B. Pedestrian and Bicycle Master Plan

The Pedestrian and Bicycle Master Plan provides a framework for how the non-motorized network should be established within the study area as funds become available. The Plan builds on the existing system by offering improvements to the bicycle and pedestrian network where deficiencies exist. Additionally, the Plan identifies new pedestrian and bicycle corridors designed to provide community connectivity and non-motorized access to new portions of the study area.

In collaboration with the SAT, the project team determined that non-motorized improvements outside roadway curb lines such as sidewalks and paths would be the focus of this planning effort, as these are currently of primary importance and need improvement. However, it is important to note that on-street methods for accommodating cyclists, such as bicycle lanes, sharrows, widened shoulders, and bicycle boulevards remain valid strategies for Box Elder and should be considered in future planning efforts.

The Pedestrian and Bicycle Master Plan, provided on **Figure 17,** distinguishes existing sidewalks and shared use paths (solid lines) from proposed facilities (dashed lines). Taken as a whole, the existing and future path corridors and sidewalk connections will provide more safe and efficient ways for people on foot or bicycle to reach their chosen destinations throughout and beyond the community.

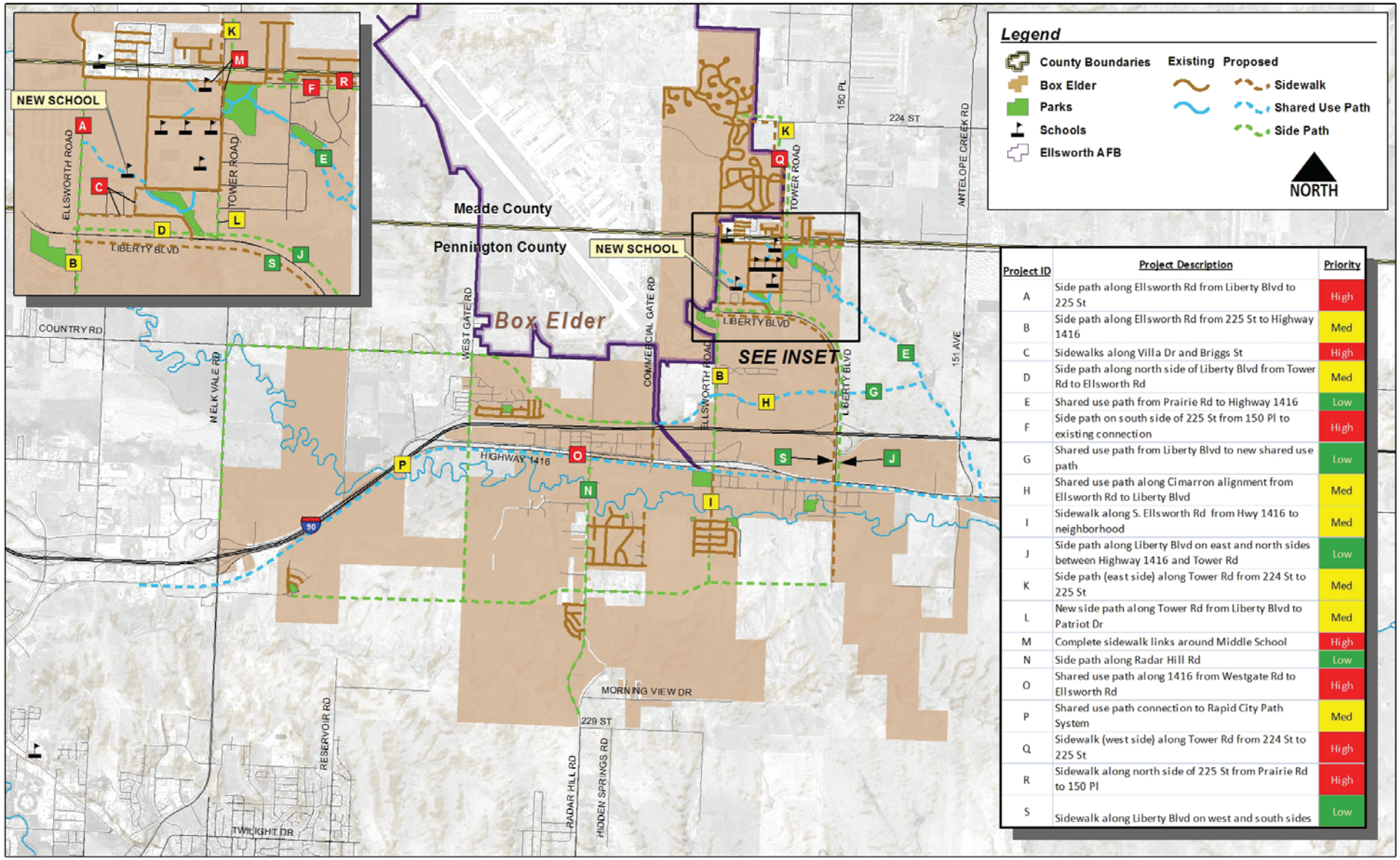
Basic project types are described as follows:

Sidewalks: The sidewalk inventory conducted in the review of existing conditions revealed inconsistency across the City. In general, more recently constructed neighborhoods included sidewalks along all roadways. Also evident in the inventory are missing linkages in the sidewalk network. For example, sidewalks are provided along roads bordering the cluster of Douglas schools east of EAFB, but sidewalks linking the schools to the surrounding neighborhoods are lacking in continuity. Accordingly, many sidewalk extensions have been identified as projects in the Plan.

Side Paths: Side paths are bicycle and pedestrian paths that run parallel alongside roadways, typically within the ROW. The paths are a minimum of 10 feet wide and provide an increased level of safety for non-motorized travelers, especially along busier roadways. There are currently no side paths in the study area. As shown on **Figure 17**, side paths are proposed to be constructed along major community routes, including Radar Hill Road, Liberty Boulevard, Ellsworth Road, and the future Cheyenne Boulevard.

Shared Use Paths: Shared use paths are bicycle and pedestrian paths that typically extend across open spaces or along drainages and connect to major amenities within the community and often extend to nearby communities. These facilities are not constructed within roadway ROW. There are a number of existing shared use paths in the study area, including a short network of paths in the arboretum park located east of the schools and a path connecting Villa Drive to Patriot Drive. It is recommended that the current network of shared use paths be extended to include a new east-west path along Highway 1416 that could eventually provide a regional connection west into Rapid City. Additional shared use paths are identified between the Arboretum and Highway 1416, and along the proposed new Cimarron Road alignment.

Figure 17
Pedestrian and Bicycle Master Plan and Projects



Project ID	Project Description	Priority
A	Side path along Ellsworth Rd from Liberty Blvd to 225 St	High
B	Side path along Ellsworth Rd from 225 St to Highway 1416	Med
C	Sidewalks along Villa Dr and Briggs St	High
D	Side path along north side of Liberty Blvd from Tower Rd to Ellsworth Rd	Med
E	Shared use path from Prairie Rd to Highway 1416	Low
F	Side path on south side of 225 St from 150 Pl to existing connection	High
G	Shared use path from Liberty Blvd to new shared use path	Low
H	Shared use path along Cimarron alignment from Ellsworth Rd to Liberty Blvd	Med
I	Sidewalk along S. Ellsworth Rd from Hwy 1416 to neighborhood	Med
J	Side path along Liberty Blvd on east and north sides between Highway 1416 and Tower Rd	Low
K	Side path (east side) along Tower Rd from 224 St to 225 St	Med
L	New side path along Tower Rd from Liberty Blvd to Patriot Dr	Med
M	Complete sidewalk links around Middle School	High
N	Side path along Radar Hill Rd	Low
O	Shared use path along 1416 from Westgate Rd to Ellsworth Rd	High
P	Shared use path connection to Rapid City Path System	Med
Q	Sidewalk (west side) along Tower Rd from 224 St to 225 St	High
R	Sidewalk along north side of 225 St from Prairie Rd to 150 Pl	High
S	Sidewalk along Liberty Blvd on west and south sides	Low

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V. PLAN IMPLEMENTATION

A. Roadway Project Plan

Recommendations for improvements to the Box Elder roadway transportation system have been derived from the Major Street Plan. The recommendation includes a select list of projects generally within the City of Box Elder and identified through the public input process, traffic forecasting, intersection analysis, projects included in the State Transportation Improvement Plan (STIP), Rapid City Area MPO Transportation Improvement Program recommendations in the Decennial Interstate Corridor Study by SDDOT (see **Appendix C**), and projects identified by the Study Advisory Team (SAT) and City staff.

Public versus Private Driven

The project listing has been divided between public and private driven projects. Projects listed as public represent deficiencies within the roadway network that either currently exist or will occur with anticipated growth. These projects require complete funding from a public entity or group of entities: the City of Box Elder, Pennington and Meade counties, or SDDOT.

Projects listed as private are those roadways associated with future development activity. These projects are, therefore, initiated by future growth and will require financial leading by a developer, to be supplemented where appropriate by a public agency.

Local Urban Systems Projects Eligibility for Box Elder Roadways

The City of Box Elder currently receives from SDDOT an allocation of Local Urban Systems Projects funds. Local roadways classified as rural major collectors and urban collectors and above are eligible for Federal-Aid funds. **Appendix D** shows the local roadways eligible for these funds, which include City roadways such as West Gate Boulevard, Cheyenne Boulevard, Radar Hill Road, Liberty Boulevard, Tower Road, Ellsworth Road, Highway 1416, and a portion of 225th Street. With the adoption of the Major Street Plan, the City can request changes in the functional class. This request is submitted through SDDOT, and SDDOT forwards the functional class changes to FHWA for approval.

Project Prioritization

Recommended projects were prioritized into near, mid, and long term categories. The prioritization was based on criteria that were derived from the values and goals that are important to the City of Box Elder. The criteria are as follows:

- **Safety:** This involves evaluating projects on their potential to improve safety at intersections and along roadways for all modes of travel.
- **Neighborhood Connectivity:** This includes making roadway linkages to provide a second point of access for isolated neighborhoods and/or connecting existing neighborhoods.
- **Economic Development:** This involves evaluating projects that have the potential to be a catalyst to new development opportunities. For example, new roadways connecting existing major roadways that provide access to largely undeveloped land are likely to encourage new development in undeveloped areas.

- **Congestion:** This involves evaluating projects on their potential to relieve existing or future congestion.
- **Liberty Interchange:** This involves evaluating projects that increase the usage of the Liberty interchange and/or encourages EAFB personnel to use the interchange for trips to and from the base.
- **Regional Connectivity:** This involves projects that connect Box Elder to surrounding communities.
- **Cost:** This involves the estimated total cost based on the city's ability to implement the project using its annual STP (surface transportation planning) funding.

Based on these criteria, projects were defined as either near, mid, or long term in their delivery as a complete project. Near-term projects are those anticipated to be funded and built within the next five years (2015 to 2020). These projects tend to be low-cost, publically funded projects that make new neighborhood connections to the roadway network, and address future capacity issues. Mid-term projects are those anticipated to be funded and built not immediately but within the next 5 to 15 years (2020 to 2030). Mid-term projects tend to be higher cost publically funded improvements and projects driven by development activity. Long-term projects are those anticipated to be funded and built in the long term (beyond 2030) by either the state or by future investment by private entities.

Project Cost

Project costs have been developed for each recommended roadway project. These conceptual costs were based on the construction of the recommended typical section for Box Elder arterial, collector, and local roadways. Typical sections were two-lane (one lane in each direction) roadway segments, complete with curbs, gutter, and sidewalks on either one or both sides of the street. Cost estimates also include bridges when roadways spanned waterways. Existing roadways upgraded to the typical sections recommended in this report, it was assumed the improvement included minor drainage upgrades. For new roadways, it was assumed it would consist of an underground storm sewer system completes with inlets and pipes.

While ultimately not every roadway segment or improvement may be built to these specifications, this cost procedure provides the most conservative view of construction costs. Cost opinions included construction-related items based on 2013 unit costs, a 25 percent contingency factor applied to these items and smaller percentages to account for other costs such as ROW, utilities, design, mobilization, and construction engineering. In addition, a 4.43 percent per year inflation factor was applied to item costs to estimate costs in the anticipated year of expenditure. **Appendix E** provides more detailed explanations of cost opinions by project.

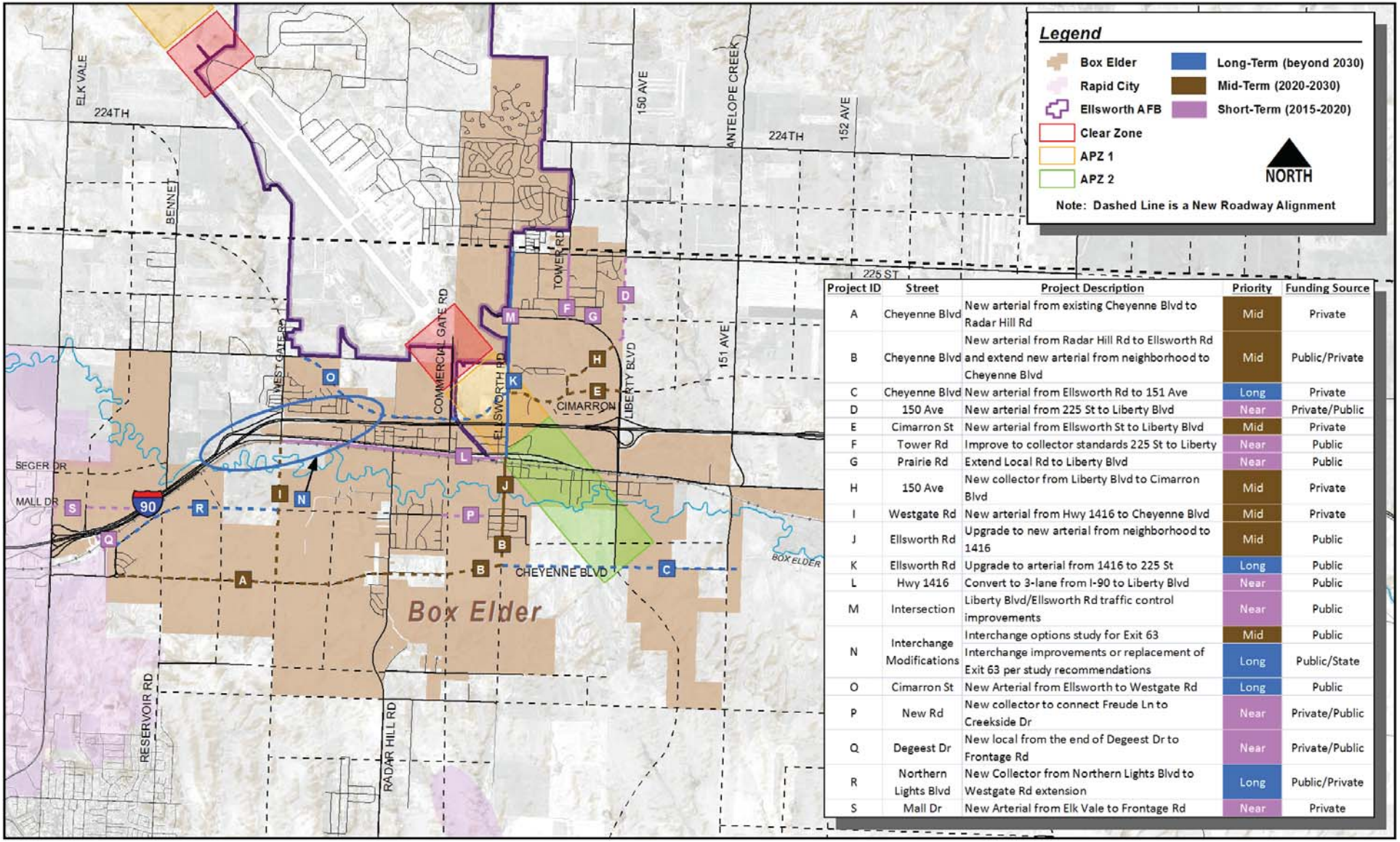
Project List

Recommended projects are shown on **Figure 18**. A total of 22 projects have been identified as needed roadway network improvements for the City of Box Elder. These projects are listed in **Table 3**, which provides the estimated cost for each project, a general description of each project, and the prioritization of the project. As shown, construction of the full set of identified projects would require an investment of approximately $139 million. Alone, the near-term priority projects would require $11.1 million to complete.

Table 3. Prioritized Roadway Projects

ID	Street	Project Description	Funding Source	Cost (millions $)	Priority
D	150 Avenue	New arterial extension from 225th to Liberty Boulevard	Private / Public	1.9	Near
F	Tower Road	Widen existing roadway to provide curb and gutter and left turn lane according to the collector typical section standard recommended in Section VI-A.	Public	0.7	Near
G	Prairie Road	Construct new local road to allow access location on Liberty Boulevard	Public	0.27	Near
L	Highway 1416	Convert existing four-lane highway to a two lane undivided roadway with a center left turn lane per the STIP	Public	3.5	Near
M	Intersection	Replace existing all-way stop traffic control with signalized control when warranted	Public	0.35	Near
P	Freude Lane	Construct new collector from Freude Lane west to Creekside Drive to connect existing neighborhoods and to provide a second point of access.	Public / Private	1.0	Near
Q	Degeest Drive	Extend new collector from the end of Degeest Drive north across railroad tracks and connect to I-90 service Road	Private / Public	0.85	Near
S	Mall Drive	Extend new arterial from Elk Vale to Service Road	Private	2.5	Near
A	Cheyenne Boulevard	Extend new arterial from existing Cheyenne Boulevard east to Radar Hill Road	Private	12.0	Mid
B	Cheyenne & Ellsworth	Build new arterial from Radar Hill Road to a new Ellsworth arterial extension south from existing neighborhood	Private / Public	6.1	Mid
E	Cimarron Drive	Extend new arterial from Ellsworth Road to Liberty Boulevard	Private	4.4	Mid
H	150 Avenue	Build new collector from Liberty Boulevard to Cimarron Drive	Private	2.5	Mid
I	West Gate Road	Construct new arterial from the West Gate / 1416 intersection south to the future Cheyenne Boulevard extension (see project A)	Private	7.2	Mid
J	Ellsworth Road	Widen existing roadway from existing neighborhood to 1416 to provide curb and gutter and left turn lane according to the arterial typical section standard recommended in Section VI-A.	Public	0.83	Mid
N	Interchange Options Study	Study interchange options for Exit 63	Public	0.15	Mid
C	Cheyenne Boulevard	Build new arterial from Ellsworth Road to 151 Avenue	Private	15.4	Long
K	Ellsworth Road	Widen existing roadway from 1416 north to 225th to provide curb and gutter and a left turn lane according to the arterial typical section standard recommended in Section VI-A	Public	5.3	Long
N	Interchange Modification	Interchange improvements or replacement of Exit 63 per the recommendations of the Interchange Options Study	Public	50.0	Long
O	Cimarron Drive	Build new arterial from West Gate Road east to Cimarron Drive intersection with Ellsworth Road	Public	16.9	Long
R	Northern Lights Boulevard	Extend new collector from Northern Lights Boulevard east to the future extension of West Gate Road (see Project I)	Public / Private	6.7	Long

Figure 18
Roadway Project Summary Map



Project ID	Street	Project Description	Priority	Funding Source
A	Cheyenne Blvd	New arterial from existing Cheyenne Blvd to Radar Hill Rd	Mid	Private
B	Cheyenne Blvd	New arterial from Radar Hill Rd to Ellsworth Rd and extend new arterial from neighborhood to Cheyenne Blvd	Mid	Public/Private
C	Cheyenne Blvd	New arterial from Ellsworth Rd to 151 Ave	Long	Private
D	150 Ave	New arterial from 225 St to Liberty Blvd	Near	Private/Public
E	Cimarron St	New arterial from Ellsworth St to Liberty Blvd	Mid	Private
F	Tower Rd	Improve to collector standards 225 St to Liberty	Near	Public
G	Prairie Rd	Extend Local Rd to Liberty Blvd	Near	Public
H	150 Ave	New collector from Liberty Blvd to Cimarron Blvd	Mid	Private
I	Westgate Rd	New arterial from Hwy 1416 to Cheyenne Blvd	Mid	Private
J	Ellsworth Rd	Upgrade to new arterial from neighborhood to 1416	Mid	Public
K	Ellsworth Rd	Upgrade to arterial from 1416 to 225 St	Long	Public
L	Hwy 1416	Convert to 3-lane from I-90 to Liberty Blvd	Near	Public
M	Intersection	Liberty Blvd/Ellsworth Rd traffic control improvements	Near	Public
N	Interchange Modifications	Interchange options study for Exit 63	Mid	Public
		Interchange improvements or replacement of Exit 63 per study recommendations	Long	Public/State
O	Cimarron St	New Arterial from Ellsworth to Westgate Rd	Long	Public
P	New Rd	New collector to connect Freude Ln to Creekside Dr	Near	Private/Public
Q	Degeest Dr	New local from the end of Degeest Dr to Frontage Rd	Near	Private/Public
R	Northern Lights Blvd	New Collector from Northern Lights Blvd to Westgate Rd extension	Long	Public/Private
S	Mall Dr	New Arterial from Elk Vale to Frontage Rd	Near	Private

B. Pedestrian and Bicycle Projects

The project team, in collaboration with the SAT, determined that the most important non-motorized needs are concentrated around the Douglas Schools area. Accordingly, the Pedestrian and Bicycle projects shown on **Figure 17** were prioritized based on proximity to the schools.

Project List

Table 4 lists the projects, priorities and opinions of probable costs. Sidewalk and side paths costs were based on typical costs for concrete. Costs for shared use paths assumed 10 foot-wide gravel path. Based on 2013 construction cost estimates, the full set of identified projects would require an investment of about $1.8 million. Alone, the high priority projects would require $360,000 to complete.

Table 4. Prioritized Pedestrian and Bicycle Projects

Figure 15 Project ID	Project Description	Length (ft.)	Priority	Estimated Cost (thousands)
A	Side path along Ellsworth Rd from Liberty Blvd to 225th St	1,500	High	40
C	Sidewalks along Villa Dr and Briggs St	1,800	High	24
F	Side path on south side of 225th St from 150 Pl to existing connection	2,000	High	52
M	Complete sidewalk links around Middle School	900	High	12
O	Shared use path along Highway 1416 from Westgate Rd to Ellsworth Rd	10,600	High	135
Q	Sidewalk (west side) along Tower Rd from 224 St to 225th St	5,300	High	70
R	Sidewalk along north side of 225th St from Prairie Rd to 150 Pl	1,800	High	24
B	Side path along Ellsworth Rd from 225th St to Highway 1416	9,700	Med	250
D	Side path along north side of Liberty Blvd from Tower Rd to Ellsworth Rd	2,700	Med	70
H	Shared use path along Cimarron alignment from Ellsworth Rd to Liberty Blvd	4,500	Med	116
I	Sidewalk along S. Ellsworth Rd from Highway 1416 to neighborhood	2,400	Med	31
K	Side path (east side) along Tower Rd from 224th St to 225th St	5,300	Med	137
L	New side path along Tower Rd from Liberty Blvd to Patriot Dr	900	Med	23
P	Shared use path connection to Rapid City Path System	14,000	Med	180
E	Shared use path from Prairie Rd to Highway 1416	12,500	Low	160
G	Shared use path from Liberty Blvd to new shared use path	4,000	Low	51
J	Side path along Liberty Blvd on east and north sides between Highway 1416 and Tower Rd	8,700	Low	224
N	Side path along Radar Hill Rd	900	Low	23
S	Sidewalk along Liberty Blvd on west and south sides	11,300	Low	150

VI. TRANSPORTATION STANDARDS

A. *Proposed Roadway Cross Sections*

Figure 19 and **Figure 20** depict typical cross sections for arterial, collector and local roadways. Historically, Box Elder has used the Rapid City Standards for roadway typical sections. *BESTPlan* provides typical sections specific to the Box Elder area that can be used as a starting point for design of arterials and collectors in various contexts. Typical sections for arterial, collector and local classifications are not divided into "Urban" or "Rural" categories. This is done to provide the City with flexibility to implement particular sections when deemed appropriate. Typical sections for trails and paths are not included in this document, but the *Rapid City Area Bicycle and Pedestrian Master Plan* may be used as a design reference for trails and paths. In addition, minimum sidewalk and side path widths are depicted on **Figure 19** and **Figure 20**. **Table 5** provides summary information for each cross section.

REASONS FOR THIS STANDARD:

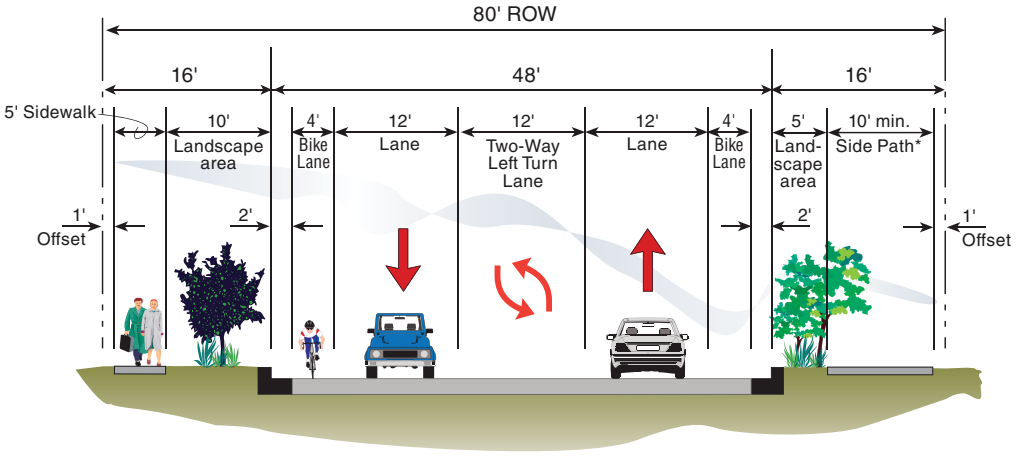
- Reminds City staff of elements that can be incorporated into roadway design
- Provides ROW widths for preservation
- Helps with cost estimating/budgeting
- Clear guidance for developers
- Enhances identity and unity of Box Elder

Table 5. Typical Section Characteristics

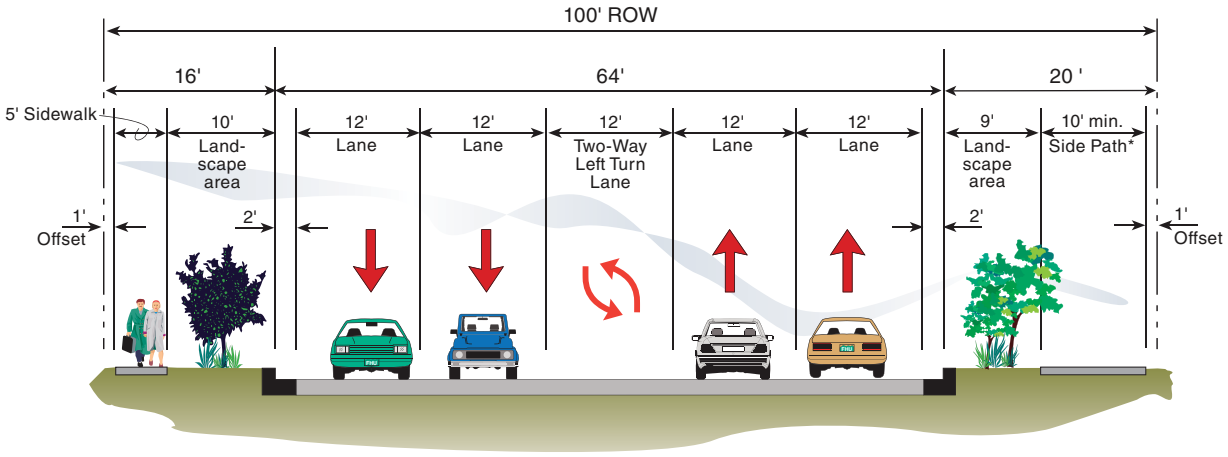
Classification	ROW (ft.)	Traveled Way (ft.)	Amenity Zone (ft.)	Number/ width of Travel Lanes	Speed (mph)		Shoulder/Bike Lane
					Design	Posted	
Arterial (2-3 lane)	80	48	16	2+Center Left Turn Lane / 12 ft.	50	30-45	4 ft Bike Lane
Arterial (4 lane)	100	64	20	4 / 12 ft.	50	35-45	n/a
Collector	66	46	10	2 / 11 ft.	35	30-35	4 ft. Bike Lane
Collector with on-street parking	66	46	10	2 / 11 ft.	35	30-35	6 ft. On-Street Parking
Local-Residential (Attached Walk)	50	32	9	2 / 10 ft.	25	25	6 ft. On-Street Parking
Local-Residential (Detached Walk)	60	32	14	2 / 10 ft.	25	25	6 ft. On-Street Parking

The roadway cross sections shown reflect a "Complete Streets" philosophy of designing streets to accommodate all roadway users. Providing detached walks and bicycle lanes are two distinctive aspects of the Complete Streets approach, which is intended to help build a road network that is safer, more livable, and welcoming to everyone (www.completestreets.org). While the City of Box Elder has not officially adopted a Complete Streets policy, the typical sections included in *BESTPlan* are intended to accommodate all users.

Figure 19
Arterial and Collector Cross Sections

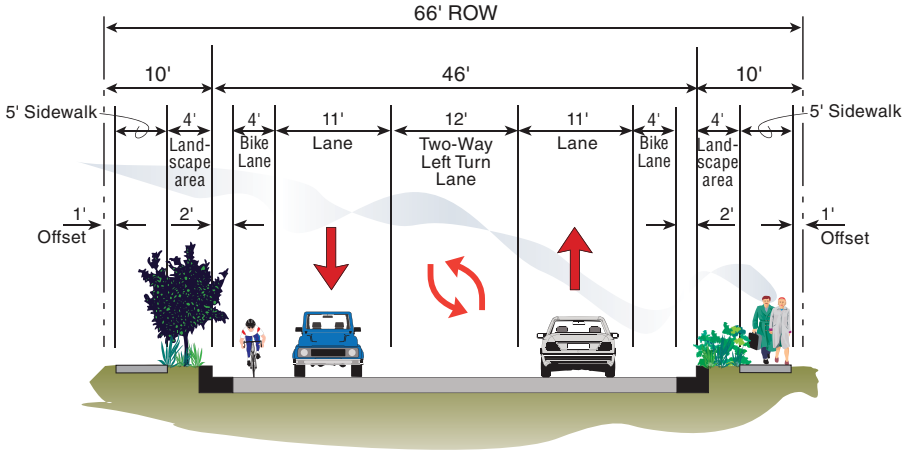


Two - Three Lane Arterial
(e.g. Ellsworth Road)



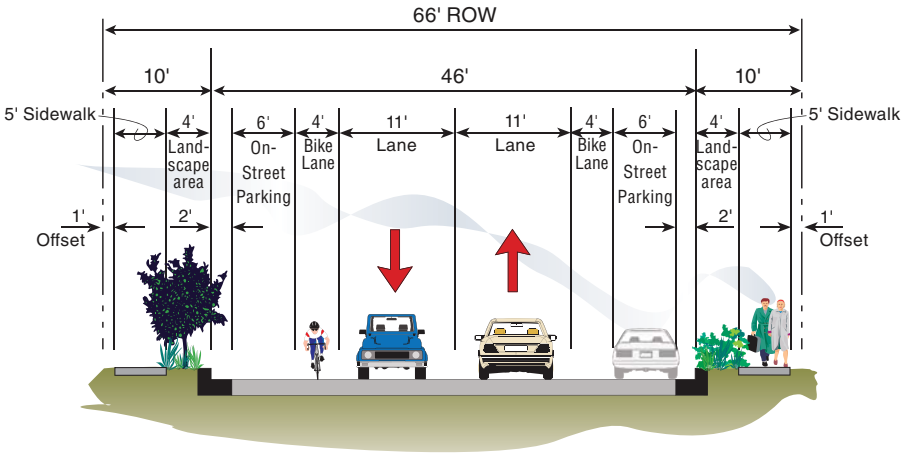
Four Lane Arterial
(e.g. Liberty Boulevard)

*Side Paths should be at least 5' away from edge of curb

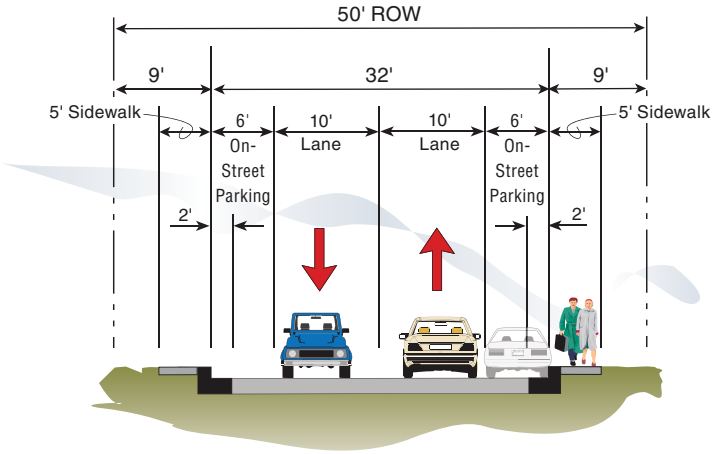


Collector

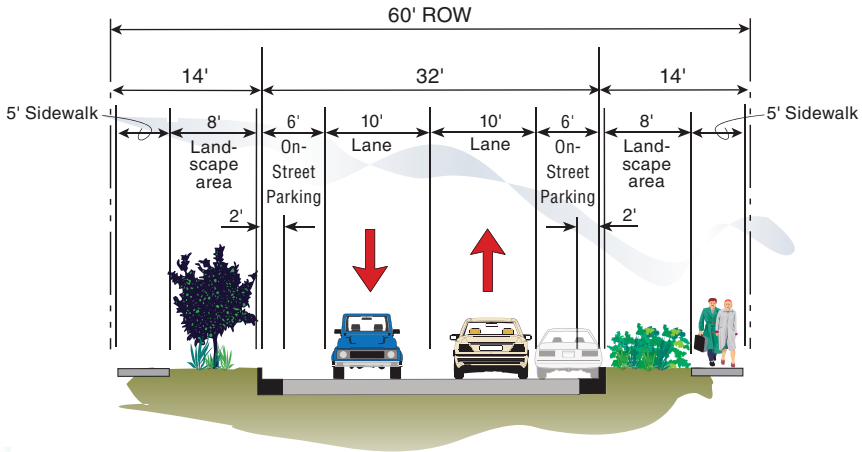
Figure 20
Collector (with Parking) and Local Street Cross Sections



Collector With On-street Parking



Local-Residential Attached Walk



Local-Residential Detached Walk

B. Transportation Development Review

Box Elder is currently known as a development-friendly community, which will continue to help the community to grow and develop economically. To ensure that transportation needs are met as growth happens, this plan provides a process by which new development and redevelopment efforts will address transportation needs.

Level of Service Standard

Consistent with the Rapid City Infrastructure Design Criteria Manual, it is recommended that Level of Service C serve as the design objective for the peak hour. Levels of Service are defined in the *Highway Capacity Manual*.

REASONS FOR THIS STANDARD:

- Ensures that developers are mindful of transportation needs when planning
- Helps to provide a basis for requests to the developer for improvements
- Maintains acceptable operating conditions as growth happens

Traffic Studies

New development in the study area generates vehicle-trips and associated new demands on the roadway system. The impacts of different developments vary from a small number of trips for a single new home to a large number of trips for a major residential subdivision or commercial development. Many municipalities require applicants for major developments to fund and submit a traffic impact study estimating the number of trips expected to be generated, the expected distribution of those trips onto the surrounding road network, and identifying major road improvements needed to accommodate the traffic.

Jurisdictions typically establish a threshold for the size of development that would trigger the requirement to do a traffic impact study (TIS). The traffic volume thresholds shown in **Table 6** are recommended in consideration of the need for a TIS.

Table 6. Traffic Impact Study Requirements

Daily Traffic Volume Generated by Proposed Development (Vehicle-trips per day)[1]	Study Requirements
1,000 or more	Traffic Impact Study Required
0–1,000	Traffic Impact Study may be required at the discretion of the City of Box Elder

[1] Daily Traffic Volume generated by development may be calculated based on proposed land uses using Trip Generation, Ninth Edition (Institute of Transportation Engineers, 2012). Using these rates, 1,000 vehicles per day corresponds to approximately 23,000 Square Feet of Shopping Center Retail or approximately 105 single-family detached homes.

The City of Rapid City has published guidelines for conducting a TIS. These guidelines provided in **Appendix F** could be used as a reference for Box Elder when requesting that a developer provide a TIS.

Other Development Review Considerations

To ensure that the development review process fully captures the transportation priorities of Box Elder, it is recommended that the following issues also be incorporated into the review:

- **Access Management:** The type and spacing of accesses should be permitted in a manner consistent with standards for Access Management and the classification of the roadway being accessed. Access Management techniques are to be incorporated with the development plan, such as:
  - Providing opportunities for interconnectivity and circulation between adjacent parcels and sharing of accesses
  - Limiting access movements to right-turn only or ¾ movement to enhance safety and efficiency
  - Avoiding offset intersections that create the potential for interlocking left turns
  - Providing appropriately-sized turn lanes for movements entering the site
  - Ensuring that adequate separation from adjacent accesses is provided
- **Sidewalk provision:** Development and redevelopment plans should include sidewalk linkages across the property, even when such connections are not well-developed outside the property. Americans with Disabilities Act (ADA) accessibility should be provided in accordance with Federal law.
- **Multi-modal accommodations:** Development and redevelopment plans should take advantage of opportunities to enhance the safety and efficiency of multi-modal travel, including bicycle parking, on-site walking paths, and parking lot pavement markings.
- New development should occur only where existing transportation facilities are adequate or where necessary improvements will be made as part of the development project.
- Development should pay its equitable share for necessary improvements to the City transportation system.
  - City of Box Elder ordinances should require construction of improvements identified through a traffic impact study.

C. Access Management

Currently, applicants request vehicular accesses and the City of Box Elder reviews access proposals. Access is granted or denied on a case-by-case basis. The establishment of access management guidelines is intended to guide the City in determining allowance of access to a particular property, and under what circumstances or restrictions that an access might be allowed. The guidelines are not intended to be a full comprehensive access manual, but rather some principles to determine if access would be allowed

REASONS FOR THIS STANDARD:

- Secure safe and efficient flow of traffic into the future
- Preserve functionality of roadway network
- Provide guidance to developers on number and location of accesses
- Provide objective, uniform standards for access to prevent constant need for re-interpretation

and references to determine the need for auxiliary turn lanes. It is recognized that City staff would look at each access case by case to determine any need for acceleration/deceleration lanes.

Access guidelines will be specific to the functional classification of the roadway being accessed, with the following guidelines:

- **Access Permitting:** It is recommended that access permit applications be required for gaining access to any City roadway. A permit application will also be required when there are changes to the property that increase the traffic volume to the site by 20 percent or more.
- **Arterial Roads:** Direct access to abutting land is subordinate to providing service to the through traffic movements. Access will normally not be granted to individual property that has a reasonable alternative means of access to a lower classification of roadway. Consideration of reasonable alternative access will take into consideration the function of the alternative roadway, its purpose, its capacity, its operation, its safety, and the means of improving the alternative roadway. Ideally, accesses should be limited to only arterial and collector cross-streets.

  Intersections with the potential for eventual signalization should be spaced at one-quarter-mile intervals based on section lines where feasible and subject to the roadway's grade and to the driver's entering sight distance. Allowed accesses or intersections spaced at intervals other than one-quarter mile will be restricted to right-in/right out only unless an engineering study clearly demonstrates that there are benefits to allowing additional movements and that the access location would not be a significant detriment to the integrity of the arterial roadway.

  All necessary means shall be pursued to ensure that any access granted to an arterial roadway serves as many properties as possible; this may require the stipulation of cross access through the subject property to serve neighboring properties. Additional access will not be provided to parcels along the arterial which are subdivided or are under a common ownership. Single family homes will not be allowed to front onto an arterial.
- **Collector Roads:** Direct access onto a collector roadway is reasonably balanced with the roadway's mobility function. A minimum of one access will be allowed to serve each property provided that it does not create a hazard or a detriment to the roadway's integrity and is at least 500 feet from another existing or future access or intersection. Access will normally be full movement, unsignalized unless such access creates an operation or a safety problem. In such a case, a restriction of movements may be required. A second access to individual properties may be granted if this access is not detrimental to existing or future access serving the adjacent property or to the operation of an existing or a planned cross-street intersection.
- **Local Roads:** The intent of local roads within developing areas is to provide direct access to abutting properties. Minimum spacing between access/intersections should be 50 feet; greater or lesser spacing may be required in unique circumstances subject to specific traffic conditions.

Table 7 outlines the spacing requirements for access to roadways of various functional classification categories.

Table 7. Access Spacing Standards

Functional Classification	Distance between Full Movement Accesses	Distance between Limited Movement Accesses
State / US Highway	See SDDOT Standards	See SDDOT Standards
Arterial	¼ mile (1,320 feet)	660 feet
Collector	500 feet	250 feet
Local Road	50 feet	50 feet

It is recognized that some access drives will be used very little, such as those serving agricultural purposes or oil and gas purposes. If the access is to experience very little use (no more than twice a month), the policy stated above may be waived barring any other unusual circumstances.

D. Roadway Surfacing of Existing Roadways

The decision to pave an existing gravel roadway is complex, requiring consideration of multiple factors. Based on a review of available resources and standard practices, the following elements should be considered in making the decision to pave a gravel roadway:

REASONS FOR THIS STANDARD:
- Provide rationale for making decision to pave
- Allocate funding to surfacing projects
- Minimize dust impacts of gravel roads

- Daily traffic volumes and type of traffic along the roadway. Past data from SDDOT indicate that it is economically viable to provide surface treatment to gravel roads carrying in excess of 250 to 300 vpd. Roads carrying in excess of 660 vpd are typically reviewed to determine whether an alternate roadway surface should be considered.
- The continuity and functional classification of the roadway should be considered. Arterial roads should generally be paved before collector or local roads. As another consideration, a local street may be economically sealed or paved while a road with heavy truck usage may best be surfaced with gravel and left unpaved until sufficient funds are available to place a thick load-bearing pavement on the road.
- The tendency of drivers to divert away from gravel surfaces and onto paved surfaces to make their trip should be considered. If the new paved roadway would provide the first paved surface serving a particular demand pattern within the area, it should be designed to accommodate higher levels of traffic and routes leading to it may require some improvement to provide adequate traffic safety.
- Traffic safety should be addressed. Paved roads encourage higher travel speeds, and sight distance, curvature, lane width, surface friction and superelevation should be tailored to the anticipated travel speed. As stated in the Gravel Roads Manual, it makes no sense to pave a gravel road which is poorly designed and hazardous.

- It is important to build up the road base and improve drainage before paving. If water is not drained away from the road, the pavement fails.
- The decision to pave a gravel road is ultimately based on economic considerations. Accordingly, SDDOT published a research report in June 2004 intended to assist local governments with the roadway surfacing decision. The report provides a detailed cost model addressing the agency and user costs associated with various roadway surfaces.
- Public opinion should be weighed in the decision process and leaders should inform the public about the factors considered in the decision process.

E. *Intersection and Pedestrian Crossing Design*

Throughout the planning process, City of Box Elder staff has requested that standards be developed to assist the City in making decisions about pedestrian crossings of roadways. Standards should address methods for determining whether any special crossing treatment is necessary, determining the type of treatment that is most appropriate (if needed), and design elements of pedestrian crossings.

1. Needs Assessment

REASONS FOR THIS STANDARD:

- Enhance pedestrian safety in Box Elder
- Provide guidance for designers on proper midblock and intersection crossing protocols

The initial assessment of whether any special crossing treatment is necessary should be undertaken as an analytical study of crossing conditions to see if crossing treatment(s) is/are needed. Among the technical items that a needs assessment should address for a given potential pedestrian crossing treatment include:

Data Collection

- Number of pedestrians crossing
- Traffic volumes and vehicle types
- Vehicular travel speeds
- Records of traffic crashes
- Review of sight distance for peds seeking to cross
- Collect data regarding available gaps in traffic

Analysis

An engineering study should be prepared documenting the above data collected and providing an assessment of whether current and/or future conditions justify installation of a pedestrian crossing signal or a different special treatment. Resources for supporting this need include the *Manual on Uniform Traffic Control Devices* (MUTCD), the Rapid City Area MPO's *Bicycle and Pedestrian Master Plan*, and the City of Boulder, Colorado's *Pedestrian Crossing Treatment Installation Guidelines* (November 2011).

2. Selection of Treatment

There are many existing means and methods to provide pedestrian crossing of a roadway. These include installing crosswalks, pedestrian-actuated signals, standard intersection traffic signals, raised pedestrian refuge islands, in-pavement lit crosswalks, curb "bulb-outs," and curb ramps. **Table 8** contains a partial list of crossing treatments for the City's consideration. It is recommended that these treatments and other innovative ideas be considered for implementation at locations with a demonstrated need. Other resources, such as *Alternative Treatments for At-Grade Pedestrian Crossings* (Lalani, 2001) provide many more crossing treatments.

Table 8. Pedestrian Crossing Treatments

Pedestrian Crossing Treatment	Description
Crosswalk	Common intersection treatment. Use only when can be protected in some fashion, such as at signalized intersection or locations with pedestrian-actuated crossings.
Pedestrian actuated signalized crossing	Use at midblock locations with high pedestrian and vehicular traffic. Consult Manual on Uniform Traffic Control Devices.
Raised pedestrian refuge islands	Use in combination with pedestrian-actuated traffic signals or other traffic warning devices. Creates two-stage crossing, a helpful safety measure.
Bulb-outs	Use when crossing distance is excessive and improved pedestrian visibility is needed. Can be combined with landscape enhancements to help with pedestrian visibility.
Curb ramps	All pedestrian crossings should have curb ramps available for use by disabled individuals.
Grade Separation	Construction of tunnel or overpass exclusively for pedestrian use.

3. Crossing Design

Design of pedestrian crossing treatments should be developed using available industry resources. Design components include elements such as pavement marking dimensions, appropriate roadway and pedestrian signage, signal placement and indications, ADA components, visibility enhancements, and material selection. **Appendix G** provides a document published by the FHWA regarding design of pedestrian crossings.

F. Truck Routes

The City currently maintains a listing of identified truck routes. No modifications to this listing are proposed with *BESTPlan*. Needed adjustments to the truck routes to accommodate changing growth or travel patterns may be incorporated into future editions of *BESTPlan* and/or City ordinances.

VII. SUMMARY AND ACTION STEPS

The intent of the Box Elder Strategic Transportation Plan (*BESTPlan*) is to ensure that the City of Box Elder has a plan in place to effectively upgrade the transportation plan and a vision for the transportation needs as future development occurs. The prioritized roadway project listing includes intersection improvements, roadway improvements, capacity projects, and completing new roadway links. The prioritized pedestrian and bicycle project listing includes new sidewalk locations and additions to the existing path system. The projects discussed in **Section V** include public projects that will be the responsibility of public agencies and will require coordination among the City, Meade and Pennington counties, and SDDOT. The Major Street Plan and project listing also detail private driven projects located in undeveloped portions of the study area that will be the responsibility of future development to finance and construct.

The following list provides a summary of actions the City of Box Elder should consider taking to ensure that needed transportation improvements are planned for and funded:

- Officially adopt *BESTPlan* through the governing bodies, including MPO Committees, Box Elder Planning Commission, and City Council.
- Begin to plan and budget for completion of the eight roadway improvements and seven pedestrian and bicycle improvements identified for the short term. Leverage the existing Box Elder Capital Improvement Projects Committee to address these improvements.
- Initiate discussions with SDDOT on the alignment and intersection control for the planned modifications to Highway 1416 identified in the STIP.
- Implement the Transportation Standards identified in *BESTPlan*, including:
  - Require traffic impact studies from proposed developments that meet the size thresholds so that the requirements for internal roadways and impacts to the surrounding roadway system can be evaluated. Development projects should be responsible for improving the arterials and collectors adjacent to their developments to match Box Elder's standard cross-sections.
  - Use the Major Street Plan as the official future roadway plan for the City and as a tool to identify required street corridors as the City exercises its platting authority in Meade and Pennington counties.
  - Permit new accesses/approaches to City roadways based on the categories and guidelines included in *BESTPlan.*
  - Integrate pedestrian crossing design guidance into future crossing projects and enhancements to existing pedestrian roadway crossings.
  - Use the typical roadway sections provided in *BESTPlan* to provide guidance to development projects as to the required ROW dedication and provide a starting point for roadway design and construction projects.

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