Memorandum

Subject:	State Highway 82 S-curve Technical Memorandum - Updated
Project Name:	New Castle Creek Bridge Investigative Study with Revised Scope (the Project)
Attention:	City of Aspen (the City)
From:	Jacobs
Date:	July 2024
Copies to:	Project File

1. Introduction

This memorandum summarizes a concept analysis and safety evaluation performed by Jacobs regarding options for improving the S-curve alignment along State Highway (SH) 82 in Aspen, Colorado (Figure 1). The City requested Jacobs investigate design options and impacts of increasing the curve radii (curve softening) at two 90-degree (S--curve) turn locations entering and exiting Aspen.

Two options were presented at an April 2024 Aspen City Council work session. Council directed further investigation into Option 2 with specific modifications. The Council made the following requests: provide access to SH 82 from North 8th Street and phase Option 2 to work in the interim two-lane existing bridge configuration and a future three-lane bridge configuration. Following the April work session, Jacobs was contracted to obtain topographic surveys in select areas, develop a traffic model, and progress the option to a 15% design level to refine and better understand right-of-way (ROW) impacts, traffic and operational impacts and costs for an initial and ultimate phase. The focus of the updated memorandum provides refined details for Option 2. For details on Option 1, refer to the SH 82 S-curve Technical Memo, April 2024 (Jacobs 2024A)

Figure 1: S-curve Alignment Study Area

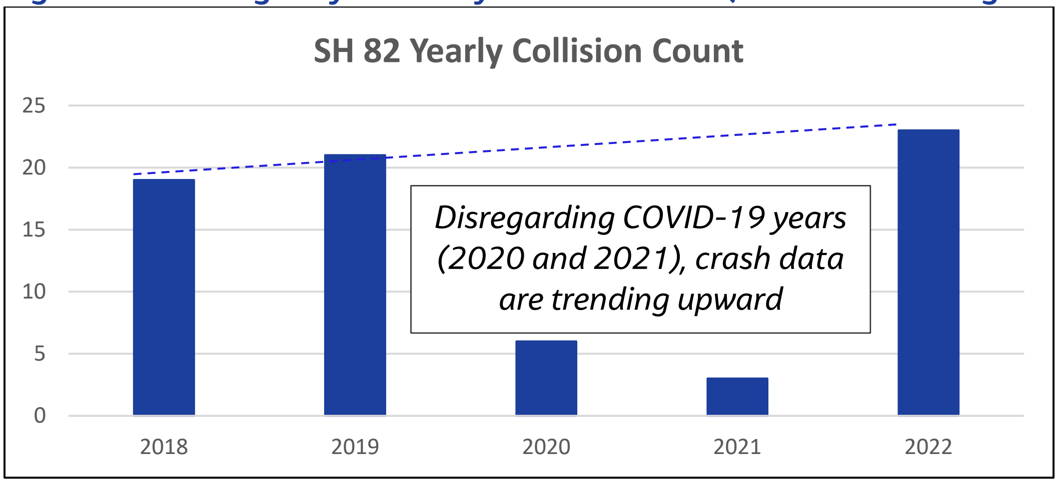
2. History and Crash Data

As a resort town and year-round destination for many travelers, traffic and congestion has continued to grow and challenge the existing infrastructure. Since the Entrance to Aspen Final Environmental Impact Statement (CDOT 1997) and Record of Decision (ROD) (FHWA 1998), many transportation and traffic studies have occurred over the years to evaluate SH 82 improvements through the city. Attachment 1 presents the transportation studies and implemented improvements specific to addressing issues on the S-curves and Castle Creek Bridge over the last 20 years. Not all studies were conclusive, resulting in non-implemented improvements.

The safety and driver expectations of commuters in Aspen and along SH 82 is an important consideration when evaluating corridor modifications. According to the latest 5-year crash data (Colorado Department of Transportation, 2018 to 2022), most incidents were rear-end collisions occurring at the Castle Creek Bridge, on North 6th Street, and near or between the S-curve locations. Rear-end collisions are a indicator of congestion and speed differentials between vehicles.

As shown on Figure 2, crashes dipped during the COVID-19 pandemic; however, after COVID-19, crash statistics drastically increased and began to highlight an upward trend from 2018 (ignoring COVID-19 data).

Figure 2: State Highway 82 Yearly Collision Count (Castle Creek Bridge to N. 6th St.)



Several locations that experience more crashes, shown on Figure 3, have pinch points that contribute to these crashes. To address some of these crash problems and types (Figure 4), mitigation options could include minimizing conflict points by extending designated transit lanes, removing access at select intersecting streets, and reconfiguring the outbound zipper lane on West Main Street. The options discussed in the following section feature these enhancements to reduce conflict points while improving traffic flow.

Figure 3: State Highway 82 Collision Classification (2018 to 2022)

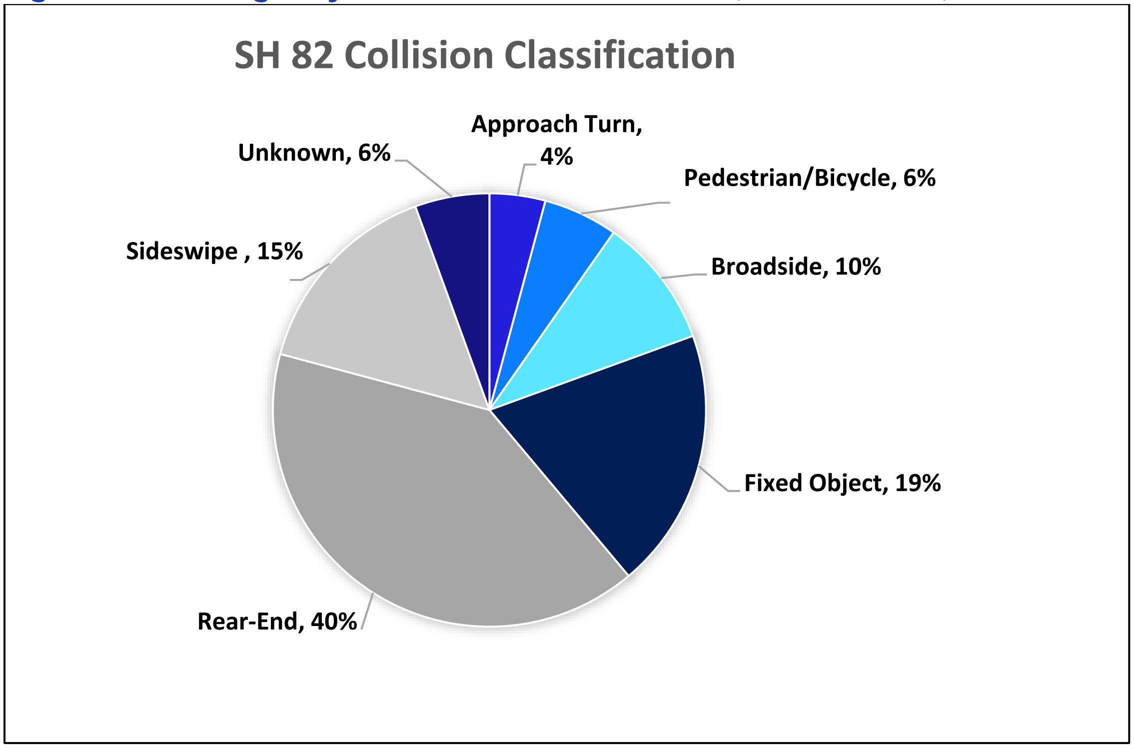
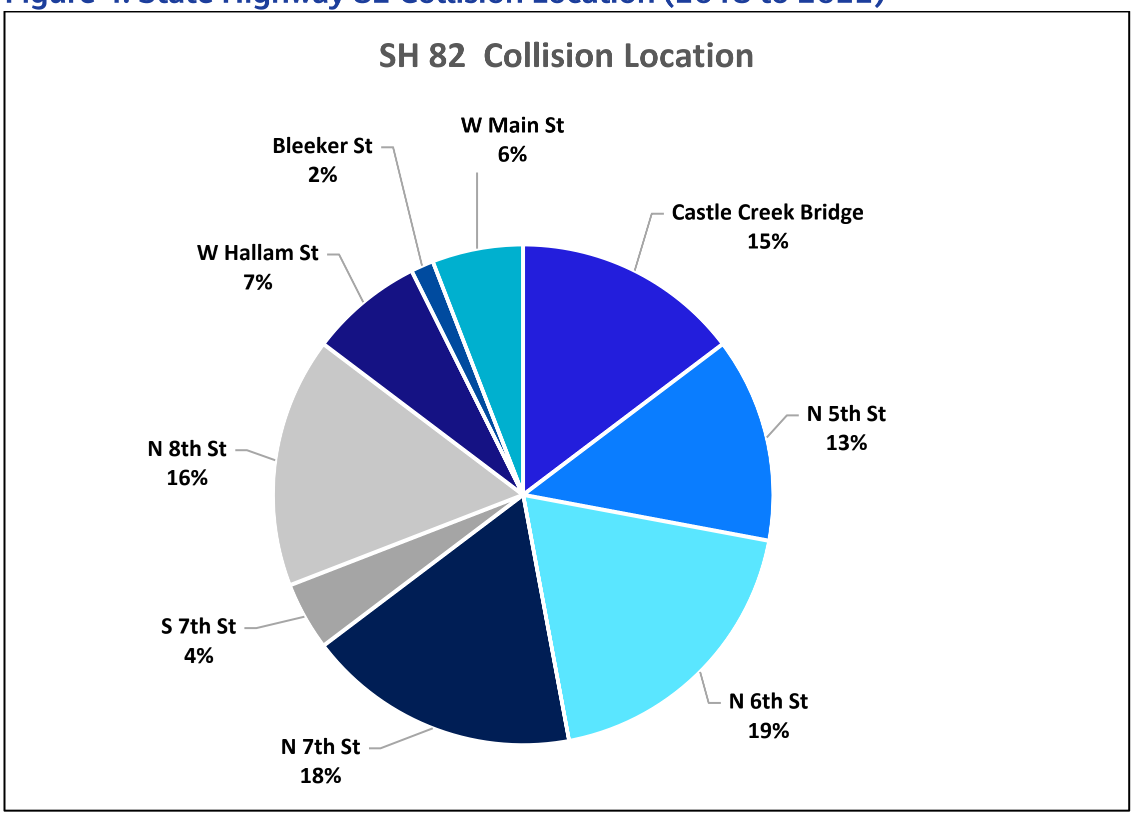


Figure 4: State Highway 82 Collision Location (2018 to 2022)

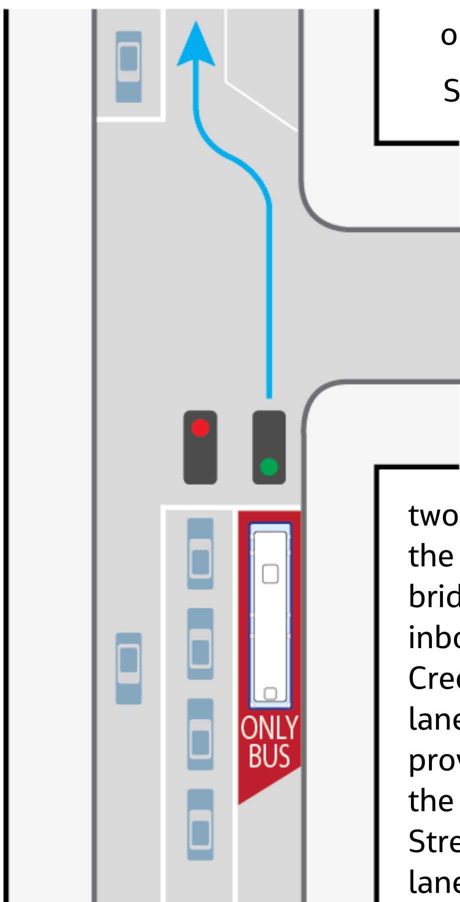


3. Option 2 Initial and Ultimate Phases

Based on feedback from Aspen City Council and recommendations by Jacobs, improvements to the corridor could be implemented in two phases, initial and ultimate. The two-stepped approach will provide a phased solution for implementation, matching the existing two-lane bridge and widening for a future three-lane option.

The initial phase buildout has been developed to smooth the S-curves while improving safety and outbound traffic flow, prioritizing buses, and maintaining bicycle and pedestrian connections. Access points were selectively eliminated to reduce conflict points on SH 82 and ease traffic congestion; however access from North 8th Street was added back into the design after the April 2024 work session. Further traffic impact analysis (that is, traffic modeling) was also performed to make quantitative assessments (such as travel time and delay) regarding the options' travel benefits compared to a no-build option (refer to Section 4 for operations analysis).

Figure 5: Illustration of Bus Queue Jump at Intersection



Softening the curves was strategic because layouts were based on accommodating buses in the outside lanes, heavy trucks (WB-67 design vehicle), and a future fixed-rail transit system. For the transit system, an assumption of a light rail transit (LRT) vehicle was selected to set a minimum radius for the curves (refer to Section 6, Transit Options). To accommodate the larger vehicles through the curves, lane width widening is provided in the S-curve corners.

The initial phase is designed to work with the existing two-lane bridge; the ultimate phase is designed to widen the east side approach to accommodate a three-lane bridge, which would allow for two outbound lanes and one inbound lane across a new three-lane bridge over Castle Creek.[1] The ultimate phase will extend the outbound bus lane to Cemetery Lane, where a widened intersection will provide a bus queue jump to prioritize transit (Figure 5). For the ultimate phase, the ingress access from North 8th Street is eliminated to avoid conflicts with the extended bus lane. Attachment 2 showcases the extents and impacts of the initial phase. Drawings depicting the ultimate phase are

[1] As part of a separate task, Jacobs evaluated rehabilitating or replacing the existing SH 82 Castle Creek Bridge to accommodate two or three lanes.

provided in Attachment 3, including the Cemetery Lane intersection reconfiguration with bus lane queue jump.

These proposed improvements will have impacts, including ROW and temporary construction easement (TCE) acquisition, removal of existing trees, and minor impacts to a historic property. Following the April 2024 work session, Jacobs completed a site visit to collect additional field surveys to help verify and refine anticipated impacts in the S-curves. Additionally, the Project evaluated the drainage plan and determined some areas where drainage improvements were needed, which drove a need for additional temporary easements in the initial phase.

In the ultimate phase, Jacobs noted the Cemetery Lane intersection widening for the bus queue jump lane. This widening would impact the Marolt Open Space (owned by the City). Because this is a sensitive area, special attention or construction of a wall may be needed to avoid or mitigate impacts to the property.

Table 1 lists critical design elements included in both the initial and ultimate phases.

Table 1: Option 2 Design Elements and Impacts, Initial and Ultimate Phase

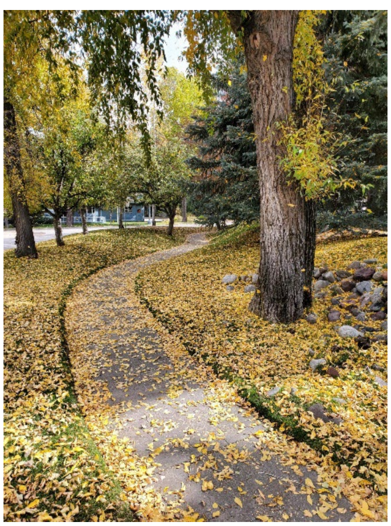
Design Elements and Impacts	Initial Phase	Ultimate Phase
Two lanes of travel in each direction. Outer lanes designated bus and transit lanes.	Yes	Yes
Matches three-lane bridge section. Outer outbound lane designated bus and transit lane.	No	Yes
Matches two-lane bridge section.	Yes	No
Ingress and egress to North 8th Street removed.	No	Yes
Ingress to SH 82 from North 7th Street removed.	Yes	Yes
Access from outbound SH 82 to North 7th Street.	Yes	Yes
Increased radii at S-curves (accommodates large vehicles and future transit system).	Yes	Yes
Ingress and egress to South 7th Street and West Main Street removed.	Yes	Yes
Right-of-way and temporary construction easement acquisition [ROW/TCE] (square feet).	2,245/8,385	2,245/9,835
Mature trees impacted by option (quantity).	10	30
Historic property impacts (Not Adverse) on 7th and Main Street.	Yes	Yes

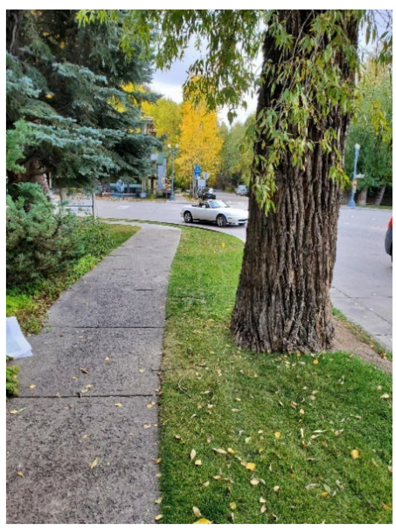
Design Elements and Impacts	Initial Phase	Ultimate Phase
Queue jump at Cemetery Lane to facilitate merge of outbound buses with general traffic.	No	Yes
Main Street zipper lane removed and converted to merge lane.	Yes	Yes
Better facilitates outbound flow of traffic.	No	Yes
Open space impacts.	No	Yes

The Christian Science Society building at 734 West Main Street is the one historic property impacted by curve softening. Survey was performed on this property to better understand the impacts. Two large diameter trees and a smaller-diameter tree would be removed with the proposed improvements. ROW and TCEs are needed for softening the curve (encroachment on the property) and reconstructing the sidewalk across this property. Even with these impacts, the effect is expected to be Not Adverse for this historic property.

Figures 6 and 7 provide examples of impacted trees in the curve-softening areas.

Figures 6 and 7: Mature Trees Impacted by Curve Softening





4. Operational Benefits

The following sections summarize quantitative and qualitative assessments of operations based on traffic modeling and engineering judgment.

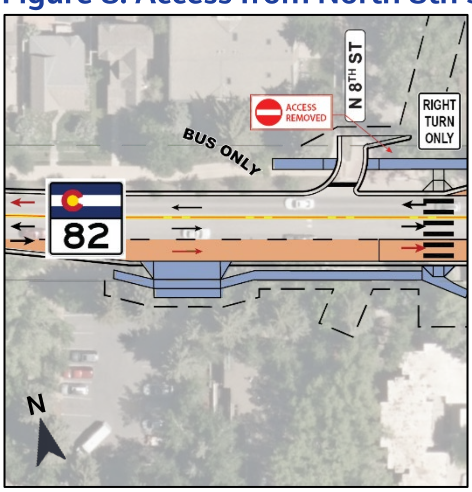
4.1 Designated Bus Lanes

A critical design element in the proposed options is the extension of designated bus lanes through the S-curves. It is generally understood that incorporating designated bus lanes will help alleviate congestion and improve safety by removing zippering of bus and general traffic on SH 82. Currently, existing outbound buses merge with general traffic near North 6th Street and Main Street. The reintroduction of bus traffic to general traffic creates a bottleneck, causing friction between buses and general traffic. In the Option 2 initial phase, the outbound bus lane will be extended to the bus stop near 8th Street. After making it's stop, the bus will then merge with SH 82 general traffic to cross the bridge over Castle Creek. The Option 2 ultimate phase will carry the outbound bus over a widened three-lane bridge and feature a bus queue jump for the transit lane at the Cemetery Lane signal, improving safety, reducing congestion, and prioritizing transit. Additionally, signal timing optimization at Cemetery Lane can be evaluated to improve traffic operations for all traffic.

4.2 S-curve Accesses

To help with evening peak-period traffic flow, the City commissioned a prior project that removed access to SH 82 from West Hallam Street. Additionally, the City manually suspends access to SH 82 from North 7th Street during evening peak hours by placing a barricade to keep west end traffic from entering SH 82. Removing access points along SH 82 will improve traffic flow and reduce conflict points and potentially reduce traffic collisions. The Option 2 initial phase will maintain ingress at the 8th Street access to SH 82 and eliminate egress from SH 82 (Figure 8). This phase will also maintain egress from SH 82 to North 7th Street at Curve 1 but will eliminate ingress (Figure 9). However, the Option 2 ultimate phase will eliminate ingress from 8th Street access to SH 82.

Figure 8: Access from North 8th Street



The Option 2 initial and ultimate phases include a painted median at Curve 1, providing a smaller separation of opposing traffic (Figure 9). The Option 2 ultimate phase will eliminate ingress and egress access to SH 82 at Curve 2, cutting access from South 7th Street and West Main Street by connecting them (Figure 10). Eliminating access at this curve will reduce vehicle conflicts on SH 82 and improve traffic flow through the curve.

Figure 9: Curve 1 Option 2

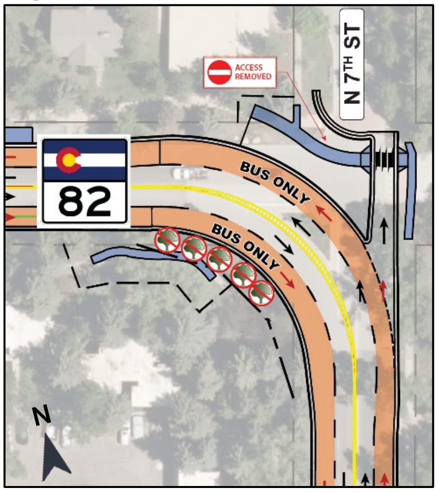
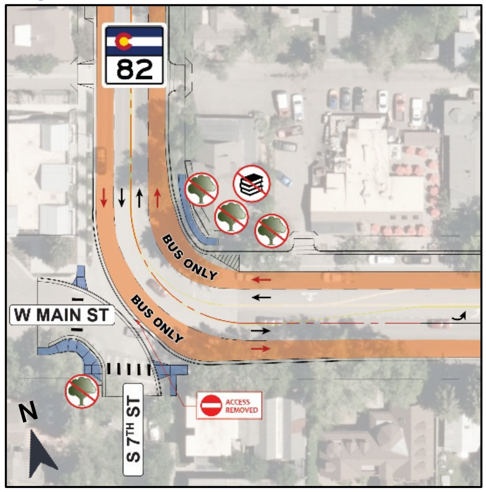


Figure 10: Curve 2 Option 2



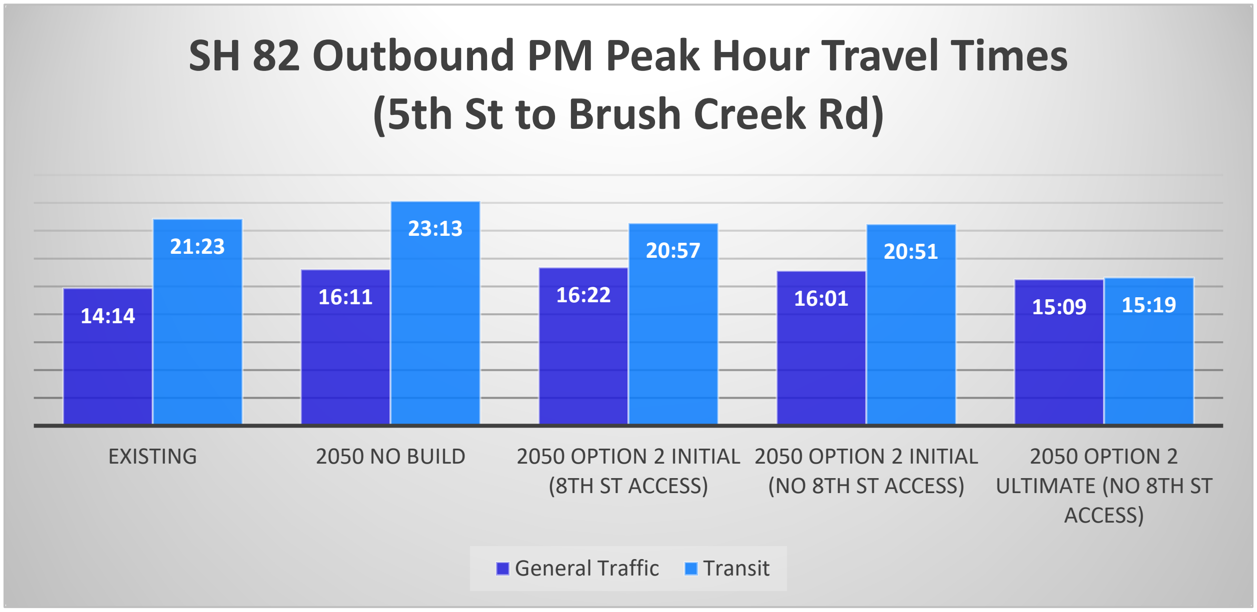
Pedestrian connectivity and safety are critical elements of each phase. Sidewalks and crosswalks are planned for each phase, and the existing inbound and outbound bus stops will remain in both phases.

4.3 Traffic Operations

A Vissim traffic model was developed for the existing conditions, no-build scenario, and Option 2 initial and ultimate phases. The traffic model was run in the morning and evening peak hours for July 2024 traffic (existing conditions) and future (2050) traffic for no-build, initial and ultimate scenarios, which factors modest annual growth. The AM peak hour modeled was identified as 8:15 to 9:15 a.m. while the PM peak hour was identified as 4:30 to 5:30 p.m. The focus of the developed traffic model was the main routes and not west-end side streets.

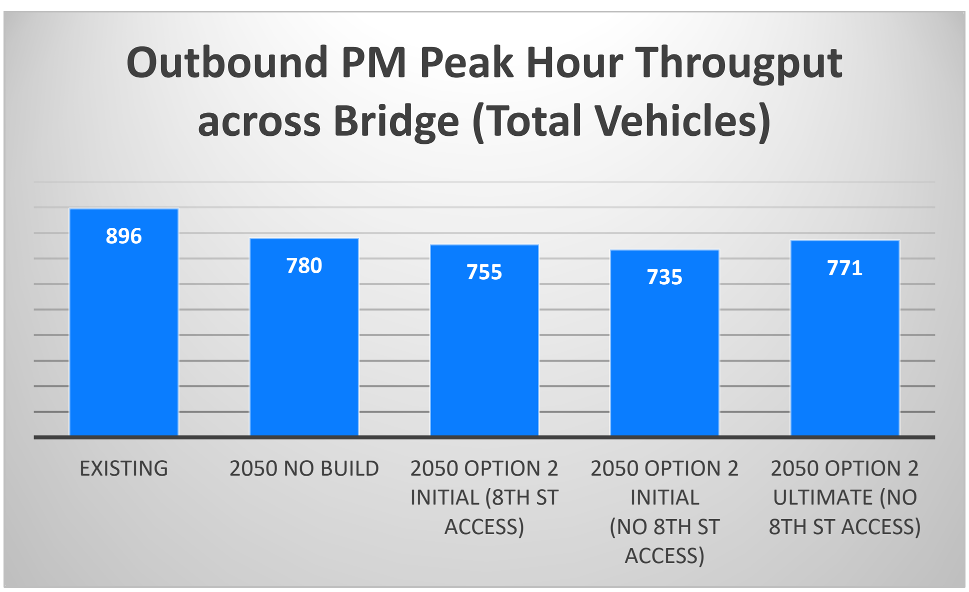
The initial phase S-curve improvements (without 8th St ingress) shows negligible time savings during the PM outbound peak hour for general traffic when compared to the no-build scenario (Figure 11). Adding the access in at 8th contributes to negligible delay for general traffic when compared to the no-build. The initial phase S-Curve improvements actually show slightly better transit times when compared to no-build and existing conditions. Option 2 Ultimate (3-Lane with bus priority queue jump at Cemetery Lane) does show time savings for both general and transit traffic over the no-build. In fact, transit spends five less minutes travelling to Brush Creek Rd while general traffic clocks in at nearly a minute less time.

Figure 11: Outbound PM Peak Hour Travel Time Comparisons



From the traffic model, we can evaluate vehicle throughput for each scenario. Figure 12 details the travel throughput across the bridge in the outbound PM peak hour. Even though the ultimate adds an outbound transit lane across the bridge, transit would stay the same throughput and general traffic throughput is more than initial options but slightly less than if you didn't build the three-lane bridge. This is likely due to the new westbound transit priority queue jump at Cemetery Lane.

Figure 12: Outbound PM Peak Hour Throughput Comparisons



For the AM inbound peak hour, both the no-build and initial phase S-curve improvements show dramatic increases (roughly doubling) in travel times during the AM peak hour for general traffic when compared to the existing scenario (Figure 13). The initial phase S-Curve improvements and ultimate phase are no different geometrically than the no-build from Brush Creek to 8th Street. The jump in travel times is due to the heavy demand in the system in 2050. Note that this jump is not apparent in PM travel times because additional congestion towards the east of 5th Street is not captured in the travel time measurements, but any increase to PM travel demand would further congest downtown Aspen city streets in 2050.

The S-Curve improvements do not alleviate AM inbound congestion. The inbound AM peak hour estimates travel times over one hour without plans to alleveiate the inbound demand. Longer travel times may force some commuters to choose transit, which would lessen the general traffic demand but additional transit service will be required to serve the shifted demand.

Figure 13: Inbound AM Peak Hour Travel Time Comparisons

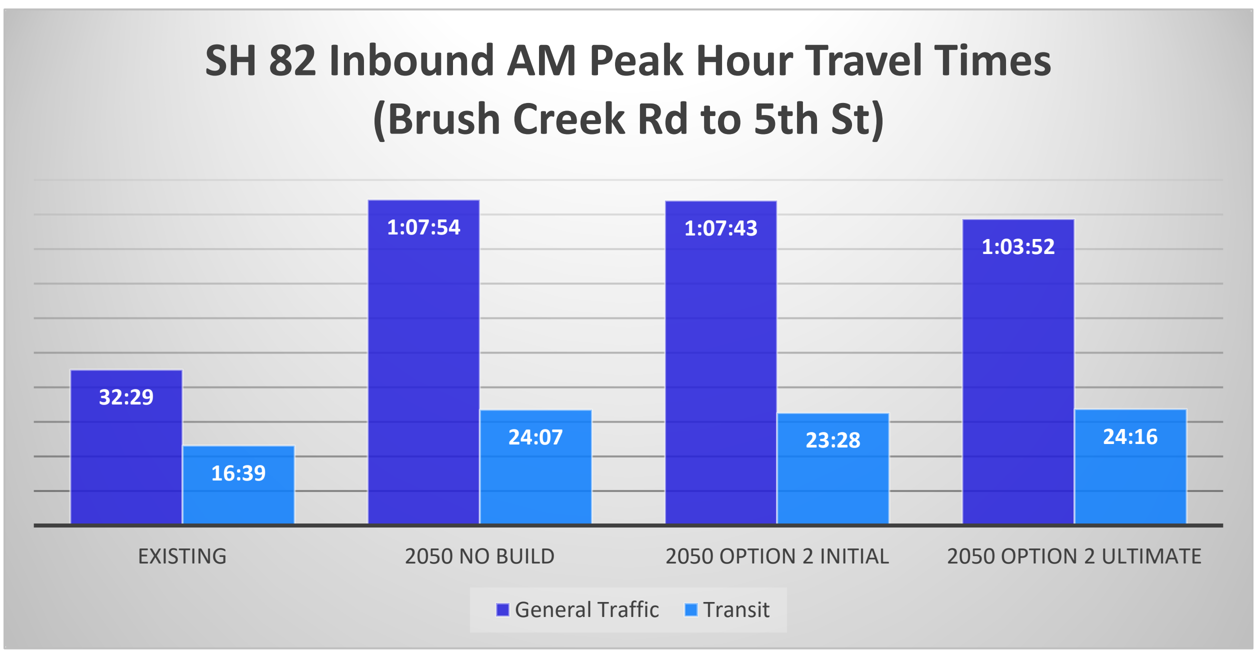
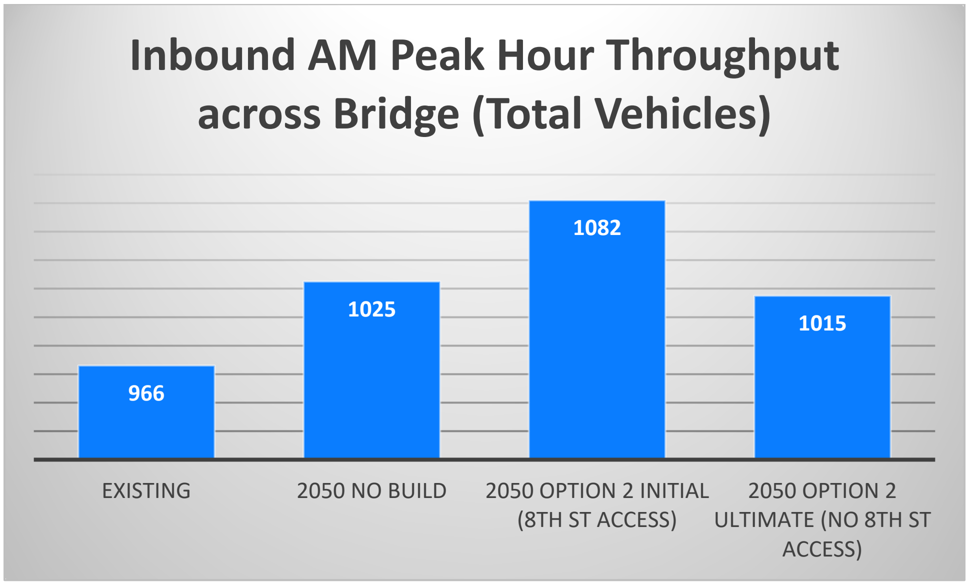


Figure 14 details the travel throughput across the bridge in the inbound AM peak hour. For the ultimate, initial and no-build, there are no physical geometry changes affecting the throughput. The variance between no-build and initial is 57 vehicles, the slight dip between initial and ultimate is likely due to the transit priority queue jump at Cemetery Lane interrupting inbound flow and thereby lowering throughput.

Figure 14: Inbound AM Peak Hour Throughput Comparisons



With the initial S-Curve improvements, general traffic flow and transit will not improve noticebaly over the no-build scenario. If the ultimate 3-lane solution was implemented, transit times would improve in the outbound direction during the PM peak hour, while the general traffic would see a slight travel time benefit (< 1 min.) alongside the dedicated transit lane. Neither phase of the S-Curve improvements benefit inbound transit or general traffic in the AM peak hour.

4.4 Castle Creek Bridge Widening

Approaches to narrow bridges tend to slow and congest traffic because the traveler feels compressed by both oncoming traffic and the bridge elements along the driving lane. This will remain the case for any initial build that matches up with the existing two-lane bridge.

Construction of a widened three-lane Castle Creek Bridge would be beneficial for traffic flow, safety, and emergency evacuation; however, the widening option has numerous challenges and impacts. Details are captured in the SH 82 Castle Creek Bridge Feasibility Study (Jacobs 2024B). Construction of a three-lane bridge would necessitate the widening of the approaches on both ends.

Increasing capacity at the bridge is also critical when considering emergency egress. According to the City's evacuation models, complete evacuation of the city will take more than 12 hours, even using both lanes of the existing bridge for outbound. Considering the initial phase of S-curve improvements, the existing two-lane bridge will remain a bottleneck and result in significant congestion during an evacuation event and daily peak periods.

Creating additional capacity and shoulder widths by widening the bridge and approaches at Castle Creek Bridge will improve safety, prioritize transit, and serve as an additional lane across the bridge for evacuation events.

5. State Highway 82 Pinch Point Analysis

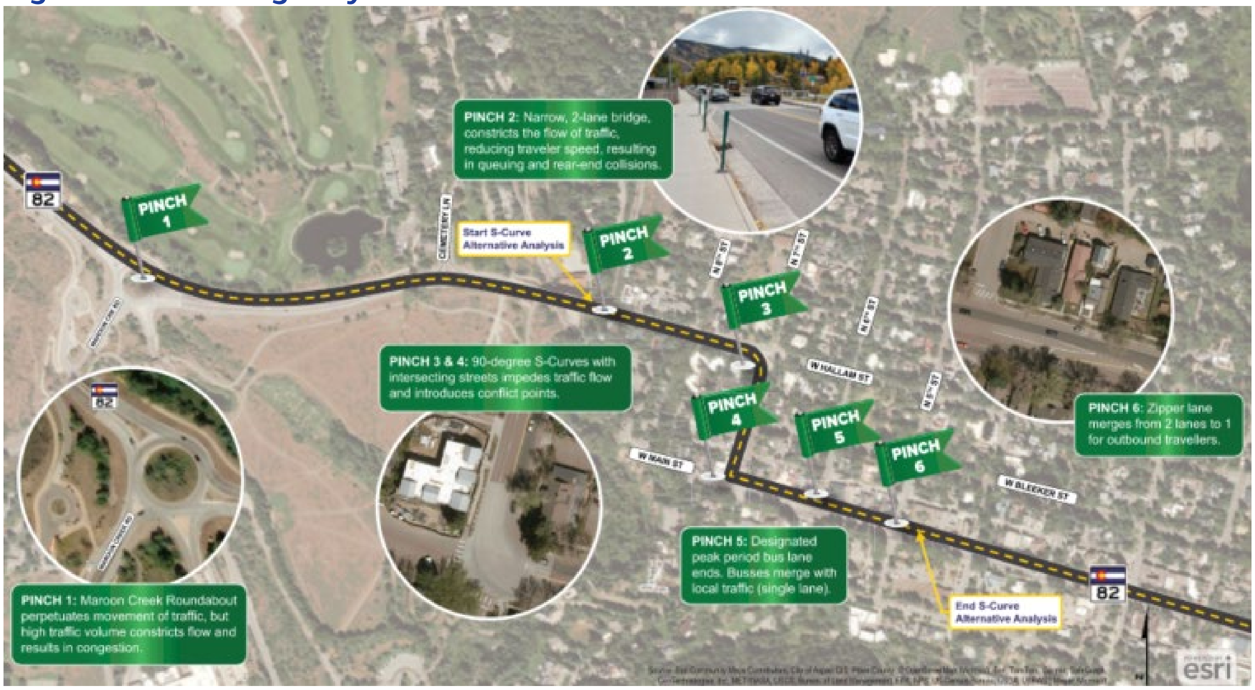
Pinch points can be defined as places where roads or paths become narrow or places of frequent traffic convergence, causing the traffic to slow down or stop. SH 82 has several pinch points that inhibit the flow of traffic, resulting in congestion or increase accident potential. S-curve modifications may alleviate some conflict points; however, congestion and queueing will remain if the pinch points are not properly addressed. The West End Neighborhood Traffic Study SH82 (Fox Tuttle 2022) peak-hour volume data indicate the S-curves, the Maroon Creek roundabout, and other traffic constrictions (pinch points) reduce capacity on SH 82 in the Castle Creek Bridge area to between 1,000 to 1,400 vehicles per hour.

Figure 15 presents pinch point locations along the corridor. The six pinch points are as follows:

1) Maroon Creek roundabout
2) Existing Castle Creek Bridge
3) 90-degree S-curve (7th and Hallam Street) (Curve 1)
4) 90-degree S-curve (7th and Main Street) (Curve 2)
5) Outbound bus merge
6) Zipper lane

Option 2 will soften the S-curves and remove access at conflicting streets, providing substantive improvements to Pinch Points 3 and 4. Additionally, Pinch Point 5 will be relocated but not resolved because buses will have to merge with general traffic at some other westerly point (depending on the phase). Pinch Point 6 is also being addressed to serve as an outside merge for outbound traffic rather than an atypical inside zipper lane, which will provide a safer merge but still cause traffic friction and congestion.

Figure 15: State Highway 82 Pinch Point Exhibit



Note: Refer to Attachment 4 for an enlarged view.

Although each phase provides improvements for the pinch points described, these improvements do not solve the bottleneck issues entirely. The Maroon Creek roundabout remains a pinch point, and Castle Creek Bridge will remain a point of restriction as a narrow two-lane bridge during the Option 2 initial phase.

Jacobs is preparing a traffic study to evaluate other solutions to help with congestion and pinch points in the corridor.

6. Transit Options

One consideration regarding adding designated bus lanes and softening the curves along the route now is that these bus lanes can be repurposed later for future transit options. Advancements in transit technology could provide more options than were available when the Entrance to Aspen ROD (FHWA 1998) was completed. These advancements include improvements to vehicle, route, and station designs, with an emphasis on efficiency, performance, and sustainability and reducing greenhouse gas emissions.

Transit technology options include LRT, trolleybus, battery electric and fuel cell electric buses, and hybrid in-motion charging trolley buses. Technology selection will naturally be influenced by the subject corridor, including considerations of capacity, trip frequency, and snow. Given the common inclement weather in the Project corridor, issues such as snow removal, facility maintenance, mixed traffic management, and other issues can be assessed through a technology comparison. Track systems and overhead lines can be adversely affected by snow and ice, and even high winds can disrupt the electrical line connections.

The proposed curve-softening improvements will accommodate a variety of transit options and will not preclude a future fixed-rail LRT system when ridership and funding can support such an investment. There are numerous options regarding bus technology, with each providing its own pros and cons related to performance, infrastructure impacts, and operational and maintenance costs. If ridership warrants the consideration of longer articulated buses, these buses have a better turning radii than a typical bus, so the proposed improvements would be more than adequate to support these longer buses, as well. Attachment 5 documents some transit options for the corridor.

7. Option 2 Impacts and Costs

Table 2 presents estimated costs of impacts from the curve softening based on 15% level design during Option 2: Initial Phase and Delta to Ultimate Phase. Impacts and cost have been refined based on 15% design and updated field surveys within the corridor.

Each phase will result in property impacts, necessary for ROW acquisition, TCEs, and tree removals. ROW acquisition costs are based on recent acquisition data from City staff.

Table 2: Summary of S-curve Initial and Delta Ultimate Impact Comparison

S-curve Impact	Initial Impact Quantity	Δ Ultimate Impact Quantity	Units	Approximate Unit Cost (2024 dollars)	Initial Impact Cost	Δ Ultimate Impact Cost
ROW Acquisition	2,245	+ 0	Square feet	$8,000	$17,960,000	+ $0
TCE	8,385	+1,450	Square feet	$1,500	$12,577,500	+$2,175,000
Tree Removals	10	+20	Each	$10,000	$100,000	+$200,000

ROW unit costs remain estimated at $8,000 per square foot based on conversations with the City. Additionally, unit costs for TCEs remained the same at $1,500 per square foot. Actual costs of ROW and TCEs could be lower or higher than estimate.

Tree removal quantity increased slightly for the initial construction because of additional survey findings. For the ultimate phase, construction tree removals increased when including the reconstructed Cemetery Lane intersection on the west side of the bridge, which was not included in the original assessment.

The 15% level design of the initial and ultimate phases allowed for the development of a conceptual cost estimate for each phase (Table 3).

Table 3: Costs Summary for Initial and Ultimate Phase Implementation

Scope of Work	Initial Phase (Two Lane)[a]	Ultimate Phase (Three Lane)[a]	Δ Ultimate (Three Lane)[b]
Construction Items	$ 4,794,000	$ 8,371,000[c]	$ 4,348,000[d]
Utilities and Traffic Control	$ 431,000	$ 1,005,000[c]	$ 698,000[d]
Design/NEPA/CE&I	$ 1,927,000	$ 3,625,000[c]	$ 2,064,000[d]
ROW and TCEs	$ 30,538,000	$ 32,713,000	$ 2,644,000
Project Totals	**$ 37,690,000**	**$45,714,000**	**$ 9,754,000**

[a] 2024 dollars

[b Inflated to 2028 dollars

[c] Does not include a potential wall between SH 82 and the Marolt property

[d] Costs for design and reconstruction of the approaches for a Three-lane Shifted bridge were provided for in the cost estimates developed for the Castle Creek Bridge Feasibility Study (Jacobs 2024B).

NEPA = National Environmental Policy Act

CE&I = Construction Engineering and Indirect costs

After the initial phase construction an additional $8 million is needed to widen for the three-lane bridge option on both approaches to the bridge, which would also include the bus lane priority queue jump at Cemetery Lane. Inflating to 4 years in the future (2028) at 5% interest increases costs to $9.7 million. These costs do not include construction of a three-lane bridge.

8. Conclusions

Constructing the Option 2 initial phase discussed in this memorandum would reduce conflict points, which increases safety and extends the bus lanes, prioritizing transit within the S-curves. With the traffic modeling factored there are negligible gains to general traffic flow compared to the no-build. And, this initial phase does not adequately address the larger congestion, travel time problems, and emergency egress for the City. Implementation of the ultimate phase improvements (3-Lane) would improve outbound general traffic flow and prioritize transit but does little to help inbound traffic nor does this phase adequately address the other nearby corridor pinch points outside of the S-curves. Overall Project costs for design, construction, and impact costs are quite high for either phase of improvements. For the initial phase, matching the existing two-lane bridge, construction, utilities, traffic control, design, and ROW is estimated at $37.7 million in 2024 dollars. Though these estimates provide refined perspective of estimated cost and impacts against benefits to safety and mobility, they are based only on a 15% design effort.

9. References

Colorado Department of Transportation (CDOT). 1997. *State Highway 82 Entrance to Aspen: Final Environmental Impact Statement, Section 4(f), Volume I.* Project STA 082A008. August.

Federal Highway Administration (FHWA). 1998. *State Highway 82 Entrance to Aspen: Record of Decision*. Project STA 082A-008. August. https://www.codot.gov/projects/archived-project-sites/SH82/documents/1998ROD.pdf.

Jacobs. 2024A. *SH 82 S-Curve Technical Memo*.

Jacobs. 2024B. *SH 82 Over Castle Creek Bridge Feasibility Study*.

Fox Tuttle Transportation Group (Fox Tuttle). 2022. *City of Aspen West End Neighborhood Traffic Study SH82*.

Attachment 1: History of Studies and Implemented Improvements Related to S-curves

Transportation Studies Timeline: *Castle Creek Bridge and S Curves*

1994-1998: *During the EIS process, improving the existing bridge and S Curves were evaluated and eliminated at the comparative screening level based on community acceptability and safety issues. The EIS analysis found that, compared to other alignments, the safety of State Highway (SH) 82 would not significantly improve because of the S curves, even with curve improvements. The existing alignment also does not address the need for an alternative emergency access route in and out of Aspen.*

Since then, because of continued interest in improving existing SH 82, other studies have been conducted, as shown below.

CITY OF ASPEN

S Curves - Citizen Task Force Project Development

AUG 2004

Final report for Citizen task force work to improve traffic flow and increase pedestrian safety. (April 2002- August 2004)

S Curve Project - Next Steps

NOV 2004

Staff presentation to Council requesting approval to move forward with the Citizen Task Force recommendations for a main street transit lane and access point closures to improve conditions in advance of the PA

S Curve Safety Improvements / Main Street Transit Lane Signing and Striping

MAR 2006

Restripe the S Curves and Main Street for better transit performance. Add crosswalk striping for pedestrians.

Feasibility Study Update - SH 82 Maroon Creek Roundabout to Main Street Reversible Lane

MAY 2008

Reversible lanes are feasible but largest impediment is cost of the bridge improvements. Widening of bridge to the north would reduce construction impacts but problematic. Bridge replacement consistent with PA is most cost effective.

SH 82 Entrance to Aspen Split Shot Alternative Additional Studies

JUN 2008

The PA travel times were 20% lower than the Split Shot. The PA also had lower open space impacts.

Aspen Area Community Plan

FEB 2012

Maintain SH 82 as a two-lane facility with any extra capacity going to transit. Avoid a net loss of open space.

Entrance to Aspen Analysis and Cost Analysis

JUN 2012

Travel times were lower through the PA as compared to all other alternatives. Costs for the PA are greater than all of the other alternatives.

Bicycle and Pedestrian Plan

JAN 2015

Build a pathway from Buttermilk to the Inn at Aspen

Castle Creek Bridge Connectivity - Conceptual Design Review

FEB 2015

Add sidewalk and barrier to the north side of Castle Creek Bridge. Add new path connections to bridge sidewalk.

Upper Valley Mobility Study

JUN 2017

The PA is the best solution for optimizing transit. Build the PA including the new bridge and dedicated bus lanes.

Upper Valley Mobility Report

SEP 2017

Extend HOV lanes into Aspen to reduce congestion. Add HOV lane enforcement. Pursue LRT because of transit driver shortage.

Near Term Transit Improvements

JUL 2021

Extend HOV lanes into Aspen to improve transit ridership

West End Traffic Calming and Traffic Evaluation

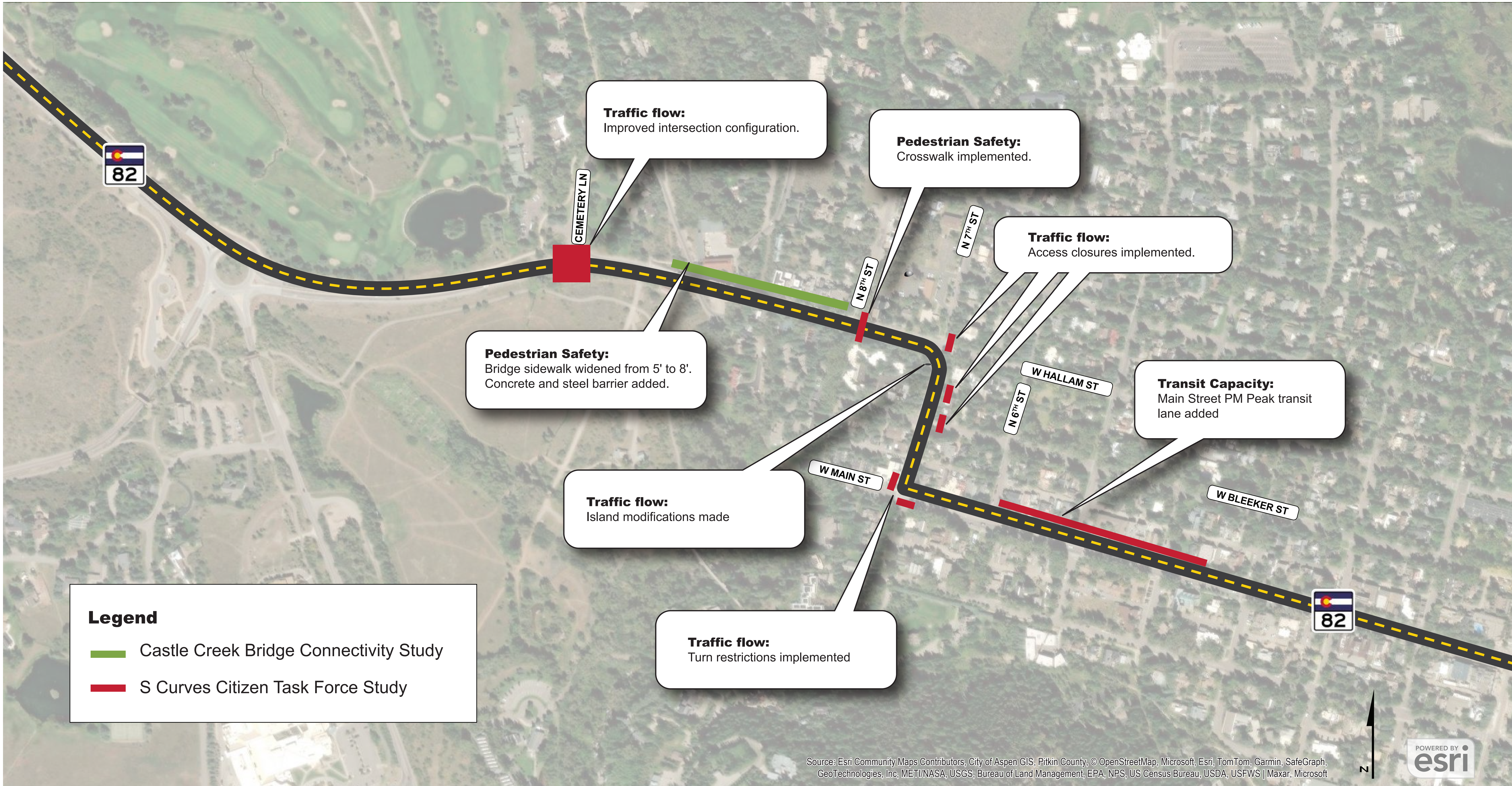
AUG 2022

S curves only can accommodate 38% of current westbound volume in the PM peak. 35% of overall traffic diverts to the neighborhoods in the PM peak. Traffic calming was not recommended

- Green flag = Improvements Implemented
- Orange flag = More Study/Recommendations Inconclusive
- Blue flag = Improvements Not Implemented

ACRONYMS

HOV - High Occupancy Vehicle
VPH - Vehicles per Hour
LRT - Light Rail Transit
BRT - Bus Rapid Transit
ROW - Right of Way
PA - Preferred Alternative



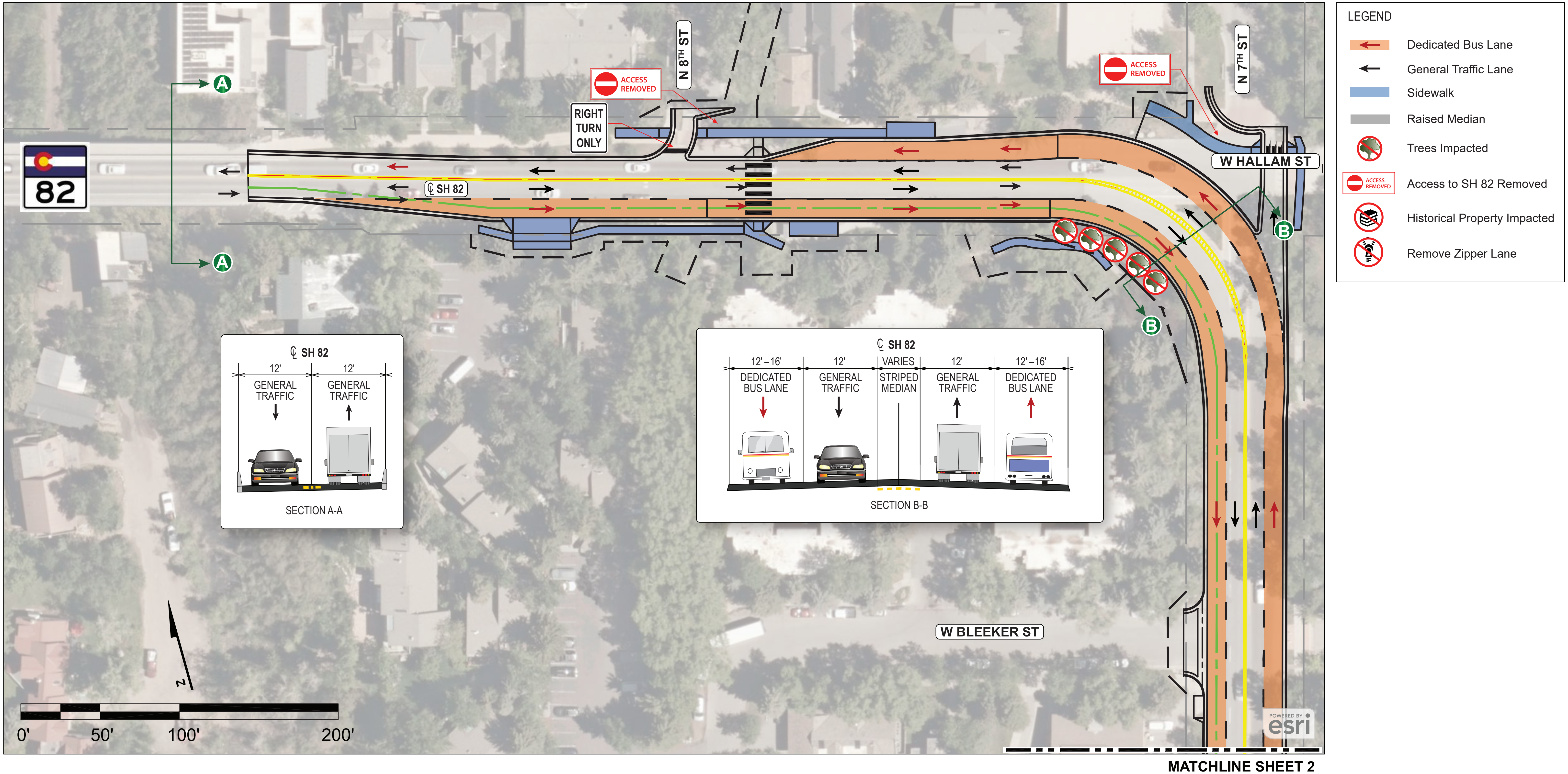
S Curve and CCB Improvements

for traffic flow and pedestrian safety (2002-2024)
City of Aspen

Jacobs

CITY OF ASPEN

Attachment 2: S-curves Option 2 – Initial Phase



Option 2 Initial | Sheet 1

City of Aspen

Jacobs

CITY OF ASPEN

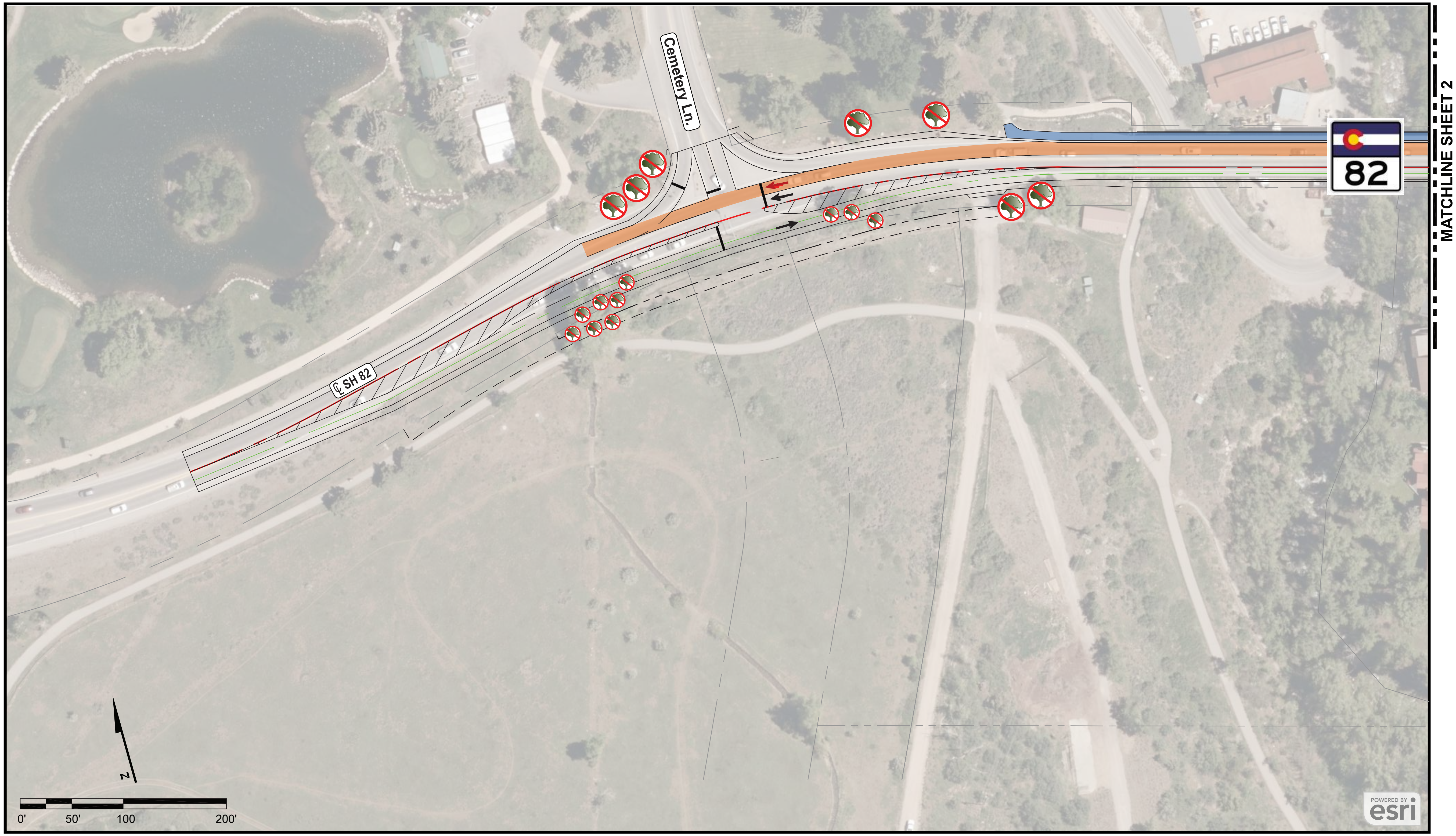
Option 2 Initial | Sheet 2

City of Aspen

Jacobs

CITY OF ASPEN

Attachment 3: S-curves Option 2 – Ultimate Phase



LEGEND

- Dedicated Bus Lane
- General Traffic Lane
- Sidewalk
- Raised Median
- Trees Impacted
- Access to SH 82 Removed
- Historical Property Impacted
- Remove Zipper Lane

Option 2 Ultimate | Sheet 1

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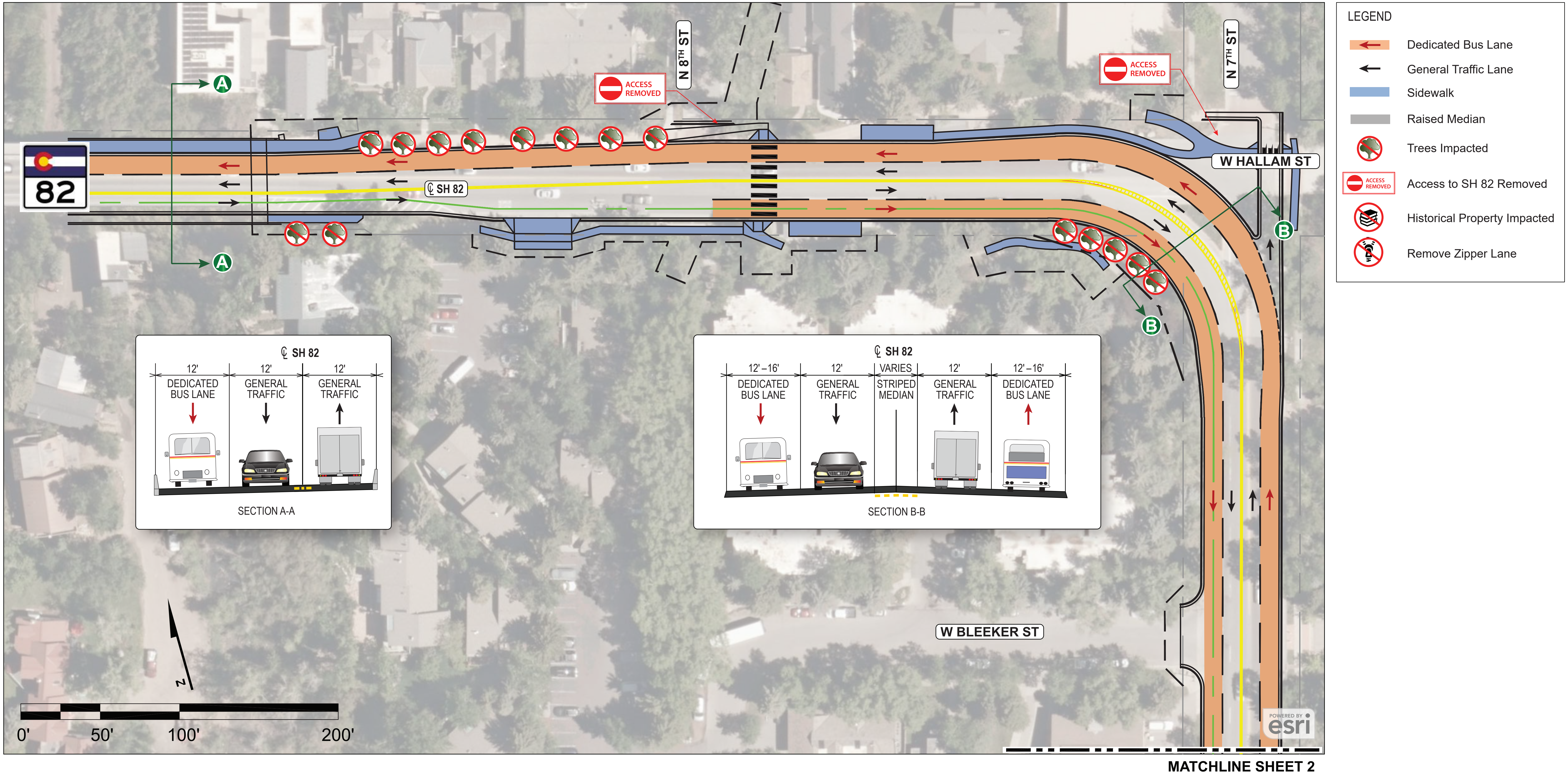

Option 2 Ultimate | Sheet 2

City of Aspen

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Option 2 Ultimate | Sheet 3

City of Aspen

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Attachment 4: Pinch Point Diagram

SH 82 Pinch Point Exhibit

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Attachment 5: Transit Options

Public Transit Options

Aspen, CO

Light Rail

- Reduces air pollution and greenhouse gas emissions by providing alternative to private vehicles
- Higher passenger capacity per lane per hour
- Lower operating cost per passenger
- Can be accommodated through S-Curve alignment
- High construction costs
- No intermingling of transit and general traffic
- Overhead electric can be affected by high winds and snow

Trolleybus

- Draws power from overhead wires and requires poles
- Differs from a traditional trolley system in that two wires and two poles are necessary to complete the electrical circuit
- Bus has greater flexibility to maneuver along the roadway
- Trackless design that provides more opportunities to mix traffic and maximize use of ROW
- Track systems and overhead lines can be adversely affected by snow and ice
- High winds can disrupt the bus/electric line connection

Battery Electric Bus

- Battery electric buses and fuel cell electric buses eliminate the need and impacts from electrification lines
- Accommodates sensitive built environments and constrained ROW
- Battery life and recharge time can pose a challenge
- Recharged, stationary, in 5–20-minute sessions

Overhead In-Motion Charging Trolleybus

- In-motion charging allows operations to continue smoothly without interruption
- In-motion charging trolleybuses use overhead catenary wires, covering about 20-40% of the route, otherwise battery powered
- Reduces overall impacts caused by catenary wires
- Reduces challenges associated with recharging systems
- Ideal in rural/urban corridors

Trackless Tram

- A hybrid technology utilizing rubber wheels and powered by rechargeable batteries
- Sustainable public transit with net zero emission vehicle
- Guided by digital rail with sensors in road, no catenary wires required
- Optical guidance may not be ideal in heavy snow conditions
- Vehicle weight requires substantial roadway surfaces