

MANDAN MEMORIAL HIGHWAY CORRIDOR STUDY



CITY OF
MANDAN
"WHERE THE WEST BEGINS"

Prepared for
Bismarck-Mandan Metropolitan Planning Organization
City of Mandan

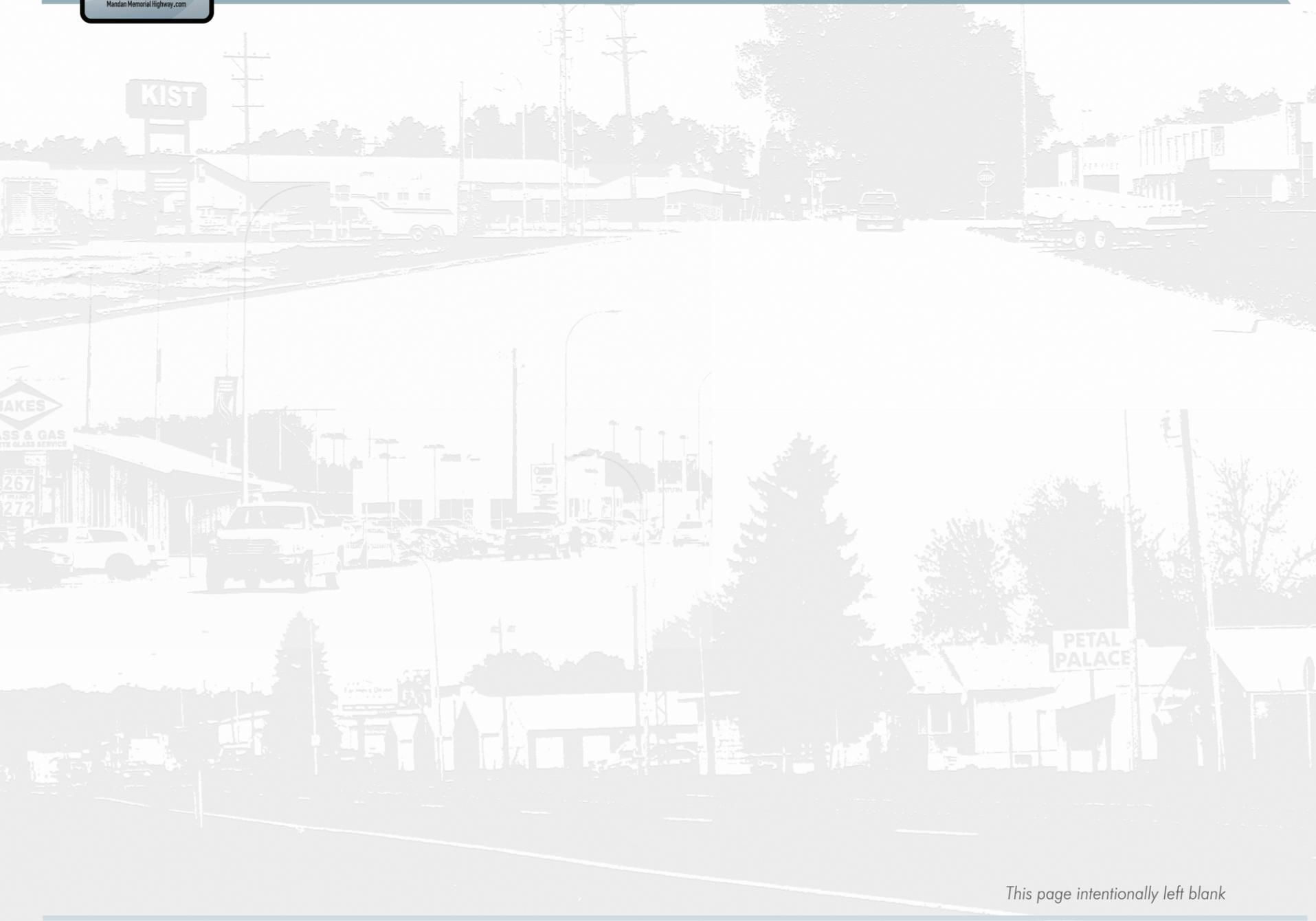


Prepared by
Kadrmas, Lee & Jackson, Inc.
RDG Planning & Design

Kadrmas
Lee &
Jackson

Engineers Surveyors
Planners





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Memorial Highway Corridor Study

Prepared By:

Kadrmas, Lee & Jackson, Inc.
128 Soo Line Drive
Bismarck, ND 58501
Phone: 701 355 8400
Fax: 701 355 8781
Website: kljeng.com

RDG Planning & Design
301 Grand Avenue
Des Moines, IA 50309
Phone: 515 288 3141
Fax: 515 288 8631
Website: rdgusa.com

On behalf of the
Bismarck-Mandan Metropolitan Planning Organization (MPO)

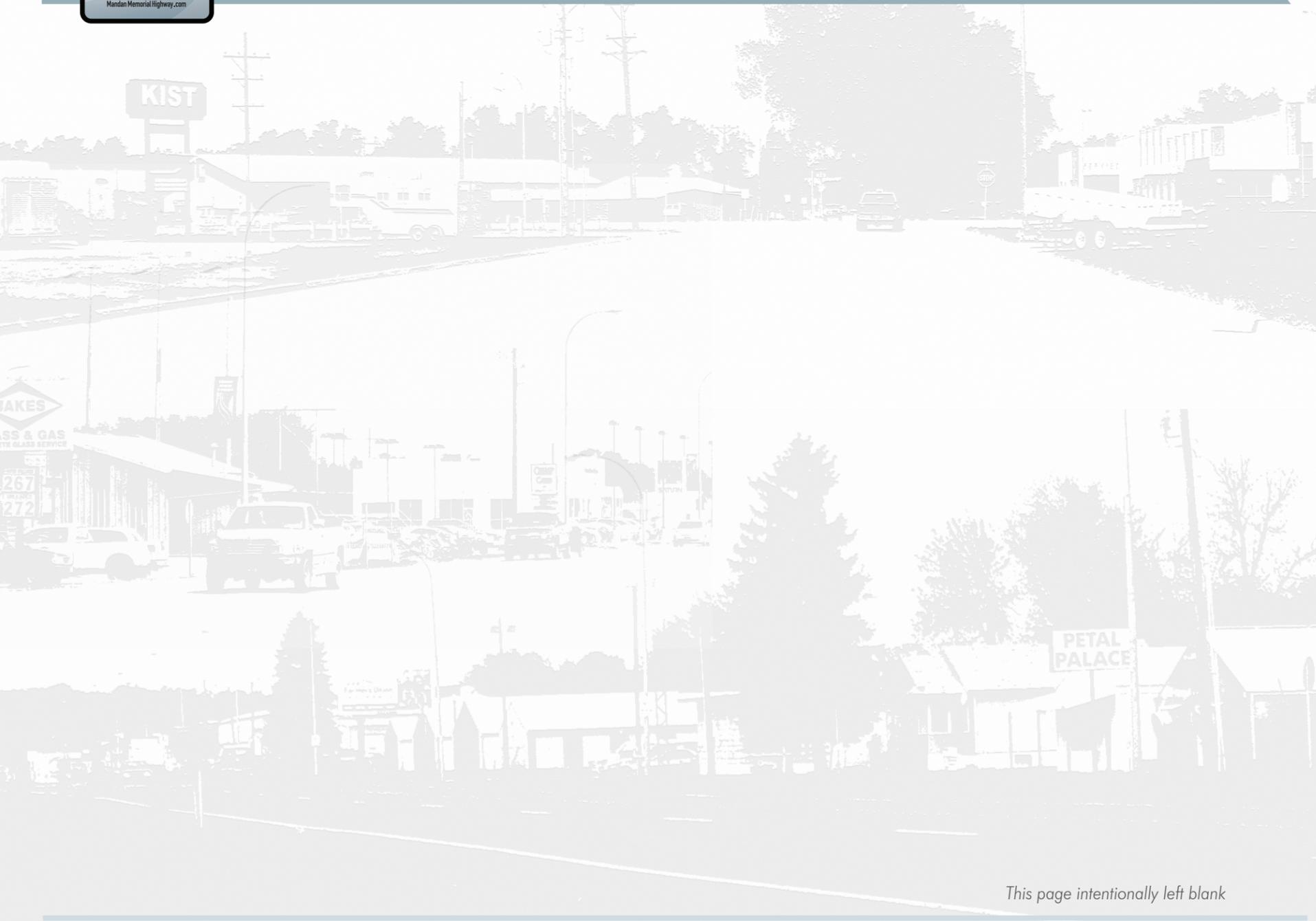
221 N. Fifth Street
Bismarck, ND 58506
Phone: 701 355 1840
Fax: 701 222 6450
Website: bismarck.org/mpo

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Memorial Highway Corridor Study Steering Committee

- Dave Bechtel, City of Mandan Engineering Department
- Stacey Hanson, NDDOT
- Kevin Levi, NDDOT
- Steve Saunders, Bismarck-Mandan MPO
- Ben Ehreth, Bismarck-Mandan MPO
- Cole Higlin, Mandan Park District
- Stephanie Hickman, Federal Highway Administration
- Ellen Huber, City of Mandan Business Development Department
- Lynn Eckroth, Mandan Steel
- Annette Behm, Caldwell Open Road Honda
- Bill Kist, Kist Livestock
- Jim Mellon, Midway Lanes

Bismarck-Mandan MPO Technical Advisory Committee

- Robin Werre, Bis-Man Transit
- Marcus Hall, Burleigh County Engineer
- Mel Bullinger, Bismarck City Engineer
- Stacey Hanson, NDDOT
- Mike Aubol, Morton County Engineer
- Paul Trauger, Morton County Auditor
- Steve Saunders, Bismarck-Mandan MPO
- Chuck Peterson, Freight Representative
- Robert Johnston, Mayor of Lincoln
- Dave Bechtel, Mandan Engineering Department
- Carl Hokenstad, Bismarck/Burleigh County Planning Director

Bismarck-Mandan MPO Policy Board

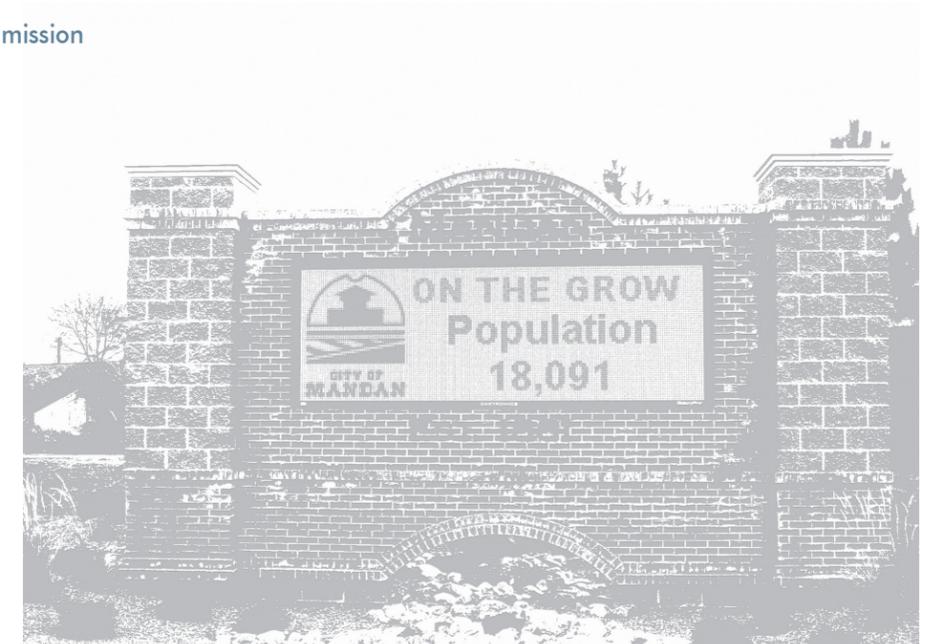
- John Warford, Mayor of Bismarck
- Robert Johnston, Mayor of Lincoln
- Tim Helbling, Mayor of Mandan
- Doug Schonert, Burleigh County Commissioner
- Andy Zachmeier, Morton County Commissioner

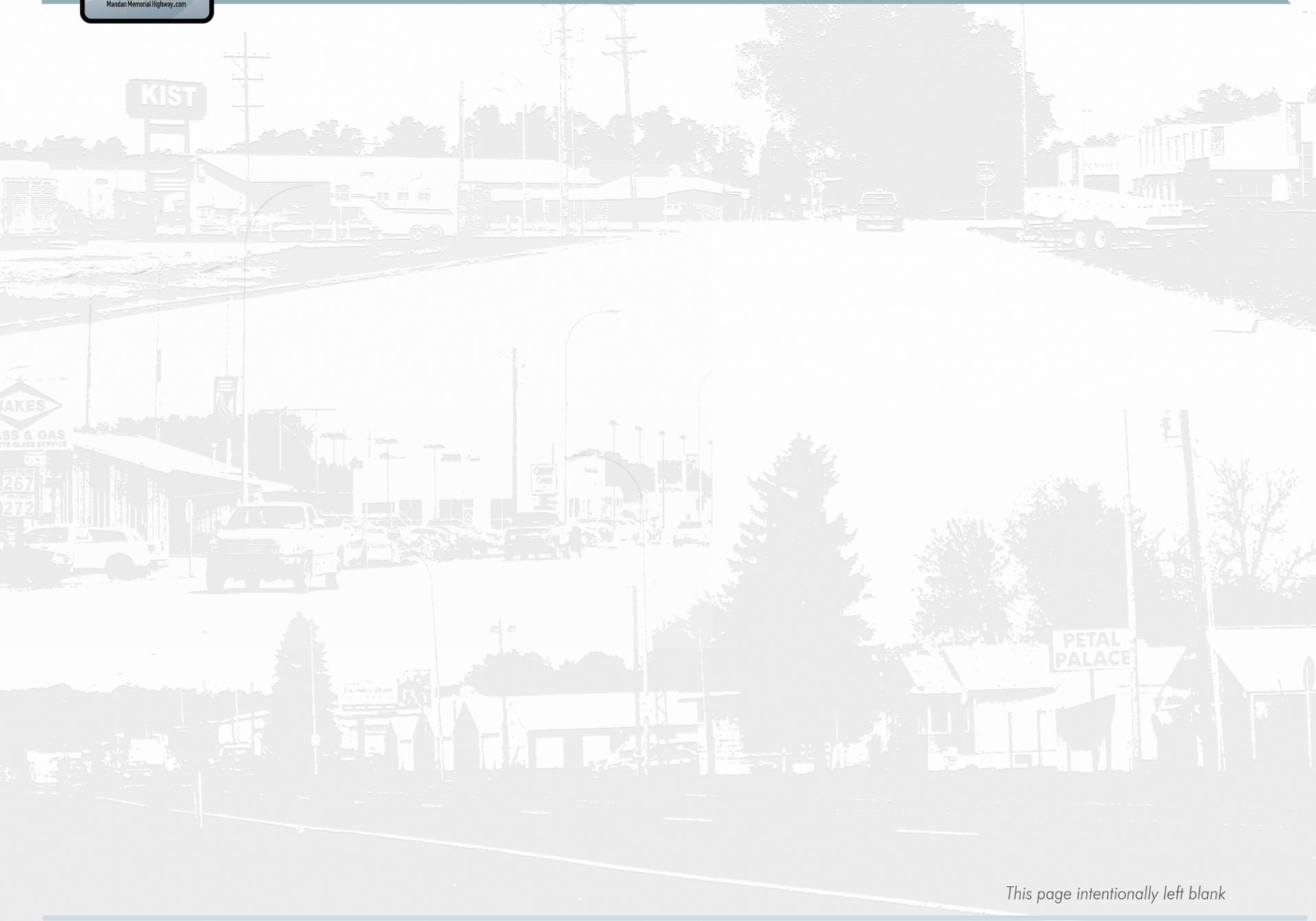
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- Tom Jackson
- Sandra Tibke
- Dennis Rohr
- Dot Frank

Morton County Commission

- Mark Bitz
- Bruce Strinden
- Jim Boehm
- Richard (Dick) Tokach
- Andy Zachmeier

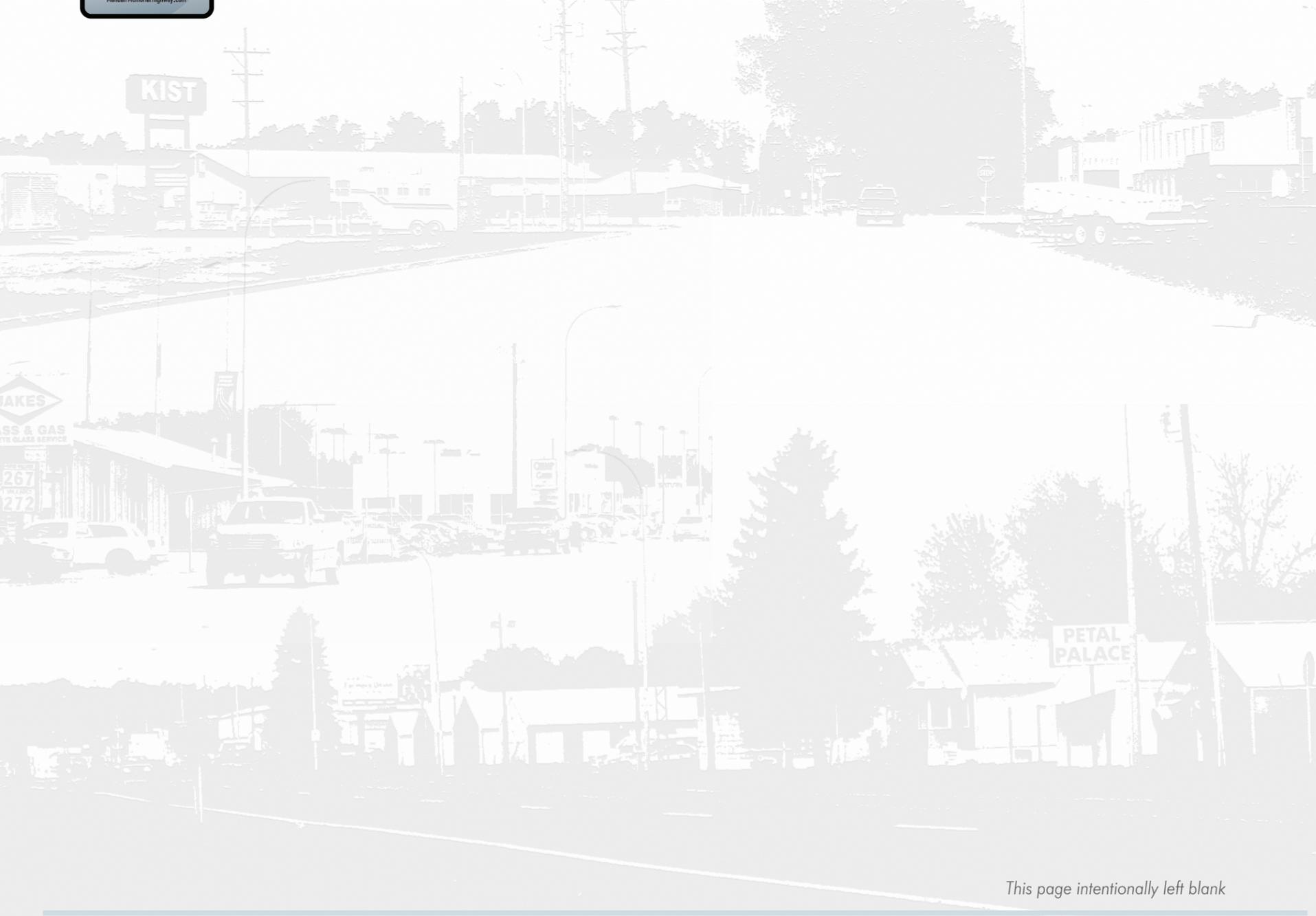




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Mandan Memorial Highway Corridor Study Executive Summary December 2010

Recommended streetscape and entry monument looking westward from 46th Avenue



The purpose of the Memorial Highway Corridor Study is to develop a master plan addressing a variety of issues including existing and future land use, traffic and safety improvements, drainage improvements, creating an identity or sense of place, pedestrian and bicycle accommodations and future roadway reconstruction alternatives. Three major overlapping components of the study area environment include future land use, roadway improvement alternatives and streetscape/landscape improvements. Combining these three aspects into one plan provides the basis for developing a defined Memorial Highway identity composed of an economically healthy, efficient and visually appealing community.

The Memorial Highway Corridor Study includes a market analysis updating a previous Mandan market study with actual development trends

since 2003. The market analysis concluded there is currently not enough un-met demand to support bringing big box retail stores into the area. Recommendations are to continue to promote existing trends that utilize a mix of commercial office, retail and industrial uses in appropriately zoned locations. Retail and industrial uses could continue to capitalize on the existing customer base of the numerous motor vehicle and agricultural-related businesses.

Based upon market analysis conclusions, it is recommended the study area continue to support a mix of land uses (residential, commercial and industrial), with emphasis on managing the transitions from one land use to another to minimize future land use conflicts (conflicts may include incompatible smells, noise, traffic, uses or views). Recommendations include creating

linear “greenway” park areas along roads, as a transition between industrial and residential uses, such as around the Kist Livestock Auction area. The recommendations also suggest expanding recreational opportunities at Dacotah Centennial Park, developing an event center prominently visible from Memorial Highway, and extending the Fort Lincoln Trolley and area trail system to the event center for improved visibility and access.

Transportation within and through the study area is recommended to be improved by constructing new roadways to provide more efficient connections from one area to another. Some future connecting roadways could be completed as development expands into undeveloped areas, such as an extension of Longspur Trail between 32nd and 40th Avenues. The extension

Recommended streetscape for future signalized intersections (40th Avenue shown)

of Longspur Trail would allow access across the southwestern portion of the study area without having to use Memorial Highway for short trips, as well as providing an alternative access to existing area developments. Roadway extensions in the Twin City Drive/Twin City Estates area would improve access for existing and new developments, while also improving emergency vehicle access. An extension of 40th Avenue to the Twin City Estates area through a new railroad underpass was considered, along with an interstate overpass to Captain's Landing area; both alternatives are not recommended due to financial considerations.

Improvements to Memorial Highway itself includes proposed reconstruction and lowering of the roadway to a 5-lane curb and gutter roadway with the following features:

- Two through lanes in each direction, with a center two-way left-turn lane.

- Minimize motorist confusion by emphasizing roadway intersection locations with decorative treatments (low maintenance plantings, western theme fencing, and street name monuments)
- Creating a sense of place and community pride with periodic decorative treatments reminiscent of western ranching and Native American themes, including a gateway entrance on the east end near 46th Avenue.
- Bike lanes, sidewalks, and new street lights along each side of the road with emphasis of crosswalks locations through improved signing and decorative pavement markings.
- A new drainage system is proposed to include underground piping. The existing roadway is not centered within the road right-of-way, creating a very narrow ditch along the north side. The roadway centerline is proposed to be shifted southward, with no drainage

ditch on the north side, along with a shallow ditch on the south side to accommodate periods of high snowmelt or rainfall.

- Traffic signals would be installed at some time in the future at 40th Avenue, and the temporary traffic signal at 46th Avenue is recommended to remain.
- The high-voltage overhead power lines along the south side of Memorial Highway could be placed underground at a cost of \$5-10 million.
- To reduce crashes, it is recommended to revise some driveway locations to minimize conflicts and eliminate unneeded driveways.
- Extend trails and sidewalks from side streets to Memorial Highway for improved connectivity throughout the study area.
- Coordinate bus stop locations at local businesses along Memorial Highway.
- Eliminate sharp angled intersections along Memorial Highway, by closing the intersection of 24th Avenue, and realigning 40th Avenue while eliminating the 39th Avenue intersection.
- Improve special event and daily traffic operations at 3rd Street and 24th Avenue by installing a modern roundabout.

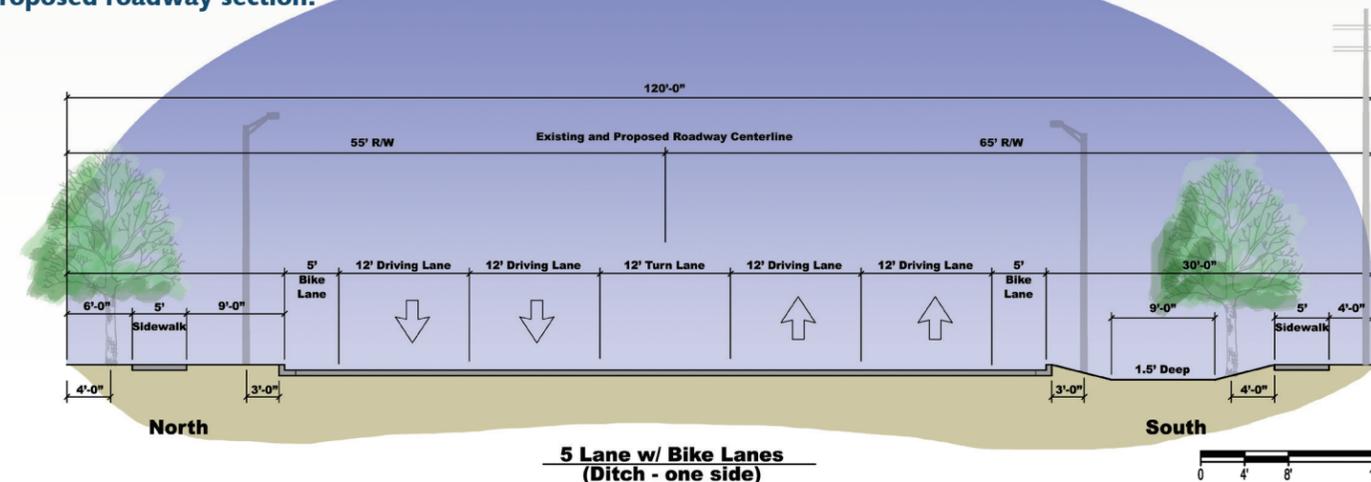
What Happens After The Corridor Study?

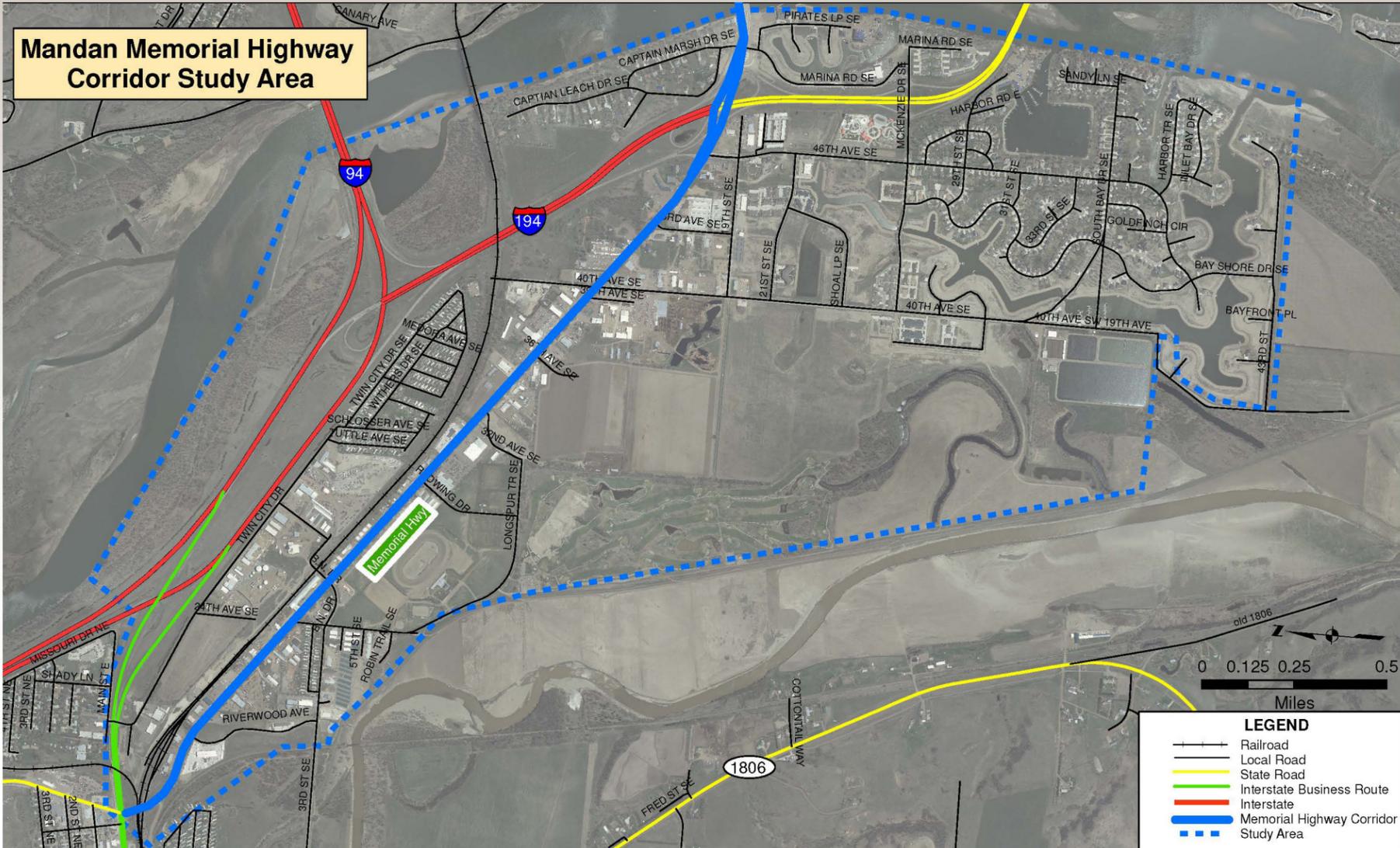
After the Corridor Study is complete, it may be seven years or more before any reconstruction could begin on Memorial Highway. Prior to reconstruction, several years of work would be required to obtain environmental clearances and design any improvements. In the meantime, the City of Mandan could begin implementation of proposed land use and development revisions, prepare and submit funding applications for various street and trail improvements, work with area businesses to consider forming a Memorial Highway business association and work with area landowners and developers to make the study area vision a reality.

Proposed realignment of 39th and 40th Avenue intersection.



Proposed roadway section.





OPINION OF COSTS

Description	2010 Cost*	Year to Construct	Year to Construct Cost**	Potential Federal Participation at 80% of Construction Cost	Potential Local Match at 20% of Construction Cost***	Engineering Fees at 20% of Construction Cost
Memorial Highway Reconstruction with Sidewalks	\$16,066,152	2017	\$21,142,000	\$14,094,667	\$3,523,667	\$3,523,667
Memorial Highway Storm Water Management	\$3,226,725	2017	\$5,372,735	\$3,581,823	\$895,456	\$895,456
Memorial Highway Transportation Enhancement ****	\$2,065,824	2017	\$2,718,484	\$1,812,323	\$453,081	\$453,081
Memorial Highway Water and Sewer Replacement	\$5,414,400	2017	\$7,124,981	0	\$7,124,981	\$1,187,500
Total Memorial Highway Improvements:			\$29,233,219	\$19,488,813	\$4,872,203	\$4,872,203
40th Avenue Realignment	\$375,220	2017	\$493,764	\$329,176	\$82,294	\$82,294
40th Avenue Trail Extension	\$76,454	2017	\$100,608	\$67,072	\$16,768	\$16,768
Twin City Estates Sidewalk	\$120,587	2017	\$158,684	\$105,789	\$26,447	\$26,477
Longspur Trail Road	\$377,414	2020	\$558,665	\$372,443	\$93,111	\$93,111
Robin Trail	\$733,900	2022	\$1,174,998	\$783,332	\$195,833	\$195,833
BNSF Service Road	\$869,200	2024	\$1,505,173	\$1,003,449	\$250,862	\$250,862
McKenzie Drive Extension	\$5,880,000	2030	\$13,400,000	\$10,720,000	\$2,680,000	\$2,680,000

*Cost estimates contain a 25% contingency factor. McKenzie Drive costs from 2010 L RTP. Includes engineering.

**4% per year inflation rate used for projected costs, year of construction is estimated only. Funding is not yet available. Includes engineering.

***Current NDDOT policy provides for up to a 50% match on local funds for the roadway and storm water improvements.

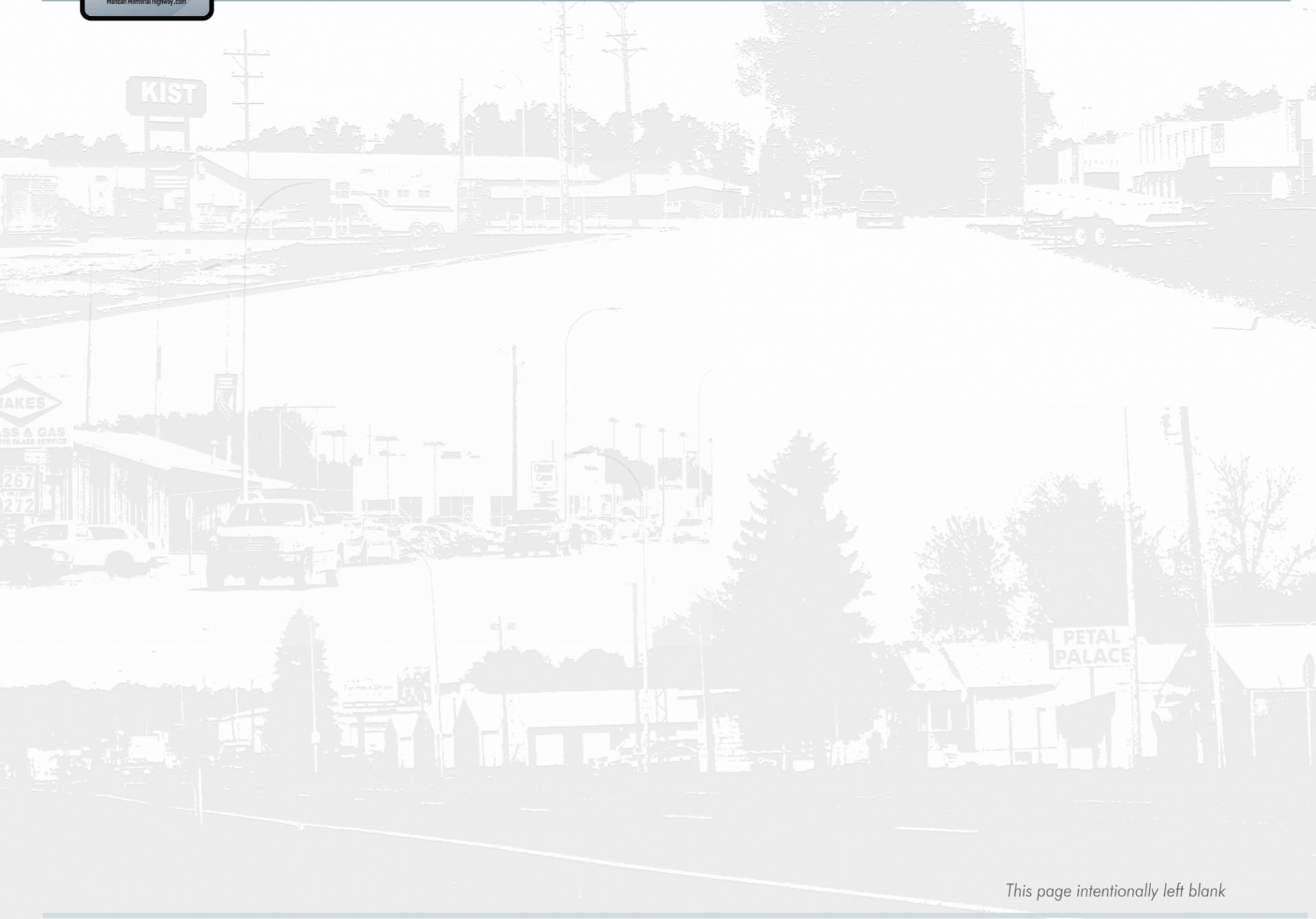
****Included bike lanes, landscaping and decorative features.

Cost Analysis

The varieties of proposed infrastructure improvements include investments typically initiated by private developers as well as city or state agencies. City sponsored initiatives allow for some shaping of direction and timing of developments. Current cost estimates and year of construction are speculative due to unknown roles, capacities and total size of such initiatives.



Recommended pedestrian crossing west of Riverwood Avenue, looking westward toward floodgate walls.



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Introduction

The purpose of the Mandan Memorial Highway Corridor Study is to develop a master plan for addressing a variety of issues including existing and future land use, traffic and safety improvements, drainage improvements, creating an “identity” or sense of place, pedestrian and bicycle accommodations, and future roadway reconstruction alternatives.

Introduction

In 1922, Liberty Memorial Bridge became North Dakota's first automobile crossing on the Missouri River creating the Memorial Highway connecting Bismarck and Mandan. Memorial Highway soon became attractive to development, catering to local residents and cross country motorists. Today, added vehicular capacity of the new Liberty Memorial Bridge and Memorial Highway's central proximity between the central business districts of Mandan and Bismarck creates even more attraction for new development and redevelopment of mature properties. The area is more than a vital link in our local transportation system, the relative health and vitality is essential to the economic well-being of Mandan. Memorial Highway functions as an extension of Mandan's Main Street providing a variety of retail, commercial, industrial, and recreational properties. The Memorial Highway Corridor Study acknowledges the future vision of the roadway must not only cater to transportation needs of existing and future generations, but also cater to economic, recreational and business needs and potential of this premier regional commercial activity center. In other words, future vision of the area development should drive the resulting corridor visions rather than the roadway driving the vision of development. The corridor is a classic example of the "land use connection" between development and transportation needs.

WHY THE STUDY?

Streets have multiple, complex functions. Streets are fundamentally transportation facilities to help diverse users reach destinations safely and efficiently. But streets are major public spaces that affect the visual and experiential quality of a city and economic lifelines for adjacent businesses. Streets also have unintended negative consequences including barriers that reduce access, generate noise, and impact surrounding property values.

As the major arterial road between two cities, Memorial Highway has become an opportunity corridor. The future potential is compelling. The highway provides a high quality urban environment integrating transportation, development, visual, and neighborhood contexts. The study is a guide to realizing the full potential of Memorial Highway.

THE STUDY AREA

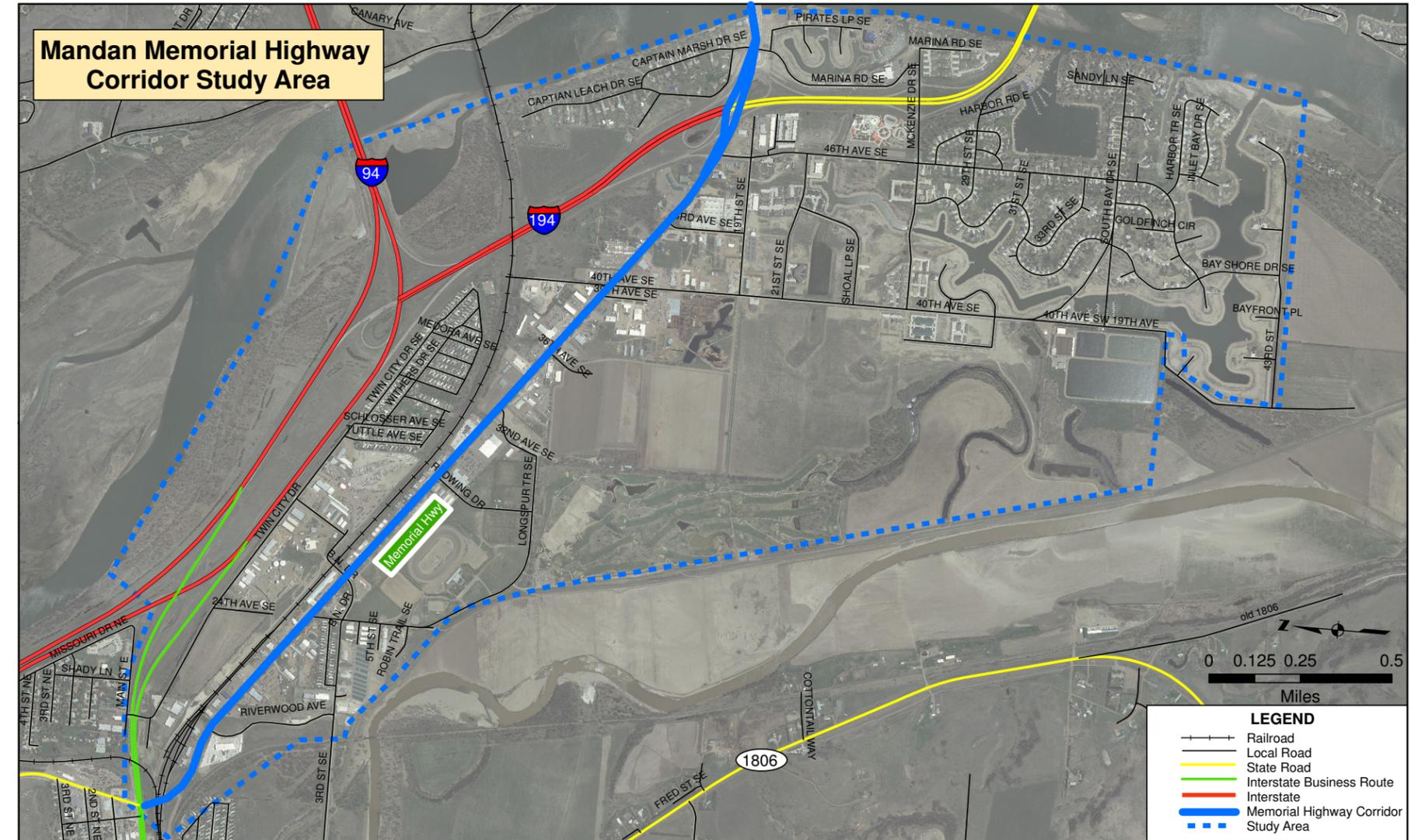
Map 1.1 identifies the project study area within the context of Mandan. The study area recognizes the relationship between Memorial Highway and surrounding neighborhoods. The area extends from the Missouri River on the east, north to Mandan's Main Street, bordered by the Heart River on the west, and southward to the southern limits of the Lakewood residential development. The study considers both the function and character of the main corridor and effects on health and quality of its surrounding environments.



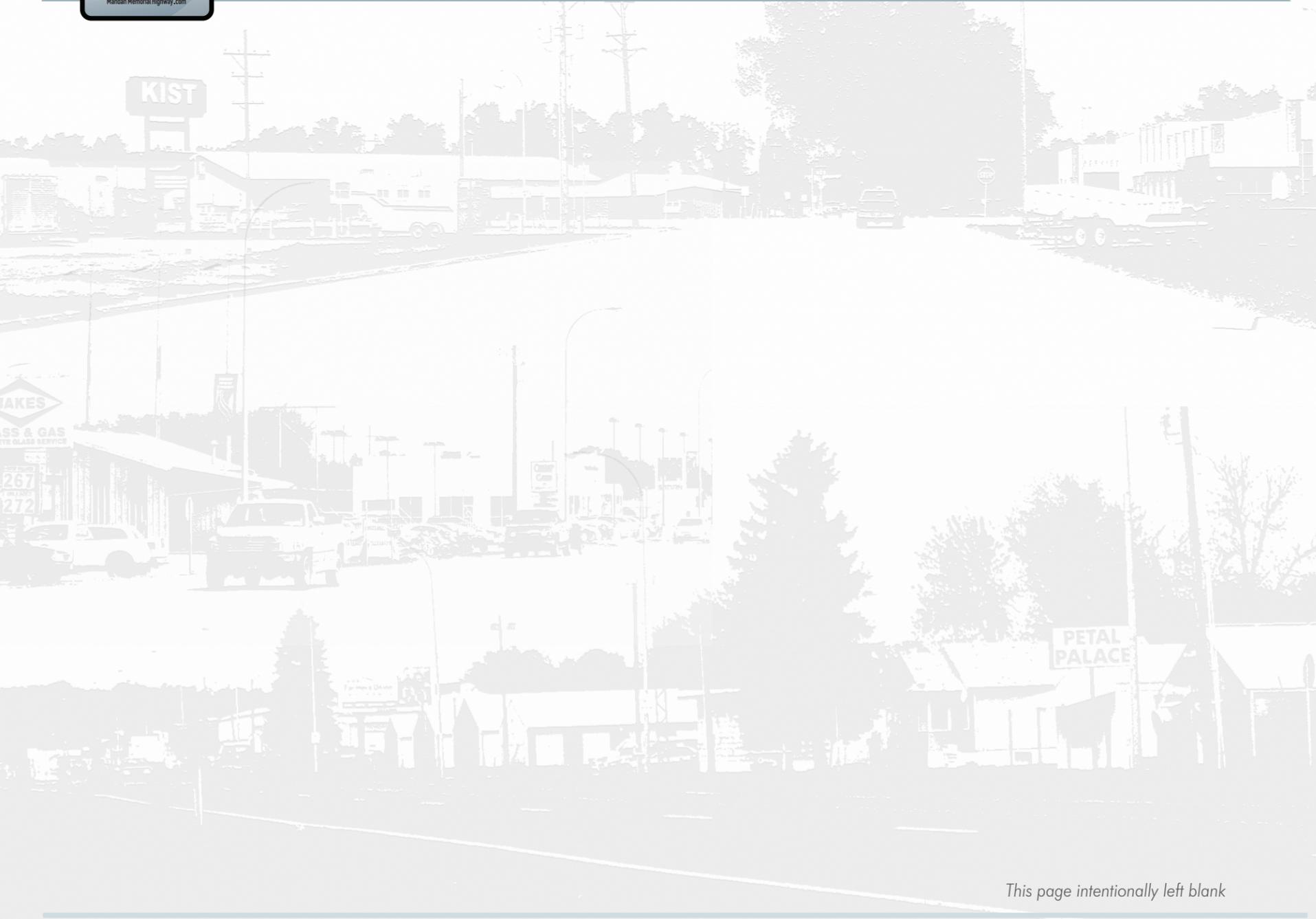
THE STRUCTURE OF THE STUDY

The Memorial Highway Corridor Study is divided into four parts:

- **Part 1 (Chapter 1)** presents the overall approach and describes the process of involvement of community members.
- **Part 2 (Chapters 2, 3, & 4)** describe existing conditions and contexts of Memorial Highway and the study area today, fundamental to developing an appropriate study for the corridor's future.
- **Part 3 (Chapters 5 & 6)** present a unifying vision and development framework for the corridor and surrounding areas, and alternatives considered.
- **Part 4 (Chapter 7)** describe funding needs, opportunities, and techniques for implementing the study's concepts and recommendations.



Map 1.1



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Chapter 1

The Corridor Study used a planning process focusing on community-based values and goals of all interests and stakeholders.

PLANNING PROCESS

Planning Process

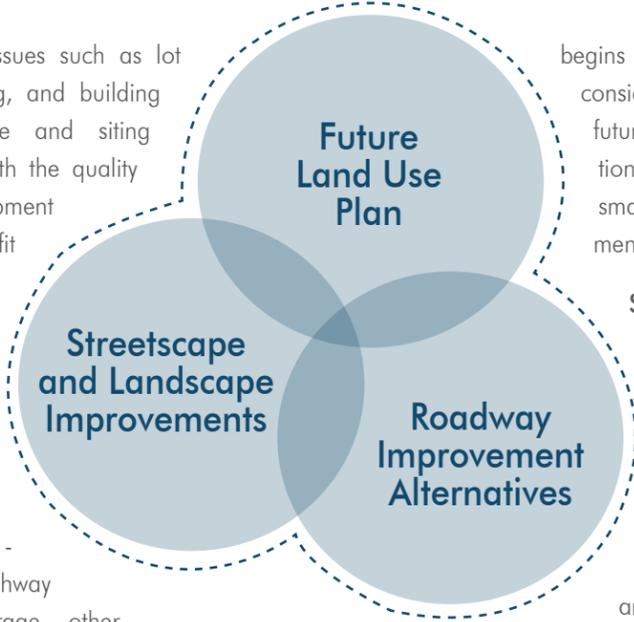
PLANNING APPROACH

The Memorial Highway Corridor Study is based on an economically healthy, efficient and visually appealing corridor that will benefit the entire Mandan community. Within the last few years, this major street has experienced considerable new investment along with deterioration. Commercial and agricultural-oriented businesses are experiencing, to some degree the nation's economic downturn, but remain optimistic about their future. The plan recommends development concepts and public actions that will create more attractive industrial, commercial, recreational and residential environments for current and prospective residents and businesses. Three major overlapping components of the study area environment include: **Future Land Use, Roadway Improvement Alternatives, and Streetscape and Landscape Improvements.**

Future Land Use: Memorial Highway serves a variety of adjacent land uses and reflects varied character throughout its length. Land uses along the street and in the surrounding study area were evaluated based on markets and established city goals. Future land uses will probably not change dramatically from past patterns – industrial and commercial development along most of the street or in close proximity to the street and residential uses in surrounding areas. However, change will be most controversial and critical at the boundaries where

uses meet. Issues such as lot size, buffering, and building structure type and siting determine both the quality of a development and ability to fit into a neighborhood environment. For example, existing uses along Memorial Highway may discourage other desirable uses and limit landscaping and site enhancements. Successfully managing the transition between higher and lower intensity uses, helps the busy commercial corridor co-exist with distinctive, adjacent residential areas. Finally, the relationship of buildings to the street help determine the quality of the corridor's environment.

Roadway Improvement Alternatives: Memorial Highway as a transportation facility should serve all modes effectively, and the plan takes a "complete street" approach for the overall study area. The approach assumes movement throughout the study area and destinations are safe and comfortable for all transportation user groups – motorists, transit riders, bicyclists and pedestrians. The process



begins with a detailed traffic analysis that considers existing patterns and defines future needs, and integrates transportation system design at both large and small scales into the visual and development environment.

Streetscape and Landscape Improvements: Memorial Highway passes through a variety of contexts including industrial, commercial, recreational, agricultural support, auto-oriented and office. A mix of large-scale to small-scale residential areas are in close proximity to Memorial Highway. The role and age of each context produces a specific street character. The plan views streetscape as a way to unify the corridor, improve image, expand market, and enhance human scale and pedestrian accommodations. Recommendations are based on public input and a realistic assessment of possibilities. The planning approach of relating development potential, transportation function, and visual streetscape produces a realistic vision. The plan understands the power of a vision for the Memorial Highway corridor grounded in function, realism, context and economics.

PLANNING PROCESS

The plan's concepts are informed opinions and perceptions of residents and people who work or invest in Mandan. While business and property owners are typically the primary participants in a corridor planning process, every community resident has a stake. The planning process invited extensive public participation in defining a future for Memorial Highway and surrounding environments.

The public participation process included:

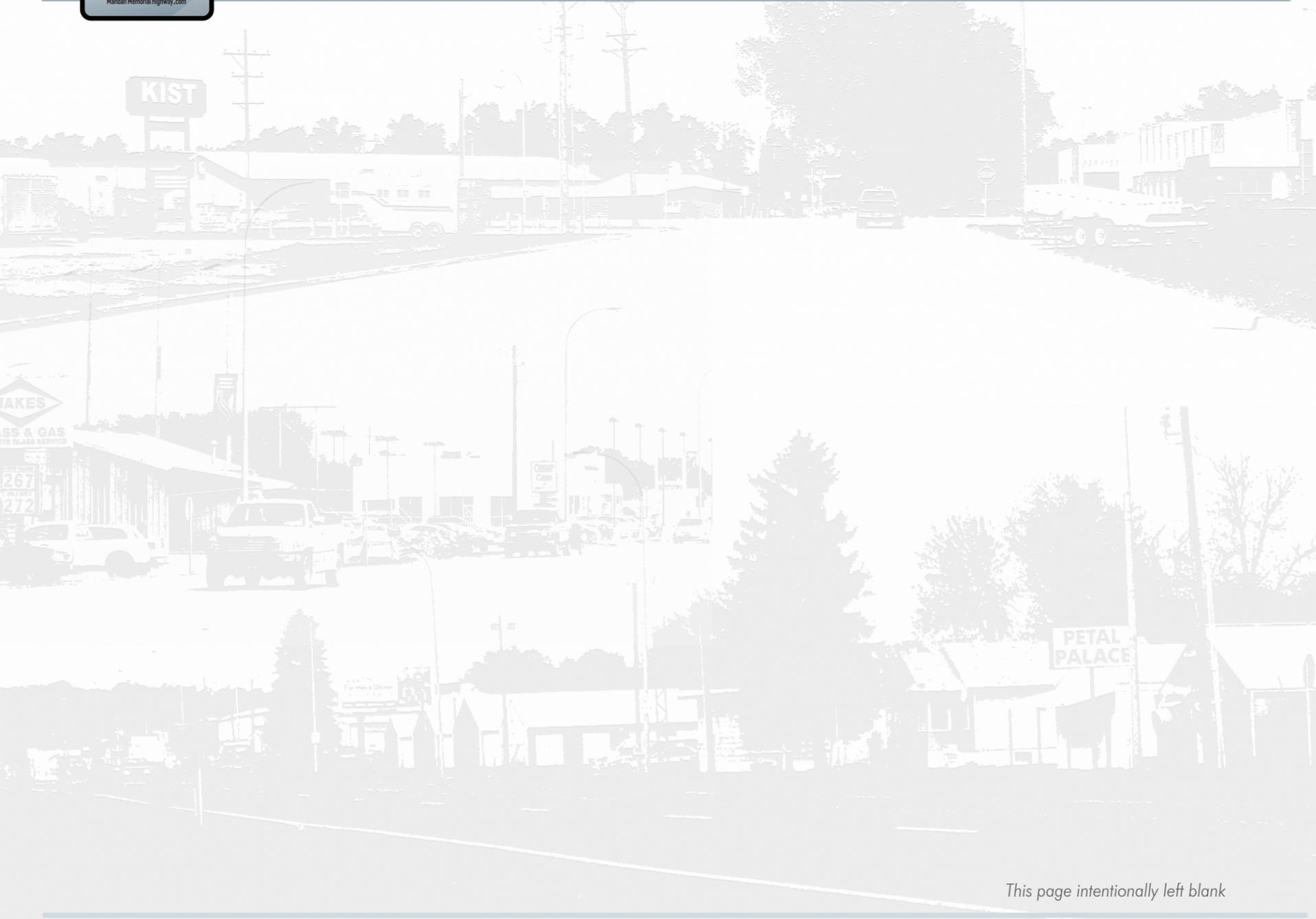
- **Steering Committee:** A project steering committee composed of key stakeholders in the corridor was central to the planning process. The committee included economic development agencies, property owners, real estate and development interests, and government agencies, who actively engaged throughout the process.
- **Open House:** The actual planning process began with an Open House/Kick-Off meeting in 2009. The meeting reviewed the planning process and considered the experience of other communities with active corridor development plans.
- **Public Input Meetings:** Three public meetings were conducted throughout the planning process to seek input, share ideas, and refine concepts with residents, business and property owners, and public officials.

- **Agency Meetings:** Meetings were held with the Mandan Planning Commission, Mandan City Commission, the North Dakota Department of Transportation (NDDOT) Executive Management Team and Bismarck-Mandan Metropolitan Planning Organization's (MPO) Technical Advisory Committee and Policy Board to present findings, share opinions and discuss the corridor's vision.
- **Stakeholder Interviews:** Residents, business and property owners, financial institutions, and public officials participated in interviews and surveys to share opinions of the corridor and future opportunities.
- **Field Investigation:** Consultants completed a thorough inventory of existing conditions, documenting street design and configuration, land use, pedestrian facilities and streetscape elements.

- **Analysis:** The consultant team developed a library of corridor images and surrounding neighborhood.
- **Design Charrette:** Two design charrettes in Mandan engaged citizens, residents, business owners and other stakeholders in the planning process. Participants shared ideas, issues, and concerns informally and interactively with the planning team.
- **Plan Refinement:** Concepts developed during design charrettes were evaluated, tested, and modified; resulting in a refined concept.
- **Public Involvement:** The open house, input meetings and project website provided the public an opportunity to review and provide comments to the development concept prior to the approval process.

CORRIDOR VISIONING PROCESS





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Chapter 2

To guide the future of the corridor, we must first assess the components and gain an understanding of existing conditions.

MEMORIAL HIGHWAY AND PROJECT AREA TODAY

Memorial Highway and Project Area Today

LAND USE AND EXISTING CONDITIONS

Figure 2.1 presents the Memorial Highway Corridor project study area. The transportation and corridor enhancement components of this report are focused upon the approximately three mile length of the Memorial Highway between Main Street and the Liberty Memorial Bridge. However, as illustrated in Figure 2.1, the study area extends far beyond the corridor frontage properties, from the Missouri River to the floodway of the Heart River.

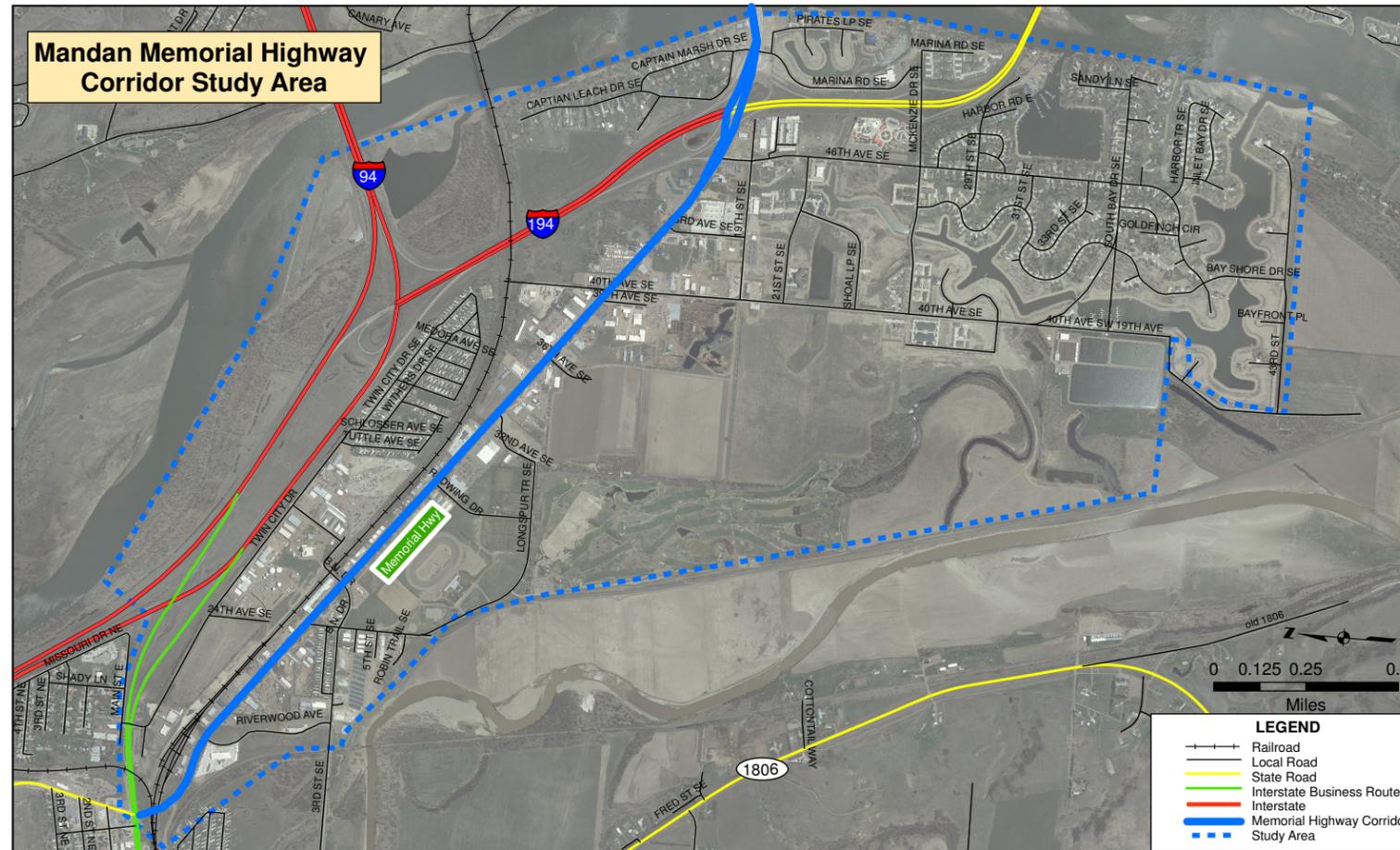


Figure 2.1: Project Study Area

Development history along the corridor begins with construction of the original Liberty Memorial Bridge in 1922 and the corridor has been developing and evolving since. The diversity of development over time is illustrated by Figure 2.2, which shows many subdivision plats that exist in the project area. At the same time, large tracts of unplatted ground are south of the Memorial Highway.

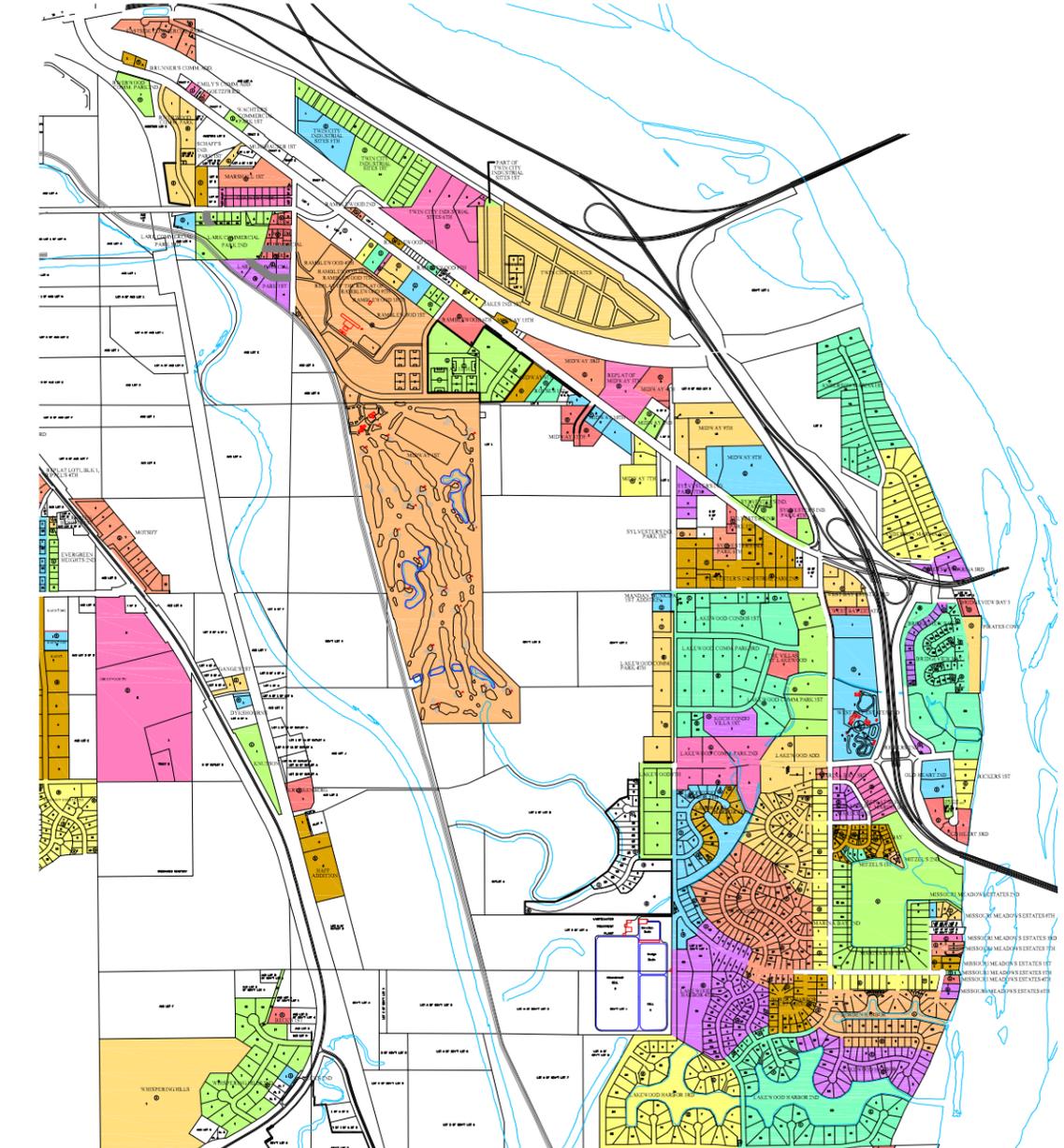


Figure 2.2: Study Area Subdivisions

The Existing Land Use Map, Figure 2.3, demonstrates the diversity of land uses in the study area, ranging from Agricultural and Single-Family Residential to Heavy Industrial. The diversity of land uses in such a small area of the region is a unique characteristic of the study area. Unsurprisingly, such a mixture of land uses does not coexist without some indication of potential conflicts from diverse uses in such close proximity. The pertinent aspects of land uses existing in the study area include:

- A wide diversity of non-residential uses fronting the corridor, from office and neighborhood services to auto and farm-related businesses to heavy industrial uses.
- The tight parcel depths along the north side of Memorial Highway west of 32nd Avenue restrict uses to smaller buildings.
- There is not a coherent pattern or grouping of these commercial/industrial uses along the corridor. Rather, the pattern of use appears randomly mixed. As demonstrated later, the uniform zoning along the corridor is the likely cause of the lack of use transitions.
- The Twin City Estates Mobile Home Park is isolated by highway, railroad and industrial uses. A smaller mobile home park on 3rd Street is also isolated by surrounding industrial uses.
- New residential development is located south of 19th Street and east and west of 40th Avenue. A new condominium townhome area has developed immediately south of the Liberty Memorial Bridge, while north of the bridge lies the unincorporated Captain's Landing single-family residential area, developed around the 1960's.
- 19th Street, with light and heavy industrial uses to the north and office and residential uses to the south, represents a land use transition area where there are likely to be land use conflicts.
- Recreation uses, including Dacotah Centennial Park, soccer fields and a golf course lie adjacent to the floodway area of the Heart River.
- Most parcels along the corridor are in active use, while several large vacant parcels are south of the corridor. Several large vacant lots are located north of the railroad tracks.

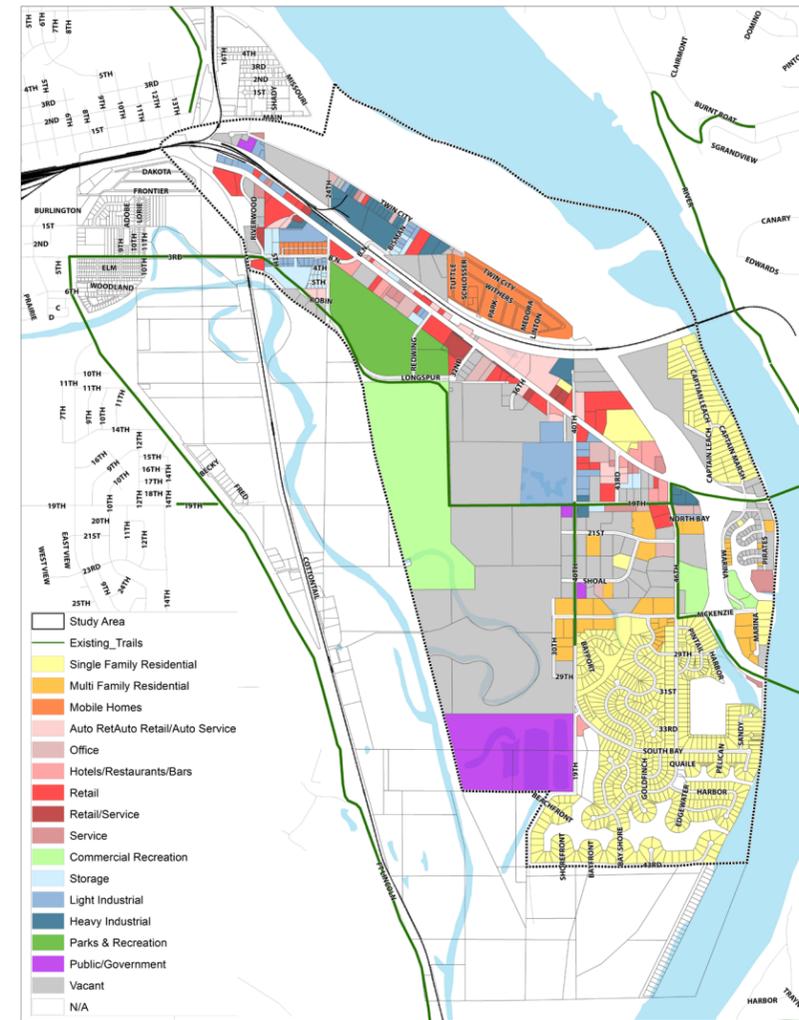


Figure 2.3: Existing Land Use

Figure 2.4 indicates zoning districts presently designated in the study area. The zoning district abbreviations:

- A Agriculture
- R7 Single-Family Residential
- R3.2 Two-Family Residential
- RM Multi-Family Residential
- CA Light Commercial
- CB Heavy Commercial
- CC Heavy Commercial
- MA Light Non-Nuisance Industrial/Heavy Commercial
- MB Heavy Industrial/Heavy Commercial
- MC Light Non-Nuisance Industrial/Heavy Commercial
- MD Heavy Industrial/Heavy Commercial

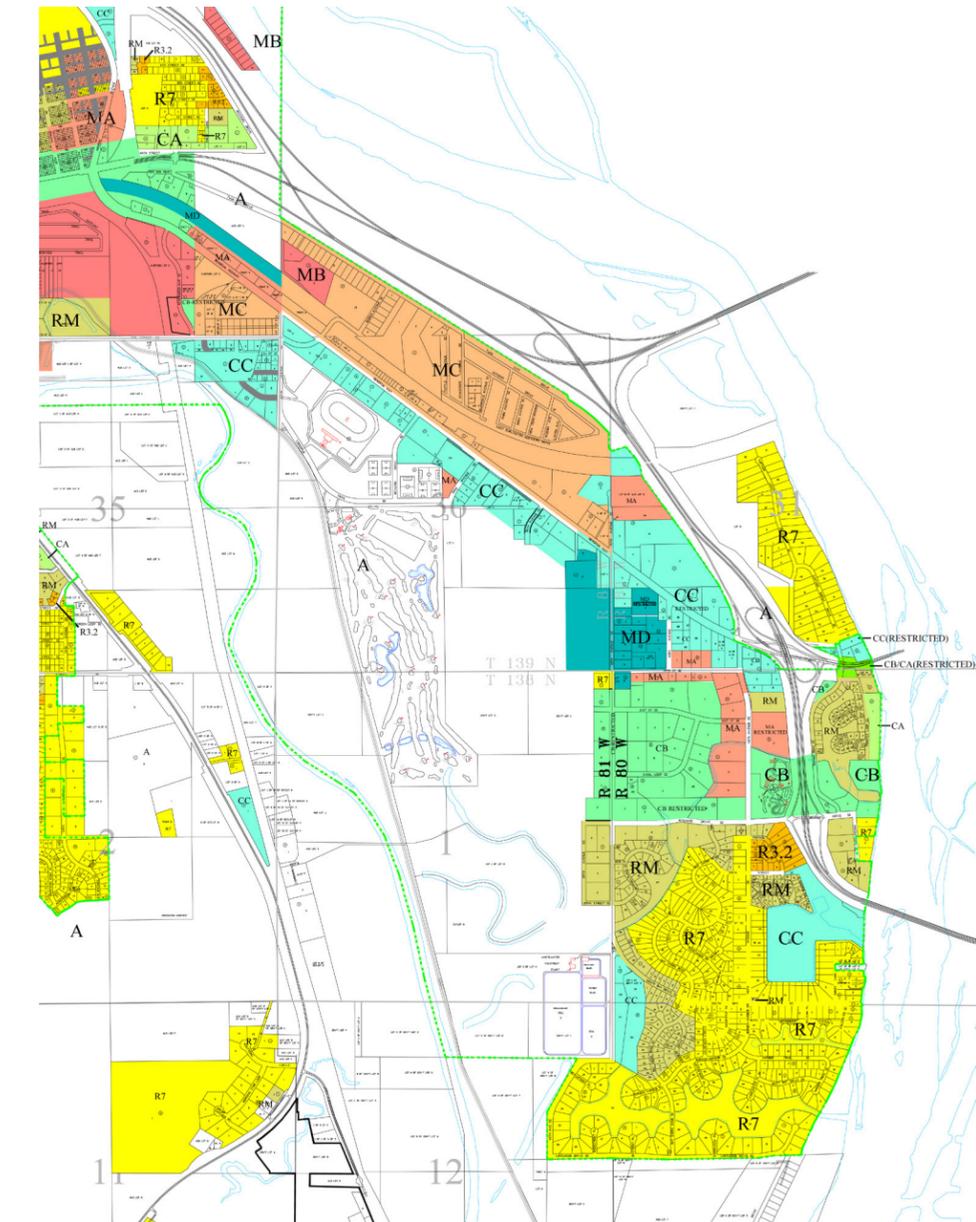


Figure 2.4: Existing Zoning

Generally, study area zoning in many areas reflects an overzoning which permits an intermixing of more intense uses having more extreme impacts alongside a lighter use which may be negatively impacted by the proximity of the more intense use. For example a bank/office building adjacent or very near to a concrete batch plant.

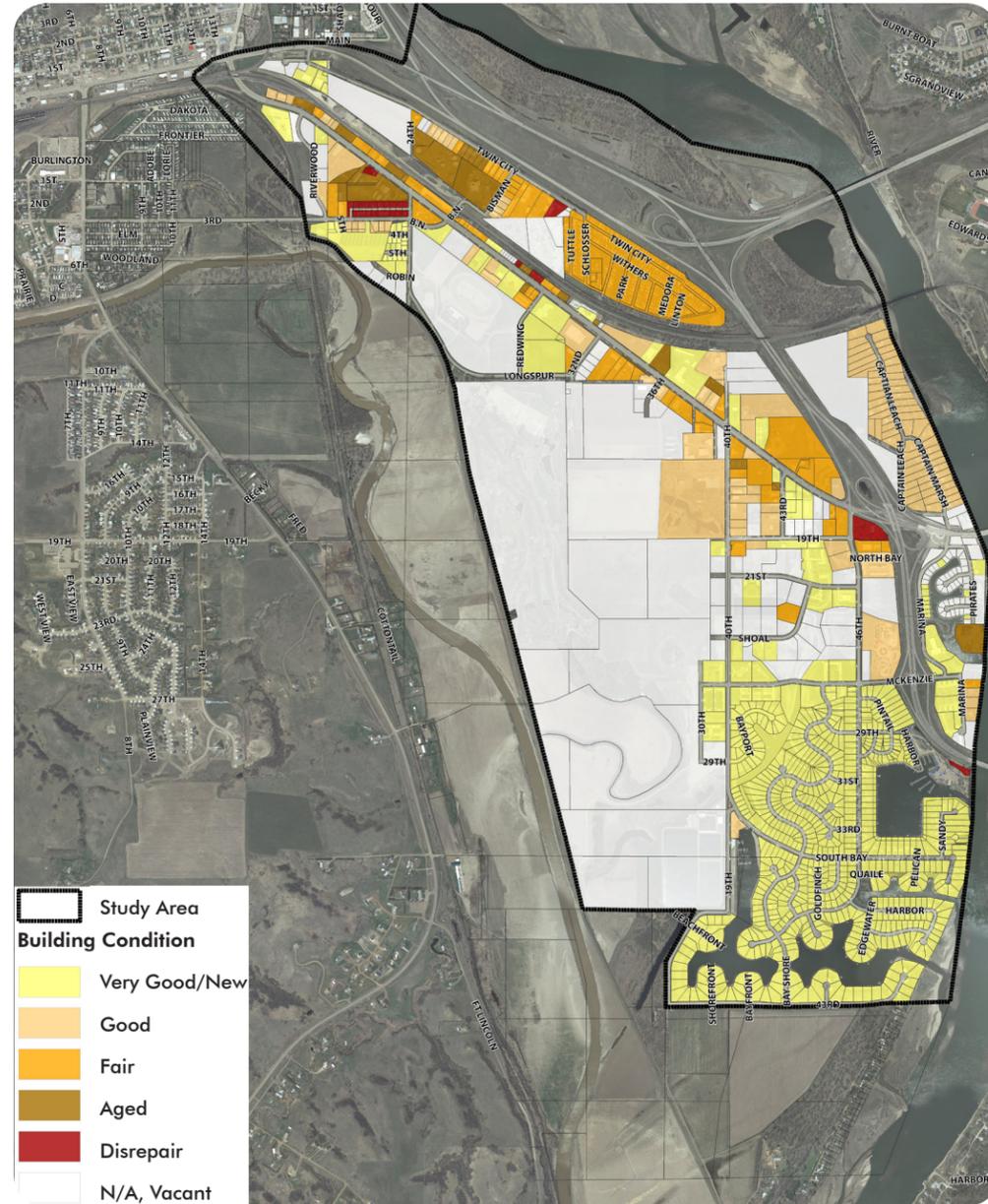


Figure 2.5: Building Conditions

Given the age of development in the study area, it reflects a wide range of building conditions. Figure 2.5 indicates conditions of buildings and properties in the study area. With a few exceptions, the properties fronting the highway are generally in fair to good condition. The residential development area south of 19th Street reflects very good/new conditions.

By combining consideration of building conditions with vacant and underutilized lots, a development opportunity map can be developed, (Figure 2.6). Highlighted areas represent the best opportunities for development or redevelopment in the study area. The map becomes the base for development of a “Future Land Use Development Concept” in Chapter 5.

Mandan Memorial Highway Study Area: Development Opportunity Areas

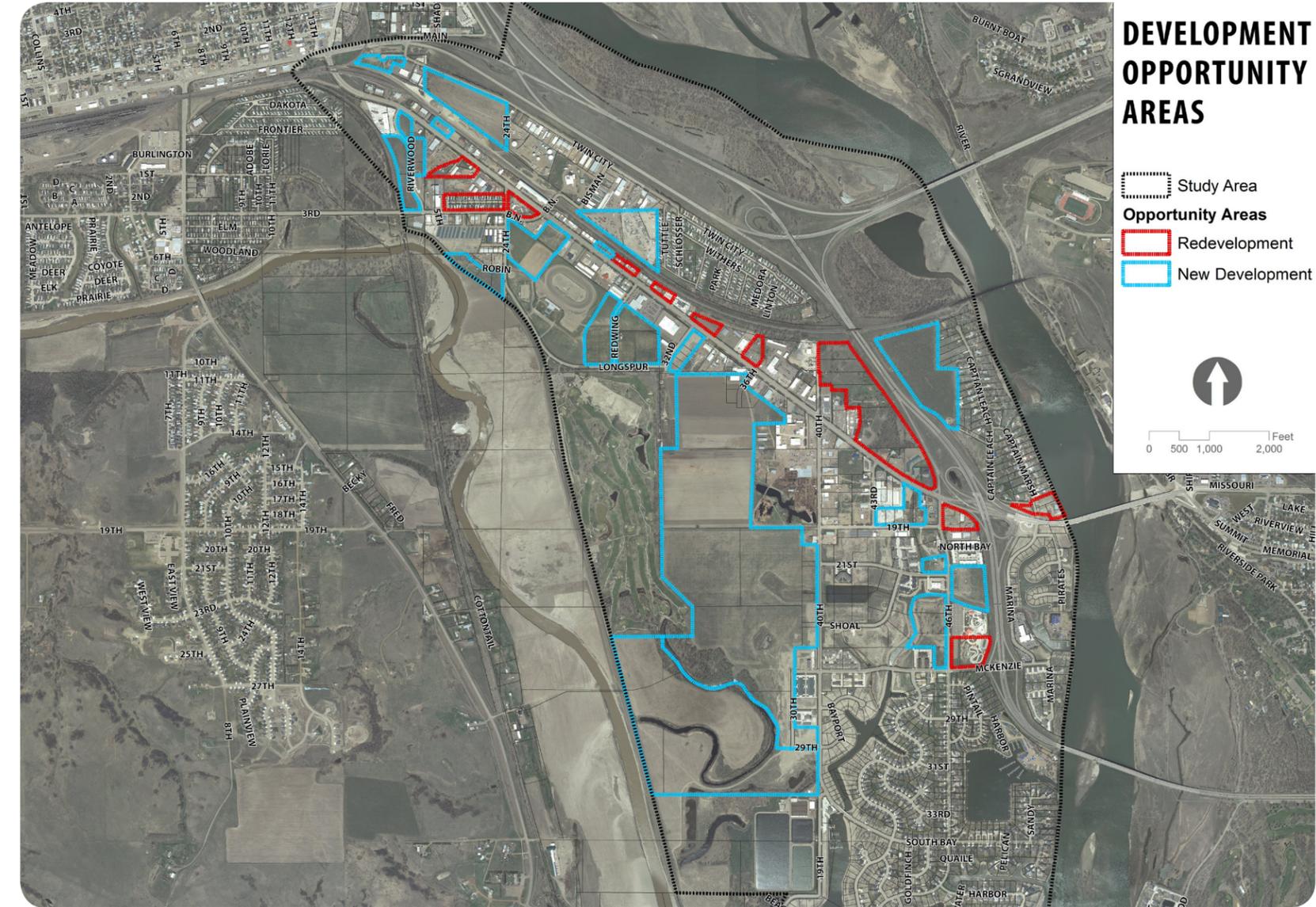


Figure 2.6: Development Opportunity Areas

Finally, Figure 2.7 indicates the trails that exist in the Study area, superimposed on an aerial photograph. Figure 2.8 indicates planned subarea trails as reflected in an excerpt from a "Future Trails Map" in the recently updated Bismarck-Mandan MPO Long Range Transportation Plan.

Mandan Memorial Highway Study Area: Existing Trails

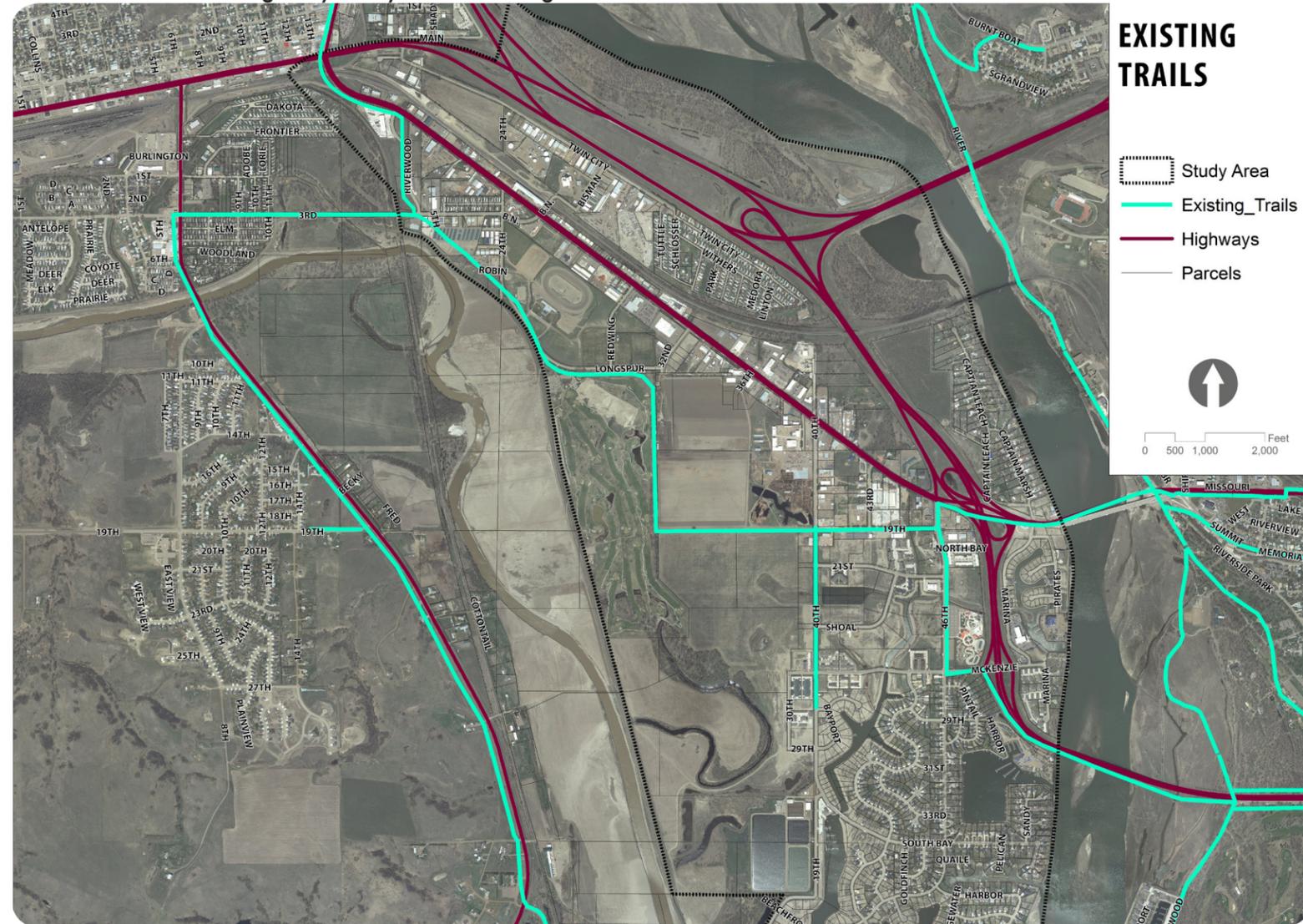


Figure 2.7: Study Area Existing Trails

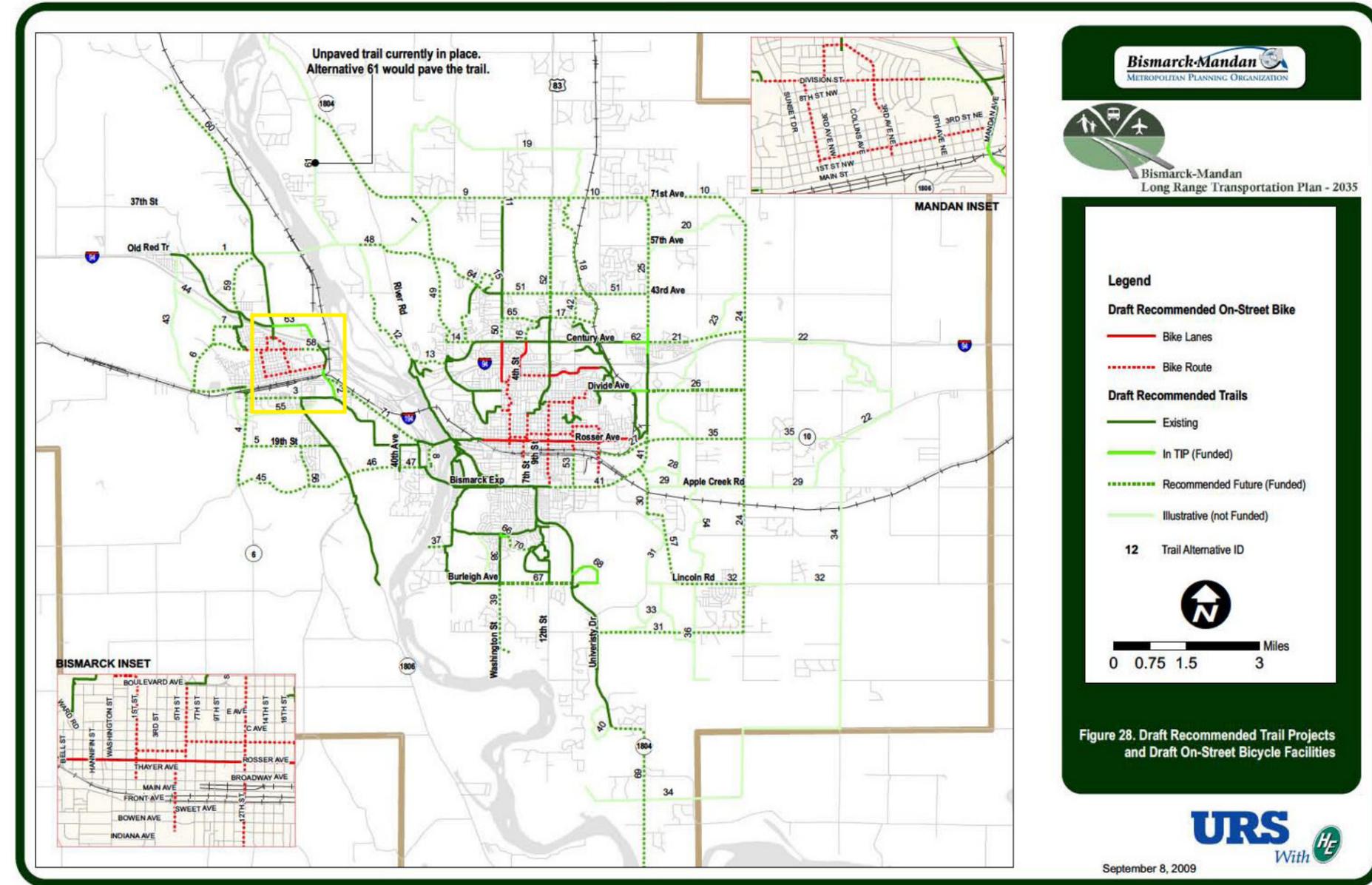


Figure 2.8: Future Trails

VISUAL ENVIRONMENT

The Memorial Highway Corridor is defined and remembered by visitors, users and residents by way of two primary considerations. First, individual businesses, services and destinations collectively represent a product that fills needs and demands of both local and regional users. Memorial Highway has a robust and dynamic collection of private and public facilities throughout the corridor serving the diverse needs of the community. Examples range from Kist Livestock Auction, automotive related services, public related recreational fields and Dacotah Speedway, part of the Dacotah Centennial Park.

The second consideration has significant impact on the brand, definition, or memory of the corridor related to the environment or landscape within which businesses strive to prosper. All natural and manmade elements visible while moving through the area result in a positive, negative, or neutral image in the minds of those who chose to experience Memorial Highway. Examples range from the street network itself to the visibility of utility infrastructure to signage and vegetation that establish the corridor edge. The visual environment is inescapably tied to the area's products and services and district brand or image.

Today, a systematic evaluation of Memorial Highway's visual environment results in an interesting and challenging list of opportunities to make improvements and embrace and protect unique

attributes. The design team observations of existing conditions informed the process and direction of recommendations outlined later in this report:

- Scale, Visual Cues, and Street Framework:** The initial experience of Memorial Highway is striking as it relates to the street network/framework or lack thereof and traditional visual clues to assist in general orientation. For nearly two miles, the flat and straight corridor broadcasts a monotone of troubling driveways and side street intersections. The lack of rhythmic, easily understood street network results in an overall disorientation and likely contributes to drivers missing their intended street. At worse, lack of clarity may also impact both vehicular and pedestrian safety along the corridor.
- Landmarks, Destinations, and Distinction:** Beyond the monotony of the right-of-way (ROW) lies a strong collection of unique facilities. Several businesses have uncommon architectural and signage styles which are the only distinguishing characteristic of much of the corridor. The facilities add value to Memorial Highway's sense of place and are common within distinctive commercial corridors.
- Consistent Quality:** Currently, the Memorial Highway corridor has a mix of visual quality levels ranging from unique, eye-catching businesses to vacant, unmaintained frontage. While some visual diversity is desirable, this

kind of inconsistency can flag a district as unstable or wavering. In contrast to private property visual inconsistency, the ROW does offer some consistency, albeit in a neutral and non-participating role. Ample opportunity exists for the roadway edges and transitions to private property to serve as a positive image enhancing and unifying visual contributor.

- Pedestrians and Alternative Transportation:** The days are gone for urban commercial corridors that are accessed by automobiles only. Not only does this go against many federal guidelines regarding complete street design requirements, but the lack of any pedestrian or alternative transportation accommodations results in a very sterile visual environment.



Mandan Memorial Highway Corridor Study: Memorial Highway and Project Area Today

Trails, sidewalks, bus stops, bicycle lanes, and their associated elements are lacking along all of Memorial Highway. The resulting void space along the edges of the roadway can also result in excessive speeding caused by a perceived openness and lack of visual dynamics and "positive friction."

- Utility Considerations:** Two dominant visual contributors along the corridor can be observed by looking up and looking down. The overhead electrical transmission lines/poles along the entire south edge of the roadway are not necessarily uncommon for this type of roadway, but they do not add to the positive visual quality of the view shed. In addition, the presence of open storm water ditches along an urban commercial corridor signal a relatively low level of infrastructure investment by the community. Opening up storm water systems can in fact be a very sustainable approach, but careful design, maintenance and education must accompany these efforts.
- Community Identification and Image:** Memorial Highway currently lacks any community or district-oriented signage, identifications, icons, or imagery. The ROW is simply void. Observant travelers might expect something to acknowledge or announce the city of Mandan

as they land on the west side of the Missouri River. District and community minded individuals might expect some signal of a unified and forward thinking district group reflected within creative corridor signing, imagery, or streetscape elements.

INFRASTRUCTURE

The analysis of existing conditions addresses:

- Transportation System
- Traffic Patterns and Operations
- Utilities
- Storm Water Management



Memorial Highway and Project Area Today

The analysis provides:

- A detailed inventory of the corridor's uses and businesses throughout the project area.
- An assessment of existing conditions including identification of issues and deficiencies.
- Identification of major development opportunities including vacant or under-used sites.
- Examination of storm water management and other infrastructure systems.

TRANSPORTATION SYSTEM

The Memorial Highway Corridor Study area is surrounded by arterial roadways that provide easy access to destinations beyond the study area for many travelers, while also creating transportation barriers to others. The west end of the study area has direct access to Mandan's Main Street and Interstate 94, while the east side of the study area has direct access to Bismarck's Memorial Highway/Main Street, Interstate 194 and Bismarck Expressway. However, the interstate system and the BNSF railroad create major transportation barriers for travel to and from the Twin City Estates and Captains Landing Township. Additionally, the southwest portion of the study area includes undeveloped areas where an interconnecting road system has not yet been developed.

Pedestrian facilities are generally lacking throughout majority of the study area, including industrial/commercial developments as well as undeveloped areas. Recent residential developments, along with commercial areas in the southeast part of the study area (46th Avenue SE) do have pedestrian sidewalks. A shared use path connects the Liberty Memorial Bridge and the Expressway Bridge, and connects to a shared use path that bisects the study area while connecting to destinations in Mandan west and north of the study area. The Capital Area Transit (CAT) provides a fixed route bus system that passes between Mandan and Bismarck along Memorial Highway. While no official bus stops are along Memorial Highway, the buses will stop wherever a patron wishes to get on or off; the problem being there is no sidewalk system to accommodate pedestrians to and from the bus.

While the study is not intended to evaluate pavement condition or maintenance needs of the transportation system, the majority of transportation facilities within the study area are in generally good condition, with many less than 20 years old. Memorial Highway received an asphalt overlay in 2009, providing a functional driving surface for the next decade.

The Memorial Highway Corridor Study includes a detailed analysis of existing and forecast traffic needs along Memorial Highway. The following section summarizes key conclusions and recommendations from the companion Memorial

Highway Traffic Operational Analysis, completed as part of this study. The findings are integrated into the basic assumptions of the corridor study.

TRAFFIC PATTERNS AND OPERATIONS

- Memorial Highway connects Mandan’s Main Street with Bismarck’s Main Avenue via one of three local vehicle crossings of the Missouri River.
- Due to limited east-west arterial roads in the study area, most travelers within the study area utilize Memorial Highway when traveling to other areas of Mandan or Bismarck.
- Memorial Highway serves as an essential evacuation route for the area.
- A continuous network of intersecting roadways are not along the corridor primarily because of the BNSF railroad along the north side of Memorial Highway. The tracks are significantly



higher than surrounding areas which results in several T-intersections for existing roadways south of Memorial Highway.

- While the posted speed limit is 40 miles per hour, public comments and casual observa-

**TABLE 1
SUMMARY OF CRASHES**

Location	Number of Collisions	Crash Rate (MEV)	Collision Type ¹						Collision Severity ²		
			RA	RE	SS - Same	SS - Opp	LT	O	F	I	PDO
Memorial Hwy & 3rd St SE	11	0.765	2	3	1	-	2	3	-	6	5
Memorial Hwy & 46th St SE	21	1.244	10	9	-	-	2	-	-	9	12
Collision Type 1: RA – Right Angle, RE – Rear End, SS – Same-Sideswipe Same Direction											
SS-Opp – Sideswipe Opposite Direction, LT – Left Turn, O – Other											
Collision Severity 2: F – Fatality, I – Injury, PDO – Property Damage Only											

tions indicate speeding is a common occurrence. However, a speed study was not conducted as part of the study.

- Memorial Highway currently operates as a 5-lane roadway including two through lanes in each direction and a two-way-left-turn lane in the center. ROW width of Memorial Highway is approximately 120 feet, with existing roadway offset ten feet from the centerline of the roadway ROW.

Crash Analysis

Crash records were obtained from the Planning and Programming Division of NDDOT. Three years of crash records, from August 1, 2006 to July 31, 2009, yielded 50 crashes along the corridor. Crash data was divided into intersection crashes occurring at or within 50 feet from an intersection and link crashes occurring greater than 50 feet from an intersection.

- **Intersection Crashes:** Review of crash history indicated, of 50 reported crashes, 36 occurred at intersections. Of 36 reported intersection crashes, nearly 90 percent (32 crashes) occurred at the two study intersections of Memorial Highway at 3rd Street SE and at 46th Street SE (Table 1, Summary of Crashes).

Crash rates greater than 1.0 crashes/million entering vehicles (MEV) are considered significant and crash reduction countermeasures

should be considered. The intersection of Memorial Highway and 46th Street SE is above that threshold. Rear-end crashes that occurred at the intersection are prevalent at signalized intersections. However, a properly functioning traffic signal typically reduces the number of right-angle crashes. Further review of records indicated in all but one case, right-angle crashes at the intersection involved eastbound motorists running a red light. Four of eight red-light runners indicated either they had the green indication, didn’t see the red indication in time, or the sun was a distraction. A large overhead sign structure is approximately 150 feet east of the signal heads. The sign would backdrop signal heads at some point for eastbound motorists and could contribute to increase in driver perception-reaction time. It is recommended to confirm an adequate clearance interval is provided at the intersection and confirm no sight issues associated with overhead signs east of the intersection. Inasmuch as the traffic signal at this intersection is temporary, a signal warrant analysis was conducted as part of the study to determine



whether or not a signal is warranted under existing and projected future traffic conditions.

- **Link Crashes:** Fourteen of 50 traffic crashes reported in the three year study period occurred on Memorial Highway between intersections. Of 14 crashes, 9 were associated with access facilities (i.e., involving vehicles pulling out or into businesses at driveways and colliding with other moving vehicles).
- **Overall Crash Data:** Crash rates from the study were compared against NDDOT’s 2008 Crash Summary to analyze crashes within the study area against the state-wide trends.
 - Zero fatalities occurred during the study time frame.

- ♦ The statewide crash rate per million vehicle miles traveled (MVMT) during the study time frame (2006-2008) is 2.08 crashes/MVMT; Morton County crash rate (2008) is 1.97 crashes/MVMT; and the study area rate is 1.83 crashes/MVMT. The statewide rate includes all rural and urban areas.
- ♦ There were 23 injury crashes or just under half of all crashes.
- ♦ The statewide ten-year average for injury-related crashes is 61.82 injured persons/100 MVMT. The three-year average is 54.71 injured persons/100 MVMT and the injured crash rate for the study area is 83.98 injured persons/100 MVMT. This constitutes a 50 percent higher injured person rate than the statewide three year average.
- ♦ Statewide average for motorcycle crashes is 1.1 percent of all vehicles for urban crashes. The study area was 6 of 93 vehicles or 6.5 percent of all vehicles.
- ♦ There was one crash involving a pedal cycle or bicycle.
- **Costs Associated with Traffic Accidents** - The National Safety Council (NSC) estimates economic impact of crashes based on wage and produc-

tivity losses, medical expenses, administrative expenses, motor vehicle damage and employer costs for injuries to workers. The costs are categorized by severity of crash. Estimated average cost per injury crash during the study time frame (2006-2008) is \$56,500 and per property damage only (PDO) crash is \$7,733. The estimates multiplied by the frequency of crashes during the three year study period equate into an economic impact of over \$1.5 million caused by the traffic crashes.

Traffic Operations

The Traffic Operational Analysis evaluated the need to change geometric and operational functions of Memorial Highway to accommodate traffic volumes projected for 2035. The analysis considered peak flows during both morning and evenings throughout



the year. The analysis evaluated Level of Service (LOS) for intersections and roadways based upon the 2035 projected traffic volumes and recommended traffic control. Key findings of the Traffic Operational Analysis:

- **Roadway Capacity:** In general, intersections included in the traffic analyses are currently operating at acceptable service levels (LOS "C" or better) during morning and evening peak-hour traffic conditions. The only exception was found at the intersection of Memorial Highway and 3rd Street SE/B.N. Drive where the north approach (a minor movement) operates at below-satisfactory levels (LOS "F") during evening peak period. Memorial Highway is recommended to continue to function as a 5-lane roadway.
- **Traffic Safety:** Review of crash records provided by NDDOT indicates 50 reported traffic crashes on this section of Memorial Highway during a three-year period ending July 31, 2009. The majority of crashes (32) occurred at the two intersections of Memorial Highway at 46th Avenue SE (21) and at 3rd Street SE (11). While nearly half of the crashes involved injuries, no fatalities were reported during the three-year period. The injury crash rate however, was 50 percent higher than the statewide average.

- **Traffic Signals:** A preliminary assessment Signal Warrant Analysis of the need to install traffic signals at study intersections revealed under existing traffic volume conditions, minimum requirements for installation of traffic signals are not met. This includes the intersection of Memorial Highway at 46th Street SE, where a temporary traffic signal is in operation at the present time. However, the signal may be justified under the caveat that the intersection would reasonably meet one of the traffic volume based warrants in the next five years. Further signal warrant analyses under the projected year 2035 conditions indicate as traffic volumes continue to grow, signals may be warranted at the three intersections of Memorial Highway at 3rd Street, 40th Avenue, and at 46th Avenue SE. Signalizing would bring the anticipated LOS from "F" with existing stop control to "C" or better with a signal.

However, if McKenzie Drive is extended from 46th Avenue SW to ND Highway 1806 as included in the Bismarck-Mandan Long Range Transportation Plan, future traffic would be reduced at the intersection of Memorial Highway and 3rd Street, reducing the likelihood of meeting traffic signal warrants by year 2035.

- **Accommodation of Pedestrians:** No provisions for safe and efficient movement

of pedestrians and bicyclists are within the corridor, and there is some public demand for such facilities.

The Traffic Operational Analysis included an evaluation of traffic capacity and safety needs along Memorial Highway. Roundabouts were briefly considered at major intersections as an alternative to future traffic signal control, but were ruled out based upon public sentiment and inability to create gaps in traffic stream. Public comments noted entering Memorial Highway from driveways or side-streets can be difficult due to lack of adequate gaps in the traffic stream. Based on the results of the Traffic Operational Analysis, the following recommendations are provided for further consideration:

- Continue to operate Memorial Highway as a five-lane roadway with a center two-way-left-turn lane. While projected traffic through year 2035 falls within the upper limits of a three-lane roadway capacity, higher frequency of driveways and trucks suggests differential speed conflicts would be problematic with a three-lane roadway. Memorial Highway traffic volumes drop considerably west of 3rd Street, where a three-lane alternative may have more viability. However, property west of 3rd Street could be developed with higher traffic

generators in the future and a continuous five-lane road section would meet driver expectancy and long term needs better than a three-lane roadway.

- Construct a separate northbound right-turn lane at the intersection of Memorial Highway at 3rd Street SE to accommodate heavy peak-hour traffic volumes occurring under two-way stop control. With the proposed improvement in place, installation of a traffic signal may not be warranted under the guidelines within the time period studied.
- Continue operation of the temporary traffic signal at the intersection of Memorial Highway and 46th Avenue SE. The recommendation is based on the following:



- ♦ The traffic signal was installed as a temporary safety measure as part of the work zone traffic control plan for the Liberty Memorial Bridge construction project in 2006-2008.
- ♦ Review of crash records between August 1, 2006 and July 31, 2009 indicate the intersection is experiencing the type of crashes often attributed to traffic signal control (i.e., 10 rear-end collisions in a 3-year period). However, many crashes occurred during construction of the Liberty Memorial Bridge which may have impacted traffic patterns and driver perception.
- ♦ At present time, traffic volumes do not meet requirements for a traffic signal. However, entering volume is greater than 1000 vehicles per hour and may be expected to reach levels that would meet other volume warrants in the next five years; meeting the roadway network warrant.
- ♦ Inasmuch as future traffic levels indicate potential need for a signal, consideration should be given to a permanent traffic control signal if warranted as part of any future roadway reconstruction project.
- Evaluate alternative access management strategies as part of the overall corridor study in an effort to improve traffic flow conditions while enhancing traffic safety within the corridor.

The recommendation is consistent with findings of crash analysis conducted for the study, indicating a majority of mid-block crashes on Memorial Highway (9 of 14 reported accidents in a three year period or nearly two-thirds) were associated with driveways.

- Explore options for improving pedestrian safety, access and circulation as part of the overall corridor study. At the present time, limited facilities are available for pedestrians, bicyclists, or people with disabilities.
- Consider designating and improving transit stop locations in coordination with CAT administrators.
- Consider closing low-volume intersections in close proximity to collectors and minor arterials (24th Avenue SE and 39th Avenue SE).

UTILITIES

Lighting

Street lighting is present throughout fully developed areas within the study area. Street lighting along Memorial Highway consists of 40-foot galvanized poles supporting cobra head fixtures along the north side of the road.

Private Utilities

Much of the study area development is served with underground natural gas lines, and underground/

overhead electrical and telecommunications service, while newer developments are generally served with underground utilities. Along the south side of Memorial Highway a wood pole overhead transmission line exists carrying two 46,000-volt and one 12,000-volt electrical lines. Coordination with MDU indicated the lines are not likely to be placed underground due to excessive cost. A cost estimate for the work starts around \$500/linear feet (LF) not including necessary peripheral, support equipment. An overall cost estimate would be approximately \$8 million. Projected cost for the year 2017 are approximately \$10 to \$11 million at a 4 percent per annum inflation rate.

Another alternative for the overhead lines would be to move them south of the business area and away from the highway, with the lines remaining overhead. According to MDU the cost to relocate the lines would be approximately \$1 million, this does not include the cost for ROW. Cost for ROW could easily run another \$1 million. Projected 2017 costs at 4 percent per annum inflation rate would be approximately \$1.3 million without ROW, \$2.6 million with ROW. This estimate assumes optimal conditions with no unforeseen difficulties being encountered.

Water Supply

The existing system was constructed in the mid-70's and consists of a 12-inch asbestos cement water main under the south ditch, with roadway crossing for hydrants and services as needed. Based on

discussions with city staff, the present water infrastructure is adequately servicing the area of Mandan. However, with the system ageing, repair frequencies are expected to increase as the system approaches the end of its service life. The AC pipe under the roadway will see added stress as new construction disturbances occur during the reconstruction of Memorial Highway. It would be a logical time to replace the AC pipe and ageing hydrants and valves when the roadway is reconstructed.

A new water main system would consist of a single 12-inch PVC main with hydrants staggered on both sides of the roadway. With a high probability of new development and redevelopment in the corridor, the water demands of a lot may vary over time. To accommodate this with a minimum amount of disruption, one larger water main could be extended across Memorial Highway between two lots, with each service line connected to the



water main at the ROW line. This would allow the ability to provide building fire flow without requiring replacement of the concrete roadway and without running a smaller conventional service line for each lot. Substantial dewatering costs are anticipated for open trench water main construction due to the water table. Alternatives to open trench construction should be considered, such as installing a new pipe inside the old pipe. For planning purposes, a cost estimate for water main replacement is based on open trench construction.

Sanitary Sewer

The existing system was constructed in the mid-70s and consists of three lift stations pumping in series from 3rd Street to 40th Avenue, with gravity 8 and 12-inch PVC lines completing the system. Much of the system has parallel gravity lines on the north and south sides of Memorial Highway, with the primary line on the south. The system has been modified as development occurred, creating an overall inefficient system. Based on discussions with city staff, the present infrastructure is adequately servicing the area's current development. New developments south of Kist Livestock would need another lift station to be compatible with the existing system. The operation and maintenance of the lift stations in recent years has increased significantly due to their age. The lift stations pumps have been replaced three times each and the inside of the wet-wells are severely corroded from the sewer gases. The lift stations will need to have major rehabilitation or be

replaced. It is anticipated that if Memorial Highway is reconstructed, it would be a logical time to replace the system, with a modern more efficient system.

The new system would consist of a centrally located single lift station with 8- and 12-inch PVC gravity lines servicing the corridor. This new central lift station would eliminate the need to rehabilitate three existing lift stations and eliminate the need for a new lift station south of Kist Livestock. The elimination of lift stations also reduces the ongoing electrical costs to lift the sewage several times, instead of only once as proposed in the new system. Sewer services would be provided for each lot. Substantial dewatering is anticipated for open trench construction, and has been considered in the cost estimates for new sanitary sewer lines and lift station.

STORM WATER MANAGEMENT

Memorial Highway was reconstructed in 1979 as the five-lane section we see today. All lanes are 12 feet wide and the center 12-foot lane functions as a left turn bay for both directions of travel. The roadway has narrow ditches on both sides with 18-inch culverts under the approaches. The longitudinal grades are quite flat and storm water flow is sluggish. Narrow ditches and flat grades have resulted in siltation and sluggish or non-existent flow.

The reconstructed roadway greatly improved vehicle capacity. However, the wider roadbed reduced the amount of available ditch storage. In

order to accommodate, a drainage easement was obtained from BNSF to construct a drainage ditch along the railroad from the west side of 3rd Street SE to the west side of Interstate 194. In addition, ditch laterals were constructed to drain water from Memorial Highway to the drainage ditch along the railroad and eastward to the Missouri River.

The railroad ditch and laterals were necessary and helped somewhat, but narrow ditches and flat gradients along the roadway did not move water fast enough. As a result, roadway ditches began to silt in and culverts became partially plugged. Consequently, today drainage along the Memorial Highway corridor is quite poor and any ponded water is basically required to soak away. Storm water runoff periodically overloads existing ditches and ponds on adjacent properties.

Centerline culverts are located where drain laterals were constructed. Some centerline culverts also act as equalizers between points. As stated above, laterals were intended to carry flow from the roadway ditches to the railroad ditch. However, often times runoff cannot reach points where laterals are located because of plugged culverts or silted-in ditches. Some ditch laterals are also silted-in.

Once runoff reaches the railroad ditch, it flows eastward to Interstate 194. Runoff is then conveyed by pipe to the south side of BNSF railroad ROW and eventually discharges into the Missouri River. The drainage pipe under Interstate 194 is located

immediately south of BNSF railroad overpass. Interstate 194 functions as a dike and protects the Memorial Highway area during flooding of the Missouri River.

The existing ditch drain along BNSF railroad is a grassed waterway. The longitudinal grade was designed with a 0.08 percent slope. Vegetative growth and siltation restricts flow, but for the most part is well maintained.

Piping under Interstate 194 was recently modified to ensure Interstate 194 functions as a flood control component for the area. A control structure was added that has a sluice gate which is closed during flooding of the Missouri River. Modifications also included a means to dewater the interior areas if need be during flooding by the Missouri River. Portable pumps lift the interior (upstream towards the Memorial Highway area) water and discharge into the sluice gate structure at a higher elevation. Similar flood control measures have also been installed for the 46th Avenue SE storm sewer system.

In 2004, NDDOT conducted a drainage study of the Memorial Highway area. The study's purpose was to analyze the existing drainage system and provide possible alternates to remove storm water with regard to the scheduled reconstruction of 46th Avenue SE as a curb and gutter section in 2005 and future reconstruction of Memorial Highway.

The 2004 study proposed the following two alternatives for managing storm water runoff: Alternate 1 involves a storm drain system installed from the BNSF Railroad overpass approximately 900 feet east of 40th Avenue. The drain will run both east and west from a central point, near the Midway Lanes location, and gather water to be channeled northward. Upon being channeled north, the flow would encounter a lift station which would discharge into a concrete channel installed on the current flow line along the BNSF railway ditch. The concrete lined ditch ultimately drains to the ditch on I-194 and the Missouri River. Alternate 2 involves the same storm water system to the west of the Midway Lanes point; at this point a lift station on the south side of Memorial Highway would lift the water and discharge it into a manhole to flow eastward to 46th Avenue in a 24 inch pipe. The system will intercept flow along the route and the pipe size will ultimately reach 48 inches at the 46th Avenue trunk line. If the elevation of the drain system is adequate it will merge into the 46th Avenue trunk line and



proceed southward to the outfall just north of the Raging Rivers Amusement Park. If the elevation is too low, a lift station will need to be installed to move the flow to the outfall at the amusement park.

Discharging runoff to the Heart River was not one of the alternatives considered in 2004. Discharging was ruled out because the Heart River's 100-year flood stage elevation is 5 to 6-feet higher than the Missouri River's 100-year flood stage.

In the past, ROW has also been a limiting factor and this is not seen as changing in the future. It is also assumed the future roadway will be designed similar to what exists today as it relates to vehicle capacity. With regard to drainage, the roadway facility and surrounding area will be best served with an underground storm drain system designed for a 10-year frequency (10 percent chance) according to NDDOT Design Manual – Highway Classification Criteria – Design Flood Frequency Standard. Final design must analyze the effects of a 100-year frequency (1 percent chance) and make design adjustments if effects are determined to be detrimental to properties.

Amended Alternate 1 recommends an underground storm sewer system will convey most of the Memorial Highway corridor runoff to a point northeast of the present Midway Lanes bowling alley, which is approximately at the midpoint of the corridor. The drainage area was estimated at about 170 acres and included all adjacent properties except the easterly

11.59 acres which would need to drain to the 46th Avenue SE corridor storm sewer system. The alternative maintains existing drainage patterns and does move runoff from one drainage basin to another.

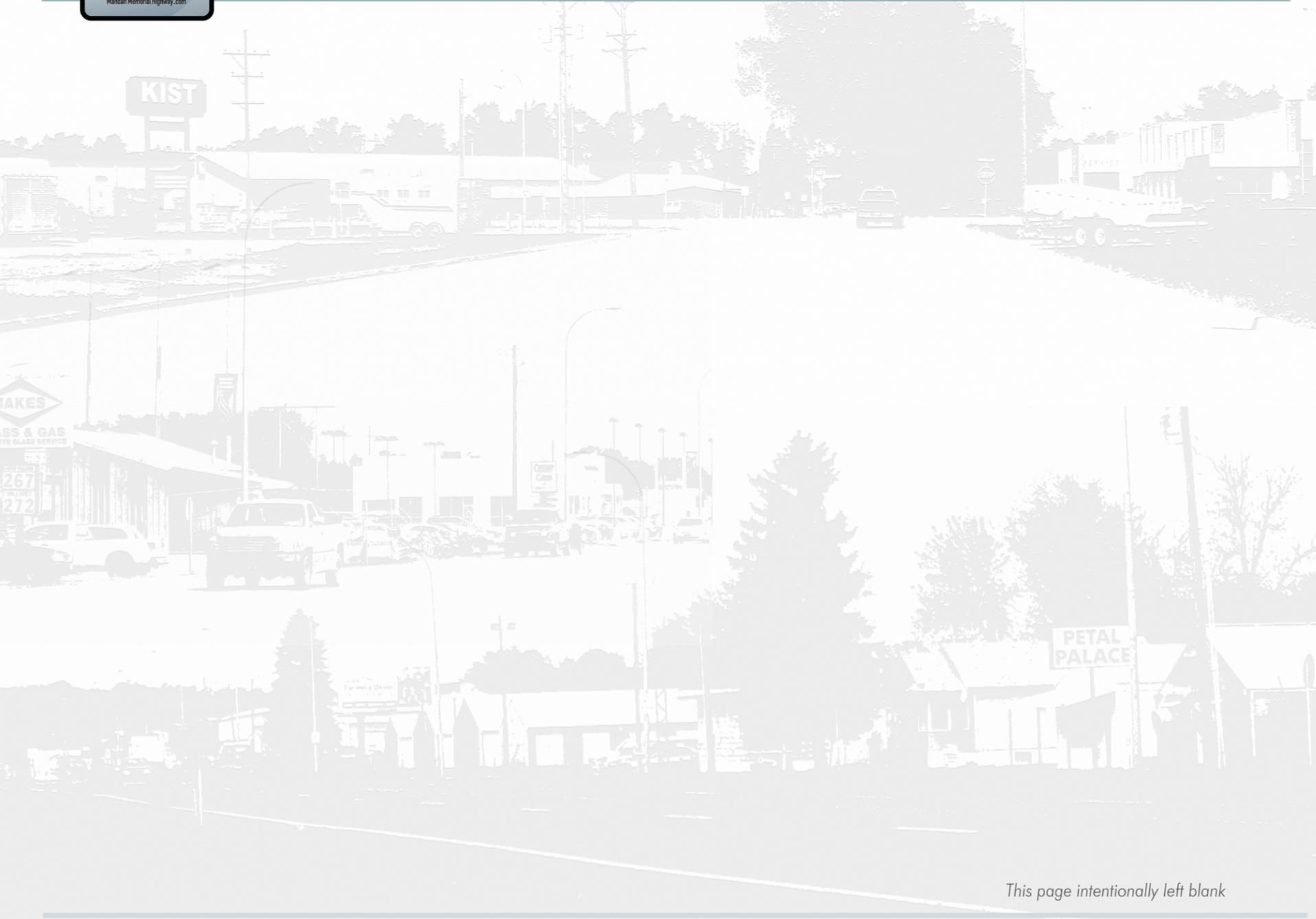
The storm water pumping station would lift the water and pump it into a proposed concrete lined ditch which would carry the water northward and then eastward in the south ditch of the BNSF railroad. From this point, runoff would follow the railroad easterly in the proposed concrete lined ditch to the Interstate 194 ROW. From here it was to flow under the Business Loop to the south ditch of the BNSF railroad and on to the Missouri River. When storm water runoff reaches the Interstate 194 ROW it will be necessary to install a permanent storm water pumping station and intake structure to replace the portable pumping operation. Additionally, storm water detention will be necessary at this location to reduce the discharge rate and optimize the pump sizing. Emergency power provisions are needed at each pumping station to provide a reliable system.

Based on findings of this storm water review, the following recommendations are provided for further consideration:

- Maintain existing drainage patterns to the Missouri River Outfall.
- Construct an underground storm drain system designed for a 10-year frequency (10 percent chance) according to NDDOT Design

Manual and implement all components of the Amended Alternate 1 for Memorial Highway's storm water management plan.

- During project design, analyze existing storm sewer system on 40th Avenue SE to determine if any of Memorial Highway's storm water flows can be added.
- During project design, analyze the Stop Log Structure at the west end of Memorial Highway to determine improvements necessary, if any. At issue with the current stop log structure is the antiquated design and the amount of time it takes to install the structure. The existing structure is a tinker-toy type assembly. The last time the NDDOT received a call to install the structure they were given a two hour notice, although the installation takes eight hours. Because of this, a new structure providing quicker response time was investigated. It was determined these types of structures are generally custom made, without having detailed design information a cost estimate is not possible.
- The final design should incorporate best management practices (BMPs) and include low-impact storm water management facilities such as bio-retention, infiltration basins, and filter/buffer strips where possible in new development and redevelopment of property adjacent to the roadway.



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Chapter 3

Sound market recommendations require a firm understanding of the market conditions impacting the corridor.

MARKET ANALYSIS

Market Analysis

The city of Mandan contracted with URS Corporation to complete a market study in 2003 as a component of the Downtown Mandan and Memorial Highway Redevelopment Plan. The market study provided a comprehensive analysis of regional market trends and Memorial Highway corridor strengths, weakness, opportunities and threats (SWOT). The market study conclusions formed the basis of specific redevelopment recommendations for the corridor. The purpose of the market study update is to document relevant development and market changes occurring since 2002 and recommend revisions to the original study recommendations when deemed appropriate. Note the scope of the 2003 study was limited to frontage properties along the Memorial Highway whereas the current study area includes substantial additional areas north and south of corridor properties.

The full market analysis update is available as a companion document to the Memorial Highway Corridor Study Report, and is summarized as follows:

Demographics and Economics

Both Mandan and Bismarck have experienced similar population growth rates since 2002, with Mandan growing at an annual rate of 1 percent and Bismarck growing at a 1.1 percent rate. Mandan's portion of the total Mandan-Bismarck city population has remained constant at 23 percent over the period.

While per capita income disparity between the communities is decreasing, disparity between Mandan and Bismarck's lower median household income is increasing. The increase is likely due to most higher-income new households settling in Bismarck. Mandan has had some success in attracting higher-income households to new residential developments in riverfront areas. The new household's income has a positive impact on the city's per capita income. However, there haven't been enough households to offset Bismarck's historic median household income advantage.

Review of the top thirty employers in the Mandan-

Bismarck area reveals no change in the top five positions. However, the largest increase in employees were in the governmental, institutional, and medical sectors. The largest decreases were in telecommunications and manufacturing.

Residential Market Update

Since 2002, the city of Mandan has been issuing an annual average of 88 new single-family permits, up from 68 observed in the 2003 study. Townhomes appear to be gaining market popularity and apartment construction also has increased. The 88 average Mandan single-family permits compares to an annual average of 192 for Bismarck. While Mandan's population accounts for only 23 percent of the combined Mandan-Bismarck total, Mandan's share of total single-family permits has been 46 percent since 2002. The rate speaks well for Mandan's housing market and the project area, where many new homes were constructed.

Market Study Recommendations Regarding Office Potential

The 2003 study identified the following office and institution development opportunities for Downtown Mandan and Memorial Highway:

- State government department and agencies
- Bismarck State College (office and classroom space)
- Local business expansion



- Native American businesses
- Creation of business incubator

Since 2002, there has been some expansion of office uses in the study area, particularly along 46th Avenue SE. The office development has included several agriculture-related state associations and local business expansions. While the corridor has not attracted significant state department or agency office development, discussion with state officials indicate potential for such uses in the future.

Market Study Recommendations Regarding Retail Potential

The 2003 study suggested segmenting the corridor into two areas and pursuing separate development uses in each. On the western end of Memorial Highway, the study recommended the following uses:

- Car/mobile home/boat dealerships
- Farm implements
- Warehousing/self storage

On the east end, the 2003 study recommended the following retail uses:

- Regional big box such as Home Depot, Meijer's, Best Buy
- Fashion department store such as Kohl's



- Casual/family dining restaurant
- Neighborhood retail such as a freestanding drug store or video store

Substantial regional big box and department store development has occurred since 2002. However, development has occurred in Bismarck for several logical market reasons. At the same time, there has been substantial new retail and office development along the Memorial Highway corridor. Most of the new developments have been in the following categories:

- Auto/RV related
- Office/government/service
- Restaurants/entertainment
- Agriculture related

Proven market strengths of the Memorial Highway corridor should be the focus of near-term economic development efforts. The focus on big box development has been unsuccessful and emphasis should shift to building the area's strengths. Further, recommended segmentation of the corridor into separate marketing districts should be dropped.

The recommended marketing strategies are supported by a detailed retail gap analysis using Claritas' Retail Market Power (RMP) Opportunity Gap report.

Market Study Recommendations Regarding Residential Potential

The 2003 market study focus was on Memorial Highway corridor frontage properties. The study recommended frontage properties be reserved for commercial use and not be devoted to residential development. While substantial residential development has occurred in the study area, all has occurred south of the corridor, consistent with the 2003 recommendation. Recommendation for commercial use of corridor frontage property should be retained. Ongoing residential development will likely generate interest in the provision of "neighborhood" commercial development to serve new developing neighborhoods as well as older residential developments.

Market Study Recommendations Regarding Convention/Hotel Development

Consistent with the 2003 study recommendations, Mandan has completed the Mandan Events Center Study. The study is still under local consideration. Meanwhile, the Mandan Strategic Plan recommends focus on expansion of Mandan’s current western and adventure tourism events and many are based in the Memorial Highway study area. Consistent with the recommendations, and the need created by the recent transfer of the Mandan Community Center, the concept of a small exhibit hall in the study area may be worth considering.

The recommendations of the Market Analysis Update have been considered in Chapter 6 with regards to the surrounding area land use plan, transportation system and road network.

Update of 2003 SWOT Analysis

The 2003 market study included strategic planning of the SWOT analysis of Memorial Highway. Review of the analysis revealed one major shift in perception that should be noted. Kist Livestock Auction was considered a weakness in the 2002 analysis, whereas today, as documented in the Mandan Strategic Plan and public input received through the new corridor study process, Kist Livestock Auction is viewed as a vital study area and community economic anchor. The single use has spun off numerous support and agriculture related businesses in the corridor. The need for buffering has been acknowledged, particularly between Kist Livestock Auction and the residential development to the south. However, on balance, Kist Livestock Auction is now viewed as a strength.



Chapter 4

Planned and proposed improvements to the corridor require analyzing and understanding the physical environment while complying with local, state and federal regulations.

ENVIRONMENTAL CONSIDERATIONS

Environmental Considerations

NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act (NEPA) of 1969, as amended, requires that projects involving federal actions, whether it be federal funding or a federal permit, analyze potential impacts to the human and physical environment as a result of the project. It also requires the analysis of reasonable alternatives. The purpose is to facilitate informed decision making in project development. If future improvements along the Memorial Highway Corridor, or elsewhere in the study area, involve federal actions, compliance with NEPA would be required.

FLOODPLAINS

Floodplains constitute lands situated along rivers and their tributaries subject to periodic flooding with a one percent chance of flooding any given year, on the average interval of 100 years or less. Per Executive Order 11988, Floodplain Management, potential effects on floodplains must be evaluated; alternatives that avoid adverse effects or incompatible developments within floodplains must be evaluated; and if the project can only be sited within

the floodplain, the project has to be designed to minimize potential harm to or within the floodplain.

The majority of the study area, including Memorial Highway, occurs above Zone AE of the Missouri River floodplain. Zone AE is an area inundated by 100-year flooding that also has base flood elevations established. A base flood elevation is the elevation that a base flood is expected to reach. Any improvements made within the floodplain would require a floodplain permit from the city of Mandan and the evaluation or consideration of the aforementioned criteria in order to avoid or minimize potential harm to the floodplain, such as increasing the flood elevation.

CULTURAL RESOURCES

If future improvements to the corridor would include federal involvement, compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470), as amended, would be required. Section 106 requires federally funded projects be evaluated for effects on historic and cultural properties included in, or eligible for listing on, the National Register of Historic Places (NRHP). Federal involvement would also require compliance with the Archaeological and Historic Preservation Act (AHPA) of 1974 (16 U.S.C. 461 et seq., and 23 U.S.C. 305) which provides for survey, recovery, and preservation of significant scientific, prehistoric, archaeological, or paleontological data when such

data may be destroyed or irreparably lost due to a federally licensed or federally funded project.

A Class I literature review was conducted on January 25, 2010. The review is a file search of state historical records to identify previous Class III Cultural Resource Inventories (on the ground pedestrian surveys) conducted within one mile of the study area and previously recorded cultural resource sites within one mile of the study area. Eighteen previous inventories have been conducted within one mile of the study area. Five of the surveys have occurred within the study area; however, a large portion has not been surveyed meaning potential for previously unidentified cultural resources to occur within the area. During previous inventories, two archaeological sites were identified within the study area. All proposed improvements in the Memorial Highway Corridor Study avoid known cultural resource sites.

ENVIRONMENTAL JUSTICE

Per Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, measures must be taken to avoid disproportionately high adverse impacts on minority or low-income communities. A low-income population is defined as a group with income levels below the national poverty level. In the spirit of this Executive Order, a preliminary analysis of minority and low-income populations was conducted within the study area.

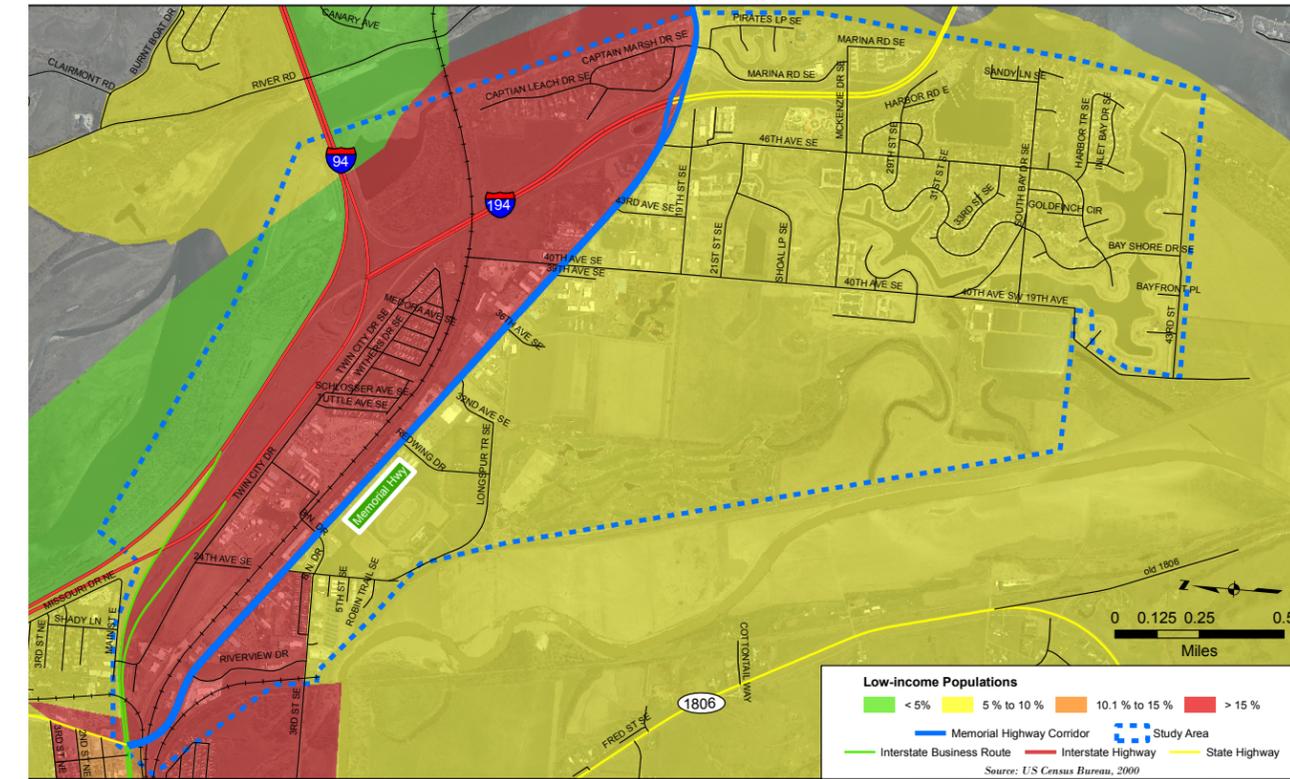
The Environmental Justice Analysis was conducted based on decennial census data (2000) from the United States Census Bureau. No newer information was available from the Census Bureau to be able to isolate low-income and minority populations down to smaller geographic areas than cities, counties, or states. Additionally, review of aerial photography shows there is a larger population (e.g., new housing developments) within the study area than identified in the census data.

The low-income analysis was conducted based on block groups. A block group reflects a sampling of households rather than all households. North-northeast of Memorial Highway, the study area consists of a low-income population of 10 to 18 percent. South-southwest of Mandan Memorial Highway, the study area consists of a low-income population ranging from 7 to 9 percent.

Census block data, also from the year 2000, were evaluated in regards to minority populations in the study area. The census block reflects data collected from all households. The majority of the study area consists of less than a 5 percent minority population. Blocks abutting Mandan Memorial Highway range from 0 percent minority population to 50 percent. See Figures 4.1 and 4.2.

Disproportionate adverse effects to low-income and minority populations must be considered during future development along the corridor including

Figure 4.1 Low Income Populations



issues of ROW acquisition and/or providing reasonable access to properties.

PROTECTED LAND USES AND/OR DEVELOPMENTS

The North Dakota Game & Fish Department and North Dakota Parks & Recreation Department (NDPR) identified the Missouri River Natural Area within the study area. The Missouri River Natural Area is state owned land that serves the purpose of

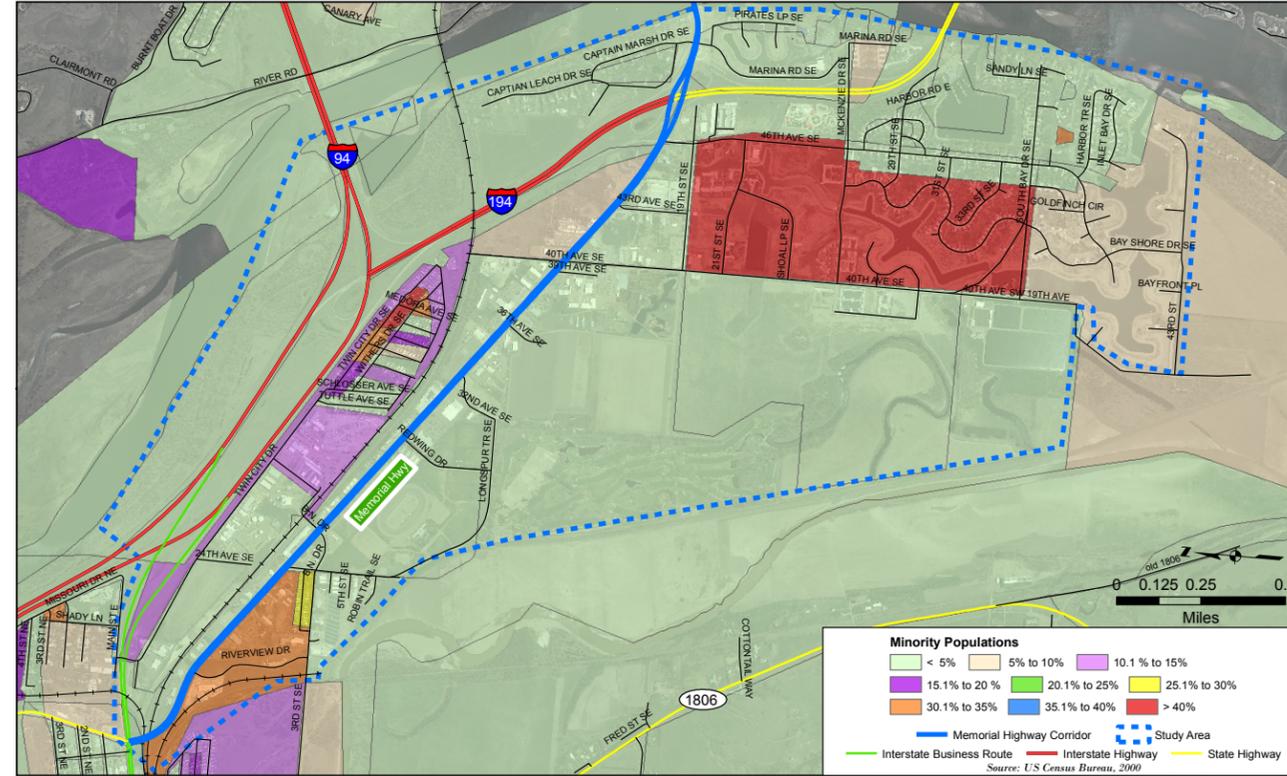
public park use/development only and to prevent the impairment of the natural beauty of the area. Any developments within the area cannot impair the scenic value of the area and must be consistent with the management agreements in place.

Additionally, if future improvements were to have NDDOT involvement, the Missouri River Natural Area would be considered a Section 4(f) property. The property cannot be impacted unless there is no feasible or prudent alternative to proposed use and

the project includes all possible planning to minimize harm resulting from the use of the property.

Additionally, the NDPR identified land within the study area purchased by the Mandan Parks & Recreation Department using Land and Water Conservation Funds (LWCF). A project may impact properties purchased with LWCF only if consistent with the comprehensive statewide recreation plan and the recreation properties are replaced with other public outdoor recreation properties of at least equal fair market value and/or reasonable equivalent usefulness and location. Other lands within the study area that have used LWCF include five trail developments as well as park benches along the Heart River Trail.

Figure 4.2 Minority Populations



WATER QUALITY

The study area contains industrial developments. As result of developments, water quality issues may arise due to waste or chemical materials entering the soil and leeching into groundwater or through runoff into surface waters. It is recommended prior to acquisition of ROW and platting of land for future improvements, a Phase I Environmental Site Assessment be conducted to identify if potential hazards exist.

Chapter 5

Alex Garvin, author of The American City, What Works, What Doesn't, describes the objective of a good plan: "a sustained and widespread private market reaction which improves the quality of life of the affected community."

THE VISION FOR THE STUDY AREA AND MEMORIAL HIGHWAY

The Vision for the Study Area and Memorial Highway

Strategic public actions can use Memorial Highway's assets and character to generate what Alex Garvin, author of *The American City, What Works, What Doesn't*, describes as the objective of a good plan: "a sustained and widespread private market reaction which improves the quality of life of the affected community." The following chapter describes a program of actions and recommendations through three parts:

- **The Objectives** defining desired outcomes of the program based on public input, the Mandan Tomorrow Plan and the consulting team recommendations.
- **The Environments** considering inter-related components of the study – transportation, development, visual aesthetics, neighborhoods, and natural environment.
- **The Memorial Highway Development Concept** illustrating detailed recommendation and projects for the study area.

THE OBJECTIVES

Increase Business and Private Investment

The Memorial Highway Corridor Study should lead to actions significantly improving the district's busi-

ness and investment climate. The program should stabilize existing businesses and reward desirable new investments to strengthen the district. Public realm investments can create conditions for desirable private responses to preserve and increase property values, increase sales tax revenues and attract new businesses.

Create a Distinctive Image and Experience

In an increasingly competitive environment, a traditional business corridor like Memorial Highway must become a destination – a place offering distinctive experiences and attractive settings to customers. Memorial Highway must become more than a generic strip as alternative business areas grow. The corridor has many assets, such as traditional status as the "main street" connecting Mandan and Bismarck, unique retail hub for farm, ranch and motorized vehicle sales; proximity to the Missouri and Heart Rivers, Fort Lincoln Trolley, Dacotah Centennial Park, Dacotah Speedway and rodeo grounds, and neighboring residential areas. The development program is designed to take advantage of features to create a corridor more than a route through the city lined by free-standing commercial uses.

Development Opportunities

While most of the corridor is built up, opportunities for new development and redevelopment exist throughout the study

area. Opportunities include vacant or underused sites, obsolete commercial uses, unnecessarily large parking lots, and declining residential structures. A thoughtful development concept guides reuse of sites, and ensures the reinvestment produces results that are both rewarding and advance interests of the entire area and community.

Complete Streets

Complete streets are corridors that safely and efficiently accommodate all transportation modes including motor vehicles, transit and pedestrian and bicycle transportation. Elements of a complete street may include:

- A traffic way that moves motorized traffic smoothly at desired speeds.



- Barrier-free sidewalks or pedestrian paths accessible during all seasons and provide a comfortable separation from moving traffic.
- Safe and convenient crossing preventing the street from becoming a barrier to pedestrian movement.
- Bicycle lanes, a safe bicycle track, or other accommodation to make bicycle transportation part of normal and predictable traffic movement.
- Accommodations for public transportation may include informational graphics, waiting areas, weather protection, bus turnouts and other features.

Complete corridors address transportation equity by serving the individual needs of groups such as seniors, children, and people with disabilities. Increasing concerns about community wellness, greenhouse gas emissions, and unstable fuel costs have expanded interest in alternative transportation modes.

Traffic calming devices are a part of complete street design and help streets operate more comfortably and appropriately in their urban contexts. Calming devices such as landscaped islands, speed tables, crosswalks, street landscaping, curb extensions, and changes in paving surfaces, discourage speeding, improve motorist attentiveness and enhance street environment. Calming devices also mark transitions

from commercial to residential environments, particularly important in the study area.

Memorial Highway itself may not be able to incorporate all features, but the study area, should strive to accommodate all modes of transportation.

The National Complete Streets Coalition (www.completestreets.org), an association of organizations including the Institute of Transportation Engineers (ITE), the American Planning Association (APA), American Association of Retired Persons (AARP), and the League of American Bicyclists is an excellent source of information on street design and status policy in the United States.

Improved Functional Safety

Memorial Highway should present a safer transportation environment for all users. Current problems include friction between local and through traffic, frequent and conflicting driveways, conflicting left turn movements and lack of pedestrian and bicycle access. Complete street concepts improve safety, but techniques are needed to reduce the possibility of crashes including rationalizing access points, controlling left turn movements, and reducing conflicts between different traffic streams. Access and left turn management programs should not reduce access or impede operation of individual



businesses. In fact, they can provide greater customer comfort and in many cases, more parking.

Environmental Sustainability

Major commercial corridors like Memorial Highway have a high percentage of impervious surface, complicating storm water management, creating a heat island, and generating other negative environmental impacts. The overall corridor should evolve toward greater sustainability by minimizing effects and incorporating best management practices into street and development design. Mixed uses on development sites and facilities encourage use of non-motorized transportation modes for short trips creating a more sustainable corridor.

Mutually Reinforcing Neighborhood Connections

Memorial Highway is not an isolated corridor, but surrounded in a neighborhood context. Residents of neighborhoods are customers for businesses along the corridor. Good physical circulation linkages free of obstacles, encourages desirable interaction. Good connections between a multi-use corridor and surrounding neighborhoods involve managing the edges – filtering out undesirable commercial traffic, minimizing visual and functional incompatibilities, and preventing operations effects such as lighting and noise. Unmanaged edges can produce deterioration at the boundaries that easily spread into the heart of the neighborhood. Commercial areas benefit from healthy surrounding neighborhoods and residential areas also benefit when nearby retail and service centers thrive.



THE ENVIRONMENTS

The following section considers three environments to describe the unifying assumptions and principles the study applies to individual character segments of Memorial Highway. The discussion of each key area identifies desirable outcomes and presents strategies to achieve them. The three environments include:

- **Transportation Environment:** Access and mobility to and within the district.
- **Visual Environment:** Design elements of the study area and overall physical appearance between Memorial Highway Corridor and surrounding neighborhoods.
- **Natural Environment and Sustainability:** The environmental performance of the district and the ability to manage factors such as storm water, emissions, extraneous lighting, and other effects.

TRANSPORTATION ENVIRONMENT

Functional Outcomes

- Improve connectivity within and beyond the study area by identifying a future transportation network that supports area growth.

- Safely and comfortably accommodate all modes of transportation in the corridor and surrounding area including motor vehicle traffic, bicycle and pedestrian transportation, and transit.
- Produce smoother, safer traffic operations by minimizing crash points and reducing friction between local and through traffic.
- Maintain good local access to businesses along Memorial Highway and throughout the study area.
- Improve travel experience, calm traffic and encourage compliance with safe speed limits by providing a more attractive and pleasant roadscape environment.

Strategies: Motor Vehicle Transportation

- Identify parallel routes, frontage roads or backage roads to Memorial Highway for accommodating shorter trips within the study area, reducing motorist conflicts while maintaining or improving access to adjacent properties.
- Identify alternative access and parking strategies for Kist Livestock Auction patrons to minimize stacking of trucks on Memorial Highway and other public roads.
- Identify alternative access roads to Twin City Estates and Captain's Landing Township areas,

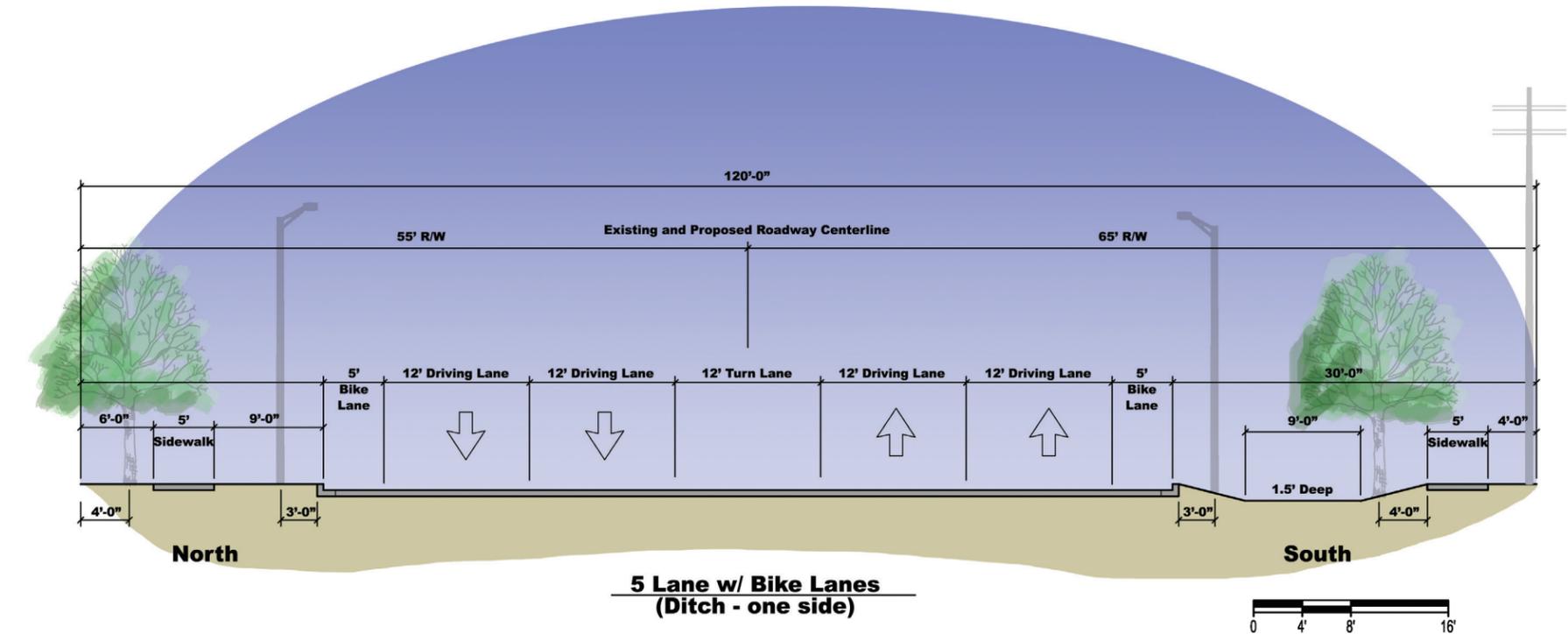
which are currently served by long dead-end roads.

- Accommodations for transit stops either on roads or with private/public partnerships on private lots.
- Implement a typical street section along Memorial Highway that provides:
 - ♦ Two standard 12-foot drive lanes in both directions.
 - ♦ A raised and landscaped median, 12 to 16 feet wide, along segments where left-

not required for acceptable business and parking access.

- ♦ A 12-foot center left-turn lane in areas where continuous left-turn movements are necessary to provide business access.
- ♦ Dedicated facilities for non-motorized transportation to minimize conflicts with motorized transportation.
- ♦ Lowering the roadway elevation to reduce steep driveways and improve drainage of adjacent properties.

- ♦ Improved street signing to provide positive direction for motorists.
- ♦ Landscaped sidewalk setback along Memorial Highway, 6 to 8 feet wide to provide comfortable and functional separation between vehicular and pedestrian domains.
- ♦ Continuous 5-foot minimum width sidewalks with barrier-free intersections.



- Provide specific intersection design modifications where necessary and access to management measures, consistent with recommendations of the Traffic Operations Study. Recommendations include:

- ♦ Increase intersection street corner radius to accommodate large trucks.
- ♦ Increase depth of turning lanes to accommodate future traffic loads.
- ♦ Consolidate driveways, control left-turn movements, and increase lighting at high-volume locations to improve safety.
- ♦ Modify some intersections to provide an additional turning lane for future traffic volumes.
- ♦ Encourage connectedness between parking lots and drives as part of the access management program.
- ♦ Develop convenient off-street parking areas directly accessible from cross streets to promote park and shop.

Strategies: Non-Motorized Transportation

- Provide connections to accommodate bicycle and pedestrian traffic between Memorial Highway, existing/proposed trails and sidewalks, and residential areas.

- Provide bicycle lanes on Memorial Highway with a minimum amount of motor vehicle/driveway conflicts.
- Encourage existing and new developments to provide Americans with Disabilities Act (ADA) compliant facilities that provide access from public sidewalks.
- Require storm drain features that do not trap bicycle and wheelchair wheels both on public and private facilities.
- Provide appropriate signage for pedestrian/bicycle accommodations and directional information.
- Provide raised medians at key locations along Memorial Highway without restricting access to businesses to provide pedestrian refuge while crossing the street.
- Provide parking lot buffers adjacent to public ROW to minimize encroachments into non-motorized vehicle space.
- Provide bicycle parking facilities at strategic locations such as Dacotah Centennial Park.
- Whenever possible, separate sidewalks from Memorial Highway with a parkway strip. Separation should average at least 6 to 8 feet from the back of the curb, although not possible in every instance. Curved sidewalk alignments should be used in places to create a more informal character.

- Use consistent sidewalk design features along Memorial Highway designed for safety and visual and functional continuity. Surfaces should be concrete with 5-foot minimum width, and a contrasting safety strip adjacent to the back of the curbs. Special surfaces should be focused at intersection and mid-block nodes, and may include ADA compliant textured or color-conditioned concrete. Finer concrete scoring patterns also add contrast and define amenity areas.
- Replace sidewalks and intersection cuts that are not ADA compliant.
- Provide well-defined crosswalks at signalized intersections and strategic points separated from intersections. Mid-block crosswalks should use pedestrian actuated flashing beacons and an offset design at refuge medians to maximize visibility and encourage greater motorist caution.
- Use consistent materials to define crosswalks. Surfaces may include stamped or patterned concrete, colored concrete, or a contrasting scoring pattern. Colored crosswalks must be separated from the detectable warnings by non-color added curb and gutter. Detail and type of materials should be consistent with other paving materials and vary depending on project budget.

VISUAL ENVIRONMENT

Improvements or functional outcomes to Memorial Highway are directly related to the evaluation and observations of the existing conditions made by the design team and listed in Chapter 2.

Functional Outcomes:

Scale, Visual Cues and Street Framework:

- Break down the scale of the corridor to be more traditional block to block.
- Establish a hierarchy of major and minor streets with associated enhancements.
- Incorporate ROW improvements near side street intersections to differentiate streets from driveways.

Landmarks, Destinations and Distinction:

- Maintain and accentuate view and orientation toward landmark facilities.

Consistent Quality:

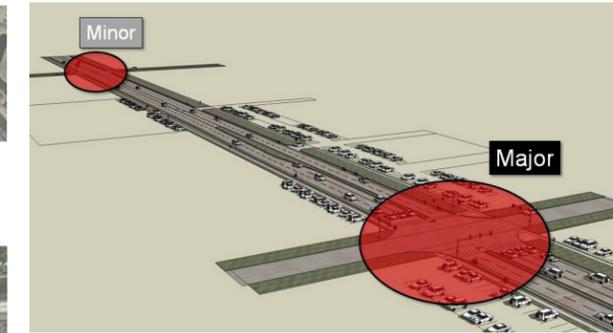
- Implement streetscape elements throughout the entire corridor.
- Keep enhancements simple and focused to allow for high quality maintenance.



Existing City Street Intersections

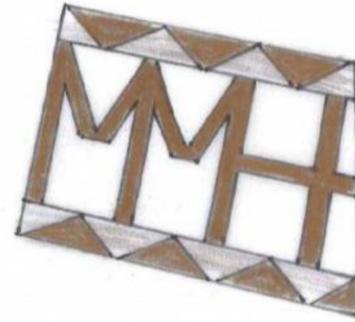


Proposed



Pedestrians and Alternative Transportation:

- Provide sidewalks throughout the study area that connect to the regional trail system.
- Accommodate pedestrian crossings of Memorial Highway utilizing crosswalks and pedestrian actuated flashing beacons at 3rd Street and at the stop log structure.
- Focus pedestrian crossings at signalized intersections where possible.
- Accommodate commuter biking via on-street and side path bike lanes and trails.



MANDAN MEMORIAL HIGHWAY
BRANDING IRON "BRAND"



Utility Considerations:

- Consider the long term re-alignment or below ground placement of transmission lines.
- Carefully design the open flow storm water drainage to result in a clean and maintained appearance.
- Implement storm water best management practices where applicable.

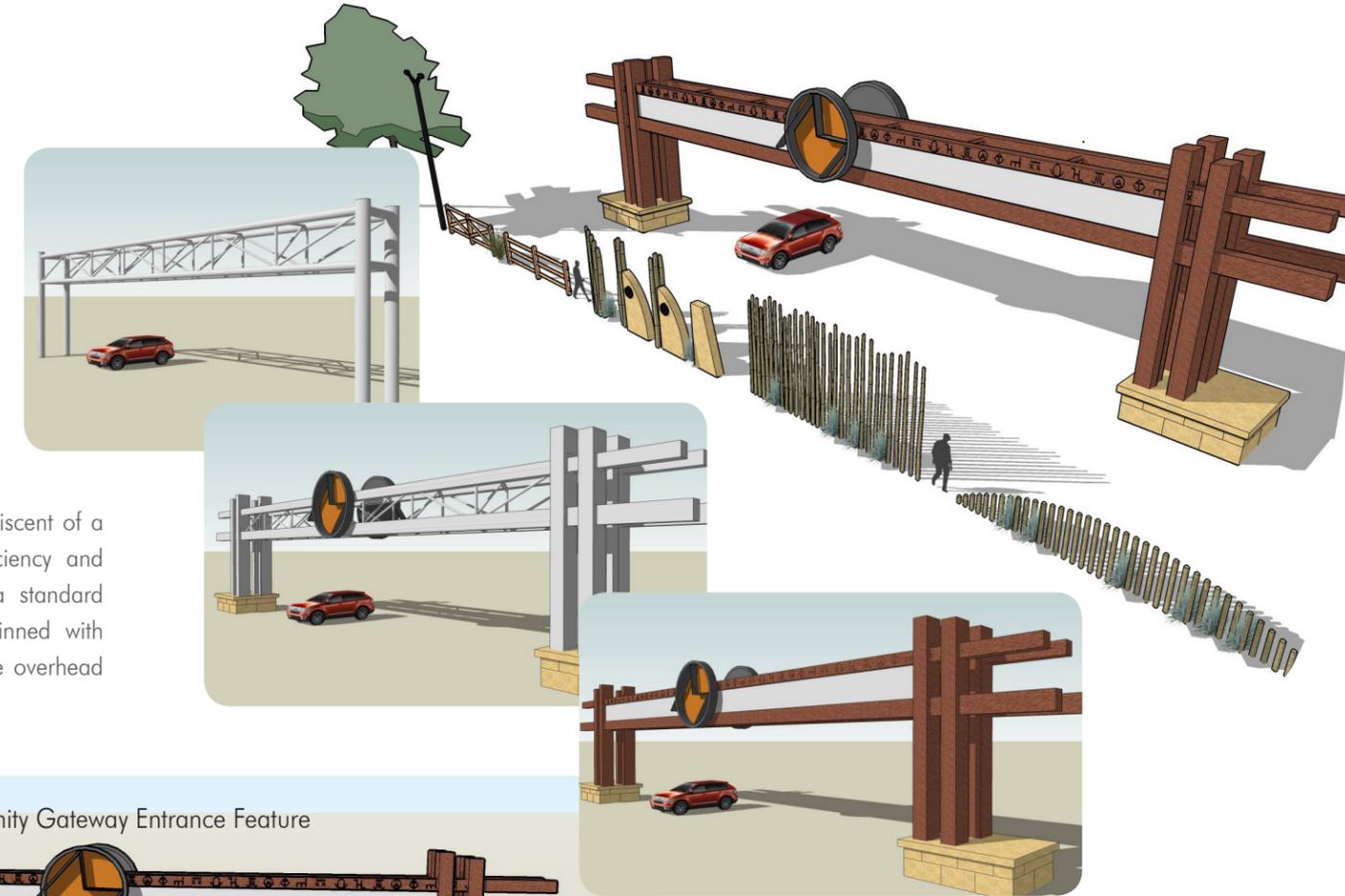
Community Identification and Image:

- Reinforce corridor uses and identity by integrating unique designs into streetscape elements.
- Announce and celebrate the community entry at the east end of the corridor.

Streetscape Elements

Community Gateway Entry Feature:

Westbound drivers and trail users cross the Missouri River and move directly into the corridor and potentially have no idea they have entered a new community and district. The intersection of Memorial Highway and 46th Avenue provides a great opportunity to announce and celebrate the community by integrating a signature entry feature west of the intersection. The feature would cross the roadway and be reminiscent of a traditional gateway structure. For efficiency and economy, the concept would utilize a standard roadway sign truss that would be skinned with additional materials to emulate massive overhead entrance gate posts and beams.



Traditional Western Crossbuck and Rail Fencing

Stone and Stake Marker Options

Native American Palisade Stake Fencing

Stone and Stake Markers:

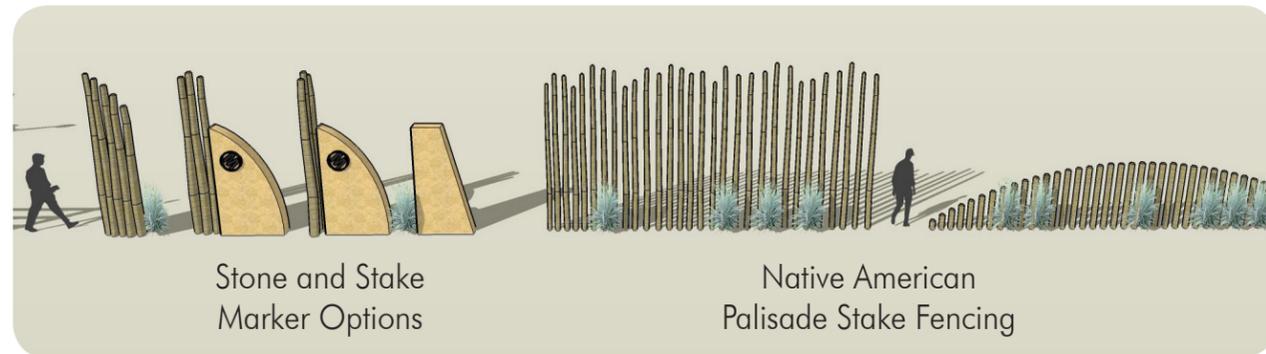
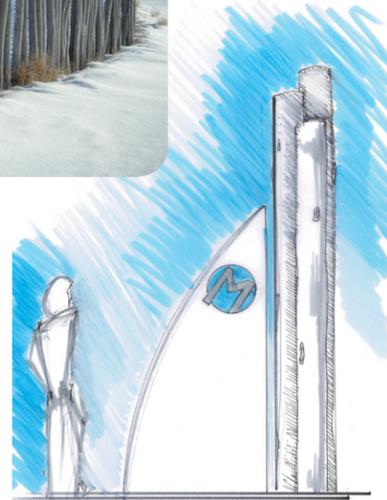
Currently, many intersections along Memorial Highway are difficult to differentiate from private driveways. The proposal is to add enhancement elements primarily at intersection areas to aid in establishing a stronger definition of public street intersections. One enhancement element is characterized as a marker, and would flank the intersections and provide an opportunity to integrate contextual materials and design themes. The markers could be made primarily of stone and metal for long, low maintenance life. Several options are illustrated on this page.



Median and Open Space Native American Landscape Palisades:

Fort Lincoln State Park is home to interesting, historic restorations of Native American On-A-Slant earthlodges, which were held up by a frame of

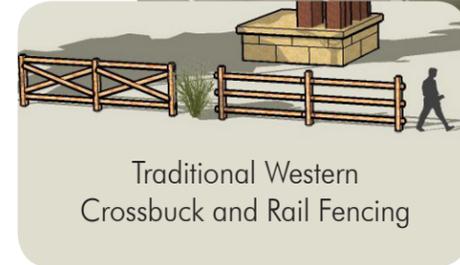
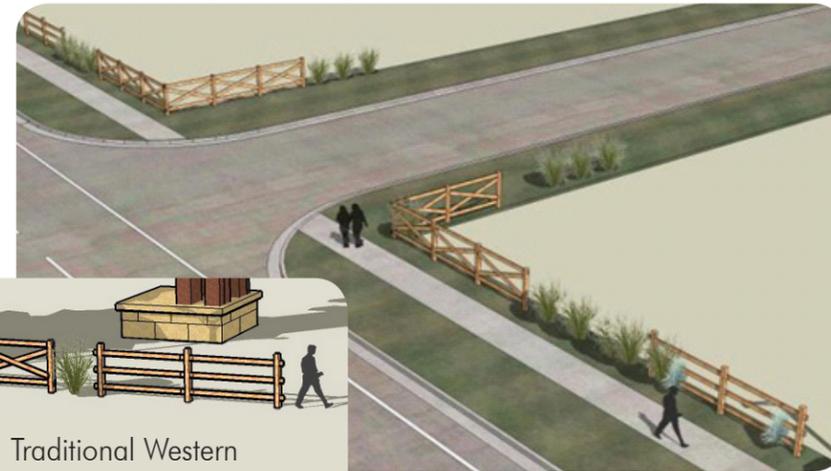
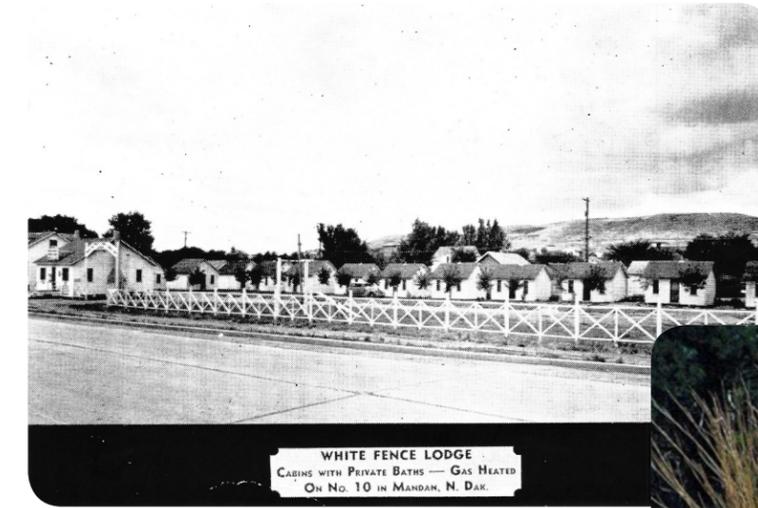
cottonwood logs and covered with layers of willow branches, grass and earth. Earthlodges were placed close together with entrances facing towards the village plaza in the center. Logs were also placed vertically in close succession to form palisades and to define and protect village spaces. One concept for enhancements along Memorial Highway is to develop an abstraction of palisades and place in subtle curves within landscape areas of the corridor. Features help define and accentuate corridor open spaces, not unlike their original use and would relate to the unique heritage of this part of North Dakota.



Traditional Western Crossbuck and Rail Fencing and Associated Landscape:

As noted, many intersections along Memorial Highway are difficult to differentiate from private driveways. The addition of segments of fencing along the ROW lines near intersections will identify and differentiate each instance of public street intersections. Fencing is not intended to be continuous and would drop off fairly quickly away from the intersections.

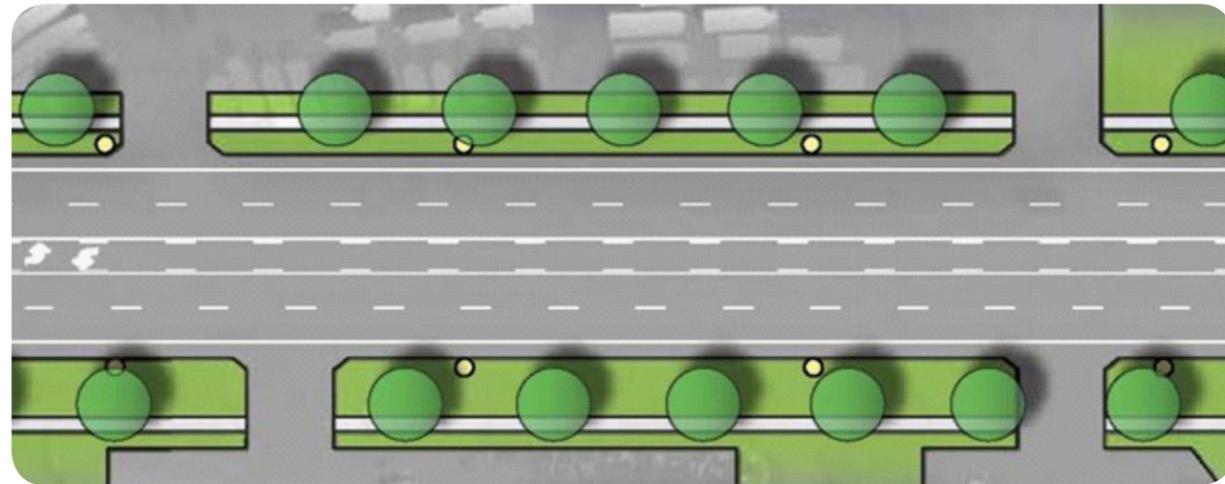
Along with fencing, native grasses would be planted along the ROW to define the public and private spaces and to provide context for the fencing. Grasses would be low maintenance and drought tolerant species capable of thriving without irrigation.



Trees and Lighting:

The addition of trees along the corridor will have a wonderful impact on the corridor's visual environment. On the northeast side of the roadway, trees will be placed between the new sidewalk and the ROW. On the south side, trees will exist between the sidewalk and roadway allowing enough separation between trees and existing overhead transmission lines.

High efficiency LED roadway lighting will be placed along the edge of the roadway and allow appropriate separation from the tree canopies.



Proposed Improvements: 46th Avenue and Memorial Highway



Proposed Improvements: 46th Avenue and Memorial Highway showing before and after views



Proposed Improvements: 46th Avenue and Memorial Highway showing before and after views



Proposed Improvements: 39th to 40th Avenue and Memorial Highway



Proposed Improvements: 39th to 40th Avenue and Memorial Highway showing before and after views



Proposed Improvements: Stop Log Structure and Memorial Highway showing before and after views



Proposed Improvements: Railroad Bridge and Memorial Highway showing before and after views



NATURAL ENVIRONMENT AND SUSTAINABLE DESIGN

Study Area

The study area incorporates the entire range of community land uses, from single-family residential to heavy industrial. As the area continues to develop and redevelop, it is important Mandan consider principles encouraging development to occur in a more sustainable fashion. While the concept of sustainability is broad and encompasses virtually all aspects of city operations, recommendations for improved development sustainability are often referenced to what has become known as Smart Growth Principles.

Communities across the country are using creative strategies to develop in ways that preserve natural lands and critical environmental areas, protect water and air quality, and reuse developed land. (RDG has been incorporating sustainability principles into study goals discussions through a modified version of the Smart Growth Principles.)While Smart Growth has become a buzzword that can evoke guarded reactions from the development community, substantial agreement has been found with individual principles when discussed within the framework of study goals and development principles to guide community growth.

Based on the experience of communities around the nation that have used smart growth approaches to improve development sustainability, the Smart

Growth Network developed a set of ten basic principles:

1. Mix land uses
2. Take advantage of compact building design
3. Create a range of housing opportunities and choices
4. Create walk-able neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty, and critical environmental areas
7. Strengthen and direct development towards existing communities
8. Provide a variety of transportation choices
9. Create predictable, fair, and cost effective development decisions
10. Encourage community and stakeholder collaboration in development decisions

The principles should be discussed by Mandan



decision-makers, with input from the community, and used to guide development decisions to the extent determined appropriate for Mandan.

Memorial Highway Corridor

Memorial Highway, along with many roadway corridors has the opportunity to lessen negative impacts on the natural environment and increase function as an integral part of a sustainable, green infrastructure system.

Five areas of focus have been identified for the corridor based on existing conditions, local ecosystem, and proposed improvements.

Alternative Transportation

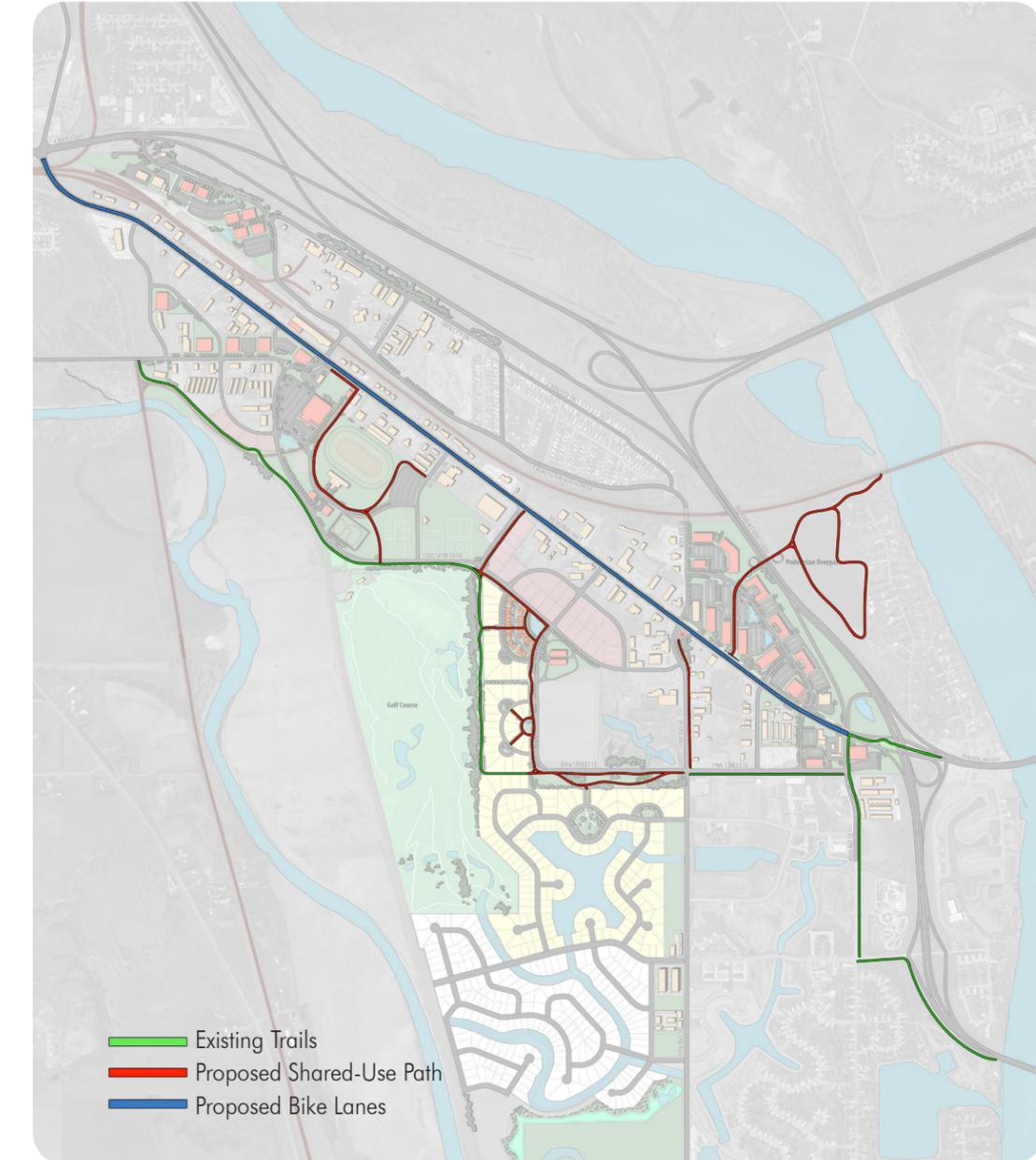
The Memorial Highway Corridor is a major transportation route for everyday traffic. While the study recommends improvement to the roadway, it is important to recognize alternative modes of

transportation such as sidewalks for pedestrians, on-street bicycle lanes and bus stops. Alternative transportation facilities increase access opportunities to businesses by customers and employees. Additionally, commuters prefer direct routes, whether by motor vehicles, foot or bicycle.

Sidewalks: Adding sidewalks along the corridor provides users the opportunity to park and walk from business within a short distance. Providing a safe route reduces the amount of short distance routes within the corridor and reduces the amount of entering and exit movements created by vehicles. Sidewalks also provide a safe and proper accessible route for persons with disabilities.

On-Street Bicycle Lanes: On-street bicycle lanes provide a viable alternative to vehicular travel. Many bicycle enthusiasts prefer dedicated bicycle lanes as opposed to a shared use path. By bringing the bicycle out onto the roadway, they are in a known location and out from the edge of parking lots making it easier to see bicycles and oncoming traffic when attempting to merge with traffic. Previous studies have shown bicycle lanes can have fewer vehicular conflicts than shared use paths that must cross numerous driveways. Allowing the cyclist with a direct route of travel could increase the use of bicycles within the corridor; this route could significantly reduce the time and difficulty for a cyclist to commute to work. The estimated cost of bike lanes on Memorial Highway is more costly than a shared use path. (See Appendix A) If funding is available,

Figure 5.0: Existing and Proposed Trail System



bike lanes are recommended due to the reduced bicycle/vehicular conflicts and due to support for bike lanes expressed by local bicycle commuters.

Bus Stops: Currently the CAT bus stops along the corridor at designated businesses. The addition of bus stops along the corridor would provide users a designated location to board. Providing locations reduces the unpredictability of the bus stopping randomly along the corridor which could cause traffic problems.

Shared Use Paths: The addition of shared use path trails within the study area would provide an additional level of circulation and connection. Trails can be used to safely transport pedestrians and recreational bicyclist to and from adjacent neighborhoods along a designated path. By incorporating connections to the existing trail system by Mandan Parks and Recreation District trail users will be more apt to visit businesses.

Trails identified in the study coordinate with the MPO long range transportation plan for 2035.

Storm Water Management: Green Infrastructure

Green infrastructure systems reduce damage to rivers and streams by using BMPs or integrated management practices (IMPs) in building and site design. Disconnecting flow from storm sewers and re-directing runoff to natural systems such as rain gardens, bioswales, biocells, filter strips, native

plantings and landscape enhancements allows storm water to infiltrate into the ground, reviving the existing aquifers. Natural systems also remove harmful pollutants and suspended solids from parking lots, streets, and roadways, improving ecological integrity of rivers and streams. A guide to the most appropriate BMP follows:



Rain Gardens: A rain garden is a shallow depression with an amended soil mixture composed of sand, topsoil, and compost and usually planted with native species that remove pollutants from storm water. Rain gardens are not a water conveyance system. Generally cells should be designed to capture 90 percent of all rain events (1.25 inches) or smaller. Since rain gardens are designed to infiltrate and cleanse water, all surface water should infiltrate within seventy-two hours. Soil tests should be completed prior to locating rain gardens.

Bioswales: In contrast to rain gardens, bioswales are an infiltration and conveyance system - usually designed as part of an overall system that outlets into a naturalized detention basin.

Bioretention Cells: Bioretention cells are a naturalized depression that slows storm water runoff, releasing at a slower rate to discourage erosion and reduce turbidity.

Typically bioretention cells require soil amendments of compost and topsoil.

Naturalized Detention Basins: Naturalized detention basins are shallow wetlands or open water ponds that contain a natural buffer that temporarily stores runoff. Buffer strips increase water quality of wetlands by allowing water to infiltrate, cleanse, cool, and recharge existing hydrologic systems. Plant selection should be limited to native aquatic and wet mesic plants.

Green Roofs: Green roofs (also known as roof top gardens and vegetated roof systems) are on-site systems designed to retain, slow, cool, and cleanse rainwater falling on the roof of a building. Green roofs can be retrofitted for existing buildings and should be encouraged in new developments. Typically, roof tops are planted with drought tolerant plant species in an engineered soil. Rooftop soil is lightweight, containing a large quantity of pumice (or similar material) and compost that holds water in the medium and drains slowly. Water evaporates

into the atmosphere, reducing peak flows in urban streams and mitigating the urban heat island effect. Different types of green roof systems include:

- Extensive green roofs, typically designed with 2-4 inches of engineered soil, and planted with only the hardiest vegetation.
- Semi-intensive green roofs, usually with 4-8 inches of engineered soil. When an engineered soil medium of six inches or more is used, choice of plants dramatically increases. Ornamental grasses and many herbaceous perennials may be included in the planting palette.
- Intensive green roofs, usually have more than 8 inches of engineered soil. These are often plazas and other areas carrying a heavy design load.



Green roofs also protect the roof, insulate, and enhance Heating Ventilation and Air Conditioning (HVAC) systems. Green roofs have been proven to triple the lifetime of the roofing system, cutting down on long term building costs while adding an ecological benefit. Insulating capabilities reduce heat loss and cool air before it enters the HVAC systems. While green roofs are not extensively used in the region, they have been implemented as close as Fargo, ND.

Light Control and Dark Skies

- Provide a level of lighting appropriate for safety, visibility, and comfort, but avoid excessive light levels. Effective outdoor lighting provides comfort and security and encourages pedestrian activity. Proper lighting in urban areas promotes vehicle safety and reduces shadows that keeps motorists from seeing pedestrians. However, excessive light produces an unpleasant environment and wastes energy.
- Utilize street lighting sources that direct light to the ground plane and minimize extraneous light. The dark skies concept focuses light on areas and surfaces that should be illuminated. Outdoor lighting performance should be based on both optics and overall system design, including distribution and functional and aesthetic requirements. At night, light sources should be almost imperceptible. High-

performance optics focus the observer's eye on the illuminated surface below the fixture.

- Use lighting that reinforces the theme and character of the Memorial Highway environment. Street lighting should relate to the streetscape during both day and night. Scale and style contribute to the visual tone of the street. The type of light source also influences energy consumption and sustainability. Efficient light sources can achieve equivalent lighting levels with lower energy use. The spectrum of light also becomes an important part of the nighttime streetscape. For example, high pressure sodium vapor lights are efficient but to some eyes renders colors poorly. Metal halide's white light renders colors and surfaces more realistically and are available in different color temperatures to provide a more incandescent appearance.

Native Landscaping

Plant selection in the public environment should reinforce community themes and use local materials. Consistent palettes of plant material used within planters, streetscapes and other locations can strengthen the composition of individual elements in the public realm. Mandan's semi-arid climate can be very harsh and plants should be used with proven performance. The following section recommends a plant palette for the corridor.

Street Trees: Street trees planted at regular intervals can define the street and provide shade. Good locations in the Memorial Highway concept include intersection bump-outs, mid-block nodes, and private property edges where two conflicting land uses occur. While installations on existing private sites are voluntary, the city should provide incentives for tree planting and new landscape standards should require street trees in new developments. Careful plant selection should be utilized to avoid irrigation to the greatest degree possible.

Because Memorial Highway is a state highway, tree planting in the ROW must meet Clear Zone standards set by NDDOT. Clear Zone standards vary depending on roadway design and should be verified according to NDDOT roadside design documents. Large trees should also not be located under power lines, or in front of business signs and displays. Final planting locations should be coordinated with adjacent property owners to minimize conflicts.

Planting trees reduce the urban heat island effect by shading sunlight from hard surfaces. Deciduous trees planted along the south and west sides of buildings reduce energy use by blocking sunlight in the summer while allowing it to penetrate the building's windows in the winter.

Appropriate street trees for the Memorial Highway environment include:

- **Honeylocust (Thornless):** Honeylocust trees are generally grow to be about 50 feet tall and tolerate urban conditions well. Honeylocust have good fall color and resistant to pests. The tree also provides filtered shade on a building façade or landscape, does not attract birds, and have small leaves that decompose easily in the autumn.



- **American Linden:** American Lindens are large trees known for pyramidal form and a popular choice for boulevard plantings. Typically, trees will grow to about 60 feet tall and should be planted at 40 feet on center.

Shrubs: Shrubs along major roads should tolerate harsh conditions. Snow and salt create especially difficult conditions. Salt tolerance shrubs should be resilient and appropriate to their surrounding land



use contexts. Shrubs appropriate to the Mandan area include:

- Russian Sage, a tolerant shrub with lovely purple flowers. Shrubs can accent pedestrian crossings and significant intersections
- Spirea, a drought and salt tolerant plant that grows well in many different soil types
- Saskatoon serviceberry (dwarf varieties)
- Red-twig dogwood

Native Grasses: Native grasses slow storm water runoff and add color to the streetscape. Grasses appropriate to the Mandan area include but are not limited to:

- Little Bluestem
- Sideouts Grama
- Prairie Dropseed

Forbs: Forbs add color and life to the roadway. Presence is limited and should be expanded upon. Forbs suggested along Memorial Highway, include:

- Purple Coneflower
- Yellow Coneflower
- Liatris



MEMORIAL HIGHWAY DEVELOPMENT CONCEPT

The vision for Memorial Highway is to establish the corridor as a regional commercial/service corridor that supports a mix of uses while providing flexibility and compatibility in design standards unified by an improved “greenscape” infrastructure. Four major factors considered during the design process for the corridors include: Access Management, Pedestrian Accommodations, Green Infrastructure and Image and Character. Mandan’s Vision Plan 2009 emphasized making the area a distinctive community with independently owned stores and unique, family friendly attractions and amenities. Figure 5.1 shows Memorial Highway project area opportunity sites. The map combines an indication of building conditions with vacant or underutilized lots to identify the prime development opportunity sites. The map was used in the project design workshop as base information for preparation of a development concept for the project area.

Figure 5.2 shows the Corridor Development Concept. The plan focuses on improving existing street intersections, new streets providing alternative access and parallel routes, addressing parking issues, reorganizing entrances and parking, improving surrounding land uses, adding more commercial space and creating

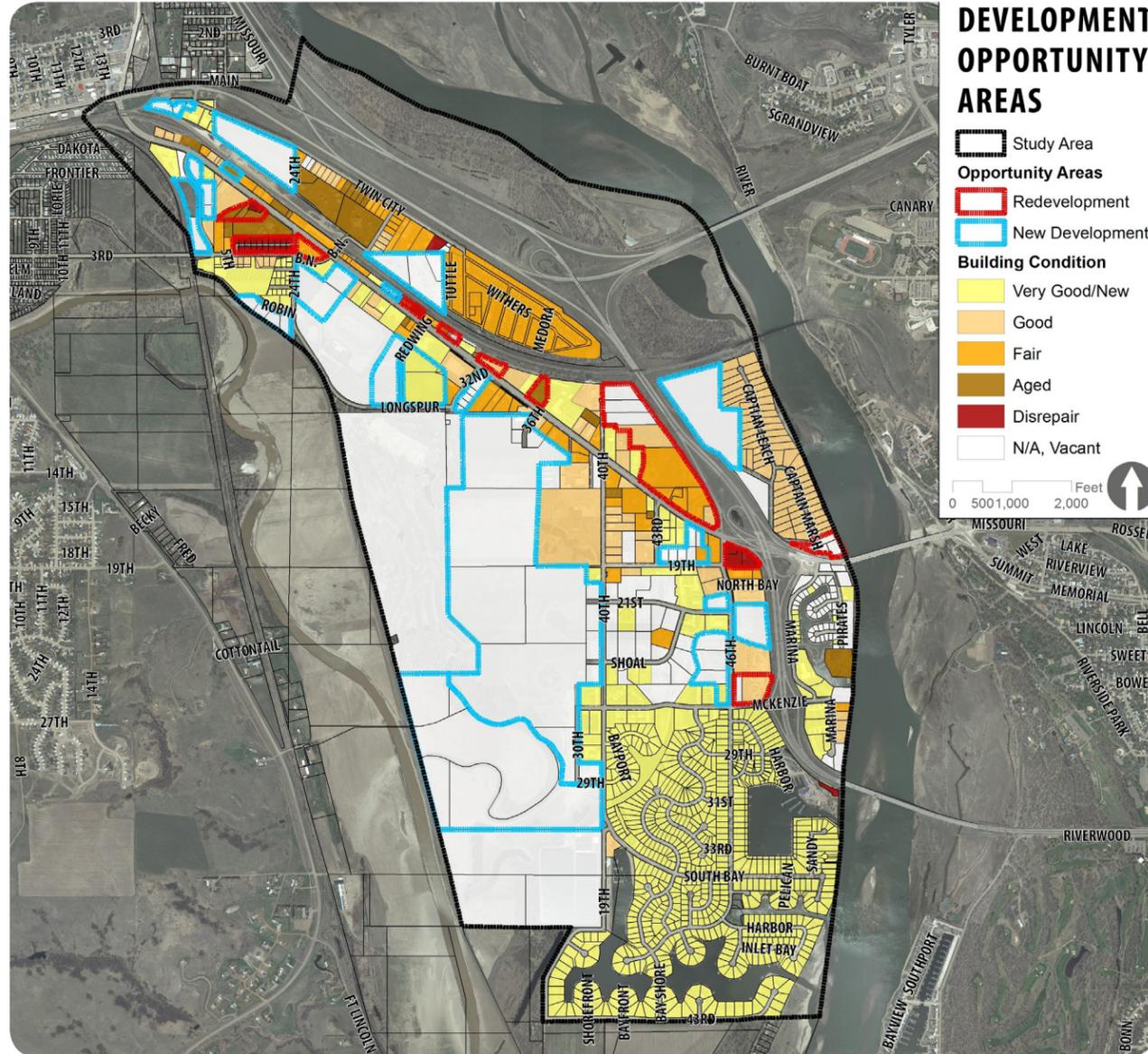


Figure 5.1: Memorial Highway Study Area Development Opportunity Areas

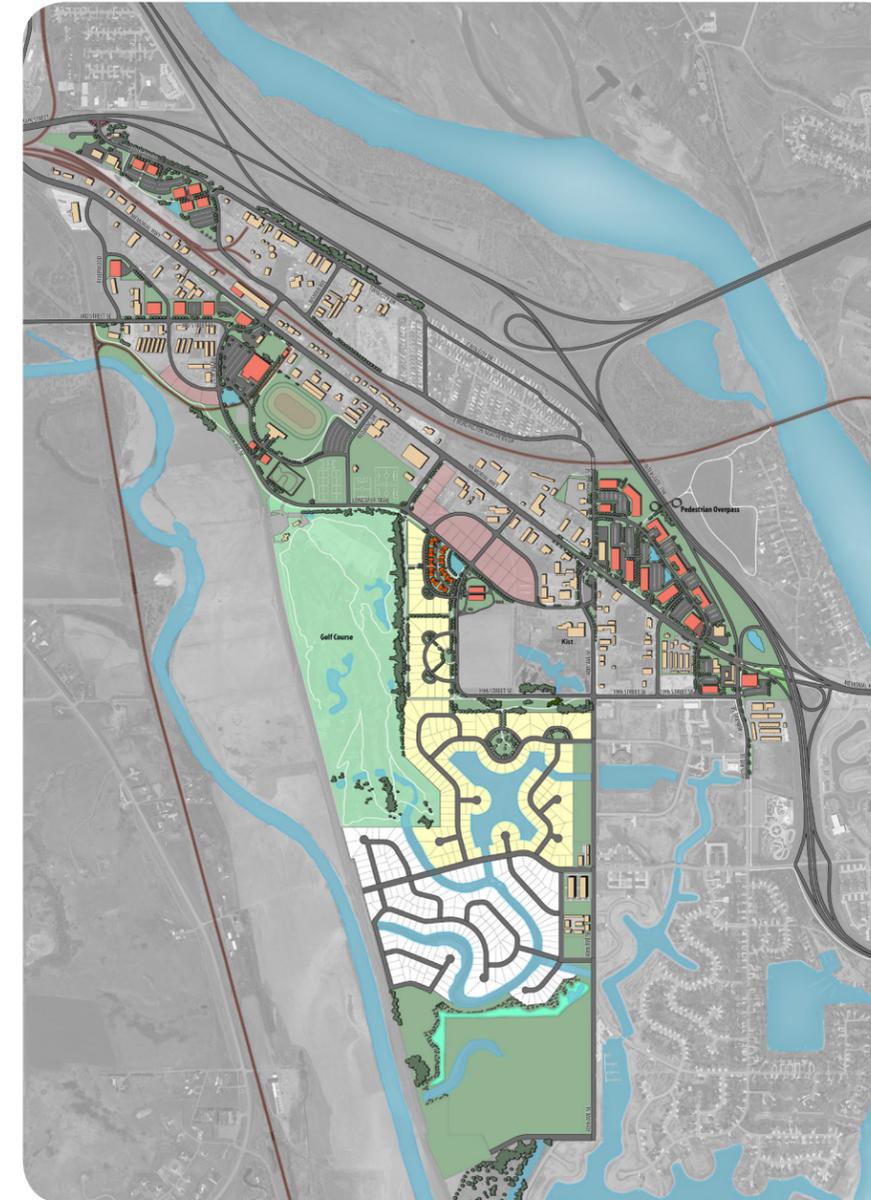


Figure 5.2: Corridor Development Concept

a quality environment throughout the corridor. The plan addresses current issues of traffic, safety, functionality, and aesthetics, and creates opportunities for a better environment. The proposed parallel road systems of Longspot Trail and Robin Trail south of Memorial Highway will provide alternative routes to access Memorial Highway. Proposed roads north of

Memorial Highway provide a similar function while also providing needed secondary access to existing and future development. The plan also expands the recreational infrastructure and destinations to help attract people from outside the area and increase local business. Issues and opportunities along with the proposed development concept are discussed on the following pages.

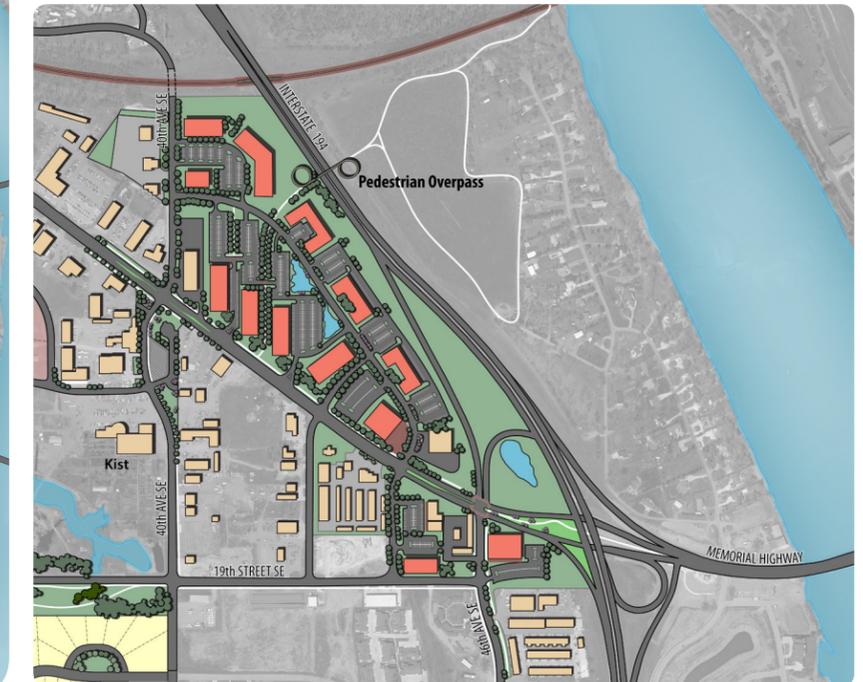


Figure 5.3: Corridor Redevelopment from 46th Avenue to 40th Avenue

FUTURE LAND USE PLAN: LAND USE ISSUES AND OPPORTUNITIES

The proposed plan addresses the issues and opportunities between 46th Avenue and 40th Avenue as shown on the figure below.

I. Corridor Properties: 46th Avenue to 40th Avenue

A. Issues and Recommendations

Figure 5.3 addresses the major issue areas between the 46th Avenue and 40th Avenue intersections along Memorial Highway. The following seven sections correlate to the numbered sections in figures 5.4 through 5.6:

1. 46th Avenue Intersection: The problem intersection has a relatively high accident rate. The intersection was signalized during the Liberty Memorial Bridge construction and signals have been maintained, although signal warrants are not currently met. The one-way southbound exit off Interstate 94 directly into the intersection is awkward. The trail from the east, located in the roadway median, brings bicycle and pedestrian activity into this intersection.



Figure 5.4: Redevelopment Concepts

The plan proposes significant pedestrian and vehicular enhancements at this intersection to clarify proposed movement areas and interactions. These enhancements are detailed in the streetscape element.

2. Gateway: East of 46th Avenue intersection is the logical location for an entrance gateway feature for Mandan and the Memorial



Highway. The streetscape element details the proposed location of the gateway feature.

3. 40th Avenue Intersection: The skewed intersection makes certain turning movements for large vehicles difficult. Sight distances are also affected. Kist Livestock Auction and other industrial uses generate significant large vehicle traffic in this location.

Skewed intersections can be very dangerous. For example, large vehicles negotiating a northbound to east turn, or a westbound to south turn, will likely be forced to swing wide outside the normal turning lanes. The intersection should present the roadway user with a clear definition of the proper vehicle path. Clear definition of vehicle paths can minimize lane changing and avoid “trapping” vehicles in incorrect lanes. The proposed plan avoids these undesirable effects by reconfiguring the alignment of 40th Avenue so that the intersection is perpendicular. This improvement enhances both the safety and traffic capacity at the intersection.

4. 39th Avenue: 39th Avenue, also a skewed intersection with Memorial Highway, is located too close to 40th Avenue in terms of access onto and off of the highway. While 39th Avenue typically serves as the main access to Kist Livestock Auction, some confusion is caused by the closely-spaced streets.



Figure 5.5: Redevelopment Concepts

Instead of two separate roadways too close to each other, the new 40th Avenue realignment cul-de-sacs the current 40th Avenue street, while realigning the two existing streets into one intersection.

5. Kist Livestock Auction Parking: The area between 39th Avenue and 40th Avenue, north of Kist Livestock Auction, is an uncontrolled, chaotic truck parking area that tends to cause



problems with entering and exiting Kist Livestock Auction traffic. However, the need for Kist Livestock Auction truck/trailer parking is real.

The realignment of 40th Avenue creates an opportunity for a small green space along Memorial Highway with pedestrian features and art/icons demonstrates the highways history. Some of the truck/trailer parking that currently occurs in this location is retained,

while the remainder is proposed to be relocated onto the Kist Livestock Auction property.

6. Kist Livestock Auction Traffic: Occasionally, Kist Livestock Auction traffic backs up onto 39th Avenue and even back onto Memorial Highway. Trucks have stacked on the highway on rare occasions.

With the improved alignment of 40th Avenue and the elimination of the unstructured truck parking in the area, the traffic back up problem at 39th Avenue and Memorial Highway will be improved. Improved parking and organized internal circulation at Kist Livestock Auction property is also proposed to improve the current situation. The proposed extension of Longspur Trail along the north side of Kist Livestock Auction would also provide an alternate access route for patrons.

7. Strata Concrete: Although the 40th Avenue platted ROW terminates in Strata Concrete's lot, the eastern portion of Strata Concrete's lot area is used for business operations and indicate they need the area and would oppose any improvement of that area as

a public street. Also, concrete trucks turning left onto Memorial Highway at 40th Avenue experience difficulty during high traffic time periods.

The redevelopment plan proposes to extend 40th Avenue farther north by shifting the road alignment east of the Strata Concrete property line. The extension of 40th Avenue would

provide access to proposed development to the east as well as an opportunity for extension of a railroad underpass to Twin City Drive. This would provide the mobile home park with a needed second access point (discussed later).



Figure 5.6: Redevelopment Concepts

B. Development Opportunities

Figure 5.7 depicts the major redevelopment opportunity areas between 46th Avenue and 40th Avenue intersections along Memorial Highway. Properties that are in disrepair and/or vacant are southeast of the 46th Avenue intersection. North of Memorial Highway, except for Open Road Honda and Perry Funeral Home, properties are either underutilized or older developments with redevelopment potential. Because of proximity to the interchange and expressway, this area is suitable for commercial developments that can draw people off of Interstate 194. The area could be a major highway commercial hub. Quality development, standard buildings, and an aesthetically pleasing environment should be created in order to attract visitors.

DEVELOPMENT OPPORTUNITY AREAS

- Study Area
- Opportunity Areas**
- Redevelopment
- New Development
- Building Condition**
- Very Good/New
- Good
- Fair
- Aged
- Disrepair
- N/A, Vacant

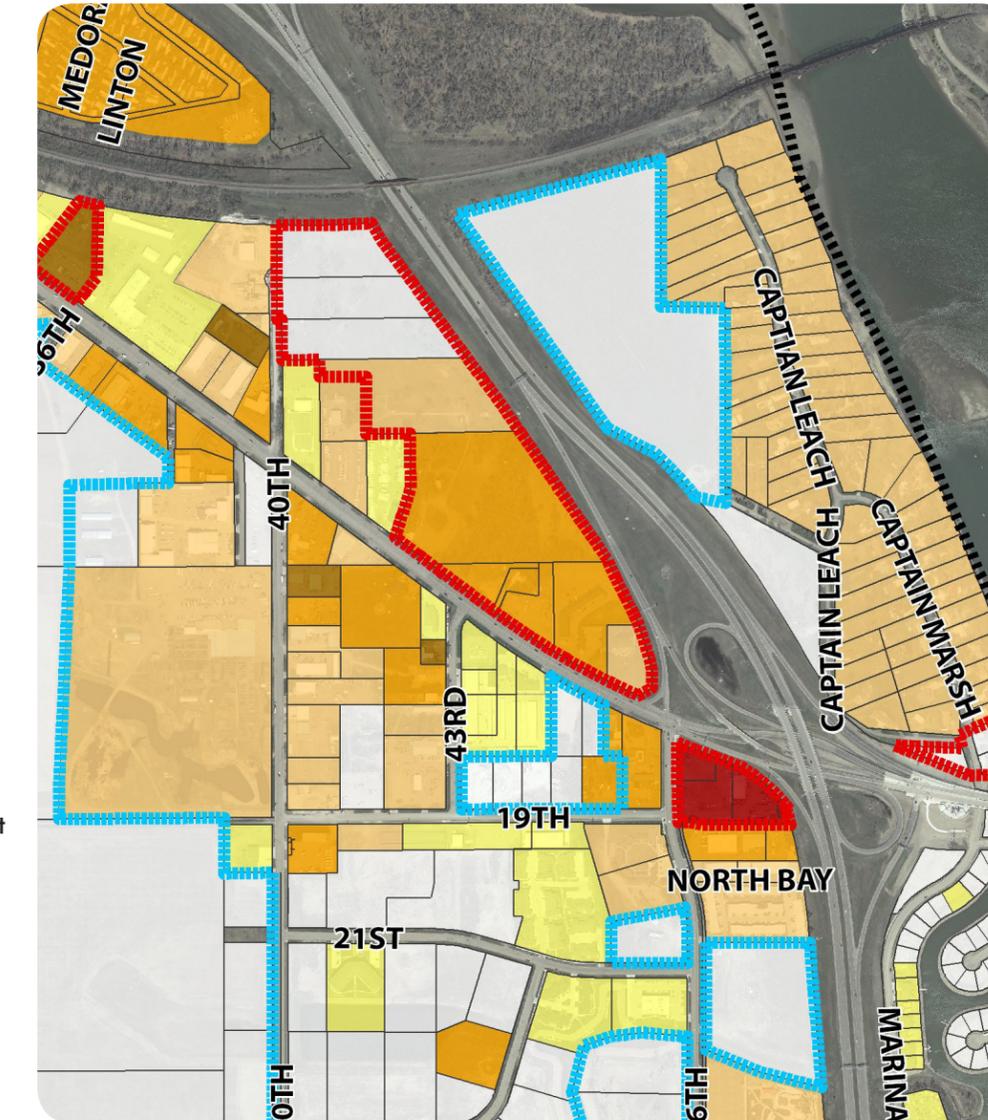


Figure 5.7: Redevelopment Opportunities from 46th Ave to 40th Ave

1. Development Opportunity: Property south of Memorial Highway near 46th Avenue.

Enhancement of the 46th Avenue intersection provides incentives for area development. The southeast corner of the 46th Avenue intersection contains dilapidated old buildings and some vacant properties. The proposed redevelopment shows commercial development at

the area with ample new parking space and entrance off 46th Avenue. A vacant parcel to the west of the intersection is also shown as developed commercially. Figure 5.8 depicts the proposed redevelopment.



Figure 5.8: Redevelopment Concepts

2. Major Development Opportunity: The River Tree Inn and the remainder of the north corridor frontage west to Open Road Honda.

The funeral home on the northwest corner of 46th Avenue intersection is a viable, long-term use. However, the remainder of the north corridor frontage west to Open Road Honda is under-utilized and should be considered for

assembly and development as a large scale planned development (40 plus acres).

As indicated in Figure 5.9, Alternate 1, the plan recommends combining the River Tree Inn property and all the other north corridor frontage properties between Perry Funeral Home and Open Road Honda and developing a large scale planned commercial/office development that is highly visible from the

Interstate, pedestrian friendly, safe and easily accessed from Memorial Highway.

A new street connection at 43rd Avenue could provide primary access into the new development area to the north. The new road would continue north of Memorial Highway, extend northwest and intersect with 40th Avenue, creating a new street with commercial/office development on both sides. Commercial development is recommended along Memorial Highway frontage and offices are recommended north of the new street (extended 43rd Avenue north of Memorial Highway).

Ample parking space for new commercial and office buildings is provided and can be accessed through Memorial Highway or through the new 43rd Avenue extension. Connections between new developments provide good internal circulation. Figure 5.10: Alternate II shows a concept for redevelopment with 46th Avenue relocated to the west. The alternative was considered during the planning process but ended up being rejected as a feasible alternative.

3. Captain's Landing Connections: As indicated in Figure 5.9: Alternative I, a trail connection from Memorial Highway through the new commercial/office development connects to development on the other side of the Interstate (Captain's Landing area) via a



Figure 5.9: Alternate I

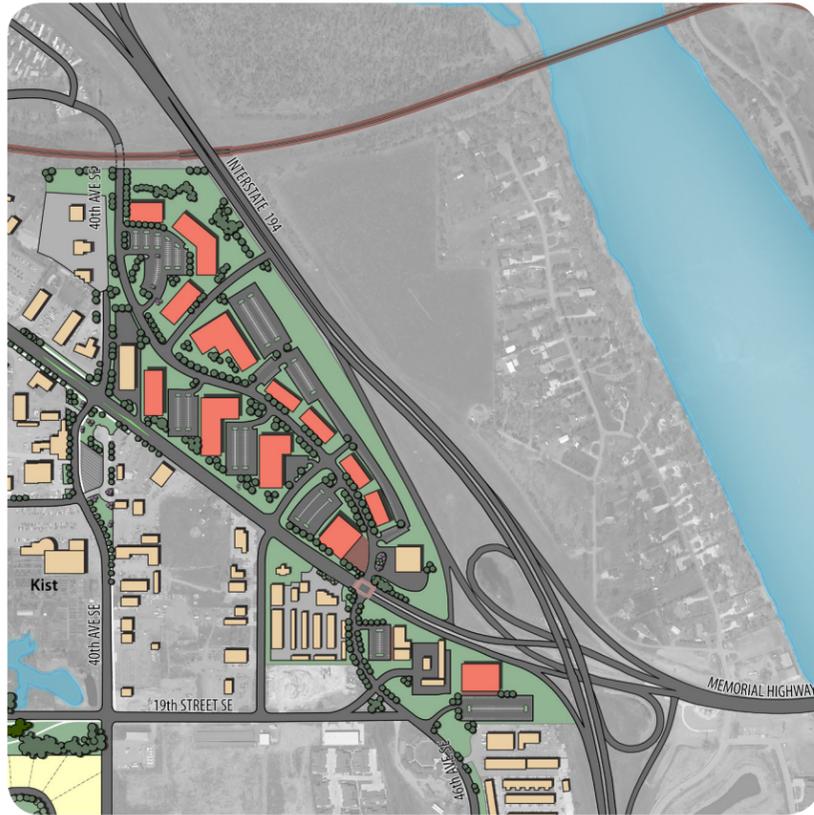


Figure 5.10: Alternate II

pedestrian overpass and to the development south of Memorial Highway.

Figure 5.10: illustrates an alternative roadway system on the west side of interstate 194.

Figure 5.11: Alternate III indicates an overpass street connection between this development area and the Captain Landing's area, with a

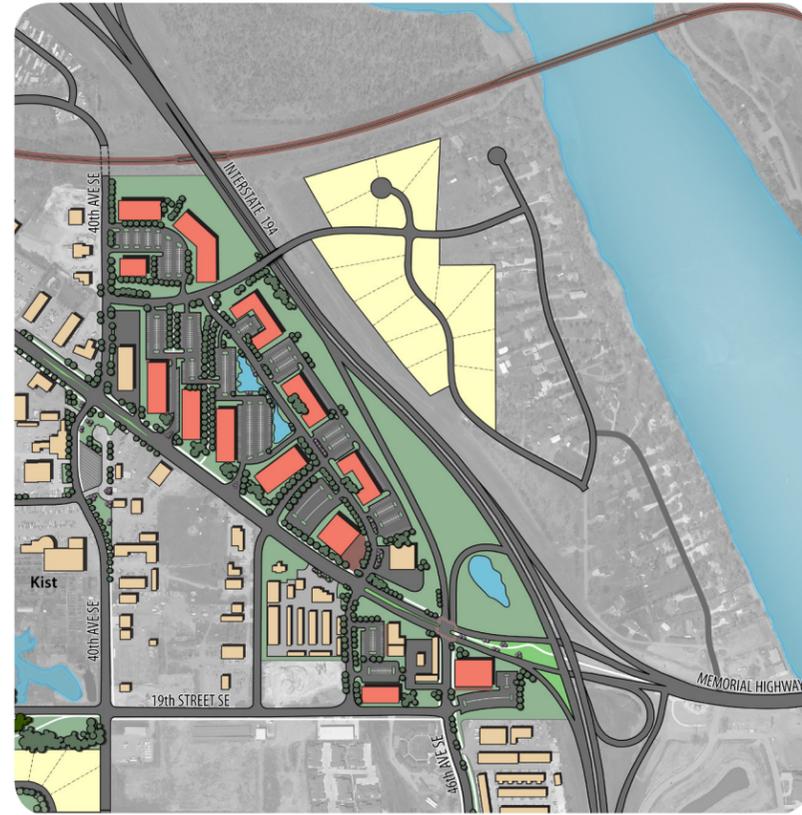


Figure 5.11: Alternate III

development concept rearranged to integrate the overpass with the proposed street system.

II. Corridor Properties: 40th Avenue to 3rd Street

A. Issues and Recommendations

Figure 5.12 identifies the major land use issue west of 40th Avenue to 3rd Street along Memorial Highway. Very shallow depth properties north of

Memorial Highway and several under-utilized or vacant properties are major issues in the area.

- 1. Inadequate Lot Depth:** Frontage properties on north side, west of 32nd Avenue have very shallow depth due to the railroad to the north. Thus inadequate private space for any corridor landscape improvements along these properties exists. From a practical standpoint, corridor design standards should allow private parking lots to abut property line, requiring all corridor enhancements to be on the public ROW.
- 2. Vacant or Under-Utilized Properties:** Areas are dealt with in the section on “development opportunities” in the following pages.

III. Corridor Properties: West of 3rd Street

A. Issues and Recommendations

Figure 5.12 identifies major issue areas west of 3rd Street along Memorial Highway. Continued shallow lot depth of properties along the north side of Memorial Highway and a skewed intersection resulting in inadequate connection to Memorial Highway are major land use issues in this area. Some properties along Memorial Highway are vacant and some have potential for redevelopment. The land use is likely to be commercial and light industrial development, consistent with recent new development in the area. Figure 5.13 illustrates the proposed plan from 40th Avenue to 3rd Street.

- 1. Shallow Lot Depths on North Side Properties:** As in the previous corridor segment, lot depths along the north side of the Memorial Highway are very shallow and do not provide any space for private streetscape improvements. All such improvements must be located on public property.



Figure 5.12 Issue Areas West of 3rd Street



Figure 5.13: Proposed Plan from 40th Avenue to 3rd Street

2. 24th Avenue: The 24th Avenue and Memorial Highway intersection is currently a skewed intersection, which creates visibility concerns. The intersection is also close to 3rd Street and Memorial Highway intersection. The plan recommends eliminating the 24th Avenue and Memorial Highway intersection and improving 3rd Street and Memorial Highway intersection. A traffic roundabout is proposed at 3rd Street and realigned 24th Avenue intersection for better circulation of vehicles and traffic calming purposes. The roundabout may be particularly beneficial during special events at Dacotah Centennial Park when traffic volumes/congestion are high. The roundabout concept is illustrated in Figure 5.14. The 3rd Street/BN Drive intersection is improved and would continue to serve as the major access to the project area north of the railroad tracks. The improved connection also ties the area north of Memorial Highway to the south. The portion of 24th Avenue from 3rd Street to Memorial Highway is removed. The roundabout also creates an opportunity for an enhancement feature or landscaping.

commercial use could be retail, restaurant or entertainment that complements other new development and surrounding recreational use such as the Dacotah Centennial Park and Dacotah Speedway.



5.14: Proposed Roundabout at 3rd Street and 24th Avenue

The lot on the south side of Memorial Highway between 3rd Street and existing 24th Avenue could present a redevelopment opportunity with highway frontage. The plan recommends a commercial development at the location with parking accessed from Memorial Highway. The

IV. West of Dacotah Centennial Park: Land Use Issues and Development Opportunities

West of Dacotah Centennial Park south of Memorial Highway, land use issues include an old mobile home residential area isolated in an industrial district, deteriorating industrial uses and under-utilized/vacant properties. There is also an opportunity to bring the Fort Lincoln Trolley into Dacotah Centennial Park and actually connect it to the Memorial Highway. Figure 5.15 depicts all identified issues and development/redevelopment opportunity areas west of Dacotah Centennial Park, south of Memorial Highway. The following three sections correlate to the numbered sections in map:

- 1. Proposed Exhibit Hall and Trolley Extension:** The plan also recommends extension of the privately owned and operated Fort Lincoln Trolley line from the current station at 3rd Street to the proposed exhibit hall site. The alternative site was studied in the Mandan Events Center Study. The vacant parcel east of McDonalds is reserved for future restaurant expansion. However, it would be desirable for the exhibit hall and trolley connection to link to Memorial Highway. The concept includes such a linkage. Parking space is provided around the exhibit hall, accessed via 24th Avenue. Easy access to Memorial Highway, centralized location, proximity to Dacotah Centennial Park and Dacotah Speedway make a prime location for such a multipurpose center. Not only



Figure 5.15: Potential Redevelopment west of Dacotah Centennial Park, south of Memorial Highway

does the concept create a connection between Dacotah Centennial Park and Memorial Highway. It also links new corridor commercial development to the Dacotah Centennial Park. A trail connection is proposed between the Dacotah Centennial Park, Dakota Speedway and the new exhibit hall and the new commercial establishments in order to increase pedestrian activity in the area.

The plan also recommends extension of the Fort Lincoln Trolley line from the current station south of 3rd Street to the proposed exhibit hall site. A small train depot is proposed at the corner of vacant parcel, visible from the Memorial Highway Corridor. This will provide the Fort Lincoln Trolley with the benefit of improved public visibility.

Issues which may arise due to the Fort Lincoln Trolley extension include cost, land acquisition, noise, track crossings and track geometry. The cost of the extension is estimated to be approximately \$4.2 million in current dollars, \$5.5 million in 2017 dollars at a 4 percent per annum inflation rate. Potential funding for the extension is explored further in this report in Chapter 6, the Financing section. Acquiring the land to place the track on may be an issue as a good portion of the land for the proposed route lies adjacent to the Heart River dike. The middle to end portion, just before the track would merge into the Memorial Highway, is

currently zoned agricultural, this may cause a problem trying to place a commercial venture in the area. Noise may be a problem with the trolley running south of an industrial area; this may become more of an issue as the track approaches the Memorial Highway with the presence of customer orientated business' in the area. There will need to be two track crossings, one on the bike path and the other on 24th Avenue SE. The crossing could be made into one, however, it could prove to be an issue for those who drive the roadway and use the path. The area where the track, turnout and depot will be placed is limited. Room for the turnouts, curves and other necessary track alignments and peripheral items may be an issue and will need to be determined early in the preliminary engineering process.

Note the proposed Exhibit Hall location conflicts with current usage of parking for event participants. An update of the Dacotah Centennial Park Master Plan is recommended to consider appropriate parking areas, event center final location and expansion of day-use facilities and opportunities.

With new commercial and office establishments, exhibit/multipurpose hall, train depot and rail lines, trails, improved Dacotah Speedway and rodeo grounds, the area will serve as an enhanced recreational destination and tourist attraction. Well designed struc-

tures, pedestrian amenities and features, and pleasing environment will enhance the area as a focal point for visitors.

2. Office/Industrial Development: An isolated mobile home residential area is north of 3rd Street and west of the existing 24th Avenue. This residential land use is in the midst of larger, more dominant surrounding commercial and industrial uses without the benefits of land use buffers. The dwellings are aged and the residential area is in a state of decline. The area has potential for redevelopment over time. If the mobile home park is ever redeveloped, the plan recommends the area be considered for rezoning to commercial or industrial uses compatible with adjacent developments. Redevelopment with a continuation of residential uses could benefit by creating buffer areas within the perimeter of the development; however, the small size of the development makes the creation of buffer areas impractical. Figure 5.14 and 5.15 discussed previously illustrates a potential redevelopment concept with commercial office buildings and surface parking accessible from 3rd Street.

The area along the existing 24th Ave SE, which is proposed for redevelopment, is encompassed by two census data block groups, one of which contains a block group that consists of more than 15 percent low-income population. In addition, three census data blocks occur

within this redevelopment area. One of these blocks contains a 25.1 percent to 30 percent minority population and the other contains a 30.1 to 35 percent minority population. The mobile home park is within the block groups and blocks. The removal of the mobile home park and redevelopment of the area would likely have a disproportionately high adverse impact on both low-income and minority populations due to displacement through new development. This displacement could also have other socio-economic ramifications to the low-income and minority populations in this area, such as economic hardship.

The State of North Dakota has no formal environmental justice policies. However, if redevelopment and subsequent relocation of the mobile home park triggers federal involvement, further analysis of potential environmental justice impacts should be conducted. As previously mentioned, at the time of this report, the only available census data is 2000 decennial data and assumed to not accurately reflect low-income and minority populations within the study area. Census Bureau 2010 decennial census data should be analyzed once available. Additionally, census data does have its limitations. For example, block groups convey data for a large geographic area as compared to block data, so it is more difficult to narrow down low-income populations

to specific households. It would be advantageous to conduct additional outreach efforts in areas identified by census data as containing low-income and minority populations, such as the area of the mobile home park on 24th Ave SE, in order to better identify low-income and minority populations and determine environmental justice concerns.

If redevelopment of the area and, hence, relocation of the mobile home park is the preferred alternative, relocations would be done in compliance with North Dakota State law.

3. New Industrial Lots: South of the extended Robin Trail Street and west of 24th Avenue SE and along the proposed rail line extension, a series of industrial lots are proposed. The location, access from the extended road and the surrounding uses complement industrial use in this area.

V. East of Dacotah Centennial Park: Land Use Issues and Development Opportunities

A. Issues and Recommendations:

Figure 5.16 identifies major issue areas south of Memorial Highway and east of Dacotah Centennial Park. Limited streets for circulation, need for better accessed recreation facilities, transition areas between industrial and residential uses, Kist Livestock Auction operation and future land needs, ongoing residential construction and planned development, and bike trail connections are the major land use issues in this area.

1. Circulation System and Access to Vacant Land:

A continuous street system south of and parallel to Memorial Highway is needed to provide an alternative to Memorial Highway for local trips. For example, a person travelling from their home in the Lakewood development area must use Memorial Highway to get their child to soccer practice at the Dacotah Centennial Park field.

The plan recommends extending and improving existing streets and developing new streets for better connections and circulation within the area. Figure 5.17 shows the area's existing street locations and current lack of street connectivity south of Memorial Highway. As depicted on Figure 5.16, extending 19th Street west and north and connecting to the Longspur Trail connects the Lakewood residential area and the



Figure 5.16: Major Issue Areas East of Dacotah Centennial Park

proposed residential south of 19th Street to the Dacotah Centennial Park and proposed exhibit/multipurpose hall and commercial area. This will reduce traffic on Memorial Highway and

provide residents of Lakewood an easy and safe route to Dacotah Centennial Park and commercial activities along the highway.



Figure 5.17: Existing Streets South of Memorial Highway

2. Future of Dacotah Centennial Park Uses:

Various discussions have taken place regarding potential alternative locations of the Mandan Rodeo Grounds and Dacotah Speedway. The Mandan Events Center Study included the Dacotah Centennial Park as an alternative location for an events center but ended up recommending an alternative site. The study is still under consideration. Meanwhile, the city recently approved the Mandan Vision Plan, including strategies recommending that Mandan strengthen and expand its western and adventure tourism attractions.

Dacotah Centennial Park and Dacotah Speedway are unique attractions that bring thousands of visitors to Memorial Highway. The plan recommends improving the park and playground facilities, adding organized practice fields and providing sufficient parking facilities for park users and visitors. The proposed plan also recommends linking the Dacotah Centennial Park to the proposed exhibit hall and to the new proposed commercial area. Sidewalks and trails will also link these facilities together to enhance pedestrian activities.

3. Transition from Industrial Uses (32nd Avenue to 46th Avenue):

A significant land use issue is the transition from industrial land uses north of 19th Street to existing and proposed residential development south of 19th Street. While Kist Livestock Auction is a

heavy industrial use and must be accommodated by zoning, application of heavy industrial zoning to the broader area north of 19th Street has allowed additional heavy industrial uses like the concrete batch plant at 19th Street and 40th Avenue. Office and multi-family uses have been built on the south side of 19th Street between 40th Avenue and 46th Avenue in an attempt to transition to lower density development to the south. However, the buffer use seems inadequate and the issue of buffering Kist Livestock Auction from planned residential development to the south is unresolved.

- 4. Kist Livestock Auction Land Needs:** Kist Livestock Auction owns the ground to the west and south and is currently using it as cattle pasture land. It is understood that Kist Livestock Auction spreads sludge from their on-site cattle sludge pits onto this pasture land. A key question is Kist Livestock Auction's planned sewage disposal plan and their need for this adjacent land. The sludge spreading operation obviously is related to the needed buffer issue to residential development.
- 5. Land Use West of Kist Livestock Auction:** The land west and northwest of Kist Livestock Auction borders industrial/commercial use on the north and the golf course on the west. Appropriate land use and transition of land uses is a key question for this area.

The study recommends residential development south and west of Kist Livestock Auction as shown on the development concept. Residential developments should have enough setback from the cattle operation and should be buffered well. A large open space with landscaping and trails is proposed south of 19th Street which also acts as a buffer to the new residential proposed further south. To the west of extended 19th Street and 36th Avenue and east of the golf course, residential development with parks and open space is proposed. Duplexes are proposed around a pond at the cross-section of Longspur Trail and 36th Avenue. The southeast corner of the intersection will accommodate commercial buildings.

- 6. Land Use West of 40th Avenue, south of 19th Street (extended):** While an existing preliminary development master plan concept is on file with the city for this area to be developed as an extension of Lakewood, buffering of residential development from Kist Livestock Auction to the north has not been addressed. The potential for the extension of McKenzie Drive west across the Heart River has been incorporated into the plan. The need for buffering of low density residential use from the wastewater treatment plant to the south has not been addressed.

The proposed development concept addresses these issues by providing large setbacks from the Kist Livestock Auction facility as shown on the plan. Well landscaped parks and open spaces will act as buffers on the south and west of the facility.

- 7. Bike Trail Connections:** An existing shared-use trail traverses the project area south of Memorial Highway. The trail currently has connections to the regional trail system entering the project area from the east at Memorial Highway and 46th Avenue and connections on the west via 3rd Street SE and at Main Street/Mandan Avenue.

The proposed plan depicts the trail system proposed within the project area and connections to the east and the west. Trails connect existing and residential developments to Memorial Highway and new commercial developments. A trail connection with an I-194 pedestrian overpass to the Captain's Landing Township was considered, but not recommended due to excessive cost and anticipated limited use. A trail connection from the proposed trolley depot to the west will connect the area to regional trails on the west. An enhanced trail connection at the 46th Avenue and Memorial Highway intersection will connect the area to regional trails to the east.

B. Development Opportunities

Figure 5.18 depicts the redevelopment opportunity areas south of Memorial Highway frontage properties. The area is starting to see some office, industrial, and residential developments. The proposed plan highlights the following areas as major opportunities:

- 1. Industrial and Residential Expansion:** Substantial land area exists for additional industrial and residential development. A large part of the currently platted Lakewood development has yet to be finished, and planned expansions of the development are on file. North of 19th Street and its extension west are numerous vacant parcels suitable for light industrial or commercial development.
- 2. Commercial and Office Development:** Land along 46th Avenue, north of McKenzie Drive, has been platted and zoned for commercial development. Office development in the area and along 19th Street has begun.
- 3. Recreational Development:** Substantial land area exists on the Dacotah Centennial Park site to expand recreational and tourism use. The go-cart site at the Raging Rivers Waterpark can be redeveloped into another recreational use. The trolley linking to Fort Abraham Lincoln State Park terminus is just outside the project area and connecting it to Dacotah

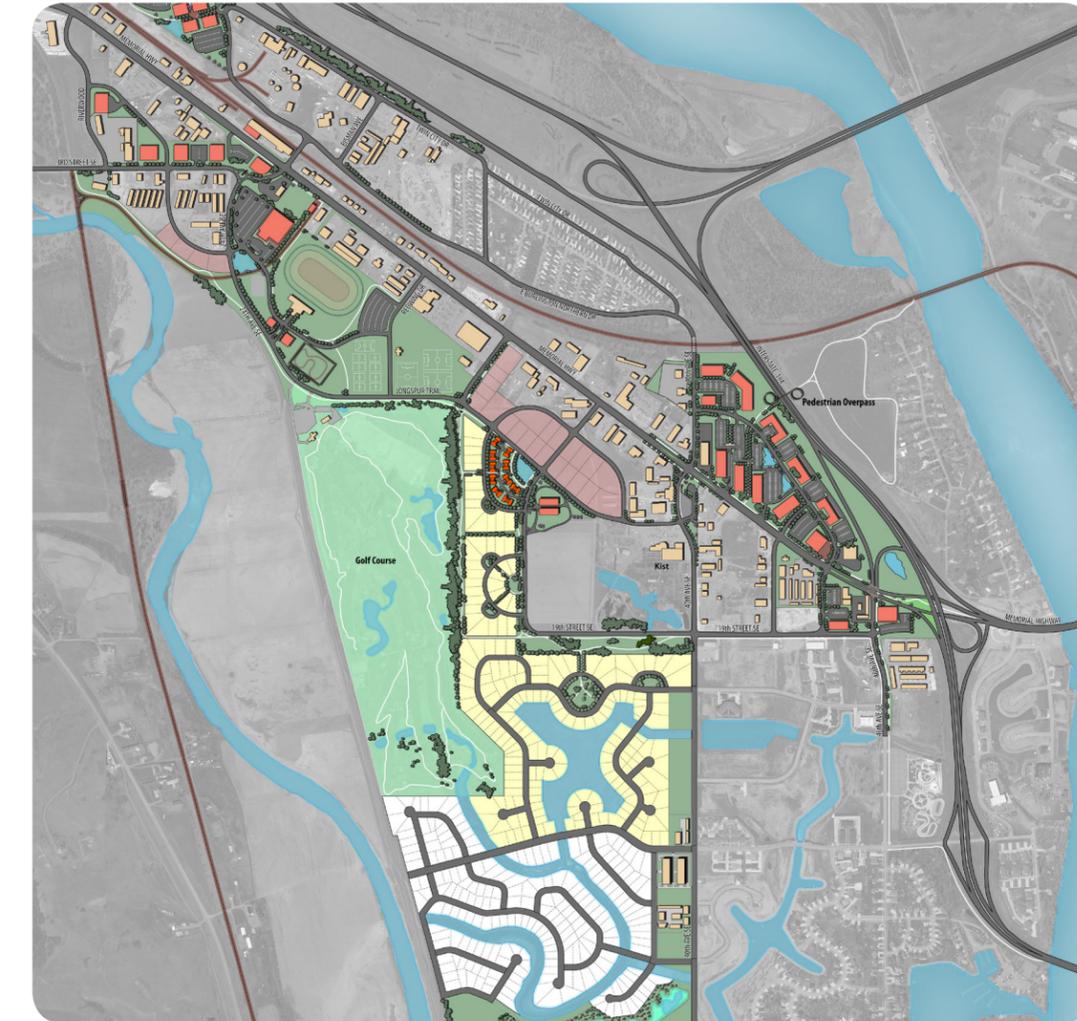


Figure 5.18: Development Opportunities South of Memorial Highway

Centennial Park provides an opportunity to expand its visibility. Finally, floodplain area on the river side of the levy provides open space

that can potentially be utilized in conjunction with some forms of outdoor recreation.

VI. Twin City Drive Area (North of Railroad Tracks)

A. Issues

Figure 5.19 addresses the major issue areas north of the railroad tracks. Limited access to the area from Memorial Highway, isolated mobile home park with limited access from Twin City Drive, heavy industrial uses without proper buffers and limited access to industrial uses are some of the major problems in this area.

1. Access: Single access to area from Memorial Highway at Bisman Avenue.

The only connection to the area north of the railroad from Memorial Highway is through the existing partially paved BNSF service road that connects 3rd Street with Bisman Avenue and Twin City Drive. The area can also be accessed through Twin City Drive from Main Street. However, the vacant land and possible redevelopment sites in the area lack adequate internal street connections and circulation.

The plan recommends extending the BNSF service road east towards Tuttle Avenue and connecting to East Burlington Northern Drive to create a loop. The proposed extension 40th Avenue north under the railroad tracks would connect with East Burlington Northern Drive creating a whole new access point from



Figure 5.19: Development Issue Areas North of Railroads

Memorial Highway to this development area on the north side of the tracks.

The plan also recommends extending BNSF service road to the west and connecting with Twin City Drive as shown on the map. The intersection of Twin City Drive and BNSF service road is proposed to include a traffic island for traffic calming purposes. The

traffic island could also be used for placing an art or landscaping feature.

2. Twin City Estates Mobile Home Park: Twin City Estates is isolated by the interstate, railroad, and industrial area to the west. There is only one access to and from the mobile home park. There are reports of pedestrians crossing the railroad track at 40th Avenue and random

locations to access locations south of the railroad tracks.

An extension of 40th Avenue under the BNSFRR tracks was analyzed to provide a second roadway access to the area, as well as improved pedestrian access. The Twin City Estates mobile home park road system is privately owned, therefore the 40th Avenue railroad underpass would connect to a new public roadway that would be constructed along the north side of the railroad tracks, extending westward to connect to Bis-Man Avenue. The cost of the railroad underpass structure alone is estimated at \$2 million in today's costs. The costs of connecting roadways would add more cost to the completed project. Since it is unlikely the underpass and road system would be eligible for classification as a collector or arterial roadway, the construction cost would be a local responsibility. Also, due to the very limited number of land owners that might be included in a special assessment district to fund the road and underpass improvements, it is highly unlikely that any special assessment district could be formed to provide funding. For these reasons the railroad underpass is considered to not be financially feasible, and is not recommended to be included in the long range plan for the area. However, an extension of the BNSF railroad frontage road along the north side of the railroad might be feasible if

area landowners wish to redevelop the existing industrial lots just west of Twin City Estates, thereby providing a potential connection and second access to Twin City Estates.

Note that the Twin City Estates area has also been identified as an area of low-income and minority populations, and therefore subject to environmental justice provisions. (see Figures 4.1 and 4.2 on pages 35 and 36) The Memorial Highway Corridor Study has provided recommendations regarding non-motorized access throughout the study area. The Twin City Estates area has no pedestrian or bicycle facilities connecting to the rest of the community. Environmental justice provisions require consideration of disproportionate adverse affects to low-income and/or minority populations. In this case, the recommended plan would proportionally share the benefits of improved non-motorized access throughout the study area by constructing sidewalks from Twin City Estates to Memorial Highway via Twin City Drive and Bis-Man Avenue. A pedestrian crosswalk across Memorial Highway at the east side of the 3rd Street intersection would provide pedestrian access to the rest of the community. The relatively low traffic volumes and speeds along Twin City Drive and Bis-Man Avenue provide a roadway that could be shared-use with bicycles. A cost estimate of

the proposed sidewalk connection to Twin City Estates is included in Appendix A.

- 3. Industrial Use buffering:** Currently, no buffer or landscape separates heavy industrial vacant area adjacent to the mobile home parks. To the west of the mobile home park, there are many industrial activities going on. Such activities should be well buffered from surrounding residential areas.
- 4. Industrial Access:** Twin City Drive is only street access to industrial properties in the subarea.

Though a number of industrial uses are north of the railroad tracks, the only street access to these properties currently is from the Twin City Drive. Connection from Memorial Highway with the extension of BNSF service road east and west and connection to Burlington Northern Drive and to 40th Avenue would provide additional access to this area and open it for growth.

B. Development Opportunities

Figure 5.20 depicts the development opportunity areas north of the railroad tracks. Some properties on the north along Twin City Drive are currently vacant and have potential for major office/industrial development.

1. Industrial Development Sites: Several large vacant parcels are available for industrial development.

Vacant parcels adjacent to the mobile home parks are available for industrial development. Buffers should be created between industrial uses and the mobile home park.

2. Office Development Potential: Vacant parcels at the west end of Twin City Drive has access to Main Street and provides opportunity for higher quality office/commercial development, consistent with new development to the west.

The plan recommends an office development on the vacant parcels along the west end of Twin City Drive. The area has access from Main Street and is also connected to Memorial Highway through the proposed BNSF service road extension. The proposed development is also consistent with the surrounding uses. Offices would be accessed from Twin City Drive and would have sufficient parking spaces. Landscaping and quality architecture will be



Figure 5.20: Development Opportunities in Twin City Drive Area

the keys to maintaining high quality environment and separation from existing industrial uses to the east.

3. Entrance/Gateway Feature: The plan recommends developing a gateway entrance feature at the Main Street and Twin City Drive Intersection. With new extended and improved streets, the area will be easily accessible from Memorial Highway. The new street connects and ties the proposed office development on the north to the Memorial Highway and to the developments on the south.

VII. Captain's Landing Township: Captains Landing Township is a rural residential and agricultural area north of the Memorial Bridge, which is landlocked by I-194 on the west, BNSFRR on the north, and the Missouri River on the east. This township is not in the city of Mandan. An alternative access to Captains Landing Township was explored, due to there being only one very long and circuitous access via McKenzie Drive from the south. An access directly off of the west side of Memorial Bridge is not feasible due to the fully controlled access provisions of the interstate system. The only alternative access available is to construct an overpass or underpass across I-194, somewhere between the BNSFRR and Memorial Highway. An underpass was ruled out due to water table and potential flooding issues.

While a roadway overpass is not considered to be financially feasible at this time, the undeveloped areas on either side of I-194 could still be developed with a road system so as not to

rule out a future overpass in the future, should funding ever become available.

VIII. Corridor Site Map: The following pages contain a strip map of the corridor beginning with 46th Avenue SE to the east and ending at Main Street to the west. The top strip map shows aerial photographs of the corridor as it exists today, the bottom strip shows the vision for the corridor as depicted in the study.



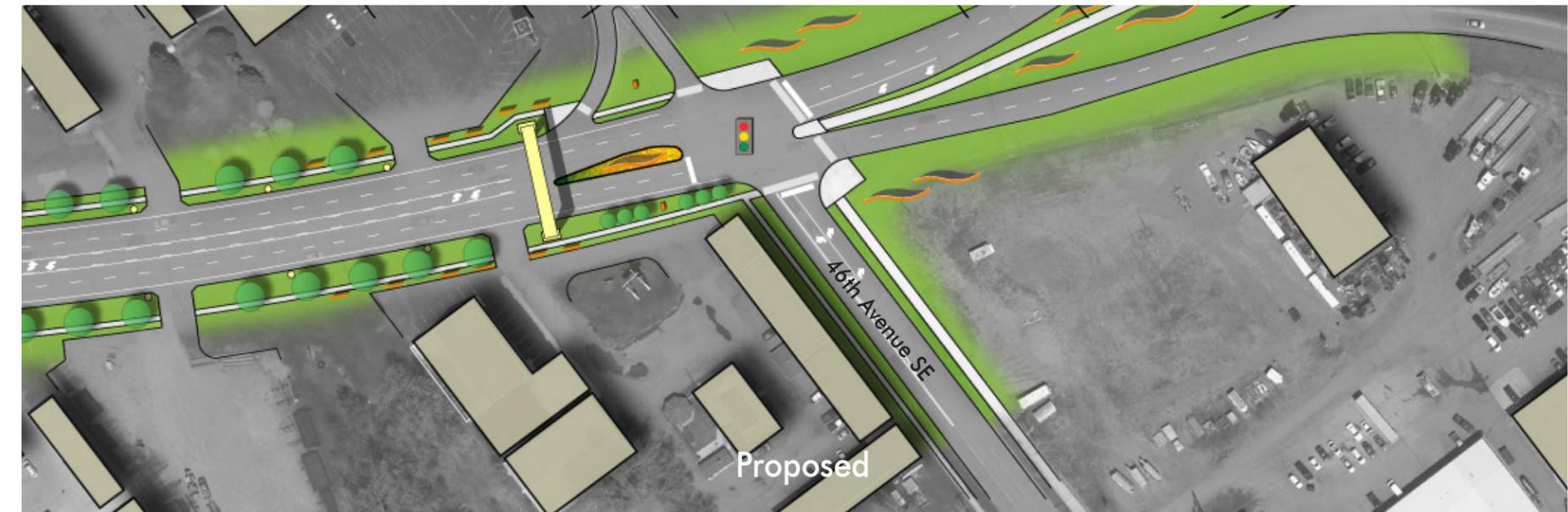
N ↑

Legend	Community Gateway entrance feature	stone marker	median plantings	street light	crosswalk
	Native American-palisade fencing	traditional western crossbuck and rail fencing	street tree	traffic signal	



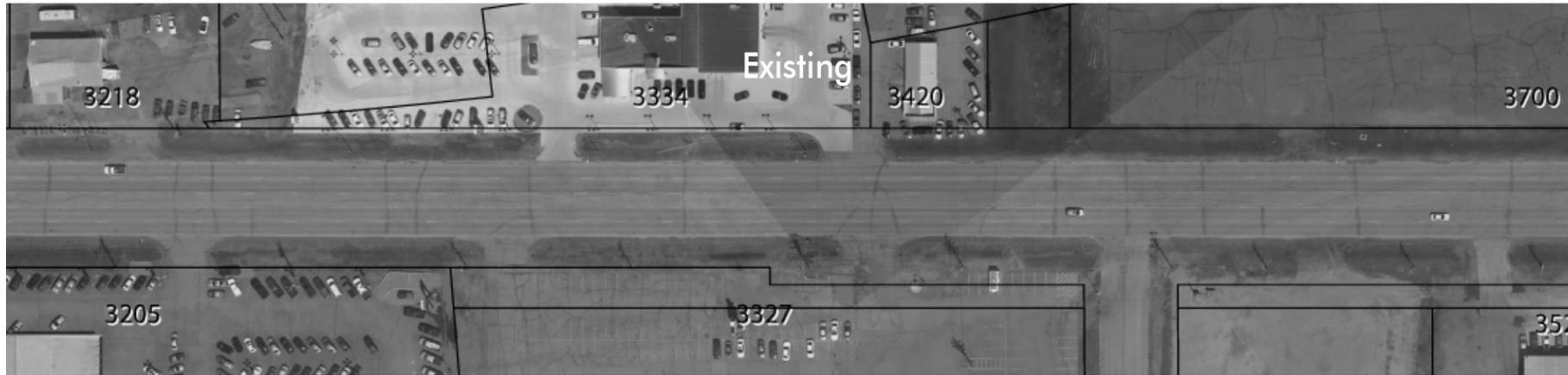
N ↑

Legend	Community Gateway entrance feature	stone marker	median plantings	street light	crosswalk
	Native American-palisade fencing	traditional western crossbuck and rail fencing	street tree	traffic signal	





- N
↑
- Legend**
- Community Gateway entrance feature
 - stone marker
 - median plantings
 - street light
 - crosswalk
 - Native American-palisade fencing
 - traditional western crossbuck and rail fencing
 - street tree
 - traffic signal



N ↑

Legend

	Community Gateway entrance feature		stone marker		median plantings		street light		crosswalk
	Native American-palisade fencing		traditional western crossbuck and rail fencing		street tree		traffic signal		



N ↑

Legend

	Community Gateway entrance feature		stone marker		median plantings		street light		crosswalk
	Native American-palisade fencing		traditional western crossbuck and rail fencing		street tree		traffic signal		

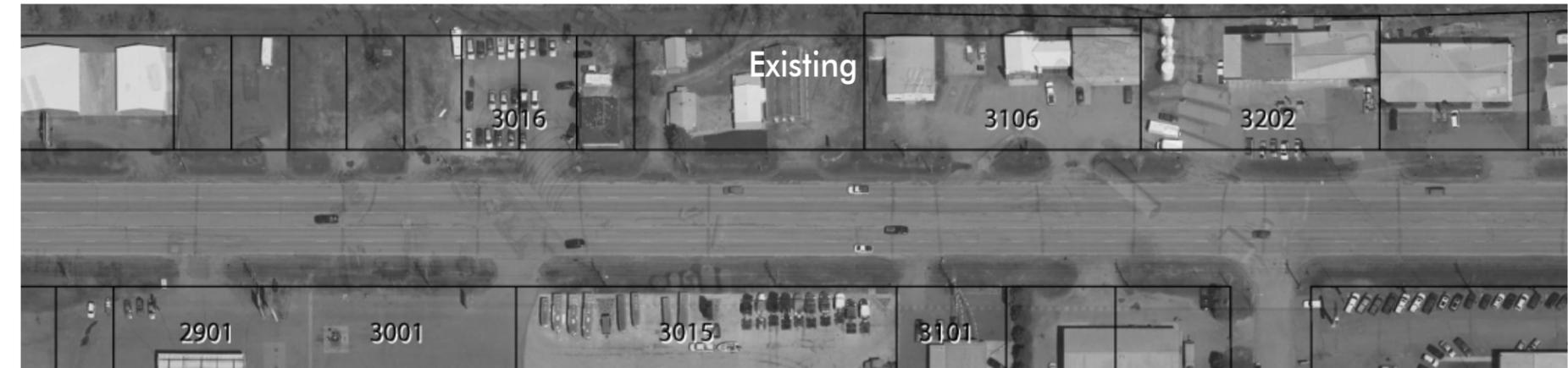




N ↑

Legend

	Community Gateway entrance feature		stone marker		median plantings		street light		crosswalk
	Native American-palisade fencing		traditional western crossbuck and rail fencing		street tree		traffic signal		



N ↑

Legend

	Community Gateway entrance feature		stone marker		median plantings		street light		crosswalk
	Native American-palisade fencing		traditional western crossbuck and rail fencing		street tree		traffic signal		





N ↑

Legend

	Community Gateway entrance feature		stone marker		median plantings		street light		crosswalk
	Native American-palisade fencing		traditional western crossbuck and rail fencing		street tree		traffic signal		

N ↑

Legend

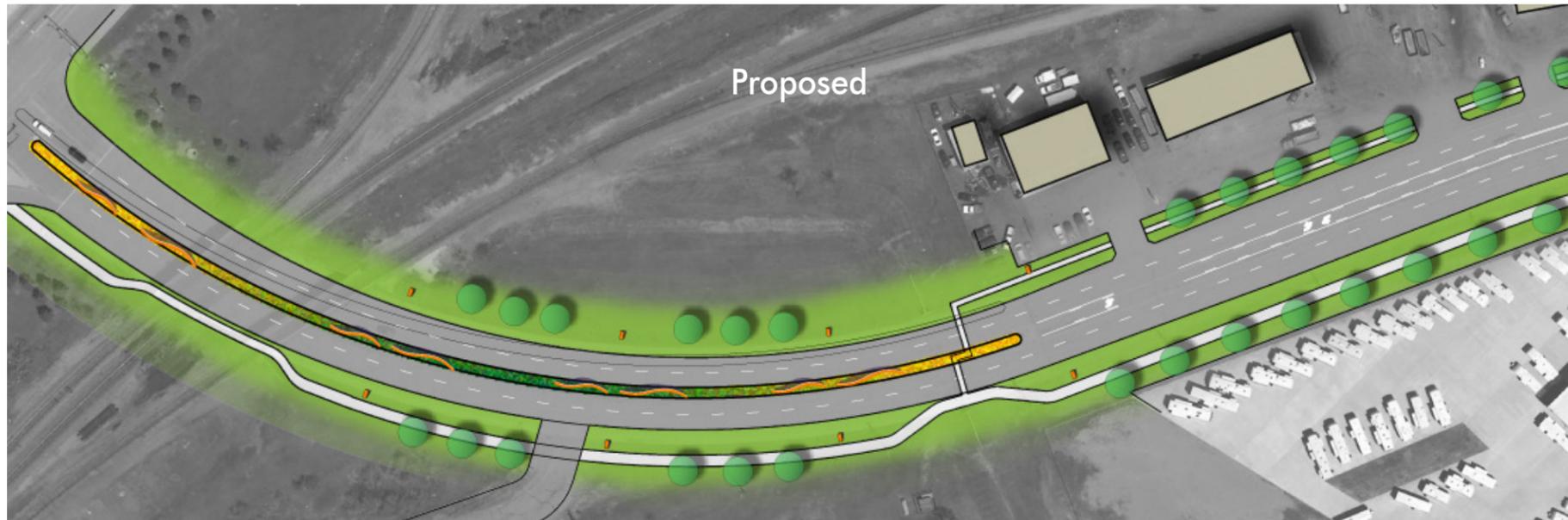
	Community Gateway entrance feature		stone marker		median plantings		street light		crosswalk
	Native American-palisade fencing		traditional western crossbuck and rail fencing		street tree		traffic signal		





Existing

- N ↑
- Legend
- Community Gateway entrance feature
 - stone marker
 - median plantings
 - street light
 - crosswalk
 - Native American-palisade fencing
 - traditional western crossbuck and rail fencing
 - street tree
 - traffic signal



Proposed

Chapter 6

Implementing the vision of the study will create a healthy commercial district, destination recreational areas, and a memorable drive down Memorial Highway.

IMPLEMENTING THE VISION

Implementing the Vision

INITIAL POLICIES

Amend Zoning Ordinance and Adopt Design Guidelines

The project area has several issues relating to appropriate uses, zoning, and design. Zoning establishes land use controls, while design guidelines provides advisory, or perhaps mandatory, restrictions and requirements on the performance of the property.

Appendix B: Zoning Ordinance Analysis is a comprehensive review of the city of Mandan's Zoning Ordinance, with recommendations for revisions to implement the goals of the Memorial Highway Corridor Study vision. Following is a listing of specific zoning ordinance revision recommendations detailed in Appendix B.

- **Recommendation 1:** Mandan should consider updating the format of its zoning code.
- **Recommendation 2:** Establish maximum store size limits to insure that the CA-Light Commercial District Group A uses will have limited impacts on surrounding residential districts.

- **Recommendation 3:** Remove unlimited "Dwellings" as permitted uses in CB-Heavy Commercial district. Allow multiple-family dwellings by Special Use Permit.
- **Recommendation 4:** Add Mini-Storage Warehouse as a permitted use, with design standards regarding site paving, building materials and fencing requirements, to the CB-Heavy Commercial district. Recommendation 3 and 4 will allow elimination of the CC-Heavy Commercial district and Mandan henceforth to have only one Heavy Commercial district.
- **Recommendation 5:** Eliminate the MC-Light Non-Nuisance Industrial/Heavy Commercial district as duplicative of the MA district and unneeded.
- **Recommendation 6:** Add Livestock Sales Pavilion to the permitted use list in MB Heavy Industrial/Heavy Commercial (by Special Permit if deemed necessary) and eliminate the MD-Heavy Industrial/Heavy Commercial district as duplicative of MB and unneeded.
- **Recommendation 7:** Outdoor advertising sign is listed in the Service Group B uses. This is not typical, as sign regulations and permitted signs by district are usually covered in a separate sign section. We did not find a sign section in the zoning code. Assuming the section

exists elsewhere in the city code, it should be reviewed for restrictions and all billboard provisions should be listed.

- **Recommendation 8:** General landscaping, open space or buffer yard were not found in the code. The requirements are important provisions mitigating the impacts of land use transitions and affecting the visual quality and perceived desirability of the community as a place to locate. Mandan should consider adding at least minimal requirements.

In addition to the specific zoning ordinance revision recommendations above, the Zoning Analysis makes a number of Study Area zoning recommendations:

- **Recommendation 9:** Rezone all MD-Heavy Industrial zoned property east of 40th to CB-Heavy Commercial zoning.
- **Recommendation 10:** Survey the uses on the north side of the corridor west of 40th Avenue and, if conforming to CB-Heavy Commercial, rezone as much as possible to CB.
- **Recommendation 11:** Rezone all CC-Heavy Commercial zoned areas on the south side of the corridor to CB-Heavy Commercial.
- **Recommendation 12:** Rezone all property west of 24th Avenue on the south side of the corridor to MA-Light Industrial. (MC-Light

Industrial goes to MA-Light Industrial under Recommendation 5.

- **Recommendation 13:** Revise Section 8.A. and 8.E. of Section 21-04-18, Gateway and Memorial Highway Overlay District, to include a list of permitted architectural materials meeting the design standards.
- **Recommendation 14:** Rezone the Twin City Estates Mobile Home Park from MC-Light Industrial to RH-Mobile Home Residential.
- **Recommendation 15:** Rezone all remaining MC-Light Industrial districts to MA-Light Industrial.
- **Recommendation 16:** Adopt a future land use plan as an amendment to the city's comprehensive plan, for the vacant A-Agriculture zoned land along Twin City Drive, establishing the intended use as commercial/office consistent with MB-Heavy Commercial zoning.
- **Recommendation 17:** Rezone current MA-Light Industrial districts along 19th Street west of 46th Avenue and along 46th Avenue south of 19th Street to CA-Light Commercial and Services.
- **Recommendation 18:** Rezone the bulk of the MD-Heavy Industrial district north of 19th Street and east of 40th Avenue to CB-Heavy Commercial. Consider a transition area of

CA-Light Commercial and Services for properties bordering 19th Street.

- **Recommendation 19:** Rezone the existing CB-Heavy Commercial district south of 19th Street north of McKenzie Drive, west of 46th Avenue and along 40th Avenue to RM-Multi-Family Residential zoning.
- **Recommendation 20:** Adopt the various Land Use Plan components of the Memorial Highway Corridor Study as amendments to the city's planning efforts (land use plan, comprehensive plan, etc.) and develop city ordinances and/or incentives to insure all future development proposals are in conformance with plan.
- **Recommendation 21:** Rezone the MD-Heavy Industrial zoning in the area to at least MA-Light Industrial and perhaps CB-Heavy Commercial.

Consider uses along 3rd Street, including the concept for a redeveloped mobile home park, as MB-Heavy Commercial. Rezone the CC-Heavy Commercial area to CB-Heavy Commercial if the recommended deletion of CC zoning is undertaken.

From a timing perspective, it is recommended upon approval of the Memorial Highway Corridor Study, the Planning Commission be directed to form a Study Committee to review the above ordinance revision and rezoning recommendations, for report back to the full Commission and action within one year.

Establish a Business Improvement District

The plan addresses organizational issues for corridor management and promotion. Some commercial strips are envisioning themselves as





Business Improvement Districts (BID), much as traditional neighborhood and town centers have since the initiation of the tool in the late 1970s. An example of such a district that is analogous to Memorial Highway is the South Locust corridor in Grand Island, NE. Here, as part of a corridor reconstruction project, the city's redevelopment authority created a tax increment district to finance landscaping, lighting, and corridor enhancements. Businesses created a BID to finance some of the capital costs and to maintain the enhanced streetscape. Property owners elected to participate in a BID to share the cost of maintenance. The unified approach has paid off in a vastly improved physical and business environment that has generated substantial new development.

Maintenance Considerations

Any public facility will require some level of maintenance. Before a community elects to add public infrastructure there must be an understanding of the following issues and responsibilities:

- What type of maintenance is required, and when?
- Which Department and staff will perform the maintenance?
- Does the Department and/or individual have the necessary budget, equipment and expertise?

For example, the public works or street department will typically maintain street fixtures within a street right-of-way and plow snow on a roadway. Will adjacent property owners be responsible for

mowing any boulevards and sidewalk snow removal abutting their property? What about a 10 foot wide shared use path or a grassed median? Often times a local parks department will mow the medians and remove snow on shared use paths. Providing adequate room along shared use paths for snow plowing/snow storage can minimize snow removal costs. Will there be a sprinkler system, and who will winterize or maintain? Some business districts utilize a business association whereby their membership fees provide funding to hire or contract for the maintenance of landscaping and street furniture, ensuring a clean and friendly environment to business patrons and visitors. Agreements and understanding of responsibilities should be in place prior to any construction of new facilities that may impact manpower, machines, materials and methods of maintenance.

FINANCING

The following section identifies possible funding opportunities for the proposed improvements.

Funding Sources

- **Federal Transportation Funding:** Memorial Highway is functionally classified as a minor arterial and is on NDDOT's secondary regional system, and therefore eligible for federal transportation funding assistance through NDDOT. Under current regulations, the federal funding assistance may provide up to 80 percent of the construction cost of

eligible road construction activities. Eligible construction activities typically include roadway surfacing, sidewalks, roadway drainage, lighting, traffic signals and associated roadway items. Construction activities that are typically not eligible for federal transportation funding include city water/sewer utilities and other items not essential to providing a transportation facility. To secure funding, the Bismarck-Mandan MPO and NDDOT must coordinate with each other to determine funding priority, amount of funding available, eligible costs, and what year funding would be available. Federal transportation funding is typically programmed three to five years out, so funding for any new projects is typically available three or more years in the future. Once the funding is identified, the project must be included in the Bismarck-Mandan MPO Transportation Improvement Program (TIP) and NDDOT State Transportation Improvement Program (STIP).

Additionally, federal transportation funding is available through the annual congressional appropriations process. All units of state and local government are eligible to apply for congressionally directed funding. Applications for funding are typically released by each congressional office in January of each year. One application per project is required to be submitted to each congressional office in February or March, depending on the specific

application deadline. Additionally, funding requests should be accompanied by letters of support from the requesting entity and project stakeholders. Though being on the TIP or STIP is not required, it would help to boost the competitiveness of such a request. The congressional appropriations process can take 12 to 18 months to complete. Additionally, congressionally directed funding has become both limited and highly competitive in recent years.

- **Federal Transportation Bill:** Congress is preparing new surface transportation authorization legislation to replace the current Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Authorization, which expired September 30, 2009. As a result, congressional members will have the opportunity to submit applications for funding authorization under the bill Member-Designated High Priority Projects. The High Priority Projects will be selected through a competitive process and projects demonstrating the greatest need and a large amount of community support will be selected for funding authorization. The city of Mandan needs to stay in contact with their congressional delegation and request a copy of the funding application be emailed as soon as released.

- **Transportation Enhancement Funding:** The federal transportation bill includes federal funding provisions for Transportation Enhancements, which include roadway landscaping/beautification as an eligible activity. The funding category typically provides federal funding for up to 80 percent of the eligible activities. Local jurisdictions must coordinate with NDDOT to apply for funding. Funding is typically allocated several years in advance similar to federal transportation funding, and must be included in the Bismarck-Mandan MPO TIP and NDDOT STIP.

- **Tax Increment Financing District:** A Tax Increment Financing District (TIF) is a special tax district used to promote commercial and industrial development. A TIF provides financing for public improvements (sewer, water, roads, etc.) using new tax revenue created by new, expanded, or renovated commercial prop-



erty in a TIF district, which is defined by the community. A TIF district can be undeveloped land, a main street district, the whole downtown, a few parcels, whatever the communities chooses or in this case the Memorial Highway area. TIF uses future gains in taxable valuation and taxes to finance improvements that will create those gains. Increased tax revenues are the tax increment. The fundamental purpose of tax increment financing is to encourage desirable development or redevelopment that would not otherwise occur but for the assistance provided. TIF does not involve any out-of-pocket expense for government units. Rather the original taxable value of property in a TIF district remains frozen for the period of the financing. Local government units continue to receive property taxes based upon the “frozen” taxable value. North Dakota Century Code (NDCC) Chapter 48-58 Urban Renewal Law allows for tax increment financing in two forms: a tax increment, derived from the property tax differential between original taxable value of the property in a development or renewal area compared to taxable value after improvement, is diverted to a special fund dedicated to debt service on bonds or a loan associated with development costs, or as a 15-year property tax exemption. The city of Mandan has a TIF policy which outlines the criteria and thresholds for TIF assistance as well as the application and review process.



For residents, a TIF can encourage commercial and industrial development in the community. Once public improvements in the district have been paid for, increased tax revenue generated by the new development becomes part of the city’s general revenue. With a TIF, improvements can be made at no cost to other tax payers.

For businesses, a TIF can provide an attractive mechanism to pay for infrastructure improvements necessary for business construction, expansion, or renovation. Without a mechanism in place such as a TIF to fund necessary infrastructure improvements, a business may chose to locate or expand in another community. Businesses want to locate in a “Town with a Plan.”

- **Mandan Revolving Loan Fund:** Two separate \$1 million revolving loan pools were created in 2007 and 2009 to assist with business start-ups, expansions, and retention in Mandan and the surrounding 10-mile radius within Morton County. Twice, the city of Mandan provided \$250,000 in sales tax revenue as a match for two \$750,000 loans from USDA Rural Development to establish the revolving loan pools. Administration of the program is by the Lewis and Clark Regional Development Council (RDC). Goals of USDA’s Intermediary Relending Program (IRP), the source for the majority of loan funds, include job creation and retention. Program criteria includes:
 - ♦ Funds cannot compete with, but rather must complement conventional lending options. Owner equity of at least 10 percent of total project costs is required.
 - ♦ The IRP loan can be no more than 50 percent of total financing needs with a maximum of \$250,000 per project. Most loans are approved for 10 to 25 percent of the financing package.
 - ♦ Rates and terms are based upon assets being financed, credit risk, economic impact, and the borrower’s ability to cash flow — usually 1 to 2 percentage points below prime with a 12-month deferral of the principal portion of payments. Rates on

loans approved to date range from 6.25 percent to 6.5 percent with a 12-month deferral if the principal portion of the payment.

- ♦ A 1 percent origination fee is on all loans.
- ♦ For more information, contact the Lewis and Clark RDC, 701 667 7624.
- **Municipal Bonds.** Municipal bonds are issued by a city or other local government to raise funds. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from federal income tax and from income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.
- Communities should leverage bonds through the North Dakota Public Financing Authority to use their credit rating to obtain higher scoring bonds. The state currently has three municipal bond programs: Capital Financing Program, State Revolving Fund (SRF), and Industrial Development Bond Program. In the

corridor concept, bonds are most appropriate to finance all or part of streetscape improvements.

- **Community Development Block Grant Program – State and Small Cities:** The goal of the Community Development Block Grant (CDBG) Program for states and small cities is to provide funds to communities under 50,000 in population for projects to develop viable communities by providing decent housing and a suitable living environment, expanding economic opportunities, principally for persons of low and moderate income.

States receive CDBG funds from the federal government and pass funding on to local governments under 50,000 in population. Local governments may use funds to directly conduct eligible activities. Communities may also sub-grant funds to any entity, including for-profit organizations. Communities may apply jointly for CDBG funds when addressing a common problem requiring mutual action by both jurisdictions. Funds may be used to:

- ♦ Acquire deteriorated and inappropriately developed real property and either dispose of or retain for public purposes.
- ♦ Purchase, develop, or rehabilitate facilities to serve the public including water and sewer.

- ♦ Remove architectural barriers to the elderly and people with disabilities.
- ♦ Rehabilitate and improve public and privately owned residential facilities and public or privately owned commercial and industrial facilities.
- ♦ Provide relocation assistance.
- ♦ Finance economic development projects, including acquisition, development or rehabilitation of building and capital equipment.
- Up to 15 percent of each state’s grant may be used to establish or expand public services, such as child care, law enforcement, fair housing counseling, or health services. The program is administered by Region 7 of the Lewis and Clark RDC.
- **Surface Transportation Reauthorization Bill – Recreational Trails Program – State and Local:** The upcoming Surface Transportation Reauthorization Bill is expected to dramatically increase the level of funding for bicycle and pedestrian trails through its popular Recreational Trails Program. Funds are available to states, cities, counties, civic organizations, and Tribal governments.

The program provides funding to develop and maintain recreational trails and trail-

related facilities for both non-motorized and motorized recreational trail uses. Funds are available to develop, construct, maintain, and rehabilitate trails and trail facilities. Uses include hiking, bicycling, in-line skating, equestrian, cross-country skiing, snowmobiling, off-road motorcycling, all-terrain vehicle riding, four-wheel driving, or using other off-road motorized vehicles.

Funds can be accessed in two ways: submitting an application to the North Dakota congressional delegation for a Recreational Trails earmark or submitting an application to North Dakota Parks and Recreation Department for Recreational Trails funding. A 20 percent local cost-share is required for both.

- **Federal Transit Administration – Metropolitan and Statewide Planning:** Programs provide funding to support cooperative, continuous, and comprehensive planning for making transportation investment decisions in metropolitan areas and statewide. For planning activities that:

- ♦ Support economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency
- ♦ Increase safety of the transportation system for motorized and non-motorized users

- ♦ Increase security of the transportation system for motorized and non-motorized users
- ♦ Increase accessibility and mobility of people and freight
- ♦ Protect and enhance the environment, promote energy conservation, improve quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns
- ♦ Enhance integration and connectivity of the transportation system, across and between modes, for people and freight
- ♦ Promote efficient system management and operation
- ♦ Emphasize preservation of the existing transportation system.

Major new fixed guideway projects or extension to existing systems financed with New Starts funds, typically receive funds through a full funding grant agreement that defines the scope of the project and specifies the total multi-



year federal commitment to the project.

Funds are apportioned by a complex formula to states that includes consideration of each state’s urbanized area population in proportion to the urbanized area population for the entire nation, as well as other factors. States can receive no less than 0.5 percent of the amount apportioned. Funds are sub-allocated by states to MPOs by a formula that considers each MPO’s urbanized area population, individual planning needs, and a minimum distribution. The federal share is not to exceed 80 percent cost of the projects funded under the program. Types of funds could possibly be sought in the futures if additional planning is needed.

- **Federal Appropriations – HUD – Economic Development Initiative-State:** The Transportation and Housing and Urban Development

(HUD) Appropriations Bill includes an account titled the Economic Development Initiative (EDI). The EDI program is administered by the Department of Housing and Urban Development.

EDI funds can be used for property acquisition; rehabilitation of publicly owned property; housing rehabilitation; economic development activities; acquisition, construction, reconstruction, or installation of public facilities; public works and other site improvements. Congress typically provides no more than \$400,000 per each congressionally directed EDI project. No local match is required.

- **The Storefront Improvement Program:** The program provides matching funds for exterior makeovers to commercial properties in the downtown area, continues in 2010. One application period remains with a deadline of November 1, 2010. Approved project applicants receive reimbursement not to exceed \$10,000 for up to 50 percent of expenses for improvements. Funding for the program comes from sales tax collections. The city should consider a similar program for properties along Memorial Highway.
- **Property Tax Incentives for New or Expanding Businesses:** NDCC 40-57.1 provides incentives in the form of property tax exemptions, payments in lieu of taxes, or a combination of both to a qualifying business.

New and existing buildings, structures, and improvements owned or leased by a qualifying project may receive property tax incentives. New buildings, structures, and improvements constructed and owned by a local development corporation may receive a partial or complete exemption from ad valorem taxation while unoccupied. Once occupied, the exemption continues until the next assessment date following the first occupancy. A qualifying project which locates in a building owned by a local development corporation qualifies for the property tax incentives, provided application is made and granted prior to occupancy. Incentives are granted at the discretion of the city or county in which the property is located, to any new or expanded revenue-producing project. Applications are submitted to the City Assessing and Building Inspection Department and are subject to review and approval of the Mandan Growth Fund Committee and the Mandan City Commission. The program follows the ND Tax Department Guidelines and Application for new or expanding business tax incentives.

- **Heritage Areas:** The Northern Plains Heritage Area in North Dakota is part of the newest batch of National Heritage Areas created by the Omnibus Land Management Act of 2009. The area encompasses 800 square miles in five counties – Burleigh, McLean, Mercer,

Morton and Oliver. The designation as a National Heritage Area is bound to produce both direct and indirect benefits across the region. For example, heritage conservation efforts often lead to increased eco-tourism and related economic development benefits as they appeal to all ages and interests. Some Heritage Areas develop opportunities for walking, hiking, biking, and paddling. Some areas have festival and museums to visit. Many areas provide volunteer opportunities, group tours, and multiple-day excursions.

Designation as a National Heritage Area comes with limited financial and technical assistance from the National Park Service. Additionally, annual Congress appropriations provides funding for the National Park Service and National Heritage Areas through the Heritage Areas Partnership Program account of the Interior-Environment appropriations bill.

Often, funds are provided directly for specific Heritage Areas in the form of congressionally directed funds or earmarks. Other times Heritage funding is provided to the National Park Service, who administers the Heritage Area Partnership Program and its funding.

Heritage Area funding might be applicable an extension of the Fort Lincoln Trolley, expanded recreational/tourism features, and/or some

recreational/tourism elements of the proposed event center at Dacotah Centennial Park.

master plan. Currently, estimation of probable costs to accommodate development initiatives would be speculative at best due to unknown roles, capacities, and size of such initiatives. However, probable cost of constructing a typical Mandan city street

section has been included to help initiate discussions at the city and private developer level.

For example, the extension of Longspur Trail eastward to 40th Avenue is included on the federal

PROBABLE COSTS

The variety of proposed infrastructure improvements include investments typically initiated by private developers as well as city or state agencies. While private developers typically dictate when, where, and how properties might be improved, city sponsored initiatives can help shape the direction and timing of local developments. City sponsored initiatives would require coordination and cooperation of land owners, and may include the construction of a local street system, regional storm water drainage systems, and/or water and sewer provisions. Initiatives may serve a larger area, thereby accommodating smaller piece-meal private development while still fitting within a larger area

**TABLE 2
OPINION OF COSTS**

Description	2010 Cost*	Year to Construct	Year to Construct Cost**	Potential Federal Participation at 80% of Construction Cost	Potential Local Match at 20% of Construction Cost***	Engineering Fees at 20% of Construction Cost
Memorial Highway Reconstruction with Sidewalks	\$16,066,152	2017	\$21,142,000	\$14,094,667	\$3,523,667	\$3,523,667
Memorial Highway Storm Water Management	\$3,226,725	2017	\$5,372,735	\$3,581,823	\$895,456	\$895,456
Memorial Highway Transportation Enhancement ****	\$2,065,824	2017	\$2,718,484	\$1,812,323	\$453,081	\$453,081
Memorial Highway Water and Sewer Replacement	\$5,414,400	2017	\$7,124,981	0	\$7,124,981	\$1,187,500
Total Memorial Highway Improvements:			\$29,233,219	\$19,488,813	\$4,872,203	\$4,872,203
40th Avenue Realignment	\$375,220	2017	\$493,764	\$329,176	\$82,294	\$82,294
40th Avenue Trail Extension	\$76,454	2017	\$100,608	\$67,072	\$16,768	\$16,768
Twin City Estates Sidewalk	\$120,587	2017	\$158,684	\$105,789	\$26,447	\$26,477
Longspur Trail Road	\$377,414	2020	\$558,665	\$372,443	\$93,111	\$93,111
Robin Trail	\$733,900	2022	\$1,174,998	\$783,332	\$195,833	\$195,833
BNSF Service Road	\$869,200	2024	\$1,505,173	\$1,003,449	\$250,862	\$250,862
McKenzie Drive Extension	\$5,880,000	2030	\$13,400,000	\$10,720,000	\$2,680,000	\$2,680,000
*Cost estimates contain a 25% contingency factor. McKenzie Drive costs from 2010 LRTP. Includes engineering.						
**4% per year inflation rate used for projected costs, year of construction is estimated only. Funding is not yet available. Includes engineering.						
***Current NDDOT policy provides for up to a 50% match on local funds for the roadway and storm water improvements.						
****Included bike lanes, landscaping and decorative features.						

aid system as a Proposed Collector roadway. The extension would provide an alternate route for access to properties along and south of Memorial Highway, as well as provide access to currently non-platted and unimproved properties. While current property owners may not have immediate plans of developing property, there is a community benefit of providing the Longspur Trail extension even without immediate adjacent development plans. If the community waits for property owners to plat and develop property, the ROW is typically donated as part of the platting process. However, if the community wishes to advance road extension prior to land owner initiated platting, the community may need to purchase the ROW, at costs which are unknown. A probable cost of roadway extension has been included for planning purposes; without any costs for water and sewer facilities since the demand and sizing of services is unknown.

Note that the extension of McKenzie Drive westward to ND Highway 1806 recommended in the LRTP, and the cost estimate and proposed year of construction from the LRTP are included in Table 2 for information purposes.

Three transportation alternatives presented in the plan may not be financially viable: the proposed extension of 40th Avenue through a railroad underpass to the Twin City Drive area, the Interstate 194 overpass to the Captain's Landing Township and the extension of the Fort Lincoln Trolley to the proposed event center. The probable cost for the

railroad underpass structure is \$2 million, while the Interstate 194 overpass structure and approach embankment is also estimated at approximately \$2 million. Approach roadways for both alternatives are not included in the probable cost estimates.

Preliminary evaluation of 40th Avenue railroad underpass indicated 279 existing mobile homes in Twin City Estates would be primary beneficiaries of the underpass. It might be argued that the industrial and commercial properties east and west of the proposed underpass might also receive some benefit, although may be difficult to quantify. The underpass route is unlikely to be eligible for inclusion on the federal aid road system, therefore all construction costs would be local responsibility. Assuming a developer would finance the actual approach roadway costs, a special assessment district to fund the underpass structure would require a \$7,168 assessment per mobile home. However, any assessments would be to the owners of Twin City Estates, and not mobile home lot renters. Due to the high cost of underpass, the 40th Avenue railroad underpass is recommended to be eliminated from financial planning within the study.

Preliminary evaluation of Captain's Landing Township overpass indicated 63 existing residential lots that would benefit from an overpass. The undeveloped agricultural land in the area east of Interstate 194 could be subdivided into approximately 24 rural-sized residential lots totaling 87 benefitted properties. The overpass route is unlikely

to be eligible for inclusion on the federal aid road system, therefore it is assumed all construction costs would be local responsibility. Assuming a developer would finance the actual approach roadway costs, a special assessment district to fund the overpass structure and embankment would require a \$23,000 assessment per lot. Due to high costs per benefitted property, the Interstate 194 overpass is recommended to be eliminated from financial planning within the study. However, the future road system on either side of Interstate 194 could be developed so that a future overpass could be constructed if funding ever became available.

The Fort Lincoln Trolley extension is estimated to cost over \$4 million in 2010 dollars (see Appendix A). The trolley is a private enterprise that is unlikely to recoup the costs of the trolley extension. Due to the high cost, the trolley extension is recommended to be eliminated from financial planning.

Other major transportation improvements recommended in the plan include Memorial Highway reconstruction as proposed, and water, sewer and storm water improvements. Probable cost estimates and estimated year of construction for the improvements are summarized in Table 2.

Note the actual year of construction is unknown. The year of construction is estimated for the earliest time that construction might begin.

As development grows within the study area, it is recommended to annually consider the actual development with growth projections assumed by the LRTP. If actual development differs significantly from the LRTP projections, updating the LRTP traffic model is recommended.

CONCLUSION

Implementation of the corridor study encompasses far more than a plan to rebuild and construct roads. The vision of the study is to create a healthy community and commercial district, promote compatible development through management of transition areas, create a destination recreational area including Dacotah Centennial Park, and a beautiful and memorable experience along Memorial Highway and the city of Mandan.

A successful implementation plan begins with the city of Mandan identifying a department and/or staff person to oversee the coordination of the various recommendations within the Mandan Memorial Highway Corridor Study. Implementation can then focus on several concurrent activities:

- Begin management of the land use transition areas. The Mandan Planning and Zoning Commission could start the process by scheduling public hearings for proposed zoning and development code revisions.
- Develop consensus on recommended greenway buffers around Kist Livestock by

coordinating with landowners, developers and the Mandan Park District.

- Review any new building permits and platting requests to maintain consistency with Mandan Memorial Highway Corridor Study recommendations for land use transitions, access control, future street and pedestrian/bicycle connectivity and land use compatibility.
- Investigate community and funding issues regarding the recommended event center in Dacotah Centennial Park.
- Consider preparing a new master plan for Dacotah Centennial Park to enhance the day use and recreational opportunities.
- Consider an implementation and funding strategy to improve pedestrian accessibility through the construction of new sidewalks in various areas throughout the study area.
- Coordinate with the Memorial Highway business community to determine if an area business association is desired, and if so, began forming an association to promote events, beautification and other coordinated efforts.
- Coordinate with NDDOT for scheduling federal funding assistance for future road improvement projects in the study area.
- Begin the city of Mandan budgeting process for future infrastructure and roadway improve-

ments along Memorial Highway and other study area streets.

- In 2012 conduct a turning movement traffic counts at the 39th/40th Avenue and 46th Avenue intersections with Memorial Highway to determine if traffic signal warrants are met as development continues to grow south of Memorial Highway.
- If major developments are proposed within the study area, conduct a traffic impact study to determine compatibility with existing or proposed infrastructure.

Upon implementation of the vision, the Memorial Highway study area will offer all the amenities of the present while respecting the history of the past.

Appendix A

COST OPINIONS



OPINION OF ROADWAY COSTS MEMORIAL HIGHWAY FROM MAIN STREET TO 46TH AVENUE				
August 30, 2010				
Item No.	Item Description	Unit	Unit Price	\$/LF
1	9" PCC Pavement	SY	\$55	\$370
2	PCC Curb & Gutter	LF	\$20	\$40
3	4" PCC Sidewalks (Both Sides)	SY	\$40	\$46
4	Lighting (Both Sides)	LF	\$37	\$37
5				
6	Base Material for Street	TON	\$15	\$70
7				
8	Common Excavation	CY	\$8	\$57
9	Removal of Pavement (8")	TON	\$8	\$24
10	8" PCCP Driveway	L SUM	\$400,000	\$32
11	Mobilization	L SUM	\$400,000	\$32
12	Seeding/Erosion Control	L SUM	\$150,000	\$12
13	Pavement Marking/Signing	L SUM	\$500,000	\$39
14	Traffic Control	L SUM	\$250,000	\$20
15	Contract Bond	L SUM	\$100,000	\$8
16	Signals	L SUM	\$750,000	\$59
Sub-Total			\$845	
Contingencies @ 25%			\$211	
Engineering @ 20%			\$211	
Total Cost/FT*			\$1,268	
Total 2010 Cost for 12,672 FT			\$16,066,152	
Total 2017 Cost @ 4% Inflation			\$21,142,000	

* Mandan Memorial Highway project is 2.4 miles (12,672LF)

OPINION OF STORM WATER ALTERNATIVES COSTS MEMORIAL HIGHWAY FROM MAIN STREET TO 46TH AVENUE	
August 20, 2010	
Amended Alternate No. 1	
Item	Estimated Cost
Original 2004 Trunk Line	\$1,441,000.00
Original 2004 Ditch Liner	\$254,150.00
Original 2004 Ditch Regrade	\$6,000.00
Additional Pumping Station	\$200,000.00
Additional Detention	\$100,000.00
Emergency Generators	\$150,000.00
Subtotal	\$2,151,150.00
Engineering (20%)	\$430,230.00
Subtotal	\$2,581,380.00
Contingencies (25%)	\$645,345.00
Total	\$3,226,725.00
2017 Costs At 4% Inflation Rate	\$5,372,735.00

OPINION OF TRANSPORTATION ENHANCEMENT FUNDS COSTS MEMORIAL HIGHWAY FROM MAIN STREET TO 46TH AVENUE				
August 31, 2010				
Item - Amenities	Unit	Quantity	Unit Price	Total
Traditional Fencing	LF	2450	\$20.00	\$49,000
Stone and Stake Marker	EA	14	\$10,000.00	\$140,000
Native American Stake fencing	LF	324	\$100.00	\$32,400
Community Gateway Entrance Feature	LS	1	\$300,000.00	\$300,000
Street Trees	EA	400	\$350.00	\$140,000
Median Plantings	SF	5400	\$3.00	\$16,200
Ornamental Grasses	LS	1	\$8,000.00	\$8,000
Total - Amenities				\$685,600
Contingencies @ 25%				\$171,400
Engineering @ 20%				\$171,400
Total 2010 Cost for Amenities				\$1,028,400
Total 2010 Cost for Bike Lanes				\$1,037,424
Total 2010 Cost for TE				\$2,065,824
Total 2017 Cost @ 4% Inflation for Amenities				\$1,353,304
Total 2017 Cost @ 4% Inflation for Bike Lanes				\$1,365,180
Total 2017 Cost @ 4% Inflation for TE				\$2,718,484

OPINION OF BIKE LANES COSTS MANDAN MEMORIAL HIGHWAY (5' bike lane includes 1.5' gutter and 3.5' road widening)				
August 30, 2010				
Item No.	Item Description	Unit	Unit Price	\$/LF
1	9" PCC Pavement (7FT)	SY	\$55	\$44
2				
3				
4				
5				
6	Base Material	TON	\$15	\$9
7				
8				
9				
10				
11				
12				
13	Pavement Marking/Signing	L SUM	\$20,000	\$2
14				
15				
16				
Sub-Total			\$55	
Contingencies @ 25%			\$14	
Engineering @ 20%			\$14	
Total Cost/FT*			\$82	
Total 2010 Cost for 12,672 FT			\$1,037,424	
Total 2017 Cost @ 4% Inflation			\$1,365,180	

**OPINION OF 10 FT MULTI-USE TRAIL COSTS
MANDAN MEMORIAL HIGHWAY**

(As an alternative to the recommended bike lanes)

August 30, 2010

Item No.	Item Description	Unit	Unit Price	\$/LF
1				
2				
3				
4				
5	10' HBP Trail	TON	\$80	\$20
6	Base Material	TON	\$15	\$3
7				
8	Common Excavation	CY	\$8	\$8
9				
10				
11				
12				
13	Pavement Marking/ Signing	L SUM	\$25,000	\$2
14				
15				
16				
Sub-Total			\$29	
Contingencies @ 25%			\$7	
Engineering @ 20%			\$7	
Total Cost/FT*			\$43	
Total 2010 Cost for 12,672 FT			\$550,716	
Total 2017 Cost @ 4% Inflation			\$724,710	

* Mandan Memorial Highway project is 2.4 miles (12,672LF)

**ESTIMATE OF COST
MANDAN CITY STREET**

(40' wide between face of curbs)

August 27, 2010

Item No.	Item Description	Unit	Unit Price	\$/LF
1	4.5" CL 29 HBP	TON	\$30	\$30
2	PCC Curb & Gutter	LF	\$20	\$40
3	4" PCC Sidewalks (Both Sides)	SY	\$40	\$46
4	Lighting (Both Sides)	LF	\$30	\$30
5	6" Subgrade Preparation	STA	\$300	\$3
6	Mobilization	L SUM	\$20,000	\$4
7	Seeding	ACRE	\$3,000	\$2
Sub-Total			\$155	
Contingencies @ 10%			\$16	
Engineering @ 20%			\$34	
Cost Per Lineal Foot of Street Total*			\$205	

**OPINION OF ROADWAY CONSTRUCTION COSTS
ROBIN TRAIL AND BNSF SERVICE ROAD
MANDAN MEMORIAL HIGHWAY**

November 6, 2010

Item No.	Item Description	Unit	Unit Price	\$/LF	\$
1	Robin Trail	LF	3580	\$205	\$733,900
2	BNSF Service Road	LF	4240	\$205	\$869,200
3					
Robin Trail - Total 2022 Cost @ 4% Inflation Per Annum					\$1,603,100
BNSF Service Road - Total 2024 Cost @4% Inflation Per Annum					\$2,109,570

**OPINION OF 5FT SIDEWALK COSTS
TWIN CITY ESTATES TO MEMORIAL HIGHWAY AT BNSF SERVICE
ROAD AND 3RD STREET SE
MANDAN MEMORIAL HIGHWAY**

November 6, 2010

Item No.	Item Description	Unit	Quantity	Unit Price	\$
1					
2	Topsoil and Common Excavation	CY	509	\$3	\$1,527
3					
4					
5	Base Material	Ton	319	\$16	\$5,104
6					
7					
8	4" PCC Pavement - Sidewalk	SY	1528	\$45	\$68,760
9					
10					
11	Pavement Marking/ Signing	L Sum	1	\$5,000	\$5,000
12					
13					
14					
15					
16					
Sub-Total					\$80,391
Contingencies @ 25%					\$20,098
Engineering @ 20%					\$20,098
Total Cost					\$120,587
Total 2017 Cost @ 4% Inflation Per Annum					\$158,684

**OPINION OF COSTS - FORT LINCOLN TROLLEY EXTENSION
MANDAN MEMORIAL HIGHWAY**

October 27, 2010

Item No.	Item Description	Quantity	Unit	Unit Price	Cost
1	Land Acquisition - Track, 3/4 mile x 45' W	178,200	SF	\$6	\$1,069,200
2	Embankment - Borrow	19,800	CY	\$11	\$217,800
3	Rail Subballast	3,025	Ton	\$16	\$48,400
4	Rail Ballast	3,025	Ton	\$16	\$48,400
5	Track	3,960	TF	\$195	\$772,200
6	Turnout	1	EA	\$60,000	\$60,000
7	Track Crossing	1	EA	\$50,000	\$50,000
Depot and Parking Area - 25' x 50' Depot, 160 x 180 Parking Area					
8	Land Acquisition	30,300	SF	\$10	\$303,000
9	Building	1,250	SF	\$75	\$93,750
10	Base Material	1,000	Ton	\$16	\$16,000
11	Asphalt	1,067	Ton	\$85	\$90,695
12	Striping and Signing	1	L Sum	\$10,000	\$10,000
13					
Sub-Total					\$2,779,445
Contingencies @ 25%					\$694,861
Engineering @ 20%					\$694,861
Total Cost					\$4,169,168
Total 2017 Cost @ 4% Per Annum Inflation					\$5,486,340

**OPINION OF WATERMAIN AND SANITARY SEWER COSTS
MANDAN MEMORIAL HIGHWAY**

December 8, 2010

WATERMAIN (12,200 FT)

Item No.	Item Description	Unit	Quantity	Unit Price	Total
1	12" Watermain	LF	12,200	\$65	\$793,000
2	Hydrant	Each	35	\$4,000	\$140,000
3	Hydrant Lead Pipe (35 x 60')	LF	2,100	\$60	\$126,000
4	12" Gate Valve	Each	35	\$2,500	\$87,500
5	Hydrant Gate Valve	Each	35	\$1,500	\$52,500
6	8" Service Pipe (92 Lots/2 x 60')	LF	2,760	\$60	\$165,600
7	8" Service Gate Valve (92 Lots/2)	Each	46	\$1,500	\$69,000
8	1" & 2" Service Pipe (75 Users x 60')	LF	4,500	\$30	\$135,000

Watermain Subtotal \$1,568,600

SANITARY SEWER (10,000 FT)

Item No.	Item Description	Unit	Quantity	Unit Price	Total
9	8" & 12" Sanitary Sewer Pipe	LF	10,000	\$75	\$750,000
10	Sanitary Manhole	Each	30	\$6,000	\$180,000
11	Sanitary Service Pipe (80 Lots x 60')	LF	4,800	\$70	\$336,000
12	Lift Station	Each	1	\$500,000	\$500,000
13	Forcemain	LF	5,000	\$55	\$275,000

Sanitary Sewer Subtotal \$2,041,000

Sub-Total for Watermain and Sanitary Sewer \$3,609,600

Contingencies @ 25% \$902,400

Engineering @ 20% \$902,400

Total 2010/FT Roadway (12,672 FT) \$427

Total 2010 Cost for Watermain and Sanitary Sewer \$5,414,400

Total 2017 Cost @ 4% Inflation \$7,124,981

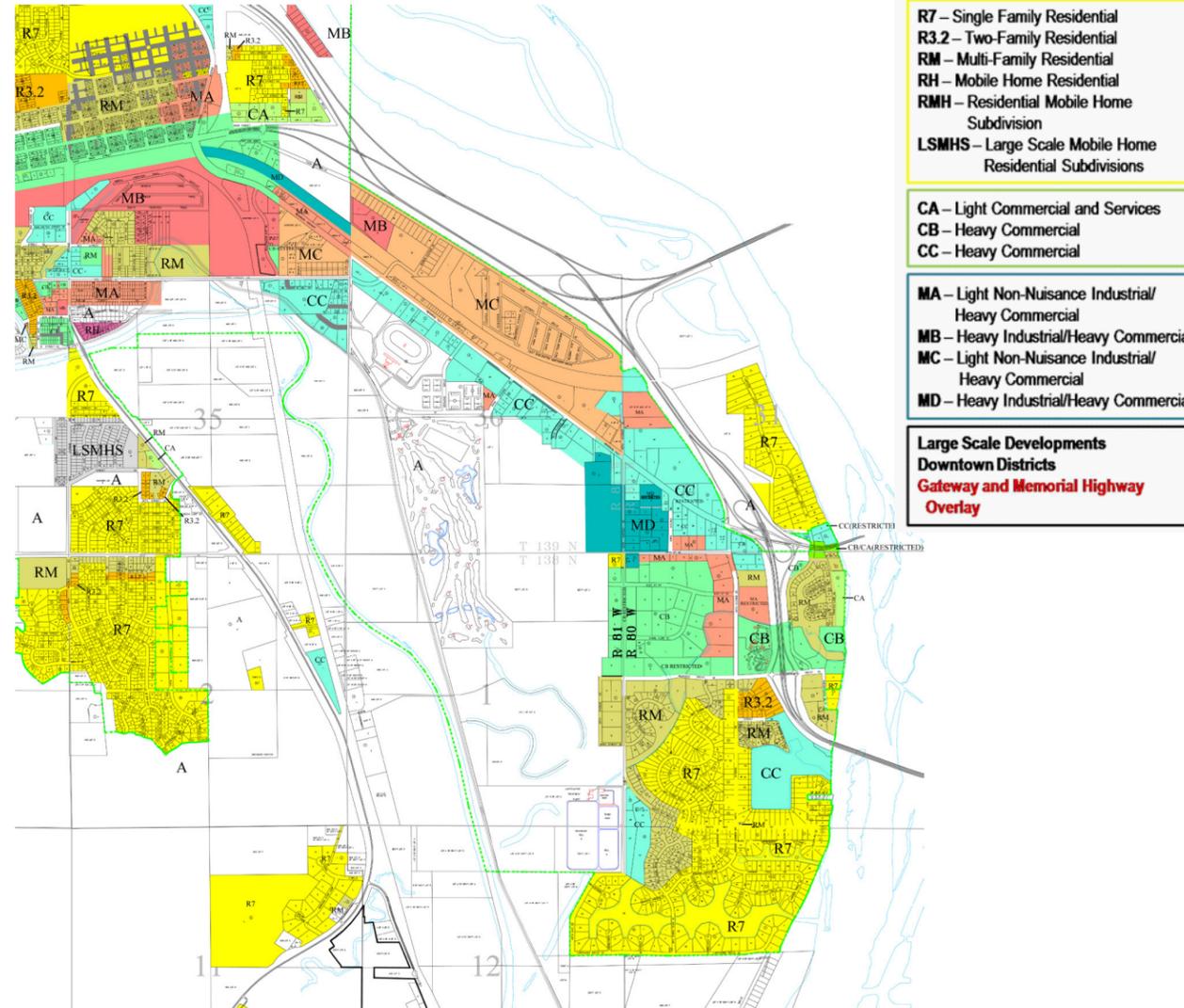
* Mandan Memorial Highway project is 2.4 miles (12,672LF)

Appendix B

ZONING ANALYSIS RECOMMENDATIONS

Zoning Analysis and Recommendations

Map 1 indicates the current zoning in the Memorial Highway study area. All of Mandan's commercial and industrial zoning districts, and most of the non-mobile home residential districts are applied in the study area. The zoning analysis will provide an overview of the zoning code and make several general revision recommendations. The focus of the overview is review of commercial and industrial zones applied in the study area. Next will be an evaluation of the zoning of the Memorial Highway corridor frontage properties. Then, the analysis will focus on that part of the study area north of the corridor, and finally the study area south of the corridor.



Map 1: Study Area Zoning

I. OVERVIEW AND GENERAL RECOMMENDATIONS

The Mandan zoning code can be described as a first generation code in that follows the format of the early model zoning codes. A key characteristic of early codes is a format that lists in detail each use permitted in every district. Making an overly lengthy, repetitive code difficult to understand and use. The outdated format has largely been replaced by the definition of use types describing groups of uses with similar impacts, and a permitted use table identifies all permitted uses in one table. This eliminates the repetitive permitted use lists and makes comparisons between districts very easy.

Recommendation 1: Mandan should consider updating the format of its zoning code.

Beyond format, some substantive issues should be highlighted for discussion by the city's planning commission and possible revision. The general description of the CA-Light Commercial district includes the following statement:

"A CA commercial district is established as a district in which the principal use of land is for commercial and service uses to serve the surrounding residential district and in which traffic and parking congestion can be reduced to a minimum in order to preserve residential values and to promote the general welfare of the surrounding residential districts."

The division of retail, service and office uses into Group A and B categories seems to be an attempt to divide uses by intensity. However, Group A category permitted in CA-Light Commercial includes the following uses without any limitations as to size:

- Department store
- Furniture store
- Grocery store
- Hardware store
- Office supply store
- Sporting goods store

Clearly, in today's retail environment, any use can become so large in size that the use would have severe adverse impacts on the surrounding residential district, contrary to the CA district's intent.

Recommendation 2: Establish maximum store size limits to ensure that the Group A uses will have limited impacts on surrounding residential districts.

CA-Light Commercial transitions to CB-Heavy Commercial primarily through the introduction of Group B commercial uses in several categories. Some of the heavier commercial uses permitted in CB include:

- Dance hall, pool hall, tavern
- Auto truck sales

- Farm implement store
- Feed, grain, farm supply store
- Trailer sales
- Auto laundry
- Auto repair garage
- Outdoor advertising sign

CB-Heavy Commercial is very similar in permitted uses to CC-Heavy Commercial with two exceptions: Dwellings are permitted in CB but not in CC, while Storage Building and Warehouse is permitted in CC but not in CB.

Permitted housing: With suggested limitation of Retail Group A uses, it is perhaps acceptable to permit all manner of dwellings, including single-family homes, in the CA-Light Commercial district. However, many bulleted CB uses can have severe impacts on residential uses, particularly single-family. To allow the random mixing of all types of dwellings with heavy commercial uses is not advisable. Multi-family uses could be permitted, but should have the benefit of special review.

Recommendation 3: Remove unlimited *Dwellings* as permitted uses in CB. Allow multiple-family dwellings by Special Use Permit.

If Recommendation 3 is followed, the only difference between CC and CB is CB permits *Storage Building and Warehouse Use*. In most codes, unlimited warehouse use is permitted in light industrial districts, not heavy commercial. In fact, use is listed in Industrial Group A under the MA-Light Non-Nuisance Industrial/Heavy Commercial district permitted uses. The exception, and what may be behind the Mandan code's provision, is permission, typically with design standards, of Mini-Storage or Self-Storage facilities in heavy commercial zones. The permission of mini-storage uses with design guidelines, in Heavy Commercial zones is much better than the permission of unlimited warehousing, a clearly industrial use, in a commercial district.

Recommendation 4: Add *Mini-Storage Warehouse* as a permitted use, with design standards regarding site paving, building materials and fencing requirements, to the CB-Heavy Commercial district. Recommendation 3 and 4 will allow the elimination of the CC-Heavy Commercial district and for Mandan henceforth to have only one Heavy Commercial district.

The MA-Light Non-Nuisance Industrial/Heavy Commercial district seems to include an appropriate mix of light industrial uses. However, another light industrial district has the same name

descriptor: MC-Light Non-Nuisance Industrial/Heavy Commercial. The only difference between permitted uses in MA and MC appears to be the deletion of *Animal Hospital* from MC permitted uses and the addition of sporting goods store to the listed permitted uses in MC. However, as already seen, *sporting goods store* is listed as permitted in Retail Group A and should already be allowed in the MA district.

Recommendation 5: Eliminate the MC-Light Non-Nuisance Industrial/Heavy Commercial district as duplicative of the MA district and unneeded.

MA-Light Non-Nuisance Industrial/Heavy Commercial transitions to MB-Heavy Industrial/Heavy Commercial through the introduction of an Industrial Group B uses, which include all of the heaviest industrial uses permitted in cities including:

- Fat rendering
- Garbage, offal, or dead animal reduction
- Soap manufacture
- Stockyards or feeding pens
- Slaughter and packing of animals and meat products
- Junk yards
- Manufacturing, compounding, processing, refining and treatment of the following mate-

rials and products: (includes "Concrete products or mixing")

- Auto, truck sales
- Sand and gravel extraction

The MB uses are listed to demonstrate the MB zone permits the most intensive industrial uses imaginable. Another heavy industrial district exists, called MD-Heavy Industrial/Heavy Commercial. It appears the only substantive permitted use differences between MD and MB is the addition of the use *Livestock Sales Pavilion* to the permitted uses in MD. However, from a use intensity standpoint, livestock sales has no more impact on the community than large commercial uses or the stockyards, feeding pens or slaughter operations permitted in the MB zone. There is only one livestock sales operation in Mandan, and it hardly deserves its own separate zoning district.

Recommendation 6: Add *livestock sales pavilion* to the permitted use list in MB (by Special Permit if deemed necessary) and eliminate the MD-Heavy Industrial/Heavy Commercial district as duplicative of MB and unneeded.

Additional general observations and recommendations regarding the zoning ordinance:

Recommendation 7: As indicated above, *outdoor advertising sign* is listed in the Service Group B uses. This is not typical, as sign regulations and permitted

signs by district are usually covered in a separate sign section. A sign section was not found in the zoning code. Assuming it exists elsewhere in the City Code, a review for reasonableness of restrictions and all billboard provisions should be listed.

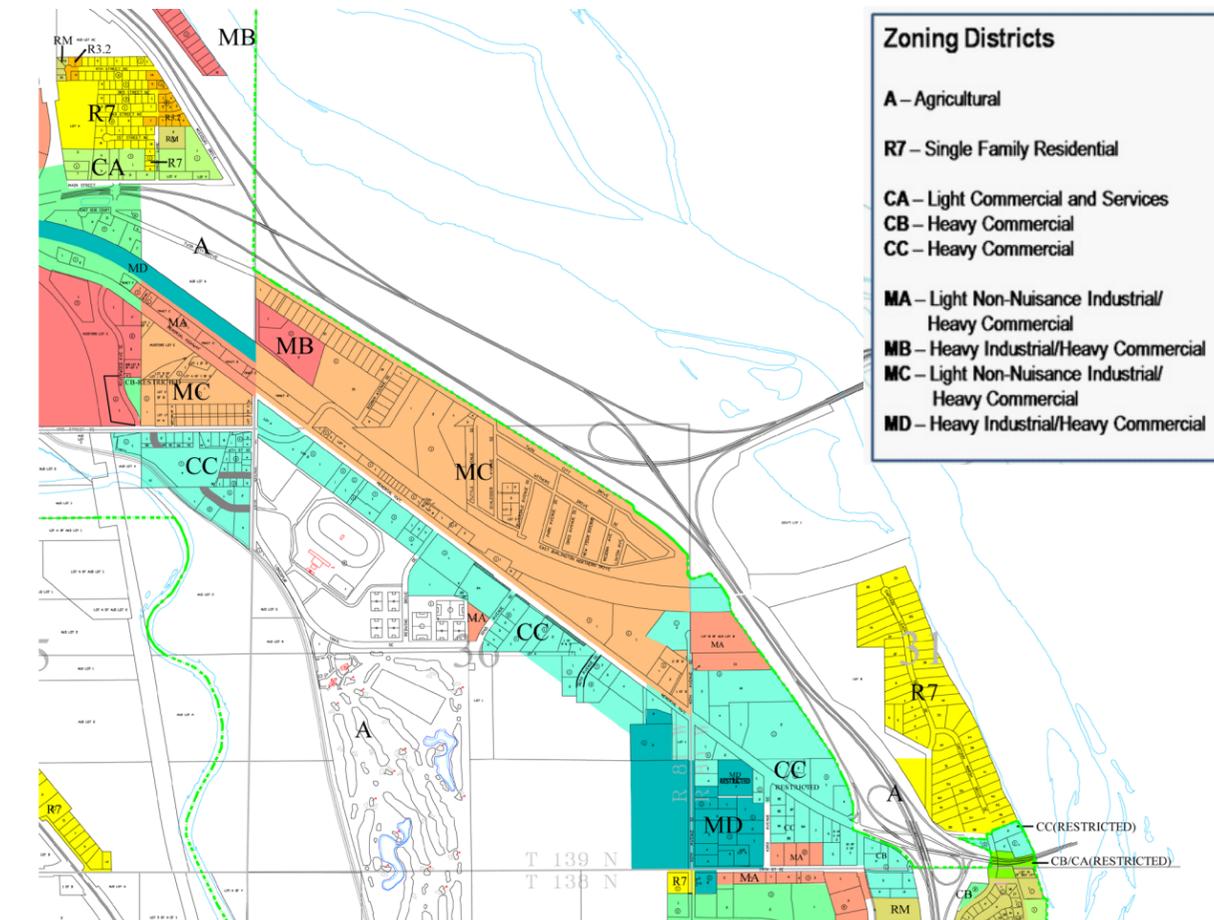
Recommendation 8: General landscaping, open space or buffer yard requirements were not found in the code. Mitigating the impacts of land use transitions and affecting the visual quality and perceived desirability of the community are important provisions as a place to locate. Mandan should consider adding at least minimal requirements addressing issues.

II. MEMORIAL HIGHWAY CORRIDOR STUDY AREA RECOMMENDATIONS

Corridor Frontage Properties

Map 2 indicates the current zoning of Memorial Highway corridor properties. Maps 3 and 4 show

existing land uses along the corridor. Other than several notable long-term corridor properties, most uses along the corridor are commercial or light industrial. Exceptions include Mandan Steel, Strata Concrete, and Kist Livestock Auction, all of which should be considered *Heavy Industrial* uses.



Map 2: Study Memorial Highway Corridor Zoning

Although recently rezoned to CC, the northeast, southeast and southwest corners of 40th and Memorial Highway were historically zoned MD Heavy Industrial, and therefore were the corridor is significantly “over-zoned”. That is, a heavier, less restrictive zoning district was applied to the area than would be needed for the existing land uses.

There are several reasons why over-zoning can negatively impact a district. Heavier zoning allows uses that have more negative impacts. Zoning a commercial area as Industrial, allows for high impact industrial uses, such as manufac-

turing, adjacent to less intensive uses, say retail. Zoning exists, in part, so that similar uses having similar impacts may be grouped together, thereby ensuring high-impact uses do not negatively impact lower-impact uses. People investing in business development in an area generally want to make sure that their investment is protected and not subject to adverse impacts from adjoining uses. Heavy-impact uses need to be carefully located in a community not only to minimize impacts on adjoining uses but also heavy impact uses are often not those a city would want in a highly visible gateway location.

New uses in the area of 40th and Mandan Memorial Highway, for example the Honda Shop, have tended to be commercial and therefore it was appropriate to downzone the area to CC Heavy Commercial.

Under Recommendation 4 above, the CC district would be eliminated and replaced by CB-Heavy Commercial.

Recommendation 9: Review all remaining MD-Heavy Industrial zoned property remaining on the MMH corridor to determine if the existing use

can be accommodated with CB-Heavy Commercial zoning.

As indicated on Map 3: Existing Land Use, most uses on the north side of the corridor are commercial, similar to the south side. However, the zoning map illustrates the north side of the corridor is zoned MC-Light Industrial, while the south side is zoned CC-Heavy Commercial. It is not clear that Mandan Steel is a permitted use under MC-Light Commercial. Regardless, the property should remain zoned industrial. Acknowledging that exception, the city should evaluate the appropriateness of rezoning much of the area consistent with the current and proposed property use.

Recommendation 10: Survey the uses on the north side of the corridor west of 40th Avenue and if conforming to CB-Heavy Commercial, rezone as much as possible to CB.

As indicated in Recommendation 4 above, CC-Heavy Commercial zoning should be changed to CB-Heavy Commercial and CC eliminated. If that recommendation is followed, the following recommendation is a “clean-up” action.

Recommendation 11: Rezone all CC-Heavy Commercial zoned areas on the south side of the corridor to CB-Heavy Commercial.

On the west end of the corridor, the north side is zoned CB-Heavy Commercial while the south side is zoned MB-Heavy Industrial and MC-Light Indus-

trial. New developing uses in area have been either commercial or office/warehouse/light industrial flex space. The existing building materials business (Marshall Lumber) currently requires light industrial zoning. However, modern building materials big-boxes (e.g. Menards, Lowe’s) are usually allowed in heavy commercial districts.

Recommendation 12: Rezone all property west of 24th Avenue on the south side of the corridor to MA-Light Industrial. (MC-Light Industrial goes to MA-Light Industrial under Recommendation 5.)

The Gateway and Memorial Highway Overlay District provides standards above and beyond the base district for all properties within 200 feet of the Memorial Highway ROW. The Mandan Architectural Review Commission is charged with reviewing plans for conformance with the stated standards. While stated higher standards seem appropriate for the Memorial Highway corridor, the Building Design and Construction Standards for building materials are not specific enough. Standards include the following:

A. Buildings shall be attractive and constructed of materials that will maintain their appearance over the long-term.

E. i. Exteriors of industrial buildings shall be comprised of at least 30 percent quality materials other than steel and fiberglass...

Clearly, the language leaves a lot of leeway for a developer to claim their materials meet the specification. For example, unpainted plain concrete block would appear to meet the requirement but is not the quality material the city would like to see along the corridor.

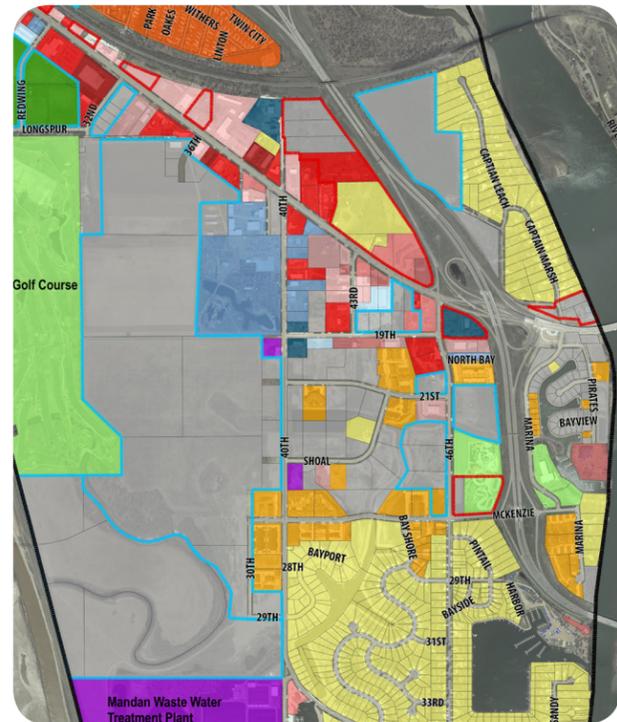
Recommendation 13: Revise Section 8.A. and 8.E. of Section 21-04-18 Gateway and Memorial Highway Overlay district to include a list of permitted architectural materials meeting design standards.

Project Area North of the Railroad

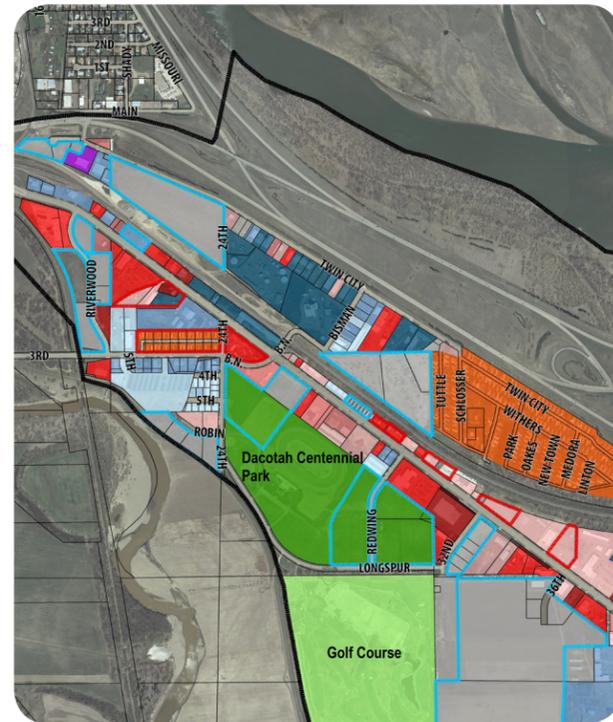
The most obvious zoning discrepancy north of the railroad is Twin City Estates Mobile Home Park zoned MC-Light Industrial. The zoning could lead to disputes as to whether a certain park use, e.g. auto repair, is permitted under the zoning regulations.

Recommendation 14: Rezone the Twin City Estates Mobile Home Park from MC-Light Industrial to RH-Mobile Home Residential.

The Light Industrial zoning currently on most of the industrial area is appropriate. However, since under Recommendation 5 the MC-Light Industrial would be replaced by MA-Light Industrial, the zoning needs to be cleaned up as follows.



Map 4: Study Area Existing Land Use – West



Map 3: Study Area Existing Land Use – East

Recommendation 15: Rezone all remaining MC-Light Industrial districts to MA-Light Industrial.

The west end of Twin City Drive is zoned MB-Heavy Commercial and has seen some high-quality office-type development. The city should encourage more office-type development to occur on the vacant, A-Agricultural zoned area to the east, rather than industrial development.

While keeping land its current “A” zoning as a holding zone is a good idea, the city should have a future land use plan for the area that clearly establishing commercial/office as the intended use, rather than industrial.

Recommendation 16: Adopt a future land use plan as an amendment to the city’s comprehensive plan, for the vacant A-Agriculture zoned land along Twin City Drive, establishing the intended use as commercial/office consistent with MB-Heavy Commercial zoning.

Project Area South of the Corridor

Starting at the east end of the study area, some over-zoning of property, particularly in transition zones bordering existing or planned residential uses exists.

Typically, to avoid land use conflicts, a community will transition its zoning, and thereby its land uses, in the following manner:

Heavy Industrial > Light Industrial > Heavy Commercial > Light Commercial > Multi-Family > Single-Family

Note it is advised not to border residential zoning and industrial zoning against each other. Likewise, Single-Family zoning (and uses) are typically not a good idea adjacent to Heavy Commercial, etc. An example of violation is the MA-Light Industrial zoning on 19th Street west of 46th Avenue and south of 19th Street on 46th. The frontage parcels in this area are developing as small-scale office while the interior parcels are developing into multi-family townhomes and/or condos/apartments. Industrial zoning is entirely too heavy for this district and could cause serious land use conflicts between adjoining uses.

The two areas are a transition from the heavy commercial uses on the corridor to the Lakewood neighborhood. Even CB-Heavy Commercial zoning is too heavy for this transition area. When thinking heavy commercial, what should come to mind is retail big-boxes and heavy auto-related uses like auto dealerships. Clearly, types of uses both belong and want to be located on Memorial Highway where the traffic levels are conducive to these uses. The areas along 19th Street and 46th Avenue should be light commercial, which allows smaller-scale, neighborhood-type retail, services and offices.

Recommendation 17: Rezone current MA-Light Industrial districts along 19th Street west of 46th

Avenue and along 46th Avenue south of 19th Street to CA-Light Commercial and Services.

As indicated in the text preceding Recommendation 9, MD-Heavy Industrial zoning north of 19th Street and east of 40th Avenue is too heavy for the area’s existing uses. The heavy industrial zoning is completely inappropriate given the proximity of existing and planned residential and office uses. Office uses (typically light commercial if small-scale), as well as residential, should not be located adjacent or across a narrow street, from heavy commercial uses. Proof of the resulting problems can be seen from the impact of the current concrete batch operation at 19th Street and 40th Avenue, on adjacent uses to the south. The concrete use was consistent with, and therefore encouraged by the current MD-Heavy Industrial zoning.

Recommendation 18: Rezone the bulk of the MD-Heavy Industrial district north of 19th Street and east of 40th Avenue to CB-Heavy Commercial. Consider a transition area of CA-Light Commercial and Services for properties bordering 19th Street.

Most platted land north of McKenzie Drive, south of 19th Street, west of 46th Avenue (west of MA zoning) and bordering 40th is zoned CB-Heavy Commercial. Heavy commercial zoning should be reserved for major shopping, big-box outlets and heavy auto-related uses. Not only is this type of use very unlikely to develop in the location, but the area has started to develop in mostly multi-family uses,

another example of over-zoning that can cause future problems for property owners. Medium to High Density residential is the appropriate use and zoning for the area.

Recommendation 19: Rezone the existing CB-Heavy Commercial district south of 19th, Street north of McKenzie Drive, west of 46th Avenue and along 40th Avenue to RM-Multi-Family Residential zoning.

The A-Agriculture zoning between 40th and 24th Avenues is appropriate in that “A” is a good “holding zone”. It is advisable to keep vacant land in a holding zoning category until a developer has a specific proposal so the granting of zoning can be one of the city’s bargaining chips at the negotiating table to ensure the project reflects city goals for the area. The critical point is without an adopted plan indicating the appropriate land use, the city has no goals for the area and is typically reduced to reacting to and usually accepting, whatever the developer proposes. The Memorial Highway Corridor Study includes a future land use plan for this part of the project area. If the plan is adopted formally, the study land use plan can become the guide against which all developer proposals are compared for conformance.

Under most state zoning enabling statutes, all rezoning must be found consistent with the city’s comprehensive plan. It is unclear whether this principle holds true in North Dakota – a quick review

of state code indicates North Dakota law does not include the provision. However, if adopting the land use plan component of the Memorial Highway Corridor Study as an amendment to the comprehensive plan will enhance the status of study land use plan as a guidance document, the step should be taken.

Recommendation 20: Adopt Land Use Plan component of the Memorial Highway Corridor Study as an amendment to the city’s comprehensive plan, and ensure that all future development proposals conform with the plan.

West of 24th Avenue and south of the Memorial Highway is a mixture of CC-Heavy Commercial, MC-Light Industrial, and MB-Heavy Industrial. The area includes new development mostly categorized as heavy commercial or light industrial. An older mobile home park surrounded by commercial uses is also in the area.

Recommendation 21: Rezone the MB-Heavy Industrial/Heavy Commercial zoning in the area to at least MA-Light Industrial and perhaps CB-Heavy Commercial. Consider uses along 3rd Street, including the concept for a redeveloped mobile home park, as MB-Heavy Commercial. Rezone the CC-Heavy Commercial area to CB-Heavy Commercial if the recommended deletion of CC zoning is undertaken.