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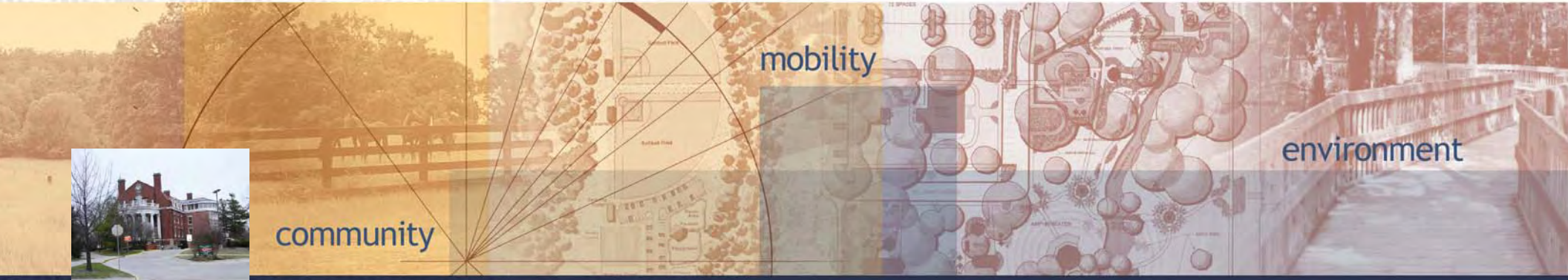

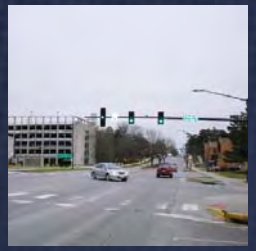

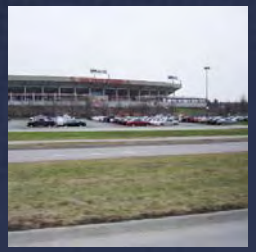

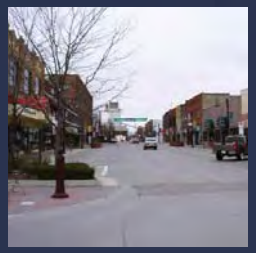

Ames Area MPO 2035 Long Range Transportation Plan

Draft Final

October 2010

HDR

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The preparation of this report has been financed in part through grants from the Federal Highway Administration, U.S. Department of Transportation, under the Metropolitan Planning Program, Section 104 (f) of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

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Chapter 1: Introduction

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CHAPTER 1: INTRODUCTION

The Ames Area Metropolitan Planning Organization (AAMPO) urbanized area covers approximately 41 square miles and consists of the contiguous urbanized area surrounding and including the City of Ames.

With a population of 52,000, the City of Ames is the largest urban area within Story County. It is home to Iowa State University (ISU) which has a population of nearly 27,000 students. The City of Ames is also the headquarters for the Iowa Department of Transportation (Iowa DOT) and is about 40 miles from the state capital in metropolitan Des Moines. Commuters travel between Des Moines and Ames. The Des Moines metropolitan area has a population of about 560,000.

The Ames area has a growing population and employment that are supplemented with increased transportation needs. Transportation services are developed and infrastructure implemented through the regional transportation planning process carried out by the AAMPO.

The AAMPO is comprised of the following agencies:

- City of Ames
- Boone County
- Story County
- Iowa State University
- CyRide
- Federal Highway Administration
- Federal Transit Administration
- Iowa Department of Transportation

As required by the Safe, Accountable, Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), every metropolitan planning organization is required to have a transportation planning process in place in order to receive federal transportation dollars. The Long Range Transportation Plan (LRTP) serves as the guide for selection and funding of area transportation projects over at least a 20 year planning horizon. The LRTP must be updated every five years and provides the framework for the five-year Transportation Improvement Program (TIP). Since the 1962 Federal-aid Highway Act, federal authorizing legislation for expenditure of surface transportation funds has required metropolitan area transportation plans and programs to be developed through a continuing, cooperative and comprehensive (3-C) planning process.

The 2030 Ames Area MPO Long Range Transportation Plan was the first LRTP for the AAMPO and was adopted in October 2005. This Plan update reflects the SAFTEA-LU requirements and changes in the Ames area since the last plan was completed.

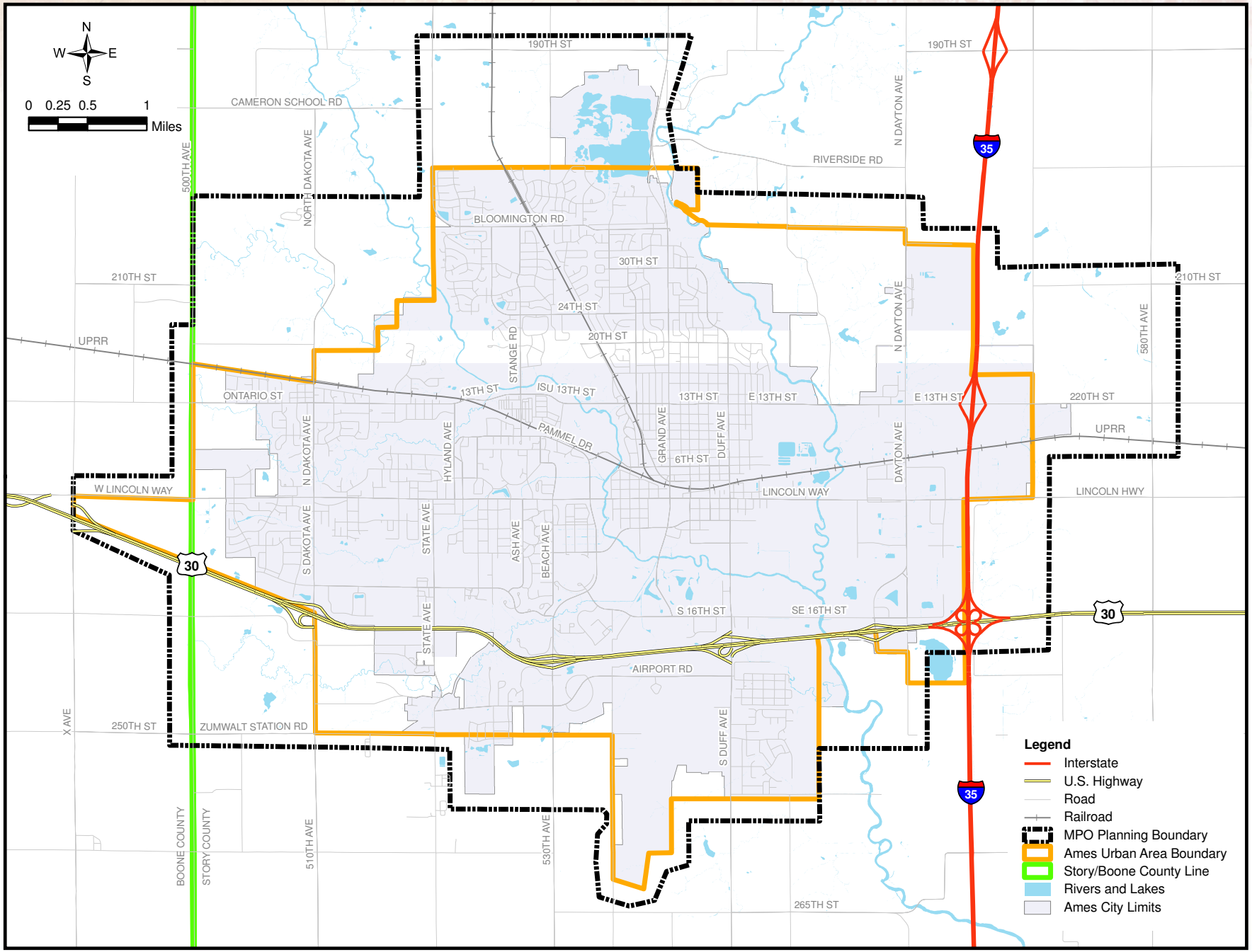
The 2035 Ames Area Long Range Transportation Plan update is a vital planning document that includes strategies leading to an integrated multimodal transportation system. The LRTP is a collaborative effort among state and local transportation officials and interested members of the public with the goal of determining future transportation needs and how to best address those needs with transportation funding dollars. This LRTP update includes collecting and analyzing new data, projecting future transportation conditions, and identifying solutions to meet transportation needs.

The 2035 Ames Area LRTP covers areas in and around Ames that are expected to become urbanized by the year 2035. This area includes the City of Ames, and portions of Boone and Story Counties. The LRTP study area (MPO Planning Boundary) is shown in **Figure 1.1**, which includes the Ames incorporated city limits plus the planning jurisdiction outside of the incorporated areas.

Why Is a Plan Needed?

- The region's transportation needs are funded in part by federal funds. In order for the Ames region to receive those funds, the federal government requires a Long Range Transportation Plan to ensure appropriate expenditure of revenues and consideration of the community's needs and desires.
- The planning process enhances the community's character and quality of life by considering the interaction between land use and transportation and their collective effect on the built and natural environments. A successful planning effort involves citizens, increases the effectiveness of investments, and promotes transportation services and infrastructure that are consistent with the community's desires.
- The current roadway, pedestrian, bicycle, and transit system will not be sufficient to accommodate the future transportation needs of the Ames area. Congestion on the system continues to grow due to growth of the City of Ames population, Iowa State University student population, new development, and increased regional travel in central Iowa. Additionally, the citizens within the Ames area are devoting renewed attention to alternative mode options with increased focus on non-automobile means of traveling.

Figure 1.1. Existing Ames Area MPO Boundary Map



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Chapter 2:
Vision, Goals and Objectives

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CHAPTER 2: VISION, GOALS AND OBJECTIVES

The vision, goals and objectives guide the transportation planning process for the Ames area. Descriptions of these terms are provided below:

- **Vision**: Provides the foundation for the LRTP with strategic direction that reflects community input. A transportation plan vision is a broad theme that underlies improvements and strategies for the future.
- **Goals**: General statements of direction for the transportation system that complement the transportation vision.
- **Objectives**: Specific outcomes to achieve the intent of the goals. Objectives should be quantifiable in order to determine if the objective has been met and what progress has been made toward achieving the goals.

2.1 Vision

A visioning exercise was conducted with the AAMPO staff, the Focus Group, and the general public at the Visioning Workshop held in October 2009. Following this workshop, the AAMPO staff and consultant team established a vision statement that integrated themes from the Visioning Workshop.

The vision statement, goals and corresponding objectives are as follows.

VISION STATEMENT

The Ames area future transportation plan delivers **innovative** and **forward-thinking mobility solutions** that respond to its **unique character** as a university community and provide long term sustainability by:

GOALS

- Developing a safe and connected multi-modal network
- Fostering livability, quality of life and sustainable development
- Delivering context sensitive solutions
- Supporting area economic opportunities
- Maximizing the benefits of transportation investments to provide efficient transportation service
- Protecting environmental resources

2.2 Goals and Objectives

1. Develop a Safe and Connected Multi-Modal Network

a.) Increase the connectivity of all modes including automobile, public transit, bicycle, air travel, freight rail, truck and pedestrian.

b.) Incorporate strategies to promote safety and security across the entire network.

2. Foster Livability, Quality of Life and Sustainable Development

a.) Match the transportation system with the desired community development pattern.

b.) Link land uses with a multi-modal network to reduce vehicle miles traveled and enhance non-automobile modes as an efficient means of travel and a recreational opportunity.

c.) Reduce overall system motorized vehicular hours traveled and improve regional access and travel times for emergency response.

3. Deliver Context Sensitive Solutions

a.) Develop context sensitive transportation facilities that fit the physical setting and preserves scenic, aesthetic, historic, and environmental resources while maintaining safety and mobility.

4. Support Area Economic Opportunities

a.) Develop a transportation system that provides desirable linkages to existing developments, new developments, redevelopments, and supports economic drivers, such as the airport.

5. Maximize the Benefits of Transportation Investments to Provide Efficient Transportation Service

a.) Preserve and maintain existing transportation infrastructure and enhance the transportation system to reduce congestion on major corridors.

b.) Consider cost-effectiveness, initial capital costs, and life cycle costs for transportation projects.

c.) Provide a transportation system that yields a favorable benefit to cost ratio by increasing vehicle occupancy, minimizing per capita vehicle miles traveled by auto, reducing delay, or promoting travel by non-auto modes for a practical cost.

6. Protect Environmental Resources

a.) Minimize transportation system infringement into undisturbed areas of identified natural resources.

b.) Minimize transportation system impact on property and the human environment.

2.3 Federal Requirements

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) contains eight Planning Factors that must be addressed in transportation plans. The goals and objectives that were developed for this LRTP update relate to the eight SAFETEA-LU Planning Factors. The relationship between the goals and objectives of this LRTP update to the SAFETEA-LU Planning Factors are presented in Table 2.1.

Table 2.1. AAMPO 2035 LRTP Goals & Objectives Comparison to SAFETEA-LU Planning Factors

AAMPO 2035 LRTP Goals and Objectives			SAFETEA-LU Planning Factors							
			A	B	C	D	E	F	G	H
			Economic Vitality	Safety	Security	Accessibility and Mobility	Environment, Energy, Quality of Life, and Consistency	Connectivity	System Management	System Preservation
Goal 1	**Develop a Safe and Connected Multi-Modal Network**									
	a	Connectivity/Continuity				✓		✓		
	b	Safety/Security		✓	✓					
Goal 2	**Foster Livability, Quality of Life, and Sustainable Development**									
	a	Land Use Consistency					✓			
	b	Vehicle Miles Traveled				✓		✓	✓	
	c	Vehicle Hours Traveled				✓	✓	✓	✓	
Goal 3	**Deliver Context Sensitive Solutions**									
	a	Context Sensitivity					✓			
Goal 4	**Support Area Economic Opportunities**									
	a	Economic Impact	✓			✓	✓	✓		
Goal 5	**Maximize the Benefits of Transportation Investments to Provide Efficient Transportation Service**									
	a	Congestion Relief				✓			✓	✓
	b	Cost	✓						✓	
	c	Benefit to Cost Ratio	✓			✓	✓		✓	
Goal 6	**Protect Environmental Resources**									
	a	Natural Environment Impact					✓			
	b	Property Impact/Human Environment					✓			✓

SAFETEA-LU Planning Factors

A. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;

B. Increase the safety of the transportation system for motorized and non-motorized users;

C. Increase the security of the transportation system for motorized and non-motorized users;

D. Increase the accessibility and mobility of people and for freight;

E. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;

F. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;

G. Promote efficient system management and operation, and;

H. Emphasize the preservation of the existing transportation system.

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Chapter 3:
Public Involvement Process

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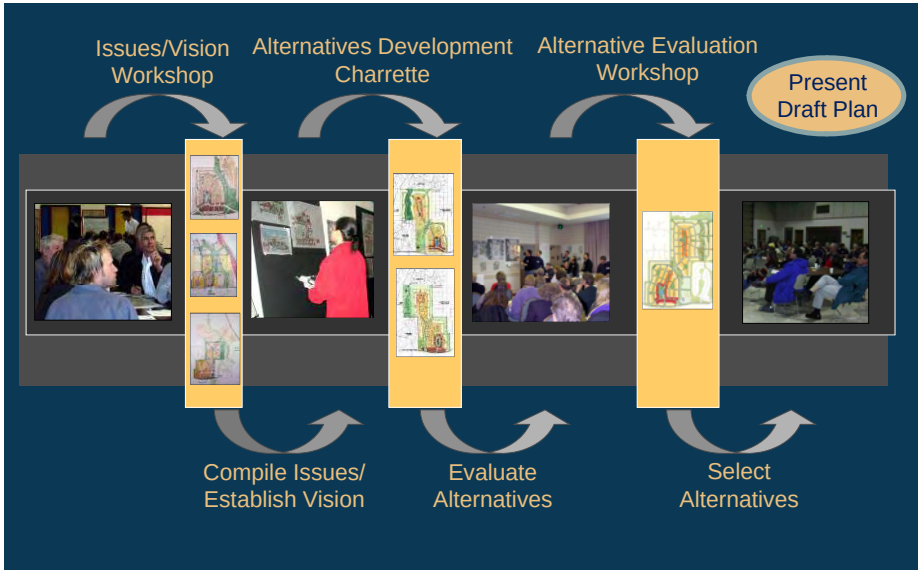
CHAPTER 3: PUBLIC INVOLVEMENT PROCESS

Transportation improvement projects represent a major public investment and will affect the citizens who live in the Ames area and those traveling through the area. Public input into the planning for these improvements is necessary for community support for the Long Range Transportation Plan Update. The public was invited to provide input on the LRTP throughout the update process, and specifically at workshops, charrettes, and presentations which are outlined in Figure 3.1. In addition to the public meetings, the Ames area was also involved in the LRTP through a survey and project website, which are also discussed in this chapter.

Figure 3.1. Public Participation in the LRTP Update Process

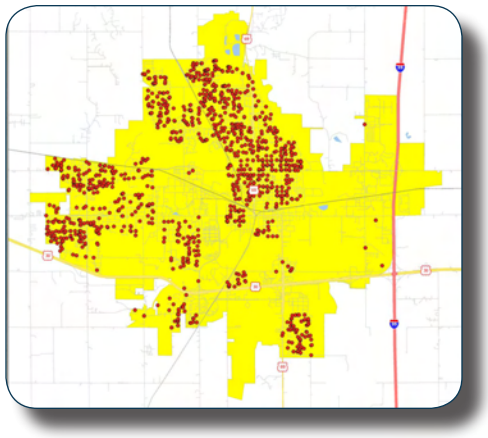


3.1 Community Survey

A research group specializing in transportation studies, ETC Institute (Research Team) worked with the AAMPO Staff to design a survey instrument that gathers input from residents about the transportation needs and priorities for the Ames metropolitan area. The survey was given to residents in the Ames area during January and February of 2010.

Some of the specific topics that were addressed in the survey included:

- Perceptions of current transportation issues.
- Commute issues for those who worked outside of the home.
- Methods of transportation used.
- Perception of the current transportation system in Ames area.
- Perception of traffic congestion in the area.
- Concern about traffic safety.
- Perceived quality of public transit.
- Barriers to using public transit.
- Bicycle and pedestrian issues.
- The importance of various issues to transportation improvements.
- Preferred sources of funding for transportation improvements.



Over 1,200 surveys were taken to ensure that the results can be analyzed for subgroups of the populations (e.g., students, seniors, families with children, persons with disabilities, etc.). The Research Team administered the survey through

a combination of mail and phone interviews. The Research Team prepared a report that documents the findings of the needs assessment survey. The report and the survey instrument are available on the AAMPO website (www.aampo.org).

METHODOLOGY

The survey was mailed to a random sample of over 4,000 residents and administered to 1,267 through either the mail or a follow-up phone interview during January and February of 2010. The original goal of 800 surveys was exceeded by 467 additional surveys. The overall results for the 1,267 surveys that were administered have a precision of at least +/- 2.6% at the 95% level of confidence.

MAJOR FINDINGS

- **Perceptions of Current Transportation Issues**. Those surveyed were asked about their level of satisfaction with various transportation issues. The issues with which residents were most satisfied, were the ease of traveling from Ames to other Iowa cities (81%), the ease of traveling from home to parks and recreation facilities (74%), and the ease of traveling from home to work (74%). The lowest amount of satisfaction was the availability of "on street" bicycle lanes (23%) and the condition of roadways (18%). When asked to name the most important issues to address over the next ten years, residents named the condition of roadways, the ease of north/south travel in the Ames area, and the flow of traffic on area streets during peak times.
  - **Trend from previous LRTP**: *In most topics that were measured in both 2004 and 2010, there were declines in satisfaction, with the most notable being the condition of roadways. In 2004, the satisfaction was 69% and in 2010 it was 18%.*

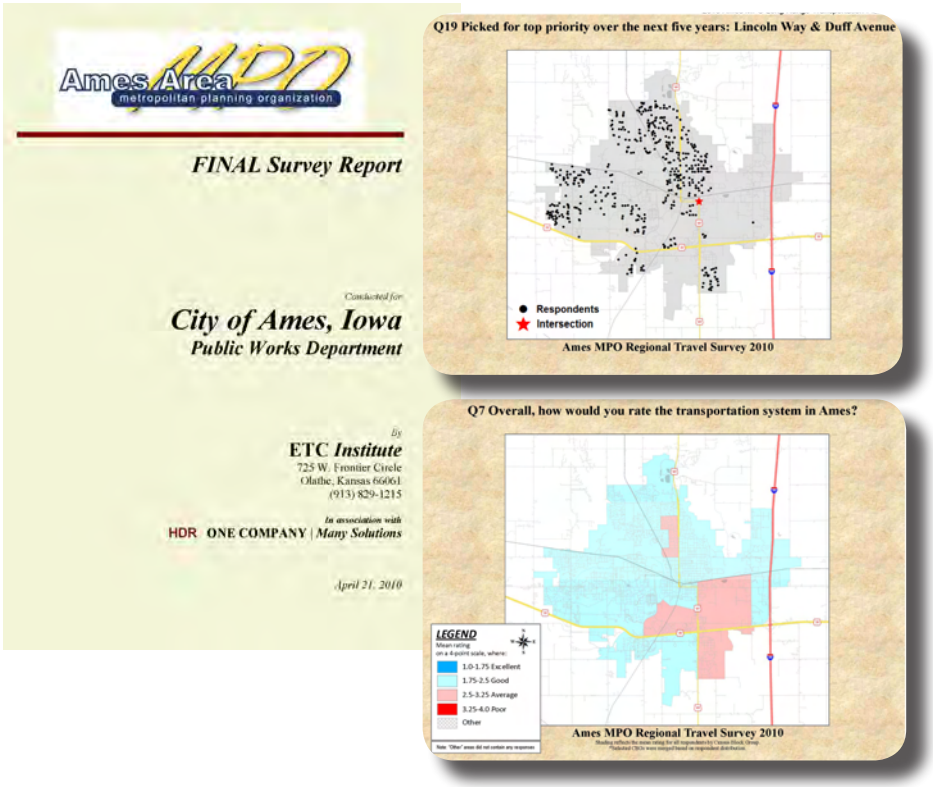
When asked to name the most important issues to address over the next ten years, residents named:

- The condition of roadways
- Ease of north/south travel in the Ames area
- Flow of traffic on area streets during peak times

- **Overall Rating of the Transportation System in Ames**. Sixty percent (60%) of those surveyed rated the transportation system in Ames as "excellent" or "good", compared to 76% who rated it as "excellent" or "good" in 2004.
- **Parking**. Sixty-six percent (66%) of those surveyed were satisfied with parking availability in residential areas; 46% were satisfied with parking in downtown Ames, and 15% were satisfied with parking on campus.
- **Public Transit**. The availability of public transit was rated "excellent" or "good" by 85% of the respondents, compared to 88% in 2004. Those surveyed were asked how satisfied they were with various aspects of transit in Ames; 79% were satisfied with the availability of information about public transit, 70% were satisfied with the frequency of bus service, and 70% were satisfied with the distance to the nearest transit stop from home.
  - **Trend from previous LRTP**: *There was a significant increase in satisfaction with the availability of information about public transit (79% in 2010 vs. 75% in 2004). All of the other four areas had declines in satisfaction from 2004.*

- **Bicycling in Ames**. The percentage of respondents who reported riding a bike in the last year was 58%, compared to 48% in 2004. Of the 58%, 50% felt safe on major streets in the area where they live, 47% felt unsafe and 3% did not know.
- **Walking in Ames**. Ninety-four percent (94%) of those surveyed had walked on the streets in their area during the past year. Of those, 84% felt very safe or somewhat safe, 15% did not feel safe and 1% did not know. Seventy-nine percent (79%) had walked on a shared-use path in the area where they live and 91% felt very safe or safe, 8% did not feel safe and 1% did not know.
- **Support for System Enhancements**. Those surveyed indicated the most important 2 issues out of 10 for system enhancements were adding more turn lanes, and widening existing roads.
- **Importance of Issues Related to Transportation Improvements**. Of several possible issues related to transportation improvements, those most important to those surveyed were supporting area economic opportunities (79%), protecting environmental resources (78%) and addressing community health and quality of life (78%).
- **How Transportation Improvements Should be Funded**. Those surveyed were asked their preference of funding sources for transportation improvements. Their greatest support was for applying a road impact fee for new developments (55%), an increase in gas tax (47%) and an increased vehicle registration fee (36%).
- **Support for Public Transportation Funding**. Forty-six percent (46%) of those surveyed were "very supportive" or "somewhat supportive" of increased funding for public transportation for improvements to the current bus system and expansions into areas not currently served by the bus.
- **Priorities for Intersection Improvements**. Fifty-one percent (51%) of those surveyed felt that the intersection of Grand Avenue and 13th Street was the most important to improve over the next five years and 44% felt that Lincoln Way and Duff Avenue was the most important.

A full copy of the Community Survey is available on the AAMPO website (www.aampo.org).



3.2 Focus Group

A Focus Group includes specifically selected individuals brought together to provide reactions to a specific topic, policy, project or issue. A focus group of community members and stakeholders was formed to help engage key decision makers and stakeholders of the Ames community in the transportation planning process. The Focus Group was comprised of personnel from the following agencies:

- AAMPO
- City of Ames
- Iowa State University
- Story County
- Boone County
- CyRide
- Iowa Department of Transportation (Iowa DOT)
- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)
- City of Ames Fire Department
- City of Ames Police Department
- Main Street Cultural District (MSCD)
- Ames Economic Development Commission
- Ames School District
- Mary Greeley Medical Center
- Friends of Central Iowa Bicycling
- Government of the Student Body, Iowa State University
- Ames/Story County Habitat for Humanity

The Focus Group met three times throughout the process and provided input and guidance on the Plan throughout the update process.

3.3 Public Meetings

The public involvement process included a series of public meetings throughout the LRTP development process. These included the following meetings:

- Issues and Visioning Workshop
- Alternatives Development Workshop
- Transportation Concept Evaluation Workshop
- Draft Plan Presentation
- Presentation of the Final Plan

Each of these meetings are discussed in the following sections.

Issues and Visioning Workshops

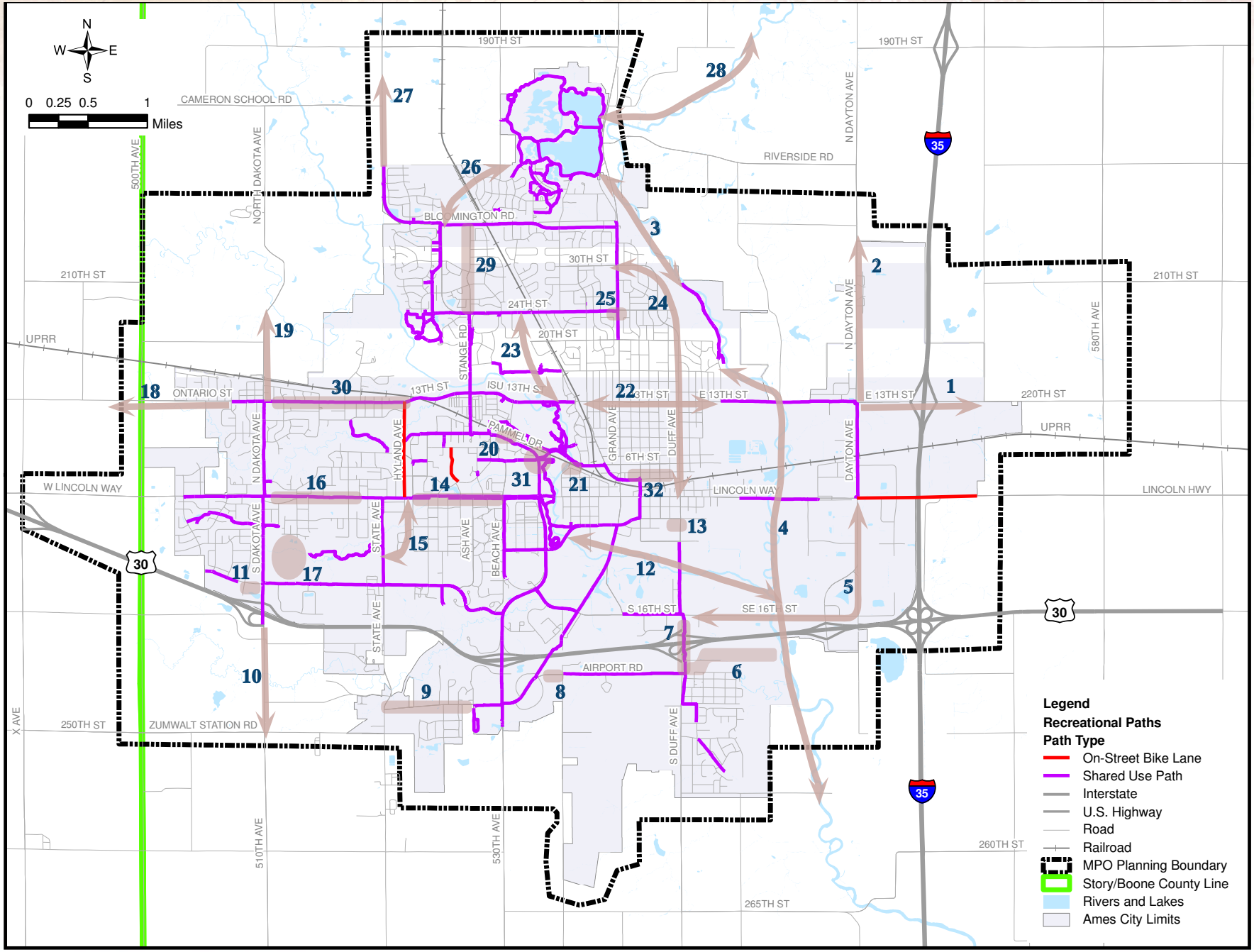
The first public meeting, entitled the Issues and Visioning Workshop, was held on October 29, 2009. The consultant team, along with AAMPO staff, conducted one session with the Focus Group and one session with the Public.

The Issues/Visioning Workshop included small group activities such as an Issues/Opportunities analysis, geographic mapping exercises and a vision statement exercise.

Geographic Mapping Exercise/Issues Identification

In the geographic mapping exercise, meeting attendees were asked to identify issues, congested corridors and intersections, and service gaps relating to the bicycle/pedestrian, transit and roadway systems. A compilation of the issues identified through this exercise are shown in **Figure 3.2, Figure 3.3** and **Figure 3.4**.

Figure 3.2. Bicycle/Pedestrian Issues from Issues/Visioning Workshops



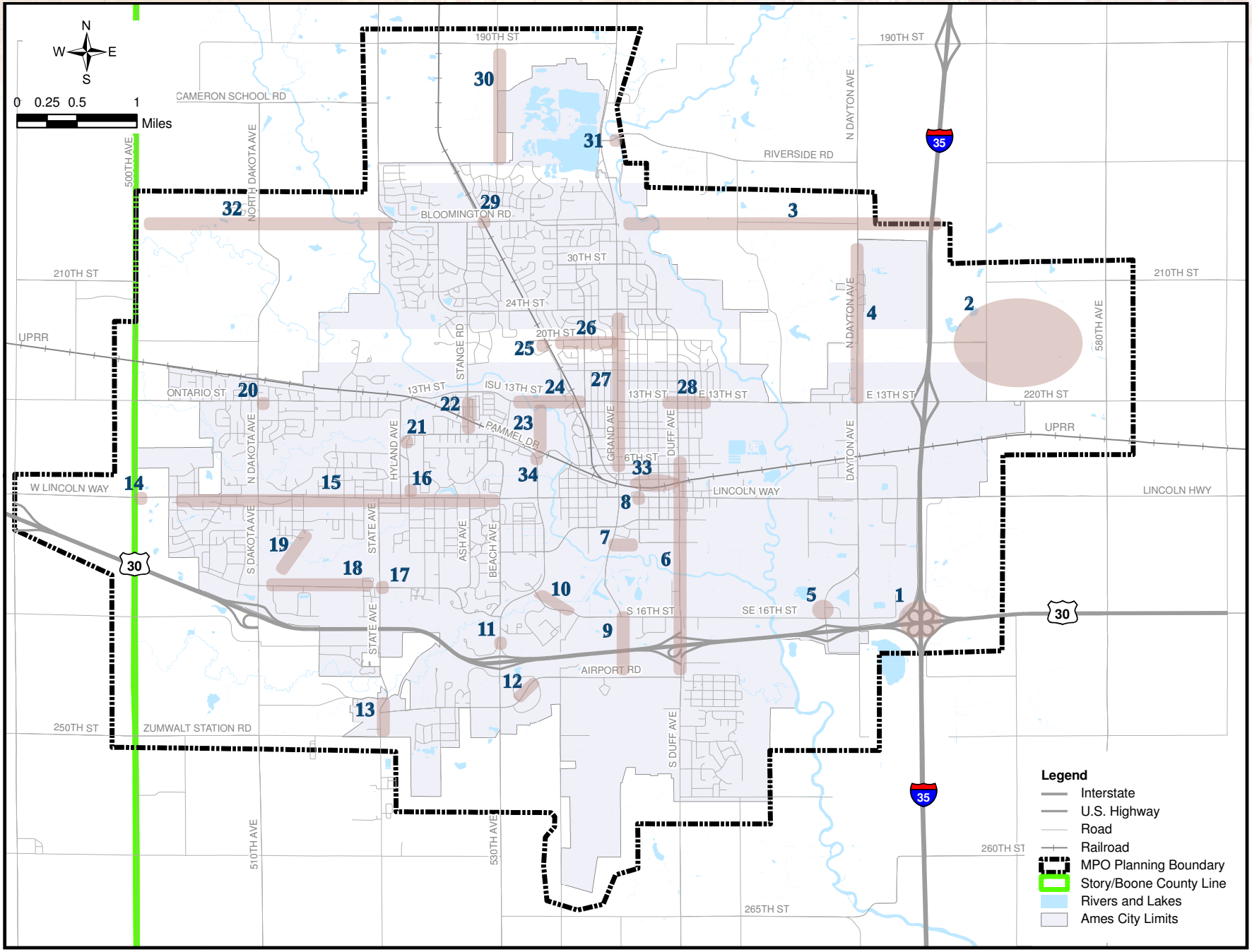
List of Bicycle/Pedestrian Issues from Issues/Visioning Workshop

1. Extend Path East along 220th Street
2. Extend Path North along N. Dayton Avenue
3. Connect Paths along South Skunk River
4. Extend Bike Path South of Ames to connect to Heart of Iowa Trail
5. Connect Paths between Dayton Avenue and S. 16th Avenue
6. Connect with Access to Sports Complex
7. Safety Concern- Non-Motorized Travelers along S. Duff Avenue at US-30
8. Connect Paths to Airport Road
9. No Sidewalk along Oakwood Road
10. Extend Path South along S. Dakota Avenue
11. Connect Paths along Mortenson Road
12. Connect Paths along Squaw Creek
13. Safety Crossing Issues for Non-Motorized Travelers at 5th Street/ Duff Avenue
14. Student Safety Crossing Issues along Lincoln Way for Non-Motorized Travelers
15. Connect Paths from State Avenue to Lincoln Way
16. Sidewalk Not Well-Suited for Bicyclists
17. Connects Paths in School Area
18. Extend Path West to Boone
19. Extend Path North along N. Dakota Avenue to MPO Boundary
20. Safety Issue Under Railroad Tracks
21. Narrow Bridge across Squaw Creek
22. Connect Paths; Safety Concerns along 13th Street
23. Connect Paths between 24th and 13th Streets
24. Connect Paths between Lincoln Way and 30th Street via Duff Avenue
25. Congested 24th Street and Grand Avenue Intersection for Non-Motorized Travelers
26. Connect Paths between George W. Carver Avenue and Grant Avenue
27. Extend Path North to Gilbert
28. Connect Path to Peterson Pits
29. Extend Bicycle Facilities
30. Driveway Cut Outs along Shared Use Path
31. Safety Concern for Bicycle/Pedestrians
32. Safety Concern in Downtown with Angled Parking

Other General Bicycle/Pedestrian Issues from Issues/Visioning Workshop

- Need Bike Lanes for Commuters
- No Traffic Detection for Bicycles
- Consider Emergency Medical Service Access Along Shared Use Path
- Lack of Bicycle Parking
- Some Shared Use Paths Are Too Narrow

Figure 3.3. Roadway Issues from Issues/Visioning Workshops



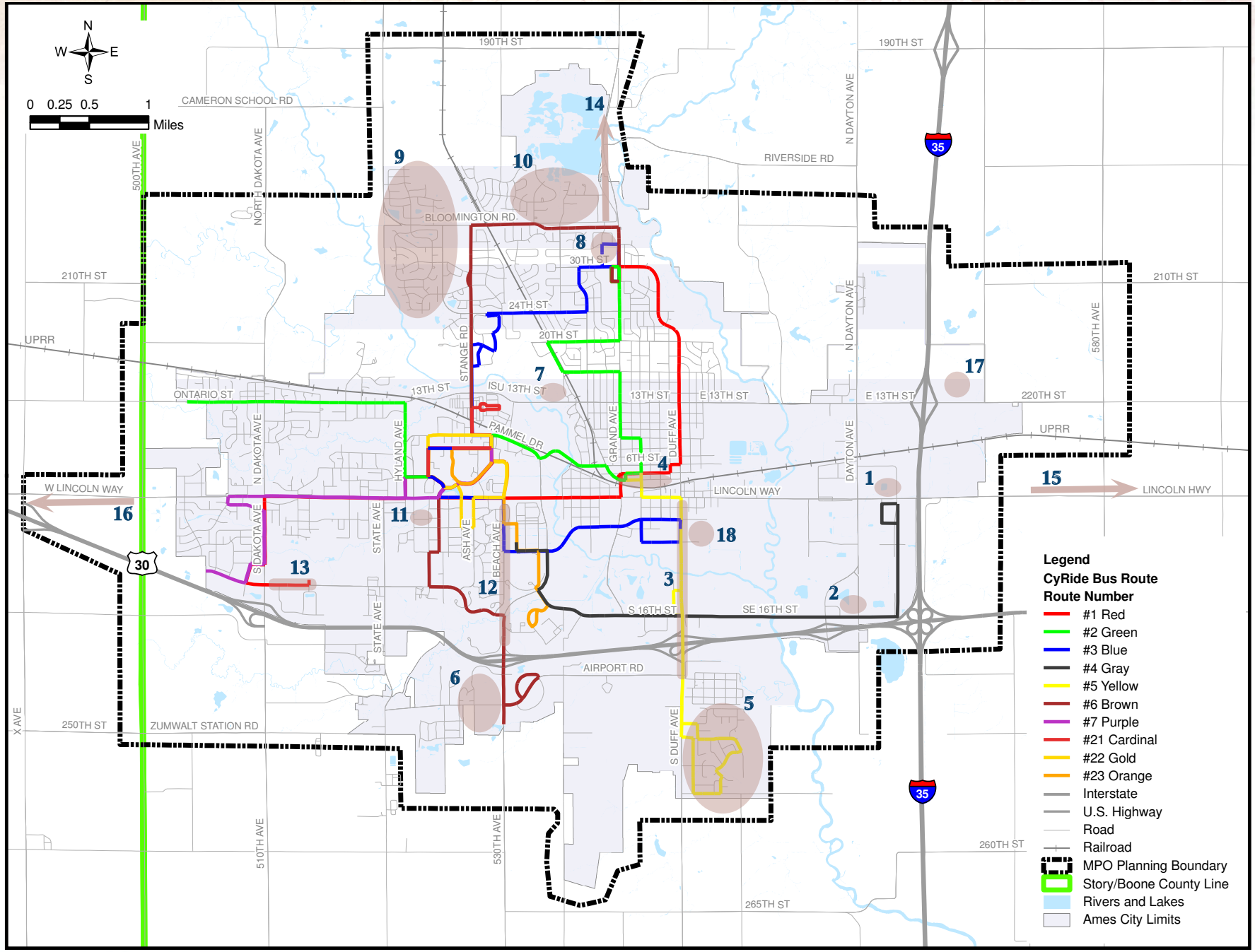
List of Roadway Issues from Issues/Visioning Workshop

1. Safety Concern- Traffic Weaving Conflicts at Highway 30/I-35 Interchange
2. Need Roadway Connectivity to Future Growth Areas
3. Bloomington Road Access to I-35
4. Congested Dayton Avenue Corridor during Peak Commuter Times
5. Congested Intersection at SE 16th Street/Dayton Avenue
6. Congested Duff Avenue Corridor; Numerous Access Points; Not Aesthetically Pleasing
7. 5th Street Connection to Grand Avenue
8. Intersection Safety Concerns at Lincoln Way/Clark Avenue
9. Grand Avenue Access to Airport Road
10. Widen S. 16th Street
11. Safety Issue for Westbound off-ramp Traffic from Highway 30 to University Boulevard
12. Safety Concern- Restricted Access from Side Streets
13. No Direct Connection between Oakwood Road and Zumwalk Station Road
14. Consider Traffic Signal at Lincoln Way/ 500th Avenue
15. Neighborhoods Interface with Lincoln Way
16. No Left-Turn Lanes from Lincoln Way onto Hyland Avenue and Sheldon Avenue
17. Intersection Congestion at Mortensen Road/ State Avenue
18. Congested Mortensen Road Corridor, especially due to Middle School Traffic; Poor Lighting
19. Dotson Drive Connectivity to Middle School
20. Congested Intersection at N. Dakota Avenue/ Ontario Street
21. Safety Issue for Westbound Left-Turning Vehicles at Pammel Drive/ Hyland Avenue
22. Need to Minimize Traffic Not Related to the University
23. Connectivity between 13th Street and University Boulevard
24. High Travel Speeds along 13th Street
25. Sight Distance Issue at 20th Street/ Railroad Gates
26. Poor Pavement Condition along 20th Street East of Grand Avenue
27. Congested Grand Avenue Corridor; Safety Concern at Intersections; Neighborhoods Interface with Corridor
28. Congested 13th Street/Duff Avenue Intersection; Difficult to Access Side Streets and Businesses at Adjacent Intersections
29. Safety Concern- Bloomington Road Westbound Merge Visibility
30. Grant Avenue Not Paved
31. Safety Concern- Westbound Left-Turns at Riverside Road/Grand Avenue
32. Bloomington Road Access to 500th Avenue
33. Railroad Conflicts in the Downtown Area
34. Intersection Safety Concern at 6th Street and University Boulevard

Other General Roadway Issues from Issues/Visioning Workshop

- Lack of Turn Lanes along Lincoln Way
- Lack of North/South Connectivity
- Lack of Traffic Signal Progression

Figure 3.4. Transit Issues from Issues/Visioning Workshops



List of Transit Issues from Issues/Visioning Workshop

1. Current Burlington Trailways Stop with No Cy-Ride Connection
2. Need Park-and-Ride (to Des Moines)
3. Transit Safety Concerns along Duff Avenue
4. Safety Concern - Too Narrow for Bus in Downtown
5. More Transit Services Needed
6. New Transit Services Needed
7. New Transit Services Needed (Access to New Pool)
8. Need Park-and-Ride
9. New Transit Services Needed
10. New Transit Services Needed
11. Need Intermodal Center
12. More Transit Services Needed
13. Transit Safety Concerns along Mortensen Road
14. Extend Transit Services North to Gilbert
15. Extend Services East to Nevada
16. Extend Services West to Boone
17. Need Transit Service to Future Commercial Development
18. Wal-Mart/ Target: Better Access for Buses
19. Formalized Transit Service to Des Moines
20. More Frequency Needed on Yellow Route and Southern Portion of Blue Route

Other General Transit Issues from Issues/Visioning Workshop

- Safety Concern- Vehicles Driving Around Buses
- Lack of Space at Existing Cy-Ride Facility
- Need for Real-Time Trip Information

Vision Themes Exercise

The Focus Group and public meeting participants were also tasked with helping to establish an overall new vision for the Plan. Input on vision themes was discussed in small groups, and then presented to the rest of the meeting participants. The vision themes gathered from each of the Issues/Visioning workshops are summarized below.

Focus Group Summary of Vision Themes

- Context Sensitive Solutions
- Efficient System/Connectivity/Alternative Fuels
- Reduce VMT/Improve Health/Improve Quality
- Return on Investment/Value
- Sustainable Future
- Forward Thinking
- Synergistic Solutions
- Excellence/Quality

Public Meeting Summary of Vision Themes

- Connected
- Alternatives
- Sustainable
- Complementary of Natural Environment
- Unique Character
- Accommodating and Safe
- University

At the end of the issues/visioning process, a Vision Statement, Goals and Objectives for the transportation plan update were established based on Vision Themes from the public meetings and additional comments received during the issues/visioning process. The Vision Statement, Goals and Objectives were discussed in Chapter 2.

Alternatives Development Workshop

A 2-day charrette was held to develop the various transportation alternatives on April 21-22, 2010. This charrette was an intensive, collaborative exercise in which a team of experts worked together with the community to address the planning and design issues associated with the LRTP.

Day One

On the first day of the charrette (April 21, 2010), a workshop was held with the Focus Group. During this meeting, a project update presentation was given, including a summary of the community survey, and Issues/Visioning workshop information. Next, the Focus Group broke into smaller groups to brainstorm transportation alternatives that would address the issues previously brought forward from **Figure 3.2, Figure 3.3 and Figure 3.4**. The alternatives for Bicycle/Pedestrian, Transit, and Roadway projects were then presented to the overall Focus Group.

The public meeting on April 21, 2010 included an open house format with a review of the vision and issues developed in the Issues and Visioning Workshop, followed by the opportunity to share concepts, alternatives and strategies, either by drawing on large maps or by writing down comments in text form, that would address the public's transportation vision and issues for the area.

Workshop stations were set up for viewing at the open house. The stations included:

- Vision/Survey
- Bicycle/Pedestrian:
  - Issues Map (**Figure 3.2 on page 3-6**)
  - Level of Service Analysis for Bicycles/Pedestrians (**Figure 5.5. Bicycle Level of Service on page 5-13** and **Figure 5.6. Pedestrian Level of Service on page 5-14**)
  - Proposed Bicycle/Pedestrian Projects from previous LRTP
- Transit:
  - Issues Map (**Figure 3.4 on page 3-10**)
  - Proposed Transit Projects from previous LRTP
- Roadway
  - Issues Map (**Figure 3.3 on page 3-8**)
  - Level of Service Analysis for Roadway (**Figure 5.3 on page 5-9**)
  - Safety Analysis for Roadway (**Figure 10.5 on page 10-7** and **Figure 10.6 on page 10-8**)
  - Proposed Roadway Projects from previous LRTP

Day Two

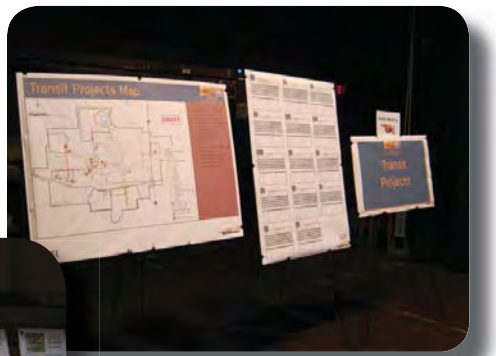
On April 22, 2010, a follow-up meeting was held with the Focus Group to review the transportation alternatives that had been brought forward by the Focus Group and the Public on the day prior.

A second session was held the evening of April 22, 2010 with an open house "pin-up" session with the public. The 'pin-up' session included a review of the initial projects identified during the previous day's workshop. The input and comments received at this session was used to develop the initial list of projects to be further developed and evaluated.

A meeting was held with the AAMPO staff on April 23, 2010 to review the information obtained from the workshops on the previous 2 days and to finalize the list of projects to be further developed and evaluated.

TRANSPORTATION CONCEPT EVALUATION WORKSHOP

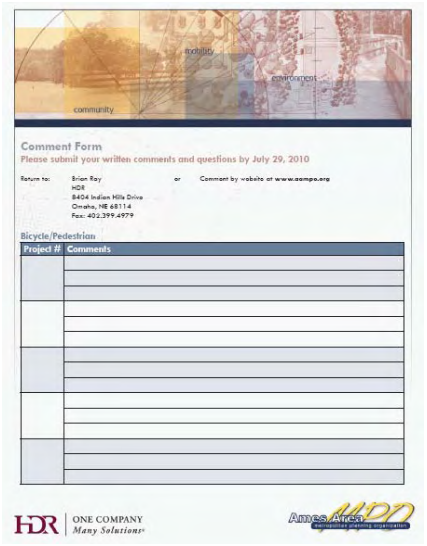
After individual potential project alternatives for bicycle/pedestrian, transit and roadway were analyzed, the resulting evaluations were made available for comment, refinement, and discussion at a Transportation Concept Evaluation Workshop.



The public workshop was held on the evening of July 21, 2010 with a presentation followed by an open-house style format. The purpose of this meeting was to review the potential projects and draft "scorecard" for each projects. The scorecards show the rating of each project against evaluation criteria. The evaluation criteria and ratings are further discussed in Chapter 6 and shown in Appendix A.

The public was asked to provide feedback on the potential project alternatives and the corresponding scorecards on comment forms at the meeting. This information was also made available on the project website and open for public comment for one week following the meeting.

A staff meeting was held with AAMPO staff to review the evaluation and input from the workshop. This information was used to develop the projects to be included in the Draft Plan.



DRAFT PLAN PRESENTATION

The Draft Plan was presented to the AAMPO Transportation Policy Committee on August 31, 2010. An overview of the Draft Plan was presented followed by a question and answer period.

DRAFT PLAN PUBLIC MEETING

A public meeting was held on September 29, 2010 to receive input on the Draft Plan. The meeting was an open house and allowed the general public to provide feedback on the Draft Plan directly to AAMPO staff.

PRESENTATION OF THE FINAL PLAN/PUBLIC HEARING

The Final Plan was presented to the AAMPO Transportation Policy Committee on October 12, 2010. This presentation was also the public hearing for the Plan.

3.4 Advertisements and Press Releases

The 2035 LRTP provides the transportation vision for the Ames area. The plan should reflect the needs and desires of citizens in the community. Public meetings were a primary channel of engaging the community in the transportation planning process. Workshops, public meetings, and public hearings were advertised in the local newspaper, sent to various groups/organizations and on the AAMPO website.

Press Release

City Manager's Office
515 Clark Avenue ♦ Ames, IA
Phone: (515) 239-5101
Fax: (515) 239-5142

Contact: Susan Gwiasda, Public Relations Officer, (515) 239-5204
Damion Pregitzer, Public Works Department, (515) 239-5275

FOR IMMEDIATE RELEASE
October 21, 2009

Public Invited to Share Ideas for Transportation Future

AMES, Iowa – The Ames Area Metropolitan Planning Organization (AAMPO) seeks citizen input at a public meeting concerning transportation issues and the direction of the long range planning efforts.

aged to attend the Issues/Visioning Worksh
0 p.m. to 8:30 p.m. in the City Hall Coun
. The meeting will start promptly at 6:0
m the AAMPO and the transportation-plann
ill include an overview of the planning p
are ideas and determine the public's tra

meeting in a series of public meetin
es Area Long Range Transportation Pla
lect a 25-year horizon (year 2035) an
ransportation improvement projects
ect the citizens who live in the Ame
lic input and community support
nt for the LRTP update.

f special accommodations for
ntact Damion Pregitzer, Public
t (515) 239-5133 by October 2
should access City Hall through
Chambers on the second floor.

ntact Damion Pregitzer, Public W
itzer@city.ames.ia.us.

###

Ames Area Metropolitan Planning Organization 2035 Long Range Transportation Plan
Community Workshops
You Are Invited
to help shape the future of Transportation in the Ames Area
Visit our website for a refresher on the issues and visions you helped establish at our last workshop. Then, join us for these workshops in April to start the plan off on the right foot
These workshops will:
- Identify new concepts and improvements for roadway, bicycle/pedestrian and transit system modifications within the region
- Define how mobility, livability, and sustainability should shape the development of the transportation network

TRANSPORTATION ALTERNATIVE DEVELOPMENT WORKSHOP
Give your input on new transportation alternative concepts!
Wednesday **April 21, 2010** 6:00pm to 8:00pm. Open House City Hall, Rooms 233/235

FOLLOW-UP WORKSHOP: PIN-UP ALTERNATIVES
Review the potential transportation alternatives!
Thursday **April 22, 2010** 6:00pm to 7:30pm. Open House City Hall, Room 235

WORKSHOPS WILL BE HELD AT:
City of Ames City Hall
515 Clark Avenue

ANY QUESTIONS PLEASE CONTACT:
City of Ames
Damion Pregitzer
Traffic Engineer/Project Manager
515 239 5275

www.aampo.org

Ames Area Metropolitan Planning Organization 2035 Long Range Transportation Plan
Community Workshop
You Are Invited
to help shape the future of Transportation in the Ames Area
Visit our website (www.aampo.org) for a refresher on the issues and visions you helped establish. Then, join us for the workshop to provide input as the plan is developed.
This workshop will:
- Present potential concepts and improvements for roadway, bicycle/pedestrian and transit system.
- Offer a preliminary evaluation of the potential concepts and improvements.

TRANSPORTATION CONCEPTS EVALUATION WORKSHOP
Review preliminary evaluation and provide input on the transportation concepts!
Wednesday **July 21, 2010** 6:00pm to 8:00pm
presentations to begin at 6:00 with short intake to follow
City Hall, Auditorium

WORKSHOPS WILL BE HELD AT:
City of Ames City Hall Auditorium
515 Clark Avenue
Enter the auditorium from the north side of City Hall (6th Street)

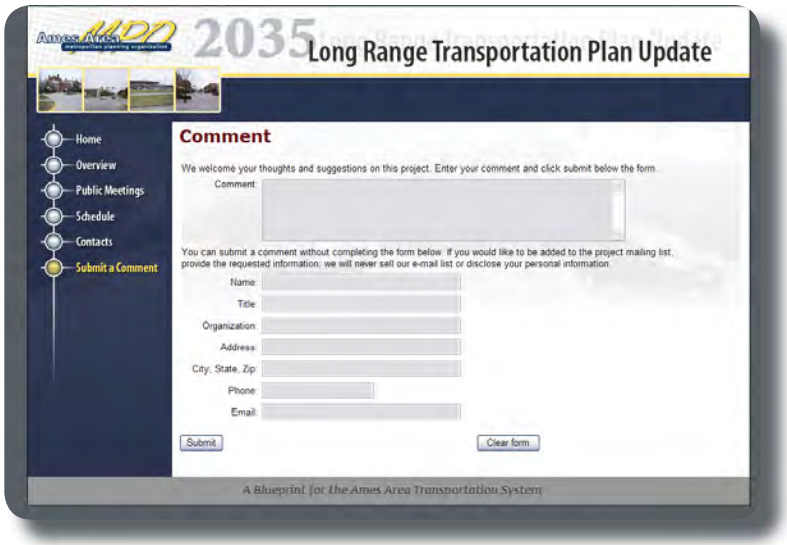
ANY QUESTIONS PLEASE CONTACT:
City of Ames
Damion Pregitzer
Traffic Engineer/Project Manager
515 239 5275

www.aampo.org

3.5 Project Website

A project website (www.aampo.org) was developed and hosted by HDR with a link to the City of Ames website. The website contains project information, comment forms, project schedule and contact information. The project website was updated prior to and after each public meeting.

To date there have been 1,490 visits by 650 unique visitors.



Ames Area MPO
metropolitan planning organization

Chapter 4:
Community Overview and Land Use

HDR

CHAPTER 4: COMMUNITY OVERVIEW AND LAND USE

The Ames area is expected to grow in both population and employment into the future. The City of Ames Planning and Housing Department maintains a Land Use Policy Plan (LUPP) that seeks to guide and manage the development process within the City limits and the unincorporated area. The LUPP covers topics including land use visioning, annexation, mobility, environmental factors, parks, recreation and open space, development priorities, affordable housing, planning management, and zoning. This section of the report highlights information obtained from the LUPP, as well as information from the U.S. Census Bureau and the Iowa Data Center.

4.1 Demographic Trends

POPULATION

Population within the City of Ames has grown from approximately 27,000 in 1960 to approximately 50,700 in 2000. This represents an annual growth rate of approximately 1.6%. These historical trends are shown in Table 4.1.

Table 4.1. City of Ames Population Trends

Year	Low
1960	27,003
1970	39,505
1980	45,775
1990	47,198
2000	50,731
2009 (Estimate)	58,339

Source: U.S. Census Bureau, AAMPO and Iowa Data Center

EMPLOYMENT

The employment data within the City of Ames was established using information from the American Community Survey 2006-2008 3-Year Estimates. The employment data is shown in Table 4.2.

Table 4.2. City of Ames Employment Data

Occupation	Estimate
Management, professional and related occupations	15,206
Service	5,682
Sales and office	7,441
Farming, fishing and forestry	309
Construction, extraction, maintenance and repair	1,422
Production, transportation and material moving	2,633
Total	32,693

4.2 Existing Land Use

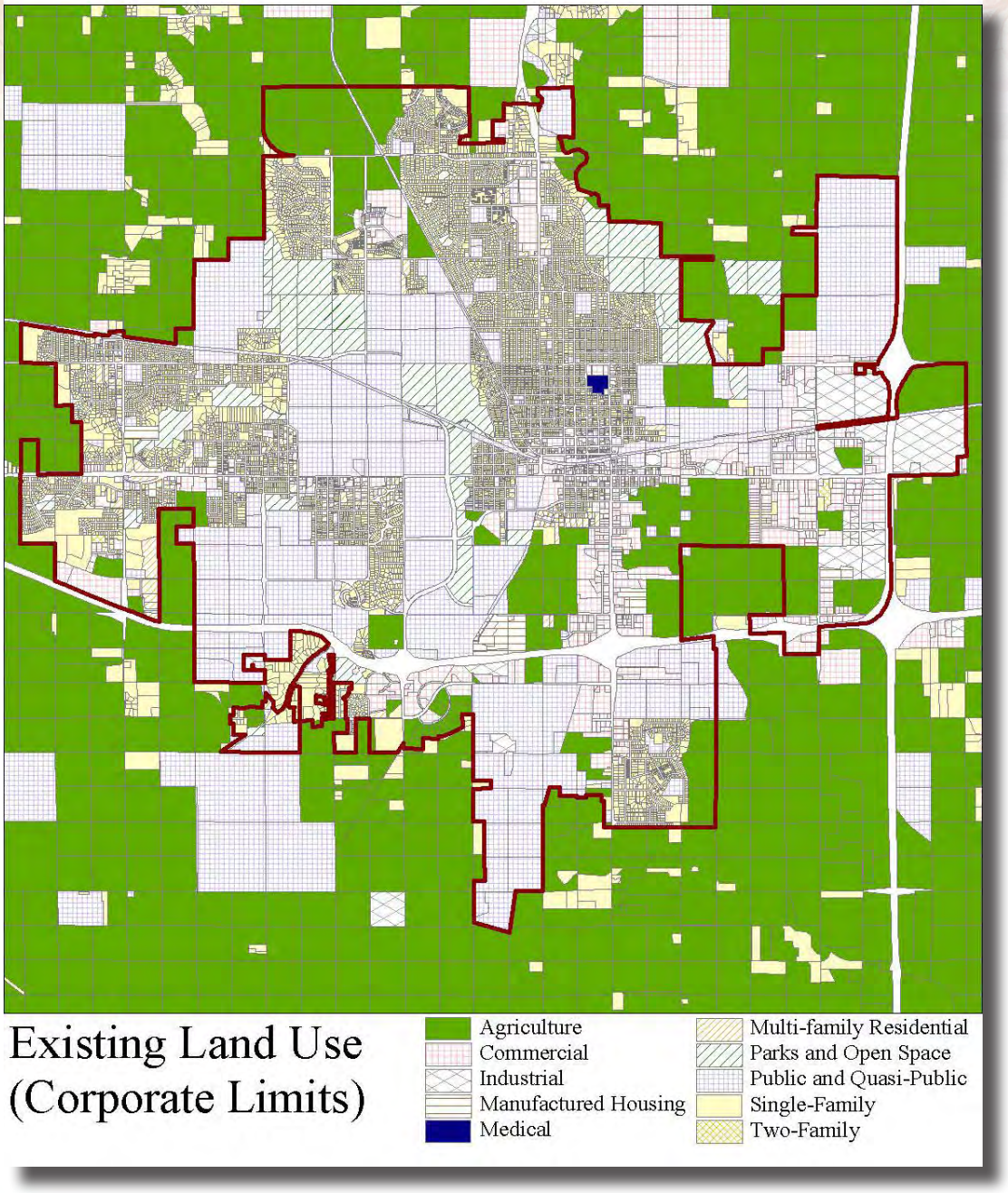
Existing land use as documented within the City of Ames corporate limits is shown in **Figure 4.1**.

4.3 Future Land Use

A map showing future land use incorporated within the Ames city limits is shown in **Figure 4.2**.

The Ames Urban Fringe area is generally within two miles of the Ames City limits. According to the LUPP, a shared land use plan was developed for this area by the City of Ames, Story and Boone Counties, and the City of Gilbert. It provides a consistent, predictable, and mutually agreed upon development plan that is compatible with existing land use in the fringe area. The Ames Urban Fringe Plan is shown in **Figure 4.3**.

FIGURE 4.1. EXISTING LAND USE - INCORPORATED AREA



Source: City of Ames Land Use Policy Plan, Latest Revision April 28, 2009

Figure 4.2. Future Land Use - Incorporated Area

Summary Text from Land Use Policy Plan

Residential Land Uses

Low-Density Residential- Single-family residential with a maximum net density of 7.26 dwelling units per net acre.

One- and Two-Family Medium-Density Residential- Single-family and two-family residential uses with a maximum net density 7.26 units per net acre and a minimum net density 6.22 dwelling units per net acre.

Medium-Density Residential - Single-family, two-family, and multi-family residential uses with a minimum net density of 7.26 dwelling units per net acre and a maximum density of 22.31 dwelling units per net acre.

High-Density Residential - All multi-family residential uses that involve more than 11.20 dwelling units per net acre

Suburban Residential - All single-family, two-family, multi-family and manufactured residential uses involving a net density of more than 5.0 dwelling units per acre.

Village Residential - All single-family, two-family, multi-family and manufactured residential uses that involve more than a net density of 8.0 units per acre with supporting convenience/neighborhood-scale commercial uses

Commercial Land Uses

Highway-Oriented Commercial - commercial uses that are associated with strip developments along major thoroughfares. Floor area ratios are between 0.25 and 0.50 depending on location

Neighborhood Commercial – existing clustered commercial land uses that integrate aesthetically and physically with existing adjacent residential neighborhoods.

Convenience Commercial – clustered convenience commercial land uses in suburban residential areas, integrated aesthetically and physically with new suburban residential subdivisions; designed to accommodate the vehicular mobility associated with conventional residential development while maintaining pedestrian connectivity.

Community Commercial Node - Community-scale commercial uses that are associated with cluster developments and with more specific uses, shared parking and common design features than Highway-Oriented Commercial,. Floor area ratios are between 0.50 and 0.75 depending on location

Regional Commercial - Regional-scale commercial uses that are associated with major retail and service centers near limited - access thoroughfares. Floor area ratios are 0.5 and higher.

Downtown Service Center - Specialized business services, governmental services and retail commercial uses associated with highly intense activities and central location. Floor area ratios are 1.0 and higher.

Industrial Land Uses

Planned Industrial - Industrial uses that involve a clustered/industrial park setting in order to achieve greater integration of uses, access and appearance. Locations should be near limited-access thoroughfares.

General Industrial - Industrial uses that involve individual siting in designated areas where overall use and appearance requirements are less restrictive.

Other Land Uses

Government/Airport - Typical uses include public-owned facilities for administration and services, plus general aviation.

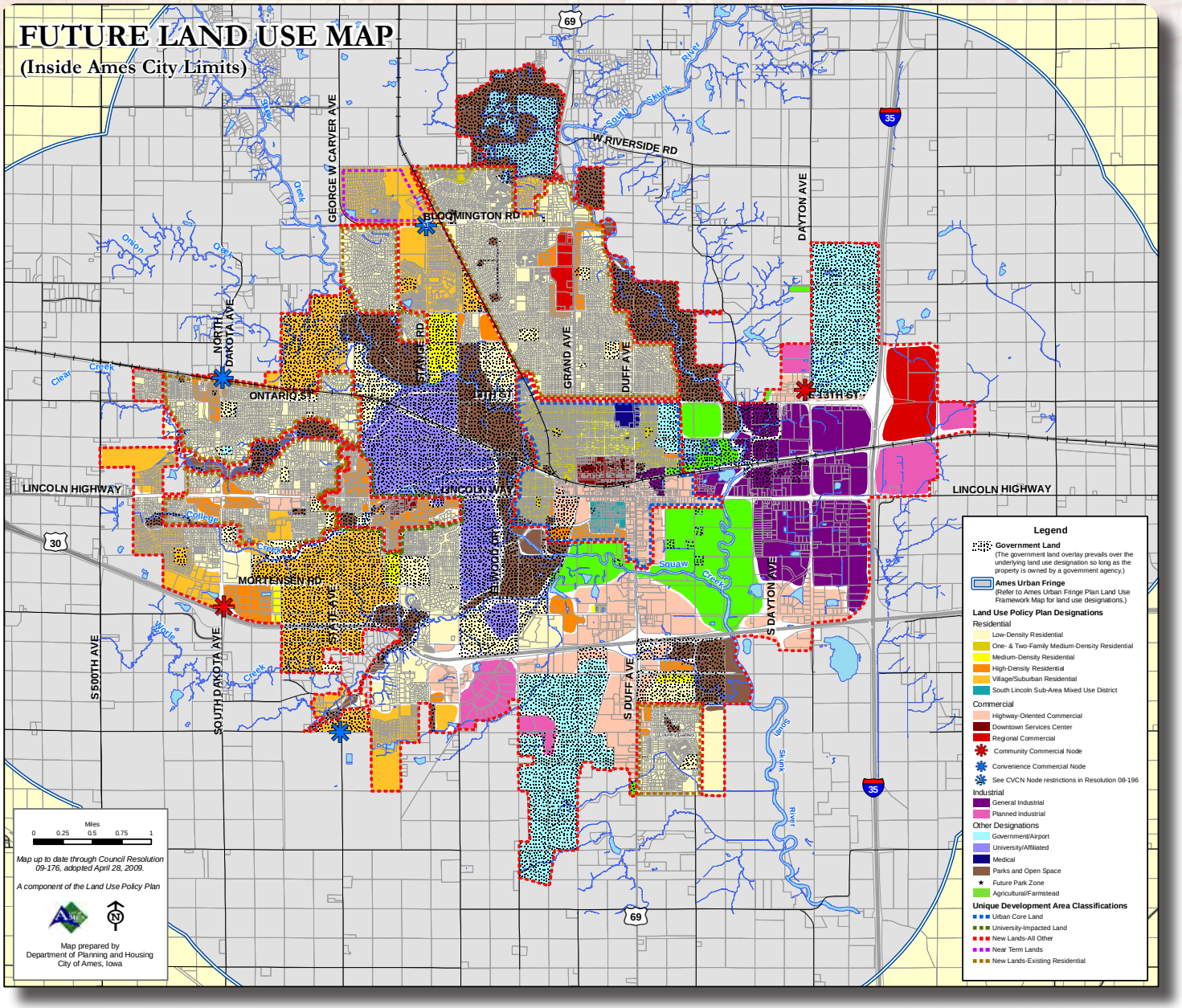
University/Affiliated - Facilities associated with the Iowa State University campus and affiliated research and agricultural farms.

Parks and Open Space - public-controlled areas for recreation, involving facilities and/or structured programs for a variety of recreational opportunities. The term "Open Space" refers to primarily undeveloped areas (maintained and natural) - for passive recreational opportunities.

Medical - Typical uses include hospital, out-patient diagnostic and surgical centers and specialized treatment facilities that involve extended stay.

Future Park Zone - general areas (or zones)- wherein future parks may be located.

Agricultural/Farmstead - areas associated with crop production and animal husbandry; fallow areas are also included. The term "Farmstead" refers to the presence of a dwelling unit associated with a specific area for agriculture.



Source: City of Ames Land Use Policy Plan, Latest Revision April 28, 2009

Figure 4.3. Ames Urban Fringe Plan

Summary Text from Ames Urban Fringe Plan

Land Use Designations for Rural Service and Agricultural Conservation Area

Agriculture and Farm Service – Farming and agricultural production; industry and commerce that need to be close to agriculture; farmsteads, farmstead sites and pre-existing homes.

Parks and Recreation Areas – privately owned recreation, conservations and related uses, with rural services and decentralized systems.

Rural Residential – Single-family residences at one unit per acre or lower density, with rural services and decentralized systems; protect agricultural operations and environment.

Land Use Designations for Rural/Urban Transition Area

Rural Transitional Residential – Single- and two-family residences at densities from one unit per acre to 3.75 units per acre, preferably in clusters, with rural services and decentralized systems; in some cases, urban services for future use or assessment waivers and other agreements about future costs and annexation.

Highway-Oriented Commercial – Commercial uses most compatible with rural areas, located on high-traffic roads and preferably in clusters; urban services; in some cases, rural services and decentralized systems with assessment waivers, other agreements on future costs and annexation.

Agriculture/Subsurface Mining – Farming and agricultural production; farmsteads, farmstead sites and pre-existing homes; with limestone resources suitable for subsurface mining.

General Industrial – Surface portion of existing subsurface mining operation.

Natural Areas – Environmentally sensitive areas; significant natural habitat; public parks and open space; future parks; greenways; farmsteads, farmstead sites and pre-existing homes.

Watershed Protection Area – Watersheds for wetlands and with vegetation that protects or improves water quality; mitigation facilities; Best Management Practices.

Priority Transitional Residential -- Single-family residences at densities above 3.75 units per acre, preferably in clusters, with rural services and common systems; urban services for future use or assessment waivers and other agreements about future costs; development agreements; annexation agreements.

Industrial Reserve/Research Park – Agricultural uses; future expansion of ISU Research Park with innovative technology companies supported by proximity to ISU; before development, change to Planned Industrial land use designation.

Agriculture/Long-Term Industrial Reserve -- Farming and agricultural production; farmsteads, farmstead sites and pre-existing homes; future large-scale industrial uses; before development, change to Planned Industrial land use designation.

Gateway Protection – Land uses and design that defines, accentuates and enhances entrance areas to community.

Airport Protection Area – Land close to airport; development characteristic that protects life and maintains integrity of aviation operations.

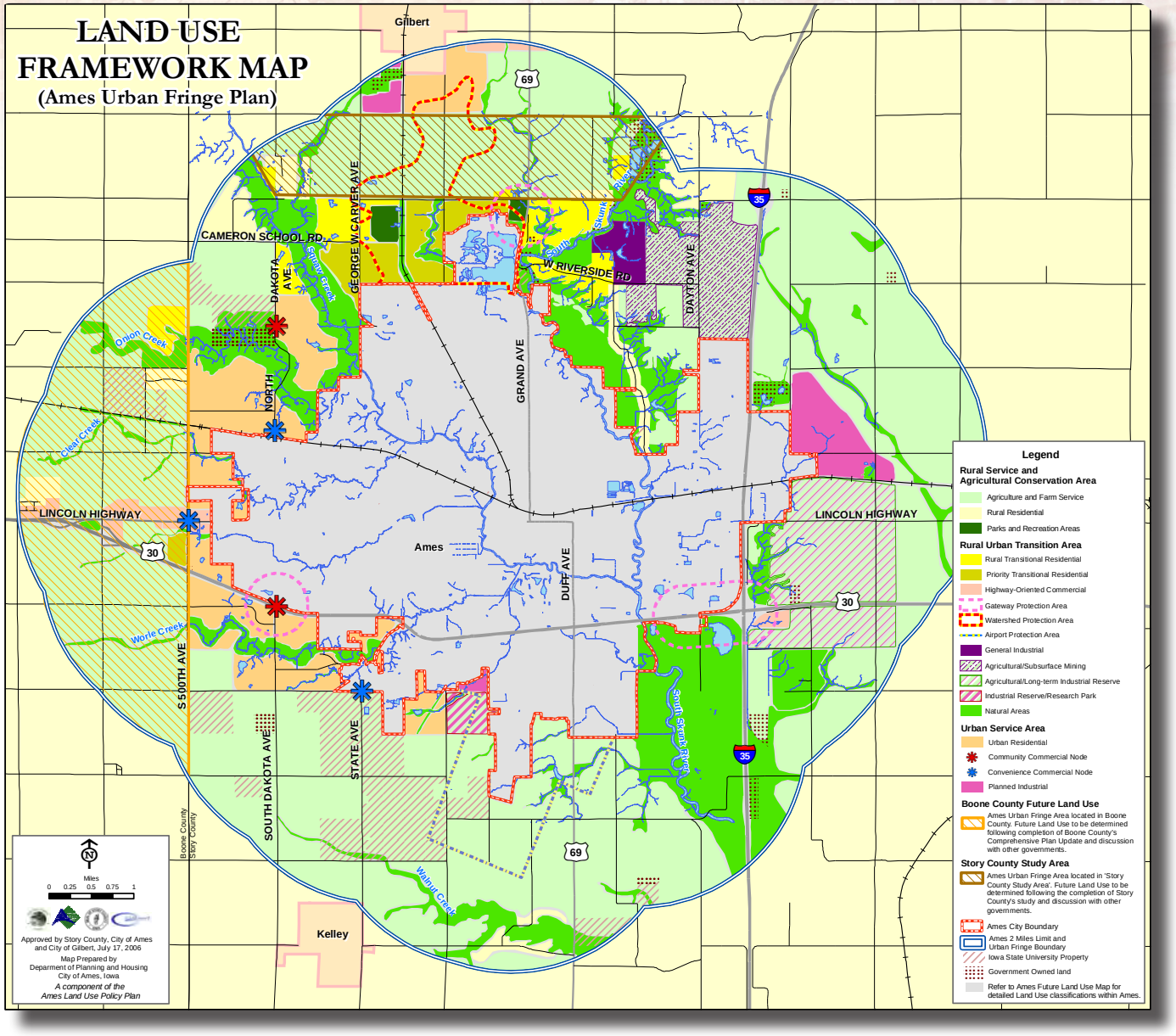
Land Use Designations for Urban Service Area

Urban Residential – Village residential developments at densities above 8 units per acre; suburban/single-family residential developments at densities above 3.75 units per acre; suburban/medium density residential development at densities above 10 units per acre; annexation; urban services: development agreements.

Planned Industrial – Large-scale industrial uses clustered in industrial parks; annexation; urban services: development agreements.

Community Commercial Node – Clustered commercial uses up to 800,000 square feet per cluster; annexation; urban services: development agreements.

Convenience Commercial Node -- Clustered commercial uses that serve convenience and localized neighborhood needs; up to 100,000 square feet per cluster; annexation; urban services: development agreements.



Source: City of Ames Land Use Policy Plan, Latest Revision April 28, 2009

4.4 Year 2035 Projections

The AAMPO used historical data and information from the LUPP to establish year 2035 population and employment projections. The population projections indicate that the population is anticipated to grow from approximately 58,300 in year 2007 to approximately 69,700 in year 2035. This represents an increase of approximately 11,200 people and an average annual growth rate of approximately 0.7%. The employment projections indicate that the employment is anticipated to grow from approximately average 32,700 in year 2007 (average 2006 – 2008) to approximately 36,500 in year 2035. This represents an increase of approximately 3,800 jobs and an average annual growth rate of approximately 0.4%.

Using the future land use plan and current development trends, the population and employment projections were then distributed to the land use map. The total population change from year 2007 to year 2035 is shown on **Figure 4.4**. The total employment change from year 2007 to year 2035 is shown on **Figure 4.5.**

4.5 Land Use and Transportation

Land use and transportation are interrelated. The land use patterns affect the needs of the transportation system and the transportation system affects the land use patterns. The year 2035 land use projections were incorporated into a travel demand model in order to identify future year transportation needs. See Section 5.2 for the results of this analysis.

Figure 4.4. Projected Population Change 2007 to 2035

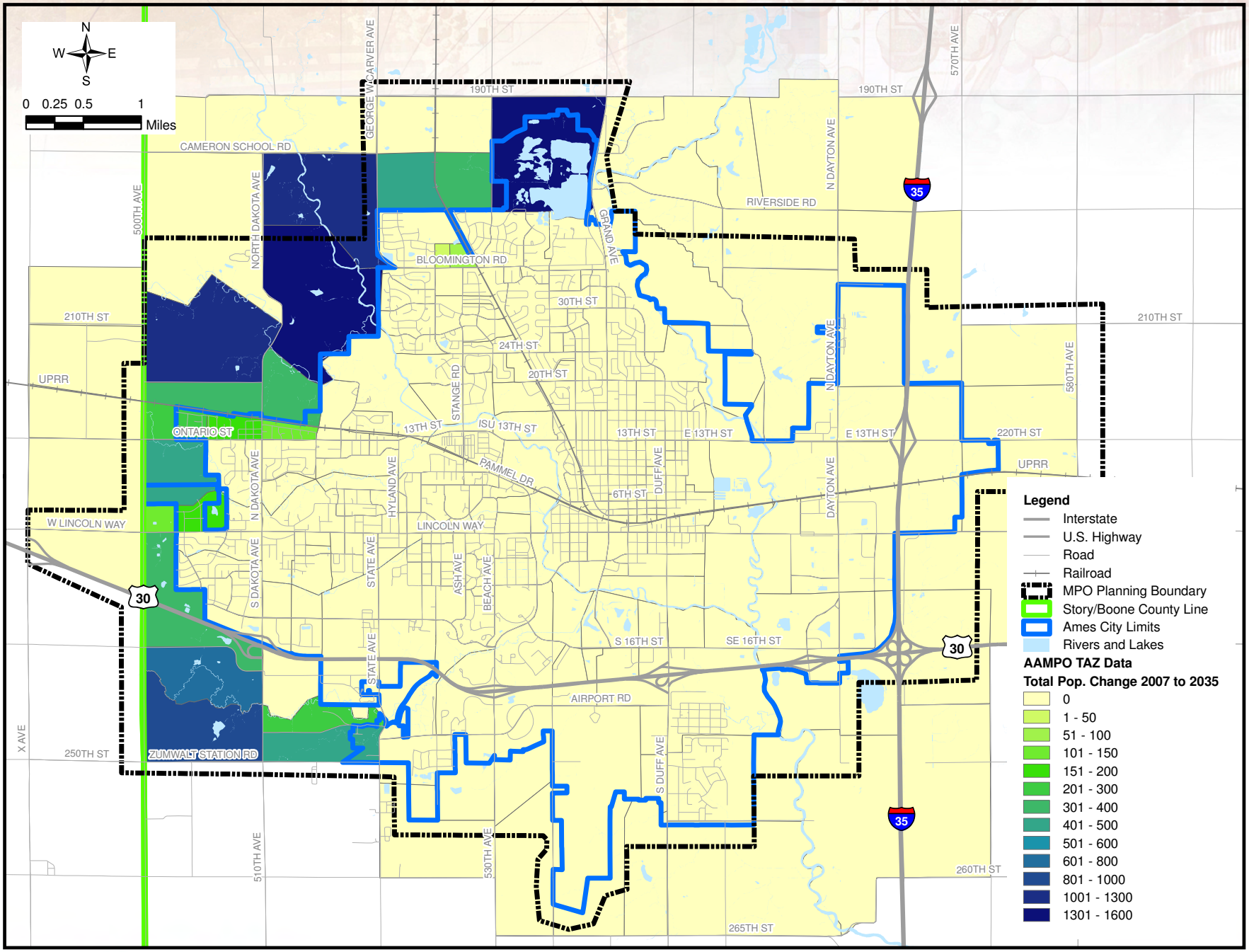
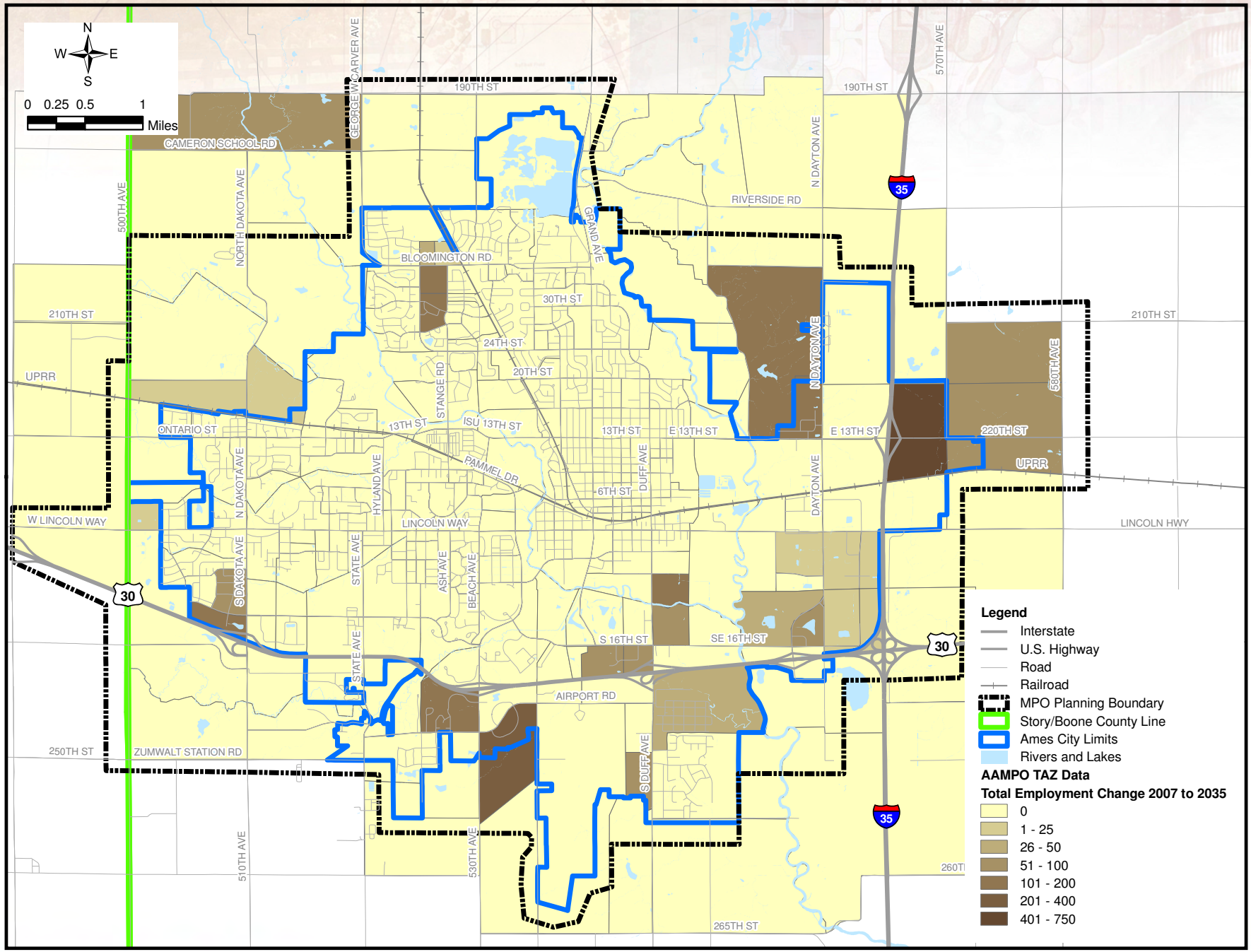


Figure 4.5. Projected Employment Change 2007 to 2035



Ames Area MPO
metropolitan planning organization

Chapter 5:
Needs Assessment

HDR

CHAPTER 5: NEEDS ASSESSMENT

The Long Range Transportation Plan (LRTP) Needs Assessment consists of several components including roadway needs, bicycle and pedestrian needs and transit needs. The existing and future needs of each mode were assessed and considered in the development and evaluation of the alternatives.

5.1 Existing Conditions

The existing conditions section evaluates the current roadway, bicycle/pedestrian and transit facilities in the Ames area.

ROADWAY SYSTEM

Overview

The roadway system in the Ames area is the primary transportation system and serves a variety of modes and vehicular types, including automobile, truck, transit and bicycles. The emphasis in the roadway element is to operate the system as safely and efficiently as possible.

Issues

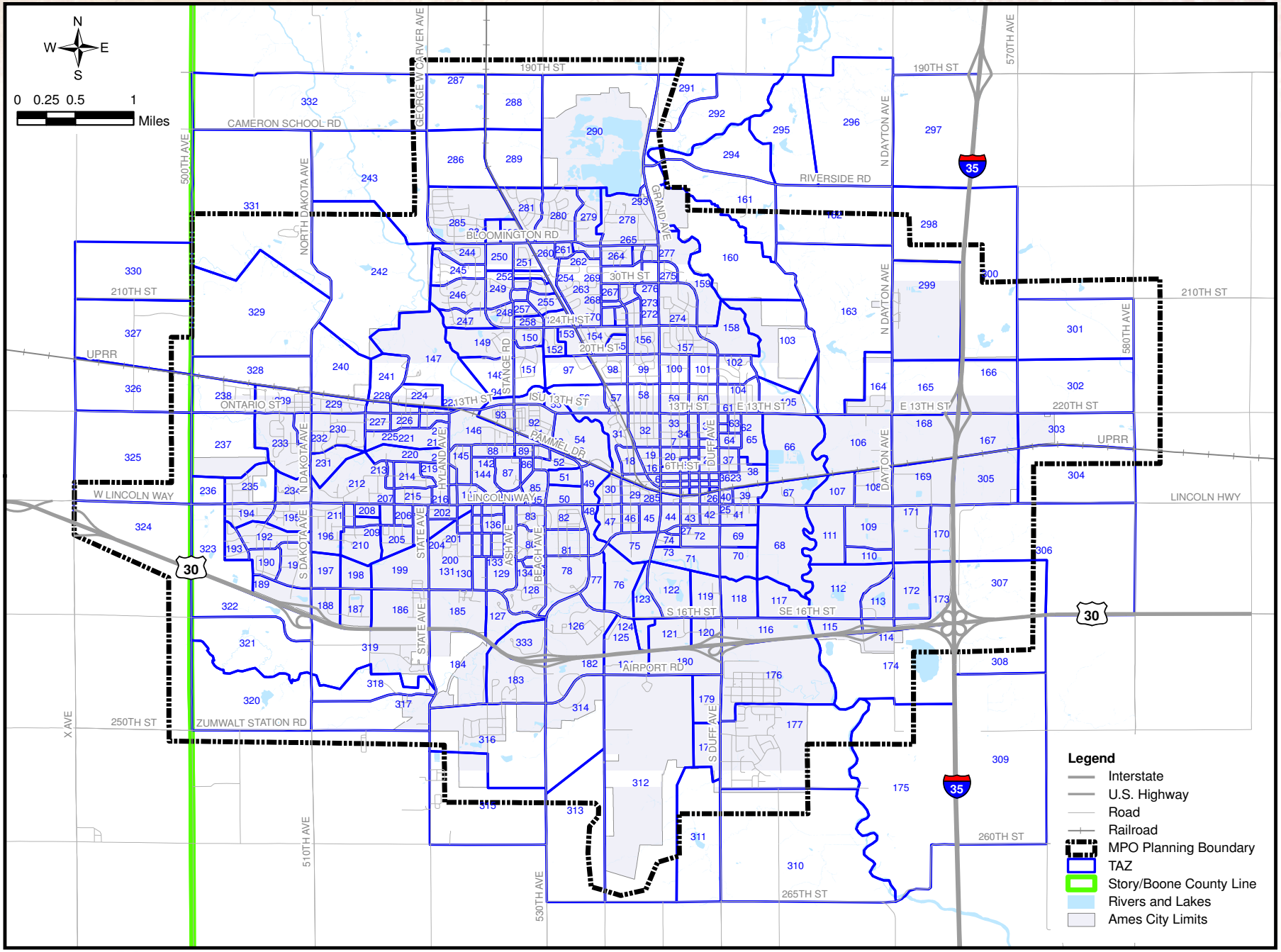
In the Issues and Visioning phase of the LRTP update process, input from the Focus Group and general public was gathered through an Issues and Visioning Workshop held in the fall of 2009. Roadway issues gathered through this process are discussed in Chapter 3.

Travel Demand Model

A travel demand model was used as a primary tool for the transportation analysis of the AAMPO. The model is comprised of 332 traffic analysis zones (TAZ's) that represent a smaller geographic area within the overall coverage of the model. The size of a zone varies, but typically is made up of census blocks or block groups. TAZ's are typically made up of homogeneous land uses or areas bounded by major arterial streets, rivers, or jurisdictional boundaries. In the travel demand model, each TAZ is quantified with certain socioeconomic data, including household size, number of available vehicles and employees. Trip making calculations are then performed based on the number of productions (homes) and attractions (employment) by TAZ. A map of the AAMPO TAZ's is shown in **Figure 5.1**.

The model network generally consists of roadways classified as major collectors or higher. Other local streets and access points are represented in the form of centroid connectors that attach trips from an analysis zone to roadways in the network. The modeled roadways are characterized with attributes such as speed, capacity and functional classification.

Figure 5.1. AAMPO Travel Demand Model Travel Analysis Zones



Travel demand models were updated for the year 2007 (existing conditions) and the year 2035 (future). Year 2007 was used for existing conditions in order to compare to latest Iowa DOT traffic count data. The purpose of modeling an existing 2007 model is to calibrate the model to existing counts.

The AAMPO model is a daily model, meaning traffic volume output reflects a 24-hour period or average daily traffic (ADT) volume. The validation process of travel demand modeling includes measuring how well the actual existing ground counts compare to the traffic volume assignment outputs from the model. Two standard measures in travel demand model calibration statistics are R-Squared (Coefficient of Determination) and Root Mean Square Error (RMSE). R-Squared is a statistic that gives information about the goodness of fit of a model. An R-Squared of 1.0 indicates that the regression line perfectly fits the data. The RMSE measures the differences between the values predicted by a mode and the values actually observed. The 2007 AAMPO travel demand model has the following statistics:

- R-Squared = 0.94
- RMSE = 30%

According to the United States Department of Transportation (US DOT) Travel Model Improvement Program (TMIP) *Model Validation and Reasonableness Checking Manual, February 1997,* a model is considered calibrated with an R-squared statistic of at least 0.88 and an RMSE less than 30%.

The Model Validation and Reasonableness Checking Manual also provides guidance on the deviation between ground count ADT's and model assignment ADT's according to facility type categories. **Table 5.1** illustrates the percentage deviation within the volume categories for the 2007 AAMPO model. The "Total Count" column illustrates the sum of the actual counts and the "Total Model" column illustrates the sum of the model assignments.

Table 5.1. Travel Demand Model Accuracy by Facility Type Category

Facility Type	Total Count	Total Model	Deviation	AAMPO
Interstate	546,850	532,787	7%	2.6%
Principal Arterial	3,827,500	3,638,751	10%	5.2%
Minor Arterial	2,773,950	2,341,251	15%	18.5%
Collector	875,570	519,499	25%	68.5%
Minor Collector	56,780	69,477	25%	18.3%

The 2007 AAMPO model exceeds the suggested maximum percent deviation for the Minor Arterial and Collector facility types. Deviation in the model for low volume roadways (collector and minor arterial) is not as important as for high volume roadways (interstate and principal arterial). This is why the allowable deviation increases as the volume decreases. In order to address this deviation, the future year model projections were post-processed using the methodologies described in the National Cooperative Highway Research Program (NCHRP) Study 255.

Another travel demand model validation check is presented in the NCHRP Study 255. This document provides deviation limits, categorized by the roadway volume. Table 5.2 shows the percentage deviation within the volume categories for the 2007 AAMPO model.

Table 5.2. Travel Demand Model Accuracy by Volume Category

Daily Volume Category	Total Count	Total Model	Deviation Limit (NCHRP)	AAMPO Deviation
0-5,000	991,505	679,768	60%	45.9%
5,000-10,000	2,211,880	1,849,090	44%	19.6%
10,000-15,000	2,297,100	2,194,518	33%	4.7%
15,000-25,000	2,490,950	2,260,535	30%	10.2%
> 25,000	218,600	172,547	25%	26.7%

The 2007 AAMPO model only exceeds the suggested maximum percent deviation for the greater than 25,000 volume category. In order to address this deviation, the future year model projections were post-processed using methodologies described in NCHRP 255. The post-processing is needed since no model will be 100 percent accurate; therefore, deviations in the base model are determined so appropriate adjustments are incorporated to alleviate the deviation in the future year model. The travel demand model provides acceptable accuracy for planning level analysis.

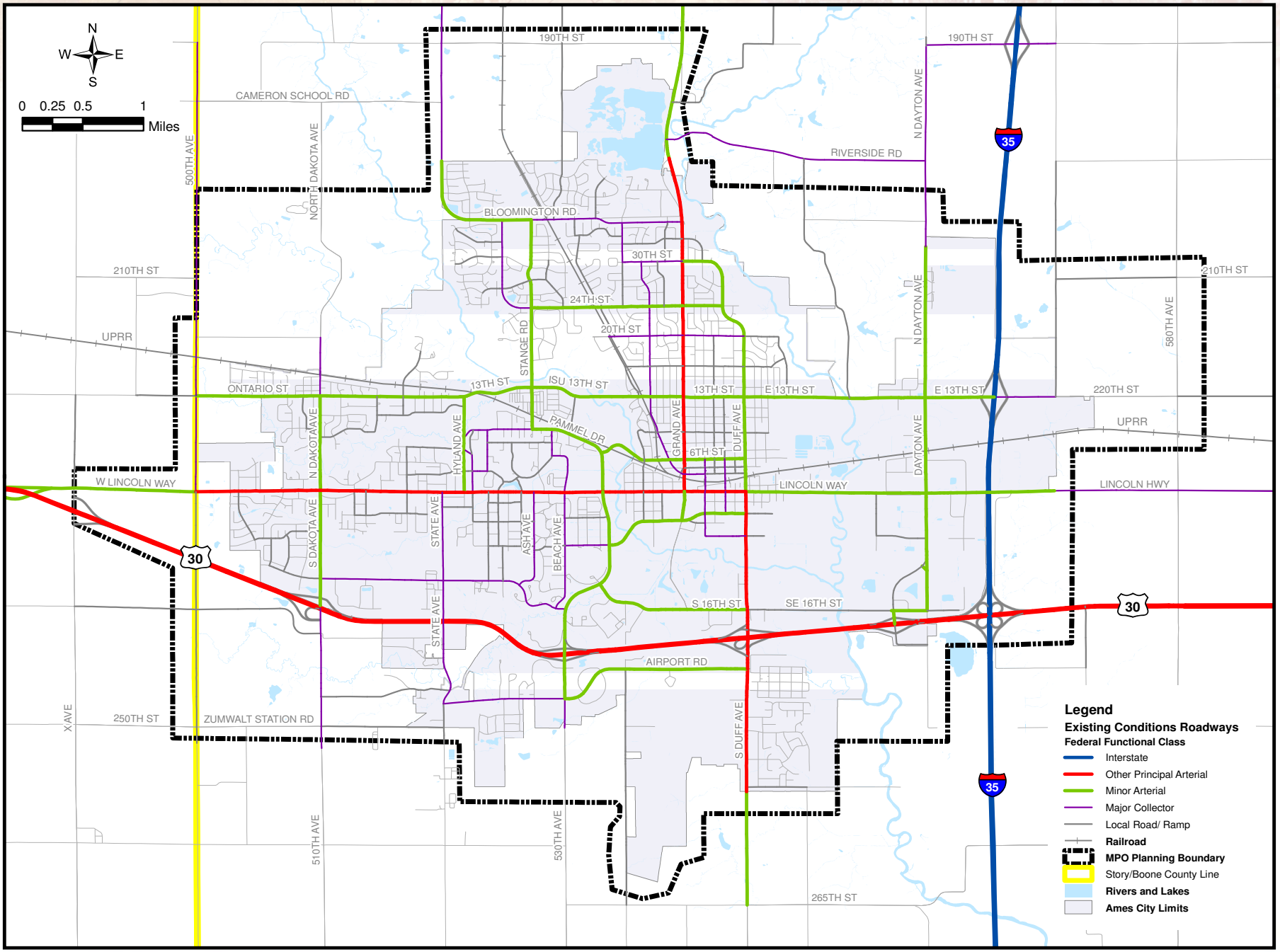
2007 Existing Traffic ADT Volumes

Average daily traffic (ADT) volume counts were collected for year 2007 and used as a baseline for the existing conditions analysis. The majority of the count locations were collected by the Iowa Department of Transportation. These volumes were collected for roadways with a functional classification of collector or higher (not local roads).

Figure 5.2 shows the study area roadways and the existing federal functional classifications. Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. Functional classifications for the AAMPO roadways include:

- **Interstate**. (i.e., I-35) A divided, limited access facility with no direct land access and no at-grade crossings or intersections. Interstates are intended to provide the highest degree of mobility serving higher traffic volumes and longer length trips.
- **Other Principal Arterial**. (i.e., U.S. 30) Permit traffic flow through the urban area and between major destinations. Principal arterials carry a high proportion of the total urban travel, since movement and not necessarily access is the primary function.
- **Minor Arterial**. (i.e., 13th Street, Payton Avenue) Collect and distribute traffic from principal arterials and interstates to streets of lower classification, and, in some cases, allow traffic to directly access destinations. Access to land use activities is generally permitted, but is oftentimes consolidated, shared, or limited to larger-scale users.
- **Major Collector**. (i.e., 20th Street, Beach Avenue) Provide for land access and traffic circulation within and between residential neighborhoods and commercial and industrial areas, as well as distribute traffic movements from these areas to the arterial streets. Collectors do not typically accommodate long through trips and are not continuous for long distances.
- **Local Road**. Offer the lowest level of mobility and the highest level of local property access. Local streets typically make up the largest percentage of street mileage and provide direct access to adjacent land uses.

Figure 5.2. Existing Roadway Federal Functional Classifications



2007 Existing Traffic Analysis

The traffic analysis was conducted using an Intersection Capacity Utilization (ICU) methodology at intersections. Key intersections within the study area were evaluated using ICU Level of Service (LOS) analysis. LOS is a qualitative measure describing operational conditions. It can range from "A" representing free-flow conditions to "F" representing gridlock. ICU analysis characterizes the capacity of an intersection in terms of the amount of time needed to serve all movements and to relate that capacity to the demand at the intersection. Therefore, the primary calculation in the ICU method is that of a reference time for each movement. The reference time is the amount of time required to serve a given movement at 100 percent capacity (saturation). Signal timings are not an input in determining intersection ICU LOS.

The ICU method was selected to complete the intersection analyses because of its simplistic nature and because the results are not dependent on specific signal timings. The parameters used to analyze each intersection with the ICU method are the same and results at multiple intersections or for various geometric/volume conditions of an intersection can be directly compared. A popular method for calculating intersection delay is the Highway Capacity Manual (HCM) method which requires specific signal timings to derive intersection delay. However, signal timings can be tailored to an intersection's geometry and volumes which can vary results significantly. Modifying signal timings can be useful for intersections that are over capacity but do not always provide results that can be directly compared to other study intersections or different geometric/volume conditions of the intersection.

Table 5.3 outlines the thresholds for each ICU Level of Service category.

TABLE 5.3. INTERSECTION CAPACITY UTILIZATION LEVEL OF SERVICE THRESHOLDS

	LEVEL OF SERVICE (LOS)							
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Intersection Capacity Utilization (Percent of Capacity)	< 60%	60% - 70%	70% - 80%	80% - 90%	90% - 100%	100% - 110%	110% - 120%	> 120%
Level of Congestion	No congestion	Very little congestion	No major congestion	Normally has no congestion	On the verge of congested conditions	Over capacity and likely experiences congestion periods of 15 to 60 minutes per day	Over capacity and likely experiences congestion periods of 60 to 120 minutes per day	Over capacity and could experience congestion periods over 120 minutes per day
	All traffic served on first cycle *Intersection can accommodate up to 40% more traffic on all movements*	*Almost all traffic served on first cycle* *Intersection can accommodate up to 30% more traffic on all movements*	*Most traffic served on first cycle* *Intersection can accommodate up to 20% more traffic on all movements*	*Majority of traffic served on first cycle* *Intersection can accommodate up to 10% more traffic on all movements*	*Many vehicles not served on first cycle* *Intersection has less than 10% reserve capacity*	*Residual queues at the end of green are common*	*Long queues are common*	*Long queues are common*

ICU analysis was performed for existing volume conditions of key intersections within the study area. The AAMPO selected the key intersection to be analyzed. Existing turning movement volumes were collected during Fall 2009 and Spring 2010 and provided by the City of Ames. The City also provided existing reference cycle lengths to be used in the analysis.

TABLE 5.4 summarizes the results from the existing conditions ICU analysis. As shown in the table, all the intersections currently perform within acceptable levels (LOS C or better) for peak hour conditions, with the exception of four study intersections:

- 13th St / Stange Rd
- 13th St / Grand Ave
- Lincoln Way / Duff Ave
- S 16th St / S Duff Ave

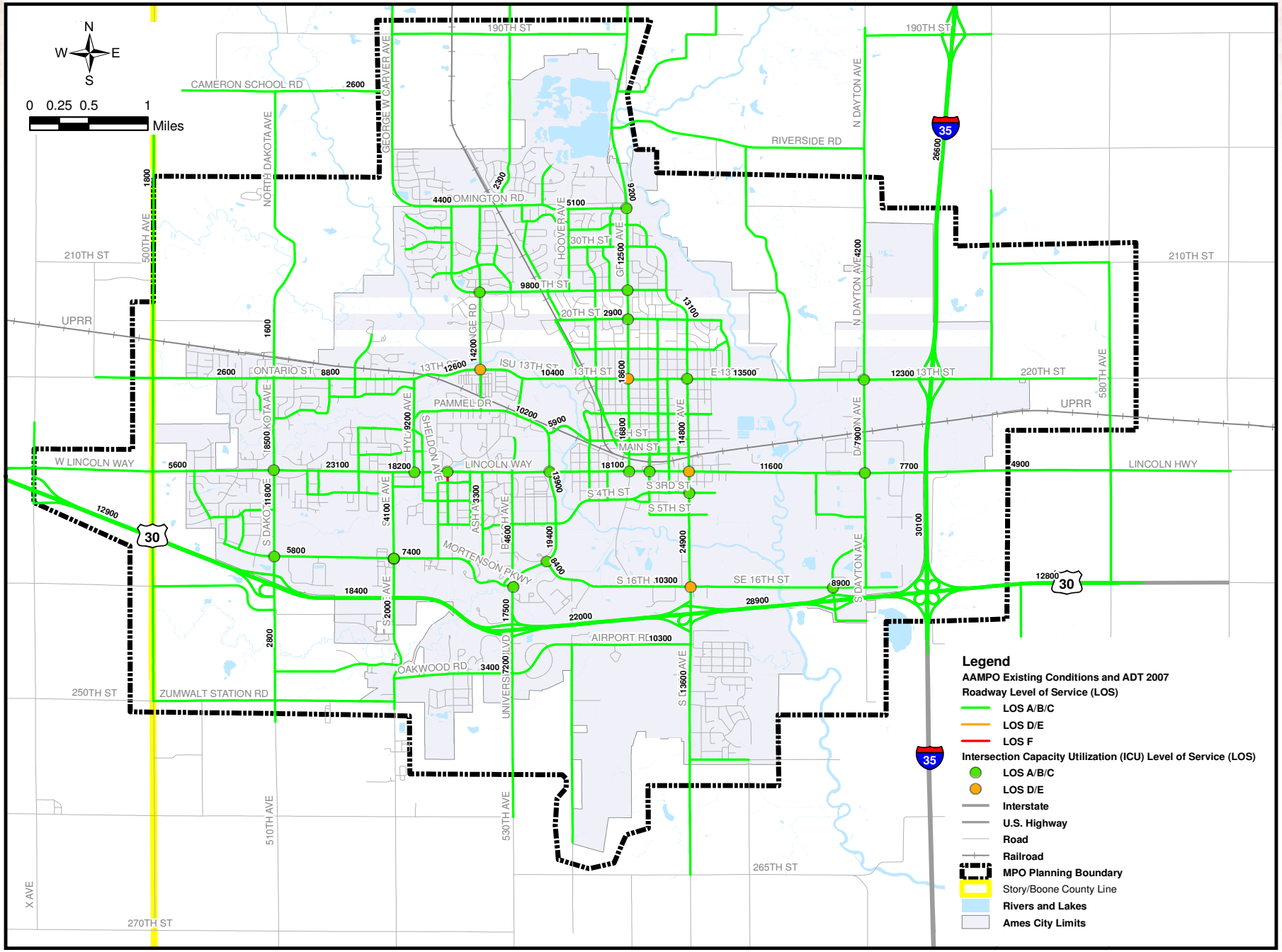
In addition to peak hour level of service measured at the study area intersections, a planning level of service was also calculated by roadway segment. The Roadway LOS is based on an average weekday (24-hour) volume and capacity. Roadway LOS is defined by thresholds using a volume to capacity ratio (V/C). For the AAMPO, capacity is established at LOS C (a V/C ratio of 1.0). Volumes are based on existing 2007 count data. Capacities are based on criteria defined by the Iowa DOT, classified according to roadway functional class, area type, and number of lanes. The roadway LOS analysis for the AAMPO shows all roadways perform during the average weekday at acceptable levels of service (C or better).

The existing conditions roadway LOS, ICU LOS, and ADT's for the 2007 existing conditions analysis are shown in FIGURE 5.3.

TABLE 5.4. EXISTING CONDITIONS INTERSECTION CAPACITY UTILIZATION ANALYSIS RESULTS

INTERSECTION	PEAK HOUR LOS		
	A/B/C	D/E	F/G/H
Bloomington Rd / Grand Ave	♦		
24th St / Stange Rd	♦		
24th St / Grand Ave	♦		
20th St / Grand Ave	♦		
13th St / Stange Rd		♦	
13th St / Grand Ave		♦	
13th St / Duff Ave	♦		
13th St / Dayton Ave	♦		
Lincoln Way / Dakota Ave	♦		
Lincoln Way / Hyland Ave	♦		
Lincoln Way / Welch Ave	♦		
Lincoln Way / University Blvd	♦		
Lincoln Way / Grand Ave	♦		
Lincoln Way / Clarke Ave / Walnut Ave	♦		
Lincoln Way / Duff Ave		♦	
Lincoln Way / Dayton Ave	♦		
S 3rd St / S Duff Ave	♦		
Mortensen Rd / S Dakota Ave	♦		
Mortensen Rd / State Ave	♦		
Mortensen Pkwy / University Blvd	♦		
S 16th St / University Blvd	♦		
S 16th St / S Duff Ave		♦	
SE 16th St / S Dayton Ave	♦		

Figure 5.3. 2007 Existing Conditions Average Daily Traffic Volumes, Intersection LOS and Roadway Segment LOS



BICYCLE/ PEDESTRIAN SYSTEM

Overview

Bicycling and walking as healthy modes of transportation, or as purely recreational activities, provide positive benefits in many areas including personal health, the health of the environment, reduced traffic congestion, improved quality of life, and the increased economic vitality of communities that have emphasized bicycle and pedestrian mobility. In a growing number of communities, bicycling and walking are considered as indicators of a community's livability – a factor that has a profound impact on attracting businesses and workers as well as tourism. In cities and towns where people can regularly be seen out bicycling and walking, there is a sense that these are safe and friendly places to live and visit. In areas that are heavily centered on a university or college, such as Ames, it is all the more important to emphasize bicycling and walking, as many students rely on these modes for most, if not all, of their transportation needs for on-campus and off-campus activities.

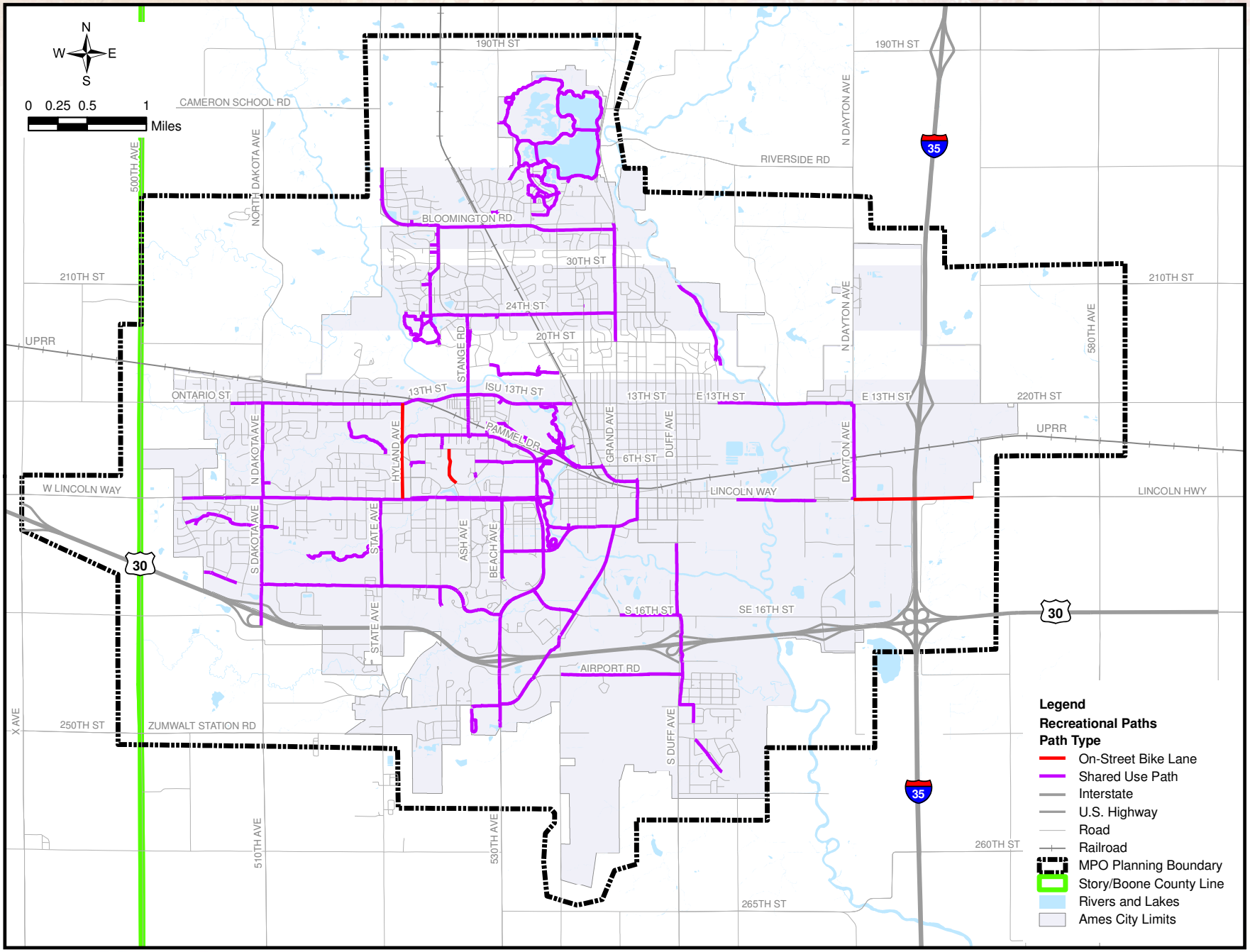
The keys to creating pedestrian and bicycle-friendly, walkable, livable places are:

- Providing a mix of complementary land uses that support shorter trips that can be made by bicycling or walking.
- Implementing traditional street patterns that better distribute traffic across the network and provide more route choices.
- Balancing the needs of all road users through the implementation of "complete streets." Streets must consider the needs of all the potential users, not just the automobile. In addition to providing route choice for the traveling public, streets must also provide for mode choice. Successful, sustainable communities consider all users, not just the majority. Incomplete streets may not only discourage travel by alternative modes, but may be hazardous for non-auto users. In contrast, a network of complete streets improves the safety, convenience, efficiency, and accessibility of the transportation system for all users.
- Using good urban design that satisfies each of the five elements that every street and place needs to succeed: security, convenience, efficiency, comfort, and welcome. Ultimately, it must be recognized that people will travel by walking or bicycling if they feel safe, if it is convenient to do so, if origins and destinations are linked through a well-connected network, and if the environment is positive and inviting.
- Implementing a comprehensive program that includes all of the 5 E's: Engineering, Education, Encouragement, Enforcement, and Evaluation. While this plan will focus on Engineering, it is important to recognize that aspects of each other area need to be implemented to ensure a bicycle and pedestrian-friendly community.

Northwestern Avenue is signed as a "Bicycle Friendly Street."

There are a growing number of bicycle and pedestrian facilities in the Ames area, which include sidewalks, on-road bicycle facilities (paved shoulders or bicycle lanes), and off-road shared use paths. The majority of existing bicycles facilities in Ames are shared use paths that are located immediately adjacent to and parallel to roadways, which are also known as "sidepaths". Many arterial and collector roadways within the area have sidepaths, and there has been a concerted effort to expand the existing system of pathways in recent years, including sidepaths and other shared use paths in exclusive rights-of-way. While there are many pathways in the area, there are very few on-road bicycle facilities. In fact, the only dedicated bicycle lanes in the area are on Hyland Avenue and Morrill Road on the Iowa State campus, the portion of Lincoln Way from Dayton Avenue to the eastern City limits and the newly constructed bicycle lanes on South Dakota from U.S. 30 to 250th Street. There are a few roadways, such as Northwestern Avenue and Ross Road, which have existing signage that recognizes them as a "Bicycle Friendly Street"; these streets do not provide dedicated bicycle facilities, but offer shared roadway environments. **Figure 5.4** shows the existing bicycle facilities within the Ames area.

Figure 5.4. Existing Bicycle Facilities



Issues

In the Issues and Visioning phase of the LRTP update process, input from the Focus Group and general public was gathered through an Issues and Visioning Workshop held in the fall of 2009. Bicycle and pedestrian issues gathered through this process are discussed in Chapter 3.

Existing Service Evaluation

Research Background

There is a general consensus that bicyclists' and pedestrians' sense of safety and comfort within a roadway corridor is based on a complex assortment of factors including traffic characteristics, roadway geometrics, personal safety, security, aesthetics, lighting and amenities, and conditions at intersections. Recent research has led to the development of two models, one each for bicyclists and pedestrians, which measure the perceptions of personal safety and comfort with respect to motor vehicle traffic. The Bicycle Level of Service (BLOS) and Pedestrian Level of Service (PLOS) models do not measure vehicle flow or capacity, but are based on human responses to measurable roadway and traffic stimuli. Each of the two models were derived from a study that placed participants in actual urban roadway and traffic conditions to obtain feedback regarding the perception of hazard or level of comfort on a variety of different roadway segments. Participants graded roadway segments on a scale from A (least hazardous) to F (most hazardous) based on how safe or comfortable they felt as they bicycled or walked on each segment. While these studies focused on the quality, or level of service, of the roadway links, the conditions at intersections were not addressed.

The result of the research was the calibration of statistically reliable mathematical models that quantify bicyclists' and pedestrians' perceptions of the quality of service on shared use roadway environments. The two models have been used or adopted by many City and State agencies. Part of the reason for the models' widespread acceptance is that they use the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes.

The BLOS model clearly reflects the effect on bicycling suitability or "compatibility" factors such as roadway width, bike lane widths and striping combinations, traffic volume, pavement surface conditions, motor vehicle speed and type, and on-street parking. Statistically, the most important variables involved the separation of the bicyclist from motorized traffic, such as the presence of a designated, striped bicycle lane. It is important to note that the BLOS model only represents bicycling suitability of the on-road environment, and does not incorporate shared use paths or sidepaths.

The factors contained in the PLOS model include lateral separation elements between pedestrians and motor vehicle traffic (i.e., width of sidewalk, width of buffer, etc.), as well as motor vehicle traffic volume, and motor vehicle speed. Similar to the BLOS model, the most important variable was found to be the lateral separation between pedestrians and motor vehicle traffic. A pedestrian's sense of safety or comfort is strongly influenced by the presence of a sidewalk. Furthermore, the value of the sidewalk varies according to its location and buffering (separation) from the motor vehicle traffic. In general, as the buffering increases, the pedestrian's comfort level increases. Additionally, a pedestrian's comfort level increases further with the presence of a barrier within the buffer, such as on-street parking, a line of trees, or a roadside swale. Unlike the BLOS model, the PLOS model does account for the presence of sidepaths, since they are located adjacent to the roadway and essentially function as wide sidewalks.

Ames Area Data

An analysis of the existing BLOS and PLOS was conducted within the MPO planning boundary. The BLOS and PLOS grades for the arterial and collector roadways within the study area are shown on **Figure 5.5** and **Figure 5.6**, respectively.

A total of approximately 65 miles of roadway were evaluated using the BLOS and PLOS models. **Table 5.5** provides a summation of the data showing the total miles and percentage at each level of service. As shown, the overall conditions in the Ames study area today can be

Figure 5.5. Bicycle Level of Service

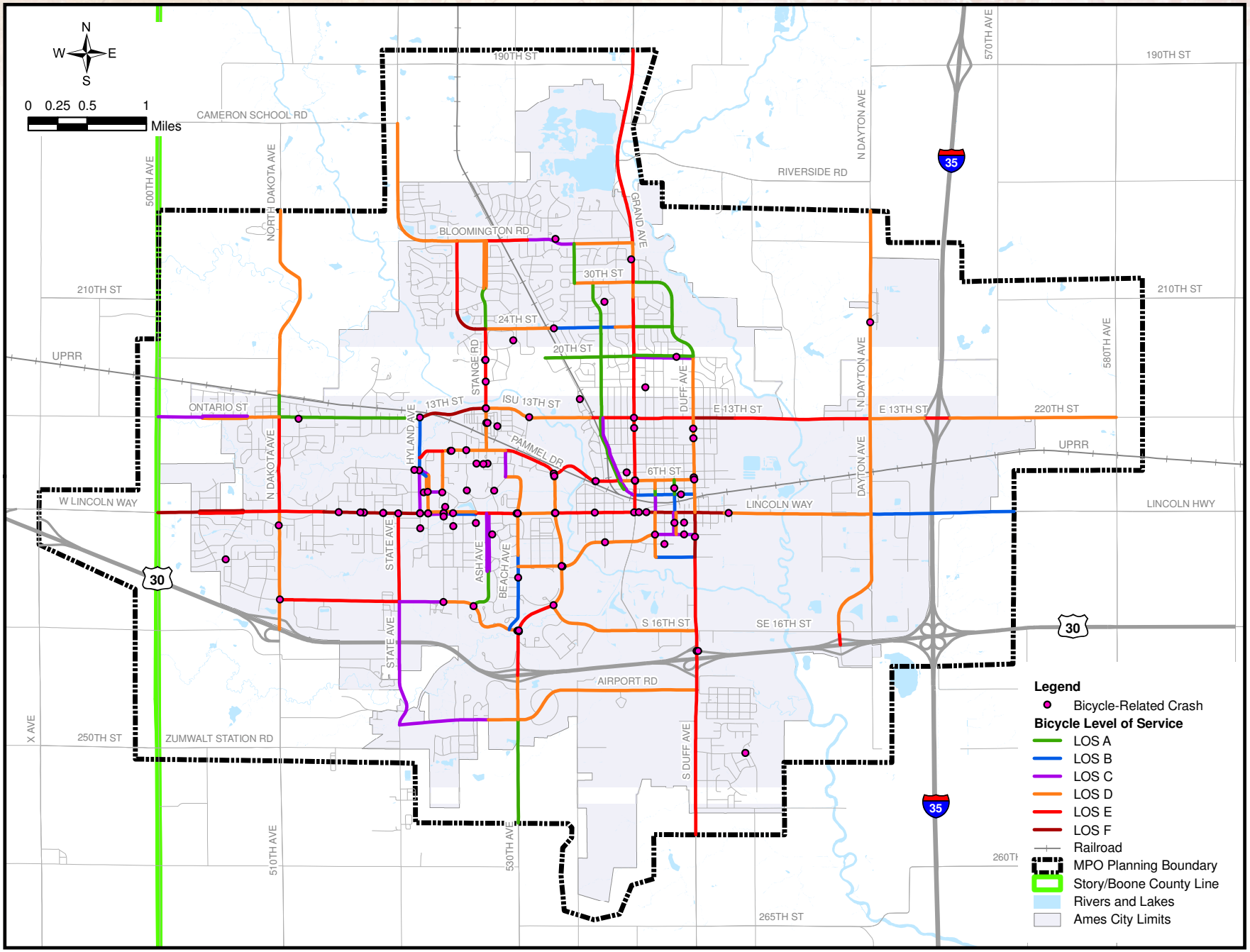
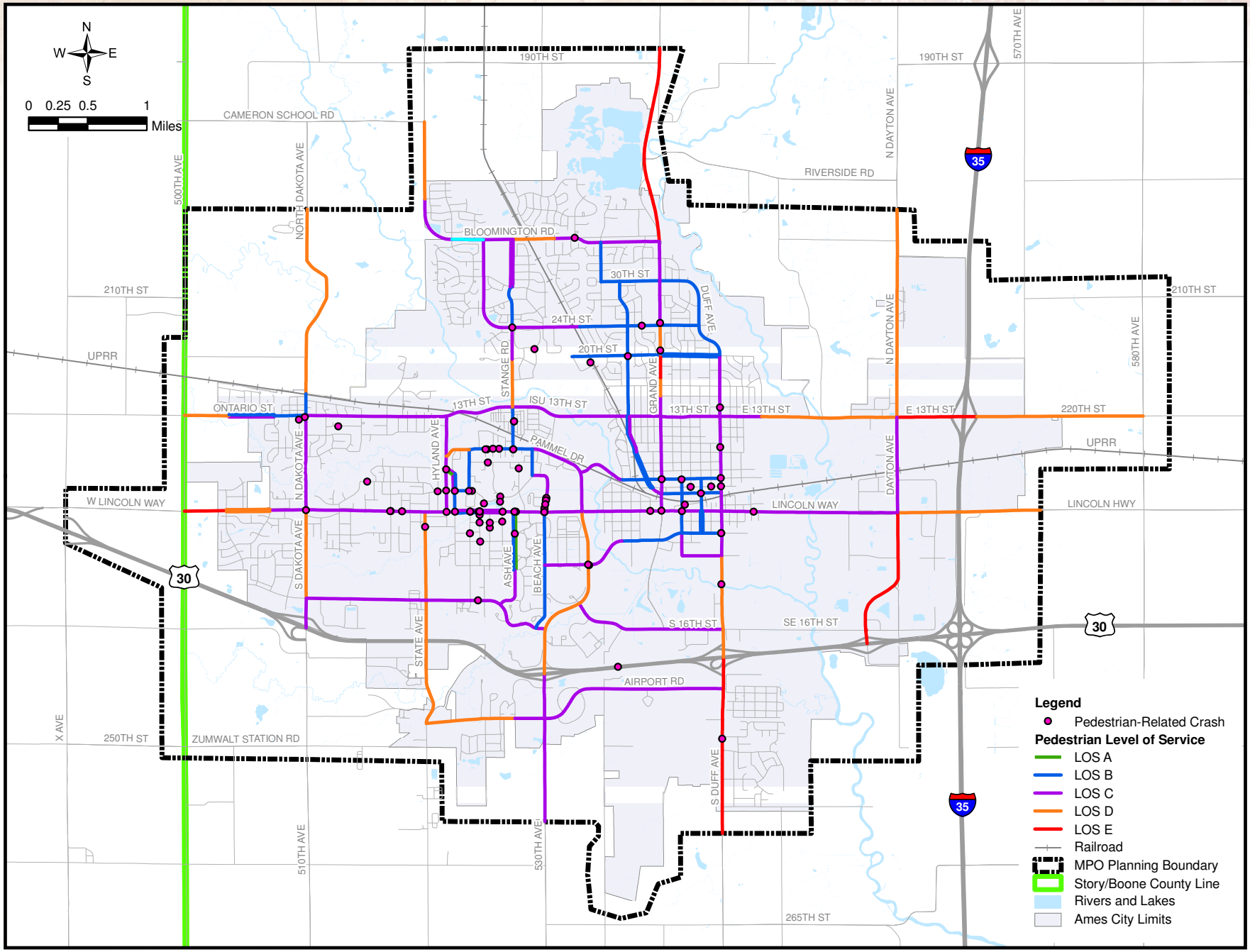


Figure 5.6. Pedestrian Level of Service



described as fair for pedestrians and fair to poor for bicyclists riding in an on-road environment. Only 17 and 21 percent of roadway miles rated a "B" or better in BLOS and PLOS, respectively. However, while nearly one-half of the roadway miles rated a "C" in PLOS, only 9 percent rated a "C" in BLOS. In many communities where BLOS and PLOS have been used, a standard of "C" is considered acceptable, and it is recommended to use this standard in Ames. This means that while 67 percent of the arterial and collector roadway network miles in Ames would be considered acceptable for pedestrians, only 26 percent would be considered acceptable for bicyclists in an on-road environment. The BLOS and PLOS summary and results are shown in Table 5.5.

Table 5.5. Ames Area MPO Bicycle and Pedestrian Level of Service Summary

Bicycle Level of Service			Pedestrian Level of Service		
BLOS	Distance (mi)	Percentage (%)	PLOS	Distance (mi)	Percentage (%)
A	7.3	11	A	0.3	1
B	3.7	6	B	13.1	20
C	5.8	9	C	29.7	46
D	27.3	42	D	15.7	24
E	16.5	26	E	5.6	9
F	3.8	6	F	0	0

The level of service analysis represents a "supply side" analysis. The results of this analysis are significant in that they can be used to conduct a benefits comparison among proposed roadway cross-sections, identify roadway re-striping or reconfiguration candidates for bicycle or pedestrian improvements, and to prioritize and program roadways for improvements. This is especially true when the LOS results are combined with an analysis of demand, because the roadways with the poorest level of service and the highest user demand can be given a high priority for making improvements. Although a formal bicycle and pedestrian demand analysis was not completed for this plan, the demand for these modes is generally highest in the areas encompassing and immediately surrounding the Iowa State campus and downtown Ames; this is because these areas have a mix of complementary land uses in close proximity to each other where short trips can easily be made by bicycling or walking. The further away from ISU and downtown Ames, the less demand generally exists for bicycling and walking trips because these areas consist largely of a single land use, and trips supportable by bicycling or walking are typically longer. For this reason, roadways closer in to ISU and downtown Ames with poor BLOS and/or PLOS grades (below the recommended standard of "C") should generally be considered higher priorities for improvement than roadways with poor levels of service further out or on the periphery of town.

TRANSIT SYSTEM

Overview

There are three main public transit services provided in the Ames area. The City of Ames, through the Ames Transit Agency (CyRide), provides fixed route transit service using city employees as well as demand responsive service through Heartland Senior Services. CyRide is jointly governed by the City, Iowa State University, and ISU's Government of the Student Body (ISU students). Further, demand responsive regional service is provided by the Heart of Iowa Regional Transit Agency (HIRTA) also by contract with Heartland Senior Services.

The primary focus of this discussion is the services provided within the study area by CyRide, the primary public transit provider in the City of Ames. The transit system information contained in this report substantially uses work contained in the Ames Area 2010 Passenger Transportation Development Plan (PTDP) completed in April of 2009 and the Ames Area MPO 2011 Passenger Transportation Plan Update in March of 2010. The PTDP is an effort of providing key community decision makers with the knowledge of how individuals are currently being transported throughout Ames, the additional transportation needs and service requests identified, and recommended projects to overcome these needs. This document is available on the CyRide website at http://www.cyride.com/planning_policies/planning.html.

Issues

In the Issues and Visioning phase of the LRTP update process, input from the Focus Group and general public was gathered through an Issues and Visioning Workshop held in the fall of 2009. Transit issues gathered through this process are discussed in Chapter 3.

Existing Service Evaluation

The City of Ames has extensive transit service, operating seven days a week. **Table 5.6** summarizes the chief characteristics of this service.

The PTDP reviewed the CyRide route structure for its four main service periods and compared them with the distribution of populations considered to be below the poverty level in Ames. In addition, the comparison of the route structure with locations of rental housing/ commercial and industrial zones in the city was also made.

The main service periods are:

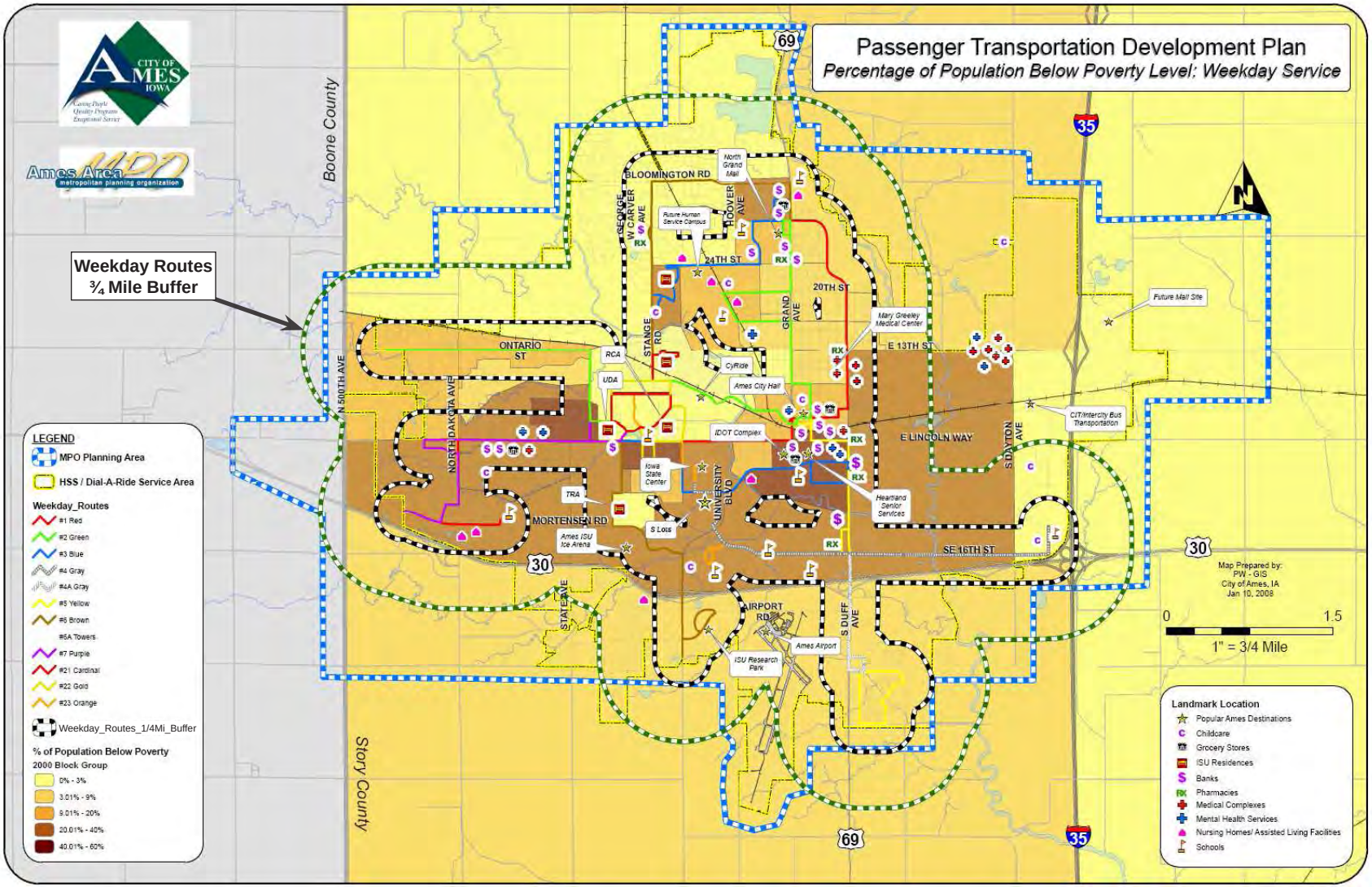
- Weekdays
- Weekday Nights
- Saturdays
- Saturday nights and Sundays

The PDTP compares weekday service period route structure with areas considered below the poverty level, with concentrations of key landmarks, and with areas of rental housing, commercial and industrial zones. This comparison is shown in **Figure 5.7** and **Figure 5.8**, with service areas of the routes (quarter-mile and three-quarter mile buffers around the routes). A quarter mile is the standard measure for the maximum distance people will typically walk to access service. The three-quarter mile buffer is the minimum service area for ADA paratransit. **Figure 5.7** shows that many of the parts of Ames with the highest concentrations of people living below the poverty level are within a quarter mile of the bus routes operating during the weekday. Expanding the service area to three-quarters of a mile from a route, an even greater portion of this population is covered by service. **Figure 5.8** shows the rental property, commercial and industrial zones within the quarter mile and three-quarters of a mile buffers. Most rental and commercial areas are within the quarter mile buffer. Residential rental units not only illustrate where high density living occurs, but also where transit dependent individuals may live. The commercial and industrial areas illustrate locations where residents work and shop.

Table 5.6. Summary of Ames Area Transit Providers

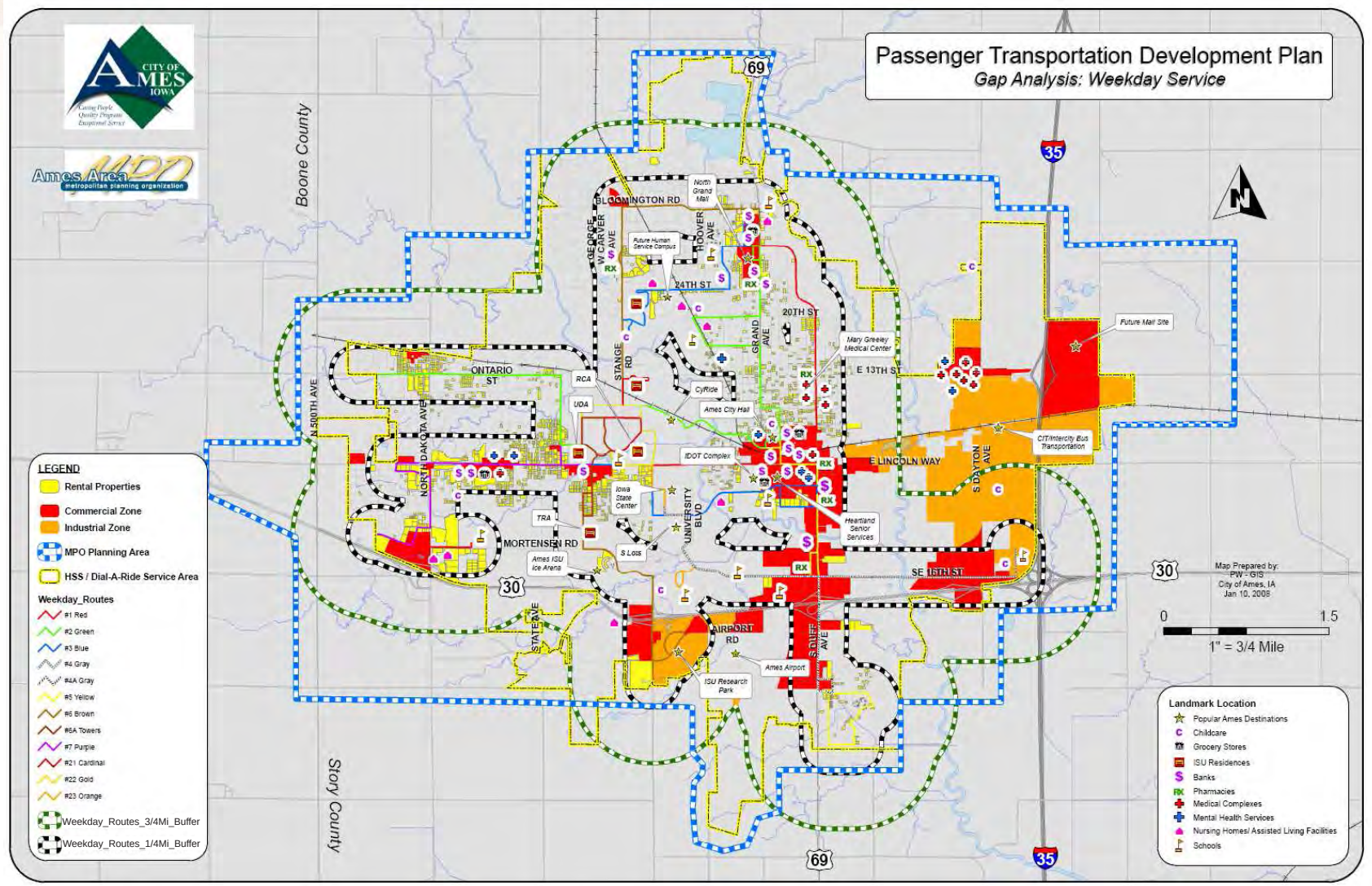
Type of Service	Fixed-Route Service	Dial-A-Ride (ADA Complementary Service)	HIRTA Regional Service	Intercity Service
Operator	Ames Transit Agency *(CyRide)*	Heartland Senior Services *(contractor to CyRide)*	Heartland Senior Services *(contractor to HIRTA)*	Jefferson Line & Burlington Trailways
Service Area	City of Ames	City of Ames	Story County	Midwest
Groups Served	General Public	General Public *(as ADA eligible)*	General Public, Seniors & Persons with Disabilities	General Public
Days of Operation Monday-Friday; Saturday; Sunday & Holidays	362 days/year 6am – 12am 8am – 12am; 9am – 12am *Closed Thanksgiving, Christmas and New Year's Day.*	362 days/year 6am – 12am; 8am – 12am; 9am – 12am *Closed Thanksgiving, Christmas and New Year's Day.*	Weekdays 6am – 6pm; 8am – 12am (within Ames only); 9am – 12am (within Ames only); *Closed Thanksgiving, Christmas and New Year's Day.*	362 days/year Varies *Closed Thanksgiving, Christmas and New Year's Day.*
Fare Structure (one-way)	$1.00 $0.50 - Elderly/disabled, K-12 students and Medicare cardholders Free - ISU students	$2.00 $6.00 (east of Skunk River; weeknights after 6:00 PM and all day Saturday and Sunday)	$5.50 $0.25 - $5.50 - (low-income passengers; prior approval required)	Varies

FIGURE 5.7. PERCENTAGE OF POPULATION BELOW POVERTY LEVEL - WEEKDAY SERVICE



Source: Ames Area 2010 Passenger Transportation Development Plan, April 2009, page 32.

Figure 5.8. Rental, Commercial and Industrial Zone Landmark Gap Analysis - Weekday Service



Ames Area Passenger Transportation Development Plan 31

Source: Ames Area 2010 Passenger Transportation Development Plan, April 2009, page 31.

5.2 Future Conditions

The plan uses a 2035 planning horizon in order to provide a minimum 25 year time period between the date of the plan and the analysis period for the improvements. This section discusses the future needs of the transportation system, as required by SAFETEA-LU.

ROADWAY SYSTEM

Travel Demand Model

The 2035 Existing Plus Committed (E+C) travel demand model network consists of the existing roadway network and any transportation improvements to be completed in the next 25 years that have already been committed to project funding through prior planning efforts and capital improvement programs in the study area. The socioeconomic data used in the model was established using a future land use plan and data provided by the AAMPO.

The AAMPO currently has several projects that are committed to be built in the near future. These projects are part of developer agreements and are projected to be constructed within the next five years. For the purposes of the transportation planning analysis conducted as part of the LRTP update process, only committed projects that relate to a change in the roadway capacity pertain to a modification in the travel demand model network. The 2035 E+C network includes the following committed projects:

- Grant Avenue - W. Wind Drive to 190th Street
- 13th Street - I-35 to 570th Avenue
- 570th Avenue - 13th Street to ½ mile north (corporate limits)
- 13th Street and Dayton Avenue Intersection Improvements

2035 Future E+C Traffic Analysis

An ICU analysis was performed for year 2035 E+C volume conditions of key intersection with existing plus committed geometrics. Committed projects that will be built before year 2035 were included in the geometric conditions of the analysis. Year 2035 E+C peak hour volumes were developed using the existing peak hour turning movement volumes, existing annual daily traffic (ADT) volumes on each key intersection leg, and forecasted year 2035 E+C ADT volumes on each key intersection leg generated with the travel demand model.

Table 5.7 summarizes the results from the 2035 E+C conditions ICU analysis. The intersections that are shown to operate in the peak hour with unacceptable levels of service (LOS D or worse) include the following:

Peak Hour LOS D/E:

- 13th St / Grand Ave
- Lincoln Way/ Dakota Ave
- Lincoln Way/ Grand Ave
- Lincoln Way / Duff Ave
- S 16th St / S Duff Ave

Peak Hour LOS F:

- 13th St / Stange Rd

In addition to peak hour level of service measured at the study area intersections, a planning level of service was also calculated by roadway segment. The Roadway LOS is based on an average weekday (24-hour) volume and capacity. Roadway LOS is defined by thresholds using a volume to capacity ratio (V/C). Volumes are based on post-processed 2035 E+C ADT forecasts from the travel demand model. The roadway LOS analysis for the AAMPO shows the majority of roadways perform during the average weekday at acceptable levels of service (C or better).

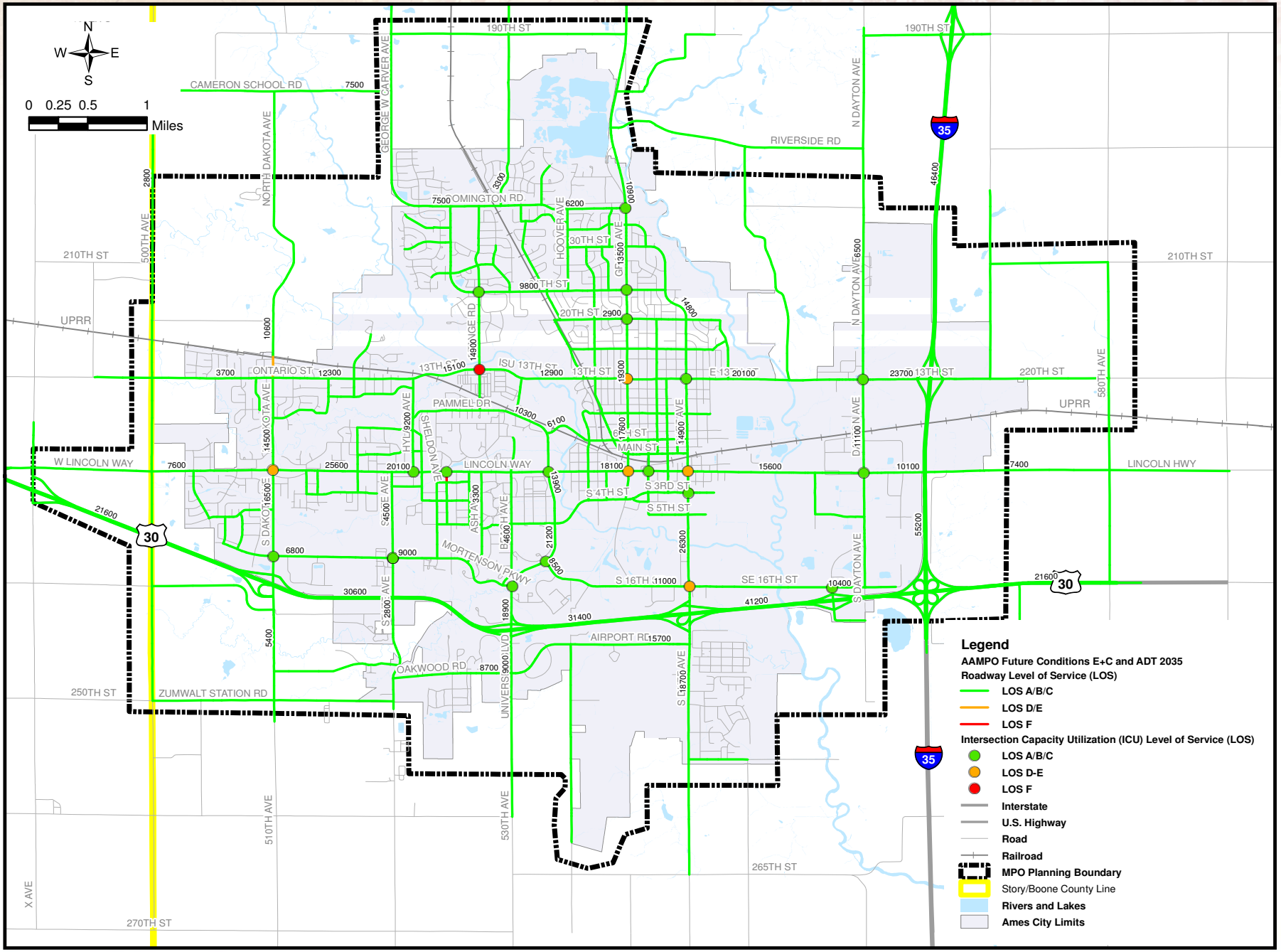
A segment of North Dakota Avenue north of 13th Street is projected to approach daily capacity by year 2035 with only the existing plus committed roadway projects in place.

The Roadway LOS, ICU LOS, and ADT's for the 2035 E+C conditions analysis are shown in **Figure 5.9**.

Table 5.7. 2035 Existing + Committed Intersection Capacity Utilization Analysis Results

Intersection	Peak Hour LOS		
	A/B/C	D/E	F/G/H
Bloomington Rd / Grand Ave	♦		
24th St / Stange Rd	♦		
24th St / Grand Ave	♦		
20th St / Grand Ave	♦		
13th St / Stange Rd			♦
13th St / Grand Ave		♦	
13th St / Duff Ave	♦		
13th St / Dayton Ave	♦		
Lincoln Way / Dakota Ave		♦	
Lincoln Way / Hyland Ave	♦		
Lincoln Way / Welch Ave	♦		
Lincoln Way / University Blvd	♦		
Lincoln Way / Grand Ave		♦	
Lincoln Way / Clarke Ave / Walnut Ave	♦		
Lincoln Way / Duff Ave		♦	
Lincoln Way / Dayton Ave	♦		
S 3rd St / S Duff Ave	♦		
Mortensen Rd / S Dakota Ave	♦		
Mortensen Rd / State Ave	♦		
Mortensen Pkwy / University Blvd	♦		
S 16th St / University Blvd	♦		
S 16th St / S Duff Ave		♦	
SE 16th St / S Dayton Ave	♦		

Figure 5.9. 2035 Existing + Committed Average Daily Traffic Volumes, Intersection LOS and Roadway Segment LOS



BICYCLE/PEDESTRIAN SYSTEM

Bicycle Facilities

The community survey discussed in **3.1** revealed some interesting public opinions regarding bicycle facilities. According to the survey, 43 percent of respondents were dissatisfied (including 13 percent who were very dissatisfied) with the availability of on-street bicycle lanes. It is interesting to note that this represented the second lowest satisfaction rate among the 18 transportation issues respondents were asked about behind only the condition of roadways. Only 23 percent of respondents were either satisfied or very satisfied with the availability of on-street bicycle lanes, which represented a decrease from 46 percent from the last such survey in 2004. When asked which three transportation issues are the most important to address over the next ten years (out of 18 possible transportation issue choices), 20 percent of respondents listed the availability of on-street bicycle lanes in their top three, which ranked this as the fifth most important issue. Further, 55 percent of respondents were supportive or very supportive of dedicated bicycle lanes, while only 22 percent were not supportive. While the City has a fairly good and well connected network of sidepaths, these survey results clearly point to the desire from the public to incorporate more on-road facilities for bicyclists.

Different types of bicycle facilities cater to the characteristics of different types of cyclists, and one type of facility will not meet the demands of the entire population of cyclists. Sidepaths are most appropriate for cyclists riding at slow speeds (10-12 mph), or young children. However, many recreational or commuter cyclists desire to travel significantly faster at speeds that are not appropriate for sidepaths. Many sidepaths in Ames cross numerous driveways and/or cross streets, each representing a potential vehicle conflict point for cyclists. Cyclists riding on a sidepath against the flow of traffic in the adjacent lane(s) are even more susceptible to vehicle conflicts at driveways and cross streets because drivers do not typically expect conflicts coming from their right on a sidewalk or sidepath. Further, sidepaths can be hazardous for cyclists because they are shared with pedestrians who are typically moving much slower than the cyclist and who may make unpredictable movements that a cyclist does not have adequate time to react to. The faster a cyclist travels on a sidepath that crosses driveways/cross streets and/or has pedestrian traffic, the more likely conflicts becomes. Other potential conflicts include motorists on side streets or driveways who may block the sidepath, and bicyclists that may travel on the road against traffic to access a pathway provided only on one side of the street, or similarly travel against traffic once a pathway ends.

While sidepaths can be used successfully and safely by bicyclists who are aware of their potential hazards, it is important that Ames broaden its bicycle facilities focus. Rather than continuing to only build and connect its network of shared use paths and sidepaths, a range of bicycle facilities should be implemented that will support bicycle travel options for all types and ability-levels of cyclists. This would include additional on-road bicycle facilities such as bicycle lanes, paved shoulders, and shared/signed routes (which can be designated by shared lane markings, or "sharrows"). It is important to note that even if a roadway has an existing sidepath, the implementation of an on-road facility should not be precluded; both on-road and off-road facilities are provided on the same roadway in many communities across the country.

The *AASHTO Guide for the Planning, Design, and Operation of Bicycle Facilities (Draft, February 2010)* provides justification by stating that "*provision of a pathway adjacent to the road is generally not a substitute for the provision of on-road accommodation such as paved shoulders or bike lanes, but may be considered in some locations in addition to on-road bicycle facilities, or as an interim accommodation until roadway conditions can be improved.*"

Pedestrian Facilities

There were few public comments on specific pedestrian-related issues, although most were regarding intersections (unsafe crossings and vehicle conflicts); examples included Grand Avenue at 13th and 24th Streets; Lincoln Way intersections in the ISU/Campustown area and South Dakota Avenue; Duff Avenue at South 5th Street; 13th Street at Stange Road and Hyland Avenue; and University Boulevard at 6th Street, Mortensen Parkway, and the US 30 ramp intersections.

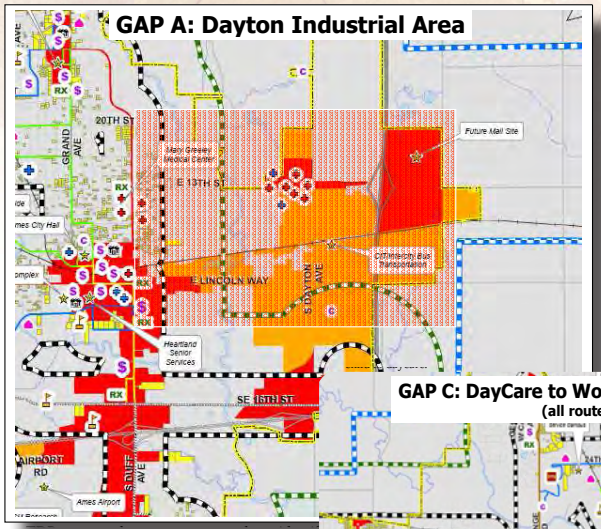
Based on the inventory completed for the PLOS evaluation, a total of approximately 57 miles of additional sidewalk would be needed to complete the sidewalk network for all the roadway segments evaluated (this length accounts for sidewalks missing on each side of the street); approximately 35 miles of sidewalks are needed on those roadway segments that do not currently meet or exceed the PLOS standard of "C". These segments are illustrated on **Figure 5.6**. However, it should be noted that sidewalks may not be warranted on all facilities (or on both sides of all facilities) if the facility is in a more rural setting or pedestrian demand is projected to be very low.

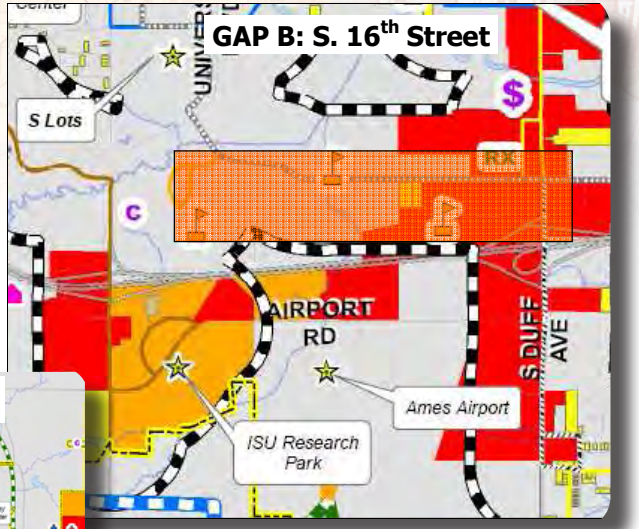
TRANSIT SYSTEM

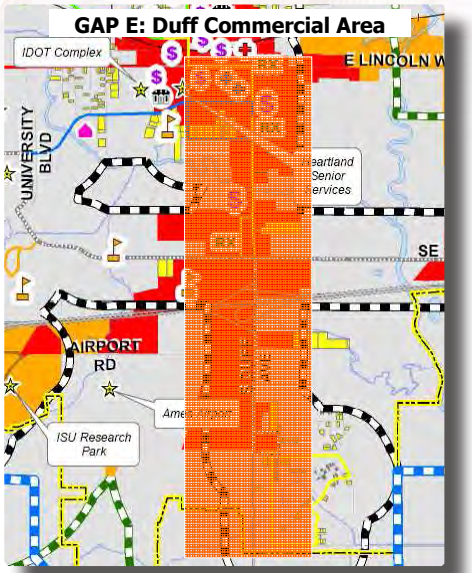
The PTDP reveals several areas of "service gaps" or areas needing service improvement. This section presents these "gaps" which represent service improvement opportunities. These seven gaps are summarized in **Table 5.8** and illustrated on the following page.

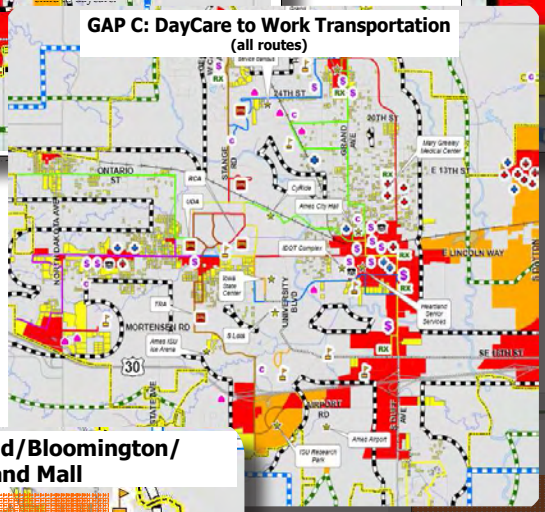
Table 5.8. Ames Area Service Gaps Analysis Results

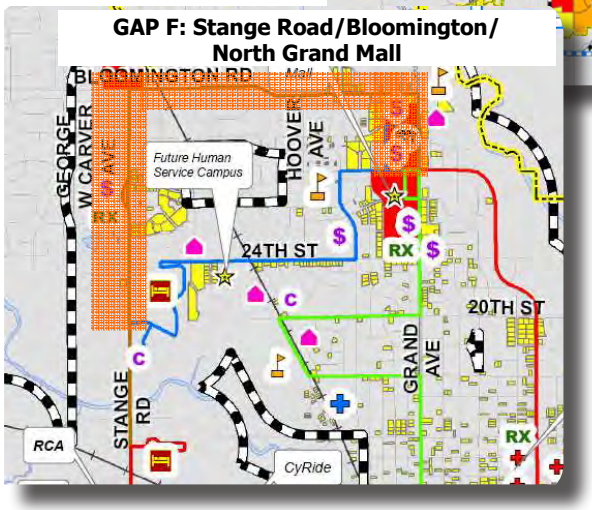
Gap Area/Name	Service Gap	Comments
Gap A: Dayton Industrial Area *Located in the northeast part of the City*	No service in an area with significant commercial and industrial development. A new mall is proposed for the area	This area has been a priority for the previous three years as part of the PTDP process. #10 Pink Route began August 20,2010, offering 6 trips/weekday.
Gap B: South 16th Street *Located on South 16th between South Duff Avenue and University Boulevard.*	The area is not conveniently reached by transit. There is currently hourly service during the midday. More frequent service during more times of the day is needed.	
Gap C: Day Care to Work Transportation *Applies to all routes, city-wide.*	The current service levels in the system do not make trips to day care as part of a work trip very practical. People who wish to take their child to day care find it difficult to "drop off" the child and then continue on their way to work on transit. The overall system frequencies of 20 to 40 minutes make such combined trips nearly 90 minutes to complete.	
Gap D: Outside Ames Transportation	Travel options from outlying areas into the city for medical and shopping trips are limited.	The highest priority service for the 2010 PTDP was service between Ames and medical services located in Iowa City and Des Moines. HIRTA provides service each Tuesday and Thursday via JARC New Freedom funding.
Gap E: Duff Commercial Area *South Duff Avenue from East Lincoln Way to the city's southern boundary.*	Currently service in this corridor is infrequent with large gaps in service hours.	South Duff Avenue is one of Ames' major commercial areas.
Gap F: Stange Road/Bloomington/ North Grand Mall	Continuation of services previously funded under Job Access Reverse Commute (JARC) funding.	JARC funded services relieved high capacity loads on buses.
Gap G: Earlier Sunday Morning Service *(Red, Green and Blue routes)*	Provide Sunday service before the current 9:00 am start time.	Implemented earlier trip on Green Route due to public request in 2009.

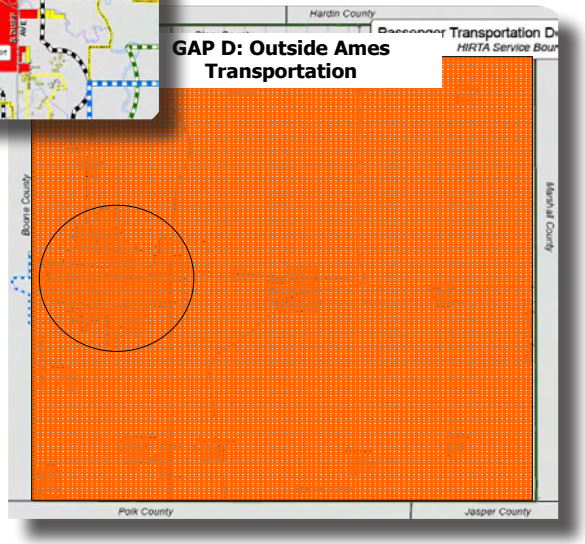


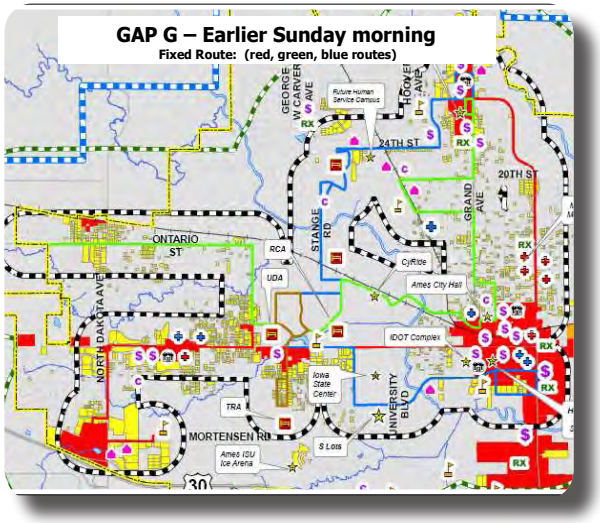












Source: Ames Area 2010 Passenger Transportation Development Plan, April 2009, pages 39 to 45.

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Chapter 6:
Alternatives Development and Evaluation

HDR

CHAPTER 6: ALTERNATIVES DEVELOPMENT AND EVALUATION

This Chapter summarizes the alternative development and evaluation process used in developing the LRTP update. The issues and needs identified through the needs assessment process discussed in Chapter 5 were used to develop potential alternatives. These potential alternatives were then screened using evaluation criteria based on the goals and objectives outlined in Chapter 2.

6.1 Alternatives Development

In order to address needs and deficiencies identified through the needs assessment process and through the Issues and Visioning process, various alternatives were developed through the 2 ½ day Alternatives Development Workshop which included a series of meetings with the Focus Group, the Public, and AAMPO staff. These alternatives included roadway, bicycle/pedestrian, transit, and other transportation solutions to address the needs and deficiencies of the transportation system.

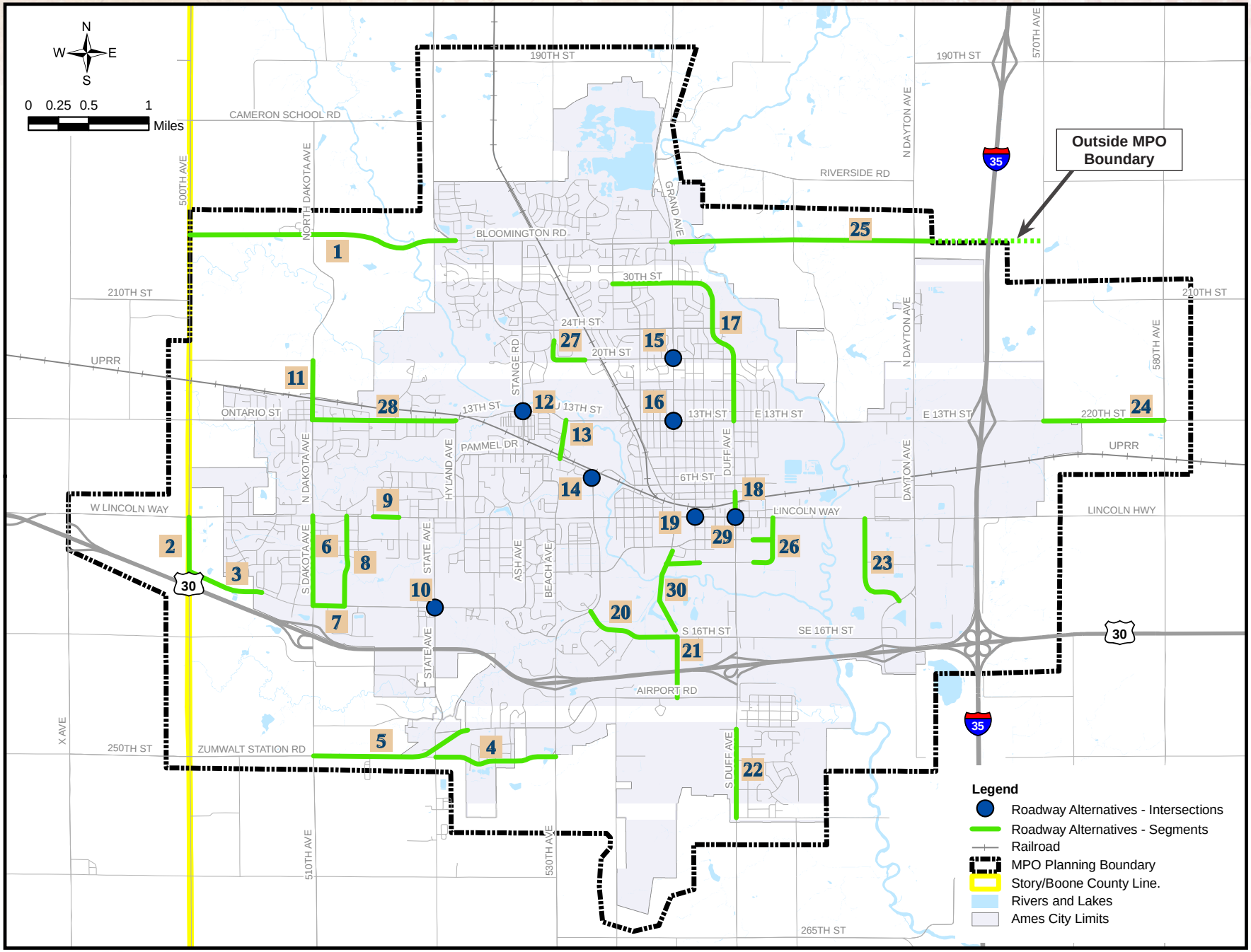
ROADWAY SYSTEM

Given the roadway system deficiencies and issues discovered during the needs assessment and through the Issues and Visioning process, several roadway alternatives were developed and advanced to the next phase of the transportation planning process. Various types of roadway projects were developed, including intersection improvements, widenings, lane reductions, grade separations, realignments, and new roadways. A concept drawing of each specific improvements was developed and is included in Appendix A. These potential roadway projects are shown in **Figure 6.1** and **Table 6.1**.

Table 6.1. List of Roadway Projects Assessed in Alternatives Development

Alternative Project Number	Project Description
1	Bloomington Road Extension - 500th Ave. to George W. Carver Ave.
2	500th Avenue Reconstruction - W. Lincoln Way to Mortensen Road
3	Mortensen Road Extension - 500th Ave. to Miller Ave.
4	Cottonwood Extension - State Ave. to University Blvd.
5	Zumwalt Station Road / Oakwood Road Realignment- 510th Ave. to Worle Ln.
6	S. Dakota Ave. Widening - Lincoln Way to Mortensen Road
7	Mortensen Rd. Widening - S. Dakota Ave. to Dotson Dr.
8	Dotson Dr. / Beedle Dr. Connection - Lincoln Way to Mortensen Road
9	Lincoln Way Widening - Marshall Ave. to Franklin Ave.
10	State Ave. / Mortensen Rd. Roundabout
11	N. Dakota Widening - Ontario Street to 215th Street
12a	Stange Rd. / 13th Street Intersection Improvements - Roundabout
12b	Stange Rd. / 13th Street Intersection Improvements - North/South Left-Turn Lanes
13	Haber Rd. Realignment and Widening - Pammel Dr. to 13th Street
14	University Blvd. / 6th Street Roundabout
15	Grand Ave. / 20th Street Intersection Improvements
16a	Grand Ave. / 13th Street Intersection Improvements- Roundabout
16b	Grand Ave. / 13th Street Intersection Improvements- Add Left-Turn Lanes (All Directions)
17	30th Street / Duff Ave. Lane Reductions - Hoover Ave. to 13th Street
18	Duff Ave. Underpass at Union Pacific Railroad
19	Lincoln Way Left-Turn Lanes at Clark Ave.
20	S. 16th Street Widening - University Blvd. to Grand Ave. Extension
21	Grand Ave. Extension - S. 16th to Airport Rd.
22	S. Duff Ave. Widening - Kitty Hawk Dr. to Ken Maril Rd.
23	Freel Dr. Reconstruction / Extension to Dayton Ave.
24	13th Street Widening - 570th Ave. to 580th Ave.
25	Bloomington Rd. Extension - Grand Ave. to 570th Ave.
26	Cherry Ave. Extension - Lincoln Way to SE 5th Street
27	20th St. Extension - Prairie View West to Ridgewood Ave.
28	Ontario St. Left-Turn Lane - Hyland Ave. to N. Dakota Ave.
29	Lincoln Way / Duff Avenue Intersection Improvements
30	Grand Ave. Extension - Squaw Creek Dr. to S. 16th / 5th Street Extension- Grand Ave. to Duff Ave.

Figure 6.1. Roadway Projects Assessed in Alternatives Development



BICYCLE/PEDESTRIAN SYSTEM

Given the bicycle/pedestrian system deficiencies and issues discovered in during the needs assessment and through the Issues and Visioning process, several bicycle/pedestrian alternatives were developed and advanced to the next phase of the transportation planning process. The various types of bicycle/pedestrian projects included shared-use paths, shared lane markings (sharrows), bicycle lanes, paved shoulders and intersection improvements. Detailed descriptions and guidance on each of these in contained in Appendix B and the following is a brief summary of each type.

Shared Use Path

Shared use paths are bikeways that are physically separated from motorized vehicle traffic by an open space or barrier and are either within the roadway right-of-way or within an exclusive right-of-way. Shared use paths may also be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users.

Shared Lane Markings (Sharrow)

Shared Lane Markings, also known as "Sharrows", are markings that are used in lanes that are shared by bicycles and motor vehicles when a travel lane is too narrow to provide a standard-width bicycle lane.

Bicycle Lanes

Bicycle lanes are the portion of a roadway which has been designated by striping, singing, and pavement markings for the preferential or exclusive use of bicyclists. They are most appropriate and most useful on arterial and collector streets.

Paved Shoulders

Paved shoulders represent the portion of the roadway contiguous with the traveled way, for accommodation of stopped vehicles, emergency use and lateral support of sub-base, base and surface courses, often used by cyclists. They are typically used on rural roadways and highways, and are beneficial for cyclists on roadways that have higher speeds or traffic volumes.

Intersection Improvements

Intersection improvements can be established through a combination of appropriately narrow lanes, appropriate curb radii, curb extensions, as well as other treatments to reduce conflicts between vehicular and pedestrian/bicycle traffic.

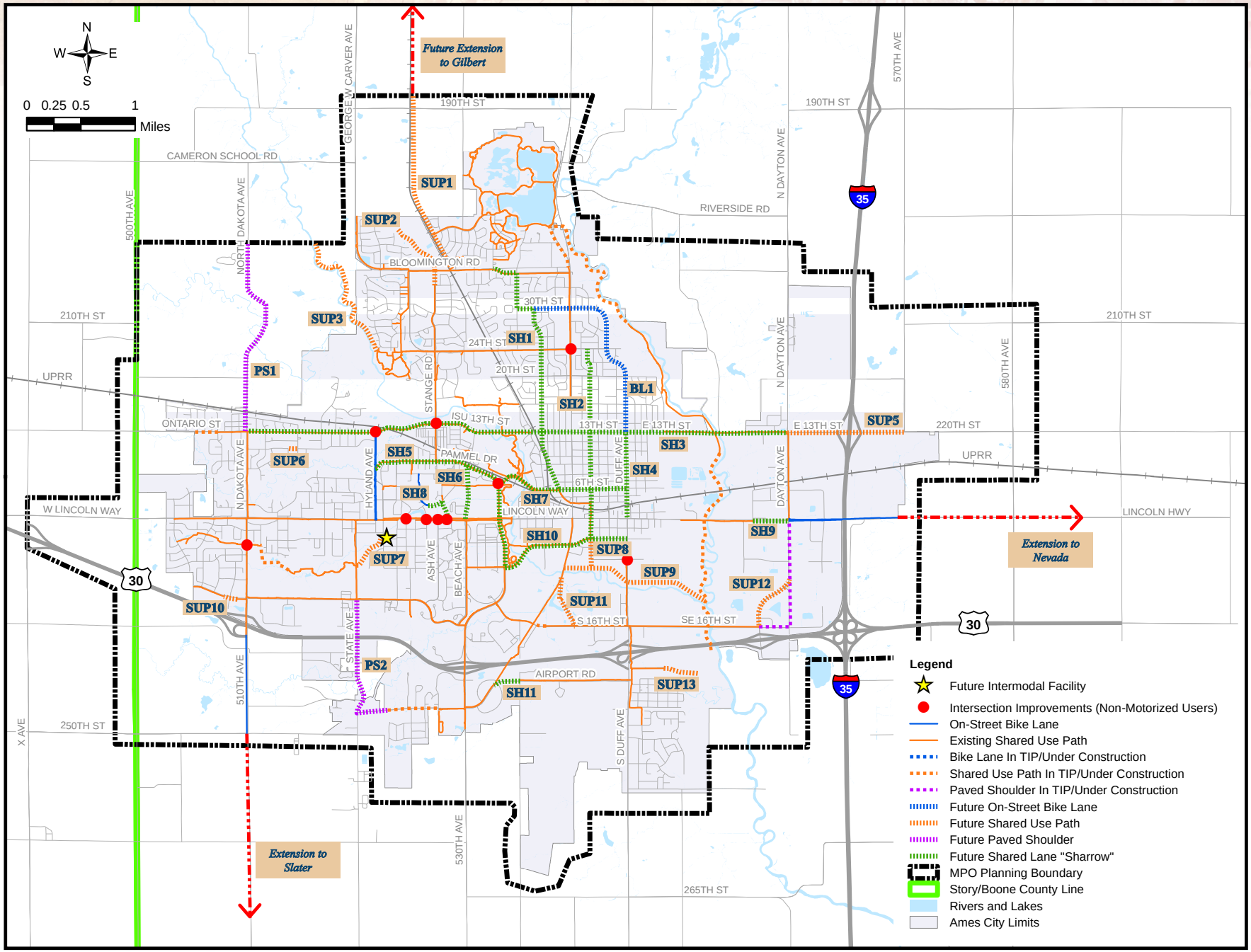
The potential bicycle/pedestrian alternative projects are shown in **Table 6.2** and **Figure 6.2**.

Table 6.2. List of Bicycle/Pedestrian Projects Assessed in Alternative Development

Alternative Project Number	Project Description
BL1	On-Street Bike Lane On Duff Ave - 30th St / Northwestern Ave to 13th St / Duff Ave
SUP1	Shared Use Path Along Union Pacific Railroad - North of Bloomington Road
SUP2	Shared Use Path Along Stange Rd - Dalton St to North of Bloomington Road
SUP3	Shared Use Path Along Squaw Creek - North of Moore Memorial Park
SUP5	Shared Use Path Along E 13th St - Dayton Ave to 570th Ave
SUP6	Shared Use Path at Ross Rd - Mesa Verde Pl to Garfield Ave
SUP7	Shared Use Path to Proposed Intermodal Facility - East of State Ave
SUP8	Shared Use Path Along Walnut St - S 3rd St to Squaw Creek
SUP9	Shared Use Path Along Squaw Creek - Proposed Grand Ave Extension to Skunk River
SUP10	Shared Use Path Along Mortensen Rd - West of South Dakota
SUP11	Shared Use Path Along S 16th Ave and Proposed Grand Ave Extension - East of Apple Ave
SUP12	Shared Use Path Along S Dayton Ave - SE 16th Ave to S Dayton Pl
SUP13	Shared Use Path to Recreational Park - East of Duff Ave

Alternative Project Number	Project Description
PS1	Paved Shoulder on N Dakota Ave - North of Ontario St
PS2	Paved Shoulder on State Ave and Oakwood Rd - South of Mortensen Rd
SH1	Sharrow on Hoover Ave and Northwestern Ave - Bloomington Rd to 6th St
SH2	Sharrow on Clark Ave - 24th St to S 3rd St
SH3	Sharrow on 13th St - N Dakota Ave to Dayton Ave
SH4	Sharrow on Duff Ave - 13th St to Lincoln Way
SH5	Sharrow on Pammel Dr / University Blvd - Hyland Ave to S 4th St
SH6	Sharrow on Beach Rd / Osborn Dr - University Blvd to Lincoln Way
SH7	Sharrow on 6th St - University Blvd to Duff Ave
SH8	Sharrow on Union Drive - Morrill Dr to Lincoln Way
SH9	Sharrow on Lincoln Way - Freel Dr to Dayton Ave
SH10	Sharrow on S 4th St / S 3rd St - University Blvd to Duff Ave
SH11	Sharrow on Airport Rd - N Loop Dr to S Riverside Dr
II	Intersection Improvements for Non-Motorized Users

Figure 6.2. Bicycle/Pedestrian Projects Assessed in Alternatives Development



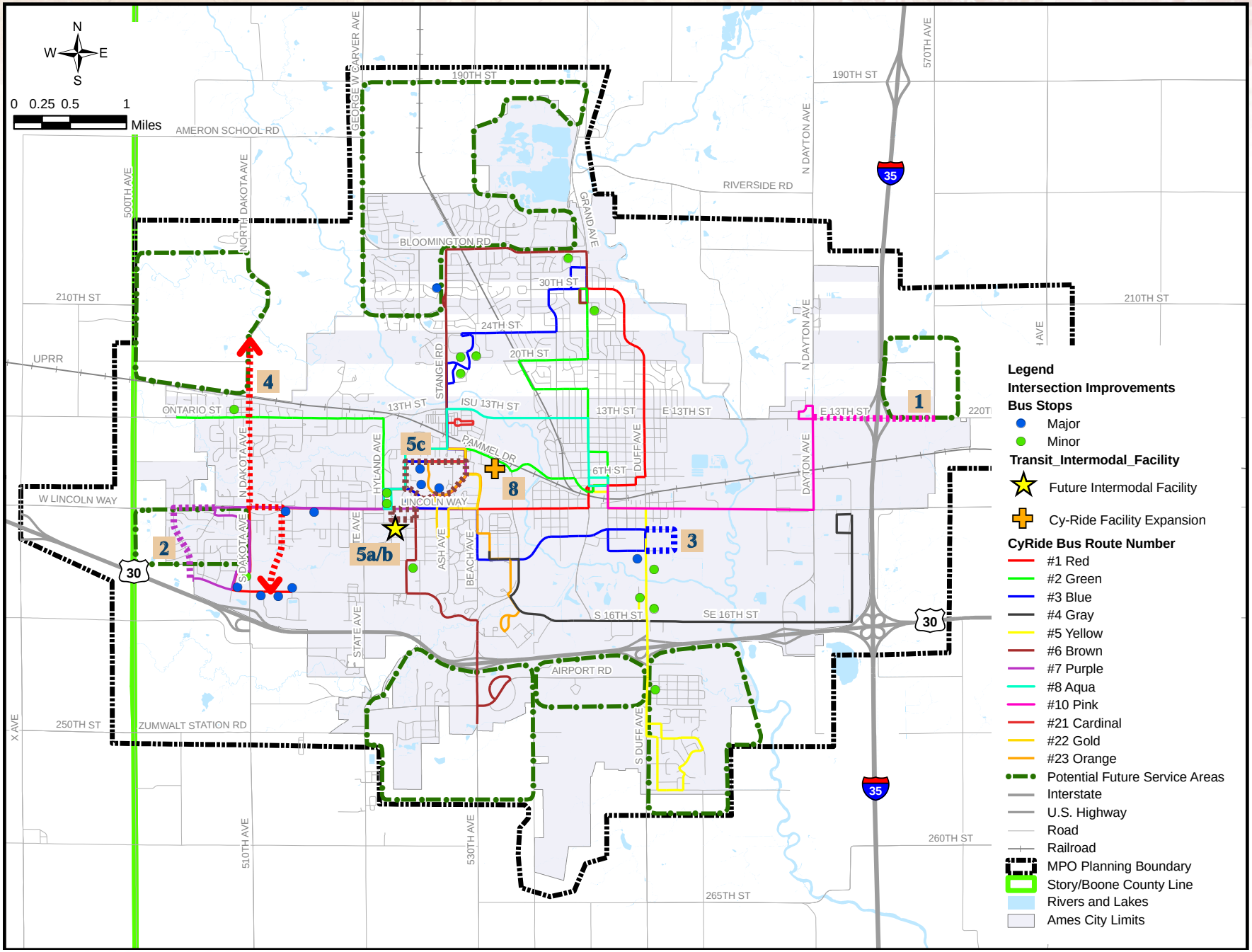
TRANSIT SYSTEM

Given the transit system deficiencies and issues discovered in during the needs assessment and through the Issues and Visioning process, several transit alternatives were developed and advanced to the next phase of the transportation planning process. The various types of transit projects included route extensions, new routes, intermodal facilities, amenity improvements, facility expansion, buses, improved frequency, studies and new technologies. These transit projects are shown in **Figure 6.3** and **Table 6.3**.

Table 6.3. List of Transit Projects Assessed in Alternative Development

Alternative Project Number	Project Description
1	Extend Pink Route to Proposed 13th Street Commercial Development
2	Extend Purple Route to Wilder Blvd.
3	Extend Blue Route to Wal-Mart and Target
4	Cross Town Route- Fieldstone Development to Mortensen Road
5a	Intermodal Facility Phase I
5b	Intermodal Facility Phase II
5c	Intermodal Facility Circulator
6	Bus Stop Improvements
7	Increase Frequencies on Core Routes to 15/30 Minutes from 20/40 Minutes
8	Cy-Ride Facility Expansion
9	Alternatives Analysis Study - Orange Route Corridor
10	Des Moines/Ames Commuter Service Study
11	Articulated Buses on Red/Orange Routes
12	Automatic Vehicle Location Technology

Figure 6.3. Transit Projects Assessed in Alternatives Development



OTHER TRANSPORTATION STRATEGIES

There are other transportation strategies that can be incorporated besides the roadway, bicycle/pedestrian and transit projects that have been presented. Some of these strategies include travel demand management and intelligent transportation system measures.

Travel Demand Management (TDM)

After conducting a review of TDM strategies used in other communities, some potential TDM strategies were identified. TDM strategies are designed to reduce the demand for transportation and thus reduce the number of vehicles using the system. TDM strategies accomplish their goals by effectively changing people's travel behavior and focus on reducing the number of single occupant vehicle (SOV) work-trips during peak periods. TDM can be geared towards the general population (transit), those living in the same neighborhood (carpool/vanpool) and to individuals (telecommuting, flex-time).

Tried and true methods to reduce traffic, improve mobility and air quality have the best results when public/private partnerships and cooperation can be established, and when land use changes can be made.

There are several reasons that the Ames area may benefit from TDM initiatives:

- **Solving Transportation Problems.** Improved transportation options can help reduce traffic congestion, facility costs, road risk, environmental impacts and consumer costs.
- **Efficiency.** Consumer choice is necessary for economic efficiency. Improved transportation options allow consumers to choose the most efficient option for each trip.
- **Equity.** Inadequate transport options often limit the personal and economic opportunities available to people who are physically, economically or socially disadvantaged. Increasing transportation options can help achieve equity objectives.
- **Livability.** Many people value living in or visiting a community where walking and cycling are safe, pleasant and common. There are also public health benefits from increased walking and cycling. As a result, transportation options can help communities become more "livable," resulting in increased property values and commercial activity.
- **Security and Resilience.** Improved transportation options results in a more diverse and flexible transportation system that can accommodate variable and unpredictable conditions. Even people who do not currently use a particular form of transport may value the availability of other forms as insurance to accommodate future needs.

Strategy 1: Aggressive Land Use/ Urban Design

Land use decisions and policies are critical in creating an environment to support mobility. Improved urban design could be integrated into vital areas of Ames. Incorporating urban design elements into key corridors with transit, and creating dense areas with a pedestrian orientation will be necessary to foster comfortable, walkable areas in an urban format. For example, the provision of shading through awnings or canopies over public sidewalk areas to promote pedestrian traffic and provide protection from the weather so that walking is encouraged.

Land use patterns and urban design will have significant effects on how much demand is put on the transportation network. Where people live, work, shop, and recreate generate the need for transportation. The term Smart Growth has been given to the practice of setting up policies that integrate transportation and land use decisions, for example by encouraging more compact, mixed-use development within existing urban areas, and discouraging dispersed, automobile dependent development at the urban fringe. Smart Growth can help improve transport options, create more livable communities, reduce public service costs and achieve other land use objectives. Smart Growth is usually implemented as a set of policies and programs by state/provincial, regional or local governments. It can be incorporated into land use development, often in exchange for reduced development fees and parking requirements. **Table 6.4** includes descriptions of various land use factors that can affect travel behavior.

Table 6.4. Land Use Impacts on Travel

Factor	Definition	Travel Impacts
Density	People or jobs per unit of land area (acre or hectare).	Increased density tends to reduce per capita vehicle travel. Each 10% increase in urban densities typically reduces per capita vehicle miles traveled (VMT) by 1-3%.
Mix	Degree that related land uses (housing, commercial, institutional) are located close together.	Increased land use mix tends to reduce per capita vehicle travel, and increase use of alternative modes, particularly walking for errands. Neighborhoods with good land use mix typically have 5-15% lower vehicle-miles.
Regional Accessibility	Location of development relative to regional urban centers.	Improved accessibility reduces per capita vehicle mileage. Residents of more central neighborhoods typically drive 10-30% fewer vehicle-miles than urban fringe residents.
Centeredness	Portion of commercial, employment, and other activities in major activity centers.	Centeredness increases use of alternative commute modes. Typically 30-60% of commuters to major commercial centers use alternative modes, compared with 5-15% of commuters at dispersed locations.
Network Connectivity	Degree that walkways and roads are connected to allow direct travel between destinations.	Improved roadway connectivity can reduce vehicle mileage, and improved walkway connectivity tends to increase walking and cycling.
Roadway design and management	Scale, design and management of streets.	More multi-modal streets increase use of alternative modes. Traffic calming reduces vehicle travel and increases walking and cycling.
Walking and Cycling conditions	Quantity, quality and security of sidewalks, crosswalks, paths, and bike lanes.	Improved walking and cycling conditions tends to increase nonmotorized travel and reduce automobile travel. Residents of more walkable communities typically walk 2-4 times as much and drive 5-15% less than if they lived in more automobile-dependent communities.
Transit quality and accessibility	Quality of transit service and degree to which destinations are transit accessible.	Improved service increases transit ridership and reduces automobile trips. Residents of transit oriented neighborhoods tend to own 10-30% fewer vehicles, drive 10-30% fewer miles, and use alternative modes 2-10 times more frequently than residents of automobile-oriented communities.
Parking supply and management	Number of parking spaces per building unit or acre, and how parking is managed.	Reduced parking supply, increased parking pricing and implementation of other parking management strategies can significantly reduce vehicle ownership and mileage. Cost-recovery pricing (charging users directly for parking facilities) typically reduces automobile trips by 10-30%.
Site design	The layout and design of buildings and parking facilities.	More multi-modal site design can reduce automobile trips, particularly if implemented with improved transit services.
Mobility Management	Policies and programs that encourage more efficient travel patterns.	Mobility management can significantly reduce vehicle travel for affected trips. Vehicle travel reductions of 10-30% are common.

Source: Victoria Transport Policy Institute. Land Use Impacts on Transport: How Land Use Factors Affect Travel Behavior. November 5, 2008. Todd Litman with Rowan Steele.

Strategy 2: Create Trip Reduction Ordinance

Establishing a city-wide Trip Reduction Ordinance (TRO) that would influence the way that new development would occur is cost effective and creates standard land use and design elements that support successful employee trip reduction programs and mobility-friendly communities. TROs also support Greenhouse Gas reduction programs and create Green jobs.

A TRO may include:

- an employee trip reduction goal
- required elements such as bicycle storage
- pedestrian amenities such as walkways to transit stops
- employee transportation coordinator(s)
- building placement to maximize walking (street facing buildings with parking in rear, residential connectivity to schools and commercial uses), transit and bicycling opportunities
- Support of carpooling and vanpooling should be required such as providing on-site parking spaces -located in preferred locations (next to entrances, in the shade, etc.) and for the exclusive use for carpoolers or vanpoolers

The TRO can be written with flexibility so that the developer may choose which elements to include as long as the goal is reached, or written with specific requirements that must be adhered to, or a combination of both. The developer and/or employer would be required to provide a report demonstrating and detailing project specifics and exactly how the goals would be achieved. Successful TROs typically are incentive based; however, should include consequences for non-compliance such as fines or delayed permitting.

Obstacles include political or developer resistance. However, economical benefits can be shown in order to gain support and developers can be given preferential treatment or expedited permitting if certain elements of the TRO are met or exceeded.

Strategy 3: Create Transportation Management Association (TMA)

A Transportation Management Association (TMA) is a public/private partnership formed so that employers, developers, building owners, and government entities can work collectively to establish policies, programs and services to address local transportation problems. TMA programs traditionally include those that are cost effective and that provide the maximum benefit to the member, including:

- Guaranteed Ride Home Program
- Personalized Carpool Matching
- Vanpool Creation
- Transit Pass Subsidy Program
- Employee Commute Programs
- Seasonal Promotional Programs such as Bike to Work week, or Try Transit week
- Car share program
- City-wide bicycle sharing program

Because of the federal funding available to create green jobs and support climate change efforts, the TMA should aggressively work to identify opportunities and obtain grant funding.

The TMA may encourage other TDM measures such as:

- Flextime
- Compressed Workweek
- Staggered Shifts

The I-235 corridor in the Des Moines area has a TDM initiative underway in a program called TDM-10. The program was assumed to be progressive, with a two percent reduction in peak hour volumes achieved by 2010 and a ten percent reduction in peak hour volumes achieved by 2030. The TDM-10 plan reflects the goals of the travel

demand management efforts supported by the Des Moines Area Metropolitan Planning Organization (MPO) and led by The Greater Des Moines Partnership. Part of this program includes the assessment of all transportation decisions made for the downtown area to ensure that they are consistent and supportive of this 10 percent peak hour volume reduction goal. The MPO financially sponsors the TMA, which performs public service in providing information to the public on bus service and ridesharing.

Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) encompass a variety of transportation system improvements designed to use technology and the application of traffic management and operations methods to improve the efficiency of a transportation network. Some of the objectives of ITS can include, but are not limited to:

- Minimizing response time for incidents and accidents
- Reducing commercial vehicle safety violations
- Utilizing road-weather information systems to reduce weather-related incidents
- Improving emergency management communications by providing real-time traveler information
- Implementing technological solutions to improve transportation management
- Improving highway and transit security
- Minimizing highway-rail grade crossing accidents
- Improving travel demand management

ITS have been shown to be a very effective tool. An integrated transportation system managed and operated more efficiently through the use of ITS technology can enhance quality of life by supporting a safer, more efficient and sustainable transportation system. ITS improvements may also lower the amount of congestion experienced by users and preserve the existing capacity of the transportation system. The regional ITS system for the Ames area is patterned on, and compatible with, the National ITS architecture. On April 8, 2001, the Federal Highway Administration issued Federal Rule 940 entitled "Intelligent Transportation Systems (ITS) Architecture and Standards" and concurrently the Federal Transit Administration issued a policy entitled "National ITS Architecture Policy on Transit Projects". The intent of this Rule and Policy is to require procedures for implementing Section 5307(c) of Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) requiring ITS projects to conform to the National ITS Architecture and standards, as well as US Department of Transportation adopted ITS standards.

Regional ITS Architecture

The AAMPO Regional ITS Architecture (January 2007) has been developed through cooperative efforts by the Region's transportation agencies, covering all modes. The Regional ITS Architecture represents a shared vision of how all the agency systems will work together in the future, sharing information and resources to provide a safer, more efficient and more effective transportation system for travelers in the Ames area.

Existing and Potential Intelligent Transportation Systems

The Ames area currently uses several ITS strategies. These strategies include the following:

- Portable Dynamic Message Signs
- Loop Detector Stations
- CCTV Cameras
- Automated Railroad Crossing Horn Warning System
- Traffic Signal Systems
- Traffic and Maintenance Database

There are additional ITS strategies the Ames area could deploy to improve the efficiency of a transportation network. Some of these include:

- Road Weather Information System
- Roadway Anti-Icing System
- Advanced Traffic Signal Control System

Advanced traffic signal control systems can improve the efficiency of a corridor without making physical changes to the roadway network. One type of advanced traffic control systems is adaptive traffic control. Adaptive traffic control is an innovative traffic management tool that automatically updates signal timings at both a local and corridor optimization level. What this means is traffic signal coordination and timing is automatically updated in a real-time manner to better serve traffic without updating timing plans. Different systems operate with different methodologies but overall the intersections constantly update the split, cycle lengths, and offsets to better utilize the cycle lengths by analyzing the volumes present in the intersection and arterial. This means that signal timing is optimized to serve the traffic present as it varies throughout the day.

Many studies have been completed regarding operational benefits of these systems. Research conducted at HDR has shown an average decrease of stops ranging from 10% to 80% on arterials averaging eight intersections. This means that on an eight intersection corridor a driver averaging 4 stops could experience a decrease of one to three stops. When looking at arterial travel time a user could experience a travel time reduction from 10% to 50%. Again, this means that if a driver averages a 5 minute commute through a corridor a user could experience a decrease of travel time from 30 seconds to two and a half minutes with an adaptive system. Recent evidence also shows that installing advanced traffic management will improve both the number of crashes and severity. Results can vary depending on the system selected, quality of existing timing plans, and traffic patterns.

Adaptive technology is a good tool to decrease congestion while improving the speed, travel time, and number of stops along an arterial. This technology is widespread throughout the world and has been growing in the United States as a viable technology in the last 10 years. Due to the real-time nature of adaptive technology an adaptive system is more beneficial where variable traffic demands exist. Typically time of day timing plans do not complement this type of traffic. In Ames an adaptive system would be a great candidate to improve special event traffic from the University and other city events on key arterials. Currently, there are many applicable technologies that could be utilized in Ames to improve traffic operations and safety.

The TDM and ITS strategies discussed in this section are potential solutions to help address the needs and deficiencies of the transportation system.

6.2 Alternative Analysis and Evaluation

Each of the Roadway, Bicycle/Pedestrian and Transit alternatives advanced through Alternative Development process was analyzed and evaluated. The evaluation criteria were developed to relate to the goals and objectives which were established during the Issue and Visioning process. For each criterion, the alternatives were rated either very good, good, average or poor. The results of this evaluation are shown in Appendix A.

ROADWAY SYSTEM

Each of the roadway alternatives was analyzed using the evaluation criteria. This evaluation of the alternatives is only one factor in determining whether a roadway project should be included in the LRTP. There are other factors that also need to be considered like timing, consistency and other overriding factors. These roadway evaluation criteria are shown in **Table 6.5**.

Table 6.5. Roadway Evaluation Criteria

Goal 1 Develop a Safe and Connected Multi-Modal Network	
a	Connectivity/ Continuity
b	Potential Safety/ Security
Goal 2 Foster Livability, Quality of Life, and Sustainable Development	
a	Land Use Consistency
b	Vehicle Miles Traveled (VMT)
c	Vehicle Hours Traveled
Goal 3 Deliver Context Sensitive Solutions	
a	Context Sensitivity
Goal 4 Support Area Economic Opportunities	
a	Economic Impact
Goal 5 Maximize the Benefits of Transportation Investments to Provide Efficient Transportation Service	
a	Congestion Relief
b	Cost
c	Benefit to Cost Ratio
Goal 6 Protect Environmental Resources	
a	Potential Natural Environment Impact
b	Potential Property Impact/ Human Environment

A scorecard for each roadway alternative was developed based on these criteria. The roadway scorecards are located in Appendix A.

BICYCLE/PEDESTRIAN SYSTEM

Each of the bicycle/pedestrian alternatives was analyzed using the evaluation criteria. This evaluation of the alternatives is only one factor in determining whether a bicycle/pedestrian project should be included in the LRTP. There are other factors that also need to be considered like timing, consistency and other overriding factors. These bicycle/pedestrian evaluation criteria are shown in **Table 6.6**.

Table 6.6. Bicycle/Pedestrian Evaluation Criteria

Goal 1 Develop a Safe and Connected Multi-Modal Network	
a	Connectivity/ Continuity
b	Potential Safety/ Security
Goal 2 Foster Livability, Quality of Life, and Sustainable Development	
a	Land Use Consistency
Goal 3 Deliver Context Sensitive Solutions	
a	Context Sensitivity
Goal 4 Support Area Economic Opportunities	
a	Economic Impact
Goal 5 Maximize the Benefits of Transportation Investments to Provide Efficient Transportation Service	
a	Congestion Relief
Goal 6 Protect Environmental Resources	
a	Potential Natural Environment Impact
b	Potential Property Impact/ Human Environment

A scorecard for each bicycle/pedestrian alternative was developed based on these criteria. The bicycle/pedestrian scorecards are located in Appendix A.

TRANSIT SYSTEM

Each of the transit alternatives was analyzed using the evaluation criteria. This evaluation of the alternatives is only one factor in determining whether a transit project should be included in the LRTP. There are other factors that also need to be considered like timing, consistency and other overriding factors. These transit evaluation criteria are shown in **Table 6.7**.

Table 6.7. Transit Evaluation Criteria

Goal 1 Develop a Safe and Connected Multi-Modal Network	
a	Connectivity/ Continuity
b	Potential Safety/ Security
Goal 2 Foster Livability, Quality of Life, and Sustainable Development	
a	Land Use Consistency
Goal 3 Deliver Context Sensitive Solutions	
a	Context Sensitivity
Goal 4 Support Area Economic Opportunities	
a	Economic Impact
Goal 5 Maximize the Benefits of Transportation Investments to Provide Efficient Transportation Service	
a	Congestion Relief
b	Cost
Goal 6 Protect Environmental Resources	
a	Potential Natural Environment Impact
b	Potential Property Impact/ Human Environment

A scorecard for each transit alternative was developed based on these criteria. The transit scorecards are located in Appendix A.

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Ames Area MPO
metropolitan planning organization

Chapter 7:
Financial Forecast and Funding

HDR

CHAPTER 7: FINANCIAL FORECAST AND FUNDING

7.1 Overview

The development of the financial plan is a critical element in the 2035 LRTP Update. The financial plan includes the existing revenue sources and anticipated revenues to operate, maintain and enhance the Ames area transportation system for the next 25 years. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) indicates that Metropolitan Planning Organizations are responsible for preparing "a financial plan that demonstrates how the long range transportation can be implemented."

The Code of Federal Regulations 23 CFR 450.322(f) (10) describes the requirements for the financial plan. This requires identification of all financial resources that are reasonably expected to be made available to implement the plan. It also requires that the plan use an inflation rate to reflect the "year of expenditure dollars."

7.2 Existing Revenue Sources (Non-Transit)

The Ames area uses various funding sources for the development and maintenance of its transportation system. The sources include Federal Highway Administration (FHWA), Iowa Department of Transportation (Iowa DOT) and local funds.

CODE OF FEDERAL REGULATIONS 23 CFR 450.322(f) (10)

(10) A financial plan that demonstrates how the adopted transportation plan can be implemented.

(i) For purposes of transportation system operations and maintenance, the financial plan shall contain system-level estimates of costs and revenue sources that are reasonably expected to be available to adequately operate and maintain Federal-aid highways (as defined by 23 U.S.C. 101(a)(5)) and public transportation (as defined by title 49 U.S.C. Chapter 53).

(ii) For the purpose of developing the metropolitan transportation plan, the MPO, public transportation operator(s), and State shall cooperatively develop estimates of funds that will be available to support metropolitan transportation plan implementation, as required under § 450.314(a). All necessary financial resources from public and private sources that are reasonably expected to be made available to carry out the transportation plan shall be identified.

(iii) The financial plan shall include recommendations on any additional financing strategies to fund projects and programs included in the metropolitan transportation plan. In the case of new funding sources, strategies for ensuring their availability shall be identified.

(iv) In developing the financial plan, the MPO shall take into account all projects and strategies proposed for funding under title 23 U.S.C., title 49 U.S.C. Chapter 53 or with other Federal funds; State assistance; local sources; and private participation. Starting December 11, 2007, revenue and cost estimates that support the metropolitan transportation plan must use an inflation rate(s) to reflect "year of expenditure dollars," based on reasonable financial principles and information, developed cooperatively by the MPO, State(s), and public transportation operator(s).

(v) For the outer years of the metropolitan transportation plan (i.e., beyond the first 10 years), the financial plan may reflect aggregate cost ranges/cost bands, as long as the future funding source(s) is reasonably expected to be available to support the projected cost ranges/cost bands.

(vi) For nonattainment and maintenance areas, the financial plan shall address the specific financial strategies required to ensure the implementation of TCMs in the applicable SIP.

(vii) For illustrative purposes, the financial plan may (but is not required to) include additional projects that would be included in the adopted transportation plan if additional resources beyond those identified in the financial plan were to become available.

(viii) In cases that the FHWA and the FTA find a metropolitan transportation plan to be fiscally constrained and a revenue source is subsequently removed or substantially reduced (i.e., by legislative or administrative actions), the FHWA and the FTA will not
withdraw the original determination of fiscal constraint; however, in such cases, the FHWA and the FTA will not act on an updated or amended metropolitan transportation plan that does not reflect the changed revenue situation.

FEDERAL AND STATE FUNDING PROGRAMS

The Ames area receives revenue from several Federal and State funding programs. These programs are divided up into the following four categories:

- State-Apportioned Federal-Aid (Formula)
- State-Allocated Federal-Aid (Discretionary)
- DOT-Managed Federal-Aid (DOT Programmed)
- Direct-Federal Apportionments (Earmarks)

State-Apportioned Federal-Aid

The AAMPO currently receives State-Apportioned Federal-Aid through the Surface Transportation Program and the Transportation Enhancement Program which are programmed by the AAMPO. The following provides a summary of the formula based State-Apportioned Federal-Aid.

- Surface Transportation Program (STP): The STP is a flexible fund that may be used for projects on any Federal-aid highway, bridge projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities. Generally, the Federal share is 80 percent of the project cost; however, when the funds are used for certain types of interstate projects, the Federal share may be 90 percent of the project cost and certain safety improvements may have a Federal share of 100 percent of the project cost.
  - Revenue Projection – The initial year (2011) revenue projection was provided by the Iowa DOT. The revenues were then inflated 2% annually. This assumption was based on funding input from the Iowa DOT and FHWA.
- Transportation Enhancement Program (TE): The TE funds were established to strengthen the cultural, aesthetic, and environmental aspects of the transportation system. TE funds may be used for projects such as bicycle/pedestrian facilities, restoration of historically significant structures, roadway beautification and other enhancement projects/programs. Generally, the Federal share is 80 percent of the project costs.
  - Revenue Projection – The initial year revenue projection was provided by the Iowa DOT. The revenues were then inflated 2% annually. This assumption was based on funding input from Iowa DOT and FHWA.

State-Allocated Federal Aid

The Ames area has also historically received State-Allocated Federal-Aid (Discretionary) funding and is eligible for a variety of these funds. Based on historical data and reasonableness of receiving funding, the two potential State-Allocated revenue sources are the Traffic Safety Improvement Program and the Safe Routes to School Program. The following is a summary of the reasonable State-Allocated Federal-Aid.

- Traffic Safety Improvement Program (TSIP): TSIP provides funding for traffic safety improvements or studies on any public roads under county, city or state jurisdiction. Any state, county or city is eligible to request these funds. Eligible projects include: construction or improvement of traffic safety and operations at a specific site with an accident history; purchase of materials for installation of new traffic control devises; or transportation safety research, studies or public information initiatives.

- Revenue Projection – It is unlikely that the Ames area would receive funding every year; however, an annual projection was developed in order to determine a reasonable 25-year projection. Based on limited historical data of the AAMPO, the initial year (2011) annual revenue projection was determined proportionally from the overall Iowa DOT TSIP funding level based on the population of the Ames area. The revenues were not inflated since this is an application-based funding source.

- Safe Routes to School (SRTS): SRTS is a program to enable and encourage children to walk and bicycle to school by providing infrastructure and non-infrastructure improvements. This program is 100 percent federally funded.
  - Revenue Projection – It is unlikely that the Ames area would receive funding every year; however, an annual projection was developed in order to determine a reasonable 25-year projection. Based on limited historical data of the AAMPO, the initial year (2011) annual revenue projection was determined proportionally from the overall Iowa DOT SRTS funding level based on the population of the Ames area. The revenues were not inflated since this is an application-based funding source.

DOT-Managed Federal-Aid

The DOT-Managed Federal-Aid includes Interstate Maintenance Program (IM), National Highway System Maintenance Program (NHS), State-Managed STP and Highway Bridge Program (HBP). The Iowa DOT is the lead for the use of these funds within the AAMPO boundary. These projections and costs are not included in this funding analysis since the AAMPO and the local jurisdictions do not have control over these programs.

Direct-Federal Apportionments

The Ames area has historically received Direct-Federal Apportionments (Earmarks) for specific projects. These funds are typically for larger highway/bridge projects. The FHWA recommends anticipating an earmark funding level of 40% on projects that would be good earmark candidates. Projects that are considered good earmark candidates will be discussed further in the Chapter 8 – Proposed Final Long Range Transportation Plan.

Federal and State Funding Projections by Year

The estimated Federal and State funding projections by year are presented in **Table 7.1**. As presented in **Table 7.1**, the total estimated projected funding for the 25 years is approximately $48 million.

Table 7.1. Federal and State Funding Projections by Year

State/Federal Funding					
	Formula Based		Discretionary		
Year	Surface Transportation Program (STP)	Transportation Enhancements (TE)	Traffic Safety Improvement Program (TSIP)	Safe Routes to School Program (SRTS)	State/Federal Funding Subtotal
2011	$1,321,450	$91,053	$90,000	$25,000	$1,527,503
2012	$1,347,879	$92,874	$90,000	$25,000	$1,555,753
2013	$1,374,837	$94,732	$90,000	$25,000	$1,584,568
2014	$1,402,333	$96,626	$90,000	$25,000	$1,613,959
2015	$1,430,380	$98,559	$90,000	$25,000	$1,643,939
2016	$1,458,988	$100,530	$90,000	$25,000	$1,674,517
2017	$1,488,167	$102,540	$90,000	$25,000	$1,705,708
2018	$1,517,931	$104,591	$90,000	$25,000	$1,737,522
2019	$1,548,289	$106,683	$90,000	$25,000	$1,769,972
2020	$1,579,255	$108,817	$90,000	$25,000	$1,803,072
2021	$1,610,840	$110,993	$90,000	$25,000	$1,836,833
2022	$1,643,057	$113,213	$90,000	$25,000	$1,871,270
2023	$1,675,918	$115,477	$90,000	$25,000	$1,906,395
2024	$1,709,436	$117,787	$90,000	$25,000	$1,942,223
2025	$1,743,625	$120,142	$90,000	$25,000	$1,978,768
2026	$1,778,498	$122,545	$90,000	$25,000	$2,016,043
2027	$1,814,068	$124,996	$90,000	$25,000	$2,054,064
2028	$1,850,349	$127,496	$90,000	$25,000	$2,092,845
2029	$1,887,356	$130,046	$90,000	$25,000	$2,132,402
2030	$1,925,103	$132,647	$90,000	$25,000	$2,172,750
2031	$1,963,605	$135,300	$90,000	$25,000	$2,213,905
2032	$2,002,877	$138,006	$90,000	$25,000	$2,255,883
2033	$2,042,935	$140,766	$90,000	$25,000	$2,298,701
2034	$2,083,794	$143,581	$90,000	$25,000	$2,342,375
2035	$2,125,469	$146,453	$90,000	$25,000	$2,386,922
Total	$42,326,440	$2,916,455	$2,250,000	$625,000	$48,117,894

LOCAL FUNDING PROGRAMS

The Ames area receives revenue from several local funding sources. These sources include the categories:

- General Obligation Bonds
- Local Options Sales Tax
- Road Use Tax
- Other Miscellaneous Sources

General Obligation Bonds

The City of Ames has historically issued General Obligation Bonds on an annual basis. The General Obligation Bonds are used for financing projects where other financing methods cannot reasonably be used. Portions of the General Obligations Bonds have been used to enhance the transportation system.

- Revenue Projection – The initial year projection for the General Obligation Bonds to be used for the transportation system was developed through reviewing the City of Ames Capital Improvement Program between 1998 and 2010. For this analysis, the revenues were inflated 2% annually to determine 25-year revenue projections.

Local Options Sales Tax

The City of Ames has a Local Option Sales Tax which 60% is used for property tax relief and 40% is used for community betterment. Portions of the Local Options Sales Tax have been used to enhance the transportation system.

- Revenue Projection – The initial year projection for the Local Options Sales Tax to be used for the transportation system was developed through reviewing the City of Ames Local Options Sales Tax between 1998 and 2010. For this analysis, the revenues were inflated 2% annually to determine 25-year revenue projections.

Road Use Tax

The City of Ames receives Road Use Tax revenues annually. The Road Use Tax revenue is restricted for street related purposes including operations and maintenance activities and eligible capital improvement funding.

- Revenue Projection – The initial year projection for the Road Use Tax revenue to be used for the transportation system was developed through reviewing the City of Ames Road Use Tax revenues between 1998 and 2010. For this analysis, the revenues were inflated 2% annually to determine 25-year projections.

Other Miscellaneous Sources

The City of Ames has also received revenue for the transportation system from a variety of other sources including Developers, Property Owner Assessments, Private Contributions, Iowa State University, Story County and other sources.

- Revenue Projection – The initial year projection for the Other Miscellaneous Sources to be used for the transportation system was developed through reviewing the City of Ames Other Miscellaneous Source revenues between 1998 and 2010. During this 7 year period the revenues fluctuated. For this analysis, the revenues were inflated 2% annually the future years.

Local FundingPrograms Projections by Year

The estimated Local Funding Programs projections by year are presented in **Table 7.2**. As presented in **Table 7.2**, the total estimated projected funding for the 25-years is approximately $394 million.

Table 7.2. Local Funding Program Projections by Year

Local Funding Programs					
Year	General Obligation Bonds (GOB)	Local Options Sales Tax	Road Use Tax	Other	City Receipts Subtotal
2011	$6,250,000	$470,000	$4,692,000	$900,000	$12,312,000
2012	$6,375,000	$479,400	$4,785,840	$918,000	$12,558,240
2013	$6,502,500	$488,988	$4,881,557	$936,360	$12,809,405
2014	$6,632,550	$498,768	$4,979,188	$955,087	$13,065,593
2015	$6,765,201	$508,743	$5,078,772	$974,189	$13,326,905
2016	$6,900,505	$518,918	$5,180,347	$993,673	$13,593,443
2017	$7,038,515	$529,296	$5,283,954	$1,013,546	$13,865,312
2018	$7,179,285	$539,882	$5,389,633	$1,033,817	$14,142,618
2019	$7,322,871	$550,680	$5,497,426	$1,054,493	$14,425,470
2020	$7,469,329	$561,694	$5,607,374	$1,075,583	$14,713,980
2021	$7,618,715	$572,927	$5,719,522	$1,097,095	$15,008,259
2022	$7,771,089	$584,386	$5,833,912	$1,119,037	$15,308,424
2023	$7,926,511	$596,074	$5,950,591	$1,141,418	$15,614,593
2024	$8,085,041	$607,995	$6,069,602	$1,164,246	$15,926,885
2025	$8,246,742	$620,155	$6,190,994	$1,187,531	$16,245,423
2026	$8,411,677	$632,558	$6,314,814	$1,211,282	$16,570,331
2027	$8,579,911	$645,209	$6,441,111	$1,235,507	$16,901,738
2028	$8,751,509	$658,113	$6,569,933	$1,260,217	$17,239,772
2029	$8,926,539	$671,276	$6,701,331	$1,285,422	$17,584,568
2030	$9,105,070	$684,701	$6,835,358	$1,311,130	$17,936,259
2031	$9,287,171	$698,395	$6,972,065	$1,337,353	$18,294,984
2032	$9,472,915	$712,363	$7,111,506	$1,364,100	$18,660,884
2033	$9,662,373	$726,610	$7,253,737	$1,391,382	$19,034,102
2034	$9,855,620	$741,143	$7,398,811	$1,419,209	$19,414,784
2035	$10,052,733	$755,966	$7,546,788	$1,447,594	$19,803,079
Total	**$200,189,373**	**$15,054,241**	**$150,286,166**	**$28,827,270**	**$394,357,050**

OPERATIONS AND MAINTENANCE

Operations and maintenance costs need to be factored in order to determine the available funding available for the transportation system. The operations and maintenance funds for the AAMPO were provided by the Iowa DOT. The Iowa DOT obtained this information from the "2009 City Street Finance Report". The initial year projections and the future year projections were developed by inflating the 2009 costs by 4% annually.

The estimated Operations and Maintenance Cost Projections by year are presented in **Table 7.3**. As presented in **Table 7.3**, the total estimated cost projection for the 25-year analysis period is approximately $292 million.

Table 7.3. Operations and Maintenance Cost Projections by Year

Maintenance and Operations			
Year	Maintenance	Operations	Total
2011	$5,128,300	$1,886,700	$7,015,000
2012	$5,333,432	$1,962,168	$7,295,600
2013	$5,546,769	$2,040,655	$7,587,424
2014	$5,768,640	$2,122,281	$7,890,921
2015	$5,999,386	$2,207,172	$8,206,558
2016	$6,239,361	$2,295,459	$8,534,820
2017	$6,488,936	$2,387,277	$8,876,213
2018	$6,748,493	$2,482,768	$9,231,261
2019	$7,018,433	$2,582,079	$9,600,512
2020	$7,299,170	$2,685,362	$9,984,532
2021	$7,591,137	$2,792,777	$10,383,914
2022	$7,894,782	$2,904,488	$10,799,270
2023	$8,210,574	$3,020,667	$11,231,241
2024	$8,538,996	$3,141,494	$11,680,491
2025	$8,880,556	$3,267,154	$12,147,710
2026	$9,235,779	$3,397,840	$12,633,619
2027	$9,605,210	$3,533,754	$13,138,963
2028	$9,989,418	$3,675,104	$13,664,522
2029	$10,388,995	$3,822,108	$14,211,103
2030	$10,804,555	$3,974,992	$14,779,547
2031	$11,236,737	$4,133,992	$15,370,729
2032	$11,686,206	$4,299,352	$15,985,558
2033	$12,153,655	$4,471,326	$16,624,980
2034	$12,639,801	$4,650,179	$17,289,980
2035	$13,145,393	$4,836,186	$17,981,579
Total	**$213,572,711**	**$78,573,335**	**$292,146,047**

7.3 Transit Revenue Sources

CyRide, the city bus system, has various performance statistics from 1976 – 2008 including operations revenue and expense information. This information was used to develop operating revenues and expenses for projections. CyRide also provided information on other non-operating revenues they have received that are used for capital projects, bus replacement, bus amenities upgrades, studies and other items.

OPERATING REVENUES AND EXPENSES

The operating revenues and expenses projections were developed based on historical data. The operating revenues were inflated based on the average annual growth rates over the last 20 years using a 6% annual maximum growth rate for any one revenue source. The operating expenses were inflated 4% annually to account for the increase in costs to maintain and operate the existing service. The projected operating expenses were subtracted from the projected operating revenues in order to determine net operating revenue available for service expansion.

The projected operating revenues and expenses by year are presented in **Table 7.4**. As presented in **Table 7.4**, the total estimated net operating revenue for the 25-year analysis period is approximately $85 million.

Table 7.4. Operating Revenue and Expense Projections by Year

	Operating Revenue										
Year	Farebox Revenue	Tax Levy	Other Trans-portation Revenue	Government of Student Body	Iowa State University	Miscel-laneous Revenue	Iowa DOT Operating Assistance	FTA Operating Assistance	Total Operating Revenue	Total Operating Expense	Net Operating Revenue
2011	$355,956	$497,428	$1,427,888	$3,297,017	$602,778	$215,238	$540,800	$1,715,190	$8,652,296	$7,729,114	$923,182
2012	$377,314	$517,325	$1,513,561	$3,428,898	$626,889	$223,848	$562,432	$1,818,101	$9,068,368	$8,038,278	$1,030,090
2013	$399,953	$538,018	$1,604,375	$3,566,054	$651,965	$232,802	$584,929	$1,927,187	$9,505,283	$8,359,809	$1,145,473
2014	$423,950	$559,539	$1,700,637	$3,708,696	$678,043	$242,114	$608,326	$2,042,819	$9,964,124	$8,694,202	$1,269,923
2015	$449,387	$581,920	$1,802,675	$3,857,044	$705,165	$251,798	$632,660	$2,165,388	$10,446,037	$9,041,970	$1,404,068
2016	$476,350	$605,197	$1,910,836	$4,011,326	$733,371	$261,870	$657,966	$2,295,311	$10,952,228	$9,403,648	$1,548,579
2017	$504,931	$629,405	$2,025,486	$4,171,779	$762,706	$272,345	$684,285	$2,433,030	$11,483,967	$9,779,794	$1,704,172
2018	$535,227	$654,581	$2,147,015	$4,338,650	$793,215	$283,239	$711,656	$2,579,012	$12,042,594	$10,170,986	$1,871,608
2019	$567,341	$680,764	$2,275,836	$4,512,196	$824,943	$294,569	$740,122	$2,733,752	$12,629,523	$10,577,826	$2,051,698
2020	$601,381	$707,995	$2,412,386	$4,692,684	$857,941	$306,351	$769,727	$2,897,777	$13,246,243	$11,000,939	$2,245,304
2021	$637,464	$736,315	$2,557,129	$4,880,391	$892,258	$318,605	$800,516	$3,071,644	$13,894,323	$11,440,976	$2,453,347
2022	$675,712	$765,767	$2,710,557	$5,075,607	$927,949	$331,350	$832,537	$3,255,943	$14,575,421	$11,898,615	$2,676,806
2023	$716,254	$796,398	$2,873,191	$5,278,631	$965,067	$344,604	$865,838	$3,451,299	$15,291,282	$12,374,560	$2,916,722
2024	$759,230	$828,254	$3,045,582	$5,489,776	$1,003,669	$358,388	$900,472	$3,658,377	$16,043,748	$12,869,542	$3,174,206
2025	$804,783	$861,384	$3,228,317	$5,709,368	$1,043,816	$372,723	$936,491	$3,877,880	$16,834,762	$13,384,324	$3,450,438
2026	$853,070	$895,839	$3,422,016	$5,937,742	$1,085,569	$387,632	$973,950	$4,110,553	$17,666,372	$13,919,697	$3,746,675
2027	$904,255	$931,673	$3,627,337	$6,175,252	$1,128,992	$403,137	$1,012,908	$4,357,186	$18,540,740	$14,476,485	$4,064,255
2028	$958,510	$968,940	$3,844,977	$6,422,262	$1,174,151	$419,263	$1,053,425	$4,618,617	$19,460,145	$15,055,544	$4,404,601
2029	$1,016,021	$1,007,698	$4,075,676	$6,679,152	$1,221,117	$436,034	$1,095,562	$4,895,734	$20,426,993	$15,657,766	$4,769,227
2030	$1,076,982	$1,048,005	$4,320,216	$6,946,319	$1,269,962	$453,475	$1,139,384	$5,189,478	$21,443,821	$16,284,077	$5,159,744
2031	$1,141,601	$1,089,926	$4,579,429	$7,224,171	$1,320,760	$471,614	$1,184,959	$5,500,847	$22,513,307	$16,935,440	$5,577,868
2032	$1,210,097	$1,133,523	$4,854,195	$7,513,138	$1,373,591	$490,478	$1,232,358	$5,830,898	$23,638,277	$17,612,857	$6,025,420
2033	$1,282,702	$1,178,864	$5,145,447	$7,813,664	$1,428,535	$510,098	$1,281,652	$6,180,751	$24,821,712	$18,317,372	$6,504,341
2034	$1,359,665	$1,226,018	$5,454,174	$8,126,210	$1,485,676	$530,501	$1,332,918	$6,551,596	$26,066,759	$19,050,066	$7,016,692
2035	$1,441,245	$1,275,059	$5,781,424	$8,451,259	$1,545,103	$551,721	$1,386,235	$6,944,692	$27,376,738	$19,812,069	$7,564,669
Total	**$19,529,379**	**$20,715,834**	**$78,340,364**	**$137,307,288**	**$25,103,231**	**$8,963,799**	**$22,522,107**	**$94,103,063**	**$406,585,064**	**$321,885,956**	**$84,699,107**

NON-OPERATING REVENUES

The non-operating revenues were developed based on historical data. The non-operating revenues have come from a variety of sources and have been used for capital projects, bus replacement, bus amenities upgrades, studies and other items. The non-operating revenues were inflated by 4% annually due to the annual variability in the historical data.

The projected non-revenues by year are presented in **Table 7.5**. As presented in **Table 7.5**, the total estimated non-operating revenue for the 25-year analysis period is approximately $121 million.

Table 7.5. Non-Operating Revenues by Year

	Non-Operating Revenues		
Year	Bus Revenues	Other Capital Revenues	Total Non-Operating Revenues
2011	$1,100,000	$1,800,000	$2,900,000
2012	$1,144,000	$1,872,000	$3,016,000
2013	$1,189,760	$1,946,880	$3,136,640
2014	$1,237,350	$2,024,755	$3,262,106
2015	$1,286,844	$2,105,745	$3,392,590
2016	$1,338,318	$2,189,975	$3,528,293
2017	$1,391,851	$2,277,574	$3,669,425
2018	$1,447,525	$2,368,677	$3,816,202
2019	$1,505,426	$2,463,424	$3,968,850
2020	$1,565,643	$2,561,961	$4,127,604
2021	$1,628,269	$2,664,440	$4,292,708
2022	$1,693,399	$2,771,017	$4,464,417
2023	$1,761,135	$2,881,858	$4,642,993
2024	$1,831,581	$2,997,132	$4,828,713
2025	$1,904,844	$3,117,018	$5,021,862
2026	$1,981,038	$3,241,698	$5,222,736
2027	$2,060,279	$3,371,366	$5,431,646
2028	$2,142,691	$3,506,221	$5,648,911
2029	$2,228,398	$3,646,470	$5,874,868
2030	$2,317,534	$3,792,329	$6,109,863
2031	$2,410,235	$3,944,022	$6,354,257
2032	$2,506,645	$4,101,783	$6,608,427
2033	$2,606,911	$4,265,854	$6,872,764
2034	$2,711,187	$4,436,488	$7,147,675
2035	$2,819,635	$4,613,947	$7,433,582
Total	**$ 45,810,499**	**$ 74,962,635**	**$ 120,773,134**

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Ames Area MPO
metropolitan planning organization

Chapter 8:
Fiscally Constrained Plan

HDR

CHAPTER 8: FISCALLY CONSTRAINED PLAN

Since there were more projects identified through the alternatives development process than available revenue, a screening process was used to develop a financially feasible plan. The plan was used to determine how to spend the anticipated revenues over the next 25 years.

8.1 Alternatives Selected

The AAMPO used scorecards developed for each alternative project, feedback received in the Visioning and Issues meetings, comments received in the Transportation Concept Evaluation meetings, information on project timing and consistency with previous or other plans, as well as other factors, to develop the LRTP project list. The following sections summarize the alternatives selected.

PLAN ROADWAY PROJECTS

The roadway projects chosen to be in the LRTP were selected to address the issues and deficiencies identified through the Needs Assessment and the Issue and Vision process. The Plan Roadway Projects are shown in **Figure 8.1** and **Table 8.1**.

Figure 8.1. Plan Roadway Map

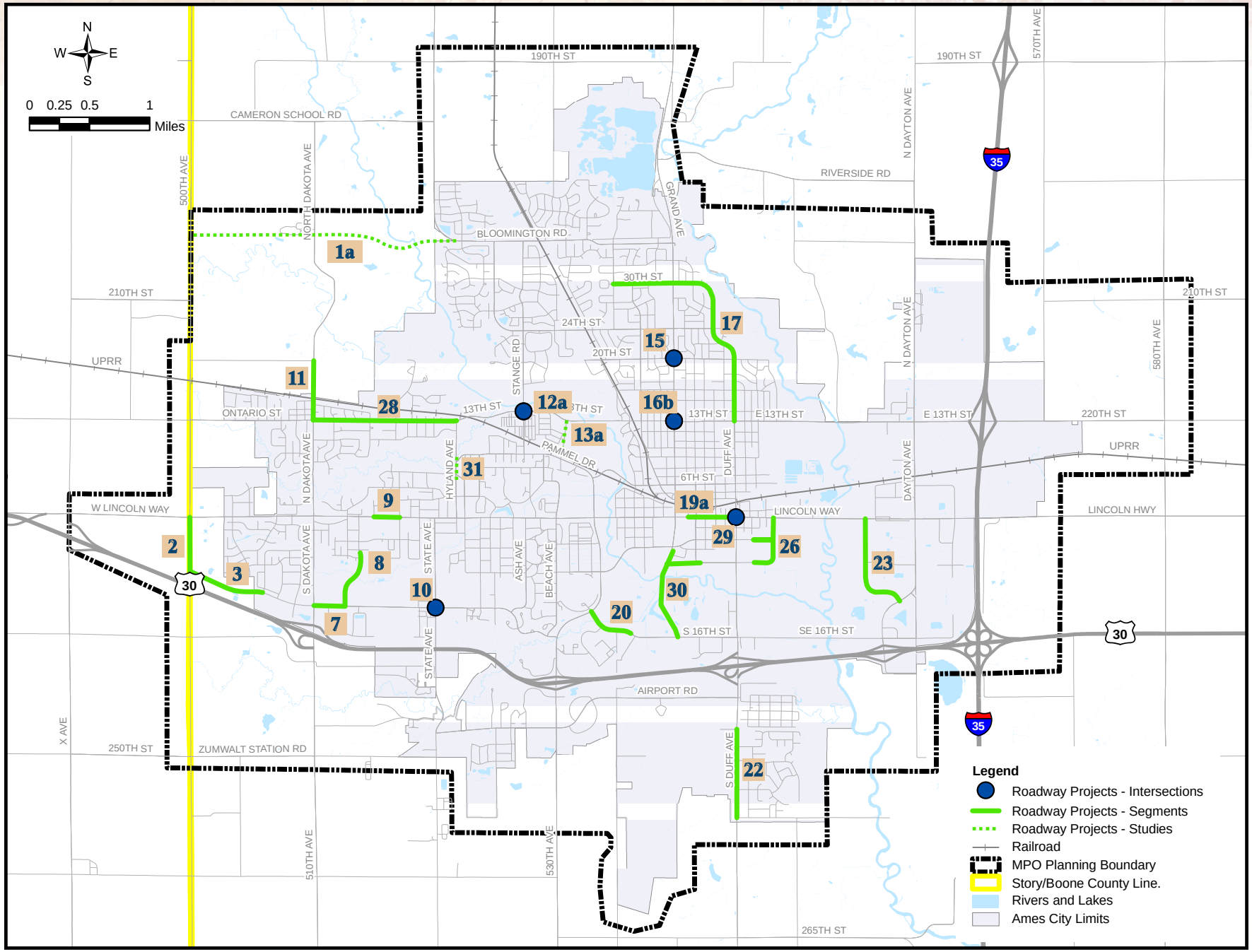

Table 8.1. Plan Roadway Projects

Alternative Project Number	Project Description	Cost (in 2010 dollars)
1a	Bloomington Road Extension Study (West). EA or EIS	$500,000
2	500th Avenue Reconstruction - W. Lincoln Way to Mortensen Road	$1,503,000
3	Mortensen Road Extension - 500th Ave. to Miller Ave.	$2,826,000
7	Mortensen Rd. Widening - S. Dakota Ave. to Dotson Dr.	$286,000
8	Dotson Dr. Connection - Lincoln Way to Mortensen Road **	$1,354,000
9	Lincoln Way Widening - Marshall Ave. to Franklin Ave.	$1,849,000
10	State Ave. / Mortensen Rd. Roundabout	$638,000
11	N. Dakota Widening - Ontario Street to 215th Street **	$5,231,000
12a*	Stange Rd. / 13th Street Intersection Improvements - Roundabout	$916,000
13a	Haber Rd. Study	$200,000
15	Grand Ave. / 20th Street Intersection Improvements	$1,485,000
16b	Grand Ave. / 13th Street Intersection Improvements - Add Left-Turn Lanes	$2,817,000
17	30th Street / Duff Ave. Lane Reductions - Hoover Ave. to 13th Street	$61,000
19a	Lincoln Way Lane Reduction - Gilchrist Ave to Duff Avenue **	$32,000
20	S. 16th Street Widening - University Blvd. to Vet Med Trail **	$1,405,000
22	S. Duff Ave. Widening - Kitty Hawk Dr. to Ken Maril Rd. **	$2,331,000
23	Freel Dr. Reconstruction / Extension to Dayton Ave.	$3,217,000
26	Cherry Ave. Extension - Lincoln Way to SE 5th Street	$2,340,000
28	Ontario St. Left-Turn Lane - Hyland Ave. to N. Dakota Ave.	$44,000
29	Lincoln Way / Duff Avenue Intersection Improvements	$95,000
30	Grand Ave. Extension - Squaw Creek Dr. to S. 16th / 5th Street Extension- Grand Ave. to Duff Ave.	$10,583,000
31	Hyland Ave. Study - Pammel Drive to Sheldon Avenue **	$100,000

**Depending on more detailed analysis, this project may be switched with Project 12b*

*** Projects were either modified or added based on input from AAMPO staff*

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Alternative project numbers 8, 11, 20 and 22 were updated based on discussions with AAMPO staff. The updated concepts for these projects are presented in Appendix A. Also, two new projects were developed based on input from AAMPO staff. The new projects are Lincoln Way Lane Reduction – Gilchrist Ave to Duff Avenue (Project 19a) and Hyland Ave. Corridor Study – Pammel Drive to Sheldon Avenue (Project 31).

Additionally, coordination with Iowa DOT District Office has taken place through this plan development process. The Iowa DOT has a couple of projects that are currently planned and a couple of projects that they anticipated over the next 25 years. These projects are funded through the Iowa DOT Commission program. The Iowa DOT Roadway Projects are shown in Table 8.2.

Table 8.2. Iowa DOT Roadway Projects within MPO Boundary

Project Description	Status	Year	Year of Expenditure (YOE) Cost
Reconstruct US 30 – 230th Street to Bike Trail (formerly CNW RR) Bridge	Planned	2011	21,700,000
Resurface US 30 – Bike Trail Bridge to Dayton Ave. Interchange	Planned	2013	N/A
Interstate 35/US 30 Interchange Reconstruction	Anticipated	N/A	N/A
Interstate 35 Widening – 13th Street to Southern MPO Boundary	Anticipated	N/A	N/A

PLAN BICYCLE/PEDESTRIAN PROJECTS

The bicycle/pedestrian projects chosen to be in the LRTP were selected to address the issues and deficiencies identified through the Needs Assessment and the Issue and Vision process. Some of the bicycle/pedestrian projects were updated and some additional projects were added based on comments received during the Transportation Concept Evaluation Workshop. The Plan Bicycle/Pedestrian Projects are shown in Figure 8.2 and Table 8.3.

Figure 8.2. Plan Bicycle/Pedestrian Map

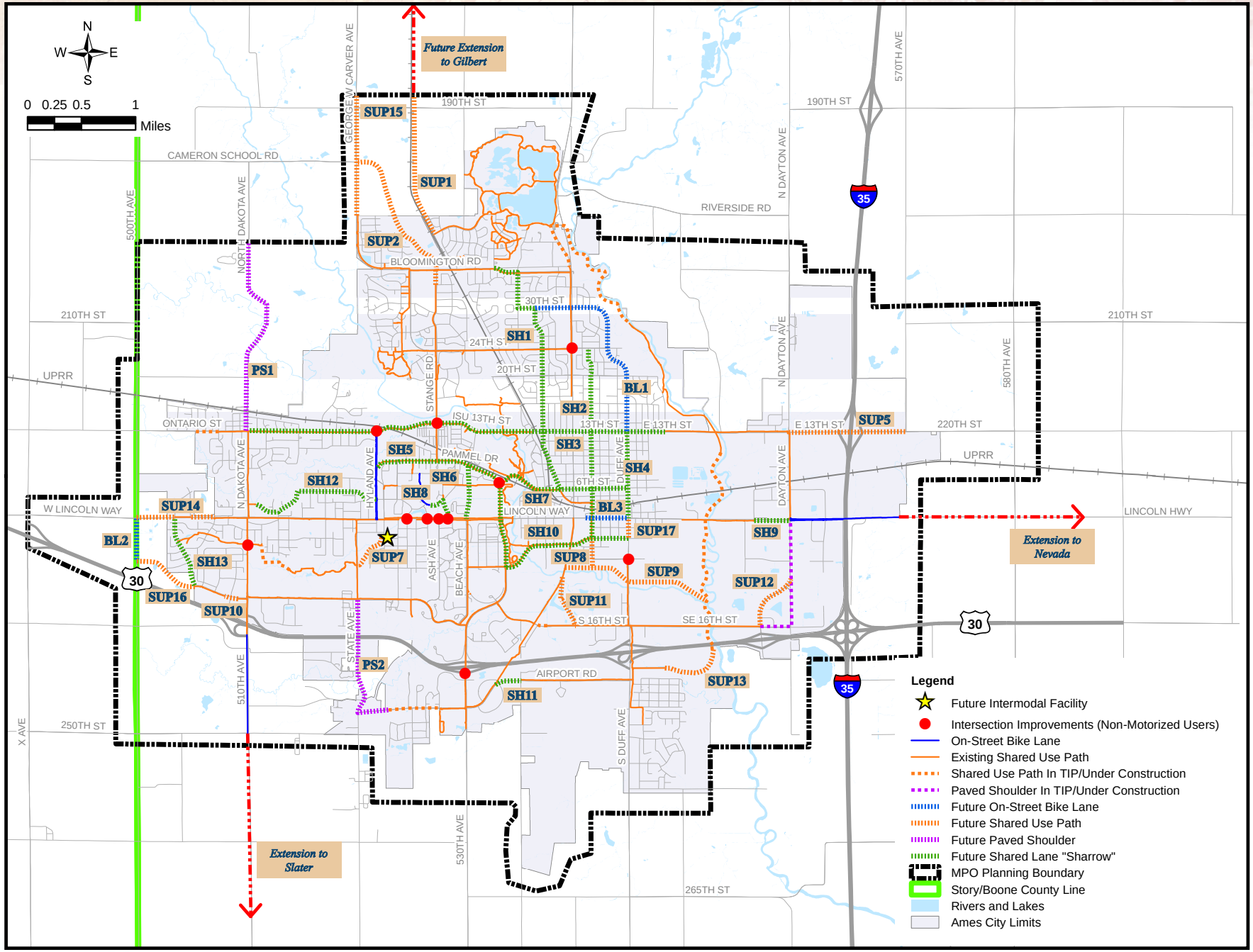

Table 8.3. Plan Bicycle/Pedestrian Projects

Alternative Project Number	Project Description	Cost (in 2010 dollars)
BL1	On-Street Bike Lane On Duff Ave - 30th St / Northwestern Ave to 13th St / Duff Ave	$69,000
BL2	On-Street Bike Lane On 500th Ave - Lincoln Way to Mortensen Rd Extension	$22,000
BL3	On Street Bike Lane on Lincoln Way - Gilchrist St to Duff Ave	$15,000
SUP1	Shared Use Path Along Union Pacific Railroad - North of Bloomington Road	$562,000
SUP2	Shared Use Path Along Stange Rd - Dalton St to Cameron School Rd.	$627,000
SUP5	Shared Use Path Along E 13th St - Dayton Ave to 570th Ave	$456,000
SUP7	Shared Use Path to Proposed Intermodal Facility - East of State Ave	$166,000
SUP8	Shared Use Path Along Walnut St - S 3rd St to Squaw Creek	$114,000
SUP9	Shared Use Path Along Squaw Creek - Proposed Grand Ave Extension to Skunk River	$592,000
SUP10	Shared Use Path Along Mortensen Rd - West of South Dakota	$54,000
SUP11	Shared Use Path Along Proposed Grand Ave Extension to S 16th St	$206,000
SUP12	Shared Use Path Along S Dayton Ave - SE 16th Ave to S Dayton Pl	$240,000
SUP13	Shared Use Path to Recreational Park - East of Duff Ave	$251,000
SUP 14	Shared Use Path Along Lincoln Hwy - N 500th Ave to Wilder Blvd and Hartford Dr to Thackeray Ave	$246,000
SUP 15	Shared Use Path Along George Washington Carver Ave. - N of Weston Dr to MPO Planning Boundary N of 190th St	$469,000
SUP 16	Shared Use Path Along Proposed Mortensen Extension - Miller Ave to Y Ave	$264,000
SUP 17	Shared Use Path Along S Duff Ave from Lincoln Way to S 3rd St	$79,000
PS1	Paved Shoulder on N Dakota Ave - North of Ontario St	$695,000
PS2	Paved Shoulder on State Ave and Oakwood Rd - South of Mortensen Rd	$503,000
SH1	Sharrow on Hoover Ave and Northwestern Ave - Bloomington Rd to 6th St	$45,000
SH2	Sharrow on Clark Ave - 24th St to S 3rd St	$32,000
SH3	Sharrow on 13th St - N Dakota Ave to Meadowland Ave	$71,000
SH4	Sharrow on Duff Ave - 13th St to Lincoln Way	$15,000
SH5	Sharrow on Pammel Dr / University Blvd - Hyland Ave to S 4th St	$37,000
SH6	Sharrow on Beach Rd / Osborn Dr - University Blvd to Lincoln Way	$9,000
SH7	Sharrow on 6th St - University Blvd to Duff Ave	$23,000
SH8	Sharrow on Union Drive - Morrill Dr to Lincoln Way	$6,000
SH9	Sharrow on Lincoln Way - Freel Dr to Dayton Ave	$6,000
SH10	Sharrow on S 4th St / S 3rd St - University Blvd to Duff Ave	$22,000
SH11	Sharrow on Airport Rd - N Loop Dr to S Riverside Dr	$5,000
SH12	Sharrow on Westbrook Dr/ Hickory Dr/Woodland St/West St - N Dakota Ave to Hyland Ave	$23,000
SH13	Sharrow on Proposed Wilder Blvd - Lincoln Way to Mortensen Rd	$12,000
II	Intersection Improvements for Non-Motorized Users	$110,000

DRAFT PLAN TRANSIT PROJECTS

The transit projects chosen to be in the LRTP were selected to address the issues and deficiencies identified through the Needs Assessment and the Issue and Vision process. The cost and description of Alternative Project Number 7 was updated based on input from the Transportation Concept Evaluation Workshop. The Plan Transit Projects are shown in **FIGURE 8.3** and **TABLE 8.4**.

FIGURE 8.3. TRANSIT PROJECTS MAP

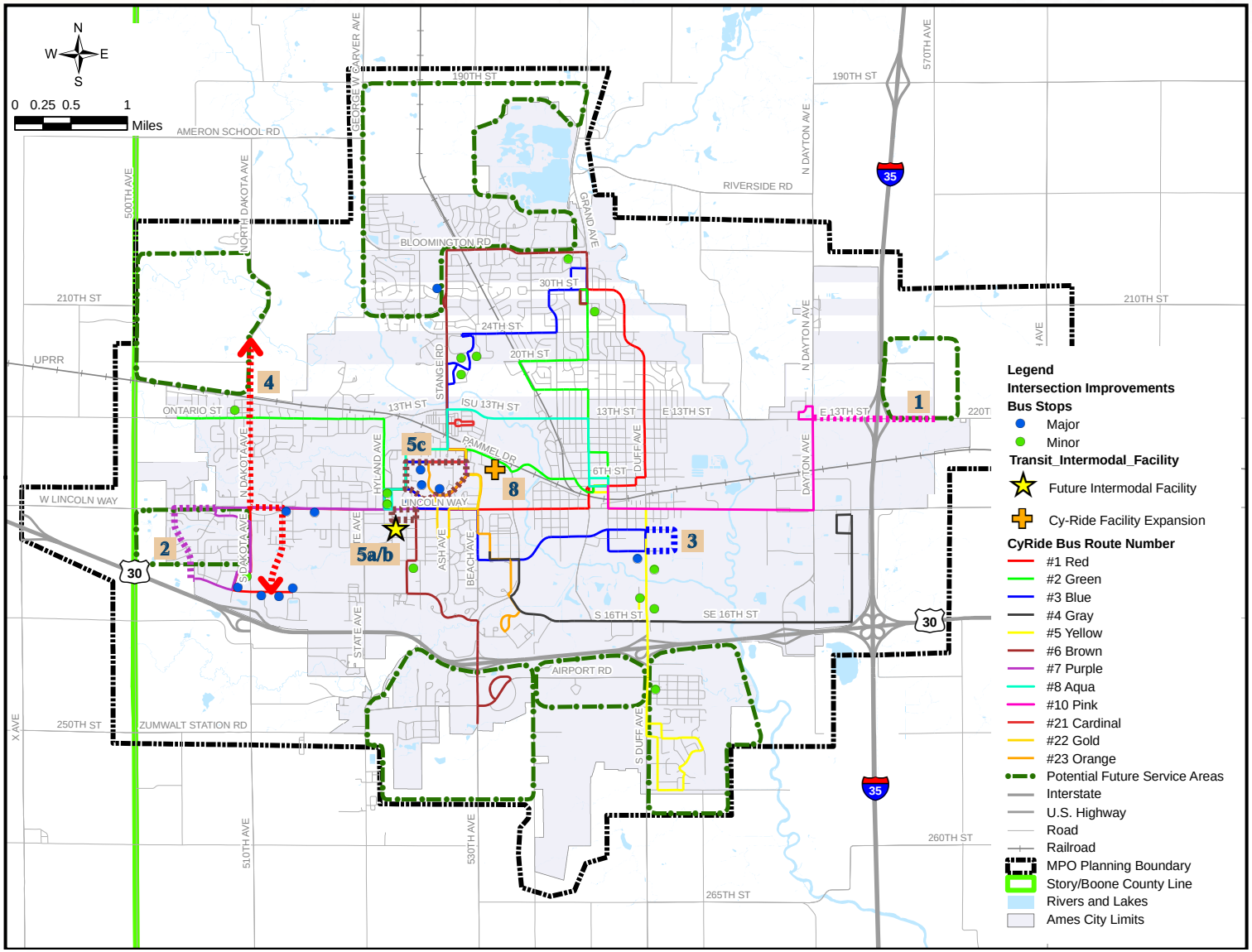

Table 8.4. Plan Transit Projects

Alternative Project Number	Project Description	Cost* (in 2010 dollars)
1	Extend Pink Route to Proposed 13th Street Commercial Development	$416,200
2	Extend Purple Route to Wilder Blvd.	$230,400
3	Extend Blue Route to Wal-Mart and Target	$291,300
4	Cross Town Route- Fieldstone Development to Mortensen Road	$208,100
5a	Intermodal Facility Phase I	$8,900,500
5b	Intermodal Facility Phase II	$13,032,500
5c	Intermodal Facility Circulator	$249,600
6	Bus Stop Improvements	$50,000
7	Increase Frequencies on Core Routes to 15/30 Minutes from 20/40 Minutes	$280,000
8	Cy-Ride Facility Expansion	$10,000,000
9	Alternatives Analysis Study - Orange Route Corridor	$200,000
10	Des Moines/Ames Commuter Service Study	$100,000
11	Articulated Buses on Red/Orange Routes	$2,800,000
12	Automatic Vehicle Location Technology	$2,000,000

**Cost for project numbers 1, 2, 3, 4, 5c, 6 and 7 are costs which will occur annually.*

8.2 Fiscally Constrained Plan

In order to develop a fiscally constrained plan, the anticipated revenues discussed in Chapter 7 and the Plan projects are brought together. Chapter 7 identified all financial resources that are reasonably expected to be made available to implement the plan. These resources will be used to prioritize the Plan projects into either the Short-Term Plan(years 1 - 10) or the Long-Term Plan (years 11 – 25).

The Plan projects will be fiscally constrained in the Short- and Long-Term Plans using an inflation rate to reflect the "year of expenditure dollars". Base on a lack of rigorously developed inflation rate for the Ames area, a 4% annual inflation for costs will be used based on U.S. DOT guidance.

The Ames area has historically received Direct-Federal Apportionments (Earmarks) for specific projects. These funds are typically for larger highway/bridge projects. The FHWA recommends anticipating an earmark funding level of 40% on projects that would be good earmark candidates. Projects that are considered good earmark candidates are anticipated to receive 40% of the funding from earmarks.

SHORT-TERM PLAN

The Short-Term Plan is for the first 10 years of the plan, year 2011 – 2020. The Short-Term Plan projects were prioritized based on need. In order to develop the revenue projections for the short term plan, the year 2011 – 2020 revenues and costs from **Tables 7.1 - 7.6** were summed for the 10-year period.

Roadway and Bicycle/Pedestrian

The forecasted revenues from years 2011-2020 were summed from **Tables 7.1 and 7.2** and the forecasted operations and maintenance costs for years 2011-2020 were summed from **Table 7.3**. The revenues were then separated for roadway and bicycle/pedestrian funding. The local options sales tax and other revenues were split between the roadway and bicycle/pedestrian funding based on historical funding

data. The roadway funding was reduced by the project maintenance/operations costs and the projected rehabilitation/reconstruction costs. It was assumed that 60% of the roadway funds (roadway revenue minus maintenance/operations costs) would be used on rehabilitation/reconstruction projects based on historical data.

The estimated funds available for roadway and bicycle/pedestrian facilities by source for the Short-Term Plan are presented in Table 8.5. As presented in Table 8.5, the total estimated project funds for the 10-year analysis period for Roadway projects are approximately $24 million and for Bicycle/Pedestrian projects are approximately $4 million.

Table 8.5. Short-Term Plan Roadway and Bicycle Pedestrian Available Funding

Funding Source	Years 2011 - 2020 Revenue
Roadway and Bicycle/Pedestrian	
Surface Transportation Program (STP)	$14,470,000
Transportation Enhancements (TE)	$997,000
Traffic Safety Improvement Program (TSIP)	$900,000
Safe Routes to School Program (SRTS)	$250,000
General Obligation Bonds (GOB)	$68,436,000
Local Options Sales Tax (LOST)	$5,146,000
Road Use Tax Fund (RUTF)	$51,376,000
Other	$9,855,000
Subtotal	**$151,429,000**
Roadway	
STP + TSIP	$15,370,000
GOB + RUTF	$119,812,000
LOST (60%)	$3,088,000
Other (95%)	$9,362,000
Subtotal	**$147,631,000**
Less - Maintenance / Operations	$84,223,000
Less - Rehabilitation / Reconstruction	$38,045,000
Total	**$25,363,000**
Bicycle/Pedestrian	
TE + SRTS	$1,247,000
LOST (40%)	$2,059,000
Other (5%)	$493,000
Total	**$3,798,000**

Roadway projects from **Table 8.1** have been selected to for the Short-Term Plan. The project cost for these projects have been inflated to year-of-expenditure dollars by grouping projects in year 1 through year 10 and selecting year 5 (2016) as the year-of-expenditure. The costs were inflated by 4% per year based on U.S. DOT guidance. The Grand Avenue Extension Project from Squaw Creek to S. 16th Street (Project 30) is a potential earmark project and is anticipated to receive 40% of the funding from earmarks. The roadway projects for the Short-Term Plan are presented in **Table 8.6**. As presented in **Table 8.6**, the total estimated cost for the short-term roadway projects are approximately $25 million. The short-term Plan roadway projected funding of $25,363,000 exceeds the projected roadway project cost of $24,895,000.

Table 8.6. Short-Term Roadway Projects

Alternative Project Number	Project Description	YOE Cost (Year 2011 - 2020)*	Potential Earmarks
7	Mortensen Rd. Widening - S. Dakota Ave. to Dotson Dr.	$348,000	
8	Dotson Dr. Connection - Lincoln Way to Mortensen Road	$1,647,000	
9	Lincoln Way Widening - Marshall Ave. to Franklin Ave.	$2,250,000	
10	State Ave. / Mortensen Rd. Round-about	$776,000	
11	N. Dakota Widening - Ontario Street to 215th Street	$6,364,000	
13a	Haber Road Study	$243,000	
16b	Grand Ave. / 13th Street Intersec-tion Improvements- Add Left-Turn Lanes	$3,427,000	
17	30th Street / Duff Ave. Lane Reduc-tions - Hoover Ave. to 13th Street	$74,000	
19a	Lincoln Way Lane Reduction - Gil-christ Ave to Duff Avenue	$39,000	
20	S. 16th Street Widening - University Blvd. to Vet Med Trail	$1,709,000	
28	Ontario St. Left-Turn Lane - Hyland Ave. to N. Dakota Ave.	$54,000	
29	Lincoln Way / Duff Avenue Inter-section Improvements	$116,000	
30	Grand Ave. Extension - Squaw Creek Dr. to S. 16th / 5th Street Extension- Grand Ave. to Duff Ave.	$7,726,000	$5,150,000
31	Hyland Ave. Study - Pammel Drive to Sheldon Avenue	$122,000	
	Total	**$24,895,000**	**$5,150,000**

** Costs in this column for potential earmark projects were reduced by 40%*

Bicycle/Pedestrian projects from Table 8.3 have been selected for the Short-Term Plan. The project cost for these projects have been inflated to year-of-expenditure dollars by grouping projects in year 1 through year 10 and selecting year 5 (2016) as the year-of-expenditure. The costs were inflated by 4% per year. There are no costs shown for project BL1 and BL2 since they are included in the roadway projects 17 and 19a, respectively. The bicycle/pedestrian projects for the Short-Term Plan are presented in Table 8.7. As presented in Table 8.7, the total estimated cost for the short-term bicycle/pedestrian projects is approximately $4 million.

Table 8.7. Short-Term Bicycle/Pedestrian Projects

Alternative Project Number	Project Description	YOE Cost (Year 2011 - 2020)
BL1	On-Street Bike Lane On Duff Ave - 30th St / Northwestern Ave to 13th St / Duff Ave	See Roadway Project 17
BL2	On-Street Bike Lane On 500th Ave - Lincoln Way to Mortensen Rd Extension	See Roadway Project 19a
BL3	On Street Bike Lane on Lincoln Way - Gilchrist St to Duff Ave	$18,000
SUP2	Shared Use Path Along Stange Rd - Dalton St to Cameron School Rd.	$763,000
SUP5	Shared Use Path Along E 13th St - Dayton Ave to 570th Ave	$555,000
SUP7	Shared Use Path to Proposed Intermodal Facility - East of State Ave	$202,000
SUP10	Shared Use Path Along Mortensen Rd - West of South Dakota	$66,000
SUP11	Shared Use Path Along Proposed Grand Ave Extension to S 16th St	$251,000
SUP12	Shared Use Path Along S Dayton Ave - SE 16th Ave to S Dayton Pl	$292,000
SUP13	Shared Use Path to Recreational Park - East of Duff Ave	$305,000
SUP 14	Shared Use Path Along Lincoln Hwy - N 500th Ave to Wilder Blvd and Hartford Dr to Thackeray Ave	$299,000
SUP 16	Shared Use Path Along Proposed Mortensen Extension - Miller Ave to Y Ave	$321,000
SUP 17	Shared Use Path Along S Duff Ave from Lincoln Way to S 3rd St	$96,000
SH1	Sharrow on Hoover Ave and Northwestern Ave - Bloomington Rd to 6th St	$55,000
SH2	Sharrow on Clark Ave - 24th St to S 3rd St	$39,000
SH3	Sharrow on 13th St - N Dakota Ave to Meadowland Ave	$86,000
SH4	Sharrow on Duff Ave - 13th St to Lincoln Way	$18,000
SH5	Sharrow on Pammel Dr / University Blvd - Hyland Ave to S 4th St	$45,000
SH6	Sharrow on Beach Rd / Osborn Dr - University Blvd to Lincoln Way	$11,000
SH7	Sharrow on 6th St - University Blvd to Duff Ave	$28,000
SH8	Sharrow on Union Drive - Morrill Dr to Lincoln Way	$7,000
SH9	Sharrow on Lincoln Way - Freel Dr to Dayton Ave	$7,000
SH10	Sharrow on S 4th St / S 3rd St - University Blvd to Duff Ave	$27,000
SH11	Sharrow on Airport Rd - N Loop Dr to S Riverside Dr	$6,000
SH12	Sharrow on Westbrook Dr/ Hickory Dr/Woodland St/West St - N Dakota Ave to Hyland Ave	$28,000
SH13	Sharrow on Proposed Wilder Blvd - Lincoln Way to Mortensen Rd	$15,000
II	Intersection Improvements for Non-Motorized Users	$134,000
	Total	**$3,674,000**

The Short-Term Plan bicycle/pedestrian available projected funding of $3,798,000 exceeds the projected bicycle/pedestrian project cost of $3,674,000.

Transit

The estimated funds available for transit operations by source for the Short-Term Plan are presented in Table 8.8. As presented in Table 8.8, the total estimated operating net revenues for the 10-year analysis period are approximately $15 million.

Table 8.8. Short-Term Plan Transit Operations Net Revenue

Funding Source	Years 2011 - 2020 Revenue
Farebox Revenue	$4,692,000
Tax Levy	$5,972,000
Other Transportation Revenue	$18,821,000
Government of Student Body	$39,584,000
Iowa State University	$7,237,000
Miscellaneous Revenue	$2,584,000
Iowa DOT Operating Assistance	$6,493,000
FTA Operating Assistance	$22,608,000
Subtotal	$107,991,000
Operating Expense	$92,797,000
Net Operating Revenue	**$15,194,000**

All of the operations related transit projects from Table 8.4 have been selected to for the Short-Term Plan. The operating cost for these projects has been inflated to year of expenditure dollars using an inflation rate of 4% per year. It is assumed that the projects will be implemented incrementally over the 10-year period, so an average of 5 years of service was used for each project to estimate the costs between years 2011 and 2020. The operations related transit projects for the Short-Term Plan are presented in Table 8.9. As presented in Table 8.9, the total estimated cost for the short-term operations related transit projects are approximately $11 million.

Table 8.9. Short-Term Plan Operations Related Transit Projects

Alternative Project Number	Project Description	YOE Cost (Year 2011 - 2020)
1	Extend Pink Route to Proposed 13th Street Commercial Development	$2,622,000
2	Extend Purple Route to Wilder Blvd.	$1,452,000
3	Extend Blue Route to Wal-Mart and Target	$1,835,000
4	Cross Town Route- Fieldstone Development to Mortensen Road	$1,311,000
5c	Intermodal Facility Circulator	$1,573,000
6	Bus Stop Improvements	$315,000
7	Increase Frequencies on Core Routes to 15/30 Minutes from 20/40 Minutes	$1,764,000
	Total	**$10,872,000**

The Short-Term Plan projected operations related transit projects net revenue of $15,194,000 exceeds the projected operations related transit projects cost of $10,872,000. This would allow for the operations related transit projects to be implemented at a faster rate over the 10-year period and/or would allow for additional services to be added during the 10-year period.

The estimated funds available for non-operating related transit projects by source for the Short-Term Plan are presented in Table 8.10. As presented in Table 8.10, the total estimated non-operating revenues for the 10-year analysis period for buses is approximately $13 million and for other projects is $22 million.

Table 8.10. Short-Term Plan Non-Operations Related Transit Projects

Funding Source	Years 2011 - 2020 Revenue
Bus Revenues	$13,207,000
Other Capital Revenues	$21,611,000
Total Non-Operating Revenues	**$34,818,000**

All of the non-operations related transit projects from Table 8.4 have been selected for the Short-Term Plan. The Intermodal Facility Phase I (Project 5a) has been funded through a TIGER grant, so project costs are not being shown for this project. The CyRide Facility Expansion (Project 8) costs have been reduced by $4.9 million that has already been funded through SAFETEA-LU. The Bus Stop Improvements (Project 6) are an annual expense, so costs have been assumed for all 10-years of the Short-Term Plan. The non-operating cost for these projects has been inflated to year of expenditure dollars by grouping projects in year 1 through year 10 and selecting year 5 (2016) as the year-of-expenditure. The costs were inflated by 4% per year. The non-operations related transit projects for the Short-Term Plan are presented in Table 8.11. As presented in Table 8.11, the total estimated cost for the short-term non-operations related transit projects is approximately $29 million with bus costs totaling approximately $3 million and other capital costs totaling approximately $26 million.

Table 8.11. Short-Term Non-Operations Related Transit Projects

Alternative Project Number	Project Description	YOE Cost (Year 2011 - 2020)
5a	Intermodal Facility Phase I	Funded Through TI-GER Grant
5b	Intermodal Facility Phase II	$15,856,000
6	Bus Stop Improvements	$624,000
8	CyRide Facility Expansion	$6,205,000
9	Alternatives Analysis Study - Orange Route Corridor	$243,000
10	Des Moines/Ames Commuter Service Study	$122,000
11	Articulated Buses on Red/Orange Routes	$3,407,000
12	Automatic Vehicle Location Technology	$2,433,000
	Total	**$28,890,000**

The Short-Term Plan projected revenue for buses of $13,207,000 exceeds the projected bus cost (Project 11) of $3,407,000. This would allow for approximately $1 million annually available for additional bus replacement over the 10-year period. This would allow for less than 3 busses per year for replacement and expanding the fleet. There is a need for 5-6 buses per year just for replacements. Additional funding will be pursued to meet this need.

The Short-Term Plan projected costs, excluding Project 11, for other capital projects of $25,483,000 exceeds the projected other capital projects revenues of $21,611,000 The CyRide Facility Expansion will be constructed in phases. The parts of expansion that are not funded in the Short-Term Plan will be funded in the Long-Term Plan.

LONG-TERM PLAN

The Long-Term Plan is for the last 15 years of the plan, year 2021 – 2035. In order to develop the revenue projections for the Long-Term Plan, the year 2021 – 2035 revenues were summed for the 15-year period.

Roadway and Bicycle/Pedestrian

The estimated funds available for roadway and bicycle/pedestrian facilities by source for the Long-Term Plan are presented in Table 8.12. As presented in Table 8.12, the total estimated project funds for the 15-year analysis period for Roadway projects are approximately $30 million and for Bicycle/Pedestrian projects are approximately $7 million.

Table 8.12. Long-Term Plan Roadway and Bicycle Pedestrian Available Funding

Funding Source	Years 2021 - 2035 Revenue
Roadway and Bicycle/Pedestrian	
Surface Transportation Program (STP)	$27,857,000
Transportation Enhancements (TE)	$1,919,000
Traffic Safety Improvement Program (TSIP)	$1,350,000
Safe Routes to School Program (SRTS)	$375,000
General Obligation Bonds (GOB)	$131,754,000
Local Options Sales Tax	$9,908,000
Road Use Tax	$98,910,000
Other	$18,973,000
Subtotal	**$291,045,000**
Roadway	
STP + TSIP	$29,207,000
GOB + RUTF	$230,664,000
LOST (60%)	$5,945,000
Other (95%)	$18,024,000
Subtotal	**$283,839,000**
Less - Maintenance / Operations	$207,923,000
Less - Rehabilitation / Reconstruction	$45,550,000
Total	**$30,366,000**
Bicycle/Pedestrian	
TE + SRTS	$2,294,000
LOST (40%)	$3,963,000
Other (5%)	$949,000
Total	**$7,206,000**

The remaining roadway projects from Table 8.1 have been selected for the Long-Term Plan. The project cost for these projects have been inflated to year of expenditure dollars by grouping projects in year 11

through year 25 and selecting year 18 (2028) as the year-of-expenditure. The costs were inflated by 4% per year. The roadway projects for the Long-Term Plan are presented in Table 8.13. As presented in Table 8.13, the total estimated cost for the Long-Term roadway projects are approximately $76 million.

Table 8.13. Long-Term Roadway Projects

Alternative Project Number	Project Description	YOE Cost (Year 2021 - 2035)
1a	Bloomington Road Extension Study (West).	$1,013,000
2	500th Avenue Reconstruction - W. Lincoln Way to Mortensen Road	$3,045,000
3	Mortensen Road Extension - 500th Ave. to Miller Ave.	$5,725,000
12a	Stange Rd. / 13th Street Intersection Improvements - Roundabout	$1,856,000
15	Grand Ave. / 20th Street Intersection Improvements	$3,008,000
22	S. Duff Ave. Widening - Kitty Hawk Dr. to Ken Maril Rd. (now 3 lane)	$4,722,000
23	Freel Dr. Reconstruction / Extension to Dayton Ave.	$6,517,000
25	Cherry Ave. Extension - Lincoln Way to SE 5th Street	$4,740,000
	Total	**$30,626,000**

The Long-Term Plan roadway projected costs of $30,626,000 exceeds the projected revenues of $30,366,000; however, there was a net surplus revenue of $468,000 from the Short-Term Plan Roadway projects which more than covers this cost difference.

The remaining Bicycle/Pedestrian projects from Table 8.3 have been selected to for the Long-Term Plan. The project cost for these projects have been inflated to year of expenditure dollars by grouping projects in year 11 through year 25 and selecting year 18 (2028) as the year-of-expenditure. The costs were inflated by 4% per year. As presented in Table 8.14, the total estimated cost for the Long-Term bicycle/pedestrian projects are approximately $5 million.

Table 8.14. Long-Term Bicycle/Pedestrian Projects

Alternative Project Number	Project Description	YOE Cost (Year 2021 - 2035)
SUP1	Shared Use Path Along Union Pacific Railroad - North of Bloomington Road	$1,139,000
SUP8	Shared Use Path Along Walnut St - S 3rd St to Squaw Creek	$231,000
SUP9	Shared Use Path Along Squaw Creek - Proposed Grand Ave Extension to Skunk River	$1,199,000
PS1	Paved Shoulder on N Dakota Ave - North of Ontario St	$1,408,000
PS2	Paved Shoulder on State Ave and Oakwood Rd - South of Mortensen Rd	$1,019,000
	Total	**$4,996,000**

The Long-Term Plan bicycle/pedestrian projected revenue of $7,206,000 exceeds the projected bicycle/pedestrian project cost of $4,996,000.

Transit

All of the proposed operations related transit projects were incorporated in the Short-Term Plan. It is anticipated that additional transit services will be added in the Long-Term Plan (year 2021-2035); however, at this

time to is too difficult to identify these services.

The estimated funds available for non-operating related transit projects by source for the Long-Term Plan are presented in **Table 8.15**. As presented in **Table 8.15**, the total estimated non-operating revenues for the 15-year analysis period for buses is approximately $33 million and for other projects is $86 million.

Table 8.15. Long-Term Non-Operations Related Transit Projects

Funding Source	Years 2021 - 2035 Revenue
Bus Revenues	$32,604,000
Other Capital Revenues	$85,955,000
Total Non-Operating Revenues	**$118,559,000**

All of the proposed non-operating projects were included in the Short-Term Plan.

The Long-Term Plan projected revenue for buses of $32,604,000 would allow for the approximately $2 million annually available for additional bus replacement and expansion over the 15-year period.

The Long-Term Plan projected revenue for other capital projects of $85,955,000 would allow for any additional phases of the CyRide Facility Expansion (Project 8) to be completed, as well as other capital projects which have not been identified at this time.

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Chapter 9:
Other Modal Facilities and Considerations

HDR

CHAPTER 9: OTHER MODAL FACILITIES AND CONSIDERATIONS

Reliable transportation systems depend on efficient connections between all modes of travel. Other modal planning activities and ongoing improvements that address freight and other needs will help to maintain the region's economy and competitiveness. This chapter describes travel considerations for moving freight and personal inter-regional travel via truck, rail, pipeline, and air.

9.1 Truck

Several industrial and manufacturing facilities in the Ames area depend on trucking for the movement of goods. A majority of the trucks accessing the area are accessing businesses in the Dayton Avenue area. The major routes for hauling goods in and out of the area are U.S. 69, U.S. 30 and Interstate 35.

The periodic designation and update of truck routes and implementation of additional limited-access roadway facilities is key for corridors utilized by truck traffic. Truck trips will avoid traveling into a large urbanized area unless that is its origin or destination.

9.2 Rail

Bulk commodities such as grain, coal, chemicals, fertilizer, stone and food products are the primary freight for rail carriers throughout Iowa. The railroad routes that traverse the Ames area were shown in **Figure 1.1**. As shown in this figure, one rail corridor runs in a north-south direction and two mainline tracks in an east-west direction.

United Pacific Railroad (UPRR) is the rail service carrier in Ames. The east-west mainline track carries over 70 trains per day. This railroad has daily switching service. There are no piggyback ramps (incline loading and unloading trailers from a flat car) available locally. There are also no intermodal facilities within the MPO boundary.

There are currently at-grade rail crossings with the UPRR mainline in the MPO boundary. They occur at the following roads:

- North Dakota Avenue
- Scholl Road
- N. Hazel Avenue
- Clark Avenue
- Kellogg Avenue
- Duff Avenue
- 580th Avenue

In 2002, the City of Ames completed the "Duff Avenue/UPRR Crossing Study". This study addressed the feasibility of relocating the UPRR mainline either north or south of the city. Moving the tracks would reduce delays, but the cost and potential environmental impacts were considered too great to further pursue the project.

9.3 Pipelines

Pipelines are included in transportation infrastructure as a means to deliver oil, natural gas, and other products. The U.S. Department of

Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) compiles pipeline mileage. In 2008, Iowa's transmission mileage totalled to 12,113 miles. Approximately 65% of these pipelines contain natural gas.

Story County has 60 miles of gas pipeline. Awareness of pipelines and preparation to deal with any type of pipeline incident is important in the planning process.

9.4 Air

The Ames Municipal Airport is located within the corporate boundaries of the City of Ames. This site is located south of U.S. Highway 30 and west of U.S. Highway 69. Access to the terminal area is provided via Airport Road.

In 2007, the City of Ames leased the municipal airport to Hap's Air Service, the current Fixed Base Operator. The City of Ames owns and operates the airport. The airport is included in the National Plan of Integrated Airport Systems (NPIAS) as a general aviation airport. The Iowa Aviation Plan identifies the Ames Municipal Airport as an Enhanced Service Airport. The Ames Municipal Airport serves the general aviation needs of Story County and provides an important means of accessing the area.

Airport operation statistics include:

- 86 aircraft based on field
- 119 aircraft operations per day on average
- Single engine airplanes: 62 (60% transient general aviation)
- Multi-engine airplanes: 12 (34% local general aviation)
- Jet airplanes: 3 (5% air taxi)
- Gliders: 6 (1% military)
- Ultralights: 3

The Ames Municipal Airport includes the following services:

- Aviation fuel sale
- Charters
- Parking and Hangars (for transient aircraft)
- Aircraft maintenance
- Passenger terminal and lounge
- Car rentals
- Flight school/flight training
- Crew Cars
- Hangar Rental
- Pilot lounge/snooze room
- Aircraft rentals
- Public telephone
- Restrooms

Table 9.1 illustrates the current and forecast demand for the Ames Municipal Airport.

Table 9.1. Ames Municipal Airport Current and Future Demand

Operational Activity	2003	2007	2012	2022
Based Aircraft	72	75	75	80
Annual Operations	35,064	38,135	40,556	43,007
Itinerant Operations	19,916	22,884	24,334	25,804
Local Operations	15,130	15,254	16,223	17,203

Source: Iowa Aviation System Plan Airport Summary Report - Ames Municipal Airport (2004)

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Chapter 10:
Safety and Security

HDR

CHAPTER 10: SAFETY AND SECURITY

Since the passage of SAFETEA-LU and the terrorist attacks of September 11, 2001, both safety and security have become major topics for those responsible for developing and implementing transportation infrastructure programs and projects. This increased interest can be credited to a continuing emphasis by the U.S. DOT on safety and the public's receptiveness to programs that save lives and advocates better quality of life for users of the nation's transportation systems.

10.1 Safety

DISCUSSION OF 2006-2011 US DOT STRATEGIC PLAN

The United States Department of Transportation (US-DOT) Strategic Plan was presented in September 2006. This plan outlines the national process for improving the transportation system for fiscal years 2006 to 2011. The plan's goals and strategies are divided into 5 strategic areas: Safety, Reduced Congestion, Global Connectivity, Environmental Stewardship, and Security, Preparedness and Response. The US-DOT considers improving safety their premier goal. The strategic goal for safety is stated as:

> *"enhance public health and safety by working toward the elimination of transportation-related deaths and injuries."*

http://www.dot.gov/stratplan2011/

The US-DOT strives to achieve this goal through 11 strategies that have been identified for all modes of transportation, and 9 strategies that are mode-specific. The Strategic Plan outlines safety outcomes and performance measures to chart progress.

In addition, the plan describes central safety strategies by mode, including the following:

- **Highway Safety**. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) outlines innovative activities to support highway traffic safety. The US-DOT provides grants to States and local communities, supporting programs that aim to reduce motor vehicle crashes. States are also provided with assistance on Strategic Highway Safety Plans (SHSP) and roadway infrastructure and operational improvements that enhance geometric design, utilize more durable pavement markings, install more visible road signs, and increase skid-resistant roadway surfaces to enhance safety. The US-DOT also focuses on data-driven safety countermeasures, public information, education materials and activities, State grant programs, and emerging technologies as they enter the market.
- **Truck Safety**. The US-DOT's primary strategy for improving truck safety levels is through aggressive enforcement of Federal Motor Carrier Safety Regulations, with increased focus on driver behavior. Educational programs to heighten public awareness of best highway safety practices for commercial motor vehicles and passenger vehicles is another truck safety strategy outlined in the plan.
- **Transit Safety**. The key strategy for transit is to integrate safety and security throughout every aspect of public transit, including planning, design, operations and maintenance; training for transit personnel; technical assistance and oversight for transit operators; safety research and technology development; support of drug and alcohol programs; and safety oversight of rail fixed route systems.

- **Aviation Safety**. General aviation safety is outlined through strategies addressing education of the pilot community, new technologies, airport infrastructure, safety management program awareness, and runway safety training.
- **Railroad Safety**. The US-DOT will continue to implement the National Rail Safety Action Plan, which targets the most frequent and highest-risk causes of train accidents and accelerates research into new technologies that can improve rail safety levels. In order to further identify potential problem areas, the DOT will introduce two automated track inspection vehicles, and issue a Federal rule to reduce the most common human errors that lead to train accidents.
- **Pipeline Safety**. Pipeline safety levels are based on 3 US-DOT strategic initiatives: managing risk & integrity, sharing responsibility, and providing effective stewardship. The US-DOT serves a stewardship role in assuring high national safety standards and guiding permitting for energy facilities.

http://www.iowadot.gov/traffic/chsp/index.htm

http://www.iowadot.gov/traffic/chsp/index.htm

IOWA COMPREHENSIVE HIGHWAY SAFETY PLAN

Iowa Comprehensive Highway Safety Plan Top five safety policy strategies (legislative)

- **Young drivers.** Strengthen minor school license (MSL) and graduated driver's license (GDL) laws with stronger provisions that are proven to reduce specific risks and save lives.
- **Occupant protection.** Require occupant restraints in all automotive vehicle seating positions.
- **Motorcycle safety.** Restore a motorcycle helmet law.
- **Traffic safety enforcement.** Support traffic safety enforcement and adjudication with adequate resources.
- **Traffic Safety Improvement Program**. Increase Iowa's Traffic Safety Improvement program (TSIP) funding from 0.5 percent to a full 1 percent of Iowa's Road Use Tax Fund.

The Comprehensive Highway Safety Plan (CHSP) is a process aimed at increasing roadway safety. The Federal Strategic Highway Safety Plan was last issued in April 2006 and encouraged the CHSP development in Iowa through the Iowa Safety Stakeholders, whose mission is to "identify target areas and strategies that will move the numbers to significantly reduce fatalities and injuries on public roadways." The "Top Five Safety Policy Strategies" of the Iowa CHSP are shown above. Some of the strategies identified by this group address infrastructure while others target driving behavior and the need for culture change. The top legislative policy strategies and administrative program strategies were outlined as follows:

IOWA COMPREHENSIVE HIGHWAY SAFETY PLAN
TOP EIGHT PROGRAM STRATEGIES (ADMINISTRATIVE)

- **Lane departure.** Enhance lane departure related design standards and policies (e.g.,paved shoulders, rumble strips and median barriers).
- **Safety corridors.** Identify safety corridors and use multidisciplinary strategies to mitigate specific crash causes such as impairment, speeding, driver inattention, and other factors.
- **Intersections.** Promote innovative intersection designs, such as roundabouts and other configurations.
- **Local roads.** Create local multidisciplinary safety teams to identify and resolve local crash causes.
- **State traffic records.** Enhance data availability and use by all stakeholders.
- **Senior mobility.** Develop a single point of contact to help older persons and their caregivers navigate existing programs regarding changing mobility needs.
- **Safety training and education.** Provide state and local multidisciplinary traffic safety education programs for professionals and the driving public.
- **Unpaved rural roads.** Promote public awareness of the risks of driving on unpaved rural roads.

IOWA DOT TOP 200 SAFETY IMPROVEMENT CANDIDATE LOCATIONS

Only 2 intersections in the Ames area are included on the Iowa Statewide Safety Improvement Candidate Location Listing (SICL). The most recent listing used crash data from 2003 to 2006. This list is published by the Iowa Department of Transportation Office of Traffic and Safety annually and includes the Top 200 locations based on number of crashes, crash severity, and the rate at which crashes occur. The locations on this list are eligible for funding assistance to develop safety improvements under the Iowa Traffic Safety Fund Program.

The intersections on this list within the AAMPO boundaries include:

- US 69/S Duff Ave & Airport Rd & Billy Sunday Rd
  - Statewide ranking: 128
- Lincoln Way & S Dakota Ave & N Dakota Ave
  - Statewide ranking: 197

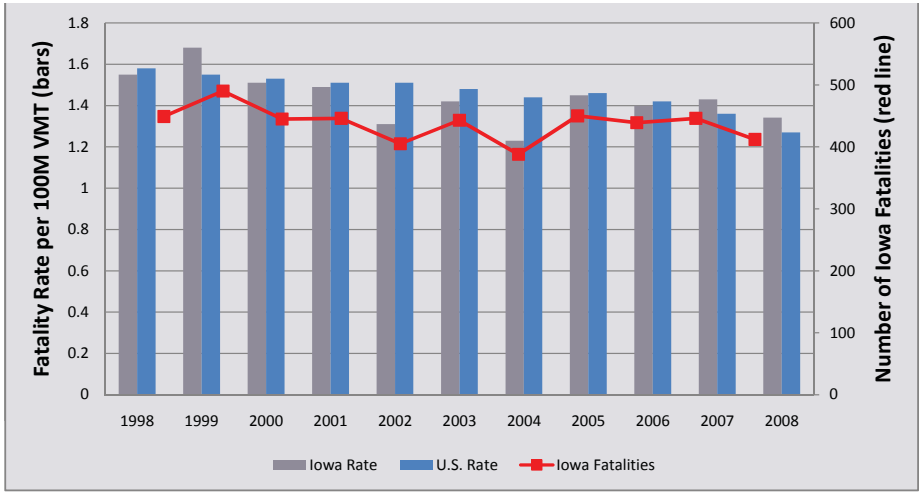
AAMPO CRASH DATA

Fatal Crash Data

According to the Iowa Department of Transportation (Iowa DOT), Iowa averages 445 deaths per year caused by motor vehicle accidents. The estimated economic impact of motor vehicle crashes in Iowa is $1.3 billion annually.

Figure 10.1 shows the fatal crash statistical trends for Iowa compared to the United States as a whole for years 1998 to 2008. Although for several years Iowa ranked below the national average in the crash fatality rate, in more recent years (2007 and 2008) the rate of fatalities caused by motor vehicle accidents has exceeded the U.S. national average. This figure also shows the number of Iowa fatalities per year continues to range above 400.

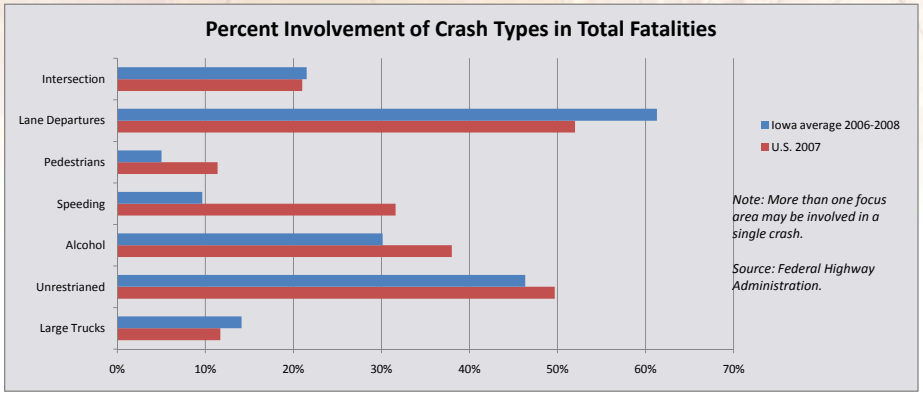
Figure 10.1. Fatality Trends for U.S. and Iowa



The characteristics of fatal crashes for Iowa compared to the United States as a whole are shown in **Figure 10.2**. In Iowa for years 2006 to 2008, vehicle lane departures have been included in over 60% of fatalities, while nearly 50% of crashes involved unrestrained passengers.

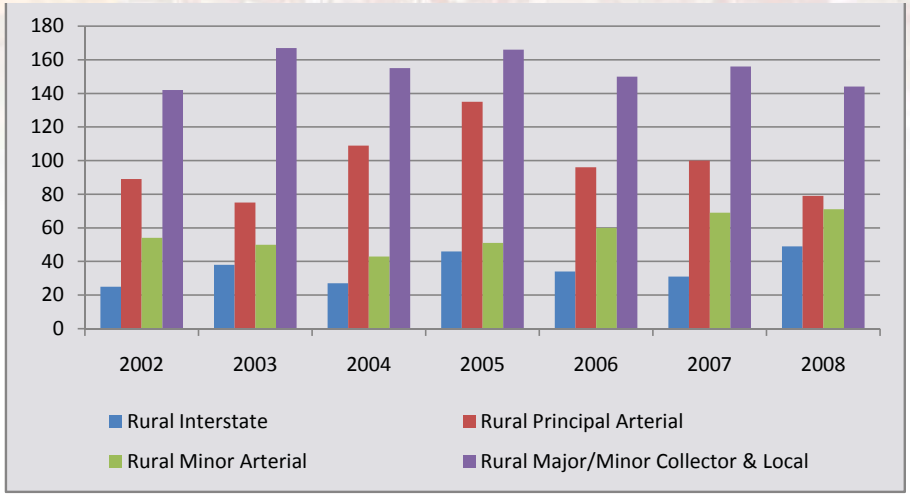
Source: Federal Highway Administration

Figure 10.2. Total Fatalities Crash Types by Percent Involvement



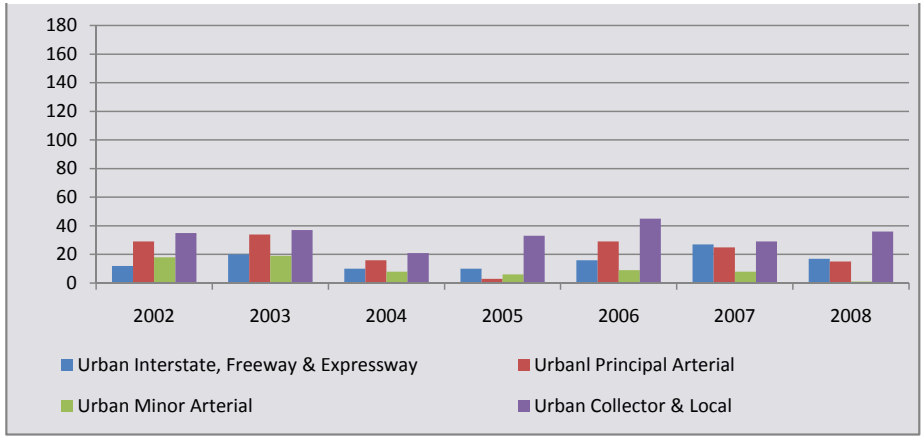
The majority of motor vehicle fatalities in Iowa occur in rural areas, compared to urban areas, as shown in Figure 10.3 and Figure 10.4. These figures illustrate that lower volume roadways, such as roadways classified with a facility type of collector or local road, contain more fatal crashes than roadways with a higher functional classification such as an interstate.

Figure 10.3. Iowa Fatalities on Rural Roadways



Source: Federal Highway Administration

Figure 10.4. Iowa Fatalities on Urban Roadways



Source: Federal Highway Administration

Total Crashes Data

Total crashes that have occurred in the AAMPO area for years 2002 to 2008 are shown in Table 10.1. In total there were 12 fatalities related to motor vehicle crashes, 124 major injuries, and 2,098 minor or possible injuries.

Table 10.1. Crashes in the AAMPO Area, 2002-2008

Year	Total Crashes	Number of Fatalities	Number of Major Injuries	Number of Minor/ Possible Injuries
2002	1000	0	21	292
2003	1079	2	20	291
2004	1114	1	11	310
2005	1035	2	13	237
2006	963	4	19	296
2007	1077	3	23	329
2008	1248	0	17	343
7-Year Total	**7516**	**12**	**124**	**2098**

Source: Iowa DOT GIS crash data

Locations for fatal and injury crashes in the 7-year period are shown in Figure 10.5.

The number of crashes per mile of roadway segment is shown in Figure 10.6.

This information was presented at the Alternatives Development Workshop and was considered in the development and evaluation of the proposed concepts in order to address Goal 1: "Develop a Safe and Connected Multi-Modal Network".

Figure 10.5. Ames Area Fatal and Major Injury Crashes Years 2002 to 2008

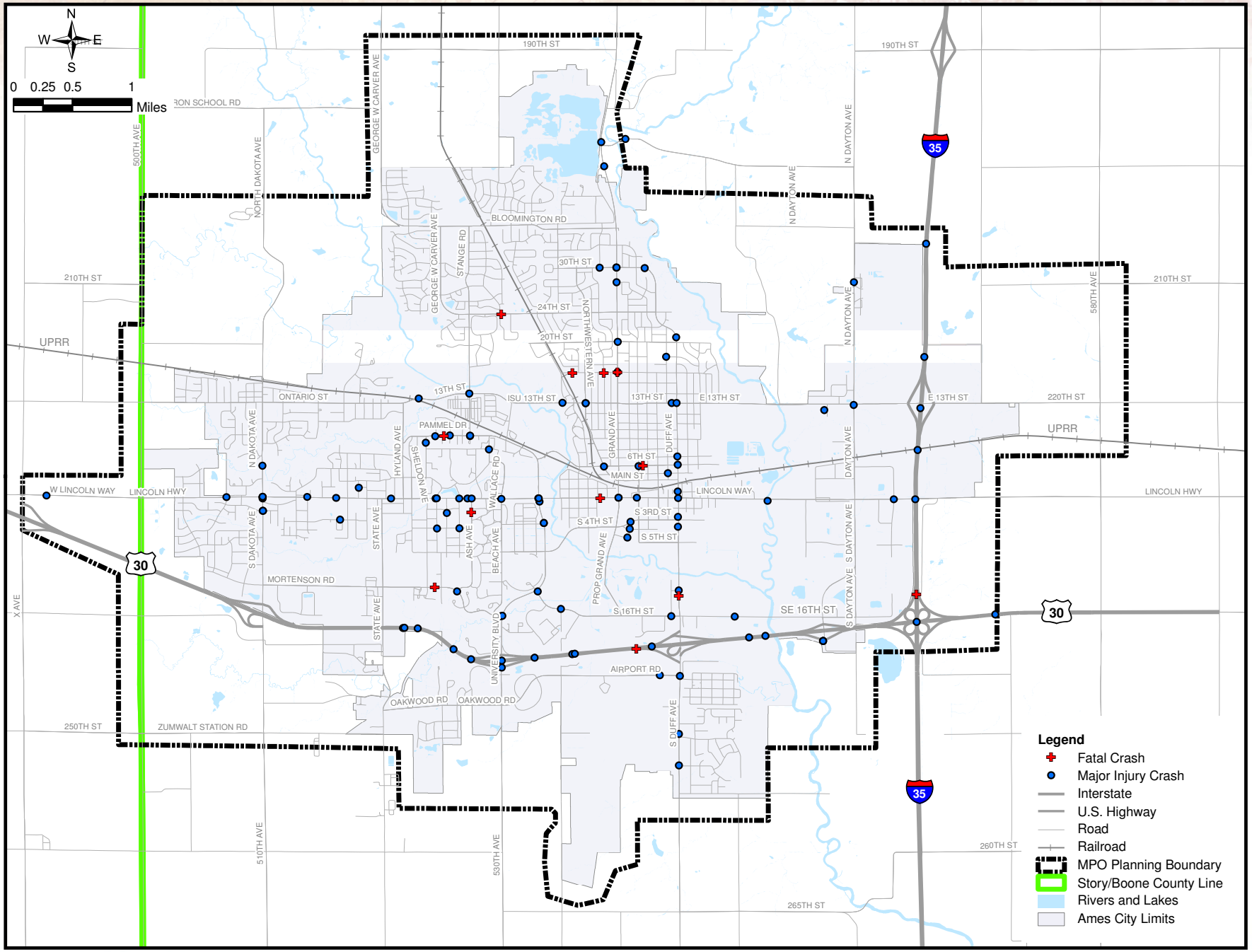
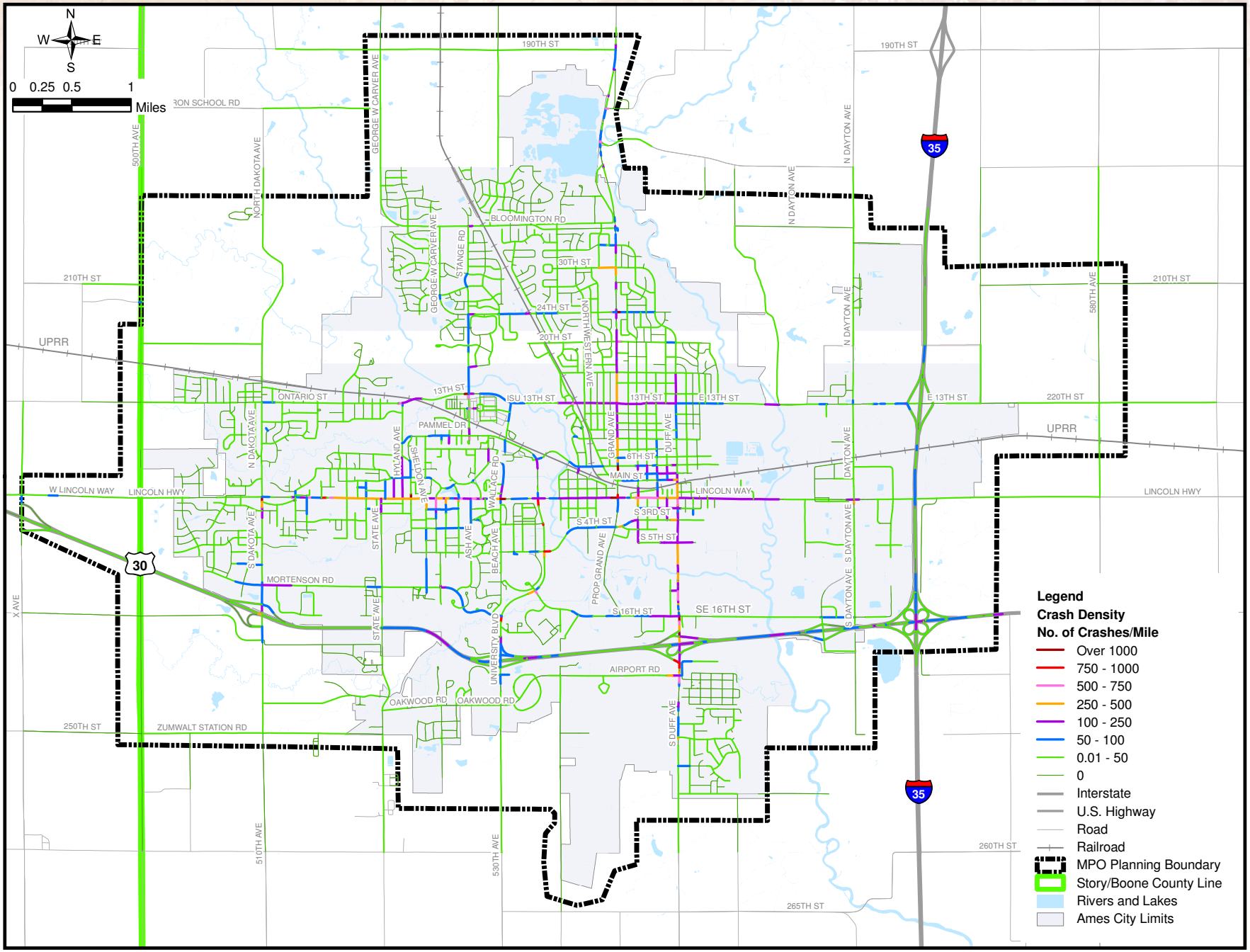


Figure 10.6. Ames Area Crash Density Years 2002 to 2008



DISCUSSION OF LOCAL AGENCY SAFETY ISSUES/ CONSIDERATIONS

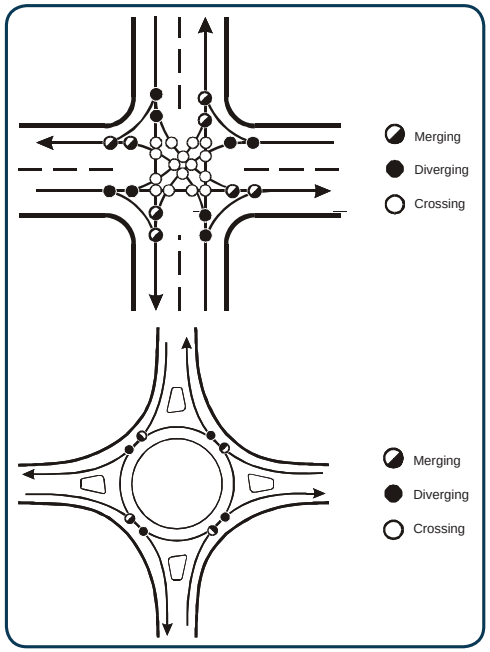
This section discusses potential safety related strategies to be considered throughout the Ames area.

ROUNDABOUTS

A modern roundabout is a roadway junction where vehicles circulate counterclockwise around a center island. There are several benefits to the installation of a roundabout compared to a signalized intersection including:

- Safety
- Sustainability
- Reduction in off-peak delay
- Long-term maintenance cost savings

A typical four-legged two-lane intersection has 32 conflict points whereas a modern single-lane roundabout has only 8 conflict points. In addition to fewer potential crash locations, circulating traffic in a roundabout operates at slower speeds than vehicles passing through a signalized intersection. The slower speeds and directional circulation offer safety benefits including less severe crashes. Right-angle crashes are eliminated and the typical roundabout crashes that occur are sideswipes which result in fewer fatalities and injury crashes than other crash types. Additionally, the slower speeds and single direction circulation make it easier for younger and elderly drivers to enter the traffic stream and appropriately judge adequate gaps in the circulating traffic. Although the number of conflict points increases from a single-lane to a multi-lane roundabout, the relative number of conflict points remains substantially lower compared to a signalized intersection.



Single-approach Intersection and Roundabout Conflict Points

Not only are roundabouts safer for drivers, but roundabouts offer safety benefits for pedestrian and bicycle traffic. Roundabouts are designed to have splitter islands dividing vehicles entering and exiting the roundabout at each approach. The divider islands offer pedestrians a refuge when crossing the street allowing pedestrians to cross each direction of traffic independently. Cyclists can either dismount and cross as pedestrians or they can enter the roundabout as non-motorized vehicles. The slow circulating speeds of roundabouts are more cyclist friendly than signalized intersections.

Middle Road/53rd Street, Bettendorf, Iowa

One of the benefits of roundabouts is sustainability. Since roundabouts allow continuous vehicular flow, vehicle emissions are lower for roundabouts compared to signalized intersections. Additionally, as noted previously, roundabouts are typically safer for all modes of traffic including pedestrian and bicycle traffic as well as vehicular traffic.

Roundabouts are yield controlled which results in minimal vehicular delay during uncongested time periods. Initial costs for the installation of roundabouts are typically higher than signalized intersections due to the need for additional right of way, but roundabouts offer improved long-

term maintenance costs compared to signalized intersections and typically cost less over time.

A few disadvantages of roundabouts include:

- Heavy vehicles may need to utilize both lanes of traffic when traversing multilane roundabouts, or will require installation of a truck apron in single lane roundabout.
- Emergency vehicles are required to reduce their speed when passing through roundabouts regardless of time of day ; however, the slowing required to negotiate a roundabout typically represents a negligible impact on total emergency vehicle travel time (and it's noted that emergency vehicles typically have to slow on approaches with red signal indications before proceeding through the intersection).
- Vehicles are continuously flowing through roundabouts prohibiting the opportunity to stop vehicular traffic for pedestrians unlike signalized intersections; however, vehicles are moving slow enough that yielding for pedestrians crossing or waiting to cross becomes very easy.

Modern roundabouts that are designed properly with sufficient horizontal deflection and adequate pavement markings offer several advantages over signalized intersections given the vehicular volumes can be adequately served by a roundabout and the roundabout is geometrically feasible. The traffic operations of a roundabout need to be analyzed with future traffic projections to ensure a roundabout is the best solution. Additionally, other considerations may prohibit the installation of a roundabout including approach grades, right of way constraints or at a location within a network of signalized intersections.

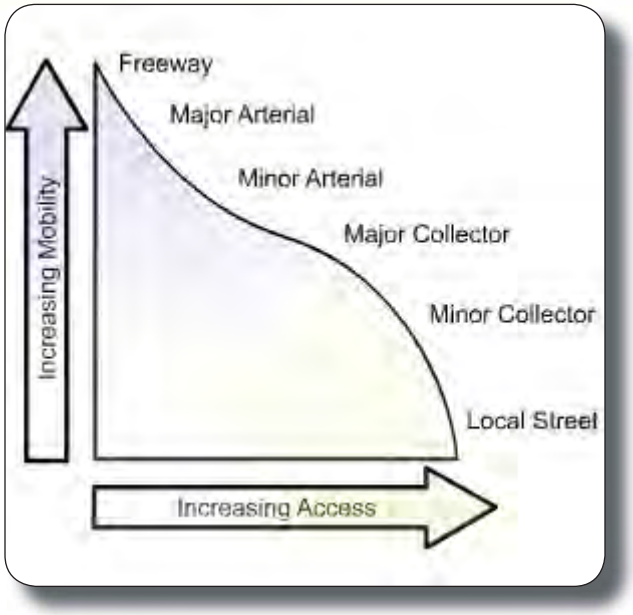
Access Management

Part of the transportation planning process includes access management. The Transportation Research Board (TRB) Access Management Committee defines access management as the systematic control of the location, spacing, design and operation of driveways, median openings, interchanges, and street connections. Access management also includes roadway design treatments such as medians and auxiliary lanes, and the appropriate spacing of traffic signals. By managing roadway access, government agencies can increase public safety, extend the life of major roadways, reduce traffic congestion, support alternative transportation modes, and improve the appearance and quality of the built environment.

Good access management promotes safe and efficient use of the transportation network. A set of techniques that state and local governments can use to control access to highways, major arterials, and other roadways include:

- **Access Spacing**: increasing the distance between traffic signals improves the flow of traffic on major arterials, reduces congestion, and improves air quality for heavily traveled corridors.
- **Driveway Spacing**: Fewer driveways spaced further apart allows for more orderly merging of traffic and presents fewer challenges to drivers.
- **Safe Turning Lanes**: dedicated left- and right-turn, indirect left-turns and U-turns, and roundabouts keep through-traffic flowing. Roundabouts represent an opportunity to reduce an intersection with many conflict points or a severe crash history (T-bone crashes) to one that operates with fewer conflict points and less severe crashes (sideswipes) if they occur.
- **Median Treatments**: two-way left-turn lanes (TWLTL) and nontraversible, raised medians are examples of some of the most effective means to regulate access and reduce crashes.
- **Right-of-Way Management**: as it pertains to R/W reservation for future widenings, good sight distance, access location, and other access-related issues.

Access Management provides an important means of maintaining mobility. It calls for effective ingress and egress to a facility, efficient spacing and design to preserve the functional integrity, and overall operational viability of street and road systems.



In areas of dynamic development, such as the S. Duff Avenue corridor, it is important to define access standards that achieve a balance between property access and functional mobility of the road system.

South Duff Avenue, south of S. 2nd Street

10.2 Security

Transportation security has generated a heightened attention since the terrorist attacks of September 11, 2001. Transportation infrastructure is vulnerable to terrorist attack due to the high concentrations of people, the threat to daily life as an essential public service, and the likelihood of the system being used both as the delivery and escape mechanism for terrorists.

Securing our nation from further attack includes focusing on what can be done now to prevent threats from being carried out, mitigating the results if they do occur, and expediting the response and recovery efforts following the event. It has been recognized that the most cost-effective time to begin to address security issues is when transportation projects are being planned and designed.

National Response Framework

The National Response Framework (NRF) was issued by the US Department of Homeland Security in January 2008. This document defines the key principles, roles, and structures that organize response methods in the United States. The NRF is classified as a framework, written to guide the local, tribal, State and Federal response efforts. The NRF identifies special circumstances where the Federal Government exercises a larger role, including incidents where Federal interests are involved and catastrophic incidents where a State would require significant support. The NRF enables first responders, decision makers, and supporting entities to provide a unified national response.

The NRF is written for senior elected and appointed leaders, such as Federal department or agency heads, Governors, mayors, tribal leaders, and city/county officials. Personal preparedness by individuals and households is also emphasized. The NRF and supporting documents are available online.

Key principles included in the NRF:

- **Engaged Partnership**. Leaders at all levels must communicate and actively support engaged partnerships by developing shared goals and aligning capabilities so that no one is overwhelmed in times of crisis.
- **Tiered Response**. Incidents must be managed at the lowest possible jurisdictional level and supported by additional capabilities when needed.
- **Scalable, Flexible, and Adaptable Operational Capabilities**. As incidents change in size, scope, and complexity, the response must adapt to meet requirements.
- **Unity of Effort Through Unified Command**. Effective unified command is indispensable to response activities and requires a clear understanding of the roles and responsibilities of each participating organization.
- **Readiness To Act**. Effective response requires readiness to act balanced with an understanding of risk. From individuals, households, and communities to local, tribal, State, and Federal governments, national response depends on the instinct and ability to act.

DISCUSSION OF 2006-2011 U.S. DOT STRATEGIC PLAN

One of the 5 strategic areas outlined in the U.S. DOT Strategic Plan is Security, Preparedness and Response. The strategic goal for security is stated as:

> *"Balance transportation security requirements with the safety, mobility and economic needs of the Nation and be prepared to respond to emergencies that affect the viability of the transportation sector"*

The U.S. DOT strives to achieve this goal with 3 outcomes:

1. Expert transportation sector intelligence
2. Preparedness for emergencies affecting the transportation sector
3. Effective response to emergencies affecting the transportation sector

The Strategic Plan states the importance of working closely with the Department of Homeland Security to assess and reduce the vulnerabilities of transportation services and infrastructure to terrorist or criminal attacks while ensuring the mobility needs of the Nation for personal travel and commerce. The list of security strategies in the plan include:

1. Work with the Operating Administrations to communicate and validate timely, relevant, expert intelligence analysis that focuses preparedness efforts, supports operational response, supports international programs, and informs technical requests from the Intelligence and Law Enforcement Communities.
2. Work with the Operating Administrations to develop a security policy framework that will ensure preparedness, mitigate the consequences of transportation sector emergencies, and support the Department's mission.
3. Fulfill DOT commitments to international partners and agreements, such as the Security and Prosperity Partnership for North America, and the North Atlantic Treaty Organization (NATO).
4. Maintain DOT responsibility for oversight of national security initiatives affecting the maritime transportation system within the Maritime Administration.
5. Maintain government-owned sealift assets and provide assured access to commercial sealift and related commercial intermodal assets for use in defense mobilizations and national emergencies.
6. Develop and implement actions to work aggressively on closing identified security program gaps and emergency operation gaps throughout the transportation system.
7. Work with the States, the Department of Defense, Surface Deployment and Distribution Command, State military offices, and applicable military units to identify and address the highway infrastructure and operational requirements that support National defense and deployment needs.
8. Represent government and industry stakeholders within the civil community in the identification of U.S. Space-Based Position, Navigation, and Timing (PNT) needs and requirements, the promotion, coordination and leveraging of PNT capabilities across the civil community, and in the development of backup position and timing capabilities that can support critical infrastructure applications within the U.S. (Supports all outcomes)
9. Develop, promote and enforce performance-based national and international hazardous materials security standards.

ROLE OF AAMPO

State DOTs and MPOs may have the ability to promote interagency coordination between the different modes of transportation, governmental agencies, groups focused on security, and others. MPOs can support programs and fund projects that enhance secure travel for all transportation system users. As the entities that plan and select projects for implementation, the MPO can ensure that whatever criterion is used to select and advance projects in a particular region recognizes, highlights, and promotes projects that address transportation security.

The MPO currently does not have an emergency evacuation/detour plan; however, the development of this plan is currently in progress.

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Chapter 11:
Environmental Coordination and Mitigation

HDR

CHAPTER 11: ENVIRONMENTAL COORDINATION AND MITIGATION

Transportation projects have the potential to impact the natural and man-made environment. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy For Users (SAFETEA-LU) requires long range transportation plans to consider these impacts at the policy or program level. Projects included in a long range plan are often years away from final design and alignment; therefore, a detailed environmental review is not feasible at this stage of the planning process. However, the AAMPO can consult with resource agencies to discuss potential impacts to natural and historic resources, and develop policies or strategies to ensure that transportation projects have minimal impacts on the environment.

11.1 Federal Requirements

Federal code outlines the requirements for metropolitan planning areas (MPO) regarding environmental consultation. 23 Code of Federal Regulations (CFR) Section 450.322 states that the transportation plan should include "a discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the metropolitan transportation plan. The discussion may focus on policies, programs, or strategies, rather than at the project level. The discussion shall be developed in consultation with Federal, State, and Tribal land management, wildlife, and regulatory agencies." This consultation shall involve comparison of transportation plans with State conservation plans, maps, and inventories of natural and historic resources. The overall purpose of this consultation is to integrate environmental values into the decision-making process from the broad planning level to the specific project level.

The AAMPO area (part of Story and Boone counties) is in attainment for all criteria pollutants (EPA, June 15, 2010); in accordance with 40 CFR 93.102, transportation conformity requirements for transportation plans do not apply.

11.2 National Environmental Policy Act Overview

Through the use of federal funding or the need for a federal approval or permit, many projects will be required to comply with the National Environmental Policy Act (NEPA). The issue of whether the project requires federal action is the determining factor in whether the project is subject to the requirements of NEPA. "Federal actions" are generally defined as those actions that are new or continuing federal activities that are either funded, assisted, conducted, or approved by a federal agency. NEPA established a supplemental mandate for Federal agencies to consider the potential environmental consequences of major Federal actions (such Federally-funded, permitted, or approved transportation projects), assess reasonable alternatives to agency proposed actions, identify and evaluate potential adverse environmental effects, document the analysis, and make this information available to the public for comment prior to implementation. Compliance with NEPA is required before final design.

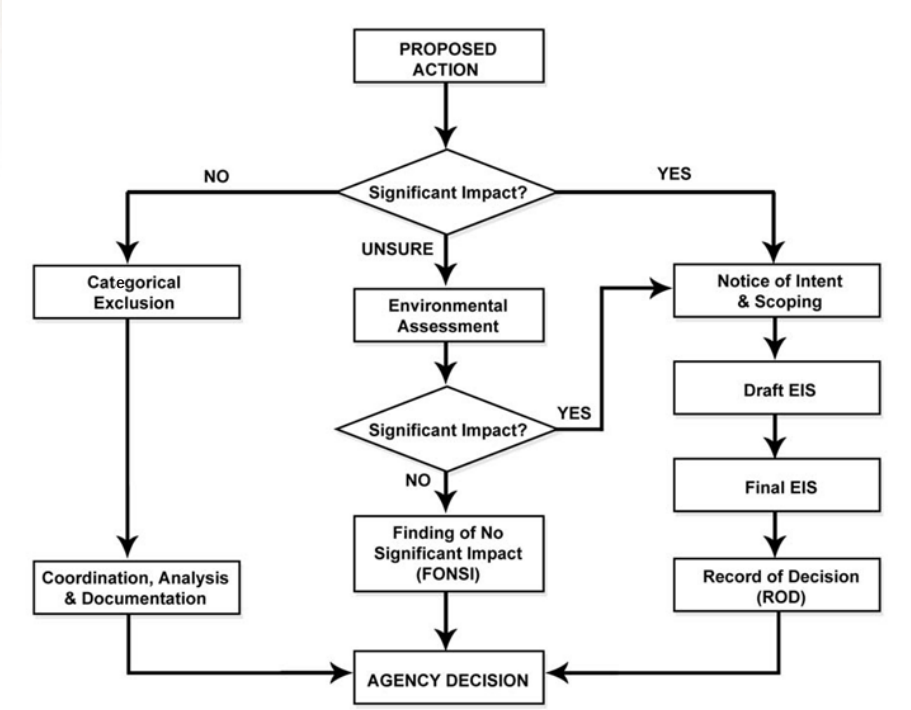
Transportation projects that do not utilize Federal funding and do not require a Federal permit or approval are not subject to NEPA. Complying with NEPA is generally the responsibility of the project sponsor. The NEPA process includes the consideration of alternatives for the project and their environmental effects, as well as public involvement and interagency collaboration.

Once it has been determined that a project is a federal action and is subject to NEPA, the type of environmental documentation must be determined. The type and scope of environmental document required by NEPA depends on the nature of the project and the significance of its impacts. The three document types, in order of complexity, are a Categorical Exclusion (CE), an Environmental Assessment (EA), and an Environmental Impact Statement (EIS).

- A CE is the simplest process, and is applicable if the project meets certain criteria for actions that do not individually or cumulatively have a significant effect on the environment.
- An EA is prepared for actions in which the significance of the environmental impact is not clearly established. If the environmental analysis and interagency review during the EA process finds that a project would have no significant impacts on the quality of the environment, a finding of no significant impact (FONSI) is issued. However, if the EA determines that there may be significant environmental consequences from the project, an EIS must be prepared.
- An EIS is a more detailed evaluation of the proposed project and its alternatives, and includes opportunities for other agencies and the public to comment. An EIS is prepared when it is anticipated that the action will have a significant effect on the environment, or to save procedural time when the significance of potential impacts is uncertain.

Figure 11.1 illustrates the process used to determine the level of NEPA documentation.

Figure 11.1. NEPA Document Decision Process (National Cooperative Highway Research Program)



Environmental analysis in a long range transportation plan is not meant to be equal to or substitute for the NEPA process. However, there are several benefits to linking the transportation planning and NEPA processes, including the early identification of potential environmental issues and consultation with various resource groups. Ultimately, compliance with NEPA will be carried out individually for each federally-funded project, or projects requiring a federal permit or approval when that project is in development. However, this transportation plan environmental analysis can provide an overview of resources in the AAMPO area, and the potential of planned transportation projects to affect those resources.

11.3 Agency Coordination

The AAMPO will consult with environmental, resource, and regulatory agencies to develop policies and implementation strategies aimed at completing the aforementioned objectives. The AAMPO has begun coordination and the following agencies have responded to a letter requesting their comments on the Ames Area 2035 Long Range Transportation Plan:

- **U.S. Army Corps of Engineers (USACE), Rock Island District:** The letter received from USACE provided a brief summary of the activities which would require USACE review. The letter stated that any project that would result in discharge of dredged or fill material into waters of the U.S. will require Department of Army Section 404 authorization. The letter also provided an overview of the Army's permitting process and requirements, and recommending contacting the Iowa Emergency Management Division to determine if proposed project areas would impact floodways.
- **U.S. Department of Homeland Security, United States Coast Guard:** The letter received from the Coast Guard indicated that the project will not require a Coast Guard permit and the project area will not fall within Coast Guard jurisdiction.
- **Iowa Department of Natural Resources (IDNR):** The letter received from the IDNR detailed potential environmental impacts associated with the projects, including wetlands, waters of the U.S., and threatened and endangered species. The letter also stressed the importance of implementing best management practices (BMP) as the projects proceed. The IDNR should be contacted to request an environmental review of natural resources in the project area, including threatened and endangered species.
- **Story County Conservation (SCC):** The letter received from the SCC stressed the importance of maintaining and improving pedestrian and bicycling facilities in the MPO area, preserving greenways and undeveloped areas, providing transportation infrastructure to areas east of Interstate 35, and limiting urban sprawl.
- **State Historic Preservation Office (SHPO):** The letter received from the historic preservation office requested coordination with the Ames Historic Preservation Commission, the Office of State Archaeologist, and SHPO to gather information regarding historic and archeological resources located in Ames.

11.4 Environmental Analysis

A general environmental analysis has been conducted to help raise environmental awareness early in the project development process and to provide the public and decision-makers with an overview of potential environmental impacts of projects. To conduct this analysis, a Geographic Information System (GIS) has been used to create a database of environmental-related layers. Transportation projects were then analyzed to determine what environmental characteristics may be an issue in the project limits of construction.

The AAMPO area includes part of Story County and Boone County. Many areas are too small or too numerous to map at a regional level and can only be clearly identified through a project-level analysis. Some areas are yet to be identified and will only become known once a project-

level analysis is completed. When a project is ready to move from the Long Range Transportation Plan (LRTP) into design phases, the project sponsor will be responsible for conducting the necessary analyses as required by state and Federal regulations to determine the type, location, and impact to environmentally-sensitive areas within the project study area.

RESOURCES POTENTIALLY AFFECTED

Environmental resources that could potentially be affected by transportation projects identified in the LRTP are discussed in the following sections. These resources include both the natural and human environment. The natural environment encompasses all living and non-living things occurring naturally on Earth, such as rivers, wetlands, species and natural areas. The human environment includes the physical environment and the relationship of people with that environment and includes items such as contaminated sites, institutions, parks and historic properties. The location of natural and human environmental resources are mapped and illustrated in **Figure 11.2** and **Figure 11.3**, respectively.

Figure 11.2. Natural Environment

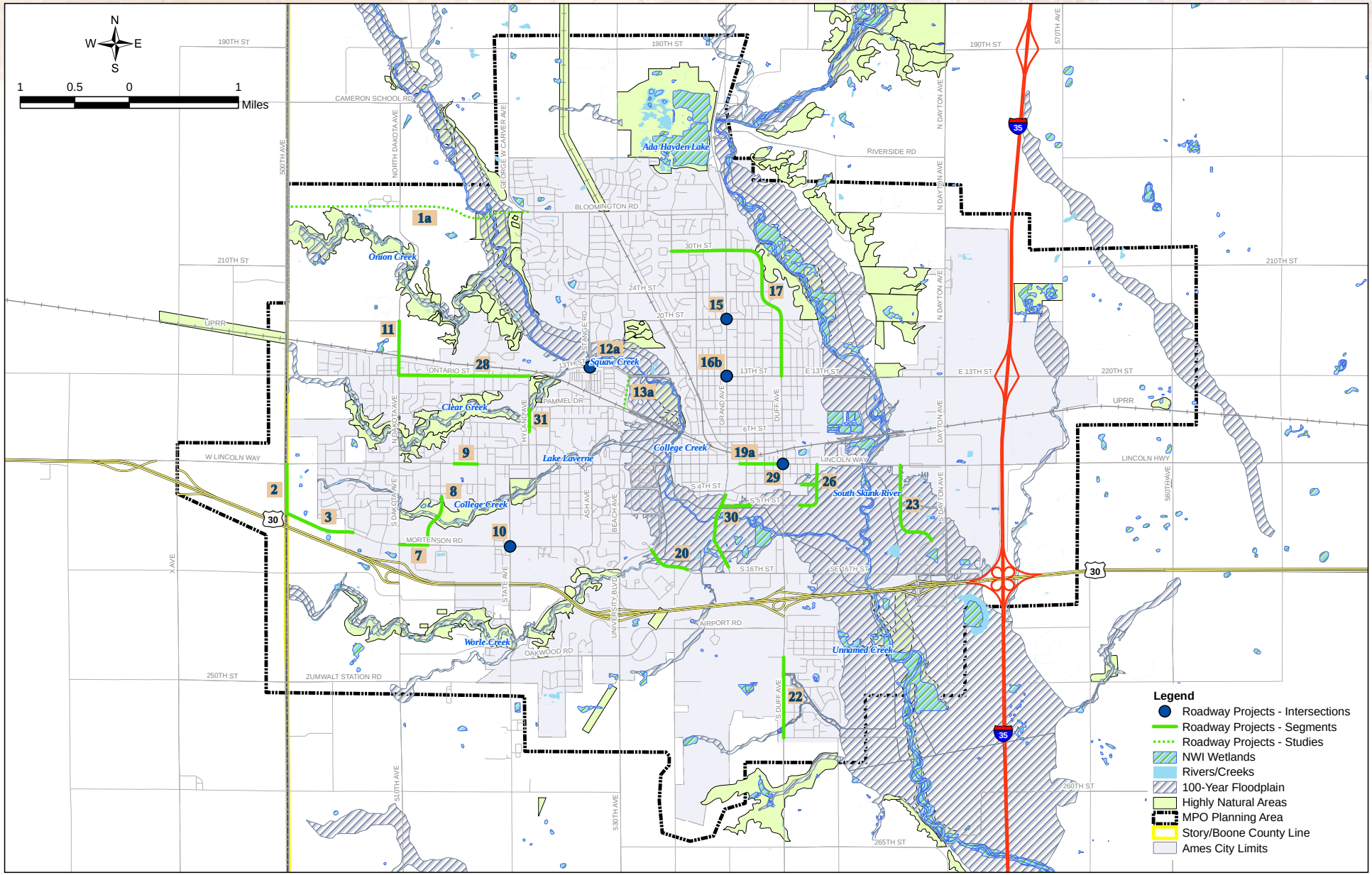
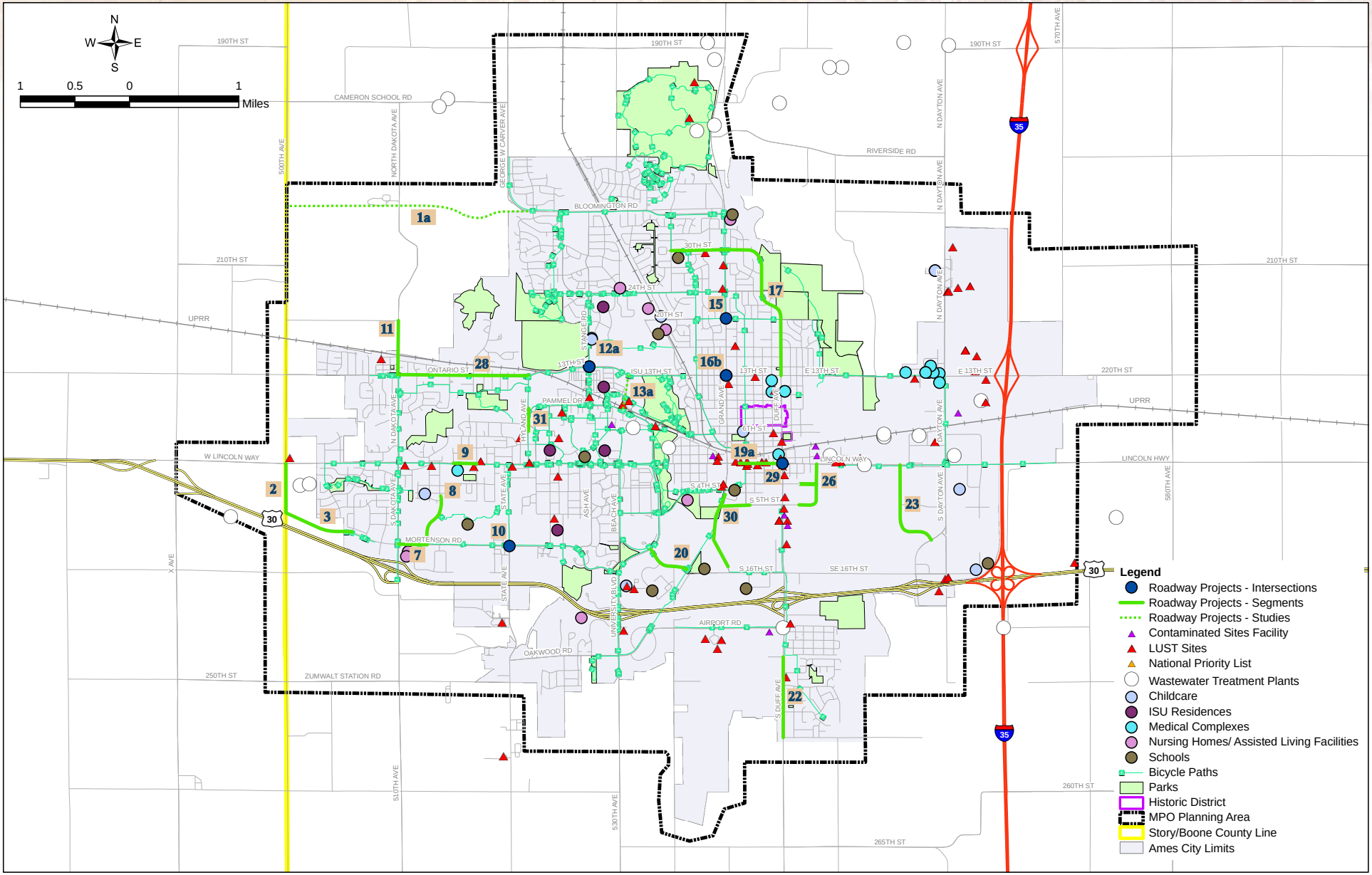


Figure 11.3. Human Environment



AIR QUALITY

The Clean Air Act requires EPA to set National Ambient Air Quality Standards for six common air pollutants. These air pollutants (also known as "criteria pollutants") are found throughout the United States. They are particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen oxides, and lead. The Iowa Department of Natural Resources (IDNR) Air Quality Bureau is responsible for air quality monitoring in Story and Boone counties. Both Story and Boone counties are in attainment for all criteria pollutants. One of the goals of the LRTP is to increase the efficiency of existing traffic movement to reduce air pollutants and greenhouse gases from automobiles. Consequently, it is anticipated that air quality would not be adversely affected by implementing LRTP improvements.

FARMLAND

The Farmland Protection Policy Act of 1981 (FPPA) (7 CFR 658) requires that Federal projects minimize the conversion of farmland to nonagricultural uses. To the extent practicable, state and local farmland policies are to be considered. Farmland is defined as prime or unique farmland or farmland of statewide or local importance. According to the Guidelines for Implementing the Final Rule of the Farmland Protection Policy Act for Highway Projects, prime farmland which is already in or committed to urban development is by definition not subject to the FPPA (FHWA, May 1989). The FPPA defines urban development as lands identified as 'urbanized area on the Census Bureau Map, urban area mapped with a tint overprint on the USGS topographical maps, or land with a density of 30 structures per 40-acre area (7 CFR 658).

Transportation projects within the urbanized area of Ames would not be subject to the FPPA. A few of the projects on the periphery of Ames, such as the Bloomington Road Extension, the 500th Avenue Reconstruction, and the Mortensen Road Extension, may be subject to the FPPA.

FLOODPLAINS

Executive Order (EO) 11988, Floodplain Management, documented in 42 Federal Register (FR) 26951, requires that Federal agencies identify potential floodplain encroachment by projects they fund and that they assess the impact of this encroachment on human health, safety, and welfare and on the natural and beneficial values of the floodplain. A floodplain is defined as the area adjacent to a watercourse, including the floodway, inundated by a particular flood event. A floodway is the channel and any adjacent floodplain areas that must be kept free of encroachment to ensure that the 100-year (1 percent annual chance) flood is conveyed without increasing the flood height by more than 1 foot. For purposes of the discussion in this LRTP, floodplain is synonymous with the 100-year floodplain. Several recent storm events have resulted in floods that exceeded the 100-year flood.

Constructability of a project relies on accurate drainage and floodplain data. Consideration must be given to existing drainage and floodplain conditions to ensure that the project avoids the potential for flood hazards or substantial disturbance to drainage patterns. Impacts on floodplains typically occur when the topography within a floodplain is substantially modified by either placement or removal of materials within the floodplain.

The Federal Emergency Management Agency (FEMA) has mapped floodplains for the South Skunk River, Squaw Creek, Worrell Creek, College Creek, Clear Creek, Onion Creek, and several unnamed tributaries of these streams. Several of the planned road projects cross these floodplains; these roads should be designed to minimize flooding impacts during significant storm events. Some of the proposed road improvement projects may require a floodplain permit from IDNR. Further mitigation measures are discussed in the Mitigation Activities section of this document.

WETLANDS AND OTHER WATERS OF THE U.S.

Waters of the U.S., including wetlands, waterways, lakes, natural ponds, and impoundments, are regulated by USACE under Section 404 of the Clean Water Act, which requires a permit to authorize the discharge of dredged or fill material into waters of the U.S. (33 USC 1344). The USACE Rock Island District has jurisdiction over wetlands potentially affected by the Project. IDNR is responsible for Section 401 Water Quality Certification for any project requiring a Federal permit or license that includes a discharge into a water of the state. U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory maps have been developed for Story and Boone counties and identify several wetlands that could potentially be affected by the proposed road projects. Several of the streams in the area have been identified as waters of the U.S. Consequently, Section 404 permits would be required for these projects. Whether these projects are Federally-funded or not, acquisition of a Section 404 permit is a Federal action requiring NEPA compliance.

WILDLIFE AND THREATENED AND ENDANGERED SPECIES

Threatened or endangered (T&E) species are protected under the Endangered Species Act of 1973, as amended (ESA) (16 USC 1531 et seq.). The ESA provides for the protection of animal and plant species determined to have a declining population and to be in jeopardy of becoming extinct. USFWS has the authority of the Federal government to administer the protection of such species. Significant adverse effects on a Federally listed species or its habitat would require consultation with USFWS under Section 7 of the ESA. Section 7 requires Federal agencies to ensure that actions that they authorize, fund, or carry out are not likely to jeopardize the continued existence of T&E species or result in the destruction or adverse modification of their critical habitat.

Within the AAMPO planning area, rivers, streams, wetlands, and upland highly natural areas prairies, woodlands, and wetlands) provide habitat for a diversity of wildlife species. USFWS lists two Federally-threatened species, the prairie bush clover and the western prairie fringed orchid as threatened in Story County; IDNR lists 38 state-protected species (13 animal and 25 plant species) in Story County. One Federally-endangered species (the Topeka shiner) is listed by USFWS in Boone County; IDNR lists 33 state-protected species in Boone County. Three of the proposed transportation projects are adjacent to highly natural areas. Potential adverse effects on a Federally-listed species or its habitat would require formal consultation with USFWS under Section 7 of the ESA. Section 7 requires Federal agencies to ensure that actions that they authorize, fund, or carry out are not likely to jeopardize the continued existence of T&E species or result in the destruction or adverse modification of their critical habitat.

The Ames High Prairie Preserve, an Iowa State Preserve area, is located within the City of Ames. This remnant prairie and woodland area provides habitat for hundreds of species, including at least two state-protected species (IDNR, no date). The proposed 13th and Stange Road intersection project is approximately 0.3 miles southwest of this preserve; no other LRTP project is in close proximity to this State Preserve.

HISTORIC AND ARCHAEOLOGICAL PROPERTIES

Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), and implementing regulations in 36 CFR 800 require Federal agencies to determine whether their undertakings will have adverse effects on historic properties (any archaeological site, historic structure, or other property listed on or eligible for listing on the National Register of Historic Places [NRHP]) and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment (16 USC 470f). This is generally accomplished through the Section 106 compliance process, which consists of the following steps:

- Identify consulting parties.
- Identify and evaluate historic properties located within the area of potential effect established for an undertaking.
- Assess adverse effects on properties listed on, or eligible for listing on, the NRHP.

- Consult with the Iowa SHPO, the Office of State Archaeologist, the Ames Historic Preservation Commission and, as appropriate, the Advisory Council on Historic Preservation and other interested parties to resolve adverse effects.

The American Indian Religious Freedom Act of 1978, as amended (42 USC 1996), was passed by Congress to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise their traditional religions, including, but not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. Therefore, the law requires that the effects of a Federal undertaking on Native American sites or places (prehistoric or historic) having religious, ceremonial, or sacred aspects be evaluated within the context of this law. Coordination with tribes acknowledged to have occupied this area of Iowa would need to be completed as part of the Section 106 compliance process and documented in the NEPA documentation for each project.

Two historic districts (Bandshell Park and Old Town) and twelve individual properties within the City of Ames are included on the NRHP. The historic districts are shown on **Figure 11.3**; individual NRHP sites are not mapped, and the location of potentially NRHP-eligible sites would need to be determined for each LRTP project. Each of the projects in the LRTP would need to be evaluated for potential impacts to these historic sites, as well as any properties that are potentially eligible for the NRHP.

SECTION 4(F)

Section 4(f) of the U.S. Department of Transportation Act of 1966 states that FHWA "…may approve a transportation program or project… requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if…there is no prudent and feasible alternative to using that land; and…the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use" (49 USC 303[c]).

A "use" of a Section 4(f) resource, as defined in 23 CFR 774.17, occurs: "(1) when land is permanently incorporated into a transportation facility, or (2) when there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose, or (3) when there is a constructive use of land." A constructive use of a Section 4(f) resource occurs when the transportation project does not incorporate land from the Section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the property are substantially diminished by a substantial interference from noise, aesthetic changes, or loss of access.

Four of the LRTP projects are adjacent to or in close proximity to city parks. All LRTP projects, with the exception of the 13th and Grand Avenue intersection project, cross or are parallel to designated bike paths. Designated bike lanes within city streets are generally considered transportation resources and are not Section 4(f) properties, but recreational bike paths separate from streets are considered Section 4(f) properties. Other recreation areas, such as swimming pools, the aquatic center, and public-owned golf courses, baseball, and softball fields, are considered to be protected under Section 4(f). Each of the Federally-funded LRTP projects would need to be evaluated for potential use of Section 4(f) properties as part of the NEPA documentation.

SECTION 6(F)

Parkland or recreation land that was acquired or developed with funding authorized under Section 6(f) of the Land and Water Conservation Fund Act of 1965 (LWCFA) must not be converted to non-park/recreation use without the approval of NPS unless it is determined that there are no practicable alternatives to the conversion and that there will be provision of replacement property that is of at least equal fair market

value and of reasonably equivalent usefulness for recreation purposes as the land proposed to be taken. If Section 6(f) land would be used for a transportation project, coordination with the U.S. Department of Interior, respective state agencies, and the local agency with jurisdiction over the park or recreation area would be necessary (16 USC 460l-4 through 460l-11). The LWFCA funded project database lists two parks in the City of Ames receiving LWFCA funding; neither of these parks are in close proximity to LRTP projects (NPS, August 16, 2010).

NOISE

FHWA has developed noise abatement criteria (NAC) and procedures for use in planning and designing Federally funded roadways. These criteria and procedures are set forth in 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. In addition, Iowa DOT's Noise Analysis and Abatement Policy for Federal-Aid Projects was written to conform to the Federal policy and guidelines as stated in 23 CFR 772.

There are numerous sensitive receptors in the vicinity of LRTP projects, such as schools, child care, nursing homes, medical complexes, churches and other places of worship, and residences. The location of licensed child care facilities, Iowa State University residences, medical complexes, nursing homes, assisted living facilities, and schools are mapped on **Figure 11.3**. In accordance with Iowa DOT guidance, the appropriate level of noise analysis would need to be completed for each of the LRTP projects as part of the NEPA documentation.

HAZARDOUS WASTE

Properties where hazardous or other regulated materials have been stored can present a future risk if spills or leaks have occurred. Contaminated or potentially contaminated properties are of concern for transportation projects because of the associated liability of acquiring the property through ROW purchase, the potential cleanup costs, and safety concerns related to exposure to contaminated soil, surface water, or groundwater. The use, storage, disposal, and transportation of hazardous materials and waste is regulated by numerous Federal regulations, such as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), and the Toxic Substance Control Act (TSCA),and state regulations (Iowa Administrative Code 567). Documentation of contaminated sites is available through the Environmental Protection Agency (EPA) and IDNR.

At a minimum, sites identified by this environmental review include those on the National Priorities List (NPL); Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list; Iowa Registry of Hazardous Waste or Hazardous Substance Disposal Sites, known leaking underground storage tank (LUST) sites, and any sites currently or formerly operating as gas stations, bulk petroleum plants, rail yards, electrical substations, dry cleaners, landfills, junkyards, vehicle repair and auto body/paint shops, fleet maintenance facilities, and agricultural chemical and fertilizer dealerships. Contaminated sites, including LUST sites and an NPL site, are mapped on **Figure 11.3**.

Many of these sites are in close proximity to LRTP projects. Appropriate studies, in accordance with the Iowa DOT Office of Location and Environment Manual (Iowa DOT, August 2009) would be conducted for projects subject to NEPA. For non-NEPA projects, studies would also be conducted as part of the due diligence process to minimize the possibility of acquiring contaminated property that could affect or be affected by the project.

ENVIRONMENTAL JUSTICE

Title VI of the Civil Rights Act of 1964 (42 USC 2000d et seq.) ensures that individuals are not excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving Federal financial assistance on the basis of race, color, national origin, age, sex, and disability. In addition, Executive Order 12898 (59 FR 7629) on environmental justice (EJ), dated February 11, 1994, directs that a Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs,

policies, and activities on racial minority (as defined by the census: Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, some other race, or two or more races), ethnic minority (Hispanic or Latino), and low income populations, referred to as environmental justice populations.

As defined in FHWA Order 6640.23, FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, dated December 2, 1998, a disproportionately high and adverse effect on minority and low-income populations means an adverse effect that: "(1) is predominantly borne by a minority population and/or a low-income population; or (2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the nonminority population and/or non low-income population." Human health or environmental effects, including interrelated social and economic effects, may include, but are not limited to, "bodily impairment, infirmity, illness, or death; air, noise, and water pollution and soil contamination; destruction or disruption of man-made or natural resources; destruction or diminution of aesthetic values; destruction or disruption of community cohesion or a community's economic vitality; destruction or disruption of the availability of public and private facilities and services; vibration; adverse employment effects; displacement of persons, businesses, farms, or nonprofit organizations; increased traffic congestion; isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community; and the denial of, reduction in, or significant delay in the receipt of, benefits of FHWA programs, policies, or activities."

To address potential environmental justice issues at a broad scale for the LRTP, the AAMPO area was analyzed at the census block group level for the presence of ethnic and racial minorities, and low income populations that are substantially above the percentage of the City of Ames (those census block groups where the percentage of minority or low-income populations are at least 40 percent higher than the population of Ames). These locations are mapped and illustrated on **Figure 11.4** and **Figure 11.5**, respectively. Substantial ethnic and racial minority populations reside in much of central Ames. Several LRTP projects, such as the Dotson Drive, Lincoln Way, 30th Street/Duff Avenue, and Ontario Street projects could affect environmental justice populations. NEPA documentation for the LRTP projects would analyze these populations at a more detailed level, address potential disproportionate impacts to these populations, document efforts to inform them of proposed road improvement activities, and document efforts to minimize and avoid environmental impacts to the environmental justice populations.

AIRPORTS

The Ames Municipal Airport, a general aviation airport open to the public, is located approximately 0.2 mile south of US 30 and approximately 0.4 mile west of US 69 (locally designated at South Duff Avenue). The primary runway is 5,701 feet in length and is constructed of asphalt (Federal Aviation Administration [FAA], July 29, 2010). A 3,491-foot concrete runway serves as a secondary runway. On average, 92 aircraft operations occur per day, 93 percent of which consist of general aviation; the balance consists of air taxi and military operations (FAA, July 29, 2010).

Because the primary runway is greater than 3,200 feet in length, FAA requires that potential obstructions to airspace from construction of projects within 20,000 feet of the runway be evaluated in accordance with 14 CFR 77, Objects Affecting Navigable Airspace. This includes temporary construction equipment that could potentially interfere with airspace. FAA should be notified of any potential airspace obstructions, as specified in 14 CFR 77. All of the LRTP projects are within 20,000 feet of the Ames Municipal Airport and would need to be evaluated for potential airspace obstruction.

11.5 Mitigation Activities

Transportation planning activities considered in Ames Area 2035 Long Range Transportation Plan are regional in scope and all of the ideas included it the alternatives analysis are general concepts with limited

Figure 11.4. Racial and Ethnic Minority Populations

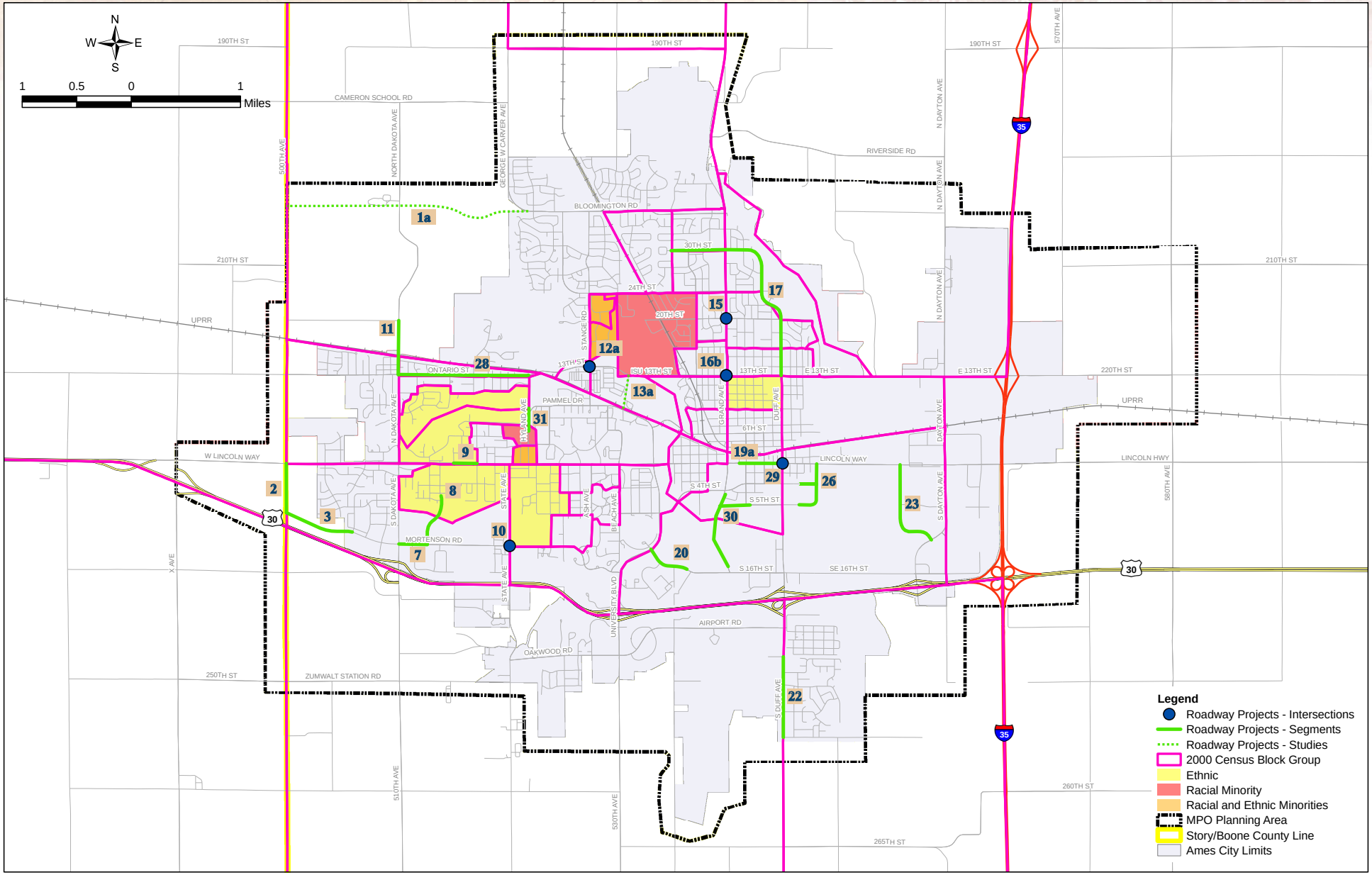
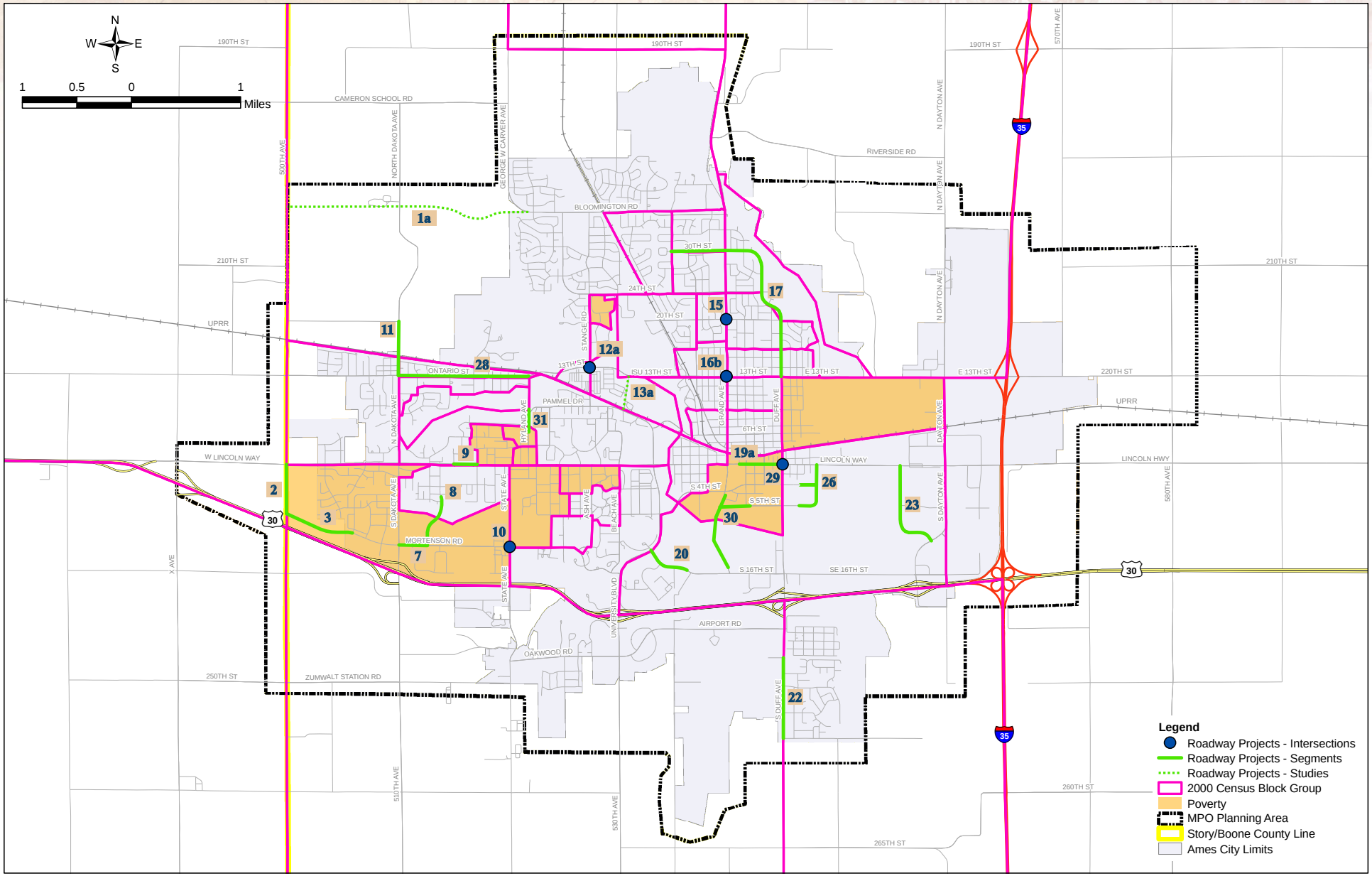


Figure 11.5. Low-Income Populations



detail on those elements that would impact the physical and social environment. Thus, the environmental mitigation discussion does not focus on individual projects within the transportation, but rather offers a summary of:

- The types of environmental sensitive areas of interest.
- The generalized mitigation strategies that could be considered in an effort to minimize negative effects that a project may have on an environmentally-sensitive area.
- The analysis to be conducted in future early stages of project development to identify potential conflicts between improvement concepts and environmentally-sensitive areas.

The AAMPO and the jurisdictional partners are committed to minimizing and mitigating the negative effects of transportation projects on the natural and built environments. The AAMPO recognizes that not every project will require the same type and / or level of mitigation; but to the extent possible, the design phase for transportation projects should include strategies to minimize off-site disturbance in sensitive areas, to preserve air and water quality, to limit tree removal, to minimize grading and other earth disturbance, to incorporate BMPs for erosion and sediment control, and limit noise and vibration impacts. Alternative designs or alignments should be promoted, where feasible, to avoid environmentally-sensitive areas.

The AAMPO encourages jurisdictions to follow federal guidance as an environmental strategy. The steps used to define mitigation in 40 CFR 1508.20 should be followed by project sponsors; they are:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resource or environment.

Avoidance of damage to the environment should always be the primary goal. However, when this cannot be achieved, minimizing impacts and compensating for them can help assuage any negative environmental impacts from transportation projects.

Protecting and enhancing the natural and built environment is an important concern for the AAMPO. Project sponsors are encouraged to begin coordination with environmental, regulatory, and resource agencies as early in the project development process as possible to ensure the best possible project outcome. While it is ultimately the project sponsor's responsibility to fulfill compliance with NEPA (as it applies to Federal actions), it is the AAMPO's best interest to promote sound planning that considers environmental factors and works to preserve, and if possible enhance, the environment. In the process of developing the long range transportation plan, the AAMPO has established a goal of protecting environmental resources.

AAMPO should continue to develop a multi-modal transportation system that preserves and enhances the natural and built environment while improving quality of life in the AAMPO area.

Objectives that will help achieve this goal include the following:

- Minimize transportation system infringement into undisturbed areas of significant natural resources.
- Establish new transportation corridors that have been planned, in part, to minimize impacts to significant natural resources.
- Increase the efficiency of existing traffic movements to reduce air pollutants from automobiles.

- Incorporate natural resources as an attraction to the community.
- Protect, preserve, and enhance natural, historic, cultural, and recreational resources by managing the existing transportation system and making transportation investments with these valued community resource in mind.
- Implements public outreach programs to include all sectors of the community, including minority and low-income groups to involve the public in the decision-making process.
- Promote energy efficiency and conservation in the movement of people and goods.
- Encourage the protection of wetlands, green spaces, and other natural resources in the planning and design of new transportation facilities, and utilize appropriate mitigation if unavoidable impacts will occur.
- Encourage the use of existing right-of-way for the expansion of the transportation system and encourage multiple uses of the right-of-way when possible.
- Advocate that aesthetic quality and scenic beauty be taken into account in roadway design and adjacent land development, including the use of native vegetation.

As the planning and environmental documentation process proceeds, mitigations for specific environmental resources would be developed through coordination with regulatory agencies. Examples of these mitigations are as follows:

- The need for a floodplain development permit should be evaluated for each project located in a floodplain. Hydraulic and hydrological modeling is often required to document anticipated changes in the water surface elevation of the 100-year flood.
- The need for a Section 404 permit through the USACE should be evaluated for those projects potentially affecting wetlands or other waters of the U.S. Required wetland mitigation typically involves enhancement or restoration of wetlands in a specified area.
- Each project should be evaluated for potential impacts to threatened or endangered species, bald eagles, migratory birds, and other protected species. Consultation with the USFWS and IDNR should be conducted as needed. Typical mitigation involves construction timing restrictions or avoidance of specific habitat.
- Potential impacts to parks, recreation areas, waterfowl and wildlife areas, and historic sites would be evaluated within the Iowa FHWA Division Office: 5-Step Decision Process for determining uses of a Section 4(f) property. All minimization and avoidance measures would be documented and any unavoidable uses (where there is no feasible or prudent alternative to such use) of Section 4(f) properties would require concurrence from the officials having jurisdiction over the affected land.

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Ames Area MPO
metropolitan planning organization

Chapter 12:
Summary and Implementation

HDR

CHAPTER 12: SUMMARY AND IMPLEMENTATION

This Chapter summarizes the proposed LRTP, provides strategies for the Ames area transportation system and discusses performance measures to monitor the LRTP's effectiveness at meeting the goals and objectives discussed in Chapter 2.

12.1 Proposed Plan Summary

The proposed LRTP projects are discussed in detail in Chapter 8 and in Appendix A. This section provides a brief summary of the proposed LRTP. The Short-Term and Long-Term projects are illustrated on **Figure 8.1, Figure 8.2 and Figure 8.3**.

SHORT-TERM PLAN

The Short-Term Plan includes projects that are anticipated to be implemented during the first 10 years (year 2011 – 2020) of the plan. These projects are shown in **Table 12.1**.

Table 12.1. Short-Term Plan

Alternative Project Number	Project Description
Roadway Projects	
7	Mortensen Rd. Widening - S. Dakota Ave. to Dotson Dr.
8	Dotson Dr. Connection - Lincoln Way to Mortensen Road
9	Lincoln Way Widening - Marshall Ave. to Franklin Ave.
10	State Ave. / Mortensen Rd. Roundabout
11	N. Dakota Widening - Ontario Street to 215th Street
13a	Haber Road Study
16b	Grand Ave. / 13th Street Intersection Improvements- Add Left-Turn Lanes
17	30th Street / Duff Ave. Lane Reductions - Hoover Ave. to 13th Street
19a	Lincoln Way Lane Reduction - Gilchrist Ave to Duff Avenue
20	S. 16th Street Widening - University Blvd. to Vet Med Trail
28	Ontario St. Left-Turn Lane - Hyland Ave. to N. Dakota Ave.
29	Lincoln Way / Duff Avenue Intersection Improvements
30	Grand Ave. Extension - Squaw Creek Dr. to S. 16th / 5th Street Extension- Grand Ave. to Duff Ave.
31	Hyland Ave. Study - Pammel Drive to Sheldon Avenue
Bicycle/Pedestrian Projects	
BL1	On-Street Bike Lane On Duff Ave - 30th St / Northwestern Ave to 13th St / Duff Ave
BL2	On-Street Bike Lane On 500th Ave - Lincoln Way to Mortensen Rd Extension
BL3	On Street Bike Lane on Lincoln Way - Gilchrist St to Duff Ave
SUP2	Shared Use Path Along Stange Rd - Dalton St to Cameron School Rd.
SUP5	Shared Use Path Along E 13th St - Dayton Ave to 570th Ave
SUP7	Shared Use Path to Proposed Intermodal Facility - East of State Ave
SUP10	Shared Use Path Along Mortensen Rd - West of South Dakota

Alternative Project Number	Project Description
SUP11	Shared Use Path Along Proposed Grand Ave Extension to S 16th St
SUP12	Shared Use Path Along S Dayton Ave - SE 16th Ave to S Dayton Pl
SUP13	Shared Use Path to Recreational Park - East of Duff Ave
SUP 14	Shared Use Path Along Lincoln Hwy - N 500th Ave to Wilder Blvd and Hartford Dr to Thackeray Ave
SUP 16	Shared Use Path Along Proposed Mortensen Extension - Miller Ave to Y Ave
SUP 17	Shared Use Path Along S Duff Ave from Lincoln Way to S 3rd St
SH1	Sharrow on Hoover Ave and Northwestern Ave - Bloomington Rd to 6th St
SH2	Sharrow on Clark Ave - 24th St to S 3rd St
SH3	Sharrow on 13th St - N Dakota Ave to Meadowland Ave
SH4	Sharrow on Duff Ave - 13th St to Lincoln Way
SH5	Sharrow on Pammel Dr / University Blvd - Hyland Ave to S 4th St
SH6	Sharrow on Beach Rd / Osborn Dr - University Blvd to Lincoln Way
SH7	Sharrow on 6th St - University Blvd to Duff Ave
SH8	Sharrow on Union Drive - Morrill Dr to Lincoln Way
SH9	Sharrow on Lincoln Way - Freel Dr to Dayton Ave
SH10	Sharrow on S 4th St / S 3rd St - University Blvd to Duff Ave
SH11	Sharrow on Airport Rd - N Loop Dr to S Riverside Dr
SH12	Sharrow on Westbrook Dr/ Hickory Dr/Woodland St/West St - N Dakota Ave to Hyland Ave
SH13	Sharrow on Proposed Wilder Blvd - Lincoln Way to Mortensen Rd
II	Intersection Improvements for Non-Motorized Users

Alternative Project Number	Project Description
Transit Projects	
1	Extend Pink Route to Proposed 13th Street Commercial Development
2	Extend Purple Route to Wilder Blvd.
3	Extend Blue Route to Wal-Mart and Target
4	Cross Town Route- Fieldstone Development to Mortensen Road
5a	Intermodal Facility Phase I
5b	Intermodal Facility Phase II
5c	Intermodal Facility Circulator
6	Bus Stop Improvements
7	Increase Frequencies on Core Routes to 15/30 Minutes from 20/40 Minutes
8*	CyRide Facility Expansion
9	Alternatives Analysis Study - Orange Route Corridor
10	Des Moines/Ames Commuter Service Study
11	Articulated Buses on Red/Orange Routes
12	Automatic Vehicle Location Technology

**This project is being built in phases; depending on funding, some phases of this project may be built in the Long-Term Plan*

LONG-TERM PLAN

The Long-Term Plan includes projects that are anticipated to be implemented during the last 15 years (year 2021 – 2035) of the plan. These projects are shown in **Table 12.2**.

Table 12.2. Long-Term Plan

Alternative Project Number	Project Description
Roadway Projects	
1A	Bloomington Road Extension Study (West).
2	500th Avenue Reconstruction - W. Lincoln Way to Mortensen Road
3	Mortensen Road Extension - 500th Ave. to Miller Ave.
12a*	Stange Rd. / 13th Street Intersection Improvements - Roundabout
15	Grand Ave. / 20th Street Intersection Improvements
22	S. Duff Ave. Widening - Kitty Hawk Dr. to Ken Maril Rd. (now 3 lane)
23	Freel Dr. Reconstruction/Extension to Dayton Ave.
26	Cherry Ave. Extension - Lincoln Way to SE 5th Street
Bicycle/Pedestrian Projects	
SUP1	Shared Use Path Along Union Pacific Railroad - North of Bloomington Road
SUP8	Shared Use Path Along Walnut St - S 3rd St to Squaw Creek
SUP9	Shared Use Path Along Squaw Creek - Proposed Grand Ave Extension to Skunk River
PS1	Paved Shoulder on N Dakota Ave - North of Ontario St
PS2	Paved Shoulder on State Ave and Oakwood Rd - South of Mortensen Rd

**Depending on more detailed analysis, this project may be switched with Project 12b.*

2035 Proposed Plan Analysis

The Proposed Plan projects were analyzed using the travel demand model to develop projected year 2035 average daily traffic volumes. An

Intersection Capacity Utilization (ICU) analysis was performed for year 2035 Proposed Plan of key intersection with the proposed geometrics. The Proposed Plan year 2035 peak hour volumes were developed using the 2035 E+C peak hour turning movement volumes, 2035 E+C annual daily traffic (ADT) volumes on each key intersection leg, and Proposed Plan year 2035 ADT volumes on each key intersection leg generated with the travel demand model.

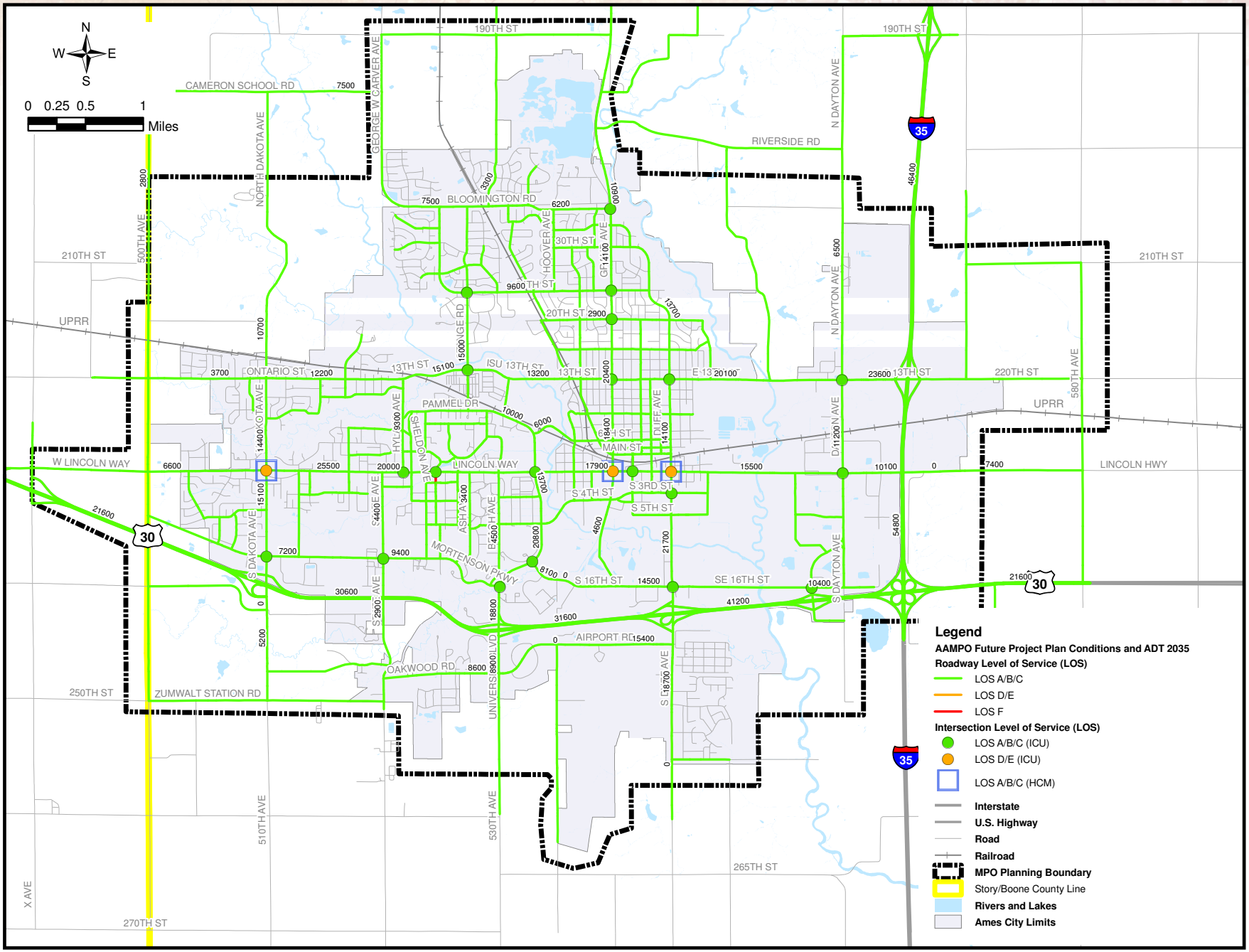
The Roadway level of service (LOS), ICU LOS, and ADT's for the Proposed Plan year 2035 conditions analysis are shown in Figure 12.1.

The intersections that are shown to operate in the peak hour with unacceptable ICU LOS (LOS D or worse) even with the proposed plan projects include the following:

- Peak Hour LOS D/E:
  - 13th St / Grand Ave
  - Lincoln Way/ Dakota Ave
  - Lincoln Way/ Grand Ave
  - Lincoln Way / Duff Ave

For the intersections with an unacceptable peak hour ICU LOS, a more detailed level LOS analysis was conducted using the Highway Capacity Manual (HCM) methodology. ICU is a more planning level intersection analysis while HCM is a more detailed analysis. Results of the HCM analysis sometimes vary from the ICU analysis since the HCM analysis uses more detailed input where as the ICU uses more generalized data instead. All of the intersections analyzed using the HCM LOS methodology are shown to operate with an acceptable LOS during the peak hour. The results of the HCM LOS are presented on **Figure 12.1**.

Figure 12.1. 2035 Proposed Plan ADT and LOS



12.2 Unmet Needs

The AAMPO has identified the need for several projects that are outside the fiscal constraints of this plan update. These projects are being shown in this document for illustrative purposes. The illustrative projects are as follows:

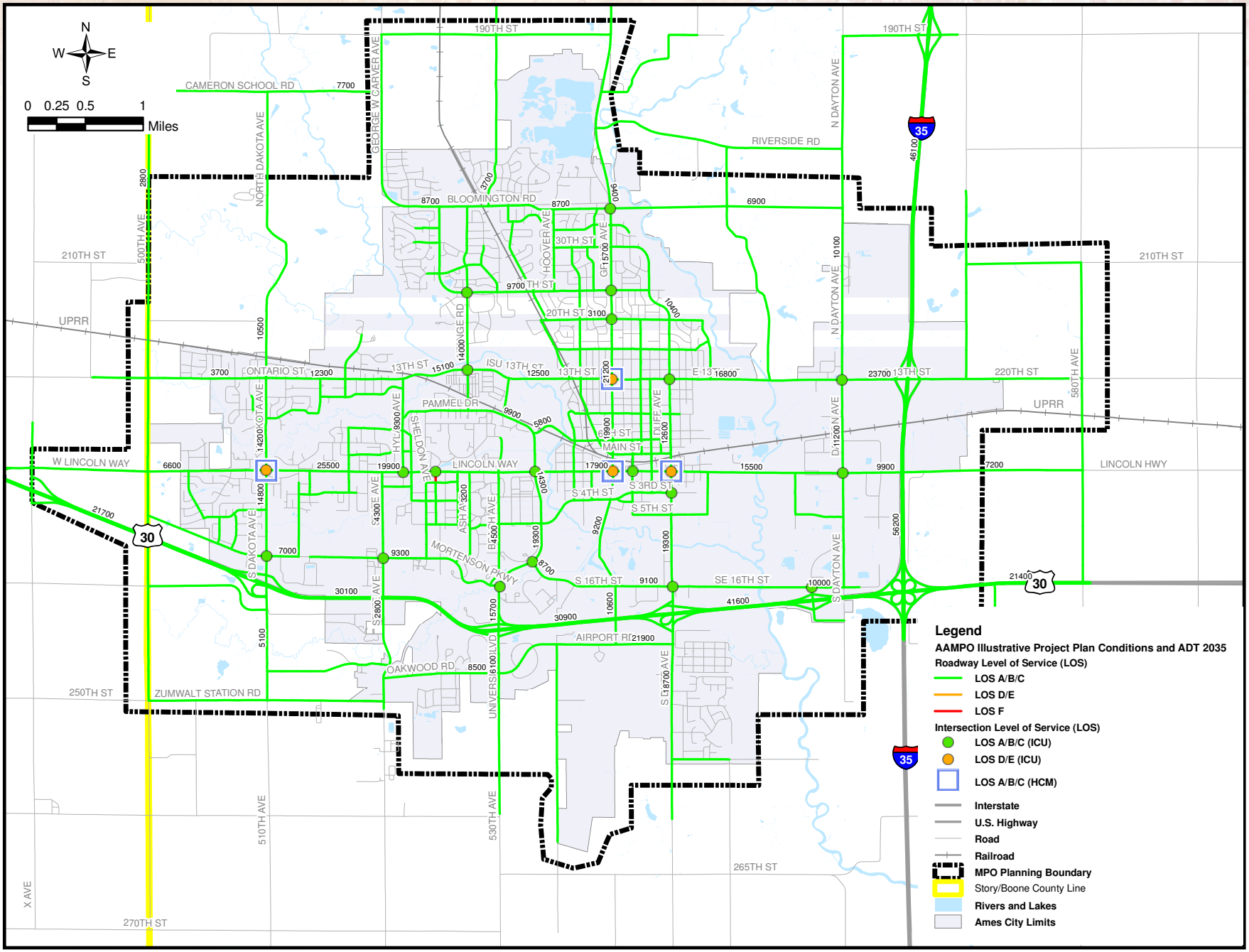
- Project 18 – Duff Avenue Underpass at Union Pacific Railroad
- Project 21 – Grand Avenue Extension – S. 16th Street to Airport Road
- Project 25 – Bloomington Road Extension – Grand Avenue to Dayton Avenue

2035 PROPOSED PLAN PLUS ILLUSTRATIVE PROJECTS ANALYSIS

The Proposed Plan projects plus the Illustrative projects were analyzed using the travel demand model to develop projected year 2035 average daily traffic volumes. An Intersection Capacity Utilization (ICU) analysis was performed for key intersection with the proposed geometrics. The Proposed Plan plus illustrative projects year 2035 peak hour volumes were developed.

The Roadway level of service (LOS), ICU LOS, and ADT's for the Proposed Plan plus illustrative year 2035 conditions analysis are shown in **Figure 12.2**. The intersections were analyzed using the same methodology described in Section 12.1.

Figure 12.2. 2035 Proposed Plan Illustrative Projects ADT and LOS



12.3 Transportation Strategies

Throughout the LRTP various transportation strategies were presented in order to address the goals and objectives identified through the Issues and Vision process. This section summarizes the various transportation strategies recommended for implementation.

TRAVEL DEMAND MANAGEMENT

TDM strategies are designed to reduce the demand for transportation and thus reduce the number of vehicles using the system. Various TDM strategies are discussed in detail in Chapter 6. The following is a list of the TDM strategies:

- **Strategy 1: Aggressive Land Use/ Urban Design**
- **Strategy 2: Create Trip Reduction Ordinance**
- **Strategy 3: Create Transportation Management Association (TMA)**

INTELLIGENT TRANSPORTATION SYSTEMS

Intelligent Transportation Systems (ITS) are a transportation system approach designed to use technology and the application of traffic management and operations methods to improve the efficiency of a transportation network. Various ITS strategies are discussed in Chapter 6. The following is a discussion on one of those strategies, advanced traffic signal control systems:

- **Advanced Traffic Signal Control Systems -** Advanced traffic signal control systems can improve the efficiency of a corridor without making physical changes to the roadway network.

SAFETY

The increased interest in safety can be credited to a continuing emphasis by the U.S. DOT on safety and the public's receptiveness to programs that save lives and advocates better quality of life for users of the nation's transportation systems. Various safety strategies/considerations are discussed in Chapter 10. The following is a summary of the safety strategies/considerations:

- **Roundabouts -** A modern roundabout is a roadway junction where vehicles circulate counterclockwise around a center island.
- **Access Management -** The Transportation Research Board (TRB) Access Management Committee defines access management as the systematic control of the location, spacing, design and operation of driveways, median openings, interchanges, and street connections. Access management also includes roadway design treatments such as medians and auxiliary lanes, and the appropriate spacing of traffic signals.

BICYCLE/PEDESTRIAN

Bicycling and walking as healthy modes of transportation, or as purely recreational activities, provide positive benefits in many areas including personal health, the health of the environment, reduced traffic congestion, improved quality of life, and the increased economic vitality of communities that have emphasized bicycle and pedestrian mobility. Chapter 6 and Appendix B provide a discussion of bicycle/pedestrian projects and strategies. The following is a few additional strategies related to bicycle/pedestrian facilities:

- **Complete Streets –** A complete street is one that is designed and operated to enable safe and comfortable access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities are able to safely move along and across complete streets. Instituting a complete streets policy ensures that the entire right-of-way is designed and operated to enable safe access for all users. Complete streets policies recognize that there is a need for flexibility as all streets are different and users needs will be balanced.
- **Bicycle Parking –** In order to promote the use of bicycles as an alternate mode of transportation, consideration of bicycle parking at areas of high need are encouraged. Bicycle parking needs to be visible, accessible and convenient.

- **Bicycle Signal Detection** – Traditional traffic signal detection is unable to detect the presence of the bicycles. On corridors with heavy bicycle volumes, it is recommended to add bicycle signal detection when the traffic signals are either being constructed, replaced or upgraded.

12.4 Performance Measures

In order to monitor the LRTP's effectiveness, performance measures have been developed that relate to the goal and objectives. This data has not typically been collected in the past, so the initial collection of this data will establish the base values for future year comparisons. There may be some performance measures that AAMPO may be unable to collect at this time. Also, some of the objectives cannot be directly measured.

1. Develop a Safe and Connected Multi-Modal Network

- Increase the connectivity of all modes including automobile, public transit, bicycle, air travel, freight rail and pedestrian.
  - Measure – Calculate the connected node ratio on an annual basis (number of street intersections divided by intersections plus cul-de-sacs).
- Incorporate strategies to promote safety and security across the entire network.
  - Measure – Monitor crash rates on annual basis for the transportation network.

2. Foster Livability, Quality of Life, and Sustainable Development

- Match the transportation system with the desired community development pattern.
  - Measure – Calculate the percent of new transportation projects that are consistent with the LUPP on an annual basis.
- Link land uses with a multi-modal network to reduce vehicle miles traveled and enhance non-automobile modes as an efficient mean of travel and a recreational opportunity.
  - Measure – Calculate the total vehicle miles traveled (VMT) on the area's roadway system each time the system-wide traffic counts are updated. Collect the total transit passenger miles on an annual basis.
- Reduce overall system vehicular hours traveled and improve regional access and travel times for emergency response.
  - Measure – Conduct studies to determine average travel time for selected origin-destination sets.

3. Deliver Context Sensitive Solutions

- Develop context sensitive transportation facilities that fit the physical setting and preserves scenic, aesthetic, historic, and environmental resources while maintaining safety and mobility.
  - Measure – Calculate the percent of transportation projects where the public input process was used.

4. Support Area Economic Opportunities

- Develop a transportation system that provides desirable linkages to existing developments, new developments, redevelopments, and supports economic drivers, such as the airport.
  - Measure – Percent of top 20 traffic analysis zones with the highest total employment that are served by all modes of transportation (roadway, bicycle/pedestrian and transit) on an annual basis.

5. Maximize the Benefits of Transportation Investments to Provide Efficient Transportation Service

- Preserve and maintain existing transportation infrastructure and enhance transportation system to reduce congestion on major corridors.

- Measure – Provide annual update on roadway conditions through the Pavement Management Program.

- Consider cost-effectiveness, initial capital costs, and life cycle costs for transportation projects.
  - Measure – Conduct a cost analysis prior to implementation of transportation projects.
- Provide a transportation system that yields a favorable benefit to cost ratio by increasing vehicle occupancy, minimizing per capita vehicle miles traveled by auto, reducing delay, or promoting travel by non-auto modes for a practical cost.
  - Measure – Assess the benefits and cost prior to implementation of transportation projects.

6. Protect Environmental Resources

- Minimize transportation system infringement into undisturbed areas of identified natural resources.
  - Measure – Inventory of impacted natural resources by new/ modified transportation systems on an annual basis.
- Minimize transportation system impact on property and the human environment.
  - Measure – Inventory of impacted property and human environment by new/modified transportation system projects on an annual basis.