SH 83 Safety and Operations Analysis:
Bayou Gulch to El Paso County Line
MP 30.20 – MP 53.88
Project Code 23008

Appendix H – Package Summary Sheets

Prepared for:

COLORADO Department of Transportation

DOUGLAS COUNTY COLORADO

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Overview of Recommendations

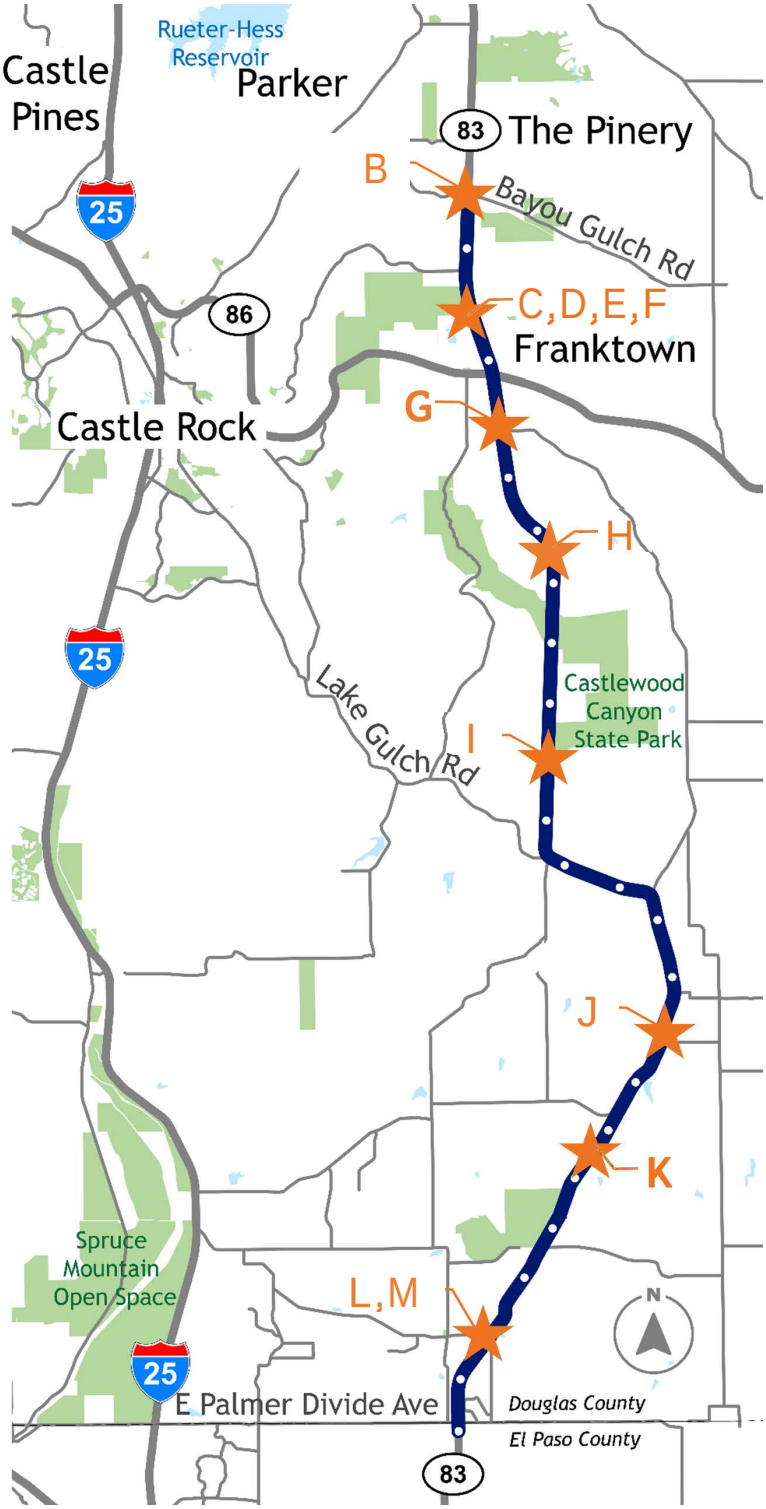
Through the safety and operations analysis, there were some improvement types that could be implemented quickly and identified as early action packages. Those include:

- Early Package 1 - Corridor Signing Improvements
- Early Package 2 - Signal Timing Modifications
- Early Package 3 - Striping Modifications

Upon completion of the analysis, additional packages were identified along the corridor. Each letter on the map, to the right, corresponds to a package in the following document.

- A - Corridor-Wide Centerline Rumble Strip Improvements
- B - Bayou Gulch SB Turn Lane Modifications
- C - Hidden Mesa Improvements
- D - Lost Lake Drive Improvements
- E - North Shoulder Improvements
- F - North Rumble Strip Improvements
- G - South Franktown Improvements
- H - Shoulder Improvements
- I - Prairie Canyon Ranch Improvements
- J - Gillian Avenue Improvements
- K - Passing Lane Improvements
- L - South Shoulder Improvements
- M - Lorraine Road Improvements

While portions of the highway right-of-way (ROW) in the project corridor (MP 30.20 to MP 53.88) have previously been inventoried for archaeological resources, those inventories are generally about 20+ years old. While the results of the inventories are still relevant, a resurvey of the highway ROW may be recommended depending on the nature of the proposed package improvements.



SH 83 Safety and Operations Analysis

SUMMARY OF PACKAGES

LOCATION	ID	PACKAGE NAME	COST
MP 30.20-53.88	Early 1	Corridor Signing Improvements	$600,000
MP 53.86, 52.60, 50.76	Early 2	Signal Timing Modifications	$15,000
MP 45.90 & 43.80	Early 3	Striping Modifications	$50,000
MP 30.20-53.88	A	Corridor-Wide Centerline Rumble Strip Improvements	$1,500,000
MP 53.86	B	Bayou Gulch SB LT Lane Modifications	$540,000
MP 52.07	C	Hidden Mesa Improvements	$1,980,000
MP 51.95	D	Lost Lake Drive Improvements	$1,750,000
MP 51.50-53.50	E	North Shoulder Improvements	$4,980,000
MP 50.75-53.88	F	North Rumble Strip Improvements	$195,000
MP 50.25-50.68	G	South Franktown Improvements	$4,130,000
MP 45.31-50.75	H	Shoulder Improvements	$12,840,000
MP 43.80	I	Prairie Canyon Ranch Improvements	$1,850,000
MP 37.82-38.08	J	Gillian Avenue Improvements	$5,840,000
MP 35.00-36.00	K	Passing Lane Improvements	$9,500,000
MP 32.15-32.61	L	South Shoulder Improvements	$1,750,000
MP 31.90	M	Lorraine Road Improvements	$4,340,000

Notes

1. Costs include design and construction based on major scope elements with a 30%-50% contingency based on the complexity of the project.
2. Costs are assumed to be in 2021 dollars and no inflation factor has been applied based on unknown market adjustments.

Corridor Signing Improvements

Early Package 1
Mile Marker 30.50 to 53.88

BACKGROUND

Increasing visibility of route-finding markers for both regular and recreational drivers on this corridor could help increase users' familiarity and awareness of their surroundings. Alerting drivers to location of access points, road curvatures, and potential school zones will improve the safety of the corridor. The operational findings don't fully capture this issue, so the benefit of changes will be difficult to measure.

PACKAGE DESCRIPTION

Increase size of existing signs, add advanced intersection signing, add flashing beacons near schools, and upgrade delineators.

Approximate Cost

$600,000

ANALYSIS FINDINGS

Safety

- 411 total crashes on the corridor (10 fatal crashes)
- 32% rear-end, 18% wild animal, 15% fixed object
- 24% run-off-road crashes (18% off-right, 6% off-left)

Traffic/Operations

- SH 83 Entire Project Limits - LOS A or LOS B in the AM & PM Peak
- Exception - PM Peak Southbound adjacent to SH 86 operates at LOS C

Environmental Context

- Refer to Appendix F: Environmental Report for whole corridor

Signal Timing Modifications

Early Package 2
Mile Marker 50.76, 52.60, 53.86

BACKGROUND

Local residents provided feedback summarizing their frustration at the signalized intersections on this corridor. As a result of uncoordinated signal operation, increasing traffic volumes, and the lack of platooning vehicles, it would be near impossible to remove all driver frustration at these signals. However, Advanced Traffic Controllers have many customizable options to provide efficiencies, reduce queueing in congested areas, and reduce driver frustration.

PACKAGE DESCRIPTION

Collect traffic counts at select locations, review Synchro models, and controller programming to make recommendations for signal timing improvements.

Cost

$15,000

ANALYSIS FINDINGS

Safety

- Intersection of SH 83 and Bayou Gulch Road - Severe/Total LOSS: Int III/III, 21 total crashes (7 injury, 0 fatal)
- Intersection of SH 83 and Castle Oaks Drive- Severe/Total LOSS: Int III/II, 10 total crashes (4 injury, 0 fatal)
- Intersection of SH 83 and SH 86 - Severe/Total LOSS: Int III/II, 30 total crashes (12 injury, 1 fatal: rear-end)

Traffic/Operations

- Intersection of SH 83 and Bayou Gulch Road - LOS E in the AM & PM Peak
- Intersection of SH 83 and Castle Oaks Drive- LOS C in the AM & PM Peak
- Intersection of SH 83 and SH 86 - LOS C in the AM & PM Peak

Environmental Context

- Refer to Appendix F: Environmental Report for whole corridor

Striping Modifications

Early Package 3
Mile Marker 43.08 and 45.90

BACKGROUND

Public feedback indicates difficulty in this area finding gaps to make turns, multiple near miss incidents and drivers illegally passing in the widened weight station segment. Drivers on this portion of roadway may be making risky maneuvers due to the straight and level roadway geometry. By making striping modifications in this area, conflict zones can be reduced, and safety improved.

PACKAGE DESCRIPTION

Install striped left-turn lane divider lines near Castlewood Canyon entrance and revise passing striping near Prairie Canyon Ranch entrance.

Cost

$50,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Segment III/II
- 22 total crashes, (2 fatal: 1 head-on, 1 rear end)
- 32% run-off-road (18% off-right, 14% off-left)

Traffic/Operations

- LOS A in the AM & PM Peak

Environmental Context

- Refer to Appendix F: Environmental Report for whole corridor

Corridor-Wide Centerline Rumble Strip Improvements

Package A
Mile Marker 30.20-53.88

BACKGROUND

This corridor generated many comments and concerns regarding head-on crashes and vehicles crossing the centerline. The safety analysis shows portions of this roadway that experience crash rates above average for this type of corridor, and provide insight into where to focus mitigation efforts. With a total of 10 head on and 14 sideswipe crashes (opposite direction), there is opportunity to address this issue.

PACKAGE DESCRIPTION

Add rumble strips in the center of the roadway. This improvement shall be coordinated with future improvements. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

Cost

$1,500,000

ANALYSIS FINDINGS

Safety

- 425 total crashes (10 fatal)
- 32% rear end, 18% wild animal, 15% fixed object
- 24% run-off-road crashes (18% off-right, 6% off-left)

Traffic/Operations

- LOS A in the AM & PM Peak

Environmental Context

- Refer to Appendix F: Environmental Report for whole corridor

Bayou Gulch SB LT Lane Modifications

Package B
Mile Marker 53.86

BACKGROUND

Feedback from Douglas County Schools reports the southbound left-turning traffic gets backed up into through traffic during school ingress and egress times. The documented rear end crashes at this access are an indication of congestion and results in further delay. Due to the internal circulation issues at Ponderosa High School affecting observed congestion on SH 83 during pickup and drop off, the recommended package may not solve the operational concern noted. To maximize the safety and operational benefits that this improvement could have, the scope of this package is recommended to be revaluated after internal school circulation issues at Ponderosa High School are resolved to the best of their ability.

PACKAGE DESCRIPTION

Extend southbound left-turn lane to provide more vehicle storage. Requires modifications to approximately 300 feet of existing median and concrete pavement on SH 83, north of Bayou Gulch Road. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

Cost

$540,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Intersection III/III
- 21 reported crashes (no fatal)
- 6 southbound rear end crashes

Traffic/Operations

- LOS C in the PM Peak

Environmental Context

- Waters of the U.S. (Bayou Gulch)
- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in

design when the need for additional right of way is being evaluated.

- High number of wildlife-vehicle collisions (WVC) (39 WVC recorded in CDOT Traffic and Safety Data between MP 52.9-MP 54.9 [20 per mile] from June 2010-June 2020) – primarily deer; Bayou Gulch Open Space located east of the project provides habitat for different species of wildlife
- Structure G-17-BR carries SH 83 over Bayou Gulch; located approximately 500' south of the Bayou Gulch Rd/SH 83 intersection; structure is approximately 255' wide (abutment to abutment) and 120' long (guard rail to guard rail); and the height of the structure is about 11 feet; the existing bridge may provide passage for wildlife; bridge modification for PMJM mitigation (e.g., ledges) likely not needed but brush piles could create continuous cover for movement underneath the bridge
- Consider wildlife fencing north and south of Bayou Gulch to guide animals toward the bridge; include escape ramps, guards, and signage
- Potential PMJM habitat is in this area; consider field surveys and culvert updates that promote wildlife passages (upsizing, ledges)
- If construction/modifications are restricted to the existing pavement, there are no archaeological resource concerns. All contractor staging is recommended to stay north of Bayou Gulch Road (within ROW) due to archaeological resource sensitivity
- Changes to roadway cross section are not expected to affect the integrity of its historic context (farm-to-market road); Bayou Gulch Bridge G-17-BR was constructed in 1981
- Resources/constraints not present/not impacted: open space/parks and floodplains

Community Feedback

- Douglas County Schools mentioned a need for more storage for southbound left-turns and suggested extending the turn lane.

Hidden Mesa Improvements

Package C
Mile Marker 52.07

BACKGROUND

Feedback from local residents expressed the increasing popularity of Hidden Mesa Open Space is leading to difficulty ingress and egress to the property. The safety analysis shows this segment experiences crash rates above average for this type of corridor, and removing conflict points will reduce opportunity for incidents, and may also provide more buffer to avoid wildlife-vehicle crashes.

PACKAGE DESCRIPTION

Improve access to and from Hidden Mesa Open Space by adding left- and right-turn lanes, acceleration and deceleration lanes, widening shoulders, and adding centerline and shoulder rumble strips. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 1 for additional context.

Cost

$1,980,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Corridor IV/IV
- No reported crashes at access point
- Pattern of rear end crashes involving injury in vicinity

Traffic/Operations

- LOS B in the PM Peak

Environmental

- Access to Hidden Mesa Open Space Potentially eligible historic resource(s) adjacent to SH 83
- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- Potentially eligible historic resource(s) adjacent to SH 83
- High number of WVC (23 WVC recorded in CDOT Traffic and Safety Data between MP 51.1-MP 53.1 [12 per mile] from June 2010-une 2020)
- Several smaller culverts located within 1 mile north/south of project area; one 7

foot- in-diameter (approximate dimensions; height unknown) CBC is located approximately 0.4 mile north; depending on size, CBC could be used as a wildlife crossing for small-to-medium sized species, in conjunction with wildlife fencing; consider upsizing to provide more potential for larger wildlife use; per OTIS, there is no structure name associated with this CBC

- Potential PMJM habitat is in this area; consider field surveys and culvert updates that promote wildlife passage (upsizing, ledges)
- Topography may be amenable for adding a larger underpass approximately 0.5 mile south of project area
- Consider wildlife fencing if a crossing is built to guide animals toward crossings; include escape ramps, guards, and signage
- An archaeological survey could be required if easements are required, due to archaeological resource sensitivity west of SH 83 (north and south of Lost Lake Drive)
- All construction activity and contractor staging is recommended to stay within ROW due to archaeological resource sensitivity west of the highway (north and south of Lost Lake Drive)
- There are potentially eligibility historic resources adjacent to the area of improvement; any temporary impacts or changes to access will need to be considered as they relate to historic resources
- Resources/constraints not present/not impacted include: PMJM habitat, Waters of the U.S., floodplains

Community Feedback

- The public reported that the Hidden Mesa Open Space is heavily used and increasing in popularity, making it difficult to enter and exit the property with the high volume of traffic. They provided solutions to add turn lanes and acceleration/deceleration lanes.

Lost Lake Drive Improvements

Package D
Mile Marker 51.95

BACKGROUND

Local residents communicated difficulty finding gaps in traffic to access Lost Lake Drive, as well as vehicles using the striped median to the south as a passing lane. The safety analysis shows this segment experiences crash rates above average for this type of corridor, and removing conflict points will reduce opportunity for incidents, and may also provide more buffer to avoid wildlife-vehicle crashes.

PACKAGE DESCRIPTION

Improve access to and from Lost Lake Drive by adding left- and right-turn lanes, acceleration and deceleration lanes, widening shoulders, and adding centerline and shoulder rumble strips. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 1 for additional context.

Cost

$1,750,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Corridor IV/IV
- No reported crashes at access point
- Pattern of rear end crashes involving injury in vicinity

Traffic/Operations

- LOS B in the PM Peak

Environmental Context

- Access to Hidden Mesa Open
- Potentially eligible historic resource(s) adjacent to SH 83
- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- High number of WVC (25 WVC recorded in CDOT Traffic and Safety Data between MP 51.0-MP 53.0 [13 per mile] from June 2010-June 2020)
- Several smaller culverts located within 1 mile north/south of project area; one 7 foot-in-diameter (approximate dimensions; height unknown) CBC is located

approximately 0.54 mile north; depending on size, CBC could be used as a wildlife crossing for small-to-medium sized species, in conjunction with wildlife fencing; consider upsizing to provide more potential for larger wildlife use; per OTIS, there is no structure name associated with this CBC

- Potential PMJM habitat is in this area; consider field surveys and culvert updates that promote PMJM passages (upsizing, ledges)
- Topography may be amendable for adding a larger underpass approximately 0.35 mile south of project area; consider wildlife fencing if a crossing is built to guide animals toward crossings; include escape ramps, guards, and signage; additional wildlife signage is recommended to alert drivers of potential wildlife movements
- All construction activity and contractor staging is recommended to stay within ROW due to archaeological resource sensitivity west of the highway (north and south of Lost Lake Drive)
- Due to the proximity of sensitivity of archaeological resources, improvements and associated activities such as staging should be limited to the existing ROW. An archaeological survey could be required if additional ROW or easements are necessary
- Changes to roadway cross section are not expected to affect the integrity of its historic context (farm-to-market road)
- Resources/constraints not present/not impacted: Waters of the U.S. and floodplains

Community Feedback

- The public stated a concern that they have trouble finding gaps to turn in this area. They also shared their experience with near misses related to drivers using the striped median south of the intersection as a passing lane, which creates a dangerous conflict if a vehicle is waiting to make a southbound to eastbound turn onto Lost Lake Drive. Two solutions were provided: to add acceleration/deceleration lanes and to add turn lanes.

North Shoulder Improvements

Package E
Mile Marker 51.50 to 53.50

BACKGROUND

This section of the corridor generated many comments and concerns regarding head-on crashes, run off the road crashes, bicyclist safety, turning movements, shoulders safety, and general congestion. These concerns are not necessarily captured in the safety and operational evaluation based on quantifiable data, however providing more space for drivers to maneuver will reduce conflict points. The additional pavement width may also improve bicyclist comfort levels should they choose to share the road with vehicles in this area. Future developments are planned along this segment of SH 83 and should be coordinated to improve SH 83 as applicable.

PACKAGE DESCRIPTION

Widen shoulders and add shoulder rumble strips on both sides of SH 83. All existing culverts in poor condition would be replaced as part of the widening. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 1 for additional context.

Cost

$4,980,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Segment IV/III
- 1 bicycle crash

Traffic/Operations

- LOS B in the PM Peak

Environmental Context

- Access to Hidden Mesa Open Space; East Canyon Trail crosses under SH 83
- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- Potentially eligible historic resource(s) adjacent to SH 83
- There are archaeological concerns outside of the existing highway ROW. An updated

archaeological survey of the highway ROW is potentially recommended, depending on the nature of the off-pavement improvements (e.g., shoulder widening)
- Changes to roadway cross section are not expected to affect the integrity of its historic context (farm-to-market road)
- High number of WVC (52 WVC recorded in CDOT Traffic and Safety Data between MP 50.5-MP 54.5 [13 per mile] from June 2010-June 2020)
- Potential Waters of the U.S.
- Potential PMJM habitat is in this area; consider field surveys and culvert updates that promote wildlife passage (upsizing, ledges)
- Bayou Gulch and Hidden Mesa Open Spaces are located near portions of the project; areas provide suitable habitat for different species of wildlife (e.g., deer, pronghorn)
- Bayou Gulch, located 0.25 mile north of the north end of the project, is mapped as a Riparian Conservation Zone and is expected to contain suitable habitat for PMJM
- Wildlife movement corridors outlined/mapped by the county do not occur within this project footprint
- Several small-to-medium culverts exist in this stretch which may provide movement for small mammals; recommend upsizing to provide more potential for wildlife use, including ungulates
- Culverts within this extent (north to south) include:
    - 083A052830BR at MP 52.82 constructed in 1968; it is a metal pipe culvert with concrete headwalls that appears to be in poor condition which CDOT would likely want to address
    - 083A052500BR MP 42.493 constructed in 1968; it is a metal pipe culvert with modern concrete headwalls which CDOT would likely want to address
    - 083A052250BR at MP 52.249 constructed in 1968; it is a metal pipe culvert with concrete headwalls that appears to be in poor condition
    - 083A051880BR at MP 51.872 constructed in 1969; it is a metal pipe culvert that appears to have modern improvements
    - 083A051590BR at MP 51.579 constructed in 1968; it is a metal pipe culvert
- Consider wildlife fencing if a crossing is built to guide animals toward crossings; include escape ramps, guards, and signage; additional wildlife signage is recommended to alert drivers of potential wildlife movements
- Resources/constraints not present/not impacted: floodplains

Community Feedback

- The public shared a number of concerns with this section related to head-on crashes, run off the road crashes, bicyclist safety, turning into driveways, the safety of shoulders for bicycles and passing vehicles, and congestion. Suggestions focused mainly on shoulders in this area: needing to be added or widened in some areas, installation of a safer space for bicyclists (either on or off the road), rumble strips and safety edges, widening the shoulders for a safe pull off, and adding a shoulder on the up-hill climb lane. Suggestions to install low volume left turn lanes, add emergency pullouts, and add turn lanes were also provided.

North Rumble Strip Improvements

Package F
Mile Marker 50.75 to 53.88

BACKGROUND

This section of the corridor generated many comments and concerns regarding head-on crashes and crossing the centerline. The safety analysis shows this segment experiences crash rates above average for this type of corridor, with 3 head on and 3 sideswipe crashes.

PACKAGE DESCRIPTION

Add rumble strips in the center of SH 83. This improvement shall be coordinated with future improvements at Hidden Mesa Open Space, Lost Lake Drive, East Park Drive, and Rafter Road. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 1 for additional context.

Cost

$195,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Segment IV/III
- 3 head on crashes, 3 sideswipe (opposite direction) crashes

Traffic/Operations

- LOS B in the PM Peak

Environmental Context

- High number of WVC (76 WVC recorded in CDOT Traffic and Safety Data between MP 49.8-MP 54.9 [15 per mile] between June 2010-June 2020)
- Potential PMJM habitat is in this area; consider field surveys and culvert updates that promote wildlife passage (upsizing, ledges)
- Bayou Gulch and Hidden Mesa Open Spaces are located near the project; areas provide suitable habitat for different species of wildlife (e.g., deer, pronghorn)
- Bayou Gulch, located 0.75 mile north of the north end of the project, is mapped as a Riparian Conservation Zone and is expected to contain suitable habitat for PMJM
- Wildlife movement corridors outlined/mapped by the county do not occur within this project footprint; however, they do occur along portions of Cherry Creek and Willow Creek 0.25 mile southwest of the SH 83 and SH 86 intersection in Franktown (southern end of the project)

- Several small-to-medium culverts exist in this stretch; recommend upsizing to provide more potential for wildlife use
- Topography may be amendable for adding a larger underpass in areas; consider wildlife fencing if a crossing is built to guide animals toward crossings; include escape ramps, guards, and signage; additional wildlife signage is recommended to alert drivers of potential wildlife movements
- On-pavement improvements will not affect archaeological resources

Community Feedback

- The public stated concerns about head-on crashes and crossing the centerline in this area. They also made a suggestion to add centerline rumble strips.

South Franktown Improvements

Package G
Mile Marker 50.25 to 50.68

BACKGROUND

Local residents reported concerns about run off the road crashes, enhancing school access and safety, and driveway access. The safety analysis shows this segment experiences crash rates above average for this type of corridor, with rear end crashes potentially being a result of congestion. The operational analysis shows LOS E in the PM Peak, which is an indication of increased congestion and delay.

PACKAGE DESCRIPTION

Add a two-way left-turn lane, acceleration and deceleration lanes, widening shoulders, and add centerline and shoulder rumble strips. All existing culverts in poor condition would be replaced as part of the widening; those in good or fair condition would be extended as needed. These improvements shall be coordinated with planned development in the area. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 2 for additional context.

Cost

$4,130,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Segment IV/III
- No reported crashes at access point
- Pattern of rear end crashes approaching Franktown

Traffic/Operations

- LOS E in the PM Peak

Environmental Context

- Franktown Elementary School
- Potentially eligible historic resource(s) adjacent to SH 83; at MP 50.592 there is a concrete box culvert that was constructed in 1955, structure 083A050680BR; at MP 50.402 there is a metal pipe culvert with concrete wingwalls (structure 083A050410BR) that was constructed in 1968 and which appears to be in poor condition

- Changes to roadway cross section are not expected to affect the integrity of its historic context (farm-to-market road)
- High number of WVC (30 WVC recorded in CDOT Traffic and Safety Data between MP 49.3-MP 51.7 [13 per mile] from June 2010-June 2020)
- Floodplain
- Potential Waters of the U.S.
- Wildlife movement corridors and Riparian Conservation Zones occur west (approximately 0.25 mile) of the project area along Cherry Creek and Willow Creek
- Small-to-medium sized culverts occur within this stretch; depending on size, could be used as a wildlife crossing(s) for smaller species, in conjunction with wildlife fencing; recommend upsizing to provide more potential for larger wildlife use
- If a wildlife system is not feasible, additional wildlife signage is still recommended to alert drivers of potential wildlife movements
- May require an updated archaeological survey
- Resources/constraints not present/not impacted: PMJM habitat and open space/parks

Community Feedback

- The public stated concerns in this area about run off the road crashes, increasing bicyclist safety, enhancing school safety, and turning into driveways. Solutions were provided to add shoulders with rumble strips and safety edges, widen shoulders or install a separate bike path, widen shoulders for a safe pull off, add shoulders on the uphill climb lane, extend the turn lane, and add acceleration/deceleration lanes.

Shoulder Improvements

Package H
Mile Marker 45.31 to 50.75

BACKGROUND

This section of the corridor generated many comments and concerns regarding head-on crashes and crossing the centerline.

PACKAGE DESCRIPTION

Add rumble strips in the center of SH 83, widen shoulders and add shoulder rumble strips on both sides of SH 83. All existing culverts in poor condition would be replaced as part of the widening; those in good or fair condition would be extended as needed. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way. Temporary construction easements may be required in some areas.

See Figure 2 for additional context.

Cost

$12,840,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Segment III/III
- 2 head on crashes, 2 sideswipe (opposite direction)
- 10 run-off-road crashes

Traffic/Operations

- LOS B in the AM/PM Peak

Environmental Context

- Castlewood Canyon State Park
- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- Potentially eligible historic resource(s) adjacent to SH 83
- The Cherry Creek Bridge at MP 46.266, structure G-18-BL, was constructed in 1948; it is eligible for listing on the National Register of Historic Places
- None of the following culverts would be considered contributing or significant
    - 083A045980BR at MP 45.973 was constructed in 1967; it is a metal pipe culvert
    - 083A046630BR at MP 46.625 was constructed in 1968; it is a double pipe culvert with concrete headwalls that appears to be in poor condition

  - 083A046830BR at MP 46.807 was constructed in 1968; it is a metal pipe culvert
  - 083A047600BL at 47.559 was constructed in 1968; it is a metal pipe culvert
  - 083A048350BL at MP 48.34 was constructed in 1968; it is a concrete box culvert that appears to be in deteriorated condition
  - 083A049080BR at MP 48.945 was constructed in 1968; it is a metal pipe culvert with concrete headwall/wingwalls that appears to be in poor condition
  - G-17-BN was constructed in 1976; it is a concrete beam bridge
  - 083A050410BR at 50.402 was constructed in 1968; it is a metal pipe culvert with concrete wingwalls that appears to be in poor condition
- Changes to roadway cross section are not expected to affect the integrity of its historic context (farm-to-market road)
- Potentially NRHP eligible archaeological site south of MP 46 entrance to Castlewood Canyon State Park (within ROW and west of ROW). Will need reevaluation if construction will occur in this vicinity
- Medium number of WVC (51 WVC recorded in CDOT Traffic and Safety Data between MP 44.3-MP 51.8 [7 per mile] from June 2010-June 2020)
- Floodplain
- Potential Waters of the U.S.
- No mapped critical or occupied habitat for PMJM occurs within the project area; however, mapped Riparian Conservation Zones may be impacted in areas where SH83 crosses Cherry Creek and Russellville Gulch; raised ledges, or brush piles for PMJM passage may not be required.
- Mapped wildlife movement corridors occur within and near the project; Russellville Gulch and Cherry Creek are mapped corridors that occur within the project area
- The bridge over Cherry Creek (G-18-BL) likely supports large wildlife movement (e.g., deer, elk); wildlife fencing could direct wildlife to use this structure/crossing
- The Russellville Gulch structure (G-17-BN) may provide passage for some large mammals; the structure is approximately 60' wide (abutment to abutment) by 45' long (guard rail to guard rail); height is unknown; further assessment of this structure, and possible upsizing, is recommended
- Flat terrain occurs near the south end of this project (south of Castlewood Canyon State Park); an arch overpass could be built for wildlife passage in this stretch
- Several areas in the middle section of the project area contain topography potentially amendable for wildlife overpasses and/or underpasses
- Several small-to-medium culverts exist in this stretch which may provide movement for small mammals; recommended upsizing to provide more potential larger wildlife use, including deer
- Consider wildlife fencing to guide animals toward crossings; include escape ramps, guards, and signage
- If a wildlife system is not feasible, additional wildlife signage is recommended to alert drivers of potential wildlife movements
- Potentially NRHP eligible archaeological site south of MP 46 entrance to Castlewood Canyon State Park (within ROW and west of ROW). Will need

reevaluation if construction will occur in this vicinity

Community Feedback

- The public stated concerns about run off the road crashes and head on crashes in this area. They provided a solution to add shoulders with rumble strips and safety edges.

Prairie Canyon Ranch Improvements

Package I
Mile Marker 43.80

CHALLENGE STATEMENTBACKGROUND

Public feedback reports concerns about left turning vehicles queueing in the through lane, as well as increased traffic to Prairie Canyon Ranch.

PACKAGE DESCRIPTION

Improve access to and from Prairie Canyon Ranch by adding turn lanes. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 3 for additional context.

Cost

$1,850,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Corridor III/II
- No reported crashes at access point

Traffic/Operations

- LOS A in the AM/PM Peak

Environmental Context

- Prairie Canyon Ranch
- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- Medium number of WVC (15 WVC recorded in CDOT Traffic and Safety Data between MP 42.8-MP 44.8 [8 per mile] from June 2010-June 2020)
- PMJM not anticipated to be impacted by project work in this location.
- Mapped wildlife movement corridors and Riparian Conservation Zones occur east and west of the project along Cherry Creek, Lake Gulch, Upper Lake Gulch; wildlife movements are expected to occur between these areas
- Topography may be amendable for adding wildlife overpasses and/or underpasses; consider wildlife fencing if a crossing is built to guide animals toward crossings; include escape ramps, guards, and signage
- Few small culverts exist within 1 mile north/south of this area; recommend upsizing to provide more potential for wildlife use
- Consider wildlife fencing if a crossing is built to guide animals toward crossings; include escape ramps, guards, and signage
- Wildlife signage at fence ends, as well as areas approaching fencing is recommended

- If a wildlife system is not feasible, additional wildlife signage is recommended to alert drivers of potential wildlife movements
- Structure 083A043810BL at MP 43.738 was constructed in 1967; it is a metal pipe culvert that is not significant or contributing
- Archaeological survey is necessary; the ROW has not been previously surveyed in this location
- Resources/constraints not present/not impacted: Waters of the U.S., floodplains, PMJM habitat, and potentially eligible historic resource(s) adjacent to SH 83

Community Feedback

- The public provided concerns about stopping in a through lane waiting to turn and causing a backup. They also mentioned that Prairie Canyon Ranch willbecome more popular in the future. There were suggestions to add turn lanes.

Gillian Road Improvements

Package J
Mile Marker 37.82 to 38.08

BACKGROUND

Public feedback reports concerns about school safety, southbound left-turn crashes, and congestion in this area. The safety analysis shows this segment experiences crash rates above average for this type of corridor, with increased severity and run off the road crashes.

PACKAGE DESCRIPTION

Add left- and right-turn lanes, acceleration and deceleration lanes, widen shoulders, and add centerline and shoulder rumble strips. All existing culverts in poor condition would be replaced as part of the widening; those in good or fair condition would be extended as needed. The improvements will cover both the intersection with Gillian Road and the entrance to Cherry Valley Elementary School. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 4 for additional context.

Cost

$5,840,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Intersection IV/IV
- 1 fatal crash, 5 injury crashes
- 4 run-off-road crashes

Traffic/Operations

- LOS B in the AM/PM Peak

Environmental Context

- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- Cherry Valley School is a potentially eligible historic resource; it would require a survey and design considerations to make sure improvements do not affect the integrity of the resource
- Structure 083A037950BR at MP 38.013 was constructed in 1967; it is a double box concrete culvert that is not significant

- Low number of WVC (5 WVC recorded in CDOT Traffic and Safety Data between MP 36.8-MP 39.1 [2 per mile] from June 2010-June 2020)
- PMJM mapped occupied habitat occurs within the project area
- Mapped Riparian Conservation Zones occur just south and west of the project area along Crowfoot Creek and West Cherry Creek; a mapped wildlife movement corridor occurs along West Cherry Creek, immediately west of the project area
- An existing 17' wide by 40' long (headwall to headwall; height unknown) CBC is near the southern end of the project area which may provide wildlife passage for certain species (e.g., predatory species and potentially even deer); recommend upsizing the culvert to attract other larger wildlife species (e.g., elk); per OTIS, a structure number is not associated with this CBC
- An existing culvert that carries SH 83 over Crowfoot Creek (located south of the project area approximately 0.75 mile) may provide wildlife movement for certain species; Crowfoot Creek is mapped as a Riparian Conservation Zone, which may provide potential habitat for PMJM (mapped critical or occupied habitat does not occur in the creek); if the project upsizes this location for other wildlife movement opportunities, it is recommended to install raised ledges for potential PMJM passage; brush piles may be another passage option, depending on water flows
- Several other small-sized culverts exist within 1 mile north/south of the project area that may provide passage opportunities for smaller species of wildlife; recommend upsizing culverts for wildlife passage
- If any culverts are upsized and/or used for the purpose of larger wildlife movement, consider wildlife fencing to guide animals toward crossings; include escape ramps, guards, and signage
- If a wildlife system is not feasible, additional wildlife signage is recommended to alert drivers of potential wildlife movements.
- Archaeological survey is necessary; the ROW has not been previously surveyed in this location
- Resources/constraints not present/not impacted: Waters of the U.S. and floodplains

Community Feedback

- The public stated concerns about school safety, left-turn southbound crashes, and heavy traffic in this area. They provided solutions to add turn lanes, add acceleration/deceleration lanes, widen the shoulders, and add a median.

Passing Lane Improvements

Package K
Mile Marker 35.00 to 36.00

BACKGROUND

While the operational analysis within this section of the corridor indicates operations are acceptable the existing shoulders are very narrow and below design standards. The safety analysis shows this segment is experiencing crashes at an average rate, and there were at least 7 crashes involving passing maneuvers. Public feedback reported concerns about illegal passing in this area from frustrated drivers.

PACKAGE DESCRIPTION

Add a passing lane ineach direction on SH 83, widening shoulders, and add centerline and shoulder rumble strips. All existing culverts in poor condition would be replaced as part of the widening; those in good or fair condition would be extended as needed. Permanent improvements are anticipated to be entirely within existing right-of-way; however, temporary construction easements may be required.

See Figure 5 for additional context.

Cost

$9,500,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Segment III/III
- 1 head on crash, 4 sideswipe (oppositedirection) crashes
- At least 7 crashes involving passing maneuvers

Traffic/Operations

- LOS A in the AM/PM Peak

Environmental Context

- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- Potentially eligible historic resources adjacent on the west side of SH 83 (Cherry School)
- Structure 083A035630BR at MP 35.641 was constructed in 1968; it is a simple metal pipe culvert which does not have historical significance
- Potential Waters of the U.S.
- Low number of WVC (8 WVC recorded in CDOT Traffic and Safety Data between MP

34.0-MP 37.0 [3 per mile] from June 2010-June 2020)

- No PMJM mapped occupied habitat occurs within the project area
- Mapped Riparian Conservation Zones occur just north and west of the project area along Crowfoot Creek and West Cherry Creek
- Several other small-sized culverts exist in and within 1 mile north/south of the project area that may provide passage opportunities for smaller species of wildlife; recommend upsizing culverts for wildlife passage
- An unnamed drainage occurs in the middle of the project area (approximately mile post 35.6); area has topography that may provide an opportunity for a larger wildlife crossing
- If any culverts are upsized and/or used for the purpose of larger wildlife movement, consider wildlife fencing to guide animals toward crossings; include escape ramps, guards, and signage
- If a wildlife system is not feasible, additional wildlife signage is recommended to alert drivers of potential wildlife movements
- Archaeological survey is necessary; the ROW has not been previously surveyed in this location Potential Waters of the U.S. at culvert crossing
- Resources/constraints not present/not impacted: floodplains, high number of wildlife-vehicular crashes, and PMJM habitat

Community Feedback

- The public provided concerns about head-on crashes and dangerous/illegal passing in this area. A solution provided was to add passing lanes.

South Shoulder Improvements

Package L
Mile Marker 32.15 to 32.61

BACKGROUND

This section of the corridor does not have any safety and operational issues based on the analysis performed; however, the existing shoulders are very narrow and below design standards.

PACKAGE DESCRIPTION

Add rumble strips in the center of SH 83. Widen shoulders and add shoulder rumble strips on both sides of SH 83. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 6 for additional context.

Cost

$1,750,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Segment III/III
- 1 fatal crash, 9 injury crashes
- 9 run-off-road crashes

Traffic/Operations

- LOS A in the AM/PM Peak

Environmental Context

- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- Potentially eligible historic resource(s) adjacent to SH 83
- Archaeological survey is necessary; the ROW has not been previously surveyed in this location
- PMJM not anticipated to be impacted by project work in this location; however, mapped Riparian Conservation Zones occur just west (West Cherry Creek) and south (Elk Creek) of the project area along
- A mapped wildlife movement corridor occurs along West Cherry Creek, west of the project area
- Smaller-sized culverts exist north at MP 32.648 (083A032650BR) and south at MP 32.109 (083A032060BR) of this area; recommend upsizing to provide more potential for wildlife use; both culverts were constructed in 1968 and both are simple metal culverts
- Consider wildlife fencing if a crossing is built to guide animals toward crossings;

include escape ramps, guards, and signage
- If a wildlife system is not feasible, additional wildlife signage is still recommended to alert drivers of potential wildlife movements
- Medium number of WVC (18 WVC recorded in CDOT Traffic and Safety Data between MP 31.2- MP 33.6 [8 per mile] from June 2010-June 2020)
- Potential Waters of the U.S.
- PMJM habitat
- Culvert replacement or widening could offer small mammal (such as PMJM) crossing opportunity
- Resources not present/not impacted: open space/parks

Community Feedback

- None documented to date.

Lorraine Road Improvements

Package M
Mile Marker 31.90

BACKGROUND

This section of the corridor generated many comments and concerns regarding lack of turning lanes and the challenge in finding gaps in the traffic. The safety analysis shows this segment experiences crash rates above average for this type of corridor, with 1 fatal and 2 injury crashes.

PACKAGE DESCRIPTION

Add left- and right- turn lanes, acceleration and deceleration lanes, widen shoulders, and add centerline and shoulder rumble strips. All improvements, including contractor staging areas, are anticipated to be within the existing right-of-way.

See Figure 6 for additional context.

Cost

$4,340,000

ANALYSIS FINDINGS

Safety

- Severe/Total LOSS: Intersection IV/III
- 1 fatal crash, 2 injury crashes

Traffic/Operations

- LOS A in the AM/PM Peak

Environmental Context

- If the project adds more than 500 square feet of new impervious surface water quality mitigation will be required; this mitigation will need to be considered in design when the need for additional right of way is being evaluated
- Medium number of WVC (11 WVC recorded in CDOT Traffic and Safety Data between MP 30.9-MP 32.9 [6 per mile] from June 2010-June 2020)
- No mapped PMJM occupied or critical habitat within/near the project area; however, mapped Riparian Conservation Zones occur just west (West Cherry Creek) and north (Elk Creek) of the project area
- A mapped wildlife movement corridor occurs along West Cherry Creek, west of the project area
- Smaller-sized culverts exist north/south of this area; recommend upsizing to provide more potential for wildlife use
- Consider wildlife fencing if a crossing is built to guide animals toward crossings; include escape ramps, guards, and signage
- If a wildlife system is not feasible, additional wildlife signage is still recommended to

alert drivers of potential wildlife movements

- Archaeological survey is necessary; the ROW has not been previously surveyed in this location
- Resources/constraints not present/not impacted: floodplains, PMJM habitat, Waters of the U.S.; there are no known eligible resources immediately adjacent to the highway

Community Feedback

- The public stated concerns about heavy traffic, reducing northbound left turn crashes, and turning onto the highway in this area. Solutions provided were to add turn lanes and acceleration/deceleration lanes.

Figure H1: Packages B, C, D, E, and F

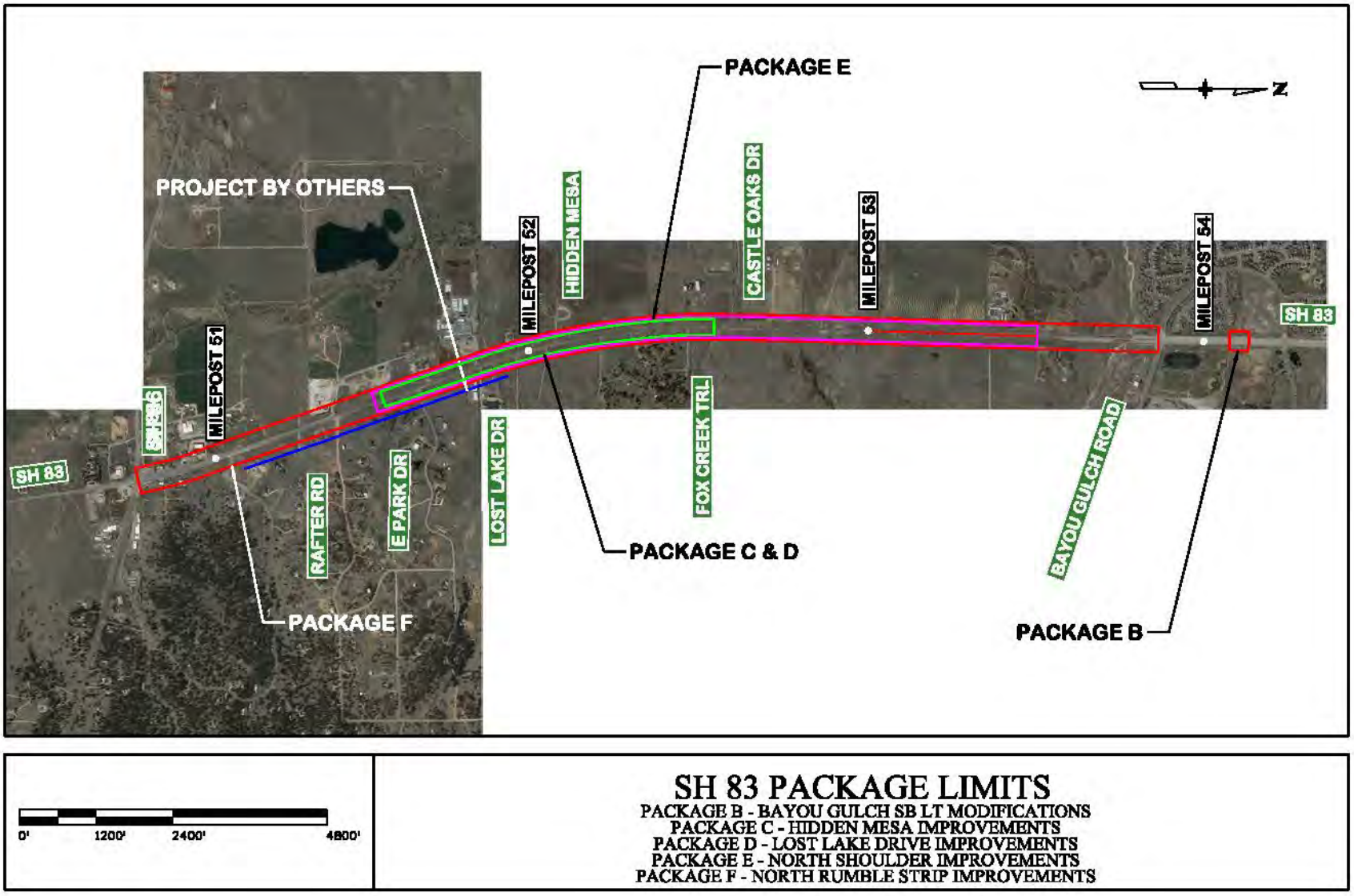


Figure H2: Packages G and H

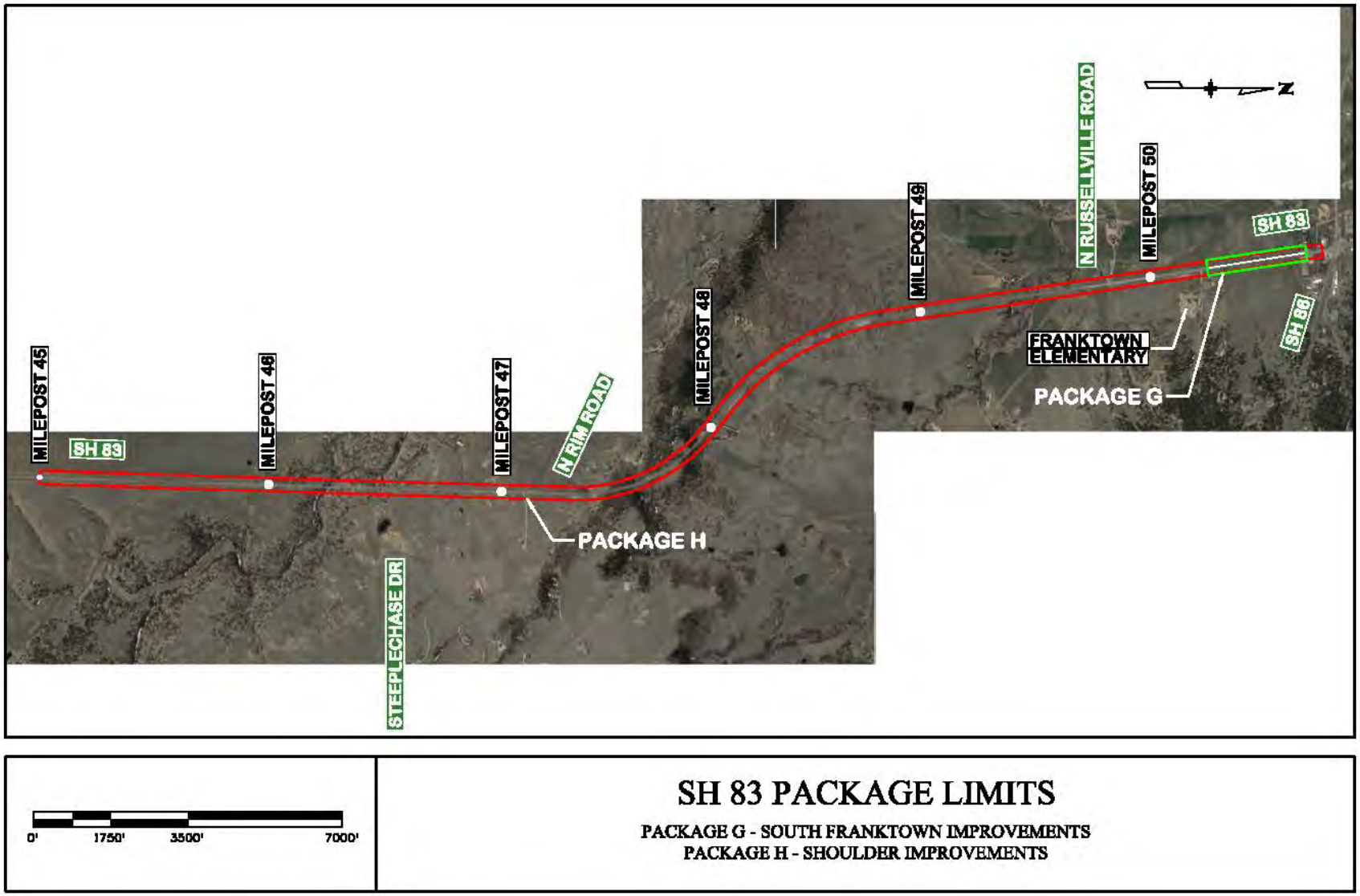


Figure H3: Package I

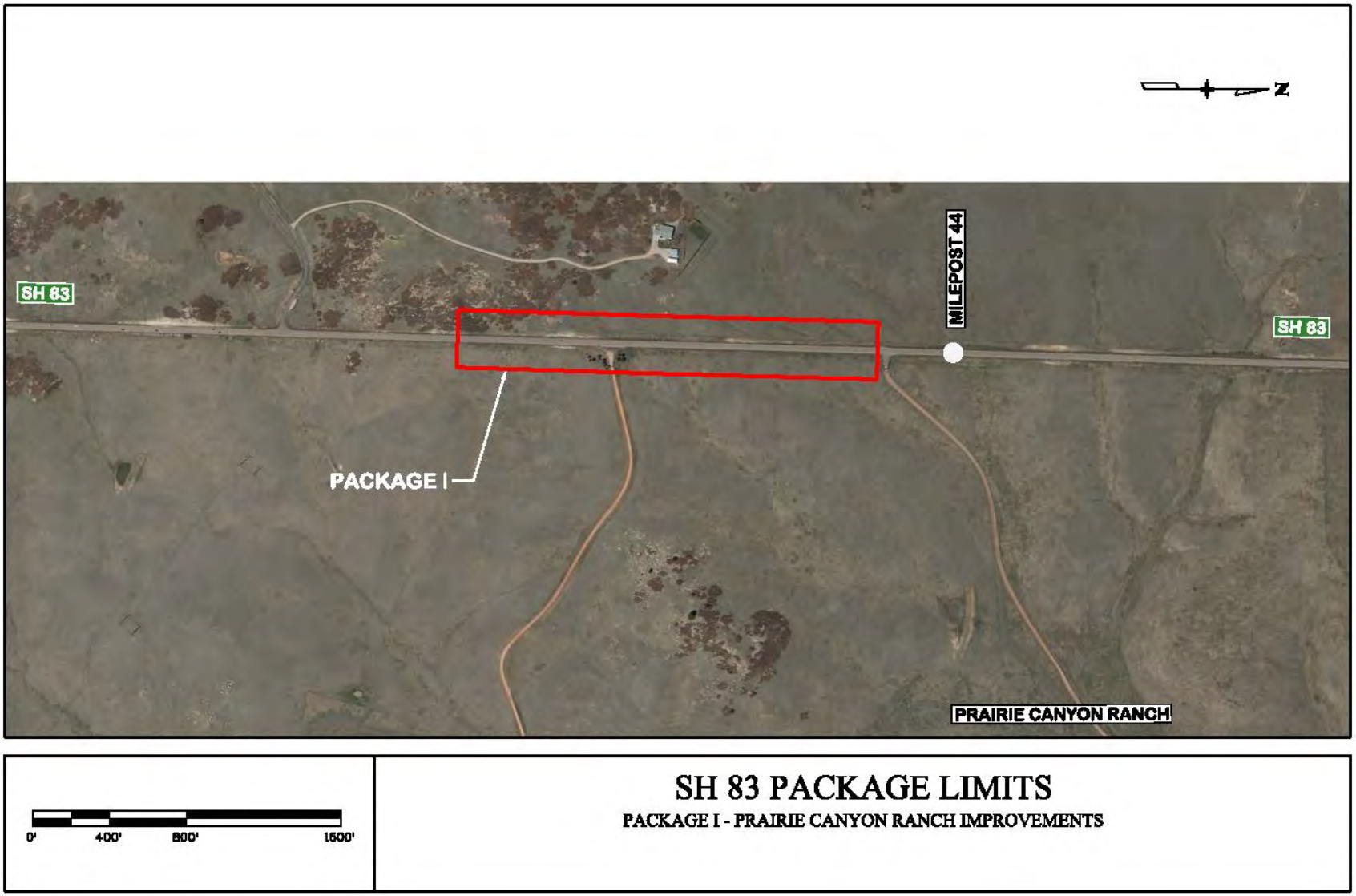


Figure H4: Package J

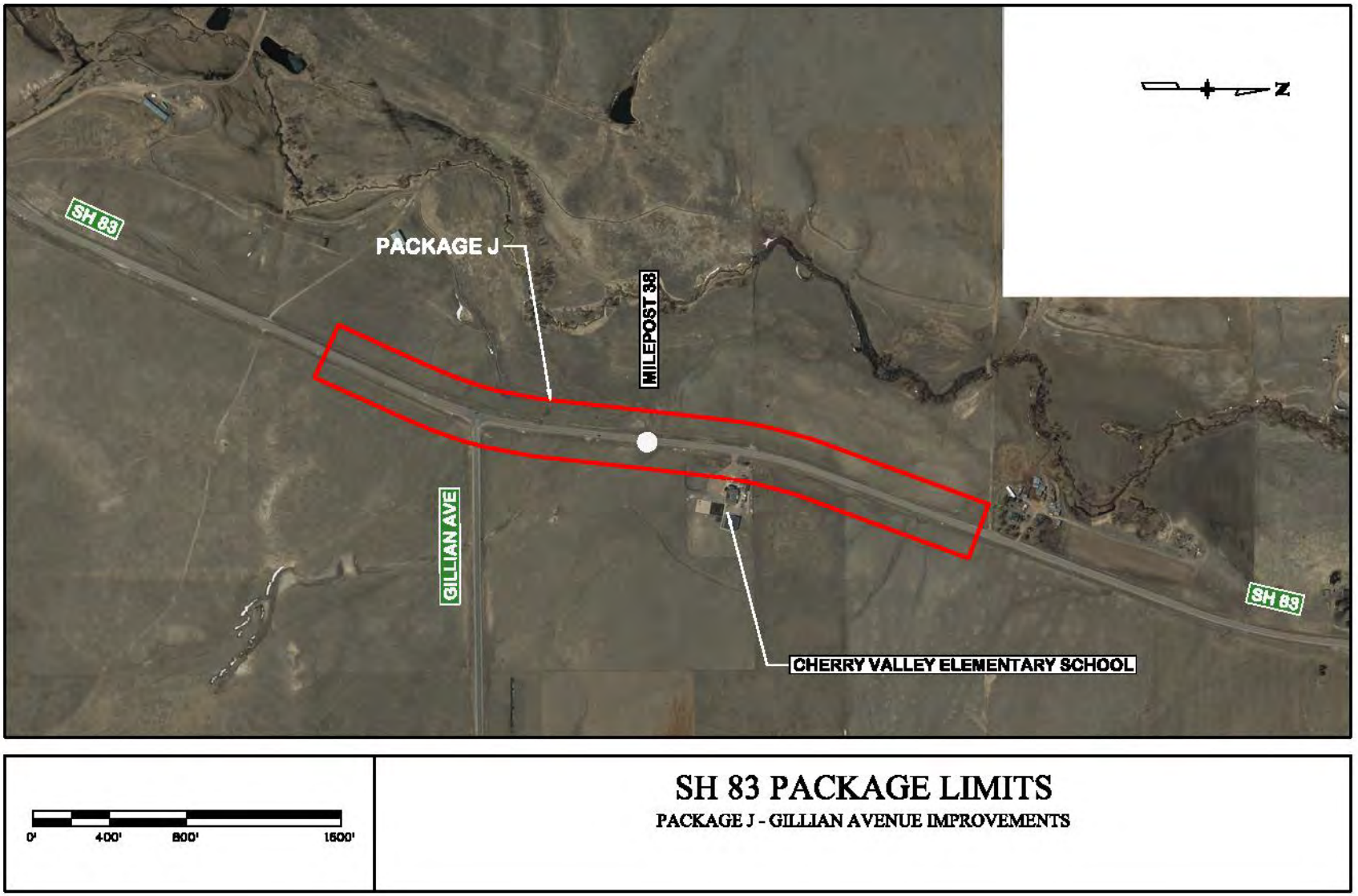


Figure H5: Package K

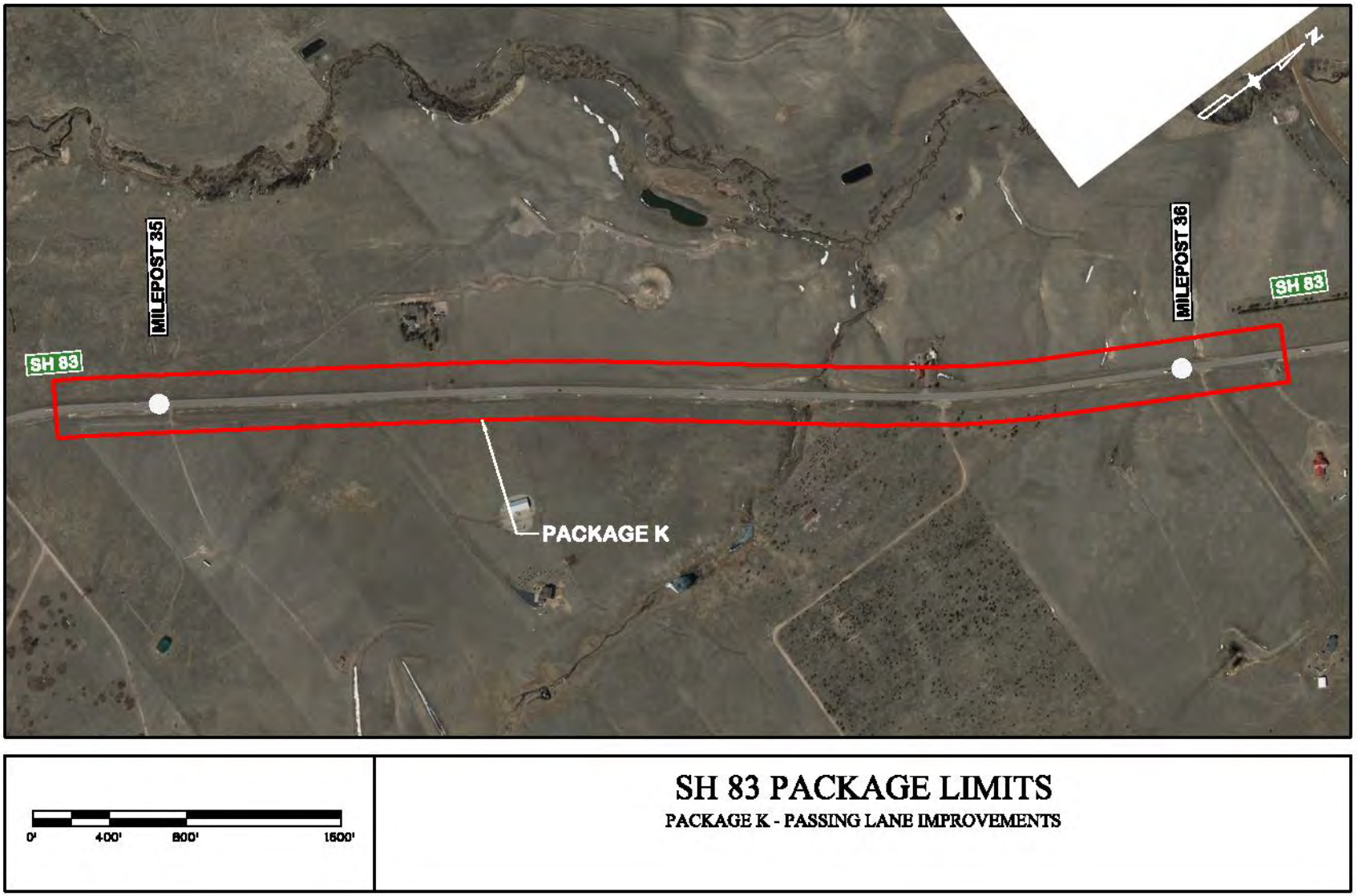


Figure H6: Package L and M