital Plan elements, some improvements will need to continue to be accomplished through existing and future funding programs in addition to obtaining dedicated annual bicycle and pedestrian funds.

Near Term (2013-2025) Prioritized Project Listing

Priority Facility	Number	Cost
Existing Bike Routes (update with new signs)	82 miles	$123,000
New Bike Routes (new signs)	53.1 miles	$159,300
Share Lane Markings	9.5 miles	$28,500
Bike Lanes (striping, marking and signage only)	0.5 miles	$12,500
Trail Underpass Lighting	3 underpasses	$60,000
Bike Activated Signals	2 intersections	$80,000
Completing Missing Sidewalk Gaps	2 miles	$264,000
Sidewalk Connections to Trails	1,000 feet	$25,000
Enhanced At Grade Trail Crossings	1 crossing	$20,000
Public On Street Bike Parking	6 spaces	$9,600
Public Garage Bike Parking	4 garages	$60,000
Pedestrian Countdown Signal Heads	736 signal heads	$66,240
Total Costs		**$908,140**

Ordinance and Design Standard Recommendations

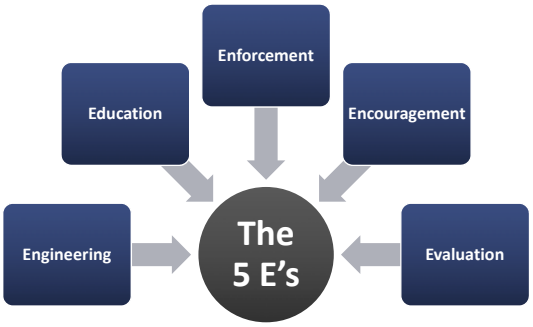
The City of Lincoln currently has existing ordinances and design standards that address much of the needed plan improvements that will help create a more useable bicycle and pedestrian system. Continued enforcement of these existing rules is very important to the success of the Plan. There are, however some additional codes and ordinances to consider for improving bicycle and pedestrian mobility within the community.

Bicycle Parking: Providing bicycle parking and storage is essential to promote a bicycle and pedestrian environment. In order to achieve this goal the City should include in its design standards requirements for a minimum amount of bicycle parking facilities using quality racks in appropriate locations with adequate space, lighting, public viewing, and convenience related to public entrances.

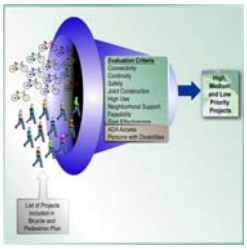
Coordination: Coordination and communication among the various City and County Departments regarding bicycle and pedestrian planning and implementation of improvements or programs is critical. The current internal and external review processes should be evaluated to ensure bicycle and pedestrian needs are considered as an integral part of the review process. It should also be noted that currently there does not exist a dedicated staff employee to oversee the bicycle and pedestrian program. The creation of a Bicycle and Pedestrian Program Manager should be strongly considered. This person would be given the authority to leverage funds for bicycle and pedestrian improvements. The duties of this Bicycle and Pedestrian Program Manager would also include coordinating City bicycle and pedestrian planning efforts and programs with other local, regional and state agencies.

The 5 E's – Engineering, Education, Enforcement, Encouragement, and Evaluation

Facilities are only one of several elements essential to building a successful bicycle and pedestrian transportation system. Bicycle and pedestrian safety education and training encouraging walking and bicycling, and enforcing the rules of the road as they pertain to bicyclists, pedestrians, and motorists, should be combined with facilities development to form a comprehensive approach to bicycle and pedestrian use. The 5 E's - Engineering, Education, Encouragement, Enforcement, and Evaluation – is an important element for a comprehensive bicycle and pedestrian plan.



Bicycle and Pedestrian Project Selection and Priority Criteria



Connectivity: Will the project provide connections or access to major employment, business, shopping, civic uses, schools, senior facilities, and public housing?

Continuity: Does the project provide for a missing link in the system or eliminate a barrier that inhibits use?

Safety: Does the project mitigate a known safety hazard?

Joint Construction/ Developer Contribution: Can the project be "piggybacked" with other major project(s), such as a road widening or land development project?

High Use: Will the project result in a likelihood of use (*i.e.,* satisfy demand, increasing use)?

Neighborhood Support: Is there strong neighborhood support for the project?

Feasibility: Is the project ready to be implemented (*i.e.,* right-of-way acquired, preliminary engineering completed)?

Cost Effectiveness: Does the project represent a good value for the investment?

Pedestrian Facilities

ADA: Is the project required to comply with ADA?

Persons w/ Disabilities: Does the project provide improvements to meet the needs of a person with disabilities?