COLORADO
Department of Transportation
Office of the Chief Engineer

Federal Highway Safety Improvement Program (HSIP)
Local Agency Application (submit applications to Regional Traffic Engineer)

https://www.codot.gov/safety/traffic-safety/safety-programs-data/hsip

Requesting Agency: Boulder County

Submitted By: Alex Hyde-Wright

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Date: 02/02/2023

(All fields required unless otherwise noted)

1) **Location** (Road Number, Street, Milepost, etc.):

   US 287C MP 305.6 to MP 313.5 (7.9 miles)
   US 287C MP 318.7 to MP 322.5 (3.8 miles)

2) **Documented crash history** (if available, otherwise CDOT crash database will be used for evaluation using the most recent available three to five years of crash data):

   The crash data provided below is only for crashes that would be mitigated by a median barrier (crossing centerline crashes, including head-on, sideswipe opposite direction, and single vehicle off-left crashes) and is for 2015 - 2019.

   Major Injury = obvious incapacitating injury crashes
   Minor Injury = complaint of injury and obvious non-incapacitating injury crashes

   US 287C MP 305.6 to MP 313.5
   - 4 Fatal
   - 3 Major Injury
   - 15 Minor Injury
   - 13 PDO

   US 287C MP 318.7 to MP 322.5
   - 1 Fatal
   - 4 Major Injury
   - 9 Minor Injury
   - 7 PDO

   While 2015 – 2019 is the most recent 5-year period for which we have *comprehensive* crash data compiled, additionally since then, there have been 3 fatal crashes in 2021, 5 fatal crashes in 2022, and already 1 fatal crash in 2023 that involved a vehicle crossing the

centerline on US 287 in these two sections that could have been mitigated by a median barrier.

3) **Traffic volume** (if available. Average daily traffic for roadways and all approaches at intersections):

   26,000 - 29,000 AADT; Posted speed limit is 65 MPH

4) **Description/Illustration of existing safety concern:**

   Both of these sections of US 287 are a high-speed, five-lane, rural roadway which includes two northbound through lanes, two southbound through lanes, a two-way left-turn lane (TWLTL) separating the northbound and southbound lanes, and right turn lanes at intersections. Because there is no physical barrier separating opposing directions of traffic, when a vehicle crosses the centerline and collides with an oncoming vehicle, the speed differential can easily exceed 130 MPH, often resulting in a serious injury or fatal crash (a "severe" crash). Currently, motorists are crossing the centerline for a variety of reasons, including losing control on snowy and icy roads, medical episodes, and driving while impaired by alcohol and/or illegal drugs. Regardless of the cause, the result is all too often tragic.

   In fact, these two sections of US 287 have the highest number of severe head-on and sideswipe opposite direction crashes (crashes involving a vehicle crossing the centerline) of any corridor in unincorporated Boulder County, and this crash trend represents the single most common fatal crash trend in all of Boulder County over the last several years.

   Based on analysis done with DiExSys software, both of these sections of US 287 have a higher than expected number of head on and sideswipe (opposite direction) crashes.

5) **Description/Illustration of proposed improvement and the extent to which it addresses the crash problem:**

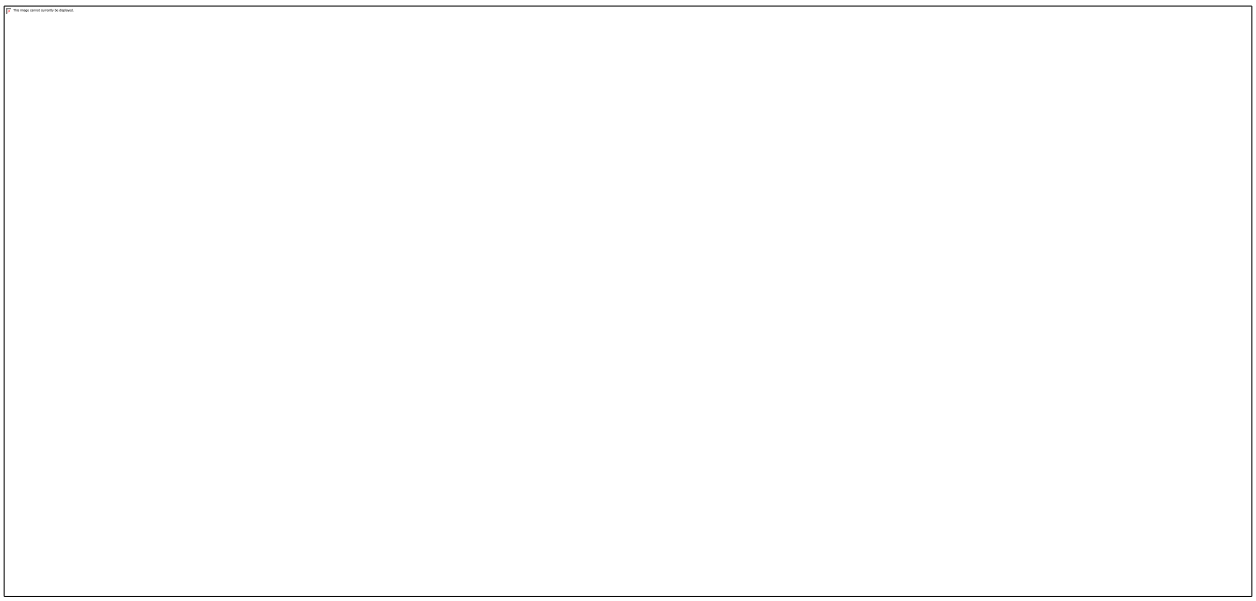
   The proposed improvement is the installation of 11.7 miles of concrete median barrier on the two sections of US 287 identified above. Rumble strips would be installed on either side of the barrier. The barrier would be approximately the same height as a jersey barrier, in order to physically prevent crossing centerline crashes. At both signalized and unsignalized intersections, there would be gaps to allow for left-turn and U-turn movements. There are 22 intersections on these two sections of US 287 with intersections spaced every 0.5 miles to 1 mile. The ends of each individual segment of concrete barrier would have an impact attenuator end section.

   Other types of countermeasures were evaluated, but ultimately decided against for several reasons:

   - Centerline rumble strips (without an additional physical barrier):
     - While centerline rumble strips can be effective for alerting inattentive, distracted, drowsy, or even alcohol/drug impaired drivers to lane departure, they are ineffective at preventing crossing centerline crashes where a driver is severely impaired or has lost control due to snow or ice on the road or is experiencing a medical episode.
   - Cable-rail barrier:
     - When a cable-rail barrier gets hit there is a large deflection to "catch" and arrest the vehicle. For a median installation, CDOT standards require 10 feet

of deflection clear zone on each side of a cable-rail barrier; with only a 15 foot wide TWLTL, there is insufficient room in the existing median for a cable-rail barrier to function without the deflection encroaching into oncoming vehicle travel lanes.
    - If a cable-rail barrier is hit, that section becomes ineffective until it is repaired or replaced. Between 2015 and 2019, there were 56 crashes that involved a vehicle crossing the centerline on these two sections of US 287. With this frequency of impacts, large sections of the cable-rail barrier would likely be ineffective for periods of time and require constant maintenance. This means maintenance workers would need to be out on this road constantly repairing or replacing the barrier, which in addition to the cost of this work, also puts the workers at risk.
- Guardrail
    - While crash impacts do not affect the effectiveness of guardrail to the same extent as cable-rail barrier, damaged guardrail would still require constant maintenance to provide the desired level of safety.
    - Damaged sections of guardrail that protrude into or are left in the travel lane would create new safety hazards.

A concrete barrier will most effectively mitigate the crash trend on this corridor while requiring a very minimal amount of maintenance.



An example of a concrete median barrier and impact attenuator end sections on a 65 MPH multi-lane CDOT highway in Region 1 (CO 58).

6) Amount of funding requested for proposed safety improvement*

Full Request:

- Federal share amount: $18,810,000
- State match amount: $2,090,000
- Local match amount: $0

Is this funding for design & construction or construction only?

- Design & Construction

Initial 1.25 mile segment:

- Federal share amount: $1,548,000
- State match amount: $172,000
- Local match amount: $0

Is this funding for design & construction or construction only?

- Construction Only

*The federal share for HSIP projects is 90 percent. CDOT (state) will provide 10 percent match on projects located along the state highway system. Local agencies will provide 10 percent match for projects that are located off the state highway system.

^Benefit/Cost evaluation will be based off the federal and state amounts listed above.

7) Total estimated proposed safety improvement cost

Full Request: $20,900,000

CDOT US287 Vison Zero and Multimodal
Approximate Quantities and Estimate
Full Build (12.1 miles)
2/14/2023

Short Item #	Long Item #	Item Description	Unit	Quantity	Unit Cost	Total Cost
202	202-00190	Removal of Concrete Median Cover Material	SY	867.20	$8.97	$7,778.78
202	202-00250	Removal of Pavement Marking	SF	78618.00	$0.85	$66,825.30
202	202-00810	Removal of Ground Sign (R3-9b "Center Lane Only" signs)	EA	32.00	$154.19	$4,934.08
606	606-00910	Guardrail Type 9 (Style CA)	LF	63753.00	$150.00	$9,562,950.00
614	614-01512	Steel Sign Support (2-Inch Round)(Post)	LF	352.00	$27.50	$9,680.00
614	614-00011	Sign Panel (Class 1) (R4-7)	SF	528.00	$30.50	$16,104.00
614	614-80385	Median Edge-Line Rumble Strip (Sinusoidal)(Grinding)	LF	96800.00	$0.65	$62,920.00
614	614-85001	Impact Attenuator	EA	44.00	$40,000.00	$1,760,000.00
627	627-00008	Modified Epoxy Pavement Marking	GAL	503.00	$150.00	$75,450.00
A		***SUBTOTAL OF MAJOR WORK ITEMS:***				**$11,566,642.16**
B		Potholing	LS	0%	of A	$ -
C		Erosion Control	LS	2%	of A	$ 231,332.84
D		Landscape and Irrigation Restoration	LS	0%	of A	$ -
E		Construction Traffic Control	LS	20%	of A	$ 2,313,328.43
F		Mobilization	LS	8%	of A	$ 925,331.37
G		Construction Surveying	LS	2%	of A	$ 231,332.84
H		***SUBTOTAL OF SECONDARY ITEMS:***				**$ 3,701,325.49**
I		CE's & Indirects	LS	26%	of A+H	$ 3,969,671.59
J		Construction Contingency	LS	15%	of A+H+I	$ 2,885,645.89
K		***CONSTRUCTION TOTAL:***				**$18,153,613.54**
L		Design	LS	15%	of K	$2,723,042.03
M		***PRECONSTRUCTION TOTAL:***				**$2,723,042.03**
N		***PROJECT TOTAL:***				**$20,876,655.58**

Initial 1.25 mile segment: $1,720,000

CDOT US287 Vison Zero and Multimodal
Approximate Quantities and Estimate
Shorter Segment (1.25 miles)
2/14/2023

Short Item #	Long Item #	Item Description	Unit	Quantity	Unit Cost	Total Cost
202	202-00190	Removal of Concrete Median Cover Material	SY	0.00	$8.97	$0.00
202	202-00250	Removal of Pavement Marking	SF	4400.00	$0.85	$3,740.00
202	202-00810	Removal of Ground Sign (R3-9b "Center Lane Only" signs)	EA	4.00	$154.19	$616.76
606	606-00910	Guardrail Type 9 (Style CA)	LF	6600.00	$150.00	$990,000.00
614	614-01512	Steel Sign Support (2-Inch Round)(Post)	LF	40.00	$27.50	$1,100.00
614	614-00011	Sign Panel (Class 1) (R4-7)	SF	48.00	$30.50	$1,464.00
614	614-80385	Median Edge-Line Rumble Strip (Sinusoidal)(Grinding)	LF	13200.00	$0.65	$8,580.00
614	614-85001	Impact Attenuator	EA	2.00	$40,000.00	$80,000.00
627	627-00008	Modified Epoxy Pavement Marking	GAL	77.65	$150.00	$11,647.06
A		***SUBTOTAL OF MAJOR WORK ITEMS:***				**$1,097,147.82**
B		Potholing	LS	0%	of A	$ -
C		Erosion Control	LS	2%	of A	$ 21,942.96
D		Landscape and Irrigation Restoration	LS	0%	of A	$ -
E		Construction Traffic Control	LS	20%	of A	$ 219,429.56
F		Mobilization	LS	8%	of A	$ 87,771.83
G		Construction Surveying	LS	2%	of A	$ 21,942.96
H		***SUBTOTAL OF SECONDARY ITEMS:***				**$ 351,087.30**
I		CE's & Indirects	LS	26%	of A+H	$ 376,541.13
J		Construction Contingency	LS	15%	of A+H+I	$ 273,716.44
K		***CONSTRUCTION TOTAL:***				**$1,721,951.56**

For information only

8) Planned construction advertise date:

Fall 2026

9) Planned construction completion date:

Fall 2027

Additional comments or notes regarding project or funding:

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Colorado Department of Transportation Region & State Traffic Engineers

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CDOT Region Boundary Map