



## **City of Loveland, Colorado**

### North Boise Avenue Corridor Study Report

December 2016



# Executive summary

The City of Loveland (the City) retained GHD Inc. to evaluate the North Boise Avenue corridor illustrated in Figure 1. This report documents the existing conditions of the corridor, including studies conducted by the City and input from public meetings, discusses the City's traffic calming toolbox, provides improvement alternatives for the corridor that meet the project objectives, and identifies a recommended alternative based on input by the public and City officials.

Although this report identifies a recommended alternative for the corridor, the City does not currently have funding for Boise Avenue corridor improvements. Additionally, the final improvement decisions are subject to Council approval and City funding.

A public meeting open house was held at Council Chambers on April 14, 2016 in the evening. The purpose of the meeting was to provide the opportunity for citizens to express their concerns about the corridor and identify performance measure priorities to be used for concept evaluation. A survey was also available at the meeting to help quantify the concerns and priorities of the citizens.

The results of the survey indicated that the main concerns of citizens varied by location within the corridor. Between Eisenhower Boulevard and 18<sup>th</sup> Street, the highest mobility concerns were quality of traffic (delay and travel time), driveway access, and intersection control (ease of crossing or turning).

In the middle of the corridor (between 18<sup>th</sup> Street and Muddy Creek Drive), mobility concerns included safety as a pedestrian, intersection control, and speeding. The concerns in the northern section of the corridor (Muddy Creek Drive to 37<sup>th</sup> Street) included speeding and intersection control.

The varying concerns throughout the corridor evidenced in the survey support the previously mentioned competing user demands of commercial use near Eisenhower Boulevard (travel time and delay concerns) and residential use north of Park Drive (safety as a pedestrian and speeding concerns). Interestingly, the highest priority for improvements in all sections of the corridor was providing additional intersection controls. Improved driveway access was also identified as a priority between Eisenhower Boulevard and 18<sup>th</sup> Street; and, improved landscape/streetscape was also identified as a priority between Arikaree Drive to 37<sup>th</sup> Street.

Alternatives were presented at public meeting #2 on July 21, 2016. Both alternatives utilized bump-outs at all intersections from Eisenhower Boulevard (exclusive) to Park Drive (inclusive).

- Alternative 1 bump-outs were six feet wide and maintained the existing six-foot parking lane and six-foot bicycle lane. Alternative 1 also proposed curbed medians north of Park Drive with improved path connectivity and the installation of a rectangular rapid flashing beacon (RRFB) at the mid-block multi-use path crossing.
- Alternative 2 bump-outs were four feet wide and removed the existing on-street parking. A two-foot buffer was added to existing six-foot bicycle lanes. Since on-street parking was removed, bicycle lanes between the intersection bump-outs were ten feet wide. Alternative 2 incorporated the same curbed medians, path connectivity, and RRFB installations at Alternative 1. The travel lanes were reduced to 11 feet in order to provide a bicycle lane with a two-foot buffer.

The bump-outs narrow the intersection width, decreasing the crossing distance for pedestrians and breaking up the straight-ahead view for drivers, encouraging slower speeds. The bump-outs also increase the visibility of the pedestrian by providing a safe place to stand beyond parked cars and increase visibility for turning vehicles by moving stopped cars closer to Boise Avenue and restricting on-street parking 35 feet in advance of the

intersection. The bump-outs help address the public concerns of pedestrian safety and speed, and help provide a balance between all corridor users.

The curbed medians provide refuge for pedestrians, encourage slower vehicle speeds, and provide an opportunity for improving the corridor landscape. These aspects help address the public concerns of pedestrian safety, speed reduction, and improved landscape.

By connecting the disjointed neighborhood paths, clearer routes are defined for pedestrians and bicycles. The addition of the RRFB signage and painted crosswalk raises motorist awareness of path users. The clearly marked crossings and curbed median refuge increase the visibility and safety of path users.

Options were also presented to improve access near the Convenience Store at Eisenhower Boulevard.

- In one option, time-of-day restrictions would prohibit left-turns to/from the Convenience Store driveway on Boise Avenue during peak traffic hours to reduce congestion and improve safety. A raised median between the northbound and southbound travel lanes (terminated at the Convenience Store driveway) would separate and organize traffic movements.
- In a second option, a raised median between the northbound and southbound travel lanes could be extended beyond the Convenience Store driveway to physically block left-turning traffic to/from the Convenience Store, reducing congestion and improving safety.
- Additional improvement possibilities included tree branch trimming and the addition of a driveway, taper lane, and/or access sign near Eisenhower Boulevard entrance to improve visibility and safety.

Results of public meeting #2 survey indicated 42% in favor of Alternative 1 and 58% in favor of Alternative 2.

The recommended alternative is a hybrid of Alternative 1 and Alternative 2 presented at the second public meeting.

Based on the low utilization of parking on the west side of Boise Avenue, the recommended alternative removes existing on-street parking on this side of the street, except for the section across from the McKee Medical Center (between 19<sup>th</sup> Street and 21<sup>st</sup> Street) and utilizes the four-foot bump-outs for the south half of the corridor. The extra width gained from the removal of on-street parking allows for the provision of a buffered bicycle lane. On-street parking was maintained across from the hospital because the parking study indicated some utilization in this area, likely for the adjacent clinics. Removing on-street parking where practical reduces roadway conflicts, improves safety, and improves intersection sight distance. The removal of on-street parking and provision of a buffered bicycle lane is supported by the public survey results which favored Alternative 2.

Due to the higher utilization of on-street parking on the east side of Boise Avenue, the recommended alternative maintains on-street parking on this side of the street up to the intersection of Silver Leaf Drive. Bump-outs on this side of the street are six feet wide and the existing six-foot bicycle lane is maintained.

In the northern half of the corridor, the RRFB and path connectivity from Alternatives 1 and 2 are recommended along the buffered bicycle lane from Alternative 2.

An RRFB is also recommended for crossing maneuvers on the south side of the 19<sup>th</sup> Street intersection near the hospital.

Recommended access improvements to the Convenience Store include a curbed median extending to the northern edge of the Boise Avenue driveway, with a depressed portion directly across from the driveway which will allow left-turns. Left-turns into and out of the driveway will be restricted during peak traffic hours (7am-9am and 3pm-6pm Monday through Friday) with the use of a sign posted in the median. If minor crashes continue to be a nuisance, the depressed portion of the median can be raised to a curbed median to physically restrict left-turns at all times of the day.

Based on the high percentage of use at the Eisenhower Driveway and public comments, a taper is recommended from the Eisenhower Boulevard intersection to the existing Convenience Store driveway, providing additional pavement for drivers to access the driveway. (City standards and preferences eliminated the additional driveway option.) A sign indicating Gas Station Entrance could accompany the taper. These improvements require approval from the Colorado Department of Transportation (CDOT). Tree branch trimming is also recommended to improve sight of the driveway.

Additional recommended improvements based on public input include moving the traffic signal pole in the northeast corner of the Eisenhower Boulevard intersection to increase corner turning clearance for large trucks.

The City roughly estimates costs of these proposed improvements to be around \$1.9 million. A final public meeting was held on November 3, 2016 to present the recommended alternative to the citizens. Feedback from the meeting resulted in minor changes to the recommended alternative.

- In locations where existing parking was removed and replaced with a bicycle lane, the bicycle lane width will be reduced from the original 10 feet to six feet in order to discourage parking in the bicycle lane. The bicycle lane buffer will be increased to six feet wide to account for the reduction in the bicycle lane width.
- On-street parking will be removed in front of the McKee Medical Center (from the southern ambulance entrance to Hoffman Drive) because parking is available in the large lots on the Medical Center property.
- Bump-outs will be added to the ambulance entrance of the McKee Medical Center and to the Country Lake Villa entrance to improve intersection sight distance and pedestrian visibility.
- On-street parking will be provided on the east side of Boise Avenue from Silver Leaf Drive to Park Drive to accommodate over-flow parking from the Country Lake Villa community.
- The existing median at the Park Drive intersection will be cut back approximately 35 feet to allow for an improved vehicle trajectory northbound through the intersection.
- The pedestrian crossing will be removed from the Muddy Creek Drive intersection since the nearby multi-use path connection and proposed RRFB will provide a more visible crossing location.

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# 1. Introduction

## 1.1 Project need

North Boise Avenue between Eisenhower Boulevard (US 34) and 37<sup>th</sup> Street (CR 24E) has a wide-range of land uses and traffic generators, including low density residential developments, businesses, medical facilities, and recreational parks, that create a mix of travel demands throughout the corridor. This variety in land use results in a diverse mix of users, often with competing, and at times contradictory, expectations of the corridor. Recently, a missing link of Boise Avenue between Mt. Columbia Avenue and 37<sup>th</sup> Street was constructed, bringing additional traffic into the area that had previously used other routes to access Eisenhower Boulevard and North County Road 11C. The original residents, in particular, are sensing the added travel pressure in the corridor. The juxtaposed needs and interests of mobility and land access consists of local residents with trip ends in the corridor desiring lower traffic flow and speeds, and other users with a through-put purpose expecting higher mobility. One of the biggest challenges for original residents and users is that the corridor is evolving toward a high mobility demand.

Harmonizing competing user demands should be the overarching goal for any corridor, or else a degree of frustration prevails in the minds of all its users. This becomes evident in complaints of speeding, poor access, and a prevailing sense of conflicting interests. This study seeks solutions to balance the needs of all users by being attentive to:

- Accommodation of the increasing demands without degrading safety, efficiency, quality of service, and user comfort.
- Reconciliation of the competing mobility and land access interests by harmonizing land use and transportation. A transportation corridor is harmonized when the expectations of all users is reasonably matched, commonly referred to as Complete Streets.

Location specific goals of the Boise Avenue corridor study include:

- Review public input and work with McKee Medical Center;
- Consideration of intersection improvements at Silver Leaf Drive, East 16th Street, and East 18th Street;
- Consideration of pedestrian crossing accommodations at the above intersections and where other concentrations of pedestrians have been observed; and,
- Review of commercial access in the vicinity of Eisenhower Boulevard (US 34).

The City of Loveland (the City) retained GHD Inc. to evaluate the Boise Avenue corridor illustrated in Figure 1. This report documents the existing conditions of the corridor, including studies conducted by the City and input from public meetings, discusses the City's traffic calming toolbox, provides improvement alternatives for the corridor that meet the project objectives, and identifies a recommended alternative based on input by the public and City officials. Although this report identifies a recommended alternative for the corridor, the City does not currently have funding for Boise Avenue corridor improvements. Additionally, the final improvement decisions are subject to Council approval and City funding.

## 1.2 Study method

The Boise Avenue corridor study consists of the following primary stages:

1. Project Initiation;
2. Concept Development;

3. Alternatives Evaluation; and,
4. Recommended Alternative.

### 1.2.1 Project initiation

The Project Initiation stage establishes the context of the corridor planning study. Critical improvement needs are identified to guide alternative development and performance measures are established to evaluate each option. This stage emphasizes public engagement that will result in a balanced determination of the desired function and performance of Boise Avenue. This is where user expectations are articulated and emphasized.

In order for the feedback to be accurately representative, local residents and other stakeholders' input are critical including: Planning, Police, Council, and commercial/institutional stakeholder components. The public participation process is aimed at producing a traceable, transparent decision process.

The Boise Avenue corridor study process for the first public contact involves:

- Identification of issues and deficiencies (a strip map plan will be available for residents to mark-up); and,
- Identification and prioritization of performance measures via an on-line public survey.

Performance measures emphasized during the project initiation stage are applied to the concept evaluation stage.

### 1.2.2 Concept development

The Concept Development stage creates a collection of potential solutions (toolbox) that support the corridor study context and performance measures identified in the Project Initiation stage. Additional data of the existing corridor is collected, including collision history, traffic counts, corridor speeds, and parking usage, to help direct the alternative creation that occurs in the next stage.

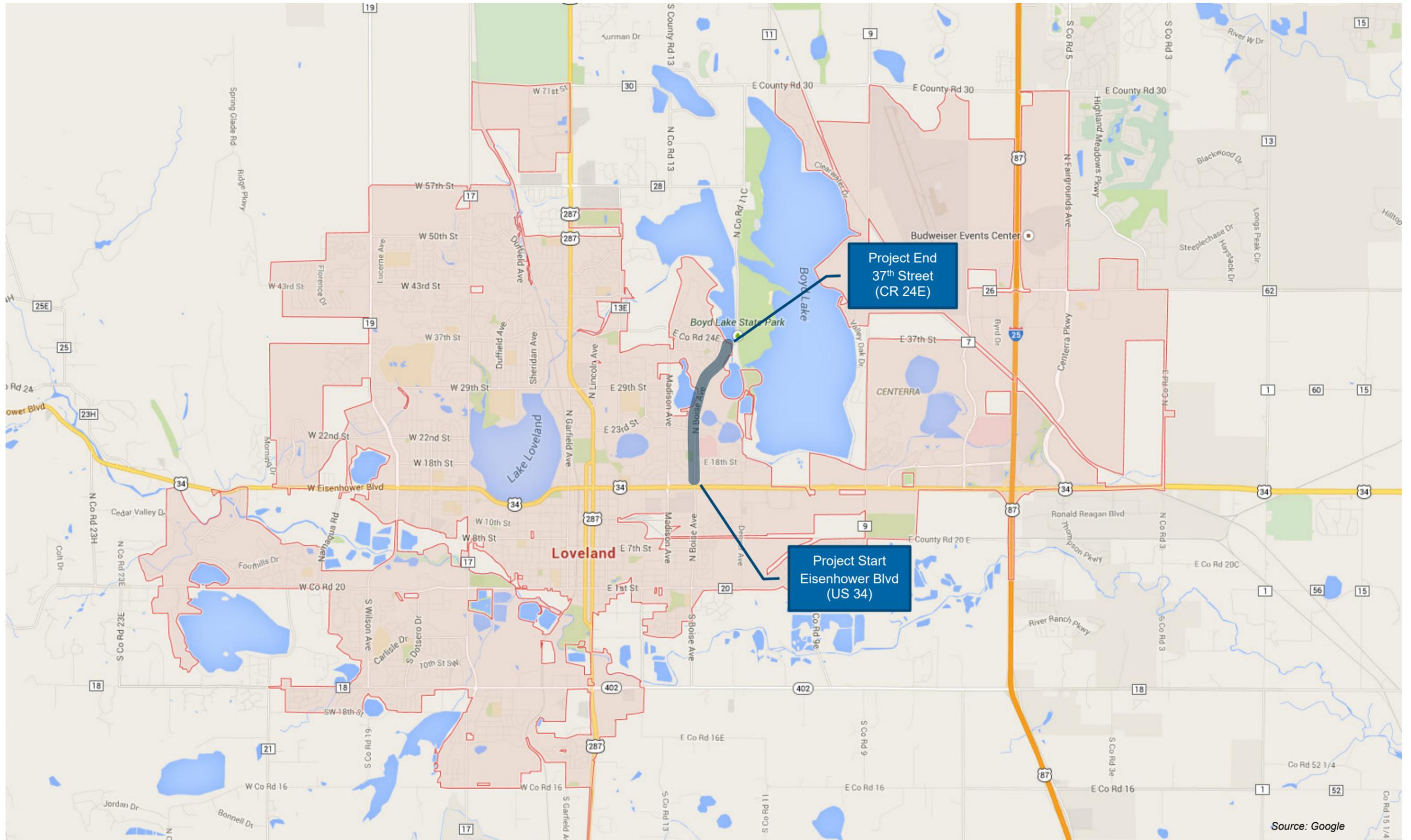
### 1.2.3 Alternatives evaluation

The Alternatives Evaluation stage selects appropriate solutions from the collection in the previous stage to develop corridor concept alternatives. This stage ends with public engagement, which involves:

- Sharing results of the additional data collected in the Concept Development stage;
- Sharing results of the public survey and key performance measures identified in the Project Initiation stage;
- Sharing alternatives and discussing how the alternatives meet the context and performance measures identified in the Project Initiation stage; and,
- Identifying alternative preference via an on-line public survey.

### 1.2.4 Recommended alternative

In this stage, performance measures are applied to the alternatives developed in the previous stage to identify a preferred alternative. Input from the City and the public survey are taken into account when making the recommendation. The recommended alternative will then be presented to the public in a final public meeting. A preferred option is then identified based on input from the final public meeting.



Source: Google

Figure 1. Project study limits

## 2. Project initiation

### 2.1 Existing conditions

The existing Boise Avenue corridor consists of a two-lane roadway with a two-way left-turn lane or painted median between the lanes in the study area. Bicycle lanes and sidewalks are provided along both sides of Boise Avenue throughout the entire study corridor. Sidewalks and multi-use paths approach Boise Avenue from the east and west in multiple locations north of Park Drive; however, the crossings at Boise Avenue are not organized or coordinated across both sides of the street. On-street parking exists along both sides of Boise Avenue from 15<sup>th</sup> Street on the south end of the corridor to Park Drive, approximately mid-way through the corridor.

Approximately 18 roadways intersect with Boise Avenue within the study corridor. Right and left-turn lanes are present at most of the intersections. Figure 3 provides an aerial image of the study corridor, illustrating the multitude of intersections and indicating the main land uses along the corridor. The southernmost intersection in the study corridor (Eisenhower Boulevard/US 34) is signalized. The northernmost intersection in the study corridor (37<sup>th</sup> Street/CR 24E) is stop-controlled on Boise Avenue. Remaining intersections throughout the corridor are minor street stop-controlled; traffic along Boise Avenue is free-flow. The posted speed limit on Boise Avenue is 30 mph for the southern portion of the corridor (Eisenhower Boulevard to Park Drive) and 35 mph for the northern portion (Muddy Creek to 37<sup>th</sup> Street) as indicated in Figure 3.

### 2.2 Public input

A public meeting open house was held at Council Chambers on April 14, 2016 in the evening. The purpose of the meeting was to provide the opportunity for citizens to express their concerns about the corridor and identify performance measure priorities to be used for concept evaluation. A strip map was available for residents to mark-up with comments and concerns, see Figure 2 for an example. The strip map was broken into four sections of the corridor to allow citizens to concentrate on the areas they were most familiar with and to help guide evolving priorities as the primary corridor use changed based on location (e.g. mostly commercial areas vs mostly residential areas). A survey was also available at the meeting to help quantify the concerns and priorities of the citizens. The survey was also made available on the project page set up on the City's website. Citizens were encouraged to spread the word about the study and online survey. Representatives from the City, Police Department, and GHD were available to answer questions and direct conversations.

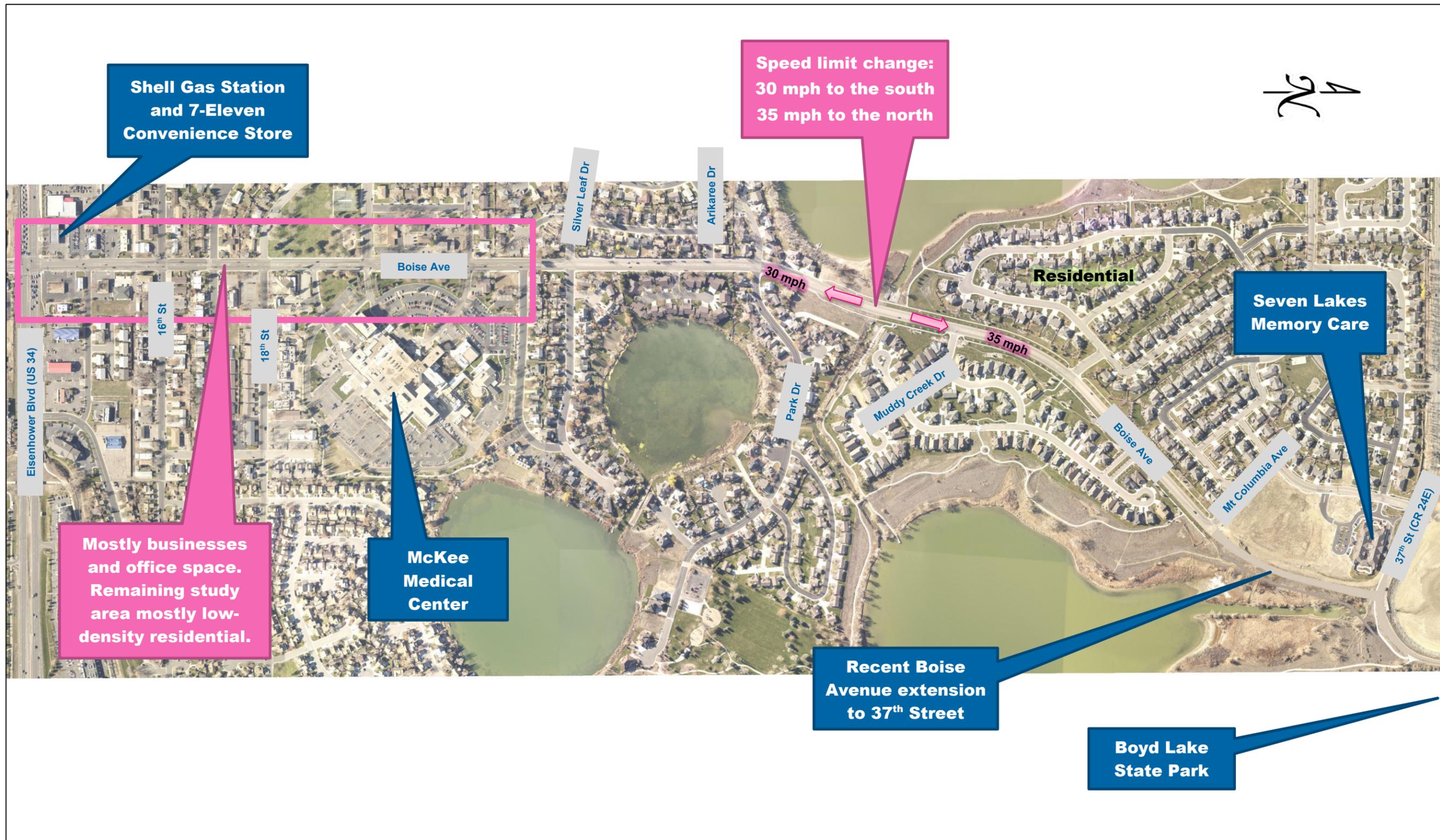
The results of the survey indicated that the main concerns of citizens varied by location within the corridor. Between Eisenhower Boulevard and 18<sup>th</sup> Street, the highest mobility concerns were quality of traffic (delay and travel time), driveway access, and intersection control (ease of crossing or turning). In the middle of the corridor (between 18<sup>th</sup> Street and Muddy Creek Drive), mobility concerns included safety as a pedestrian, intersection control, and speeding. The concerns in the northern section of the corridor (Muddy Creek Drive to 37<sup>th</sup> Street) included speeding and intersection control. The varying concerns throughout the corridor evidenced in the survey support the previously mentioned competing user demands of commercial use near Eisenhower Boulevard (travel time and delay concerns) and residential use north of Park Drive (safety as a pedestrian and speeding concerns). Interestingly, the highest priority for improvements in all sections of the corridor was providing additional intersection controls. Improved driveway access was also identified as a priority between Eisenhower Boulevard and 18<sup>th</sup> Street; and, improved landscape/streetscape was also identified as a priority between Arikaree Drive to 37<sup>th</sup> Street. The results of the public survey are summarized in Table 1. Top priorities identified in the survey are highlighted.



Figure 2. Example strip map with public comments from public meeting held April 14, 2016

Table 1. Public meeting and survey response summary

Survey Category	Eisenhower Blvd to 18 <sup>th</sup> St	18 <sup>th</sup> St to Arikaree Dr	Arikaree Dr to Muddy Creek Dr	Muddy Creek Dr to 37 <sup>th</sup> St
<b>Mobility Concerns</b>				
Quality of traffic service (delay and travel time)	12	0	1	0
Safety as a pedestrian (ease of crossing Boise Avenue)	0	8	2	2
Speeding on Boise Avenue	2	5	10	4
Driveway access/egress	3	1	0	0
Intersection control (ease of crossing or turning)	9	8	4	3
Transit routes, timetable, stop locations	1	0	0	0
Bicycle accommodation	0	0	0	1
Other	4	8	11	5
<b>Mobility Priorities</b>				
Reduce travel time	0	0	0	1
Reduce speeds on Boise Avenue	1	2	2	2
Provide more pedestrian crossings in the midblock	2	1	0	1
Provide additional intersection controls (traffic signals or roundabouts)	12	11	15	3
Improve bicycle accommodations	0	0	4	0
Improve corridor landscape/streetscape	1	1	6	3
Improve driveway access	16	0	0	0
Other	13	4	7	7



**Figure 3. Aerial view of study area**

The public survey also included an opportunity for citizens to write in additional comments and concerns (the "Other" category). The most common comments and concerns from the survey were:

- Lots of traffic going east on 18th
- Lots of semi-trucks
- Emergency equipment getting hit, police and ambulance
- Businesses across the street park up to the driveways on the side-streets
- Increase in traffic to and from Boyd Lake as well as an increase in speed since the completion of the extension to 37th
- Boise was never designed to handle the amount of traffic it now handles – and with a major hospital
- Is there any way to route trucks pulling boats to Madison to 37th in the summer time, with signage?
- Move the ambulance station out to Hwy 34. They are mostly out bound and don't need to travel so fast down Boise.
- Fatality because of speeding at Silver Leaf
- Don't want Boise a 4 lane

### 3. Concept development

Several studies were conducted by the City to help further define the problem and identify a collection of potential solutions (the toolbox). The studies included collision history, traffic volumes (including vehicle classification counts), corridor speeds, and parking usage. These studies were then used to develop the toolbox of potential solutions for improving the corridor. The studies and identified tools are described in this section.

#### 3.1 Collision History

Area collision history and records were obtained for the Boise Avenue corridor. From discussions with police, it is understood that the corridor does not have a high crash rate; however, the intersection of Boise Avenue and Eisenhower Boulevard (US 34) at the southern limit of the study corridor was identified as being in the 2015 Top 10 Accident Locations as documented in the Loveland Police Department's 2015 statistical report (see Figure 4). Additionally, one fatal crash occurred at the intersection of Boise Avenue and Silver Leaf Drive.

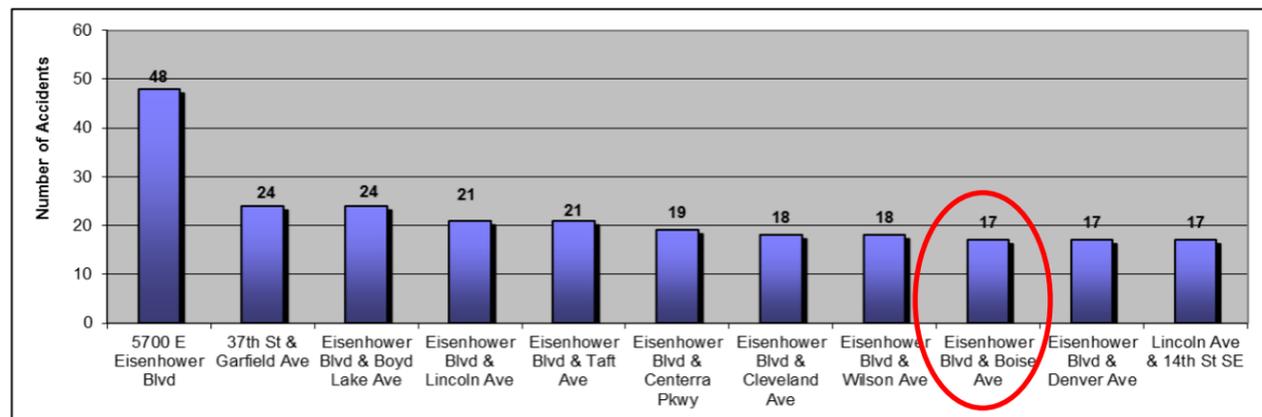


Figure 4. Loveland Police Department 2015 top 10 accident locations

Minor crashes have also been a nuisance at the Boise Avenue Shell Gas Station and 7-Eleven Convenience Store driveway access. According to police reports, four minor driveway related crashes occurred in 2015 and two have occurred through July 2016. The incidents largely stem from difficulty getting into and out of the driveway due to queues from the Eisenhower Boulevard traffic signal blocking access to the driveway. Figure 5 illustrates the driveway location and current access problems.

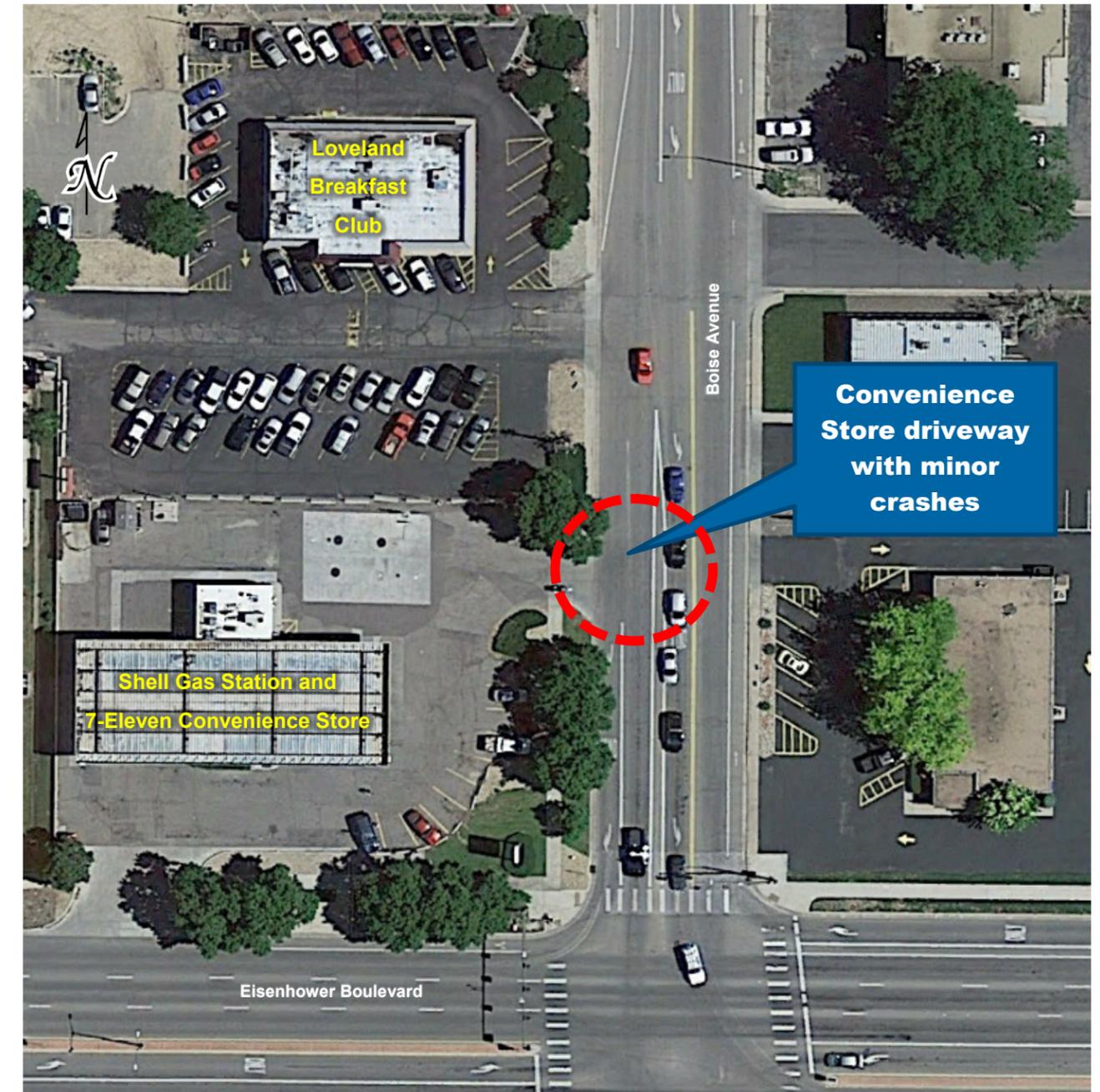


Figure 5. Convenience Store driveway location with minor crashes

### 3.2 Traffic Studies

To better understand the existing traffic dynamics of the corridor, the City conducted traffic volume studies, vehicle classification studies, and speed studies. The results of the studies are described in the following sections.

#### 3.2.1 Traffic volume study

A traffic study was completed to compare the daily traffic on Boise Avenue before and after the extension to 37<sup>th</sup> Street was constructed. The study found the difference between the amount of traffic using Boise Avenue before the extension was constructed versus after the extension was constructed was minimal. While the public perception is that the Boise Avenue extension attracted more traffic to the corridor, the traffic study does not support this view. The results of the traffic volume study are summarized in Table 2.

**Table 2. Traffic Volume Study Before/After Boise Avenue Extension**

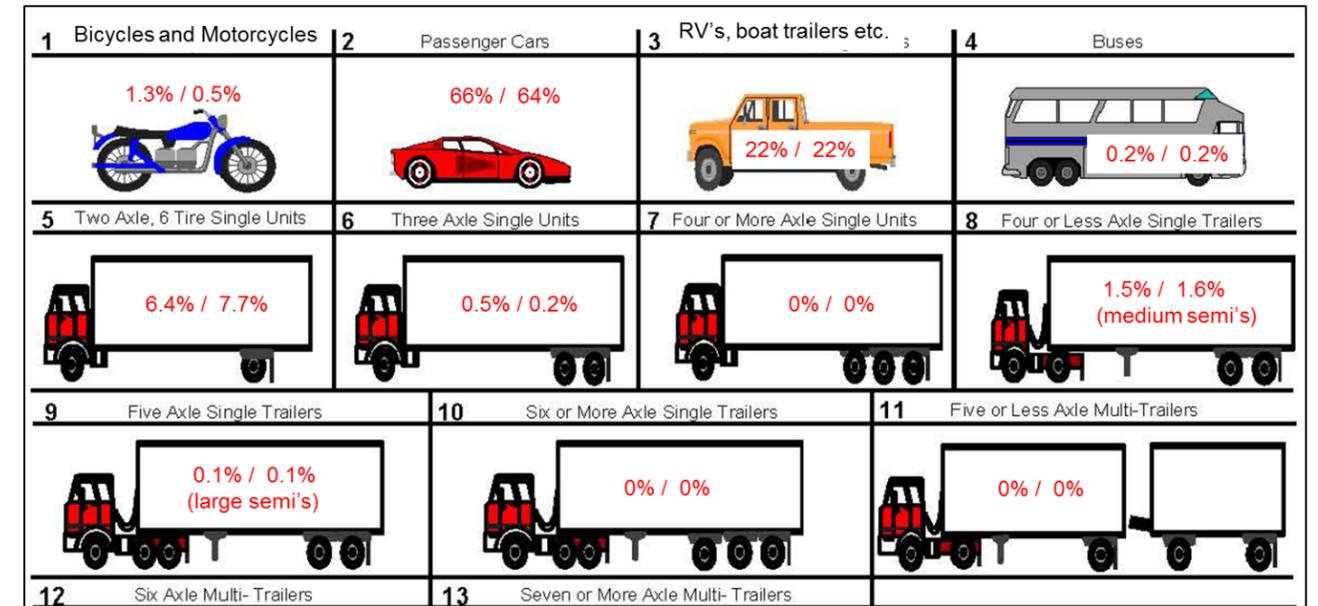
Boise Avenue Traffic Volume Study Before/After Boise Ave Extension	Before (veh. per day)	After (veh. per day)	Difference (veh. per day)
Boise Avenue South of 16 <sup>th</sup> Street	14,331	13,171	-1,160
Boise Avenue North of Silver Leaf Drive	5,816	5,958	+142

A study of driveway usage at the Shell Gas Station and 7-Eleven Convenience Store was also completed. The study found that the Convenience Store driveway access off of Eisenhower Boulevard was utilized more often than the driveway off of Boise Avenue. Additionally, a study of driveway blockage due to queues on Boise Avenue at the Eisenhower Boulevard traffic signal found that the Convenience Store driveway off of Boise Avenue is blocked 96% of the time during peak hours between 7:40 am and 4:40 pm. The Loveland Breakfast Club driveway north of the Convenience Store is blocked 60% of the time during this same period. Refer to Figure 5 for an illustration of the area.

#### 3.2.2 Vehicle classification counts

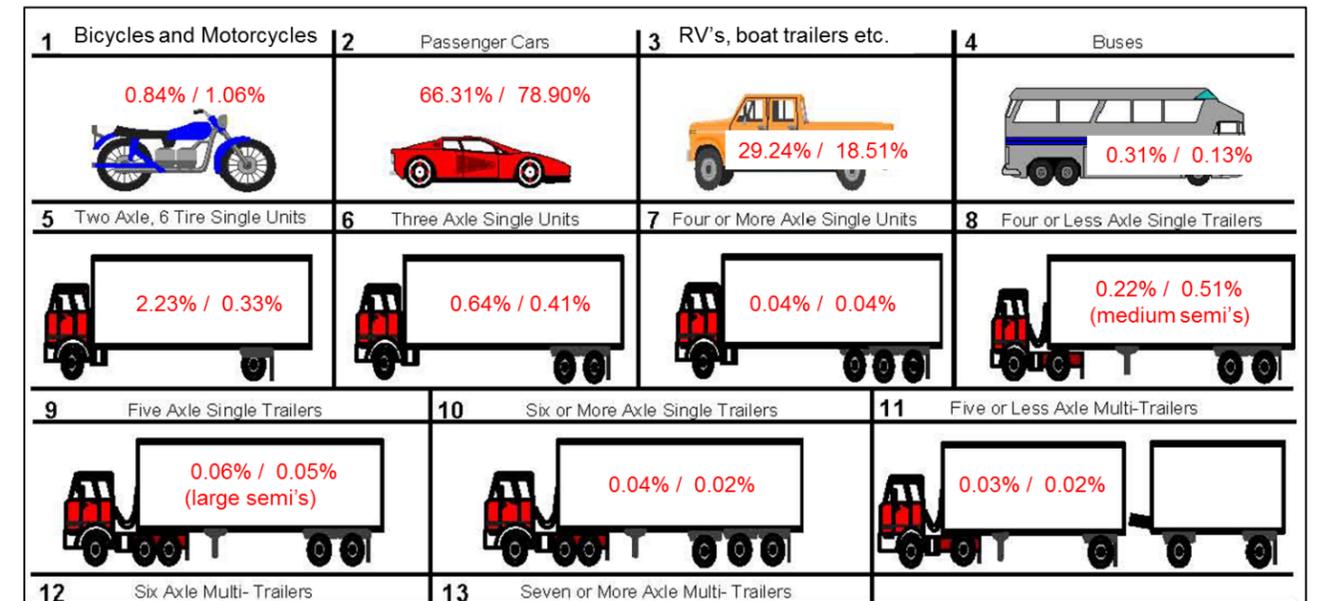
Vehicle classification counts were obtained for the corridor to determine the percentages of bicycles and motorcycles, passenger cars, recreational vehicles, buses, and large trucks that use the corridor. Data was collected south of Tomichi Creek Street May 18, 2016 through May 26, 2016. The results, summarized in Figure 6, indicate that the corridor is primarily comprised of passenger cars (64-66%), recreational vehicles (22%), and single unit delivery trucks (6.9-7.9%).

A before/after study on vehicle classification from counts taken in 2005, 2008, 2009, and 2016 was also completed to compare the classification of vehicles on Boise Avenue before and after the extension to 37<sup>th</sup> Street was constructed. The study found that after the extension was constructed, the percentage of passenger cars using the corridor increased while the percentage of recreational vehicles and single unit delivery trucks decreased. The results of the before/after classification study are summarized in Figure 7.



Key: NB % / SB %

**Figure 6. Vehicle classification May 2016**



Key: Before % / After %

**Figure 7. Vehicle classification before/after Boise Avenue extension**

#### 3.2.3 Speed study

Speed studies were conducted by the City to determine the average speeds along the Boise Avenue corridor. Fourteen speed study runs were completed northbound and southbound through the corridor on multiple days at various times of the day. The speed was recorded at each intersection along the corridor. Average speeds were generally within five miles per hour of the posted speed limit, with a slightly higher variation in the mid-section of the corridor. Additionally, the average speed northbound through the corridor was generally a couple miles per hour higher than the average speed southbound.

A spot speed was also conducted at a location south of Tomichic Creek Street where the posted speed limit is 35 mph. The average (50<sup>th</sup> percentile) spot speed observed at this location for southbound traffic was 37 mph. The 85<sup>th</sup> percentile spot speed was observed at 40 mph (ie. 85% of the traffic traveling southbound are driving at 40 mph or less).

An overview of the speed studies is provided in Figure 8, with a more detailed illustration in Figure 9 through Figure 12.

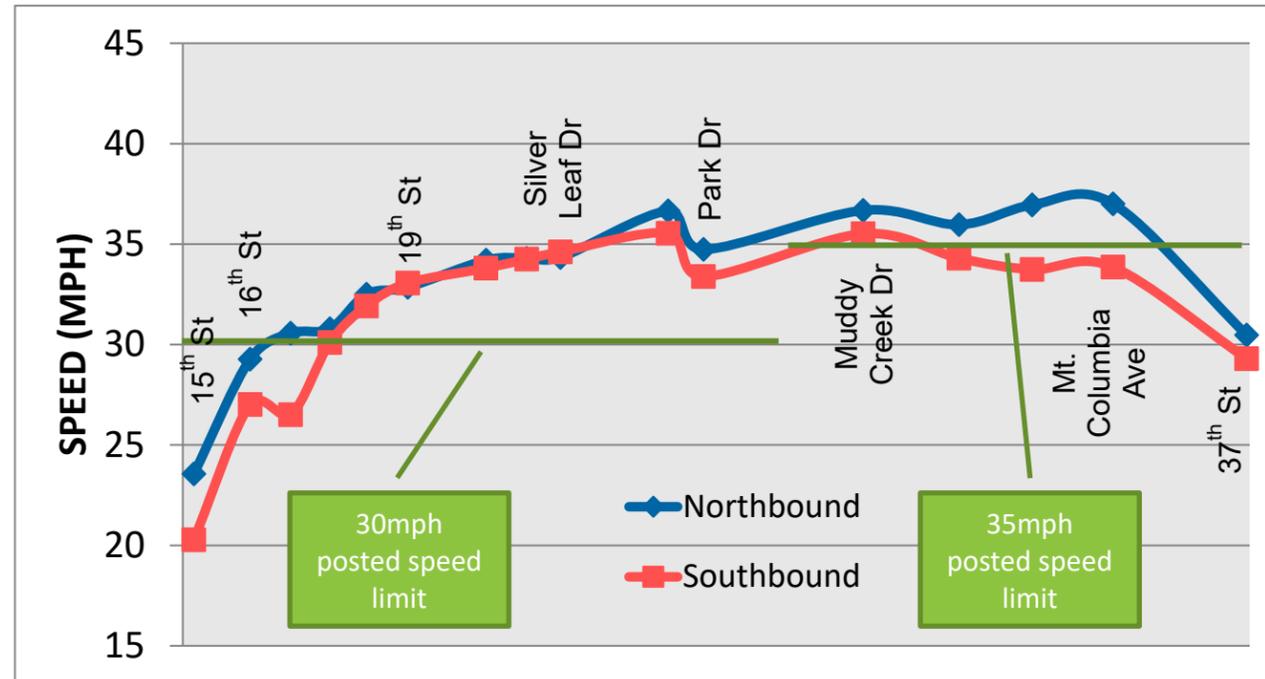


Figure 8. Speed study results

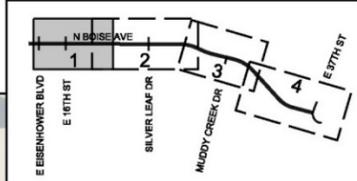
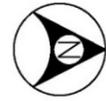
### 3.3 Parking study

The City conducted a parking study to determine the utilization of on-street parking along the Boise Avenue study corridor. The parking study was conducted at 9am, 11am, 1pm, and 3pm during the week of June 6, 2016. The results of the study indicated minimal use of the available on-street parking spaces along the corridor. The highest usage was observed on the west side of the road (southbound Boise Avenue) near the clinics adjacent to the hospital; however, even these locations had low utilization (23% of the available space).

Table 3 tabulates the results of the study. The results are illustrated in Figure 9 through Figure 12.

Table 3. Parking study results

Boise Ave Parking Study	Northbound Boise Avenue		Southbound Boise Avenue	
	Approximate # of Available Spaces veh	Maximum Utilization # veh (%)	Approximate # of Available Spaces veh	Maximum Utilization # veh (%)
Eisenhower to 16th St	2	1 (50%)	10	0 (0%)
16th St to 17th St	8	2 (25%)	8	2 (25%)
17th St to 18th St	0	0 (0%)	8	0 (0%)
18th St to 19th St	17	0 (0%)	20	0 (0%)
19th St to 21st St	11	0 (0%)	12	3 (25%)
21st St to Silver Leaf Dr	12	0 (0%)	18	0 (0%)
Silver Leaf Dr to Park Dr.	22	0 (0%)	28	1 (4%)

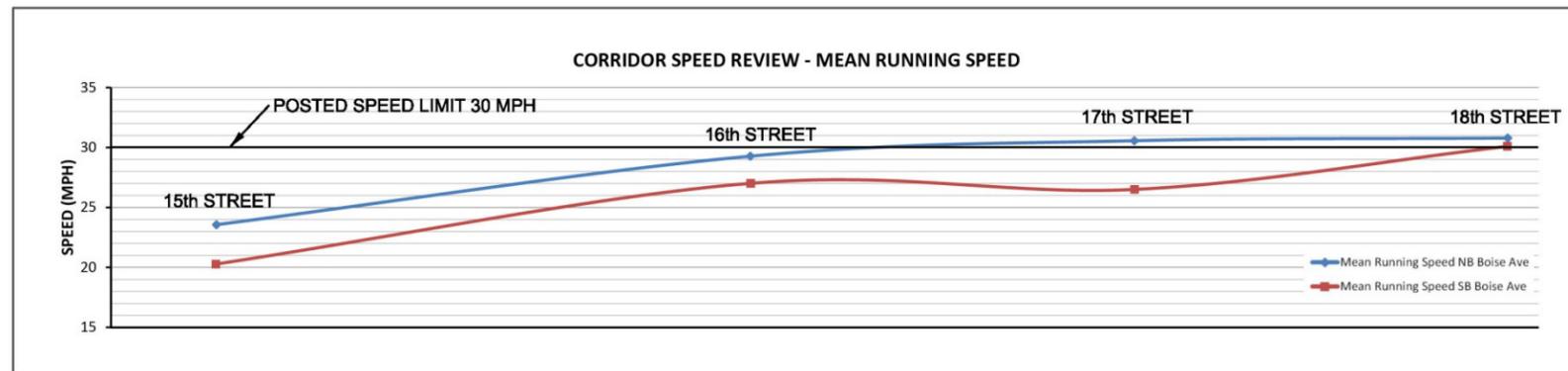


— SB On-Street Parking  
— NB On-Street Parking  
↔ Hourly Traffic Flow AM (PM)  
 ADT Daily Traffic Flow

**Areas of Concern from Public Input**

Mobility concerns	Number of Responses Eisenhower Blvd to 18th St
Quality of traffic service (delay and travel time)	12
Safety as a pedestrian (ease of crossing Boise Avenue)	0
Speeding on Boise Avenue	2
Driveway access/egress	3
Intersection Control (ease of crossing or turning)	9
Transit routes, timetable, stop locations	1
Bicycle Accomodation	0
Other	4
<b>Mobility priorities</b>	
Reduce travel time	0
reduce speeds on Boise Avenue	1
Provide more pedestrian crossings in the midblock	2
Provide additional intersection controls (traffic signals or roundabouts. List locations)	12
Improve Bicycle accomodations	0
Improve corridor landscape/streetscape	1
Improve driveway access	16
Other	13

Top Concerns and Priorities



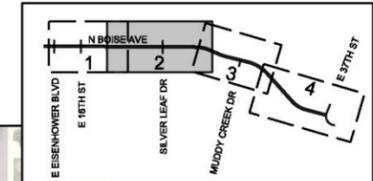
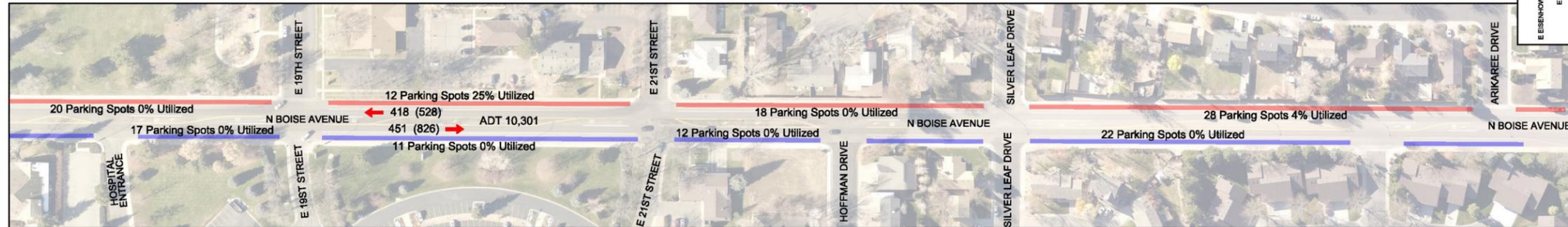
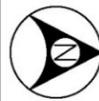
N BOISE AVENUE CORRIDOR  
LOVELAND, COLORADO

OVERVIEW OF TRAFFIC DATA COLLECTION  
EISENHOWER BOULEVARD TO 18TH STREET

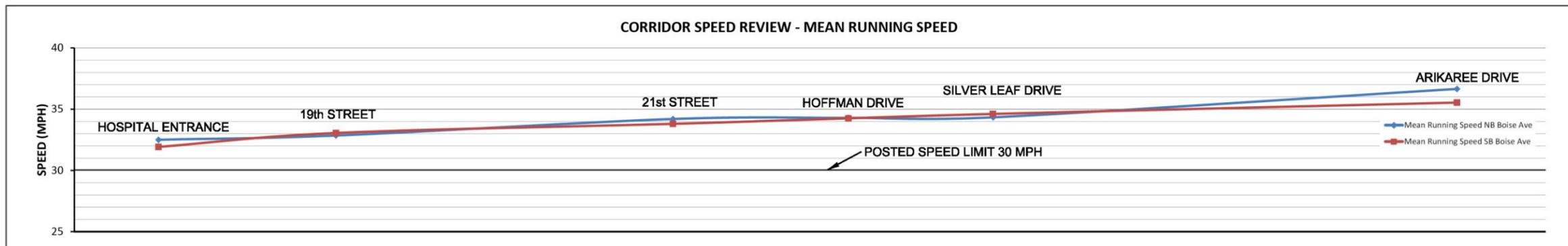


SHEET: 1 OF 4

**Figure 9. Overview of traffic data for Boise Avenue corridor section Eisenhower Boulevard to 18th Street**



— SB On-Street Parking  
— NB On-Street Parking  
← Hourly Traffic Flow AM (PM)  
← Daily Traffic Flow (ADT)



#### Areas of Concern from Public Input

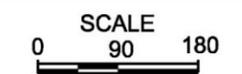
Mobility concerns	Number of Responses Hospital Entrance to Arikaree Dr
Quality of traffic service (delay and travel time)	0
Safety as a pedestrian (ease of crossing Boise Avenue)	8
Speeding on Boise Avenue	5
Driveway access/egress	1
Intersection Control (ease of crossing or turning)	8
Transit routes, timetable, stop locations	0
Bicycle Accommodation	0
Other	8
<b>Mobility priorities</b>	
Reduce travel time	0
reduce speeds on Boise Avenue	2
Provide more pedestrian crossings in the midblock	1
Provide additional intersection controls (traffic signals or roundabouts. List locations)	11
Improve Bicycle accommodations	0
Improve corridor landscape/streetscape	1
Improve driveway access	0
Other	4

Top Concerns and Priorities



N BOISE AVENUE CORRIDOR  
LOVELAND, COLORADO

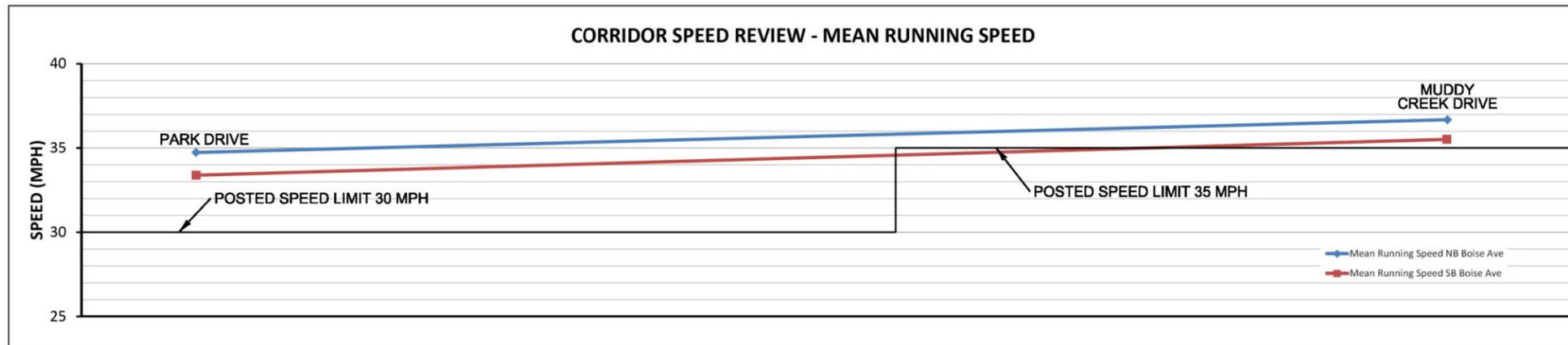
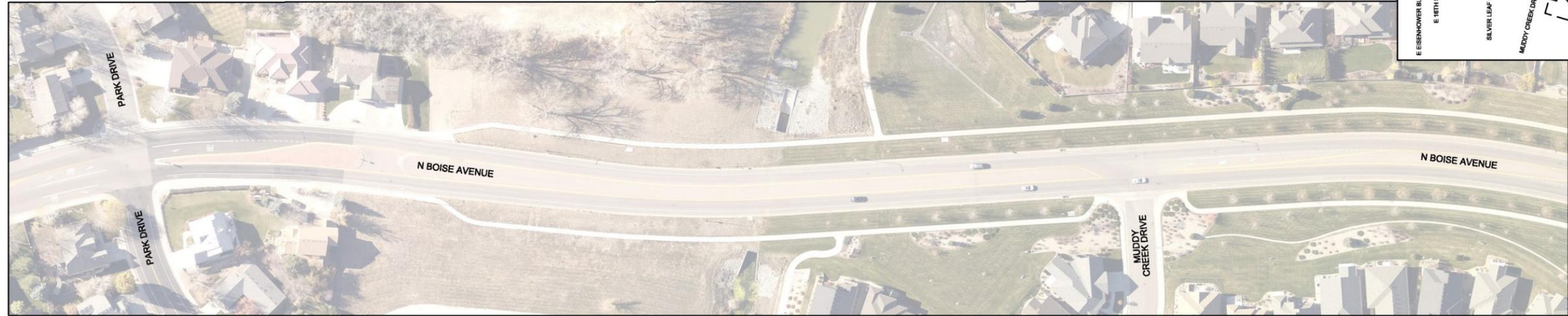
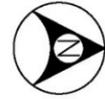
OVERVIEW OF TRAFFIC DATA COLLECTION  
HOSPITAL ENTRANCE TO ARIKAREE DRIVE



SHEET: 2 OF 4

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**Figure 10. Overview of traffic data for Boise Avenue corridor section Hospital Entrance to Arikaree Drive**



#### Areas of Concern from Public Input

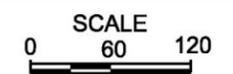
Mobility concerns	Number of Responses Park Dr to Muddy Creek Dr
Quality of traffic service (delay and travel time)	1
Safety as a pedestrian (ease of crossing Boise Avenue)	2
Speeding on Boise Avenue	10
Driveway access/egress	0
Intersection Control (ease of crossing or turning)	4
Transit routes, timetable, stop locations	0
Bicycle Accomodation	0
Other	11
<b>Mobility priorities</b>	
Reduce travel time	0
reduce speeds on Boise Avenue	2
Provide more pedestrian crossings in the midblock	0
Provide additional intersection controls (traffic signals or roundabouts. List locations)	15
Improve Bicycle accomodations	4
Improve corridor landscape/streetscape	6
Improve driveway access	0
Other	7

Top Concerns and Priorities



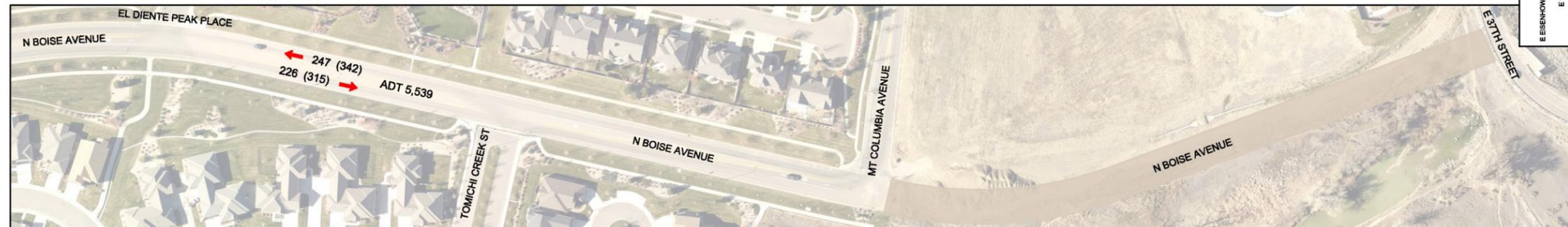
N BOISE AVENUE CORRIDOR  
LOVELAND, COLORADO

OVERVIEW OF TRAFFIC DATA COLLECTION  
PARK DRIVE TO MUDDY CREEK DRIVE

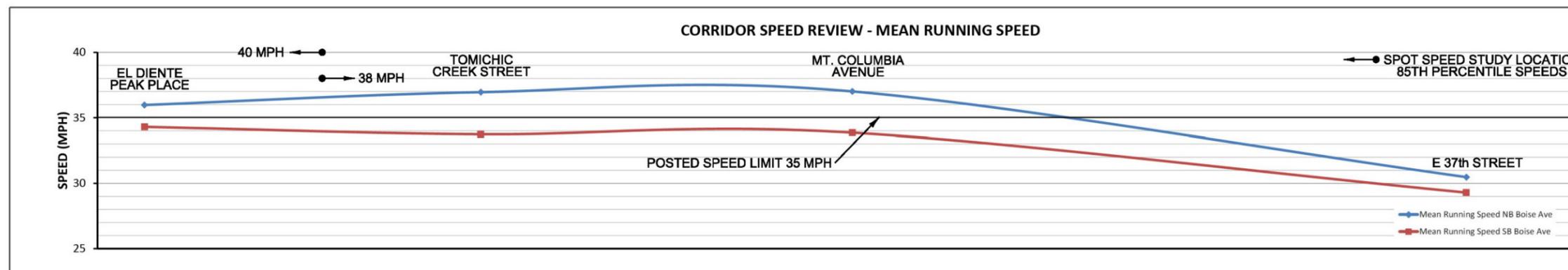


SHEET: 3 OF 4

**Figure 11. Overview of traffic data for Boise Avenue corridor section Park Drive to Muddy Creek Drive**



Hourly Traffic Flow AM (PM)  
 ADT Daily Traffic Flow



**Areas of Concern from Public Input**

Mobility concerns	Number of Responses El Diente Peak Pl to 37th St
Quality of traffic service (delay and travel time)	0
Safety as a pedestrian (ease of crossing Boise Avenue)	2
Speeding on Boise Avenue	4
Driveway access/egress	0
Intersection Control (ease of crossing or turning)	3
Transit routes, timetable, stop locations	0
Bicycle Accomodation	1
Other	5
<b>Mobility priorities</b>	
Reduce travel time	1
reduce speeds on Boise Avenue	2
Provide more pedestrian crossings in the midblock	1
Provide additional intersection controls (traffic signals or roundabouts. List locations)	3
Improve Bicycle accomodations	0
Improve corridor landscape/streetscape	3
Improve driveway access	0
Other	7

Top Concerns and Priorities



N BOISE AVENUE CORRIDOR  
LOVELAND, COLORADO

OVERVIEW OF TRAFFIC COLLECTION  
EL DIENTE PEAK PLACE TO 37TH STREET



SHEET: 4 OF 4

Plot Date: 7/12/2016 File Name: G:\11111109849 Boise Avenue, Loveland, Colorado\CADD\Exhibit\Boise Ave - Exhibit 1,20 - 4 - 11x17.dgn

**Figure 12. Overview of traffic data for Boise Avenue corridor section El Diente Peak Place to 37<sup>th</sup> Street**

### 3.4 Toolbox

Through coordination with the City, the following items were identified as possible solutions available for the Boise Avenue corridor:

- Corner sight tree trimming and improved signage (previously completed)
- Curbed medians
- Improved pedestrian connectivity
- Mid-block pedestrian crossings with rectangular rapid flashing beacons
- Buffered bike lanes
- Roundabouts
- Bump-outs/ curb extensions/bulbouts
- Access alterations and left-turn restrictions
- Passive speed control

#### 3.4.1 Corner sight tree trimming and improved signage (previously completed)

Sight distance concerns, in part due to overgrown vegetation, at many intersections along the Boise Avenue corridor were mentioned prior to the study. The City took action against these concerns by sending out tree trimming notices to property owners. Additional concerns mentioned prior to the study included way-finding issues. These concerns were addressed through the installation of additional signing, such as the No Outlet sign at Park Street and the One Way and Emergency signing at the hospital entrance (see Figure 13).



Figure 13. Signage for improved way-finding previously completed

#### 3.4.2 Curbed medians

Conversion of the existing painted medians, mostly north of Park Drive, to curbed medians can address pedestrian safety and speed concerns. Curbed medians provide a refuge for pedestrians crossing the street, allowing pedestrians to concentrate on crossing one direction of travel at a time and increasing pedestrian visibility in the center of the road. The presence of vertical curb in the middle of the roadway also introduces side friction to drivers, encouraging slower speeds. Curbed medians also provide the potential for landscaping, depending on funding and maintenance agreements, which can improve the corridor landscape (a priority identified for the northern half of the corridor). Examples of curbed and landscaped medians are shown in Figure 14.



Figure 14. Curbed median examples

#### 3.4.3 Improved pedestrian connectivity

Many of the existing sidewalks north of Park Drive lack safe, dedicated pedestrian crossings and the multi-use path lacks connectivity to both sides of Boise Avenue (see Figure 15). Improving path connectivity and providing dedicated crossing locations can help address the identified pedestrian safety concerns in the northern half of the corridor.

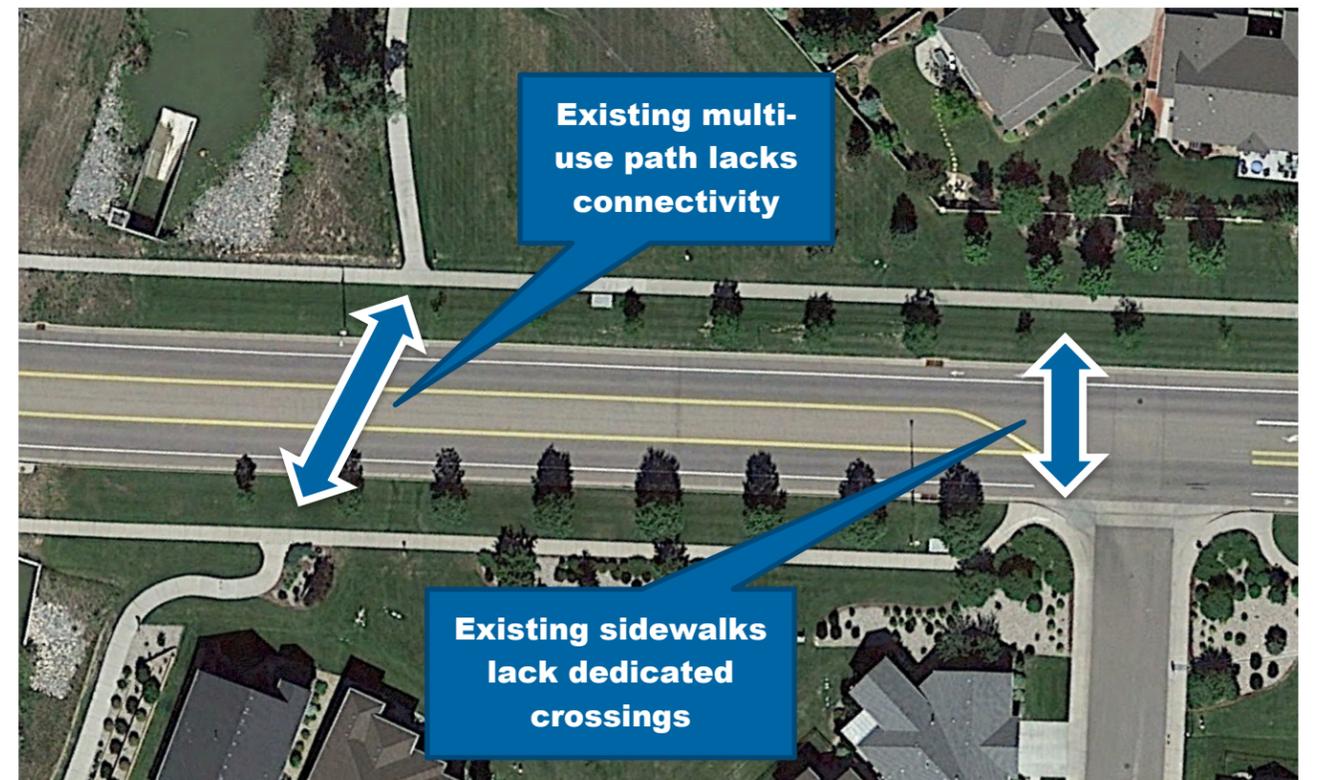


Figure 15. Lack of path connectivity and dedicated pedestrian crossings

### 3.4.4 Mid-block pedestrian crossings with rectangular rapid flashing beacons

In addition to improving connectivity and providing dedicated crossings, pedestrian safety can be enhanced through the use of rectangular rapid flashing beacons (RRFBs) at high volume mid-block crossings. RRFBs provide additional pedestrian crossing signage and flashing lights to alert drivers of the desire for pedestrians and bicyclists to cross the street. The signs and flashing lights increase the visibility of crosswalks users, thus increasing their safety. RRFBs are applicable in high pedestrian/bicycle user locations and in multi-use path connections. An example of RRFBs in use is shown in Figure 16.



Figure 16. Rectangular rapid flashing beacon (RRFB) example

### 3.4.5 Buffered bike lanes

A buffered bike lane is a standard bicycle lane with a painted buffer space between the bicycle lane and adjacent vehicular travel lane. The buffer is usually a minimum of two feet wide and provides a shy distance between bicyclists and motorists. The extra space increases comfort for bicyclists and tends to appeal to a wider range of bicyclists and abilities. (NACTO Urban Bikeway Design Guide)

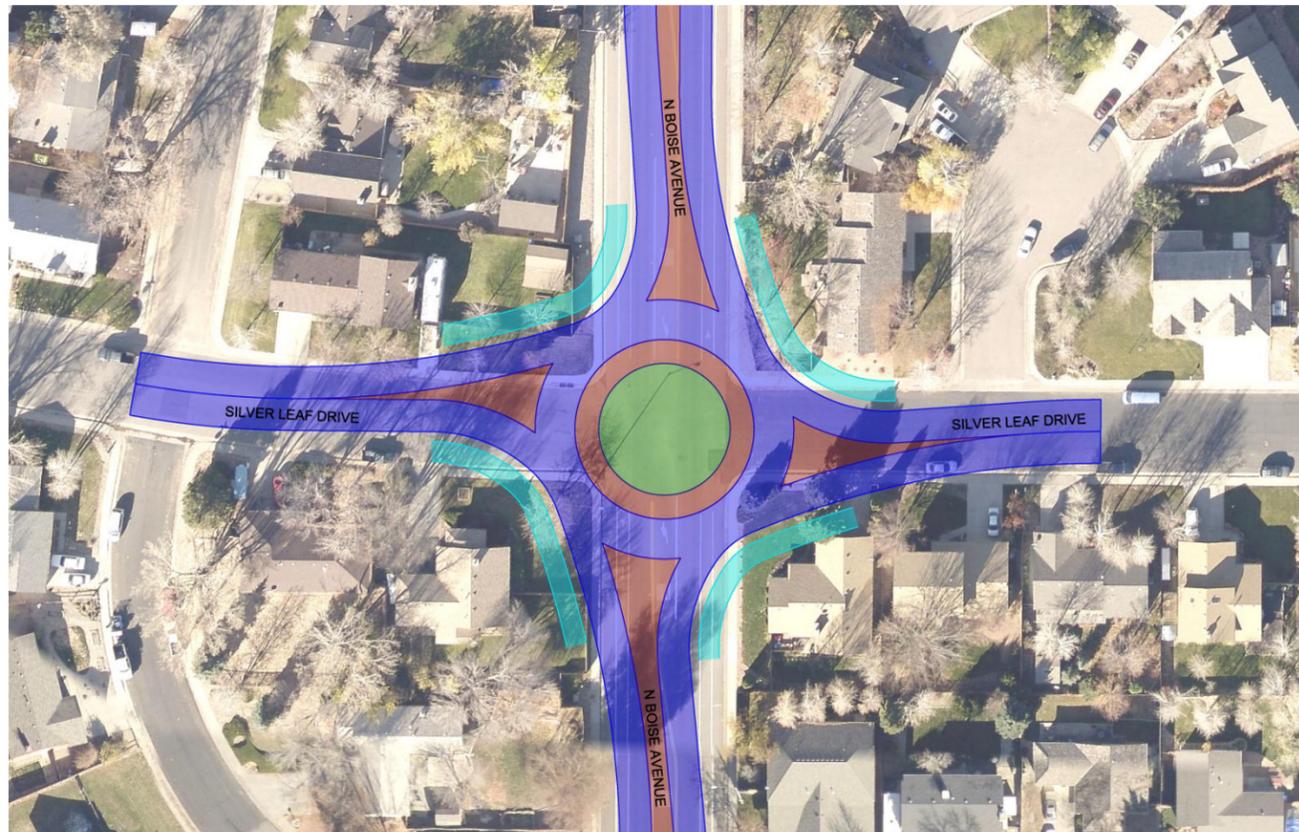
An example of a buffered bicycle lane from Colorado Springs, Colorado is illustrated in Figure 17. The hatching of the bicycle lane increases visibility and awareness of the bicycle lane for motorists and helps keep the bicycle lane narrow enough to not be mistaken for a travel lane. Implementing buffered bicycle lanes along Boise Avenue would help balance multi-modal desires along the corridor by improving bicycle facilities and safety, and increasing motorist awareness.



Figure 17. Buffered bicycle lane, Colorado Springs, Colorado

### 3.4.6 Roundabouts

Roundabouts and mini roundabouts have the potential to address several of the identified concerns throughout the corridor, including effective reduction in vehicle speeds, reduction in collision potential, improved side-street access and delay, and increased landscaping/aesthetics. Often, roundabouts and mini roundabouts are only recommended if all-way stop-controlled intersections are warranted. In the context of the Boise Avenue corridor, existing traffic volumes do not warrant the installation of all-way stop-control at the key intersections of 18<sup>th</sup> Street and Silver Leaf Drive. Because all-way stop-control intersections are not warranted along the corridor, roundabout (and mini roundabout) intersections are also not warranted along the corridor. Additionally, roundabouts at key intersections would likely result in the removal of parking near the intersection, would require additional right-of-way (potentially even the acquisition of home(s)), and would be an expensive counter measure. An example of a roundabout footprint at the Silver Leaf Drive intersection is shown in Figure 18. Roundabouts are not a practical and cost-effective solution to the identified concerns for the Boise Avenue corridor.



**Figure 18. Roundabout concept at the Silver Leaf Drive intersection**

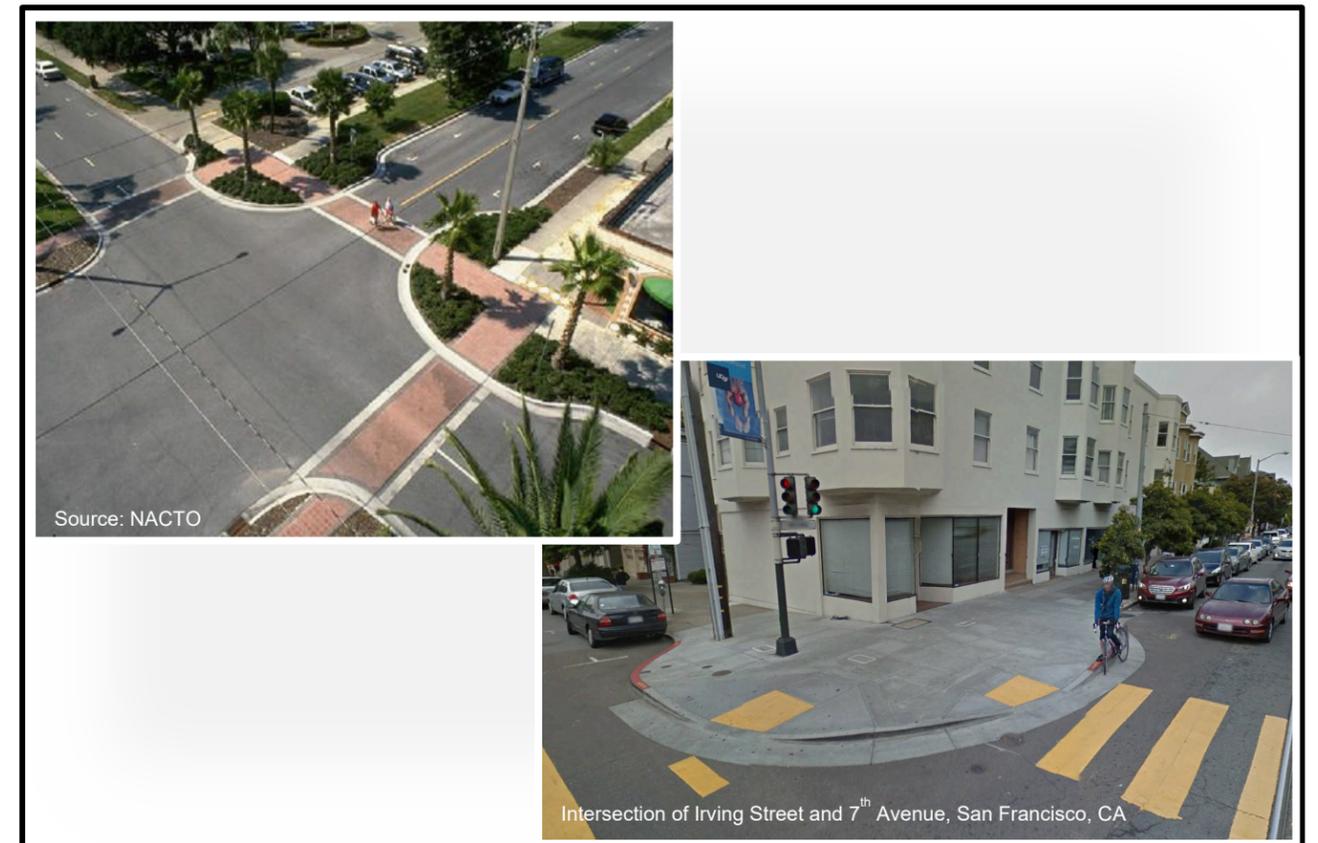
### 3.4.7 Bump-outs/curb extensions/bulbouts

Bump-outs (also called curb extensions or bulbouts) can be applied at intersections that have extra width due to parking lanes or exclusive right-turn lanes. A bump-out extends the curb line into the intersection past the parking lanes to reduce the intersection area as shown in Figure 19. Bump-outs are identified in the City of Loveland's Bicycle and Pedestrian Plan as a potential implementation strategy. Advantages of bump-outs (bulbouts) listed in the City's Plan include:

- *Bulbouts provide an entry or gateway statement into activity areas or where high volumes of pedestrians are present. Entering an area where a bulbout is present provides a clear difference between the arterial function and a local pedestrian activity area.*
- *Bulbouts enhance the visibility of the pedestrian because they physically permit the pedestrian to be located closer to the travel lanes, especially where parking is permitted, and allow the pedestrian to be seen more easily by the driver.*
- *Bulbouts constrict traffic flow through reduced lateral clearance. This reduction effects a reduction in travel speed along the corridors and improves safety for both pedestrians and vehicles.*
- *The bulbout changes the turning radius at the intersection, which reduces turning speed and vehicle and pedestrian conflicts.*
- *The extension of the bulbout reduces the time it takes pedestrians to cross from curb to curb. This reduction in pedestrian crossing time consequently reduces the time the pedestrian is exposed to moving vehicles.*

- *Bulbouts change the character of the intersection from automobile-dominant to pedestrian-friendly and multimodal-shared.*
- *Bulbouts can be an extremely positive visual and aesthetic enhancement. Features such as pedestrian lighting, planters, and benches create a focal point for pedestrian activity and change the character of the intersection from automobile to pedestrian. It should be noted that care must be taken when aesthetically enhancing bulbouts as such enhancements can block sight distances and create accident problems.*

A few disadvantages of bump-outs include potential utility relocation, possible maintenance and drainage issues, and the potential of large vehicles needing to cross into adjacent travel lanes to negotiate tighter turns. Typically, the advantages out-weigh the disadvantages. Implementing bump-outs along the southern half of the Boise Avenue corridor would help the concerns of pedestrian safety and speeding, and would help provide a balance between all corridor users.



**Figure 19. Bump-out examples**

### 3.4.8 Access alterations and left-turn restrictions

In areas where congestion occurs due to the presence of several driveways or nearby intersections, alterations to access can be considered to reduce the number of potential conflict locations and help alleviate congestion. The addition of a narrow median in the middle of the roadway to restrict turning movements into and out of driveways is a common solution. Typically, the median restricts turning movements to right-turn into the driveway and right-turns out of the driveway as shown in Figure 20. Removing the left-turns eliminates several conflict points with opposing traffic and reduces congestion.



**Figure 20. Median restricting left-turning movements to/from driveway in Loveland, CO**

Time of day left-turn restrictions can be introduced in areas where queues from nearby intersections block driveway access only during peak hours of the day. This type of restriction uses signage to prohibit left-turns only when congestion makes turning to/from the driveway difficult and dangerous but allows left-turns during off-peak times when these movements are typically easier to execute. Figure 21 provides an example of a time of day restriction sign.



**Figure 21. Example time of day restriction sign**

### 3.4.9 Passive speed control

Passive speed control is an option for encouraging slower speeds in areas of concern through the use of radar signs. Radar signs dynamically display a vehicle's speed as the vehicle approaches the sign, alerting drivers if they are exceeding the speed limit, see Figure 22. This type of passive speed control can be effective for responsible motorists and drivers who are unfamiliar with the area and speed limits; however, because the sign is passive, it is not self-enforcing, and may lose its effectiveness on familiar motorists. The sign serves as an educational tool, reinforcing the posted speed limit. Some drivers may assume the sign is linked to photo radar,

which can illicit speed compliance. Installation of the device typically costs around \$2,500, with additional dollars required for on-going maintenance.



**Figure 22. Passive speed control radar display sign example**

## 4. Alternatives evaluation

Based on the studies conducted in the Concept Development stage and the public input from the first public meeting, the tools identified in the previous stage were further developed into corridor plan alternatives that address the corridor needs. Two alternatives were developed for the corridor and presented to the public. Additional options were developed and presented to address access concerns in the Shell Gas Station and 7-Eleven Convenience Store area. This section discusses the alternatives and how they meet the corridor needs. Public comments and survey results from the second public meeting are also presented in this section.

### 4.1 Alternative corridor concepts

Using information previously gathered for the corridor and the toolbox identified in the Concept Development stage, two alternatives were developed for the corridor with additional options for the Convenience Store area. The access options for the Convenience Store area can be mixed and matched with the two corridor alternatives. The alternatives and access options are described in greater detail in the following sections.

#### 4.1.1 Corridor Alternative 1 (Maintain on-street parking)

The defining characteristic of Corridor Alternative 1 is that it maintains the existing on-street parking and bicycle lanes south of Park Drive. Intersection corner bump-outs are proposed at all intersections from Eisenhower Boulevard (exclusive) to Park Drive (inclusive). The proposed bump-outs extend the curb into the intersection six feet (the entire parking width) for a length of approximately 35 feet on all corners of the intersection. On-street parking is restricted within the bump-out areas, but permitted between intersections as it exists today. The existing bicycle lane (six feet wide) remains in place. Figure 23 illustrates a plan view of the proposed bump-outs. Typical cross sections through the bump-out and between the intersections are also illustrated in Figure 23.

The bump-outs narrow the intersection width, decreasing the crossing distance for pedestrians and breaking up the straight-ahead view for drivers, encouraging slower speeds. The bump-outs also increase the visibility of the pedestrian by providing a safe place to stand beyond parked cars. Visibility and sight distance is also increased for vehicles turning from the side street through advancement of the stop bar and restrictions of on-street parking 35 feet in advance of the intersection. The bump-outs help address the public concerns of pedestrian safety and speed, and help provide a balance between all corridor users.

In the northern portion of the corridor, Park Drive to 37<sup>th</sup> Street, proposed improvements for Corridor Alternative 1 include replacing the existing painted medians with curbed medians and improving pedestrian connectivity. In this alternative, the existing travel lane widths (13 feet) and bicycle lane widths (five feet) remain unchanged. The curbed medians provide refuge for pedestrians, encourage slower vehicle speeds, and provide an opportunity for improving the corridor landscape. These aspects help address the public concerns of pedestrian safety, speed reduction, and improved landscape.

Corridor Alternative 1 improves pedestrian connectivity by joining paths on opposite sides of Boise Avenue with strategically placed crosswalks. By connecting the disjointed paths, clearer routes are defined for pedestrians and bicycles. At the main multi-use path crossing north of Park Drive, a rectangular rapid flashing beacon (RRFB) is proposed to aid pedestrians and bicyclists cross midblock. The addition of the RRFB signage and painted crosswalk raises motorist awareness of path users. Other path connections are recommended at intersections. The clearly marked crossings and curbed median refuge increase the visibility and safety of path users. Samples and typical sections of the proposed curbed medians and path connectivity are shown in Figure 24.

Full concept plans for Corridor Alternative 1 can be viewed in the electronic version of Appendix A.

#### 4.1.2 Corridor Alternative 2 (Remove on-street parking)

The defining characteristic of Corridor Alternative 2 is that it eliminates the existing on-street parking in order to provide a buffered bicycle lane. Similar to Corridor Alternative 1, intersection corner bump-outs are proposed at all intersections from Eisenhower Boulevard (exclusive) to Park Drive (inclusive). In this alternative, the proposed bump-outs extend four feet into the intersection order to provide space for a six-foot bicycle lane with a two-foot buffer. Since on-street parking is removed, bicycle lanes are ten feet wide between bump-out intersections. Figure 25 illustrates a plan view of the proposed bump-outs and buffered bicycle lanes. Typical cross-sections through the bump-out and between the intersections are also illustrated in Figure 25.

As mentioned in the Corridor Alternative 1 discussion, the bump-outs decrease crossing distance, encourage slower speeds, and increase visibility both for pedestrians and vehicles. The buffered bicycle lanes also increase visibility and awareness of bicyclists in addition to increasing comfort for bicyclists.

In the northern portion of the corridor, Park Drive to 37<sup>th</sup> Street, proposed improvements for Corridor Alternative 2 are similar to Corridor Alternative 1 with the same proposed curbed medians, improved pedestrian connectivity, and RRFB installation; however, in this alternative, the existing travel lane widths are reduced to 11 feet in order to provide five-foot bicycle lanes with two-foot buffers. The proposed narrower travel lanes add to the friction of the curbed medians to encourage slower vehicle speeds. As mentioned in the Corridor Analysis 1 discussion, the curbed medians help address the public concerns of pedestrian safety, speed reduction, and improved landscape.

Samples and typical sections of the proposed curbed medians and path connectivity are shown in Figure 26. Full concept plans for Corridor Alternative 2, including proposed bump-outs, can be viewed in the electronic version of Appendix A.

#### 4.1.3 Convenience Store options

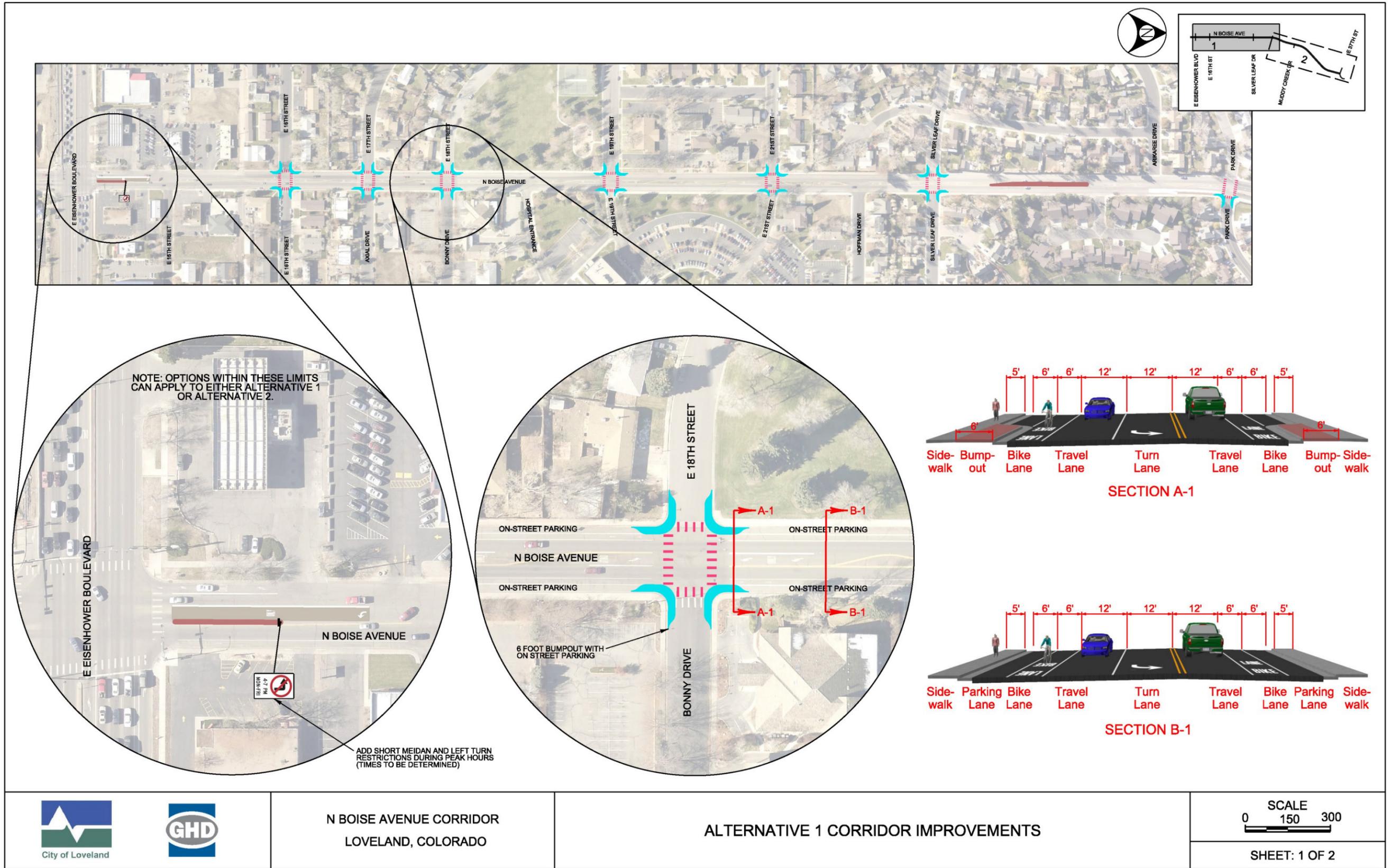
As discussed in Section 3.1, minor crashes have been a nuisance at the Boise Avenue Shell Gas Station and 7-Eleven Convenience Store driveway access. Many of the crashes are due to queues from the Eisenhower Boulevard traffic signal blocking access to the driveway, resulting in vehicles forcing left-turns into and out of the Convenience Store driveway, often with poor visibility of conflicting traffic. Several access options were developed to address these safety concerns. The options can be mixed and matched with the corridor alternatives described above. Improvement options are described below.

- The addition of a curbed median between opposing lanes on Boise Avenue, extending beyond the Convenience Store driveway to prevent drivers from turning left into or out of the driveway. The physical barrier would reduce the number of conflicts near the driveway thereby reducing crash potential, and would help alleviate congestion created by vehicles waiting for gaps to turn into the driveway. The disadvantage of this option is that left-turning movements are blocked at all times, even when the driveway is not blocked by queued traffic.
- The addition of a shortened curbed median between opposing lanes on Boise Avenue that ends prior to the Convenience Store driveway and includes a sign restricting left-turns into and out of the driveway during peak traffic periods. The curbed median would help define travel lanes and separate opposing traffic, but would allow left-turns into and out of the driveway during non-peak periods. This time of day restriction decreases crash potential during times of highest risk.
- The addition of a southbound Boise Avenue bicycle lane connecting the existing bicycle lane to the Eisenhower Boulevard intersection. Providing a dedicated bicycle lane at intersections helps to separate vehicles from bicyclists and increases bicyclist safety in a complex environment.

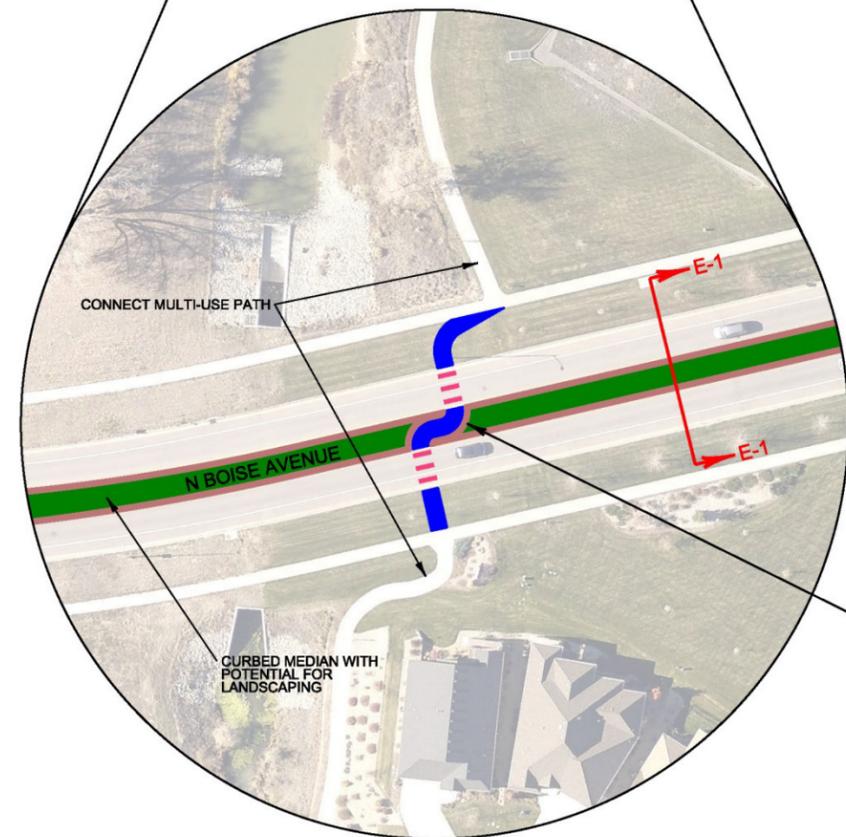
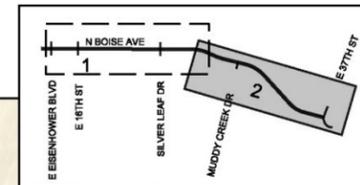
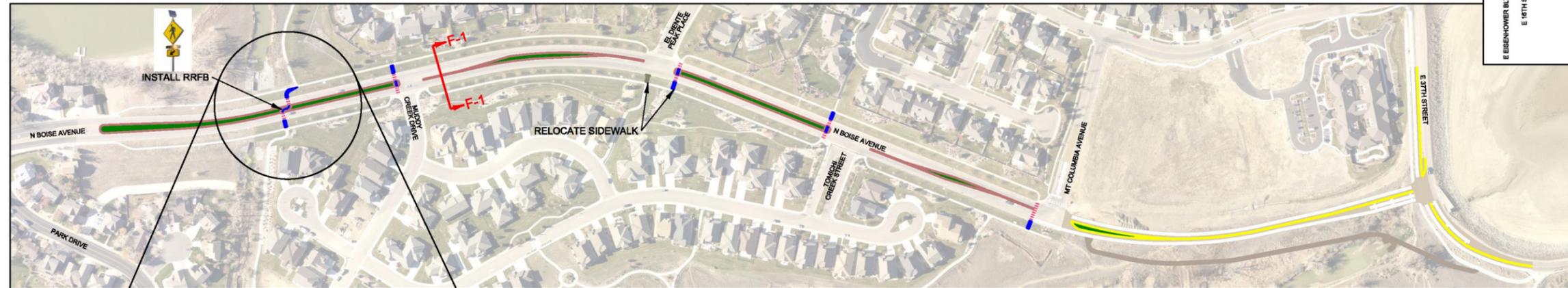
In addition to improvement options at the Boise Avenue driveway, access improvements were developed for the Convenience Store driveway from Eisenhower Boulevard. The Convenience Store driveway study discussed in

Section 3.2.1 indicated that this driveway off of Eisenhower Boulevard is used more frequently than the Boise Avenue driveway. Comments from the public identify sight distance difficulties in viewing the Eisenhower Boulevard driveway. Options for improving sight of the driveway include trimming tree branches, providing an access sign to alert drivers of the driveway location, and the possibility of an additional driveway closer to the Eisenhower Boulevard intersection (subject to City and/or CDOT approval).

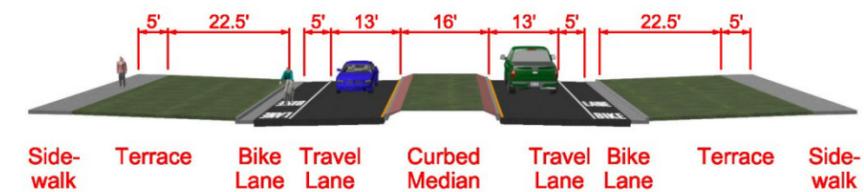
Illustrations of all of the Convenience Store access options are shown in Figure 27.



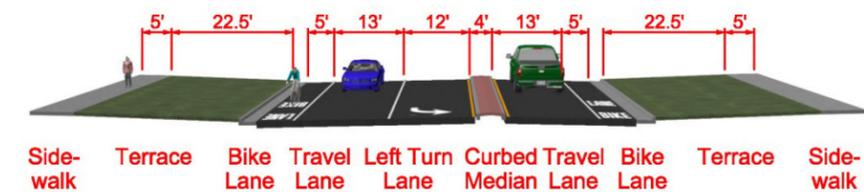
**Figure 23. Corridor Alternative 1, Southern half of corridor**



INSTALL RECTANGULAR RAPID FLASHING BEACON (RRFB)



SECTION E-1

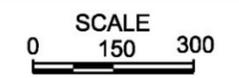


SECTION F-1



N BOISE AVENUE CORRIDOR  
LOVELAND, COLORADO

ALTERNATIVE 1 CORRIDOR IMPROVEMENTS



SHEET: 2 OF 2

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Figure 24. Corridor Alternative 1, Northern half of corridor

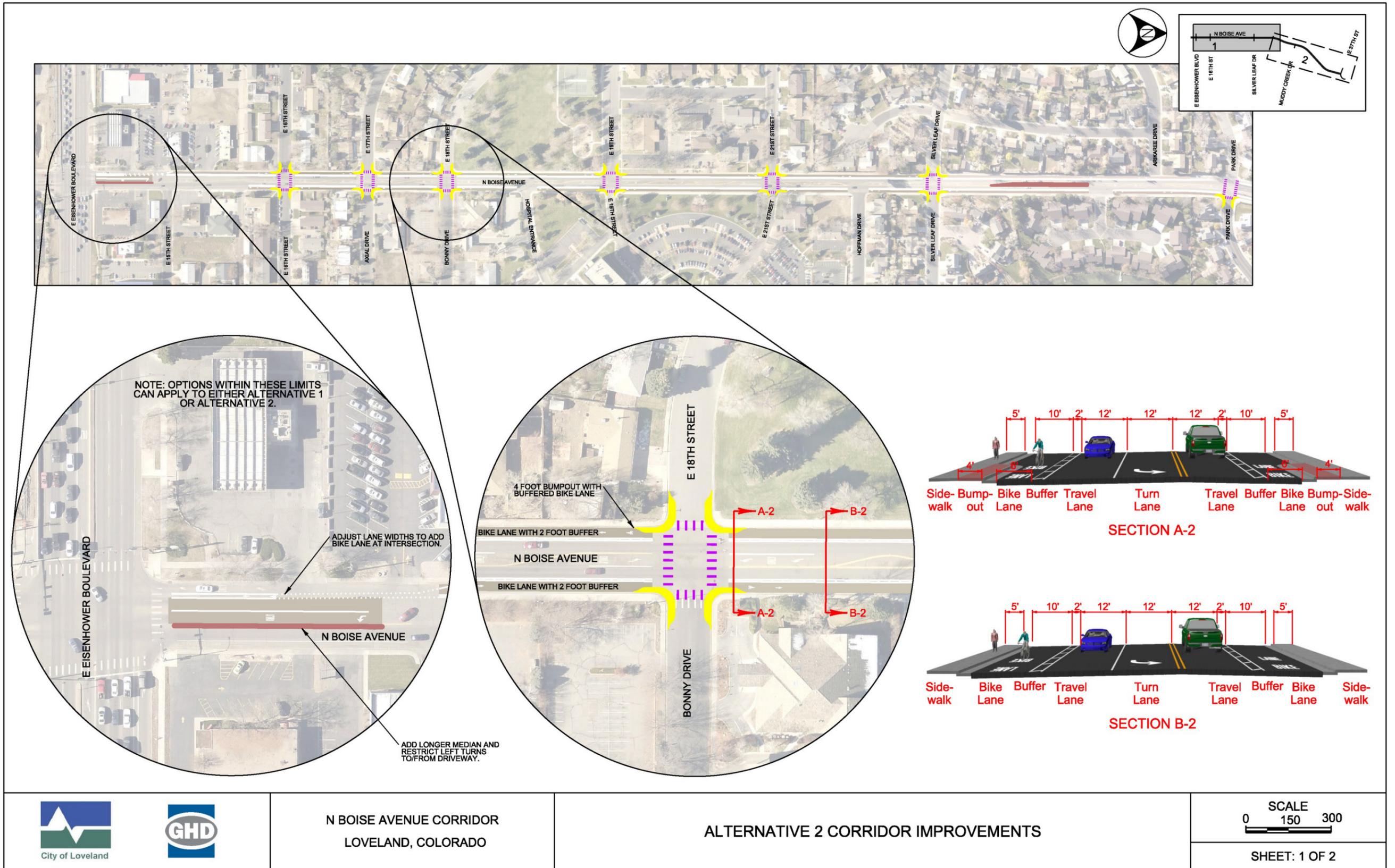
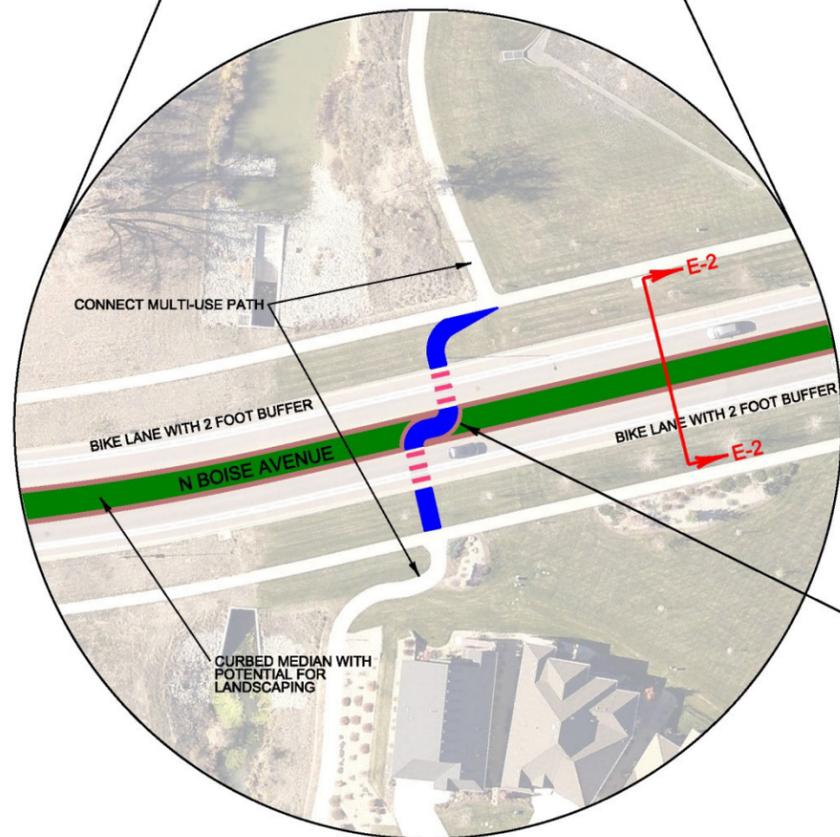
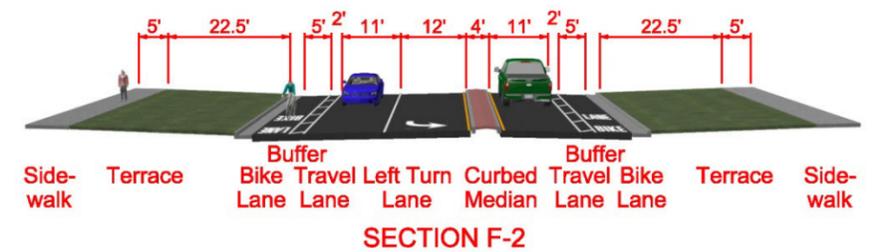


Figure 25. Corridor Alternative 2, Southern half of corridor

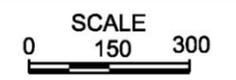


INSTALL RECTANGULAR RAPID FLASHING BEACON (RRFB)



N BOISE AVENUE CORRIDOR  
LOVELAND, COLORADO

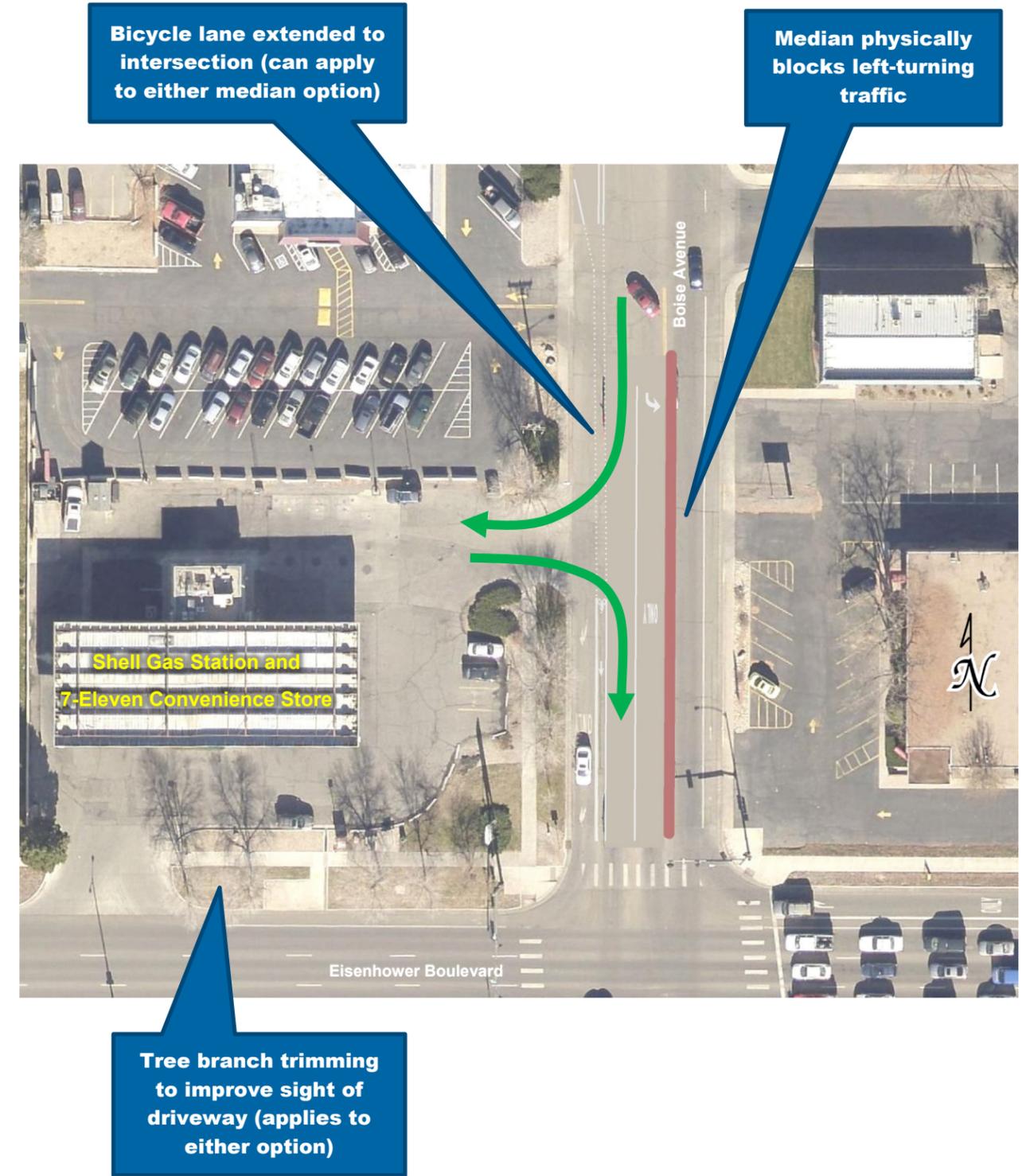
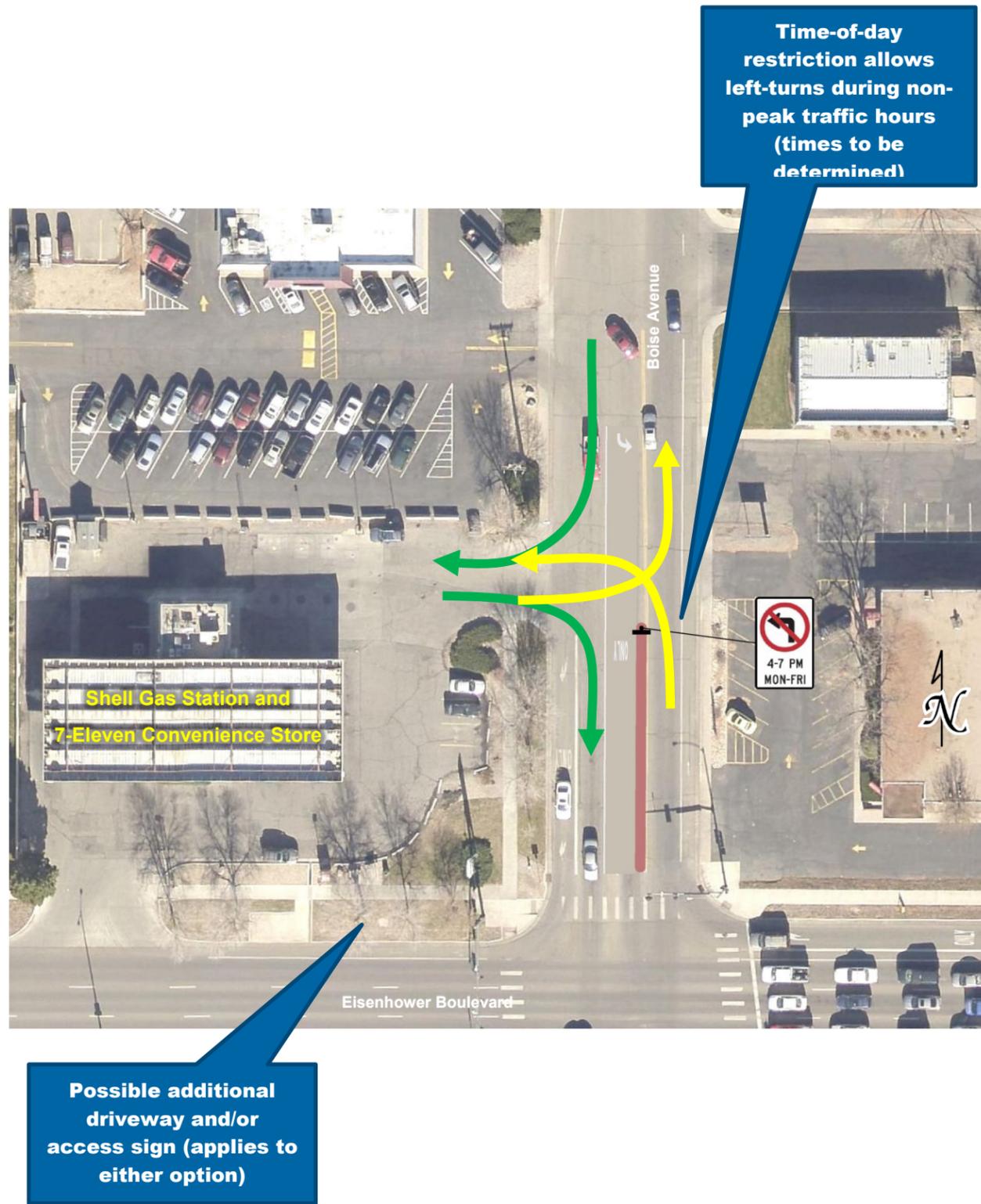
ALTERNATIVE 2 CORRIDOR IMPROVEMENTS



SHEET: 2 OF 2

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Figure 26. Corridor Alternative 2, Northern half of corridor



**Figure 27. Convenience Store options**

## 4.2 Public input

A public meeting open house was held at the City of Loveland Library on July 21, 2016 in the evening. The purpose of the meeting was to present the additional studies collected by the City, to discuss the tools identified as possible solutions available for the corridor and how those tools address the concerns and priorities identified at the first public meeting, and to present the resulting corridor alternatives. A strip map of the corridor alternative was available for the residents to view provide comments. The strip map was broken into the same four sections as the first public meeting for consistency between meetings. A simple survey was available on-line and at the at the meeting for the public to indicate whether Corridor Alternative 1 with the bump-outs that maintain on-street parking or Corridor Alternative 2 with the bump-outs that eliminate on-street parking but provide buffered bicycle lanes are preferred. The survey was also made available on the project page set up on the City's website. Citizens were encouraged to spread the word about the study and online survey. Representatives from the City, Police Department, and GHD were available to answer questions and direct conversations.

The results of the survey were 42% in favor of Alternative 1 and 58% in favor of Alternative 2, indicating that the public favors the removal of on-street parking and the addition of buffered bicycle lanes. The public survey also included an opportunity for citizens to write in additional comments and concerns. The most common comments and concerns from the survey were:

- Neither option 1 or 2 would not stop the traffic or speeders
- Blinking light at Silver Leaf rather than Park
- Neither option, want a traffic light
- Option 1 – North Boise from hospital north special events are held and parking is needed on street. One day for Turkey Trot is a thousand plus runners, walkers, etc. plus several bike events a year. N. Boise is only street that can handle these events.
- Add longer median and restrict left-turns off Boise near Hwy 34
- Thank you for putting a pedestrian cross walk across Boise to connect the two 7 Lakes bike trails. This will make it safe to cross the street and it hopefully will slow cars down.
- How about signs north and south of Park on Boise alerting drivers – ie “hidden intersection” or “limited signal (sight) intersection ahead” or something like that.
- Please do not take out the right-turn lane from Boise to Park traveling north. That right-turn lane sees a lot of traffic.
- Additional suggestion – sign alerting drivers to driveways north of Park Drive
- Stop catering to bikes all the time they do not pay any road taxes.
- Angle the fence on Park back to help with visibility
- Landscape center medians on the north end of Boise
- Electronic speed limit signs
- On-street parking needs to be maintained on the east side of Boise Avenue from Silver Leaf Drive to Park Drive to accommodate over-flow parking from the Country Lake Villa community.

In addition to the public survey, the City met with a few of the businesses along the corridor, including Weed in Agency located at 1601 E Eisenhower Boulevard and Advanced Foot and Ankle Care located at 1440 North Boise Avenue. Comments from the business meetings included:

- Weed in Agency

- Make alley behind Breakfast Club one way going east
- Move access down to the second one, close off the access near Hwy 34
- Turn radius for trucks onto Boise from Hwy 34 in both direction is very tight
- Prefer shorter median with restricted hours
- Advanced Foot and Ankle Care
  - Prefer the long median, feels the short one is a waste of time as we will have to come back and install the longer one.
  - Wants to keep driveways separate – easier from a maintenance standpoint.

## 5. Recommended Alternative

Based on input from the second public meeting, the corridor alternatives were combined into a recommended hybrid corridor improvement. Bump-outs are the basis of the recommended intersection treatment for all intersections in the southern half of the corridor; curbed medians and path connectivity are the basis of the recommended improvements for the northern half of the corridor. Details of the recommended corridor improvements are described below and illustrated in Figure 28 and Figure 29. More detailed illustration is contained in the electronic version of Appendix B.

- Based on the low utilization of parking on the west side of Boise Avenue, the recommended alternative removes existing on-street parking on this side of the street, except for the section across from the McKee Medical Center (between 19th Street and 21st Street) and utilizes the four-foot bump-outs for the south half of the corridor. The extra width gained from the removal of on-street parking allows for the provision of a buffered bicycle lane. On-street parking was maintained across from the hospital because the parking study indicated some utilization in this area, likely for the adjacent clinics. Removing on-street parking where practical reduces roadway conflicts, improves safety, and improves intersection sight distance. The removal of on-street parking and provision of a buffered bicycle lane is supported by the public survey results which favored Corridor Alternative 2.
- Due to the higher utilization of on-street parking on the east side of Boise Avenue, the recommended alternative maintains on-street parking on this side of the street up to the intersection of Silver Leaf Drive.
- An RRFB installation is recommended for crossing maneuvers on the south side of the 19th Street intersection near the hospital.
- Buffered bicycle lanes are recommended for the northern half of the corridor and are supported by the public survey. Also recommended for the northern half of the corridor are the path connectivity improvements and RRFB installations discussed in Section 4.1.

Recommended improvements near the Convenience Store are also a hybrid of the various options presented in Section 4.1.3. Details of the recommended access improvements are described below and illustrated in Figure 28.

- For improved bicycle safety, the addition of the bicycle lane connecting the existing southbound bicycle lane to the Eisenhower Boulevard intersection is recommended.
- Based on public comments, the recommended median treatment and access at the Boise Avenue driveway is a curbed median extending to the north end of the Convenience Store driveway, with a depressed portion through the driveway turning area so that left-turns and still occur. Signage restricting left-turns into and out of the driveway during peak traffic periods is placed in the median. Time-of-day restrictions are proposed for 7am-9am and 3pm-6pm Monday through Friday. The City will monitor the proposed access improvements and if minor crashes continue to be a nuisance, the depressed median can be raised to a curbed median to physically restrict left-turns at all times of the day.
- Based on the high percentage of use at the Eisenhower Driveway and public comments, a taper is recommended from the Eisenhower Boulevard intersection to the existing Convenience Store driveway, providing additional pavement for drivers to access the driveway. (City standards and preferences eliminated the additional driveway option.) A sign indicating Gas Station Entrance could accompany the taper. These improvements require approval from CDOT. Tree branch trimming is also recommended to improve sight of the driveway.

Additional recommended improvements throughout the corridor include:

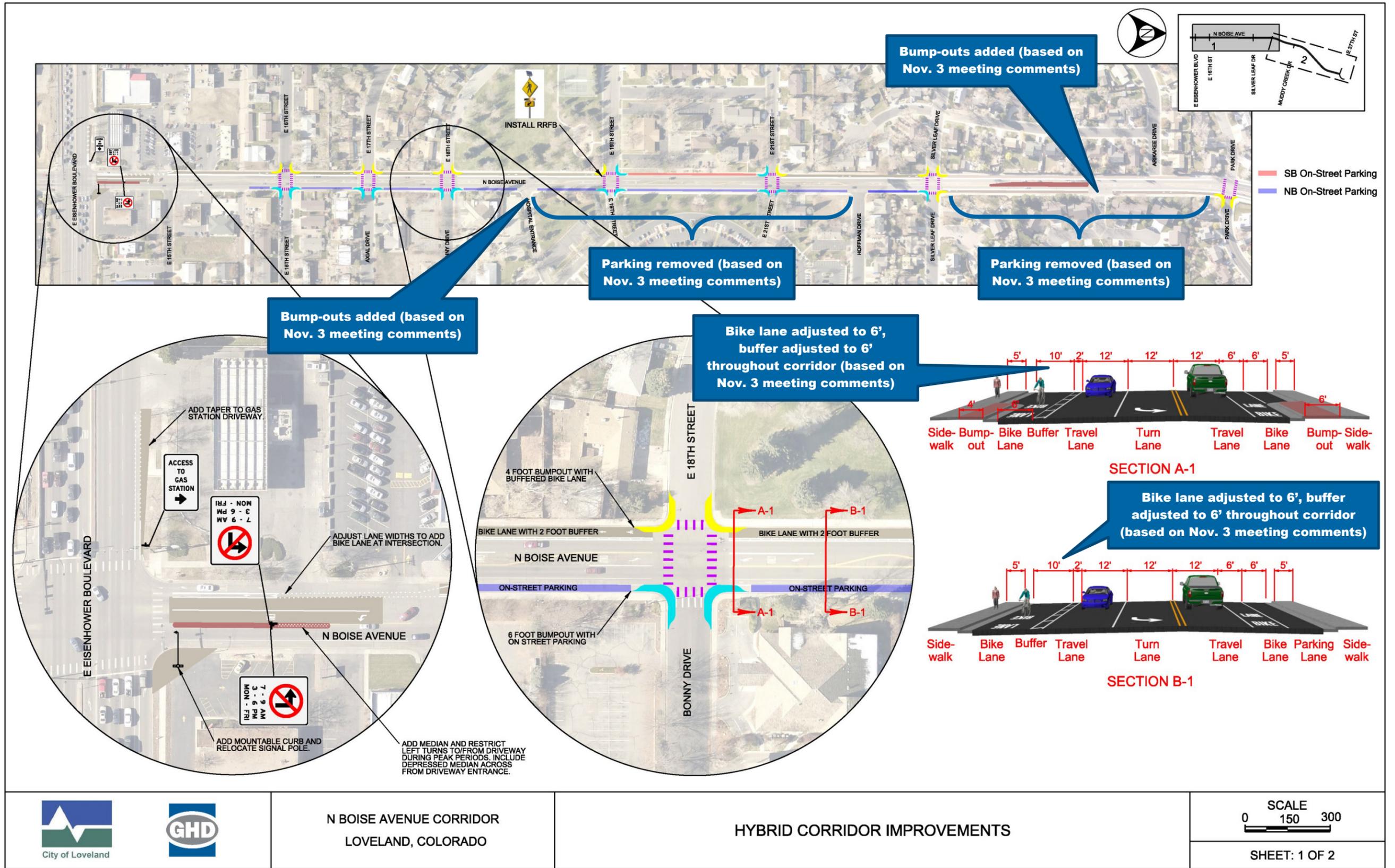
- Additional tree trimming where necessary to improve sight distance, and
- Moving the traffic signal pole in the northeast corner of the Eisenhower Boulevard intersection to increase corner turning clearance for large trucks.

Future considerations or items to monitor include:

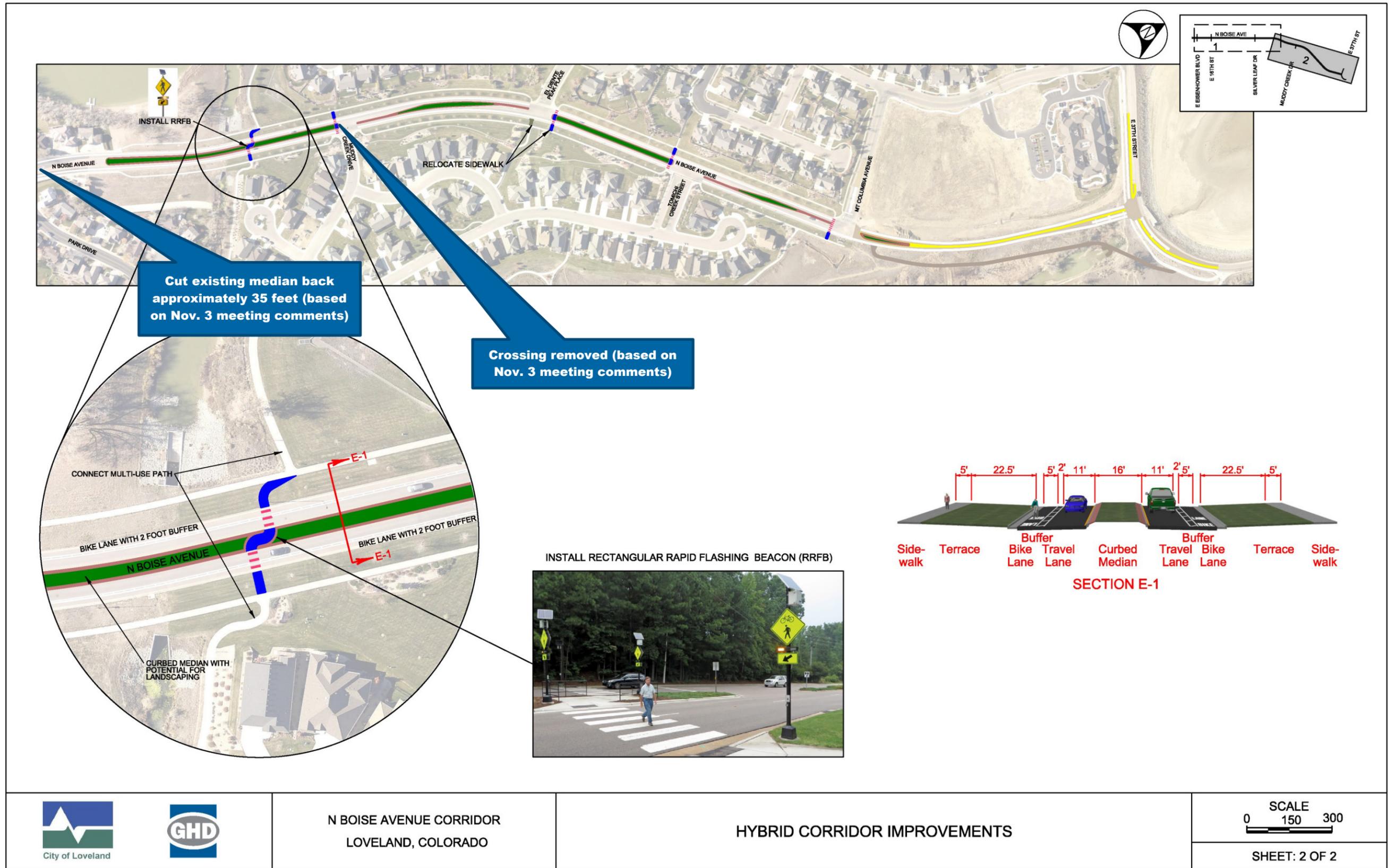
- The Loveland Breakfast Club joint access easement with 7-Eleven and the westerly neighboring properties and associated maintenance agreements.

The City roughly estimates costs of these proposed improvements to be around \$1.9 million. A final public meeting was held November 3, 2016 to present the recommended alternative to the citizens. Feedback from the meeting resulted in minor changes to the recommended alternative. The changes are described below and noted in Figure 28. More detailed illustration of the final recommended alternative is provided in the electronic version of Appendix C.

- In locations where existing parking was removed and replaced with a bicycle lane, the bicycle lane width will be reduced from the original 10 feet to six feet in order to discourage parking in the bicycle lane. The bicycle lane buffer will be increased to six feet wide to account for the reduction in the bicycle lane width.
- On-street parking will be removed in front of the McKee Medical Center (from the southern ambulance entrance to Hoffman Drive) because parking is available in the large lots on the Medical Center property.
- Bump-outs will be added to the ambulance entrance of the McKee Medical Center and to the Country Lake Villa entrance to improve intersection sight distance and pedestrian visibility.
- On-street parking will be provided on the east side of Boise Avenue from Silver Leaf Drive to Park Drive to accommodate over-flow parking from the Country Lake Villa community.
- The existing median at the Park Drive intersection will be cut back approximately 35 feet to allow for an improved vehicle trajectory northbound through the intersection.
- The pedestrian crossing will be removed from the Muddy Creek Drive intersection since the nearby multi-use path connection and proposed RRFB will provide a more visible crossing location.



**Figure 28. Recommended hybrid corridor improvements, Southern half of corridor, Including Convenience Store improvements**



**Figure 29. Recommended hybrid corridor improvements, Northern half of corridor**

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