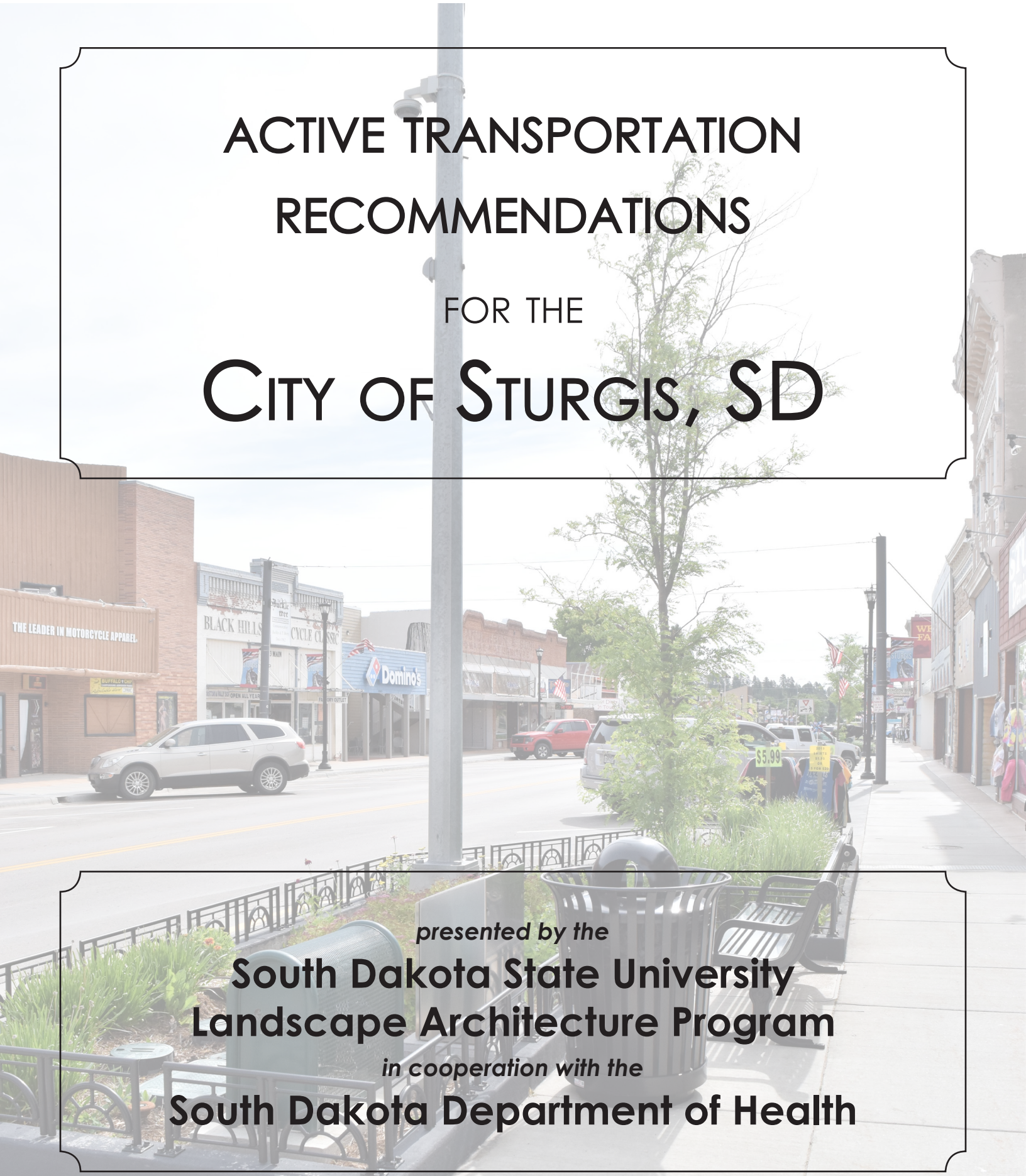
ACTIVE TRANSPORTATION RECOMMENDATIONS

FOR THE

CITY OF STURGIS, SD



presented by the

South Dakota State University
Landscape Architecture Program

in cooperation with the

South Dakota Department of Health

2 OCTOBER 2020

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Introduction

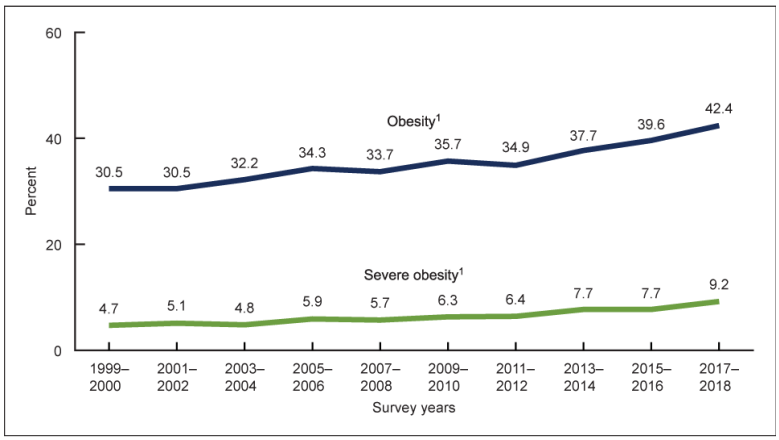
This document is the product of a collaboration between the City of Sturgis, the South Dakota Department of Health, and Landscape Architecture faculty and students at South Dakota State University.

The collaboration's intent is to highlight opportunities to improve quality of life for residents and visitors in this unique Black Hills community through active transportation. Active transportation is "any self-propelled, human-powered mode of transportation, such as walking or bicycling" (Centers for Disease Control and Prevention).

Studies have revealed that America's standing as the worldwide leader of automotive engineering and usership has been a mixed blessing. On one hand, the advent of the automobile and the freeways and other supporting infrastructure that followed provided Americans, and South Dakotans in particular, with unheard-of opportunities for travel. In South Dakota, it is considered essential to have access to reliable transportation. Without a car, it can become very difficult for many South Dakotans to meet basic needs, including access to food, education, health care and employment.

On the other hand, a rise in vehicle ownership has been accompanied by a rise in more sedentary lifestyles across America. Dependence on cars, combined with a tendency to eat less healthily and a decrease in physical activity at school and in the workplace, has contributed to a nationwide epidemic.

Obesity is a chronic illness in America. The Centers for Disease Control and Prevention have found that obesity rates have continued to rise over the last 20 years, with over 40% of Americans now considered obese (Hales, 2020). One in every eleven Americans is severely obese, more than twice the rate from the turn of the century.



[1]Significant linear trend.
NOTES: Estimates were age adjusted by the direct method to the 2000 U.S. Census population using the age groups 20–39, 40–59, and 60 and over. Access data table for Figure 4 at: https://www.cdc.gov/nchs/data/databriefs/db360_tables-508.pdf#4.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 1999–2018.

The obesity epidemic has serious consequences for Americans. A 2009 study found that health care costs are significantly higher for individuals with obesity, straining public and private healthcare providers and payers. Obesity has been linked to a higher risk of developing 13 different cancers, including breast cancer, the second-leading cause of death among women.

People with obesity are also twice as likely to miss work as their normal-weight counterparts, and would miss more than 4 additional days of work per year. Nationwide, the workplace productivity costs of obesity are nearly $12 billion annually.

In addition to decreased levels of physical health, as highlighted by the obesity epidemic, dependence on motor vehicles has also been linked to a decrease in social capital. Social capital is defined as "connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 1995). In other words, social capital consists of relationships and interactions between people in a community. This form of capital contributes to quality of life evaluations, including sense of belonging, civic pride, and voluntary philanthropy and service.

One challenge of the car culture is the fact that most driving happens with solo drivers. In 2015, over 75% of the American workforce drove alone to work and back, and average commute times have steadily increased (US Census). Studies show that carpooling and using alternative means of transportation can lead to greater social connectivity and opportunities for developing interpersonal relationships by facilitating incidental contacts with fellow commuters.

In addition, pedestrian and bicycle-friendly communities influence neighborhood safety by generating natural surveillance. Lively streets, particularly lively sidewalks, are linked to a decrease in serious personal crimes like assault, which typically occur when pedestrians are scarce. Communities designed to facilitate active transportation are also more inclusive of all segments of society, including those with restricted mobility like the very young and old, and people with disabilities.

Finally, there are significant economic benefits to be realized by developing active transportation infrastructure. As suggested previously, obesity and physical inactivity take a significant toll on a community's productivity and generated revenue. A New Zealand study estimated that increased active transportation as evidenced by bike trips of less than 5 miles resulted in the natural reduction of that country's annual health budget of $200 million, or 1.6%.

More compelling to advocates of downtowns, however, are the tendency of pedestrians and cyclists to spend more time, and by extension more money, in their target destinations. These increases are seen most in the small businesses that are the foundation of communities like Sturgis. Active transportation also contributes to lower street congestion, lower vehicle emissions, and improved access to jobs and services in the downtown, thus boosting economic viability.

In short, developing active transportation opportunities and infrastructure promises positive outcomes for the City of Sturgis, both in terms of contributing to the sense of community and improving the health and wellbeing of community members.

In June 2020, researchers from the SDSU Landscape Architecture program spent several days in Sturgis conducting observations of the built environment and collecting data on Sturgis' parks, streets and sidewalks, and neighborhoods. Data collection was facilitated by the use of the Pedestrian Environment Data Scan, or PEDS, protocol. This assessment tool guides researchers in evaluating specific attributes of the walking and cycling environment, such as land use (residential, commercial, industrial, parkland, etc.), streets (condition, width, traffic rates), sidewalks (connectivity, condition, width, amenities), and user perceptions. These data were gathered for every street, sidewalk, and bike path within Sturgis city limits.

In addition to first-hand observation and data collection, the SDSU researchers worked to talk with as many Sturgis residents and visitors as possible during the June visit. Restrictions and precautions imposed due to the global coronavirus pandemic meant that formal public meetings and open houses

were infeasible. Instead, researchers spoke with many residents in one-on-one encounters on the city's streets and sidewalks, and with city officials using remote conferencing technology.

These conversations revealed a community actively engaged in improving quality of life for not only the nearly 7,000 people who call Sturgis home, but for the thousands of visitors who flock to Sturgis each year to participate in the annual motorcycle rally and associated recreational opportunities. Sturgis community officials contributed further statistics and information about how the city functions, along with guidance regarding priorities and available resources.

SDSU Landscape Architecture fourth-year students working with Professor Don Burger took all of the collected data and observations and used them to create ideas for how to improve active transportation in Sturgis. These ideas were developed and refined during the first half of the Fall 2020 semester. The resulting recommendations strive to recognize those priorities and projects already proposed or underway throughout the city while suggesting improvements that the researchers feel will most benefit Sturgis in the long term.

The ideas presented in this booklet are intended to continue the conversation and dialogue about active transportation and community development ongoing in Sturgis. They should be considered as catalysts for creative solutions to the challenges confronting the city. Many ideas are aspirational: goals to be worked toward. In all cases, qualified professionals should be consulted prior to implementation of any recommendation presented here.

We are confident that as residents and community leaders continue to work together on facilitating active transportation, Sturgis will continue to become the "*active, growing community*" it aspires to be.

Recommendation 1: Implement a roundabout at the intersection of Junction Avenue and Anna Street

Sturgis is a tourist city known for its annual motorcycle rally, but it has much more to offer with its many attractive qualities. Sturgis is a gateway into the Black Hills, an outdoorsman's dream with its beautiful landscapes of topography change, and a forest system with an elaborate, hiking trails systems. With all this diversity the city can become a year-round destination welcoming a variety of visitors.

A gateway city like Sturgis must provide a welcoming arrival experience for residents and visitors alike. For many, the impression first gained upon arrival to a new location is the most important one, and can influence decisions regarding the amount of money spent in the city, how long the visitor will spend in the city, and whether or not they will return at some future point.

Many cities choose to erect signs at their entry points to help provide this sense of welcome. This is a route that the City of Sturgis has chosen to adopt, with an iconic monument sign positioned at the intersection of Junction Avenue and Anna Street. This sign is the featured photo opportunity for many social media posts on the Internet, largely because of its motorcycle theme and its position at the south entry to the city.

Figure 1: Existing sign, Junction Avenue @ Anna Street, Sturgis, SD

However, the intersection of Junction Avenue and Anna Street is poorly organized and, other than the sign, is lacking in aesthetic quality. The sign is an excellent first step but creating a more comprehensive and unforgettable experience that also resolves the traffic problems is necessary.

We recommend adding a roundabout to the intersection of Junction Avenue and Anna Street. This traffic feature will solve organizational problems and add a sense of arrival to this historic city. We also recommend using the center of the roundabout to provide plantings, landscaping, and a sculptural sign element as a visual focus.

Using the center of the roundabout to create a sense of entry is nothing new for a city. The famous Arc de Triomphe in Paris is the main feature of a roundabout at the intersection of twelve different roads. The Arc was placed by Napoleon Bonaparte to celebrate his victories at war and to create a monumental entry to the Champs Elysée. The roundabout that houses the Arc has become a tourist attraction, in part due to the magnificent architectural statement made by the Arc.

In Sturgis, this new roundabout will also become a significant landmark, help to further define Junction Avenue as the primary north-south arterial, and provide a benchmark for future city improvements by blending aesthetics with function.

Figure 2: Location of proposed roundabout, Junction Avenue at Anna Street

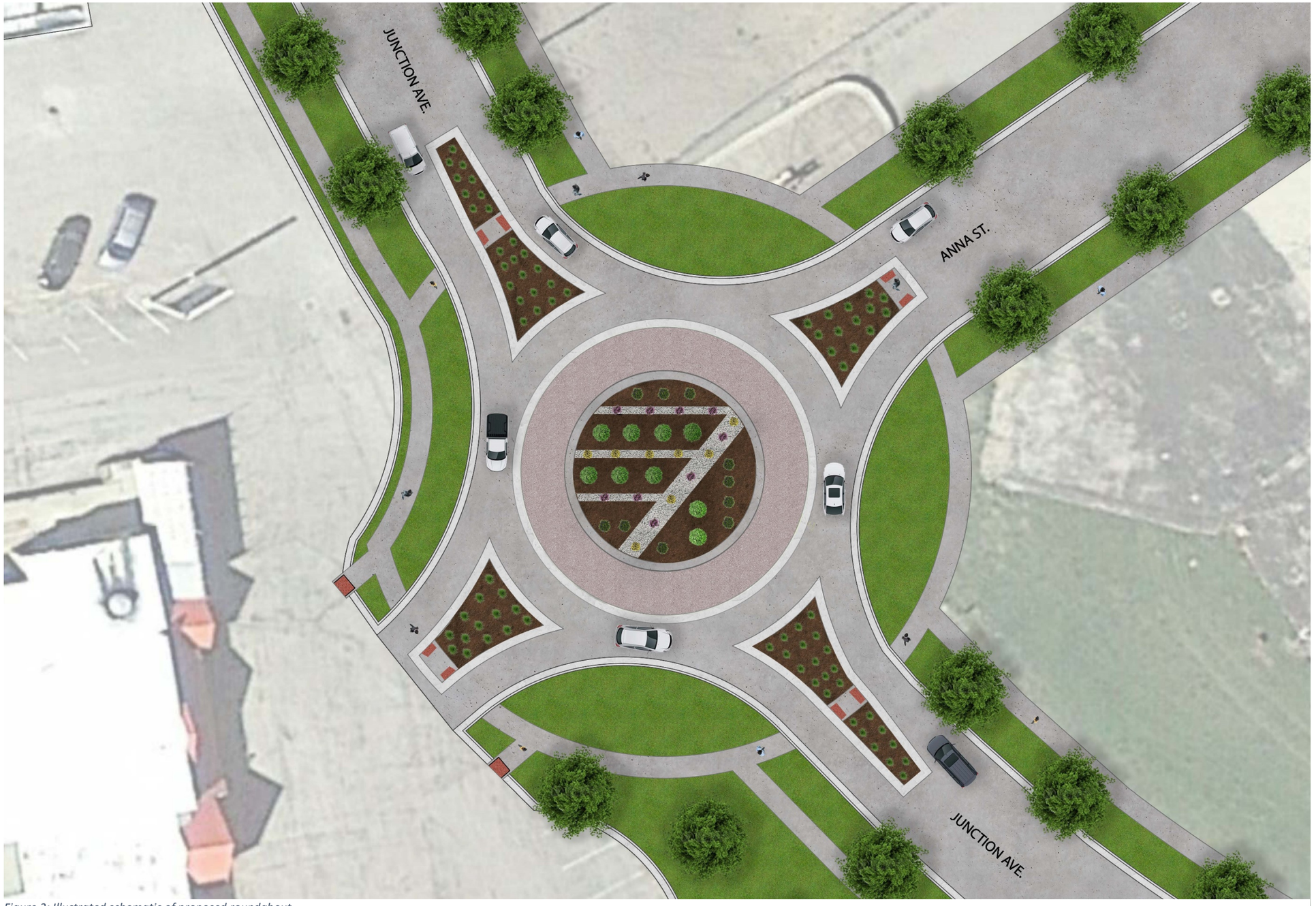


Figure 3: Illustrated schematic of proposed roundabout

Figure 4: Detail of traffic patterns

Figure 5: Eye-level perspective of proposed roundabout

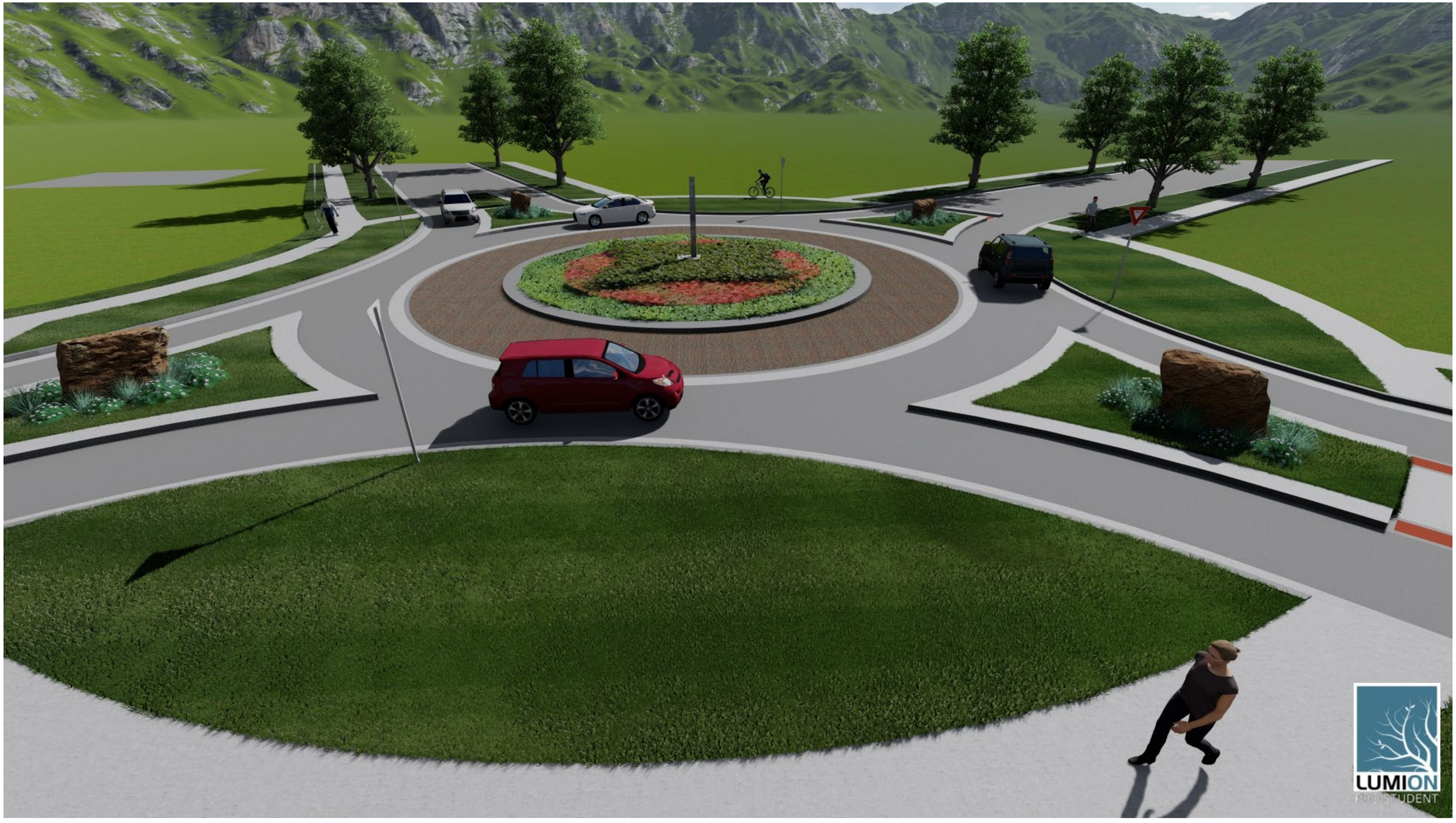


Figure 6: Birds-eye perspective of roundabout

A roundabout facilitates constant motion for motorists and is proven safer than a four-way intersection. A roundabout is a relatively new idea in the Midwest and especially in smaller communities; thus this new improvement would demonstrate that Sturgis is a future-oriented community.

Roundabout and standard four-way intersection costs are relative, with installation of a roundabout costing anywhere from $200,000 to $500,000. These costs are partially offset through the elimination of streetlights, both initial installation costs and long-term maintenance costs. In addition, a roundabout gives advantages to pedestrians, contributing to a safer crossing experience and reduced conflicts between motorists and pedestrians. Motorists naturally slow when entering a roundabout and are more

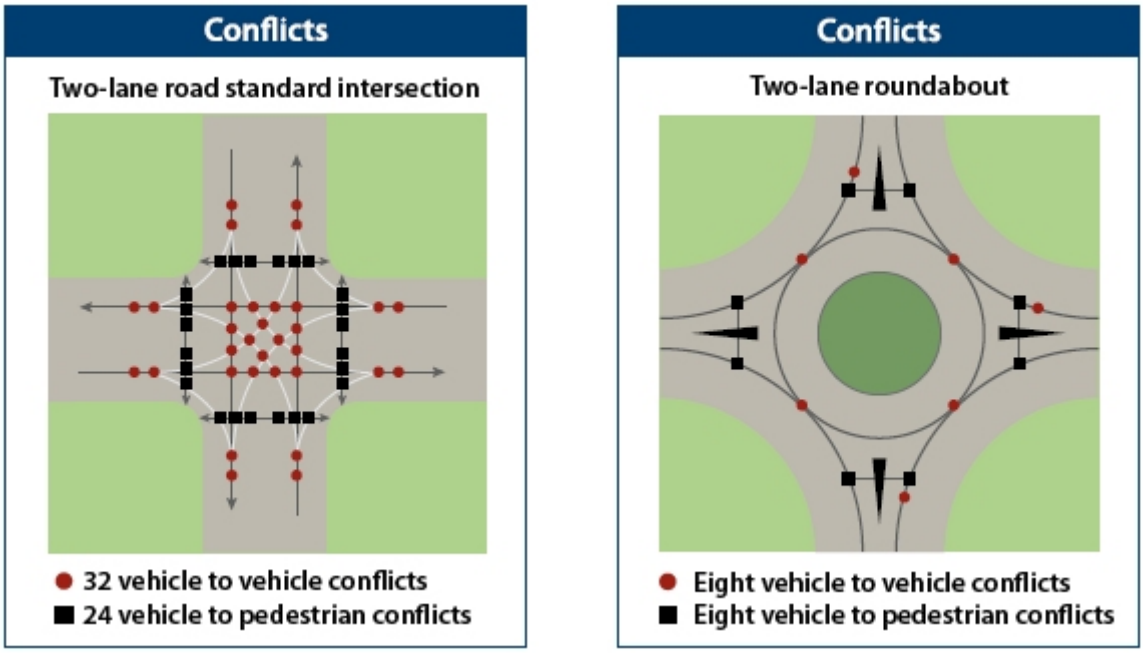


Figure 7: Comparison of pedestrian/vehicle conflicts in standard versus roundabout intersections (https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/case_studies/fhwasa09013/)

prone to looking for oncoming vehicles and, by extension, pedestrians and cyclists.

In addition, cyclists and pedestrians are divided from the main flow of motor vehicles, with street crossings set back away from the roundabout. Islands used to divide opposing lanes of traffic serve a dual function as respite islands for pedestrians. In particular, pedestrians with mobility impairments can stop at the island to catch their bearings before attempting to cross an additional lane of traffic. This helps them to become more visible to motorists and reduce conflicts.

Construction of the roundabout in Sturgis should take place in the next five to ten years, with construction ending by 2030. This timeline provides for design studies to take place in addition to fundraising and construction phases.

Case Study: Highway 13, Scott County, Minnesota

Scott County is a rural county in the greater Twin Cities metropolitan area. It is experiencing rapid population growth, with a commensurate increase in automobile traffic. The first roundabout in Scott County was constructed at the intersection of State Highway 13 and County Road 2. This intersection, previously with two-way stop-control on County Road 2, was the site of two fatal crashes and 50 injury crashes in a five-year period between June 2000 and June 2005. Both rural roads have speed limits of 55 miles per hour (mph). State Highway 13 has an average daily traffic (ADT) of 4,650 motor vehicles, while County Road 2 has an ADT of 4,300 motor vehicles.

Figure 9: Roundabout with more complex street geometry

Figure 8: Highway 13 roundabout, Scott County, MN

Before changes were made this was an unsafe intersection in a rural area. Putting in this structure ensured a safer intersection. The "before" conditions at this intersection met minimum Manual on Uniform Traffic Control Devices (MUTCD) standards. The Minnesota Department of Transportation converted this high-speed rural intersection to a roundabout to reduce high crash rates that had not been mitigated through other lower-cost treatments.

Converting this intersection to a roundabout resulted in a 76.2 percent reduction in total crashes, a 78.7 percent reduction in injury crashes, and a 100 percent reduction in angle crashes (Federal Highway Administration).

Recommendation 2: Construct speed tables at key intersections

Arterial and collector streets tend to experience higher traffic flows. For example, Lazelle Street and Junction Avenue act as the city's main commercial routes, running east-west and north-south, respectively. Their convergence underpins this area's standing as Meade County's economic generator. These corridors are full of businesses and heavy traffic. Busy roads look attractive to commercial enterprises, but busy sidewalks actually contribute to increased retail revenues.

When an individual is driving at the high speeds encouraged by typical arterial street design (wide lanes, few trees, and speeds in excess of 30 mph), they have little time to notice, much less stop and take advantage of the excellent services Sturgis offers. *Pedestrians walking down sidewalks generate retail revenue.*

High traffic speeds on Lazelle Street in particular pose challenges to pedestrians attempting to cross the street or walk along it. As a result, citizens and visitors alike are losing out on amenities north of Lazelle Street as well as the perks foot traffic brings for the newly updated Main Street. The intersection of Lazelle and Junction acts as a barrier when it should be a corridor for all forms of traffic to safely access the many attractions Sturgis has to offer.

A traffic calming method that best fits intersections like Lazelle Street at Junction Avenue is a **speed table**. A speed table is a section of road that raises pedestrians into the sight lines of motorist and slows drivers down with its ramped appearance and change of paving material. The raised design will also deter truck traffic from turning onto Junction Avenue, which is not a truck route. With the installation of a speed table and raised medians (see **Recommendation 4**), Lazelle Street will be transformed into a safer, more usable area for all modes of transportation.

Figure 10: Diagram of speed table (shown in yellow)

Figure 11: Speed table installed at a four-way intersection

A speed table costs between $2,500 and $10,000 to install, depending on the size of the intersection and the materials used in construction. We recommend that the speed table at Junction Avenue and Lazelle Street be designed and installed by the beginning of the 2025 annual motorcycle rally.

Figure 12: Location of proposed speed table at the intersection of Junction Avenue and Lazelle Street

Case study: First Street, Grand Junction, Colorado

A speed table was constructed in Grand Junction, Colorado to combat the challenge of busy roads. As the city grew into an urban center, a quiet country road became First Street, a major north-south corridor. While speed limits were posted at 35mph, traffic was routinely observed traveling in excess of 55mph, nearly twice the posted limit.

Residents became concerned about the increasing vehicle speeds and heavy truck traffic along the road. Increased traffic volumes and speeds caused difficulty entering and exiting both residential and commercial driveways and negatively impacted the safety of bicyclists and pedestrians. A proposal to widen the street was recognized by many as contributing to a greater deterioration of the neighborhood's character by failing to mitigate the chronic speeding. Instead, raised medians, curb-and-gutter, and sidewalks were installed along the road, and a series of three speed tables were constructed at key intersections. Two of these speed tables act as crosswalks.

After the project's construction, traffic volume rose from 10,372 ADT to 12,313 average daily traffic. The roadway successfully accommodated this traffic increase, which was primarily due to the overall population growth of Grand Junction. In spite of increased traffic volume, vehicle speed decreased by 10-15% and pedestrian/automobile conflicts were reduced significantly (Grand Junction Transportation Engineering Department).

SPEED TABLE DESIGN

PAVER'S LAYER
BASE
CONCRETE
BASE

SUBSOIL

SPEED TABLE ON THE
INTERSECTION OF LAZELLE ST. AND
JUNCTION AVE.

Recommendation 3: Install a Pedestrian Bridge to Cross Lazelle Street at 3rd Street

As previously stated, Lazelle Street is a busy commercial corridor on the north side of Sturgis. It faces heavy truck traffic and high speeds, making it feel unsafe and a barrier separating the north and south sides of town. As a result, this road does a poor job of facilitating pedestrian travel between parks and campgrounds, stores and businesses to the north and homes, museums, businesses and schools to the south.

As discussed in Recommendation 2, one strategy to overcome the barrier of Lazelle Street is the implementation of a speed table at the intersection with Junction Avenue. This will facilitate pedestrians crossing Lazelle Street on the east side of town. However, this leaves the west side of town underserved and unable to conveniently and easily cross this busy road. On this end of town, we recommend installing a pedestrian bridge.

A pedestrian bridge has several advantages. First, it does not impede the flow of traffic along Lazelle Street. Second, it helps to bring down the scale of Lazelle Street, helping it feel less imposing as a barrier. Third, it separates pedestrians from vehicles, reducing conflicts and potential for accidents. Finally, if the correct bridge is chosen, it can enhance the aesthetics of the west end of Lazelle Street and serve as a defining landmark equal in scale to the roundabout proposed in Recommendation 1.

Figure 13: A repurposed pedestrian bridge

Pedestrian bridges can be expensive to install, with potential costs exceeding $1,000,000. In addition, separating pedestrians from traffic and encouraging higher speeds can be deleterious to overall safety along the street.

To help mitigate costs, a common strategy is to recycle a bridge from another location. The South Dakota Department of Transportation may have information regarding bridges due for replacement around the state. If design parameters (size, length, materials, etc.) are known in advance, DOT officials can help to locate an appropriate structure. The repurposed bridge can be modified to help it fit with the feel and character of its new location spanning Lazelle Street.

Another approach utilizes local fabrication facilities to create a custom-designed bridge specific to Sturgis. This involves a greater cost but contributes to the local economy and ensures that the bridge makes a statement specific to Sturgis. Local metal artists could also be involved in adding personal touches to highlight all of the positive aspects of this gateway community.

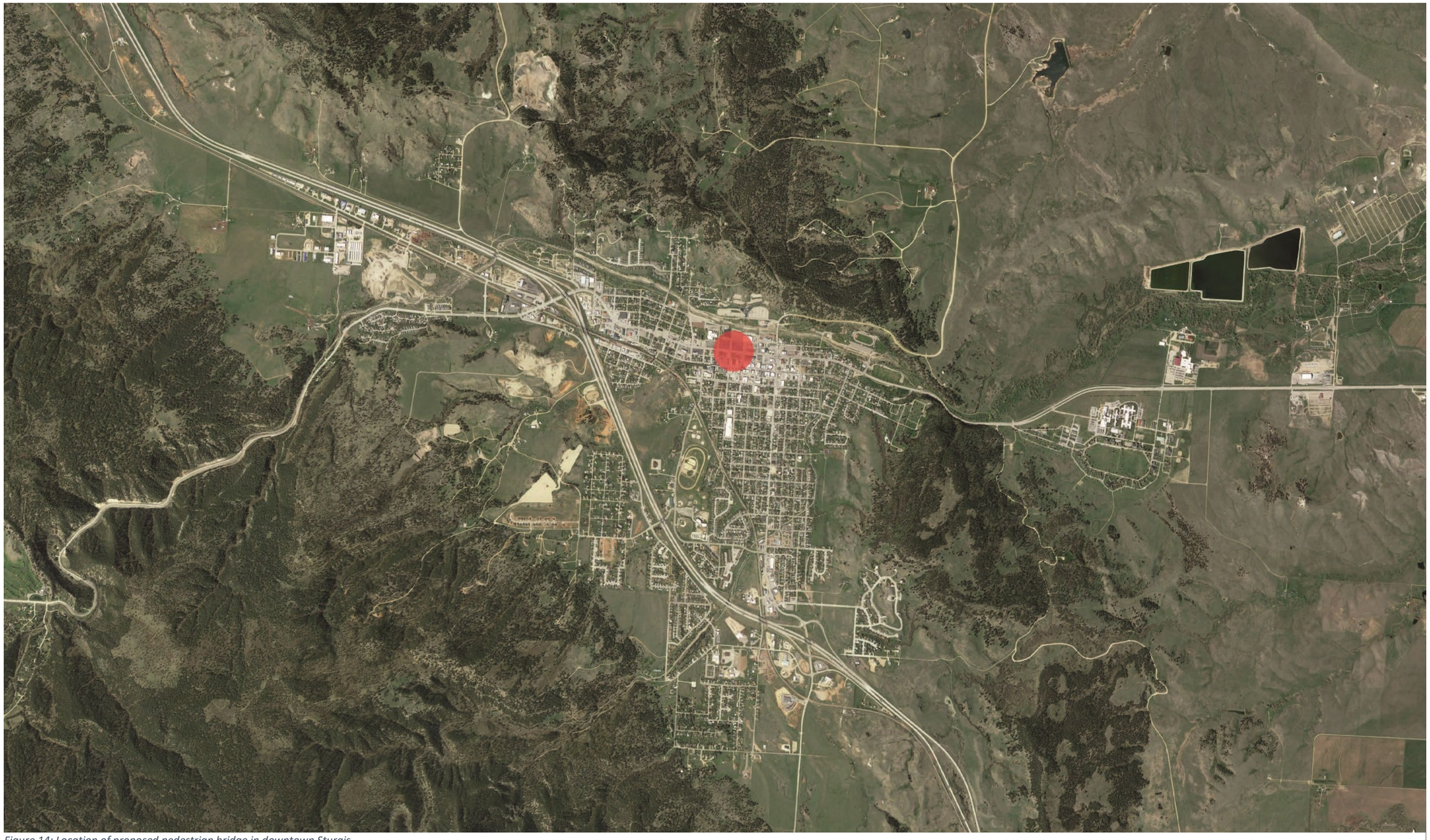


Figure 14: Location of proposed pedestrian bridge in downtown Sturgis

Case study: Greenway Pedestrian Bridge, Phoenix, Arizona

A precedent project for salvaging a bridge is the Greenway Pedestrian Bridge in Phoenix, Arizona. This project demonstrates the feasibility of recycling and repurposing an existing bridge. The Greenway Pedestrian Bridge facilitated the crossing of a main arterial road like Lazelle Street, the Greenway Parkway. Phoenix Mayor Skip Rimsza, at the time a city councilman, led efforts to begin what a local newspaper labeled as one of the world's largest recycling projects.

The City opted to move a 14-year-old, 72-ton steel-truss bridge from the Mercury Mine School to a new site over the Greenway Parkway near Aire Libre Elementary School 6 miles away. The process involved closing a major road for two hours before dawn on June 21, 1992. The total cost of the bridge relocation

Figure 15: The Greenway Pedestrian Bridge, Phoenix, Arizona

project was $12,000. New ramps, spiral staircases and footings were designed to comply with American with Disabilities Act standards. The bridge was reconstructed, and minor artistic additions designed by a local artist improved aesthetic appeal and created the appearance that the bridge had always been located there.

The "recycled" bridge is not only useful and visually pleasing but cost approximately $500,000 less than building an entirely new bridge. The primary costs of the bridge relocation were the construction of the spiral staircase and ramp, aesthetic improvements to the structure, decorative walls and extensive landscaping, which totaled $484,000 (City of Phoenix Street Transportation Department).

Pocket Parks

A pocket park is a small outdoor space, usually no more than ¼ acre. They are most often located in an urban area surrounded by commercial buildings, or in residential areas serving a local neighborhood. They serve as places to gather, relax, and recreate in locations where larger recreation facilities are not feasible or desirable. Pocket parks contribute to the overall health of a community by serving as public

gathering spaces that increase downtown revenues and property values. In many communities they serve as popular lunchtime destinations or jumping-off points for community events.

A good pocket park is something that brings pride to a community or neighborhood. One of the unique and exciting characteristics of pocket parks is that they may be created out of vacant lots or otherwise forgotten spaces. Many pocket parks are the result of community groups, private entities or foundations reclaiming these spaces.

With such a great bike system throughout Sturgis a pocket park could be a rest spot between locations, or a destination for cyclists. Ideally, pocket parks are closely tied into the neighborhoods they serve. By nature, they tend to be scattered and disconnected because they are usually created opportunistically. With some planning, they can be connected if they are placed along greenways or bike paths as long as they would still be visible to a sufficient number of pedestrians who are also potential users. This is a great cause that neighborhood groups or local community clubs could get behind.

Figure 16: A rest stop pocket park

The pedestrian bridge and pocket parks should be implemented within the next 30 years. This long-range project will require significant investment and planning, and is not critical until the city grows more. By 2050, the population of Sturgis is anticipated to exceed 15,000. At that time, the resident tax base of the community would be sufficient to implement the pedestrian bridge without grant funds.

A pedestrian bridge that is recycled and modified could cost $75,000-$120,000. This is much less then a totally custom bridge, with prices anywhere from $200,000-$500,000. Both options have appealing aspects that need to be weighed with much care. A reasonable cost estimate for the two pocket parks on either side of Lazelle Street is less than $200,000. Therefore, the total cost for the project ranges from $300,000 to $750,000.

We believe these improvements would bring something more to Sturgis that creates a feeling of pride for its citizens.

Figure 17: A pocket park with sculptural elements

Figure 18: Proposed pedestrian bridge and pocket parks

Recommendation 4: Install a Raised Median on Lazelle Street

There are many traffic-calming measures that could be suggested on Lazelle Street to help make it safer for pedestrians, including more stop signs and stop lights, a road diet (removing lanes of traffic and expanding the sidewalks and boulevards), and a raised median. These features would slow down the traffic along the street to make it overall safer for pedestrians. Adding more stop signs or stop lights allows drivers less space to accelerate to dangerous speeds as quickly along the road. A road diet would typically involve converting the existing five-lane, undivided roadway segment to a three-lane segment consisting of two through lanes and a center, two-way left turn lane. It would also reduce vehicle speed differential, improve mobility and access by all road users, and integrate the roadway into surrounding uses that results in an enhanced quality of life.

Of the potential solutions, we believe that the best answer to the problems on Lazelle Street is a raised median. A raised median should be implemented on just under a mile of Lazelle Street, between Blanche Street on the east and 6th Street on the west, about 12 blocks. A median is the area between opposing lanes of traffic, not including the turning lane. A raised median would be implemented in place of the current turn-lane median.

Figure 19: Planted, raised median adds aesthetics and slows traffic

Raised medians provide benefits to pedestrians because they can serve as a place of refuge when crossing a street. They provide space for street trees and other landscaping, which can also help reduce speeds by changing the character of the street, making it feel narrower. They also eliminate opportunities for inappropriate U-turns and left turns mid-block, thus improving motorist safety along the redesigned road.

Nationwide, pedestrian/vehicle conflicts account for around 12 percent of traffic fatalities. Nearly 75 percent of those fatalities occur at non-intersections. By providing a raised median and a possible refuge island, it is possible to bring those crash numbers down, prevent further injuries, and most importantly save lives (US Department of Transportation).

The Federal Highway Administration states that when a raised median is implemented into an area it can reduce motor vehicle crashes by 15 per cent while increasing the capacity of the roadway by up to 30 percent. Raised medians are also shown to reduce the vehicle speeds along the roadway. They provide convenient locations to install additional roadway lighting and other safety features, and when designed properly can be less expensive to build and maintain than a paved median.

Construction of a raised median along Lazelle Street should be implemented by 2030. This gives Sturgis the opportunity to build partnerships with Meade County and South Dakota Department of Transportation to complete design studies and allocate funds for reconstruction costs, which we estimate would be between $750,000-$1,500,000.

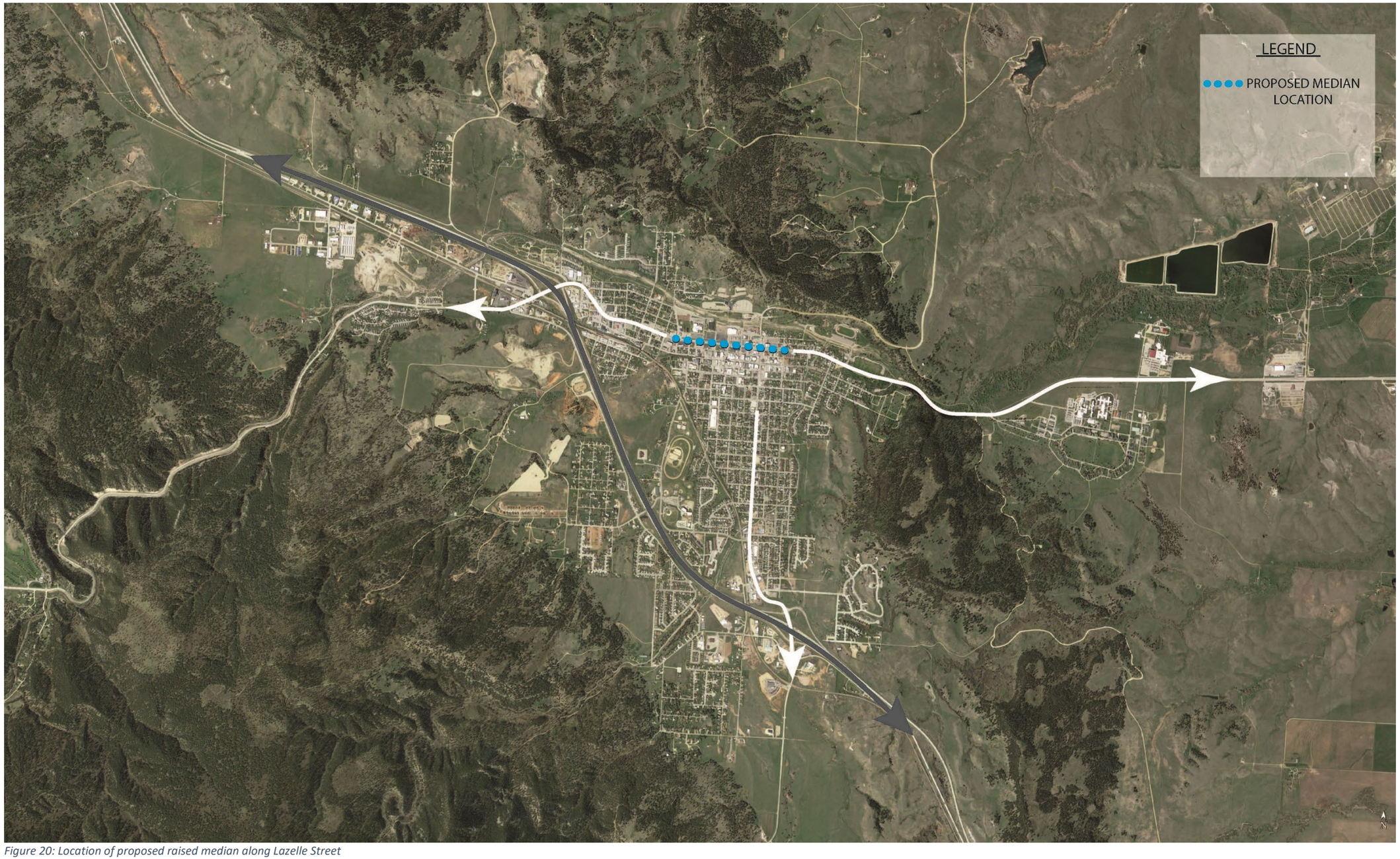


Figure 20: Location of proposed raised median along Lazelle Street

Case study: University Place, Washington

A one-mile section of Bridgeport Way in University Place, Washington was the site of hundreds of traffic collisions, most of them involving pedestrians. Bridgeport Way is the main arterial running through the middle of the city. Nearly 25,000 vehicles per day would use the corridor, making it one of the most heavily traveled roadways in the city. A safer and more pleasant Bridgeport Way was essential to the council's plan for a walkable environment centered on a community gathering place. The decision was made to replace the existing two-left turn lanes with a raised and landscaped median, construct wide sidewalks on both sides of the roadway, introduce bicycle lanes on both sides of roadways, place planter strips on both sides of the road, street lighting, permit U turns only at signalized intersections, and relocate utility lines underground. The project was completed in 1999 at a total cost of $2.5 million, including design, right-of-way and construction.

Figure 21: Bridgeport Way in University Place, Washington

The lane reductions along the corridor resulted in lower motorized vehicle speeds and fewer mid-block crashes. Collisions were reduced by 60 percent and average traffic speeds lowered by 13 percent. Despite greater pedestrian activity and exposure to vehicle traffic, pedestrian fatalities did not increase.

Prior to the project, very few pedestrians would walk along or cross the roadway because there were no sidewalks, crosswalks or paved shoulders. Increased pedestrian activity is evidenced by the over 3,200 pedestrians using the two new mid-block crosswalks each month. Study of the Bridgeport Way corridor also revealed a 600% increase in sales tax revenues after the project was implemented, along with a 7% increase in business revenues (University Place Public Works).

In conclusion, a raised median would benefit the town of Sturgis by giving Lazelle Street some extra appeal, but more importantly making it safer for pedestrians. Again, a raised median would cause drivers to slow down due to the fact of feeling enclosed and having things around them. Lazelle Street has a very wide visual profile, encouraging traffic to move quickly. A raised median would naturally encourage traffic to slow down. Moreover, a raised median would bring life to Lazelle Street by giving it added trees and decorative road-oriented lighting.

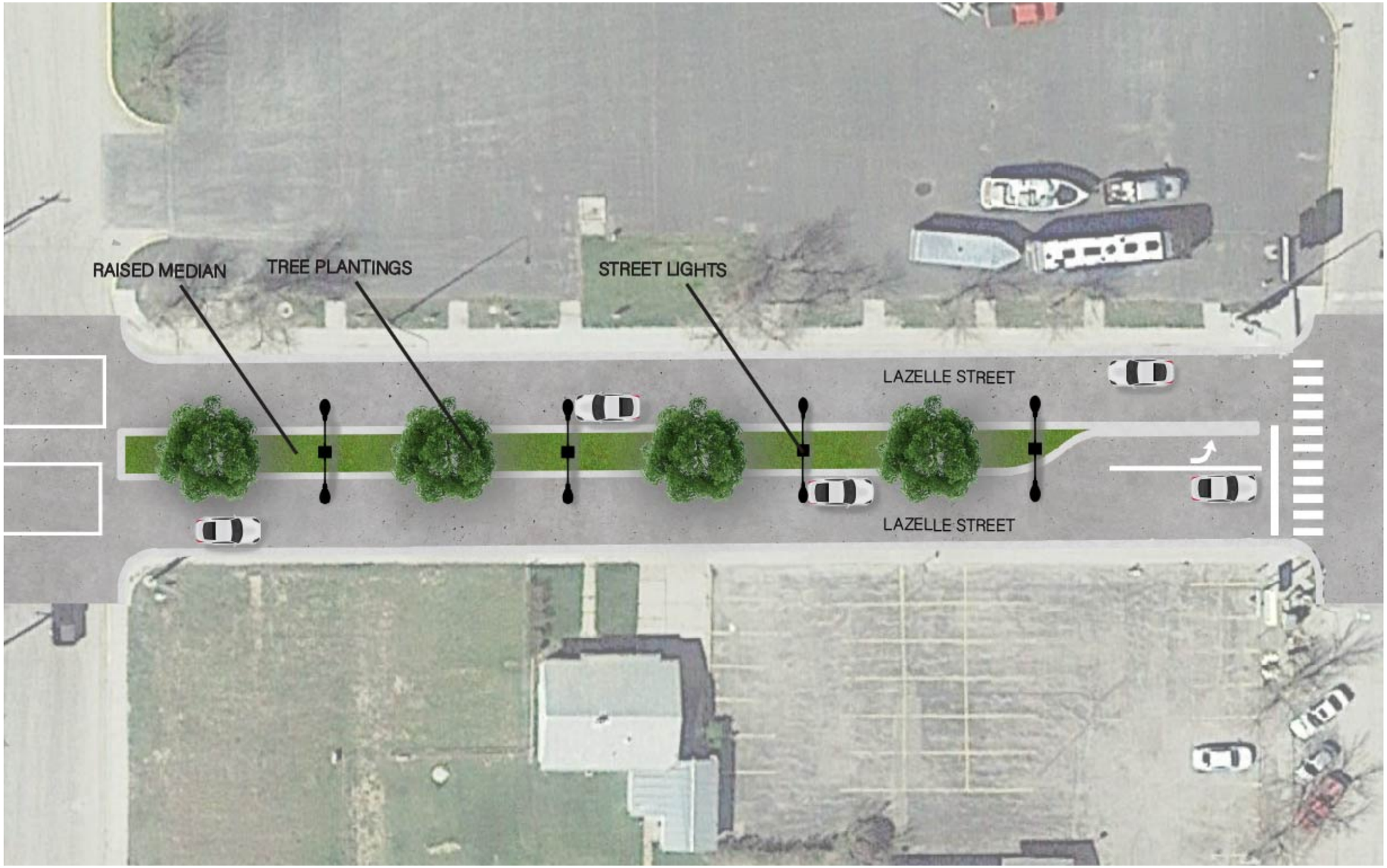


Figure 22: Lazelle Street raised median between 3rd and 2nd Streets

Figure 23: The Lazelle Street raised median

Recommendation 5: Expand the Current Bike Path System

Sturgis' existing bike path system together with the currently proposed expansions are an excellent amenity. There are currently over 10 miles of bike routes already constructed, with proposals for more to come. The paths cover most of the town and are in the right areas. The condition of the paths is good, and we think the city has done a great job with them.

Junction Avenue Bike Lane

One of the current proposals that should be prioritized is the Bike Lane on Junction Avenue. Particular focus should be given to the 0.75-mile section of Junction Avenue between Lazelle Street and Park Street.

Figure 24: Separated bike lane on a busy commerical road

North American cyclists are up to thirty times more likely to be hit by a car than their European counterparts. Researchers believe the main reason for this is the lack of designated bike lanes in North American cities. Bike lanes separate cyclists from other vehicles within the road, while also keeping bicycles off sidewalks. In this way, conflicts between pedestrians, cyclists and motorists are minimized. Studies show that because motorists and cyclists both have clearly defined driving lanes, confidence and safety are increased.

Figure 25: Semi-permanent reflectors held divide bikes from cars

Researchers at the University of Colorado Denver and the University of New Mexico discovered that cities with protected and separated bike lanes had 44 percent fewer deaths or injuries than those without them. The researchers thought one reason for this was that bike lanes encouraged more cyclists to be on the street, thus causing drivers to slow down. This was actually not the case. In contrast, physical barriers that are meant to separate bikes from speeding cars as opposed to shared or painted lines, significantly lowered fatalities in cities that installed them.

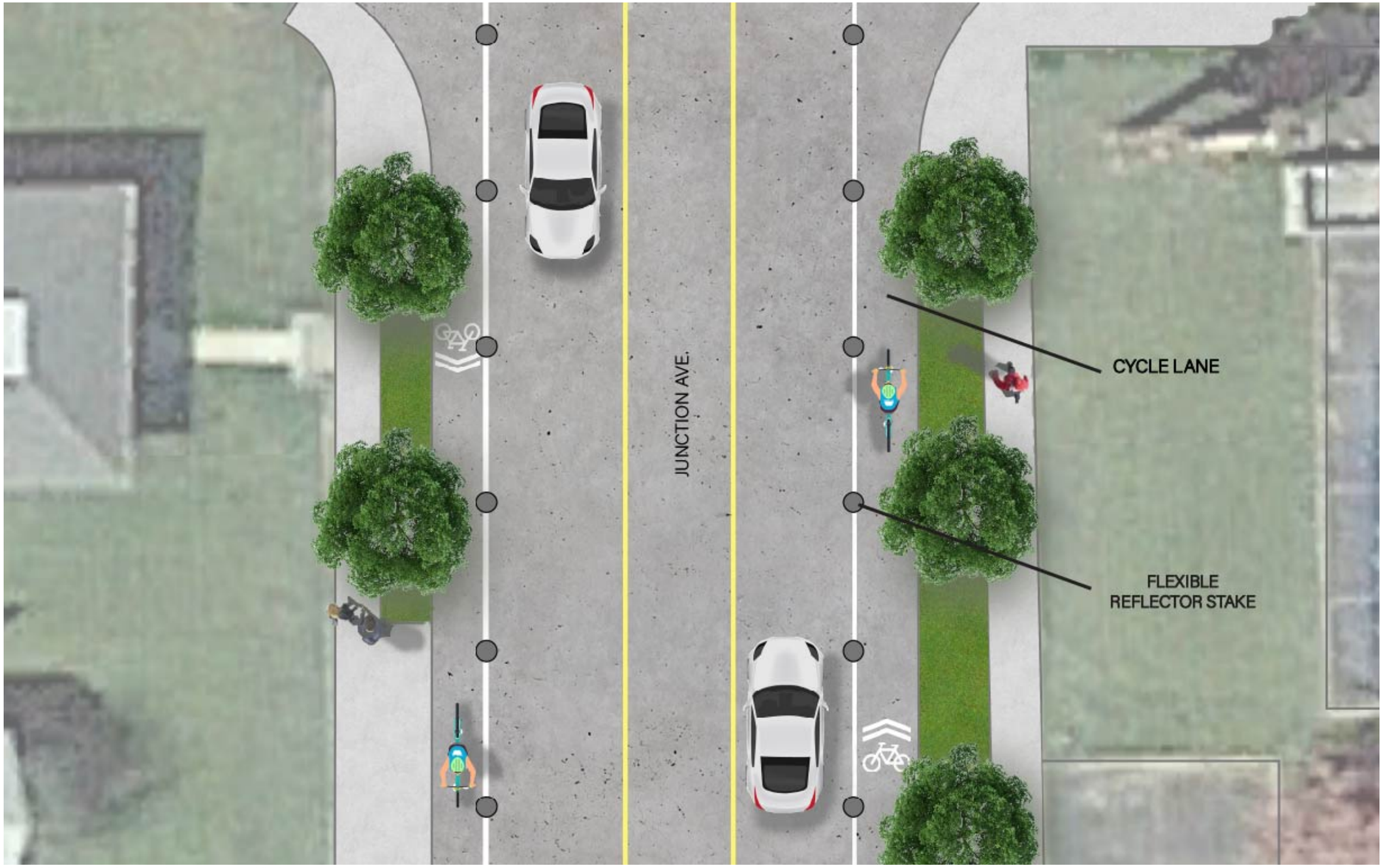


Figure 26: Plan view of proposed Junction Avenue bike lane

“Bike facilities end up slowing cars down. Even when a driver hits another driver, it is less likely to be a fatality because it’s happening at a slower speed,” says Wesley Marshall, a University of Colorado Denver engineering professor. Researchers also determined that painted bike lanes provided no improvement on road safety. Marshall goes on to say, “You’re better off doing nothing… it gives people a false sense of security that’s a bike lane.”

As a result, we recommend implementing a separated bike lane on Junction Avenue. This will give non-motorists the opportunity to safely travel along this important commercial corridor, lower the speed of traffic along Junction Avenue, make the street safer for everyone. In addition, it will further encourage economic growth and revenues along Junction Avenue.

This portion of the bike system should be implemented in the next two to five years, at an anticipated cost of $50,000.

Whitewood Bike Path

Once the bike path system is built out under the proposed system, there will still be parts of the city that are not accessible by bike. The northwest industrial part of town does not have a bike path going to it so if people want to bike to work, they have to ride on the narrow shoulder.

We propose widening the shoulder and adding a bike lane to create the Whitewood Bike Path. This path would commence at the intersection of Highway 14A and 20th Street, first heading north on 20th Street and then west on Whitewood Road for approximately 1.2 miles.

This bike path should be implemented in the next 10-15 years, and will cost $50,000- $170,000, depending on design parameters chosen.

Figure 27: Whitewood Road before and after addition of a bike path

Deadman Channel Bike Path

The last bike path we propose runs along Deadman Channel from Sherman Street to Baldwin Street. It will connect with the Junction Avenue Bike Lane via extensions on Sherman and Harmon Streets. This bike trail will help add interest to the Deadman Channel and make use of the now underutilized space on the sides of the waterway.

Figure 29: Deadman Channel at Douglas Street

Figure 28: Deadman Channel Bike Path

Currently, the channel is very unattractive and serves only to convey stormwater between Deadman Gulch and Bear Butte and Vanocker Creeks . It is a natural corridor, however, and with generous easements on either side of it can easily host a bike path. Where the channel intersects roadways, the bike path will feature at-grade crossings. The cross streets in this part of Sturgis are not generally heavily traveled. As a result, conflicts with cyclists crossing the road will be minimal. In addition, each crossing

will feature warnings on both signs and pavement to alert motorists of potential cyclists. Traffic on roads will be granted the right-of-way, with stop signs on the bike trail to control the crossings.

In some locations along the channel, the easements are more appropriate on one side than the other to host a bike path. In these locations it will be necessary to implement pedestrian-scale bridges across Deadman Channel. These bridges will also contribute to further integrating Deadman Channel into the surrounding urban fabric (see Recommendation 6).

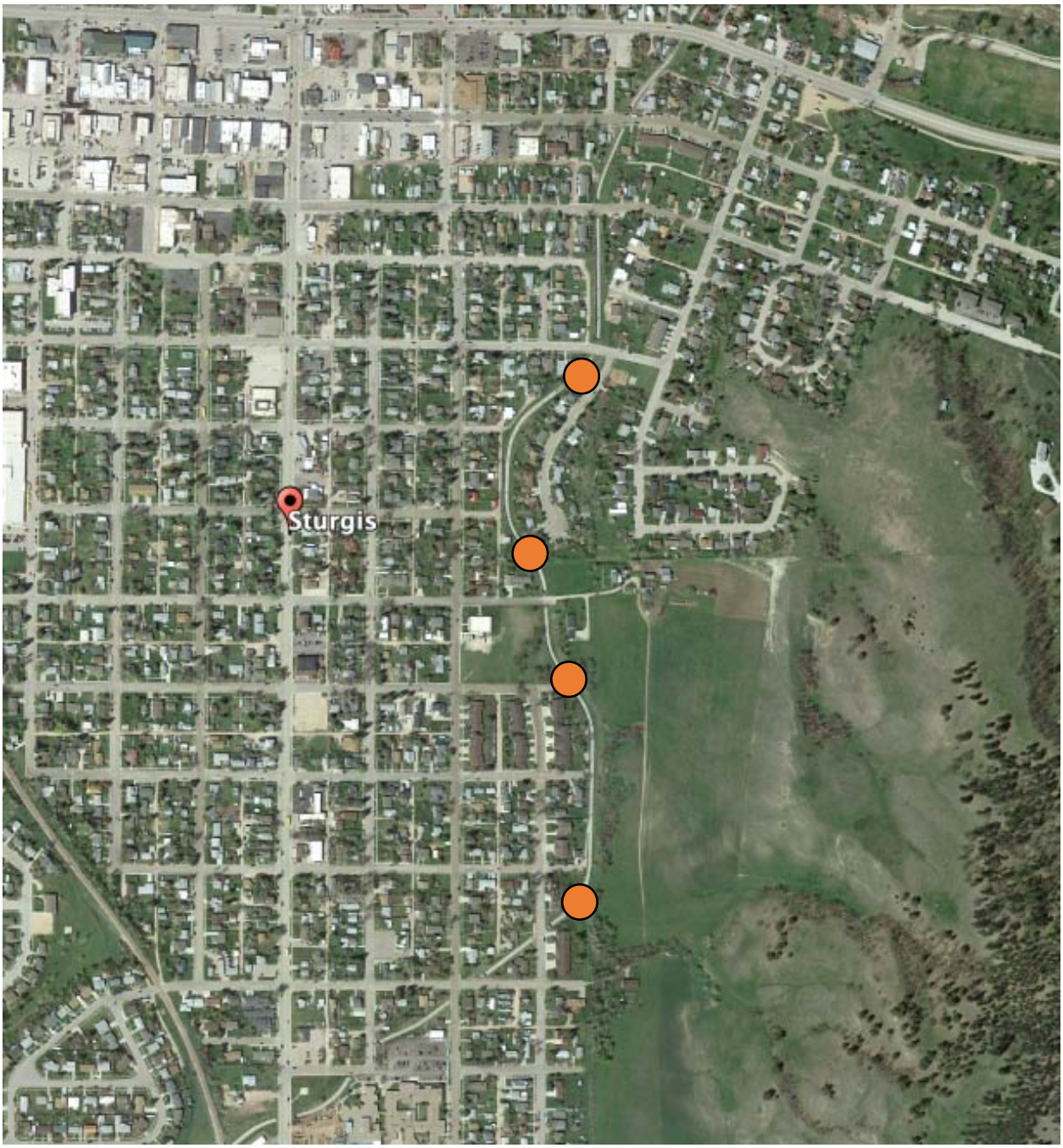


Figure 30: Proposed Pedestrian Crossings across Deadman Channel

This portion of the bike path system should be implemented in the next 10-15 years, at an anticipated cost of $1.5 million.

With more access to destinations around town active transportation in Sturgis will increase. With the increase in bicycling comes increased road safety. A 2014 study of bike infrastructure in Austin, Chicago, Portland, San Francisco, and Washington, DC, showed that adding protected bike lanes increased ridership on impacted streets by up to 171%. A 2015 study of Calgary, Canada found a 95% increase in the number of weekday bike trips in the three months after the introduction of a bike network. In addition, studies show that motorists are more inclined to look for (and thus accommodate) cyclists when more cyclists are on the road.

Figure 31: At-grade bike path crossing, Deadman Channel Bike Path

In summary, the order in which the remaining paths in the Sturgis Bike System should be built is:

1. Junction Ave Bike Lane (2-5 years)
2. Boulder Canyon Bike Path (2-5 years)
3. Vanocker Canyon Bike Path (2-5 years)
4. Williams Bike Path (5-10 years)
5. Starline Bike Path (5-10 years)
6. Dolan Creek Bike Path (5-10 years)
7. Marcotte Bike Path (5-10 years)
8. South Junction Bike Path (10-15 years)
9. Whitewood Bike Path (10-15 years)
10. Deadman Channel Bike Path (10-15 years)

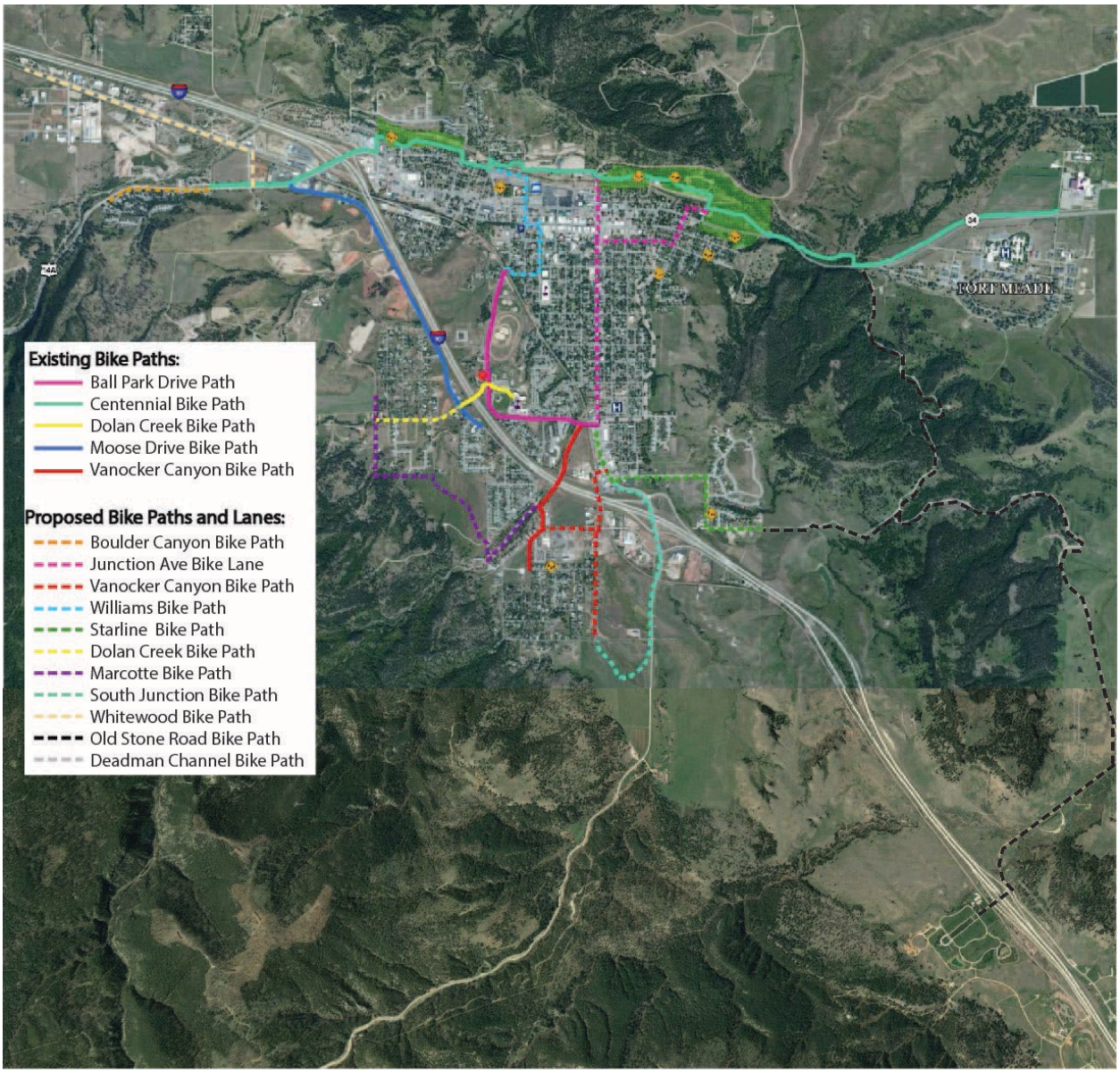


Figure 32: Proposed and Existing Extents of the Sturgis Bike Path Network

Recommendation 6: Integrate Deadman Channel Green Infrastructure Improvements

In addition to creating active transportation infrastructure alongside Deadman Channel, we recommend implementing green infrastructure improvements on this important waterway. Constructed decades ago by the US Army Corps of Engineers, Deadman Channel is a very effective, efficient stormwater conveyance. Over the last several decades, techniques and strategies for dealing with stormwater have evolved to reduce the economic, environmental, and structural costs of high runoff volumes and velocities.

Green infrastructure reexamines how stormwater can be treated, infiltrated, and distributed in ways that mitigate erosion, flooding, and downstream pollution. In addition, properly designed green infrastructure can serve dual roles as recreation, habitat, and aesthetic amenities when not actively conveying stormwater.

As Deadman Channel reaches the end of its service life in the next several years, consideration should be given to soften the physical and visual impact this channel has on the surrounding neighborhoods. We recommend that in addition to the proposed bike lane (see Recommendation 5), the concrete walls and bottom of the channel be modified to break up the flow of water along the channel. This will increase turbulence, thereby reducing velocity. Riprap and vegetation-reinforced slopes can be used to maintain structural integrity. Developing sections of the channel into rain gardens with underdrains will also help the water to pool temporarily, again slowing velocity.

Reduced velocity of stormwater will mitigate the impact the channel has once it reaches Vanocker/Bear Butte Creek. Flooding on that creek channel has caused significant damage to the north part of the city. The aim of the green infrastructure is to delay the peak runoff time, and to prolong the discharge period so that damaging flows are avoided.

We further recommend that planting beds and other landscape improvements be added at intersections of the channel and cross streets to mitigate the visual impact of the channel from the road. These landscape improvements can include green infrastructure improvements such as rain gardens, which will help to slow the rate of runoff from the road surface into Deadman Channel. Incorporating perennial and self-propagating plants will reduce the need for maintenance.

The design of these beds can incorporate 3-4 plant species as a foundation that is common to all beds along the channel, with one or two highlight species added based on location and neighborhood preference. These highlight plants will make each intersection unique and will assist in providing a greater sense of neighborhood identity.

Figure 33: Landscape Improvements to Mitigate Visual Impact of Deadman Channel from the Road

Implementing this recommendation in its entirety should happen over the next 5-25 years. Integrating planting beds can happen relatively quickly, with intersections being added incrementally as funds are made available. Each planting bed will cost approximately $4,000 per intersection ($2,000 per side).

As mentioned above, the bike path can be implemented in the next 15 years at a cost of $1.5 million. An additional $2.3 million will be required to rehabilitate the Deadman Channel itself and incorporate green infrastructure along its entirety. This should also happen incrementally, over a 25-year period.

These improvements will have lasting positive impacts on the City of Sturgis. They will help to reduce the impact of heavy rainfall events, improving quality of life not just for properties backing the channel but for all Sturgis residents and visitors.

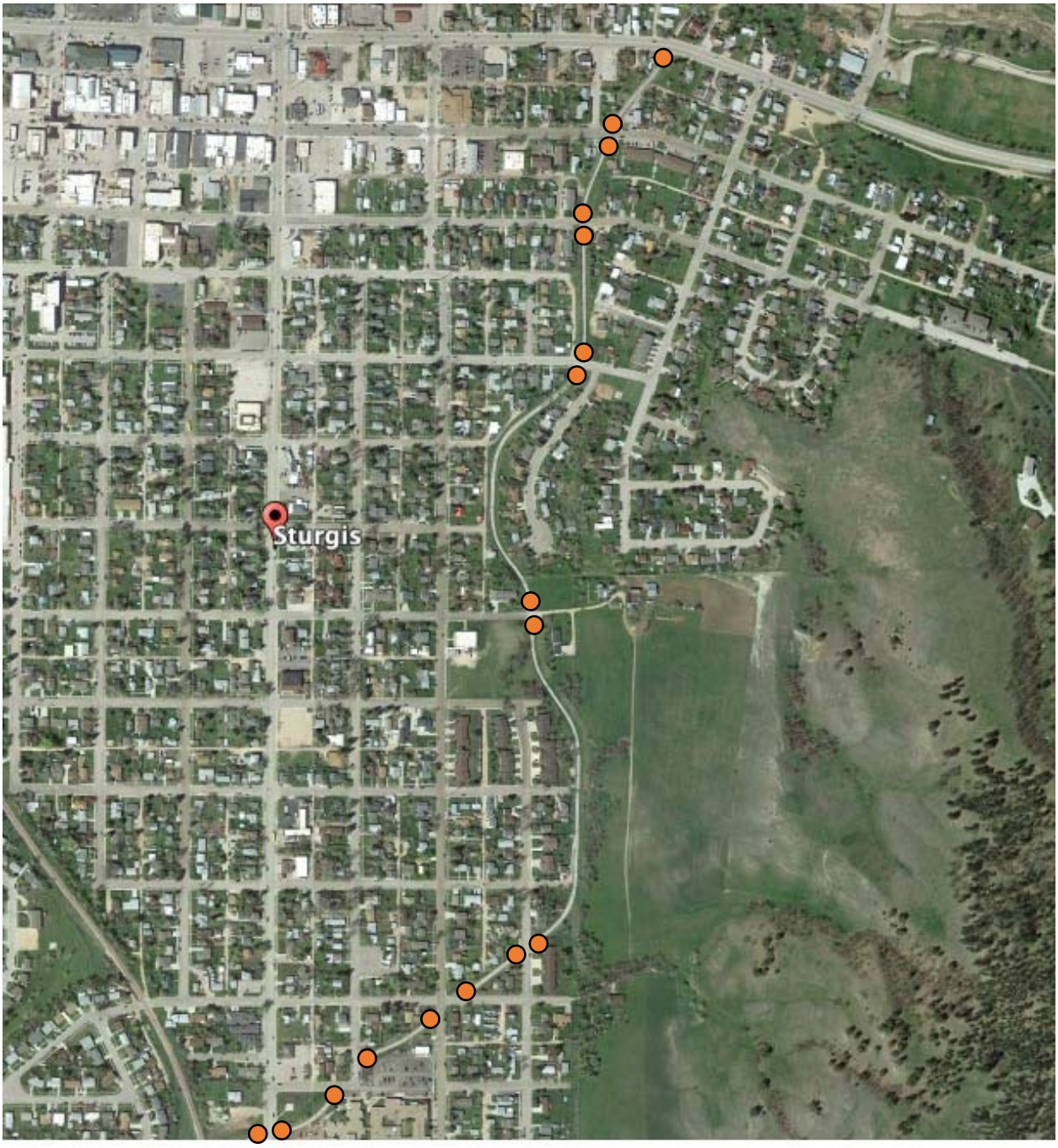


Figure 34: Proposed Landscape Improvements along Deadman Channel

Recommendation 7: Improve Wayfinding on the Sturgis Bike Path Network

As previously mentioned, the Sturgis network of bike facilities is excellent, and poised to become a world-class amenity as additional phases are implemented. Information and maps are available online at the City's website and at *BlackHillsTrails.org*. These are great resources for visitors doing advance research for a cycling trip to the area. They need to augmented by better signage on the trails themselves.

Some bike facility signage already exists in Sturgis, but more is needed. There should be three types of signs on the paths; confirmation signs, directional signs, and decision signs.

Confirmation signs indicate that a particular road or trail is a designated bike route. More comprehensive signs indicate the name of the route, its length, and connections and destinations available on or from the route. In urban areas, confirmation signs should be placed every 2-3 blocks; in less developed areas, such as around historic Fort Meade, there should be signs every mile.

Figure 35: Examples of Confirmation Bike Route Signs

Directional signs are placed where it is possible to turn on the bike lane so the cyclists don't get lost or off the bike route. These signs have arrows and labels with distances to popular destinations.

Figure 36: Examples of Directional Signs for Bike Routes

Decision signs mark the junction of two or more bike routes. They have arrows, distances, and the name of the paths. They help route users to navigate the overall bike route system to reach their destination efficiently and easily.

Figure 37: Examples of Decision Signs for Bike Routes

Pavement markings should be incorporated in addition to posted signs. Pavement markings are low-cost complements to the posted signs and increase route visibility for motorists and other adjacent users. Markings and posted signs should be added to the annual budget at a rate of $5,000 per year. At this rate, full implementation will occur over 10-12 years.

In addition to route markers, bike path network maps should be installed at major trailheads and other key locations throughout the system. These maps will help orient trail users to the system and make initial decisions about their proposed ride.

Each map will cost around $1,600. There are 26 proposed locations, for a total cost of approximately $42,000. The signs on Old Stone Road should but put in first so that can be made a bike path. After that, the rest of the signs can be installed, and they should all be put in at the same time. The signs should be put in within 2-3 years. We believe that after adding these minor changes to the already great bike paths will make Sturgis a great place for active transportation.

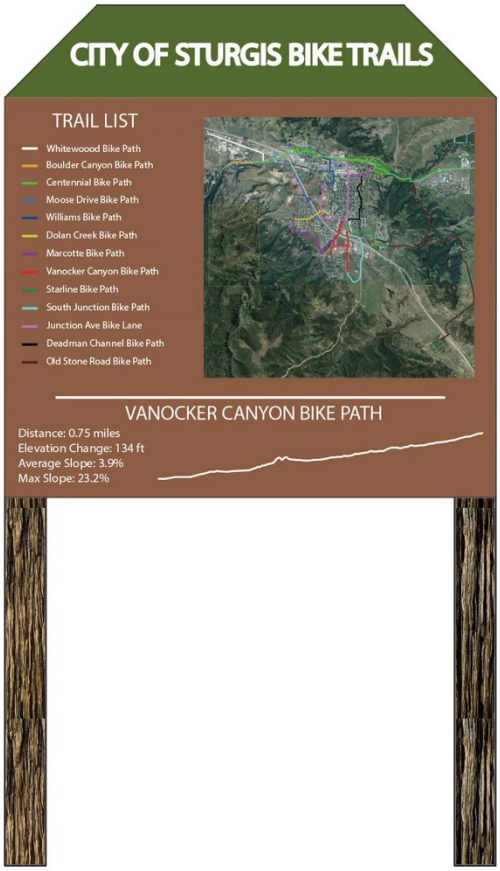


Figure 38: Proposed Bike System Map

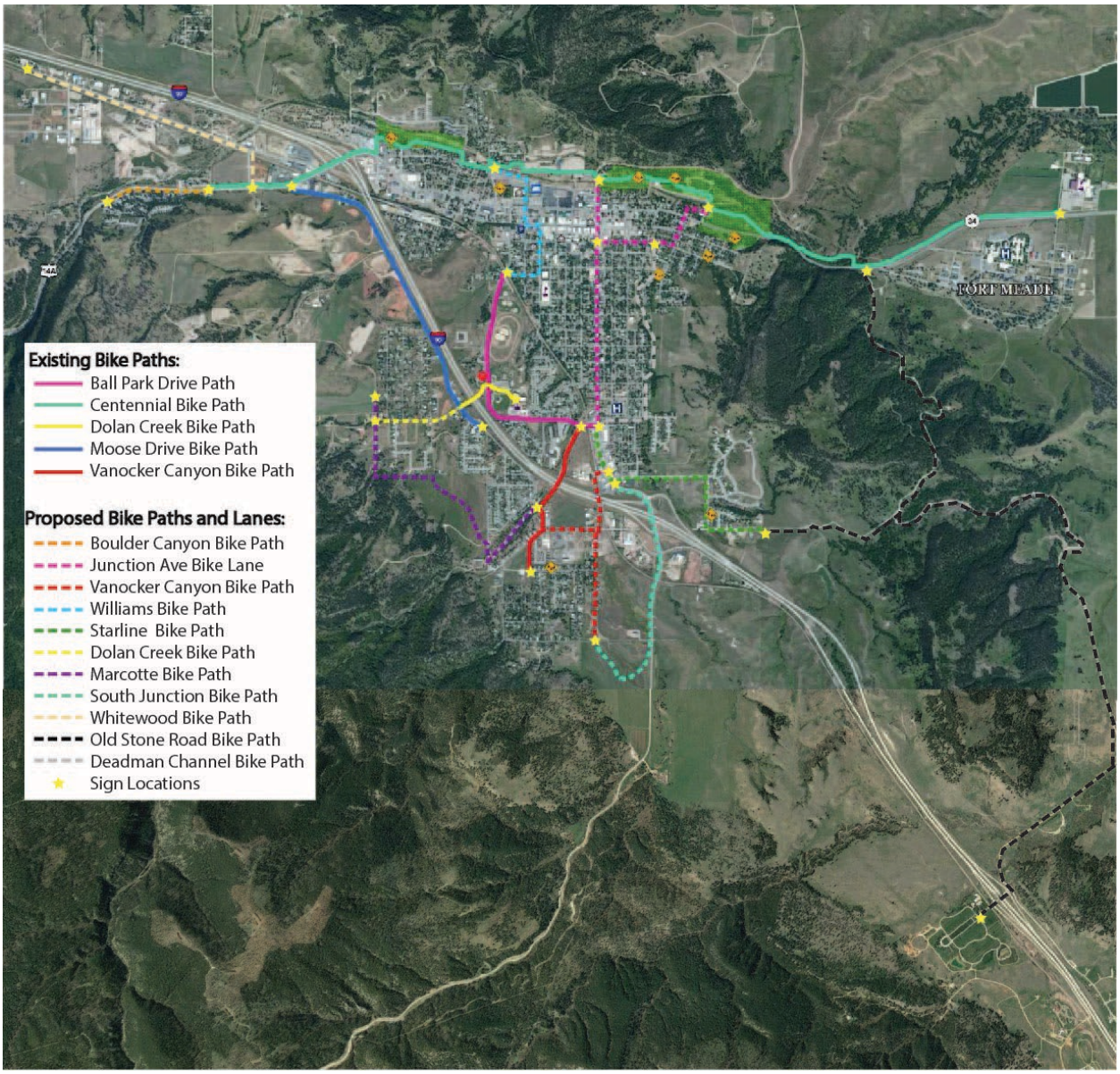


Figure 39: Proposed Bike Trail System Map Locations

Recommendation 8: Improve Parkland Distribution through Key Acquisitions

Sturgis has succeeded in providing a variety of recreational and public use activities. Sturgis also provides the recommended percentage of park space for its size which, according to the American Planning Association, is 1 acre for every 66-100 residents. However, parkland distribution is not even throughout the city. Many of the parks are concentrated in the northern region of Sturgis. This results in underserved areas where many residents do not have access to a park.

According to Project for Public Spaces, proximity to sidewalks/facilities increases the likelihood and frequency that people walk. Moreover, studies show that parks have a proximate effect on property values. In other words, property values are higher the closer they are to a park. An appropriate standard is that 75-80% of all residences should be within a 5- to 10-minute walk from a park, and all residences in a city should be within a 15- to 20-minute walk from a park.

To accomplish this, we recommend the acquisition and development of additional parkland and recreation facilities. The following discussion will examine specific opportunities.

Marcotte Parcel

The Marcotte Parcel is a proposed subdivision in Sturgis that includes residential and public use land. The current plan has great features, and the proposed park will be an excellent addition to the Sturgis Parks System. Two suggestions to this proposed park are as follows:

- There is a swale that runs through the property that will be integrated into the new park. This swale should be integrated with green stormwater infrastructure in the form of a rain garden to temporarily slow and store runoff. This will give runoff the opportunity to infiltrate into the groundwater, thus reducing overall impact on the city's stormwater system.
- Add an open grassed area on the west side of the park. This feature will provide opportunities for impromptu and organized games, contributing to a better sense of community in the new neighborhood.

Figure 40: Marcotte Addition with Proposed Changes to Parkland

Vanocker Dog Park

There is an existing dog park on the south side of Sturgis. It is owned by Scott Peterson Motors but open to the public. The dealership's generosity in providing this and other parkland amenities to the community is notable and commendable. However, due to the location of the dog park at the back of the dealership property, accessible only via the parking lot, poses access and visibility problems for this community amenity.

There are many people who walk their dogs along the existing bike trails in Sturgis, thus an additional dog-focused park should be located along an existing or proposed bike route to provide better access and higher use of the park. The dog park should also be located near residential properties and towards the center of Sturgis so that more people live near it. There is a potential property that could be purchased by Sturgis that has access to an existing bike trail, this is shown in figure 43. This land would be a great spot for a dog park, since it is located along the bike trail and is in the center of Sturgis.

This 4-acre parcel can serve as a multi-purpose park, with room for a fenced dog park, a playground, picnic shelters, and multipurpose sports field. After the land has been acquired, the dog park would cost approximately $50,000 to develop.

Figure 41: Scott Peterson Motors Dog Park

Figure 42: Proposed Dog Park Location, off Ball Park Road adjacent to the Vanocker Canyon Bike Trail

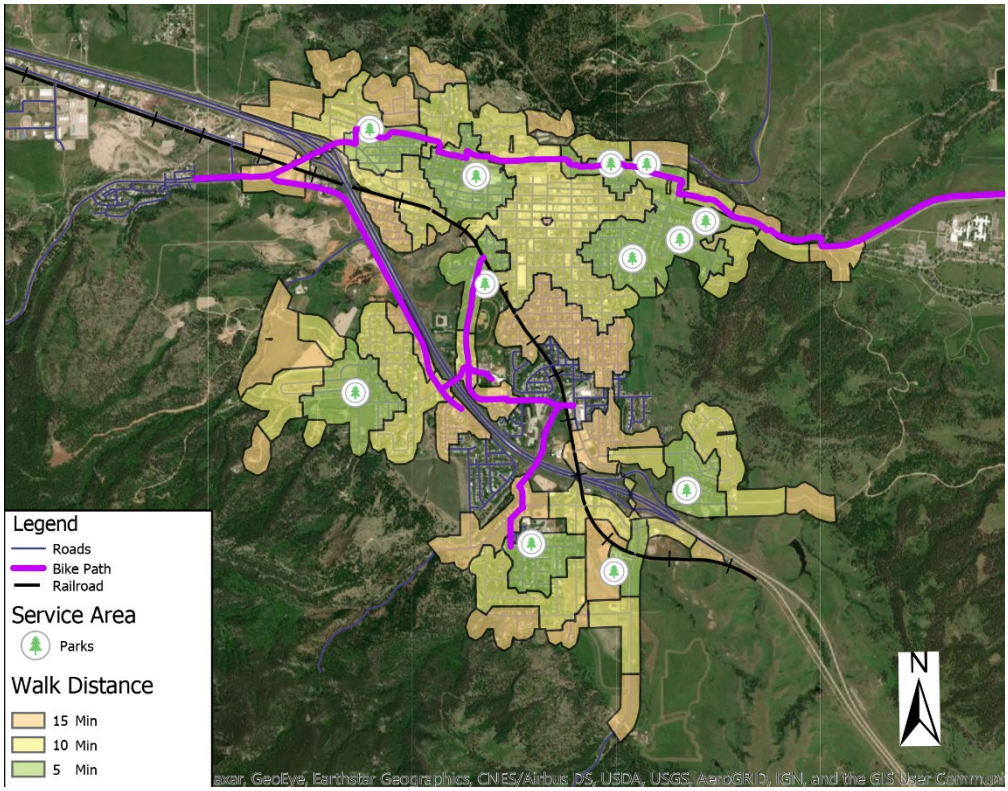


Figure 43: Sturgis Park System Distribution (Existing)

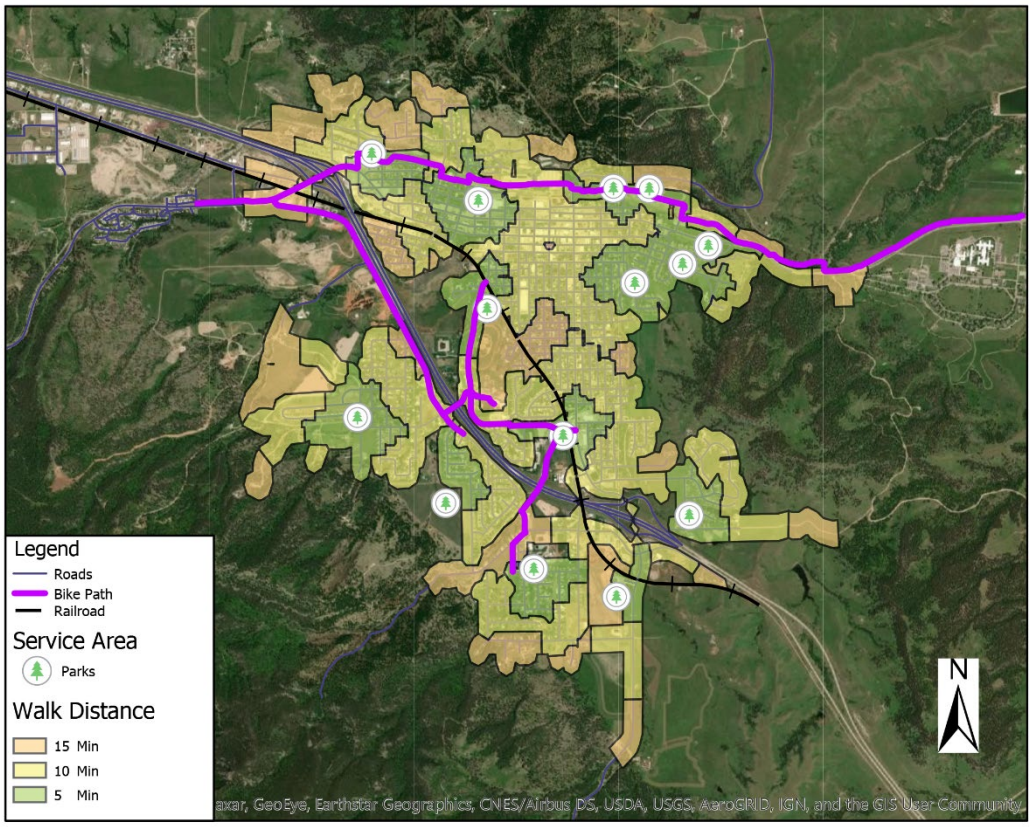


Figure 45: Sturgis Park System Distribution (Proposed)

Recommendation 9: Invest in Existing Neighborhood Parks

Sturgis has some great parks for younger audiences. Neighborhood parks such as Meade Avenue Park, Willow Park, Starline Park, Rose Street Park, and 6th Street Park are important components of a comprehensive parks system. They provide families and especially children opportunities for play and recreation within their own neighborhoods. This allows for better supervision by parents and a greater likelihood that children will be active.

The neighborhood parks are used daily by many children living in adjacent neighborhoods. Here are improvements and safety issues that should be addressed. Meade Avenue Park will serve as an example of what improvements could be made to all neighborhood parks in Sturgis.

Many children walk to Meade Avenue Park every day. Providing safe access to and around the park is important to ensure children are not put at risk when going to play. Marked crosswalks should be installed at intersections closest to the park. Sidewalks should connect to the existing sidewalks in the area to provide better access.

Signage warning motorists of the presence of children playing, or large signage advertisting the park's existence, is also appropriate. This will help slow traffic around the parks, ensuring motorists drive more cautiously and remain aware of children that may run onto the road.

Proper lighting in and around the park is also necessary to create safety, comfort, identity, and wayfinding. Incorporate pedestrian-scaled light standards inside park boundaries. An appropriate lighting plan will also help deter criminal activity, including graffiti and vandalism, inside the park, and will extend the park's useful hours of operation. Approximately $100,000 should be budgeted to improve each neighborhood park over the next 20 years.

Figure 46: Proposed Improvements to Meade Avenue Park

Figure 44: Perspective View of Meade Avenue Park Improvements

Figure 458: Willow Park Proposed Improvements

Figure 46: Perspective View of Willow Park Improvements

Recommendation 10: Update Amenities in Woodland Park

At more than 25 acres, Woodland Park is the anchor of the Sturgis parks system. Located along Bear Butte Creek on the north side of the city, it features a wide variety of recreational opportunities, including disc golf, soccer, playgrounds, picnic shelters, barbecues, and more. Mature trees provide shade and beauty.

As the park ages, adjustments and updates are necessary. The disc golf course in the park currently consists of 7 baskets, 2 of which are older and rusty. The 2 rusty baskets should be replaced, and 2 more baskets should be introduced to create a standard 9-hole course. Most disc golf courses have tee pads which give a starting point and run-up for people using the course. There should be tee pads to start each hole at Woodland Park. According to the Professional Disc Golf Association," Each tee area should have at least a two-foot apron around all sides to provide adequate room for follow-thru, so a player doesn't risk twisting an ankle or falling off a ledge. Also, it is best to provide adequate level ground for a

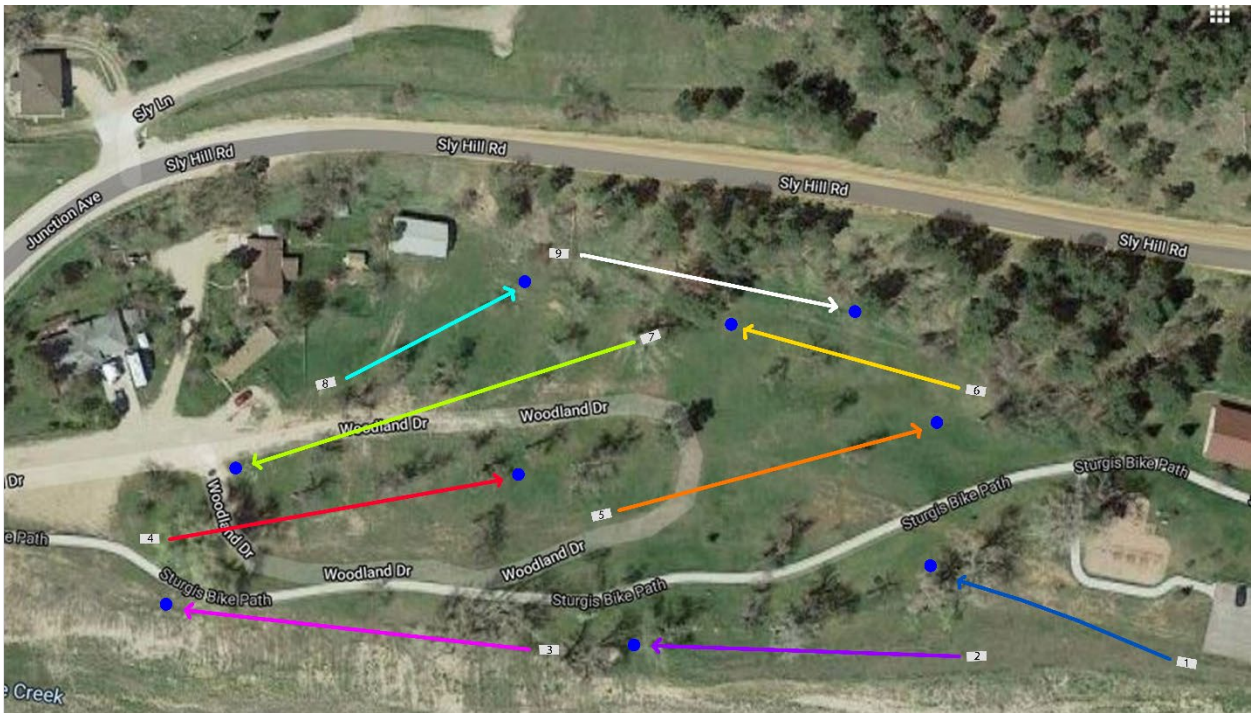


Figure 47: Woodland Park Disc Golf Course Improvements

run-up behind each tee pad, especially on longer holes."

The east side of Woodland Park features several sports fields. Currently this is a wide-open area with little to provide visual interest. Improved plantings along the edge of the sports fields will help to provide more shade for spectators and improve the visual impact of the site. The Woodland Park updates and improvements would cost about $30,000.

Figure 48: Updated Tree Plantings at Woodland Park Sports Fields

Recommendation 11: Develop a Rain Garden and Dog Park at Owen's Park

Sturgis has a lot of stormwater to manage, and sometimes the volume of water becomes too much for existing structures and causes failures. There are stormwater management practices that will aid in slowing or holding water so that more water can infiltrate back into the soil. Owen's Park is north of the fairgrounds on Ball Park Road. This is an excellent site to implement these stormwater management practices. There is a swale that follows the train tracks on the northeast side of Owen's Park. This is a perfect start to stormwater management since there is a low point at the north end which could serve as a rain garden. Figure 52 shows the recommended location and size of the rain garden, including inlets and outlets. Implementing this rain garden could cost approximately $2.5 million.

Figure 49: Owen's Park Improvements

Recommendation 12: Create a Bicycle and Motorcycle Pop-Up Training Course

Sturgis is well known for the Sturgis Motorcycle Rally. So, it is inherent that people may want to learn how to ride a motorcycle while visiting Sturgis. The Sturgis Police Department should work with local dealerships to sponsor a pop-up training course for riding motorcycles and bicycles. Road safety, handling, maintenance, and regulations governing bike and motorcycle use.

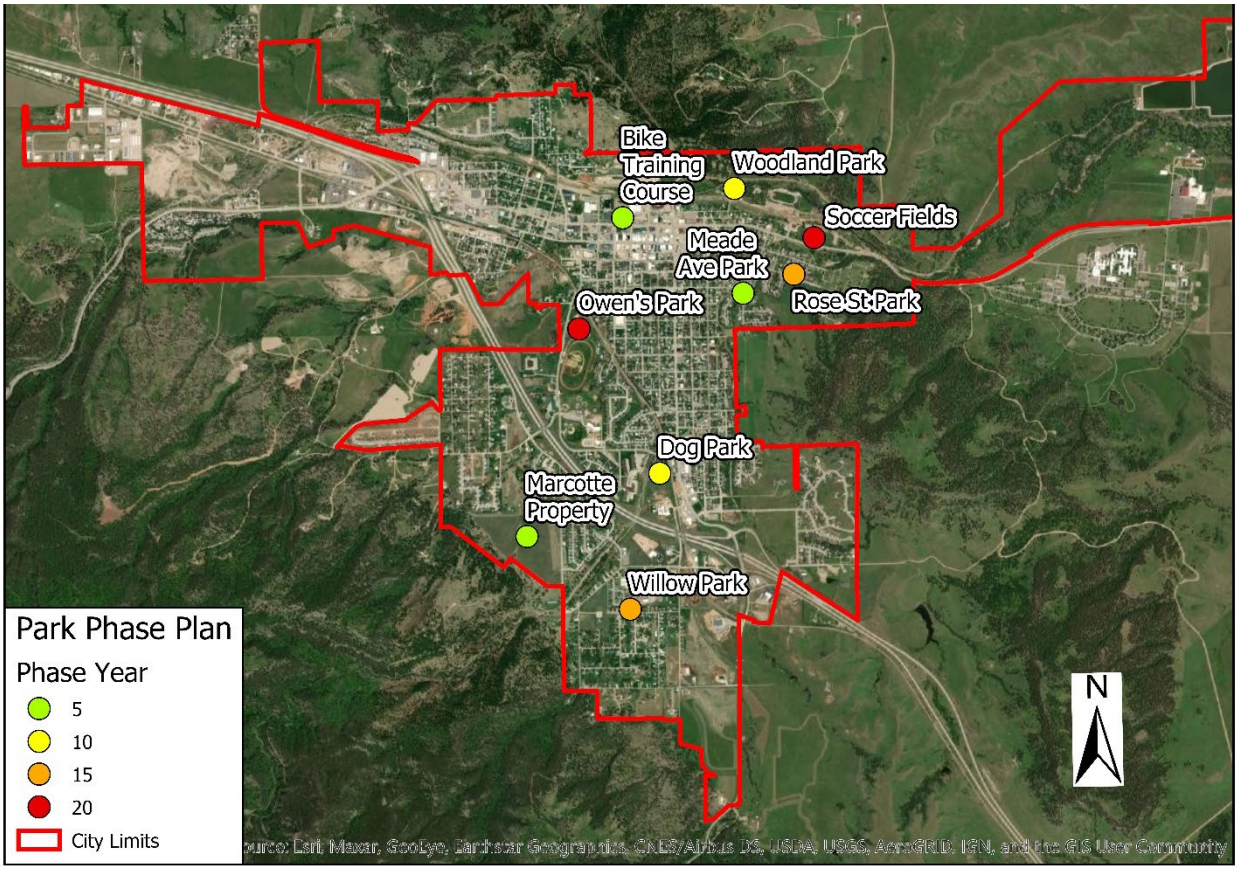
There are two parking lots on the north side of Lazelle Street immediately adjacent to the post office property that are underutilized much of the year. These parking lots are ideal for a pop-up motorcycle training course. The ideal course would be cost effective and easy to install or tear down, utilizing traffic cones and movable signage. We estimate an initial start-up cost of $5,000.

Figure 50: Proposed Location of SPD-Sponsored Bike Rodeo

Figure 51: Example of Motorcycle Rodeo

Park and Recreation Timeline

Due to limited staff and the size of these projects the installation should occur in phases. We propose a 20-year plan, beginning with the improvements to Meade Avenue Park and implementation of the pop-up training course.



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