V. RECOMMENDATIONS

URBAN STREET SYSTEM STANDARDS

The Montana Department of Transportation provided the following discussion of geometric design standards as guidance to consultants engaged in the design of Urban area projects. It is recommended that these same standards generally be used for all transportation projects within the study area, as applicable.

MONTANA DEPARTMENT OF TRANSPORTATION
Geometric Design Standards for Urban and Developed Areas

INTRODUCTION

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) made sweeping changes to Montana's highway program. It placed an emphasis on better managing, maintaining and operating existing transportation systems and giving state and local governments the flexibility to meet their needs. This included environmental and social goals and objectives of communities as related to their transportation needs. The emphasis areas under ISTEA have been continued with the Transportation Efficiency Act for the 21st Century (TEA-21). On December 4, 1992, the Montana Transportation Commission approved the Montana Department of Transportation Highways Division's Geometric Design Standards. While these Geometric Design Standards established actual standards for the National Highway System, Primary and Secondary Highway Systems, they defaulted to full AASHTO standards to the extent economically feasible for streets/highways in urban and developed areas.

Full AASHTO standards are actually a range of criteria that allow transportation officials flexibility in addressing their transportation needs while considering environmental and social goals; however, the application of this flexibility has sometimes been an area of conflict between MDT and local officials. Through a collaborative effort, representatives from major urban areas in Montana and MDT staff developed a set of minimum criteria that shall be applied on all on-system streets and highways in urban and developed

areas, except for routes on the National Highway System. These criteria are contained in this document as Montana Department of Transportation Geometric Design Standards for Urban and Developed Areas (Table 1 - Urban Standards).

In those situations where adjacent development, other physical features or environmental features or factors limit the standards to which a facility can be constructed, exceptions to standards must be approved to deviate to lesser design criteria. In design practice, these Urban Standards must be supplemented with criteria from the AASHTO "Policy on Geometric Design of Highways and Streets", current edition, for those elements of design not included herein and for those transitional or undeveloped areas based upon their existing operating conditions.

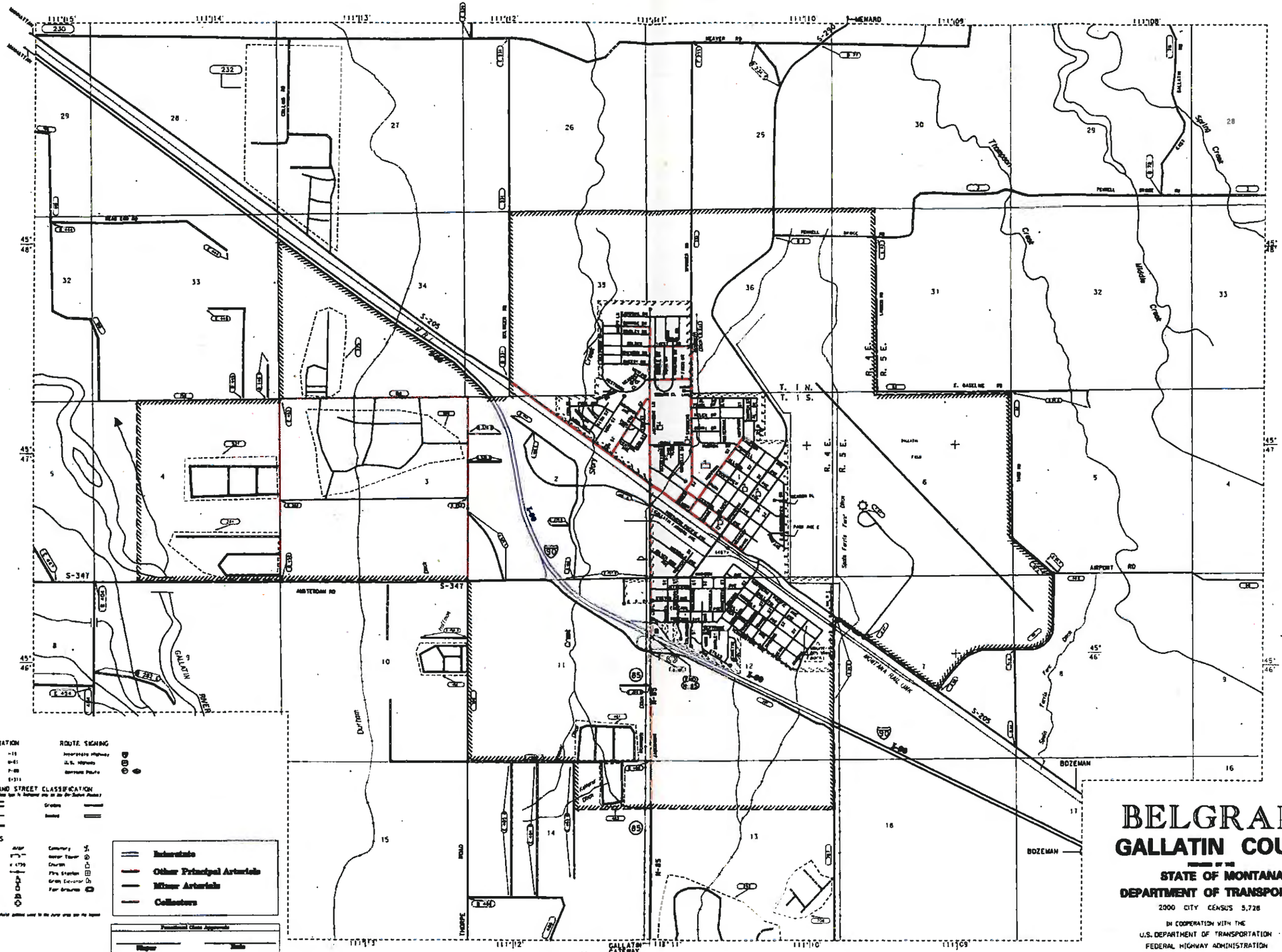
Definitions:

Clear Zone. The clear zone is an area unencumbered by obstacles starting at the edge of a travel lane that is available for the safe use and recovery of errant vehicles.

Clear Area. The clear area is the area extending 2 feet behind the curb that must be free of all obstacles.

Design Vehicle. The design vehicle is a vehicle with the dimensions and operating characteristics used to establish design controls for accommodating vehicles of designated classes. It should be the largest type vehicle commonly served by the route and the adjacent land use.

Functional Classification. Functional Classification is the grouping of roadways according to the character of service they are intended to provide. Ideally the classification provides the optimum balance between access and mobility for a highway system. The roadway classifications referred to in these standards are the Federal Functional Classifications shown on the official functional class maps prepared by the MDT Rail, Transit and Planning Division and approved by the Montana Transportation Commission and the Federal Highway Administration. Said functional classification map for the Belgrade Area is included on the next page.



LEGEND

ON-SYSTEM DESIGNATION

ROUTE SIGNING

HIGHWAY, ROAD, AND STREET CLASSIFICATION

CULTURAL SYMBOLS

- Interstate
- Other Principal Arterials
- Minor Arterials
- Collectors

Functional Class Approvals

LAMBERT CONFORMAL CONIC
NORTH AMERICAN DATUM - 1983

REVISIONS

On System	07-31-95
Local System	09-11-00
City System	08-09-00

BELGRADE
GALLATIN COUNTY

PREPARED BY THE
STATE OF MONTANA
DEPARTMENT OF TRANSPORTATION

2000 CITY CENSUS 5,728

IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

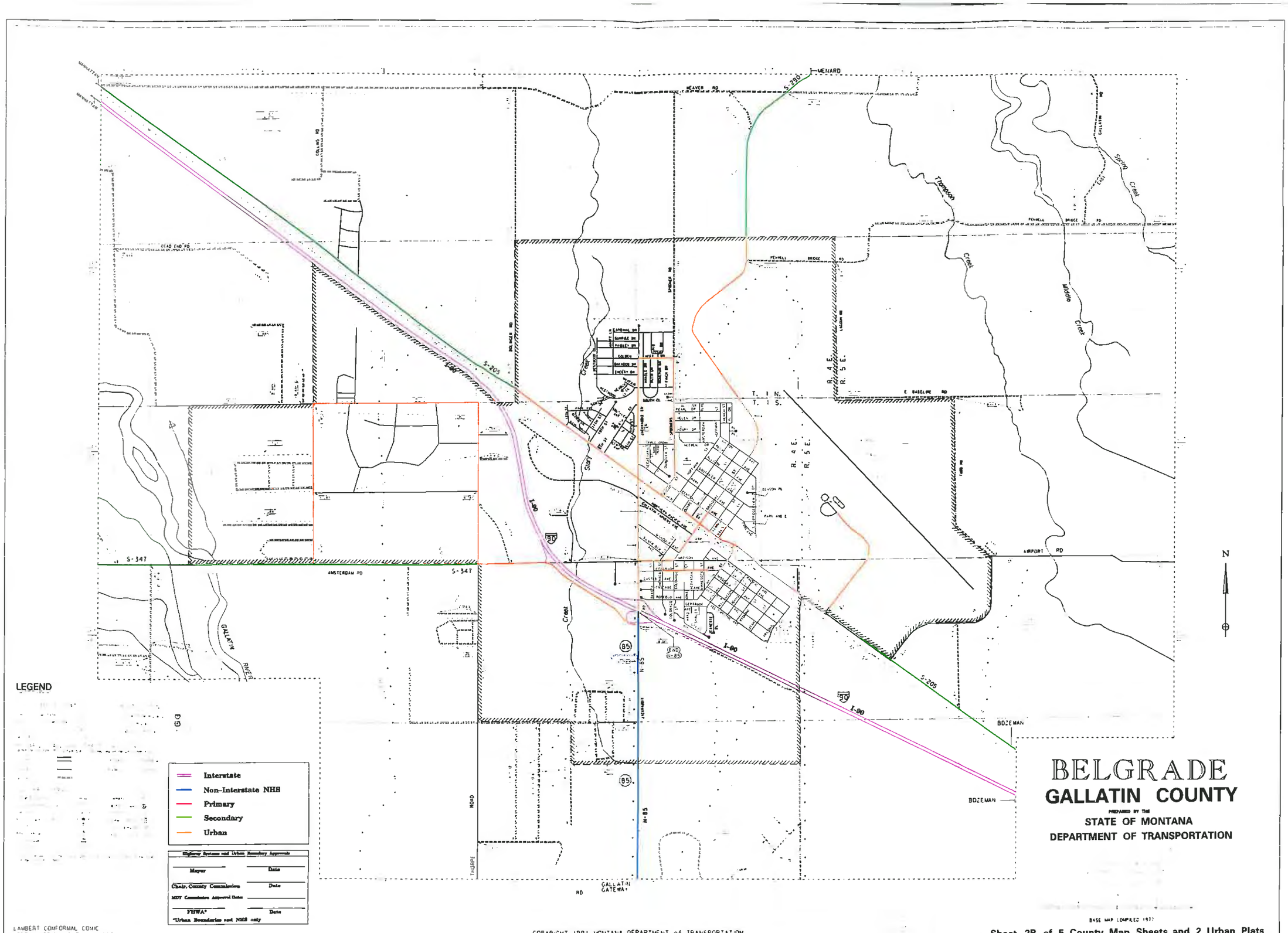
SCALE
0 1/4 1/2 1 MILE

BASE MAP COMPILED 1977

On-system. Any route of the National Highway System (including Interstate), or Primary, Secondary or Urban Highway Systems.

Transitional Area. Transitional areas provide connections between urban and rural areas. Running speeds in excess of 40 mph are typically found on these roadway segments.

Urban Area. An urbanized area or urban place, as designated by the Bureau of Census, having a population of 5,000 or more, within boundaries to be fixed by responsible State and local officials in cooperation with each other, subject to approval by the US Secretary of Transportation. Such boundaries shall encompass, at a minimum, the entire urban place designated by the Bureau of Census. See the Highway Systems map on the next page for the recently approved Belgrade Urban Area boundary.



LEGEND

- Interstate
- Non-Interstate NHS
- Primary
- Secondary
- Urban

Highway Systems and Urban Boundary Approvals

Mayor	Date
Chair, County Commission	Date
MDT Commission Approval Date	
FHWA*	Date

*Urban Boundaries and NHS only

LAMBERT CONFORMAL CONIC
NORTH AMERICAN DATUM - 1983

BELGRADE
GALLATIN COUNTY

PREPARED BY THE
STATE OF MONTANA
DEPARTMENT OF TRANSPORTATION

BASE MAP COMPILED 1977

Sheet 2B of 5 County Map Sheets and 2 Urban Plats

TABLE 1 – URBAN STANDARDS (ENGLISH)

Design Standards	Arterial [a]				Collector [a]
	Principal [a]		Minor [a]		
	(b)	(c)	(b)	(c)	(d)
Design Speed (mph)	40	40	35	35	30
Intersection Sight Distance	Refer to AASHTO's A Policy on Geometric Design of Highways and Streets (Green book)				
Stopping Sight Distance (ft) [e]	305	305	250	250	200
Minimum Roadway Width (ft)	28	28	26	26	24
Exterior Lane Width (ft)	12 [f]	12	11 [f]	11	10 [g]
Interior Thru Lane Width (ft)	11	11	11	11	10 [g]
2-Way Left Turn Lane (ft)	12	12	11	11	11
Exclusive Turn Lane Width (ft) Flush Median	12	12	11	11	10 [g]
Parking Lane Width (ft) [h]	10 [i]		10 [i]		8
Minimum Shoulder Width (ft)	0	6	0	4	4 [j]
Minimum Raised Median Width (ft) [k]	4	4	4	4	4
Ditch Slope	Slopes steeper than 4:1 should be used only when achieving a 4:1 slope is impractical				
Bicycle Lane	4 ft [l]				
Right-of-Way	Not less than required for all design elements				
Clear Zone	Refer to the AASHTO Roadside Design Guide as a guideline				
Landscaping	Landscaping will be included as an element to be considered in the design of all urban streets				

These standards are to be used on routes within the urban and urbanized limits of major communities and within the city limits of communities which do not meet the criteria for urban areas. These design standards do not apply to routes on the National Highway System.

(a) Federal functional classification defined by MDT and approved by the Montana Transportation Commission and FHWA

(b) Curbed

(c) Shouldered

(d) Includes both curbed and shouldered cross sections

(e) The stopping sight distance must be adjusted for higher design speeds and grades. Refer to the AASHTO Green book.

(f) The lane width does not include the gutter section. Add three feet where wide curb lane is provided for accommodating bicycles.

(g) Use 11 feet for collectors that primarily serve commercial/industrial areas.

(h) Includes the width of the gutter section.

(i) 8 feet may be acceptable when the lane is not likely to become a traffic lane in the foreseeable future.

(j) Shouldered cross section only.

(k) The raised median width needs to be added to the exclusive left-turn lane width.

(l) The bike lane width can include the shoulder width if there is no parking. A 5-foot width is recommended from the face of curb, guardrail or other roadside barriers. An increased lane width is recommended where the percentage of trucks or buses is high. See the AASHTO Guide for the Development of Bicycle Facilities for additional information.

New Sidewalks	Minimum Width [(a)]	60" (for Passage) 36" (minimum continuous clear width)
	Cross Slopes	1:50 (maximum)
	Gradient [(b)]	5% (maximum)
	Buffer [(c)]	18"

a) The clear width is exclusive of the curb width. Where it is impractical to provide the minimum clear width of 60 inches, provide a minimum 36-inch clear width and 60 inch by 60 inch clear passing spaces at 200-foot minimum intervals.

(b) The sidewalk gradient should typically follow the roadway gradient. Where the roadway gradient exceeds 5%, a maximum sidewalk gradient of 5% should be maintained unless it is impractical to do so.

(c) Where there is a drop-off next to the sidewalk that could pose a fall hazard (ditches, embankments steeper than 1:3), provide an 18-inch buffer between the edge of the sidewalk and the hazard.

FUTURE RIGHTS-OF-WAY DEDICATIONS

During reviews of future land use and subdivision proposals in the study area, it is recommended that the governing bodies require dedication of rights-of-way for future major roadways as a condition of any approvals being sought. Figure II.1 shows the general locations of existing and future principal arterials, minor arterials, and collectors. While more site-specific review may dictate a change to the alignments shown, dedication of rights-of-way based on Figure II.1 should provide useable corridors well into the future.

Suggested rights-of-way, based on functional classification, are as follows.

Principal arterial:	120 feet total width
Minor arterial:	100 feet total width
Collector:	90 feet total width

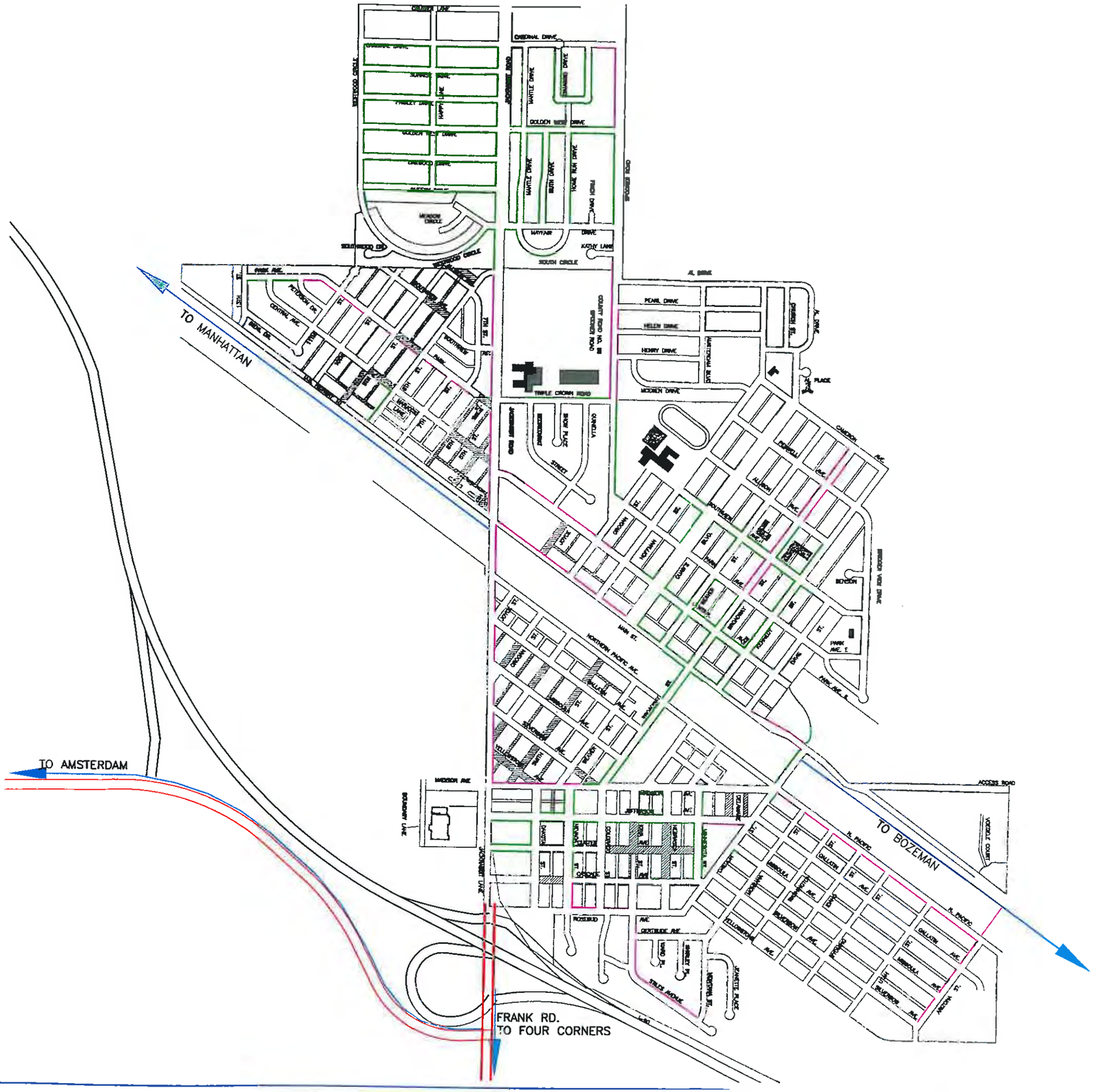
These widths are comparable to requirements in other communities in the area, and should allow for construction of adequate roadway vehicular capacity, bicycle lanes, and pedestrian sidewalks. The actual improvements installed should be based on specifics of the subject roadway at the time of construction, and may require acquisition of additional right-of-way.

PEDESTRIAN AND BICYCLE RECOMMENDATIONS

The Belgrade City Council has legal authority vested in it by Montana Codes Annotated to order property owners within the City limits to construct sidewalks across their street frontage in those areas that don't currently have sidewalks. It is recommended that the community consider installing sidewalks over time in full compliance with the requirements of the Americans with Disabilities Act within all residential subdivisions that currently do not have any walks. It is our understanding that all new residential subdivisions are required to install pedestrian sidewalks in order to obtain plat approval. This practice should continue.

Priorities for completing the sidewalk system for the schools are shown on Figure V.1. In addition to those priorities, a second group of sidewalks geared more towards travel

PEDESTRIAN FACILITIES



EXISTING SIDEWALK

PRIORITY PROPOSED SIDEWALK

PROPOSED TRAIL

FIGURE V.1

MORRISON MAIERLE, INC.

BELGRADE ZONING MAP

FIGURE Ⅴ .2

MORRISON MAIERLE, INC.

between the residential areas and the shopping and commercial areas is also indicated. In large measure, service to the shopping and commercial areas (see Figure V.2, Belgrade Zoning Map) can be provided by making a commitment to build sidewalks with any new projects on the Urban routes.

Bicycling is a practical mode of transportation for the majority of the year. However, there are limitations to riding a bicycle for transportation during the severe weather and challenging road conditions of the winter months. In spite of the seasonal nature of this mode, there should be a clear commitment to providing designated bicycle lanes on all of the Urban routes within the study area.

TRAFFIC CALMING

The concept and use of traffic calming should be restricted to residential neighborhoods and streets only. There are a number of means available to effect traffic calming on local streets. However, the City of Belgrade has been built out over the years using perhaps the most effective of techniques, that of different orientations of subdivision streets.

Subdivisions such as Hub and Crescent were originally laid out with the streets oriented parallel and perpendicular to the railroad tracks. Immediately adjacent to these subdivisions were subdivisions such as Spomers and Dyksterhouse, whose streets are on true north/south and east/west orientations. The net effect of this difference in orientation is an almost total lack of through streets except for identified collectors and arterials. Cut through traffic on neighborhood streets is so difficult as to be virtually non-existent.

In the future, it is recommended that subdivisions continue this "checker board" pattern of differing orientation, paying particular attention to the intersections of streets on the "seams" between the two orientations. The intersections common to each orientation should be carefully designed to avoid sight triangle and operational problems like those currently being experienced at the intersection of Madison/Colorado/Broadway.

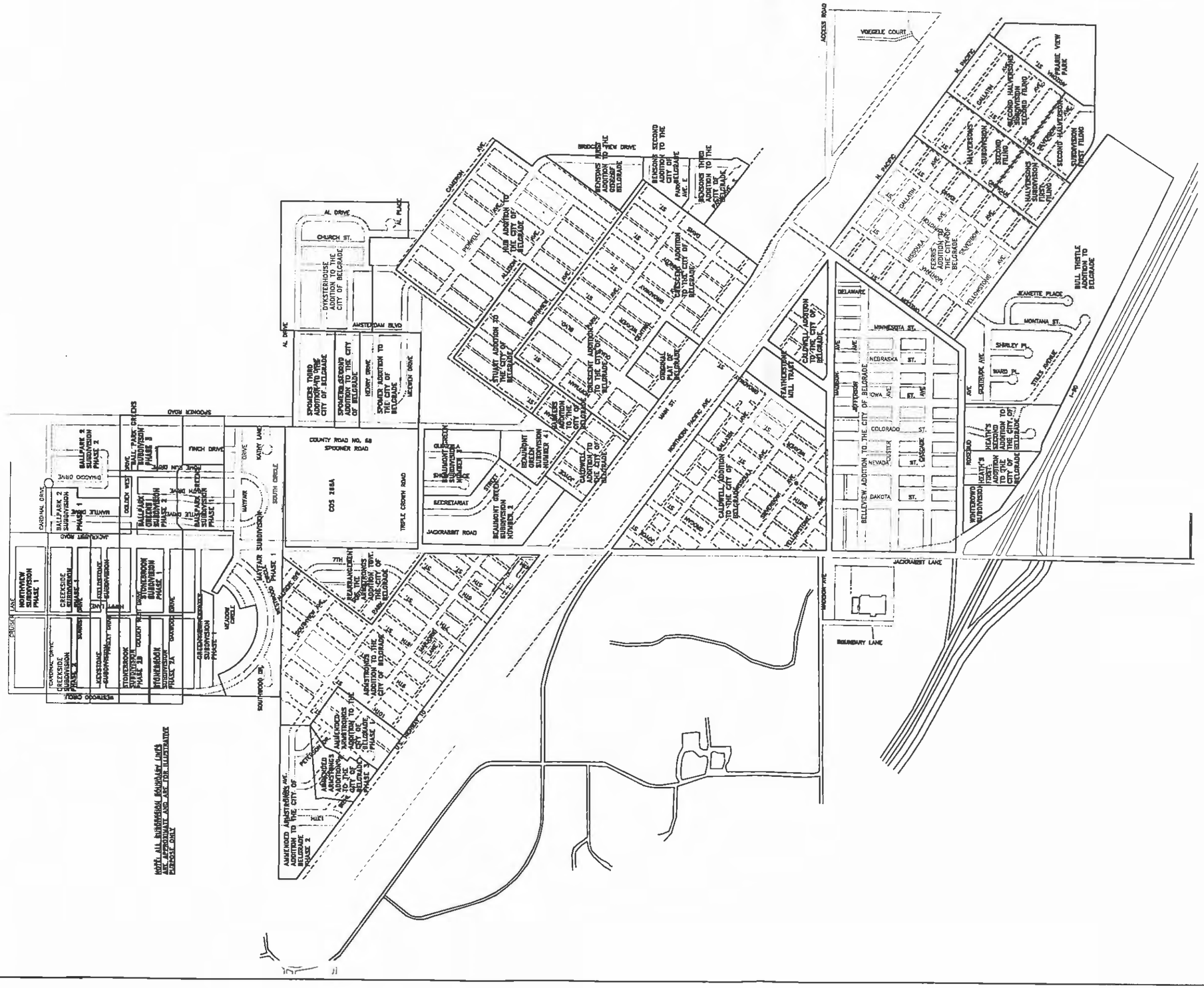


FIGURE V.3

MORRISON MAIERLE, Inc.
PO Box 1113, 801 Technology Blvd., Bozeman, MT 59771 • Phone: (406) 587-0721 Fax: (406) 587-1178

COMMITTED MAJOR IMPROVEMENTS

A. SIGNALIZE JACKRABBIT & MAIN

Problem: This intersection of two State Secondary routes is currently controlled as a four-way stop intersection, with a free right turn for northbound vehicles onto eastbound Main. Low level of service and congestion at this intersection may be correctable with the installation of a signal and other geometric changes to the roadways.

Solution: The Montana Department of Transportation has programmed a project to install a traffic signal and appropriate geometric improvements at this intersection. Given the proximity of the at-grade railroad crossing, this signal must be interconnected with the railroad crossing gate to prevent queued vehicles being stranded on the tracks. Construction is anticipated in 2003.

Note: Irrespective of the proposed project, consideration should be given to reconstructing Jackrabbit Lane and/or the railroad tracks to provide a grade separation between the two facilities. Main Street appears to be as much as five (5) feet lower than the tracks, suggesting that Jackrabbit could go under the railroad if the separation project is pursued.

The Montana Department of Transportation is currently conducting a needs study of rail-highway grade crossings. This particular crossing is one of twenty locations being studied statewide as a candidate for a grade separation project. The final evaluation and ranking of the twenty locations is not available at this time.

B. CONSTRUCT LEFT-TURN BAYS ON JACKRABBIT AT CAMERON BRIDGE ROAD

Problem: This intersection currently has high volumes on the through road (Jackrabbit) and a sufficient number of left turning vehicles to warrant addition of dedicated left-turn bays on Jackrabbit. At present, turning vehicles are at risk of being rear-ended, and create congestion at the intersection when waiting for a gap through which to turn.

Solution: Montana Department of Transportation has programmed a project to install dedicated left turn bays on Jackrabbit at its intersection with Cameron Bridge Road for both north- and south-bound vehicles. Construction is anticipated in 2004.

PROPOSED MAJOR IMPROVEMENTS

1. THORPE ROAD INTERCHANGE

Problem: Traffic from growth areas west and northwest of Belgrade, beyond the Belgrade Area Study Boundary, has few choices for vehicle trips towards Belgrade and Bozeman. Traffic using Amsterdam Road and Main Street adds to congestion at each road's intersection with Jackrabbit Lane.

Recommended Solution: Construct an Interstate 90 interchange at the existing grade separation at Thorpe Road. Construction of on- and off-ramps at this location would allow commuter traffic in particular to use Interstate 90 for trips to and from the Bozeman area without having a peak hour impact on critical Jackrabbit Lane intersections.

Note: This project may not be in conformance with Federal Highway Administration policy regarding additional interchanges to the Interstate System. Specifically, the first requisite stated in the referenced policy for adding an interchange to the System is: "*The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended by the proposal.*" Sufficient analysis to conclude that local roads and streets in the I-90 corridor in this area can not be improved to accommodate traffic demands in 2020 has not been done.

Estimated Cost: $6,000,000

2. EASTSIDE BY-PASS

Problem: Traffic from growth north of Belgrade, within and beyond the Belgrade Area Study Boundary, is currently routed through Belgrade on Broadway. This traffic passes between two elementary schools, and ultimately enters the intersection of Broadway and Main.

Recommended Solution: Construct an Eastside By-pass from the current northern city limits through Gallatin Field Airport property to Main Street. Commuter traffic in particular would be able to go to and from the Bozeman area without entering the intersection of Broadway and Main (See Major Project 10, below). In order to make the Eastside By-pass the through roadway, the intersection with Broadway should be designed to give preference to vehicles on the By-pass. Appropriate turn bays should be provided on all three legs of the intersection, with stop sign control on Broadway.

Estimated Cost: $1,025,000

3. INTERSTATE UNDERPASS AT MADISON

Problem: Traffic generated by growth south of Interstate 90 and west of Jackrabbit Lane currently has only one available route, Amsterdam Road, by which to access the Belgrade area. Continued growth will put additional pressure on the intersection of Amsterdam Road and Jackrabbit Lane.

Recommended Solution: Construct an underpass crossing of Interstate 90 generally at Montana Hideaways, with an extension of Madison Avenue from Jackrabbit Lane, west to Thorpe Road. Traffic to and from areas west of Belgrade proper will be able to access Jackrabbit Lane and the City of Belgrade at the currently underutilized intersection of Jackrabbit and Madison.

Estimated Cost: $3,041,000

4. AIRPORT INTERCHANGE

Problem: Limited access to Interstate 90 from the Belgrade Area contributes to congestion at several intersections within the Belgrade Area Study Boundary, and relatively high volumes of traffic on Main Street.

Recommended Solution: Construct an Interstate 90 interchange in the area generally between Alaska Road and Love Lane, extended. The connector road between the proposed interchange and Main Street is anticipated to pass under the railroad and intersect with Main Street at grade.

This improvement would provide better intermodal access to Gallatin Field from Interstate 90 and would give Belgrade/Bozeman commuter traffic the option of accessing the Interstate without impacting old Highway 10 east of the study area, Jackrabbit Lane and a number of intersections within the Belgrade area.

Estimated Cost: $12,218,000

5. RECONSTRUCT JACKRABBIT: MADISON TO MAIN

Problem: High traffic volumes on this segment of Jackrabbit Lane result in lower levels-of-service on a principal arterial link in the transportation system.

Recommended Solution: Reconstruct this segment to a five-lane roadway to match the improvements on Jackrabbit Lane south of Madison. Provide dedicated left-turn bays at major intersections.

Estimated Cost: $804,000

6. RECONSTRUCT MAIN: JACKRABBIT TO AIRPORT ACCESS

Problem: High traffic volumes and poor control of access result in lower levels of service on this principal arterial link in the area's transportation system.

Recommended Solution: Reconstruct this segment of Main Street in phases to a three-lane roadway complete with curb, gutter and sidewalks, dedicated left-turn bays at major intersections, and control of access to improve safety. The recommended first phase of improvements would extend generally from Broadway east to Oregon. The second phase would extend from Jackrabbit east to Broadway.

The final phase would extend generally from the east end of phase one east to the Gallatin Field access road. This phasing scheme could certainly change as needed to respond to the effects of other transportation improvements, or other community needs.

Estimated Cost: $2,474,000 (all three phases)

7. IMPROVE MAIN: JACKRABBIT – WEST

Problem: Growth in the areas northwest of Belgrade will use this segment of roadway to get to and from the Belgrade area. Lower levels-of-service on this segment, inadequate clear zones, and operational problems at major intersections should be remedied.

Recommended Solution: Establish appropriate slopes within the clear zones on both sides of the roadway and consider dedicated left-turn bays for eastbound traffic at major intersections.

Estimated Cost: $646,000

8. CONSTRUCT NORTHERN PACIFIC: BROADWAY TO DAVIS

Problem: Northern Pacific Avenue does not currently exist between Broadway and Davis, forcing drivers to enter the Madison / Broadway / Colorado intersection (see TSM b, below).

Recommended Solution: Acquire right-of-way and construct this segment of Northern Pacific Avenue to provide a continuous collector roadway along the south side of the railroad tracks.

Estimated Cost: $930,000

9. SIGNALIZE AMSTERDAM & RIVER ROCK ROAD

Problem: Anticipated high volumes of traffic entering this intersection will meet traffic signal warrants in the near future. This is also the main access to the newly constructed Ridge View Elementary School within the River Rock Subdivision.

Recommended Solution: Install a traffic signal and appropriate geometric improvements when Manual on Uniform Traffic Control Devices warrants are met, and the signal is determined to be justified.

Estimated Cost: $181,000

10. SIGNALIZE BROADWAY & MAIN

Problem: This intersection is currently controlled as a four-way stop. Directional traffic counts indicate a high percentage of vehicles on all legs of the intersection make left turns.

Recommended Solution: Install a traffic signal and appropriate geometric improvements when Manual on Uniform Traffic Control Devices warrants are met, and the signal is determined to be justified. Existing buildings and high percentages of left turns indicate elimination of on-street parking on Main Street will be necessary to provide adequate turn bays. The length of parking removal on each leg will be determined at the time of geometric design of storage lane lengths. Given the proximity of the at-grade railroad crossing on Broadway south of Main, this signal must be interconnected with the railroad signal to prevent queued vehicles being stranded on the tracks.

Estimated Cost: $243,000

Note: Public comments received during the preparation of this document often expressed concern about the elimination of parking on Main Street. A possible alternative to the solution described above is the extension of Central, east of Davis Street, to intersect with Main Street at Oregon. A one-way couplet composed of Central (westbound) and Main Street (eastbound) from Grogan to Oregon could sufficiently change the geometric requirements for signalization of the intersection that the on-street parking could be retained. Other ramifications of creating this couplet should be thoroughly investigated and evaluated prior to implementation of this alternative.

11. SCHOOL CROSSING UNDERPASS ON JACKRABBIT, NEAR TRIPLE CROWN ROAD

Problem: Pedestrian / vehicular conflicts at this school pedestrian route crossing of Jackrabbit Lane will increase over time as growth north and northwest of Belgrade occurs and traffic volumes and pedestrian volumes increase.

Recommended Solution: Construct a lighted pedestrian tunnel under Jackrabbit Lane to eliminate the pedestrian / vehicular conflict. Americans with Disabilities Act guidelines for access to the tunnel should be met.

Estimated Cost: $156,000

12. WIDEN AMSTERDAM: OFF-RAMP – WEST

Problem: Increasing traffic volumes on Amsterdam Road are expected as the areas west of Jackrabbit Lane and south of the Interstate are developed. Dedicated turn bays will become increasingly important as cross street traffic volumes increase.

Recommended Solution: Reconstruction of Amsterdam Road from the Interstate 90 eastbound off-ramp west to the Belgrade Area Study Boundary should be completed to the same three-lane standard as currently exists east of the off-ramp.

Estimated Cost: $1,116,000

13. CONSTRUCT OFF-RAMP OVERPASS WITH SLIPLANE ON AMSTERDAM ROAD

Problem: At the intersection of the eastbound Interstate 90 off-ramp and Amsterdam Road, increasing volumes on Amsterdam, combined with predominant left turns from the off-ramp onto Amsterdam will cause increased delay and create conflicts. Potentially, delay at this intersection could back traffic up on the ramp onto the Interstate.

Recommended Solution: Construct a grade separation at the intersection for traffic eastbound on Amsterdam, with the off-ramp passing over Amsterdam Road. A continuous lane from the grade separation to Jackrabbit Lane should be added to Amsterdam Road.

Estimated Cost: $1,786,000

Note: A far less expensive, more conventional solution to this problem is the installation of a traffic signal at the intersection of the off-ramp and Amsterdam Road.

14. CONNECT PARK AVENUE TO EASTSIDE BY-PASS

Problem: No easy access for the Crescent and Hub Additions to Belgrade to the Eastside By-pass (See Major Project 10, above) will be available without this link.

Recommended Solution: Construct a collector road from Bridger View Drive east to the Eastside By-pass on the alignment of Park Avenue. At the same time this link is constructed, Park Avenue from Bridger View Drive west to Broadway should be designated and controlled as a collector roadway.

Estimated Cost: $228,000

15. RECONSTRUCT MADISON - BROADWAY: JACKRABBIT TO MAIN

Problem: Access control along this business-oriented corridor is not well established. Volumes of traffic are expected to increase on this key segment of the transportation system as growth occurs.

Recommended Solution: Safety along the corridor can be enhanced with access controlled with curb and gutter, and the provision of left turn bays at appropriate locations (see TSM b, below).

Estimated Cost: $697,000

16. PEDESTRIAN / BICYCLE PATH: BELGRADE TO BOZEMAN

Problem: High traffic volumes, with a high percentage of large trucks, and inadequate shoulders on old Highway 10 between the Belgrade area and Bozeman make this route an unsafe, unpleasant pedestrian / bicycle corridor.

Recommended Solution: Build a ten-feet wide path with an all-weather surface on the south side of old Highway 10 between Belgrade and Bozeman within either the railroad or the Interstate rights-of-way. Americans with Disabilities Act guidelines for pedestrian access should be followed.

Estimated Cost: $763,000

17. SIGNALIZE AMSTERDAM & THORPE

Problem: Anticipated high volumes of traffic entering this intersection will meet traffic signal warrants in the near future as this area of rapid growth develops.

Recommended Solution: Install a traffic signal and appropriate geometric improvements when Manual on Uniform Traffic Control Devices warrants are met, and the signal is determined to be justified.

Estimated Cost: $249,000

18. RECONSTRUCT JACKRABBIT: MAIN TO CRUISER LANE

Problem: Volumes of traffic are expected to increase on this segment of the transportation system as growth occurs in the areas north and northwest of Belgrade.

Recommended Solution: Reconstruct this stretch of Jackrabbit Lane to a three-lane standard. Left turn bays should be provided at all major cross street intersections. Coincident with this reconstruction, a major storm sewer trunk main

should be master planned, designed and constructed to provide the backbone storm sewer outfall for the City of Belgrade.

Estimated Cost: $1,196,000

Prior to programming or seeking other funding for any of the recommended major projects, it is advisable that a more detailed cost estimate be prepared.

FIGURE V-4

MORRISON MAIERLE, Inc.

TSM b.
BROADWAY & MADISON
ALTERNATE #1

FIGURE V.5

MORRISON MAIERLE, INC.

TSM b.
BROADWAY & MADISON
ALTERNATE #2

PROPOSED TRANSPORTATION SYSTEM MANAGEMENT IMPROVEMENTS

The term Transportation System Management (TSM) refers to the application of construction, operational, and institutional measures to make the most productive and cost-effective use of existing transportation facilities. Well-planned TSM projects can improve levels of service and safety on existing roadways, often at relatively low cost, always at lower cost than adding new facilities and capacities to the overall system.

a. CONNECT ARIZONA TO MAIN

Problem: Poor access from the Halverson Subdivisions across the railroad to Main.

Recommended Solution: Construct a short length of Arizona Street from its current terminus at Northern Pacific to Main Street, with a right-angle, at-grade crossing of the railroad. Appropriate traffic control devices should be installed at the same time the connection is constructed.

Estimated Cost: $90,000

b. RECONSTRUCT MADISON / BROADWAY / COLORADO INTERSECTION

Problem: This is an intersection with unconventional geometry. The great majority of traffic, nearly 70% during the peak hours, passes through the intersection on the Madison Avenue / Broadway Street legs without "turning." Confusion about drivers' intent at this intersection has lead to a relatively high number of accidents.

Recommended Solution: Reconstruct this intersection to eliminate one or two of the legs entering the intersection. Specifically, eliminate either Colorado Street's access to the intersection, or Madison Avenue's access east of the intersection, or both (see Alternates #1 & #2).

Estimated Cost: $220,000 (Alternate #2)

Note: During the public input and preliminary approval phases of this document's preparation, Alternates #1 & #2 were not favorably received. In fact, the Belgrade City-County Planning Board specifically " . . . recommends further study and the pursuit of other design alternatives for the intersection."

c. CONNECT CRUISER LANE TO DRY CREEK

Problem: Traffic to and from areas north of Belgrade and west to Manhattan must negotiate a number of difficult, congested intersections within Belgrade to access either Interstate 90, or areas south of the Belgrade Area.

Recommended Solution: Construction of an approximately 300' short section of Cruiser Lane from its current eastern terminus to Dry Creek Road would provide a more direct link to Jackrabbit Lane, Interstate 90 and areas south of the Study Area.

Estimated Cost: $47,000

d. RECONSTRUCT OREGON & MAIN INTERSECTION

Problem: An overly wide approach of Oregon onto Main Street is difficult for vehicle operators to negotiate safely and predictably. The current stop sign placement is not consistent with the Manual on Uniform Traffic Control Devices.

Recommended Solution: Reconstruct the Oregon approach from Main Street south to Northern Pacific Avenue, with provisions for separate left and right turn lanes for northbound vehicles on Oregon Street. Rollover curb and gutter should be used to define the outside limits of the travel lanes while still allowing truck access to the property at the southeast corner of the intersection.

Estimated Cost: $67,000

Prior to programming or seeking other funding for any of the recommended TSM projects, it is advisable that a more detailed cost estimate be prepared.

The following Transportation System Management projects are generally much lower cost projects than those identified above, and some are so general as to be applicable throughout the study area.

e. PEDESTRIAN CROSS WALKS

Problem: Pedestrian and School crosswalks should be reviewed on a regular basis for proper location (need), proper signage, and proper markings.

Recommended Solution: Regularly assess changes in vehicular and pedestrian movements using the Manual On Uniform Traffic Control Devices for guidance in terms of need, location, pavement markings and signage.

f. LEFT TURN ARROW – NORTHBOUND JACKRABBIT AT INTERSTATE 90

Problem: During peak hours, large trucks in particular have difficulty making a left off northbound Jackrabbit Lane onto the westbound Interstate 90 on-ramp.

Recommended Solution: Install a left turn phase and signal at the referenced intersection.

g. RAILROAD CROSSINGS

Problem: At-grade railroad crossings should be reviewed on a regular basis for proper signage, and proper markings.

Recommended Solution: Regular inspection of all railroad crossings' signage and pavement markings, again using the Manual On Uniform Traffic Control Devices for guidance, should be conducted and remedial actions taken as necessary.

h. INTERSECTION SIGHT TRIANGLES

Problem: All uncontrolled intersections should be reviewed on a regular basis for sight triangle obstructions.

Recommended Solution: Any sight triangle obstructions noted should be removed if possible, or appropriate intersection traffic control installed in accordance with the Manual on Traffic Control Devices. The size of appropriate sight triangles at any given intersection is largely a function of speeds on the intersecting streets. Contact with, and cooperation from, adjoining landowners will be needed to open up the sight triangles.

i. SIGNS AND PAVEMENT MARKINGS MAINTENANCE

Problem: All types of roadway signs and pavement markings lose reflectivity and otherwise deteriorate over time.

Recommended Solution: Establish and maintain sign inventory, maintenance and replacement, and pavement markings inspection and maintenance programs.

j. PAVEMENT MAINTENANCE

Problem: All types of roadway pavements deteriorate, often in a fairly predictable time frame.

Recommended Solution: Preventive maintenance is a very cost-effective means of maintaining the community's investment in existing pavements. Establish and update a pavement management program to minimize costs associated with pavement maintenance. Establishment of a pavement management system will make the City of Belgrade eligible for additional Federal and State funds for preventive maintenance projects on designated Urban routes.

k. STOP SIGNS

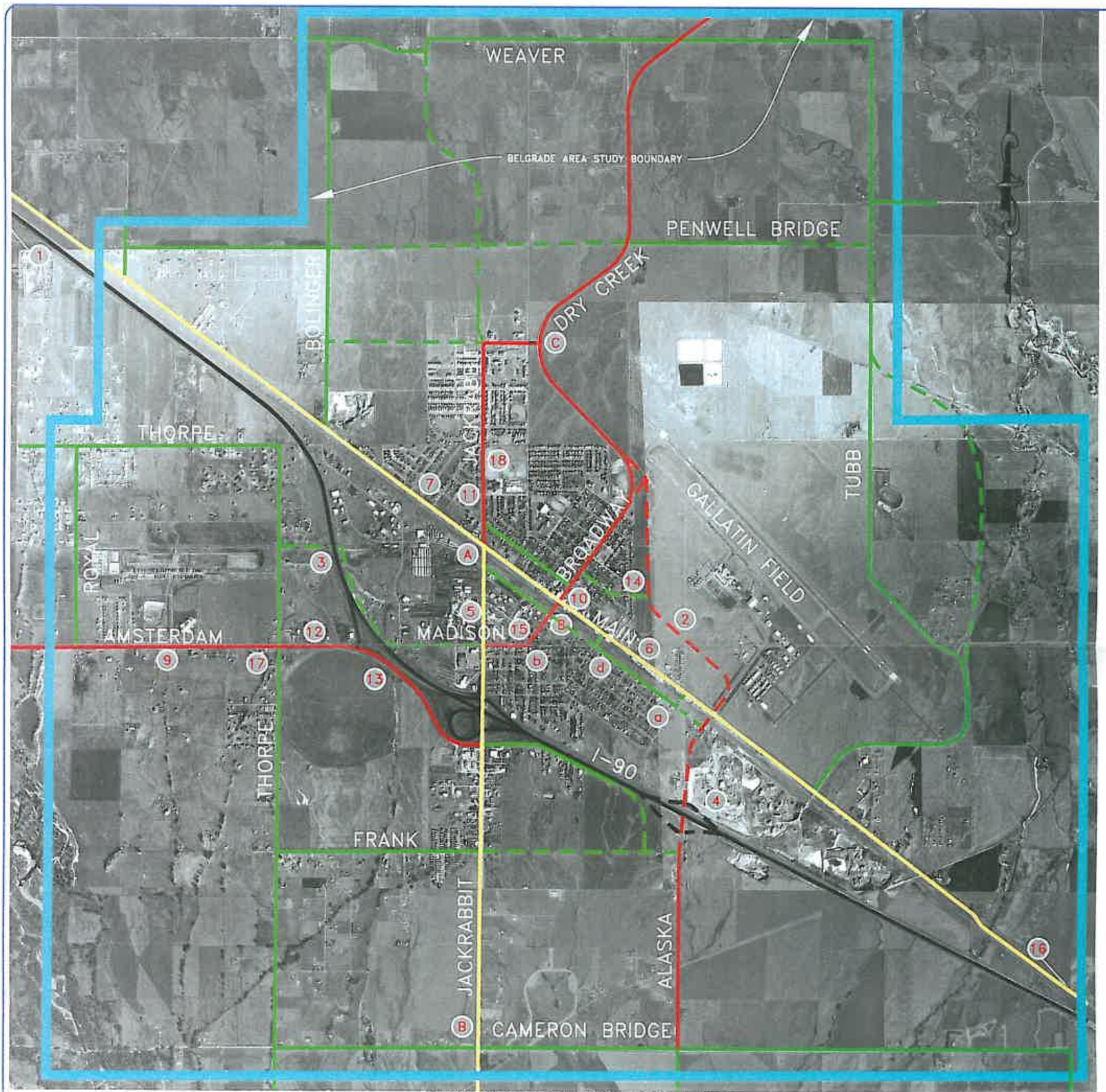
Problem: Existing Stop sign locations should be reviewed on a regular basis for proper location (need), proper signage, and proper markings.

Recommended Solution: Formulate and adopt a Stop & Yield sign policy in conformance with the Manual On Uniform Traffic Control Devices. Annually assess changes in vehicular and pedestrian movements, sight triangles, etc., using the policy for guidance in terms of need, location, pavement markings and signage. Take indicated action.

l. DOWNTOWN PARKING LOT

Problem: The individual parking stall markings in the City parking lot are worn and difficult to see.

Recommended Solution: Regularly inspect the pavement markings and needs for accessible spaces. Take remedial actions as indicated.



LEGEND

- INTERSTATE
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- COLLECTOR
- FUTURE INTERSTATE
- FUTURE PRINCIPAL ARTERIAL
- FUTURE MINOR ARTERIAL
- FUTURE COLLECTOR

PROPOSED TSM's

- a CONNECT ARIZONA TO MAIN
- b RECONSTRUCT MADISON/BROADWAY/ COLORADO INTERSECTION
- c CONNECT CRUISER LANE TO DRY CREEK
- d RECONSTRUCT OREGON/MAIN INTERSECTION

PROPOSED MAJOR PROJECTS

1. THORPE ROAD INTERCHANGE
2. EASTSIDE BY-PASS
3. INTERSTATE UNDERPASS @ MADISON
4. AIRPORT INTERCHANGE
5. RECONSTRUCT JACKRABBIT: MADISON TO MAIN
6. RECONSTRUCT MAIN: JACKRABBIT TO AIRPORT ACCESS
7. IMPROVE MAIN: JACKRABBIT – WEST
8. CONSTRUCT NORTHERN PACIFIC: BROADWAY TO DAVIS
9. SIGNALIZE AMSTERDAM & RIVER ROCK ROAD
10. SIGNALIZE BROADWAY & MAIN
11. SCHOOL CROSSING UNDERPASS ON JACKRABBIT, NEAR TRIPLE CROWN ROAD
12. WIDEN AMSTERDAM: OFF-RAMP – WEST
13. CONSTRUCT OFF-RAMP OVERPASS WITH SLIPLANE
14. CONNECT PARK AVENUE TO EASTSIDE BY-PASS
15. RECONSTRUCT MADISON-BROADWAY: JACKRABBIT TO MAIN
16. PEDESTRIAN / BICYCLE PATH: BELGRADE TO BOZEMAN
17. SIGNALIZE AMSTERDAM & THORPE
18. RECONSTRUCT JACKRABBIT: MAIN TO CRUISER LANE

COMMITTED MAJOR PROJECTS

- A SIGNALIZE JACKRABBIT & MAIN
- B CONSTRUCT LT BAYS ON JACKRABBIT AT CAMERON BRIDGE ROAD

MORRISON MAIERLE, INC.

BELGRADE AREA PROPOSED TRANSPORTATION IMPROVEMENTS

FIGURE V.6

REJECTED PROJECTS

Through the development of this Plan, and as a result of public input, a number of transportation improvement ideas were considered, but ultimately not included in the list of recommended projects. The following discussion briefly presents those ideas and identifies the concern(s) leading to their elimination from further consideration.

1. Operate Central and Northern Pacific as a one-way couplet straddling Main Street. The need to cross the mainline railroad tracks, and the relative lack of cross streets made the functionality of the couplet questionable.

2. Provide an overpass of Interstate 90 and the mainline railroad tracks from Thorpe Road to Main Street at Bolinger. A combination of the expense of construction and the resulting additional traffic in the intersection of Main and Jackrabbit led to the selection of the Interstate Underpass @ Madison project (Major Improvement Project 3) over this proposal.

3. Provide an additional at-grade railroad crossing at Quaw. The relatively small incremental increase in convenience in another crossing of the tracks was judged to be too small to justify the additional hazards and liabilities associated with this type of crossing.

4. Make Central a one-way street from Davis to Jackrabbit Lane. On the west end of Central, near Jackrabbit, there are an extraordinarily large number of residential driveways onto Central. The resulting backing movements, particularly during morning peak hours would lower the level of service on Central and be a major inconvenience for the residents along this segment.

5. Plan for a westerly extension of Frank Road, to and beyond the study area boundary. The environmental impact on the West Gallatin River was considered too great, particularly because there is no existing road on the Frank Road alignment between the river and Churchill.

6. Create a one-way couplet composed of Madison (westbound) and Jefferson (eastbound) from Jackrabbit Lane to Colorado in order reduce the number of possible turning movements at the Madison / Broadway / Colorado intersection (see TSM b). While this change could sufficiently change the geometrics of the M / B / C intersection to allow for other proposed alternatives, the southbound left-turn bay on Jackrabbit Lane at Jefferson allows storage for only of 3 – 4 vehicles, which is insufficient to handle the demands of this largely commercial area.