CAPITAL AREA COUNCIL OF GOVERNMENTS

CAPITAL AREA REGIONAL SAFETY ACTION PLAN

Blanco, Lee, and Llano Counties

APRIL 2026

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1. Executive Summary

This Regional Safety Action Plan covers Blanco, Lee, and Llano counties. It makes all three counties eligible to apply for Safe Streets and Roads for All (SS4A) Implementation Grant funding. SS4A Implementation Grants fund construction: engineering design, right of way, and physical safety improvements on public roads.

Between 2020 and 2024, **82** people died on roads in these three counties. Another **288** crashes caused serious injuries. The chapters ahead identify where those crashes concentrate, which road characteristics predict future crashes, and which countermeasures produce the highest return per dollar invested.

Corridor Projects

Top 5 per county by KA crash count. The “From–To” column shows TxDOT DFO mile markers. Full methodology and caveats are in the What to Build chapter.

Blanco County — top 5 of 46 projects, 83 KA in top 5

ROUTE	AUTH.	FROM–TO	MI	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
US 281	TxDOT	262.2–272.9	10.7	**29**	209	1,210:1	$172K	**Rumble Strip Package** (shoulder + centerline rumble strips)
US 290	TxDOT	169.8–177.5	7.7	**24**	427	1,098:1	$124K	**Rumble Strip Package** (shoulder + centerline rumble strips)
US 290	TxDOT	60.2–70.4	10.2	**12**	75	201:1	$168K	**Curve Safety Package** (curve warning + chevron signs)
US 281	TxDOT	288.1–293.2	5.1	**10**	82	1,680:1	$98K	**Rumble Strip Package** (shoulder + centerline rumble strips)
US 281	TxDOT	284.0–287.7	3.7	**8**	112	269:1	$98K	**Rumble Strip Package** (shoulder + centerline rumble strips)

Lee County — top 5 of 41 projects, 32 KA in top 5

ROUTE	AUTH.	FROM–TO	MI	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
US 77	TxDOT	211.7–220.6	8.9	**8**	58	858:1	$153K	**Install shoulder rumble strips**
SH 21	TxDOT	69.9–75.5	5.6	**6**	85	1,052:1	$136K	**Rumble Strip Package** (shoulder + centerline rumble strips)
FM 141	TxDOT	2.3–20.1	17.8	**6**	90	885:1	$320K	**Rumble Strip Package** (shoulder + centerline rumble strips)
SH 21	TxDOT	59.8–65.1	5.3	**6**	64	836:1	$132K	**Rumble Strip Package** (shoulder + centerline rumble strips)
US 77	TxDOT	234.6–238.3	3.7	**6**	79	501:1	$87K	**Rumble Strip Package** (shoulder + centerline rumble strips)

Llano County — top 5 of 55 projects, 29 KA in top 5

ROUTE	AUTH.	FROM–TO	MI	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
RM 1431	TxDOT	1.6–4.7	3.1	**6**	36	1,427:1	$78K	**Rumble Strip Package** (shoulder + centerline rumble strips)
SH 71	TxDOT	73.7–78.6	4.9	**6**	46	974:1	$124K	**Rumble Strip Package** (shoulder + centerline rumble strips)
SH 71	TxDOT	56.7–60.4	3.7	**6**	28	639:1	$112K	**Curve Safety Package** (curve warning + chevron signs)
SH 16	TxDOT	206.5–220.4	13.9	**6**	93	639:1	$190K	**Curve Safety Package** (curve warning + chevron signs)
SH 29	TxDOT	82.6–87.3	4.7	**5**	70	642:1	$152K	**Curve Safety Package** (curve warning + chevron signs)

Intersection Projects

Top 5 per county by KA crash count. Intersection names reflect the TxDOT inventory designation.

Blanco County — top 5 of 20 projects, 16 KA in top 5

INTERSECTION	AUTH.	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
US 281 / US 290	TxDOT	**4**	46	86:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
RM 473 / US 281	TxDOT	**4**	41	51:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
SS 356 / US 281	TxDOT	**3**	14	109:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
RM 32 / US 281	TxDOT	**3**	24	40:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
US 281 / US 290	TxDOT	**2**	3	165:1	$70K	**Intersection Safety Package** (lighting + conflict warning)

Lee County — top 5 of 20 projects, 11 KA in top 5

INTERSECTION	AUTH.	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
FM 1624 / SH 21	TxDOT	**3**	12	104:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
CR 223 / US 77	TxDOT	**2**	3	167:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
FM 2440 / SH 21	TxDOT	**2**	5	159:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
SH 21	TxDOT	**2**	4	107:1	$60K	**Install intersection conflict warning system**
SANDRIDGE DR / US 290	TxDOT	**2**	4	25:1	$70K	**Intersection Safety Package** (lighting + conflict warning)

Llano County — top 5 of 20 projects, 10 KA in top 5

INTERSECTION	AUTH.	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
BOULDER DR / SH 261	TxDOT	**3**	6	34:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
INDUSTRIAL BLVD / RM 1431	TxDOT	**2**	7	93:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
DILLEY ST / RM 1431 / ROSE HILL / ROSE HILL ST / TEXAS AVE	TxDOT	**2**	18	35:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
RM 2147 / SH 71	TxDOT	**2**	14	33:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
ANGLE AVE / SH 29	TxDOT	**1**	5	151:1	$70K	**Intersection Safety Package** (lighting + conflict warning)

The full project list, benefit-cost methodology, and downloadable data are in the chapters that follow.

2. **The Problem**

Between 2020 and 2024, **82** people died on roads in Blanco, Lee, and Llano counties. Crashes seriously injured another **288**.

Two crash types account for most of the fatal and serious-injury toll: single-vehicle roadway departures, where a driver leaves the road and strikes a fixed object or overturns, and head-on collisions. Together they produce 69% of KA crashes in the three-county area (CRIS 2020–2024 extract).

The federal Safe Streets and Roads for All (SS4A) program funds local road safety projects, but only in places with an adopted Safety Action Plan. The Capital Area Metropolitan Planning Organization (CAMPO) completed a Regional Safety Action Plan (RSAP) for its six-county jurisdiction in the Austin metro: Travis, Williamson, Hays, Bastrop, Caldwell, and Burnet. Blanco, Lee, and Llano fall outside CAMPO's boundary but within the Capital Area Council of Governments (CAPCOG) region. Without SS4A plan coverage, these three counties cannot apply for SS4A Implementation Grants.

CAPCOG developed this plan to close that gap. The Texas Department of Transportation (TxDOT) Austin District funded the work through its transportation planning allocation. CAPCOG did not receive an SS4A Planning Grant. This plan does not cover Fayette County because it falls outside the TxDOT Austin District funding boundary.

82
Fatalities, 2020–2024

370
Fatal + serious injury crashes

4,546
Total crashes

2,122
Road miles

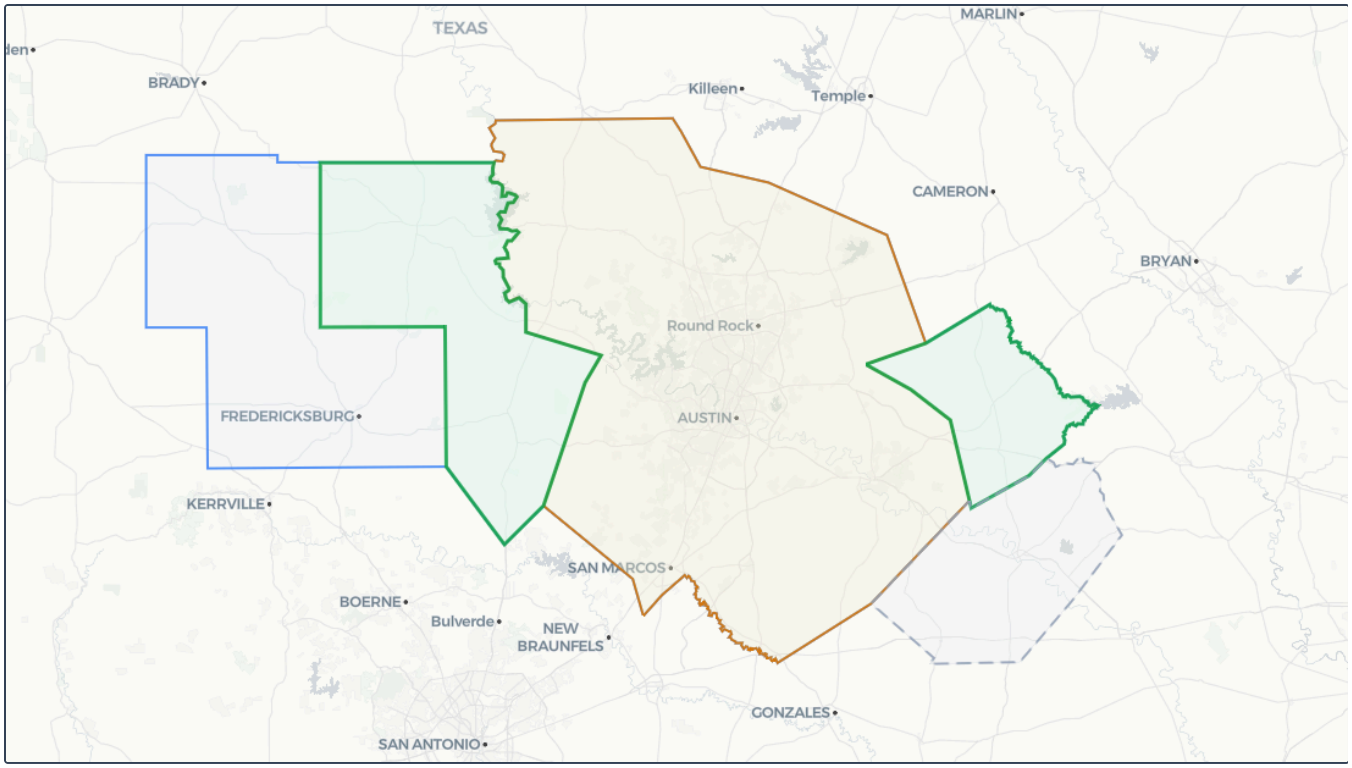
By county, 2020–2024

Blanco	pop. 12,282 · 456 road mi	**28 fatalities** 130fatal + serious · 1,239 total
Lee	pop. 18,061 · 759 road mi	**23 fatalities** 124fatal + serious · 1,829 total
Llano	pop. 22,472 · 908 road mi	**31 fatalities** 116fatal + serious · 1,478 total

Crash data: TxDOT Crash Records Information System (CRIS), 2020–2024. Law enforcement officers file a CR-3 crash report for every reportable crash per Texas Transportation Code Section 550.062. This extract includes severity, date, county, point location, collision type, contributing factor, light condition, weather, road alignment, traffic control, and time of day.

The investigating officer classifies severity at the scene using the KABCO scale: K (fatal), A (suspected serious injury), B (non-incapacitating injury), C (possible injury), O (no injury). This plan groups K and A crashes together because those two categories have the most reliable reporting (Texas A&M Transportation Institute, 2015).

3. **The Coverage Gap**



The map shows four overlapping jurisdictions. The TxDOT Austin District covers 11 counties and funds CAPCOG's transportation planning work. CAMPO completed an RSAP for its six urbanized counties in November 2025. That left Blanco, Lee, and Llano outside SS4A plan coverage — the gap this plan fills.

Fayette County is part of CAPCOG but falls in the TxDOT Yoakum District (District 13), not the Austin District (District 14). Because CAPCOG funded this plan with Austin District transportation planning dollars, Fayette is excluded.

Gillespie and Mason counties are in the Austin District but not in CAPCOG. Gillespie falls under the Alamo Area Council of Governments and Mason under the Concho Valley Council of Governments.

- TxDOT Austin District (11 counties)
- CAMPO RSAP (6 counties, already covered)
- This plan: Blanco, Lee, Llano
- Fayette County (CAPCOG, but outside Austin District)

4. **Federal Highway Safety Funding**

Transportation safety planning in the United States is a top-down system. Congress sets policy and provides money. FHWA writes the standards and distributes funds. State departments of transportation collect data, maintain roads, decide which projects to build, and set design standards. Metropolitan planning organizations program funds in urban areas. Rural areas depend on the state for project selection.

Federal Money, Federal Rules

The federal government funds highways primarily through the Highway Trust Fund (https://www.law.cornell.edu/uscode/text/26/9503) (26 U.S.C. 9503), which collects 18.4 cents per gallon of gasoline and 24.4 cents per gallon of diesel. That rate has not changed since 1993. The Trust Fund has not covered federal highway spending since 2008; Congress has transferred over $260 billion from the General Fund (https://www.fhwa.dot.gov/policy/olsp/fundingfederalaid/07.cfm) to keep it solvent.

The current authorization is the Infrastructure Investment and Jobs Act (https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf) (IIJA, Public Law 117-58), which became law on November 15, 2021. It authorizes $273 billion for federal highway formula programs over five years (FY 2022–2026). FHWA distributes those funds to state departments of transportation (DOTs) by statutory formula under 23 U.S.C. 104 (https://www.law.cornell.edu/uscode/text/23/104).

In exchange for federal dollars, states must meet federal data standards. The Model Inventory of Roadway Elements (https://highways.dot.gov/safety/data-analysis-tools/mire-fde/model-inventory-roadway-elements-mire) (MIRE), codified at 23 C.F.R. 924.17 (https://www.law.cornell.edu/cfr/text/23/924.17), defines the road characteristics that states must collect on every public road. States must have complete MIRE Fundamental Data Element (FDE) collection by September 30, 2026 (23 C.F.R. 924.11(b) (https://www.law.cornell.edu/cfr/text/23/924.11)). Those data elements (lane width, shoulder type, traffic control, speed) are the same fields this plan uses for its safety analysis.

Formula Programs vs. Discretionary Grants

Most federal highway money flows through formula programs. States receive an annual apportionment based on lane miles, vehicle miles traveled, and other factors. The state DOT decides which projects to fund. The Highway Safety Improvement Program (https://www.law.cornell.edu/uscode/text/23/148) (HSIP, 23 U.S.C. 148) is the main formula program for safety: $15.6 billion nationally over five years, with a 90% federal cost share. Texas received $6.04 billion in total federal highway formula funds in FY 2024, the largest apportionment of any state.

Discretionary programs work differently. Applicants compete for grants by submitting proposals to USDOT. Safe Streets and Roads for All (https://www.transportation.gov/grants/SS4A) (SS4A, IIJA Section 24112) is the main discretionary safety program: $1 billion per year, FY 2022–2026. Unlike formula funds, SS4A is open to local governments. Cities, counties, councils of governments, and tribal nations can apply directly, without going through the state DOT.

There is one requirement: SS4A Implementation Grants, which fund construction, require a completed safety action plan. Without one, a jurisdiction can apply only for a Planning Grant to write one. The federal government covers 80% of project costs; the local applicant pays the remaining 20%.

Highway Trust Fund: 26 U.S.C. 9503 (https://www.law.cornell.edu/uscode/text/26/9503). Federal fuel tax rates: 26 U.S.C. 4081 (https://www.law.cornell.edu/uscode/text/26/4081). IIJA highway authorization: P.L. 117-58 (https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf), Section 11101(a)(1). SS4A authorization: P.L. 117-58, Section 24112. HSIP: 23 U.S.C. 148 (https://www.law.cornell.edu/uscode/text/23/148); 23 C.F.R. Part 924 (https://www.law.cornell.edu/cfr/text/23/part-924). MIRE FDE requirements: 23 C.F.R. 924.17 (https://www.law.cornell.edu/cfr/text/23/924.17). FDE deadline: 23 C.F.R. 924.11(b) (https://www.law.cornell.edu/cfr/text/23/924.11).

5. COGs, RTPOs, and the Rural Gap

This plan exists because the federal transportation system has a coverage gap. Blanco, Lee, and Llano counties sit outside any metropolitan planning organization. CAMPO's RSAP covers the urbanized Austin metro but not these three rural counties. Without SS4A plan coverage, they cannot compete for federal discretionary grants. This chapter explains how Texas transportation governance creates that gap and what councils of governments can do about it.

TxDOT and the Texas Road System

The Texas Department of Transportation (TxDOT) maintains 81,162 centerline miles of state highway, one of the largest state-maintained networks in the country (FHWA Highway Statistics 2024, Table HM-10 (https://www.fhwa.dot.gov/policyinformation/statistics/2024/hm10.cfm)). About half of that mileage is Farm-to-Market (FM) and Ranch-to-Market (RM) roads, a classification unique to Texas. The FM/RM system totals roughly 41,000 centerline miles.

Texas has 326,028 total public road miles. Counties maintain 152,111 of those miles, and cities maintain 89,354. TxDOT's on-system roads are 25% of that total but carry most of the vehicle miles traveled. The practical distinction in Texas is on-system (TxDOT maintains these) versus off-system (counties or cities maintain these). In Texas, TxDOT owns most of the roads that carry through-traffic, and counties maintain the rest.

The 88th Texas Legislature appropriated $37.2 billion to TxDOT for the FY 2024–2025 biennium. Three sources account for most of that: federal apportionments (about a third), two voter-approved constitutional amendments (another third), and the State Highway Fund (about a quarter), which draws from the state motor fuels tax (20 cents per gallon, unchanged since 1991) and vehicle registration fees. Proposition 1 (https://www.txdot.gov/about/financial-management/funding-needs-sources/proposition-1-funding.html) (2014, 80% voter approval) redirects oil and gas severance tax revenue to highways. Proposition 7 (https://www.txdot.gov/about/financial-management/funding-needs-sources/proposition-7-funding.html) (2015, 83% voter approval) redirects a portion of state sales tax revenue. Together those two propositions have deposited over $44 billion into the State Highway Fund since 2015.

TxDOT operates 25 districts. The Austin District covers 11 counties, including the three in this plan (Blanco, Lee, Llano), the six CAMPO counties (Travis, Williamson, Hays, Bastrop, Burnet, Caldwell), and two others (Gillespie, Mason). Austin District manages 3,471 centerline miles and spent $1.3 billion on construction and maintenance in FY 2024.

MPOs, COGs, and the Rural Gap

Federal law requires a Metropolitan Planning Organization (MPO) for every urbanized area with population over 50,000 (23 U.S.C. 134(d)(1) (https://www.law.cornell.edu/uscode/text/23/134)). MPOs program federal transportation funds and develop long-range plans for their metropolitan areas. In the Austin region, the Capital Area Metropolitan Planning Organization (CAMPO) covers six counties: Travis, Williamson, Hays, Bastrop, Caldwell, and Burnet.

Rural areas outside MPO boundaries have no equivalent body. Federal law requires state DOTs to develop a statewide plan covering all areas (23 U.S.C. 135 (https://www.law.cornell.edu/uscode/text/23/135)), and states must select rural projects “in cooperation with affected nonmetropolitan local officials” (23 U.S.C. 135(g)(6)). In practice, rural counties depend on the state DOT for project selection and cannot apply for most federal highway funds on their own.

Councils of governments fill some of that gap. The Capital Area Council of Governments (CAPCOG) is a voluntary association of local governments authorized under Texas Local Government Code Chapter 391 (https://statutes.capitol.texas.gov/Docs/LG/htm/LG.391.htm). CAPCOG's jurisdiction covers 10 counties, including the six CAMPO counties plus Blanco, Fayette, Lee, and Llano. Unlike an MPO, a COG has no federal statutory authority over transportation funding. CAPCOG provides planning, data analysis, and grant-writing support to its member governments. This plan is one product of that work.

Any rural transportation planning organization in Texas faces the same gap. The tools and data sources used in this plan are public. The methodology is documented in the Methodology & Sources chapter. A COG or RTPO with access to TxDOT's published ESRI services and TWDB flood data can produce a comparable safety action plan for its own counties, making them eligible for the same federal grant programs.

TxDOT road mileage and total Texas public road miles: FHWA Highway Statistics 2024, Table HM-10 (https://www.fhwa.dot.gov/policyinformation/statistics/2024/hm10.cfm). Federal apportionments to Texas: FHWA FY 2024 Apportionment Tables (https://highways.dot.gov/iija/funding/fy-2025-computational-tables/fiscal-year-fy-2025-computational-tables). TxDOT biennial appropriation: 88th Legislature, General Appropriations Act (2023). Revenue source shares: KUT, “Who pays for Texas highways?” (May 2024) (https://www.kut.org/transportation/2024-05-20/who-pays-for-texas-highways). Prop 1 deposits ($21.6B through FY 2026): TxDOT (https://www.txdot.gov/about/financial-management/funding-needs-sources/proposition-1-funding.html). Prop 7 deposits ($22.7B through FY 2025): TxDOT (https://www.txdot.gov/about/financial-management/funding-needs-sources/proposition-7-funding.html). Austin District data: TxDOT DISCOS (https://www.dot.state.tx.us/apps-cg/discos/default.htm?dist=AUS).

Proposition 1: Texas Constitution Art. III, Sec. 49-g (approved November 4, 2014 (https://www.txdot.gov/about/financial-management/funding-needs-sources/proposition-1-funding.html)). Proposition 7: Texas Constitution Art. VIII, Sec. 7-c (approved November 3, 2015 (https://www.txdot.gov/about/financial-management/funding-needs-sources/proposition-7-funding.html)). Texas motor fuels tax: Texas Tax Code Chapter 162 (https://comptroller.texas.gov/economy/fiscal-notes/archive/2019/jul/motor-fuels-taxes.php) (20 cents/gallon since October 1, 1991).

MPO requirements: 23 U.S.C. 134(d)(1) (https://www.law.cornell.edu/uscode/text/23/134). Statewide planning: 23 U.S.C. 135 (https://www.law.cornell.edu/uscode/text/23/135). COGs: Texas Local Government Code Chapter 391 (https://statutes.capitol.texas.gov/Docs/LG/htm/LG.391.htm).

6. **What Is a Regional Safety Action Plan?**

A Regional Safety Action Plan (RSAP) is the document that qualifies a jurisdiction for SS4A Implementation Grants — federal construction dollars for safety projects. Without a completed plan, a jurisdiction can only apply for a Planning Grant to develop one. This plan covers Blanco, Lee, and Llano counties.

CAMPO completed an RSAP for its six-county jurisdiction in November 2025, funded by a $2.9 million SS4A Planning Grant. That plan did not cover Blanco, Lee, or Llano. This plan does not cover Fayette County because Fayette falls outside the TxDOT Austin District, which funds CAPCOG's transportation planning work.

CAPCOG developed this plan using existing TxDOT Austin District transportation planning funds. CAPCOG did not receive an SS4A Planning Grant. USDOT published the FY 2026 SS4A NOFO (https://www.transportation.gov/sites/dot.gov/files/2026-03/SS4A-FY26-NOFO.pdf) in March 2026, making $993 million available nationally for Implementation Grants. Application dates and requirements are in the linked NOFO document.

Required Components

The SS4A NOFO (Table 1) requires action plans to address seven components. The table below maps each component to the chapter that addresses it.

#	SS4A Component	Plan Chapter
1	Leadership Commitment	CARTPO resolution (scheduled for consideration May 1, 2026)
2	Planning Structure	Ch 14 · Stakeholder Engagement
3	Safety Analysis	Chs 9–13
4	Engagement & Collaboration	Ch 14 · Stakeholder Engagement
5	Policy & Process Changes	*Not addressed in this plan*
6	Strategy & Project Selections	Chs 15–17 · What to Build, Corridor Projects, Intersection Projects
7	Progress & Transparency	Ch 7 · How to Use This Plan

SS4A authorization: IIJA Section 24112 (P.L. 117-58). Component requirements: SS4A FY 2026 NOFO (https://www.transportation.gov/sites/dot.gov/files/2026-03/SS4A-FY26-NOFO.pdf), Table 1. CAMPO RSAP: completed November 2025 (https://www.campotexas.org/local-plans-and-studies/regional-safety-action-plan/), funded by SS4A Planning Grant (USDOT).

7. How to Use This Plan

This web page is the plan. Every number on the maps and tables ahead traces to a public government data source: TxDOT crash records, TxDOT roadway inventory, TWDB flood data, and FEMA flood zones. There is no proprietary data or manual editing in this plan. A printable PDF is available for offline use and distribution.

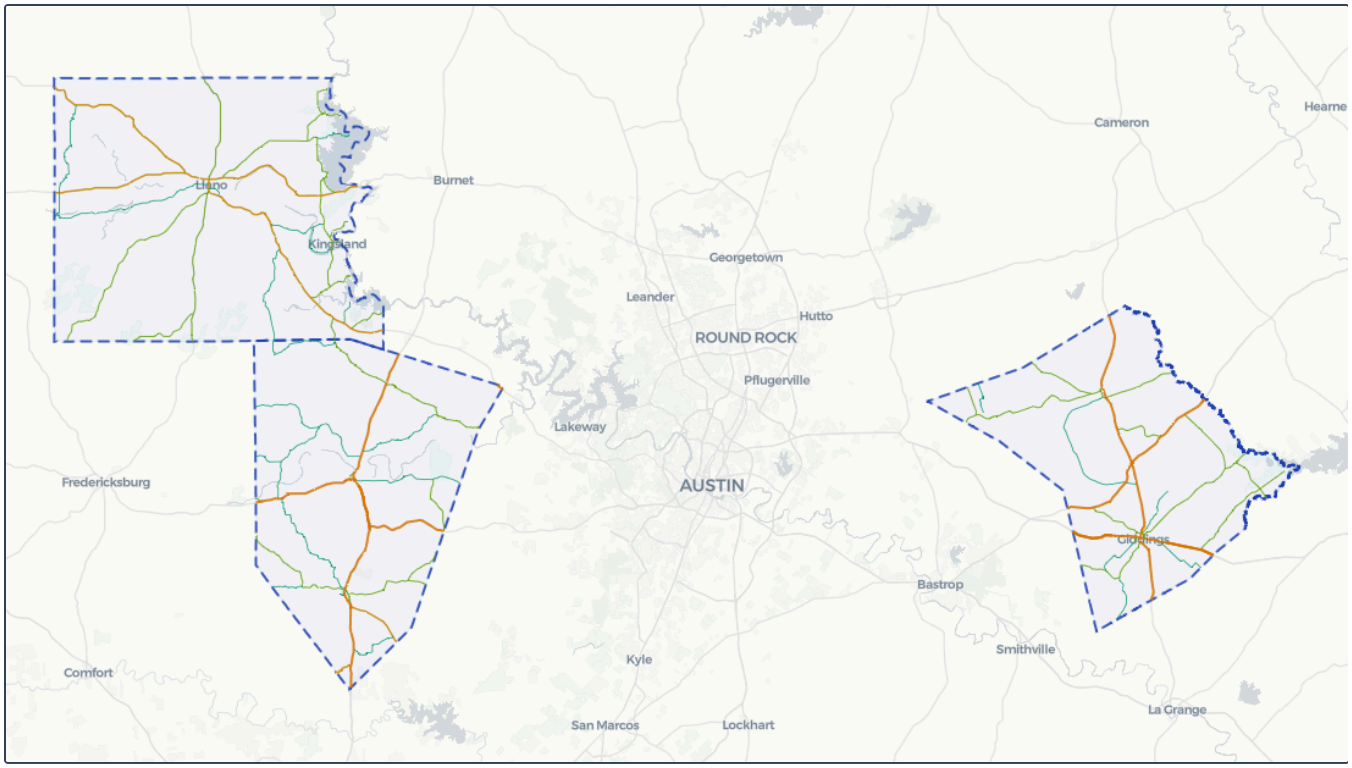
The plan updates over time. When TxDOT publishes new crash data from CRIS, or TWDB revises its flood maps, CAPCOG re-runs the analysis and the numbers on this page change. What you see today will not match what you see in 12 months.

Who This Is For

Local officials. County judges, commissioners, city managers, and public works directors who need data to support safety funding requests to TxDOT, FHWA, or FEMA. The chapters ahead rank roads by crash severity, calculate benefit-cost ratios for countermeasures, flag systemic risk factors, and map flood exposure. Those numbers feed directly into grant applications and TxDOT project requests. Click any feature on the map to see crash counts, severity scores, road characteristics, and cost estimates.

Residents. If you want to know where crashes happen and why, start with Where Crashes Concentrate. The federal safety process uses acronyms that do not explain themselves: EPDO is a severity-weighted crash score, KABCO is a five-level injury scale, and CMF is a multiplier that estimates how much a countermeasure reduces crashes. Each chapter defines these terms when they first appear.

8. **The Road Network**



Blanco, Lee, and Llano counties cover roughly 4,500 square miles. The road network that TxDOT classifies by function (arterials, collectors, and local roads) totals 2,122.1 centerline miles. Most of these roads are two-lane, undivided, with posted speeds of 55 to 70 mph and no alternate routes.

A handful of state highways carry the through-traffic: US 281, US 290, US 77, SH 29, SH 71, RM 1431, and FM 1624. Between those routes, the network is sparse county roads with narrow or no shoulders.

Class	Miles	%
Arterial (interstates, freeways, principal and minor arterials)	258.3	12.2%
Collector (major and minor collectors)	475.3	22.4%
Local	1,388.6	65.4%
Total	**2,122.1**	**100%**

BY COUNTY

Blanco	456 mi (81.4 arterial, 144 collector)
Lee	758.5 mi (92.2 arterial, 146.3 collector)
Llano	907.6 mi (84.7 arterial, 185 collector)

FUNCTIONAL CLASSIFICATION

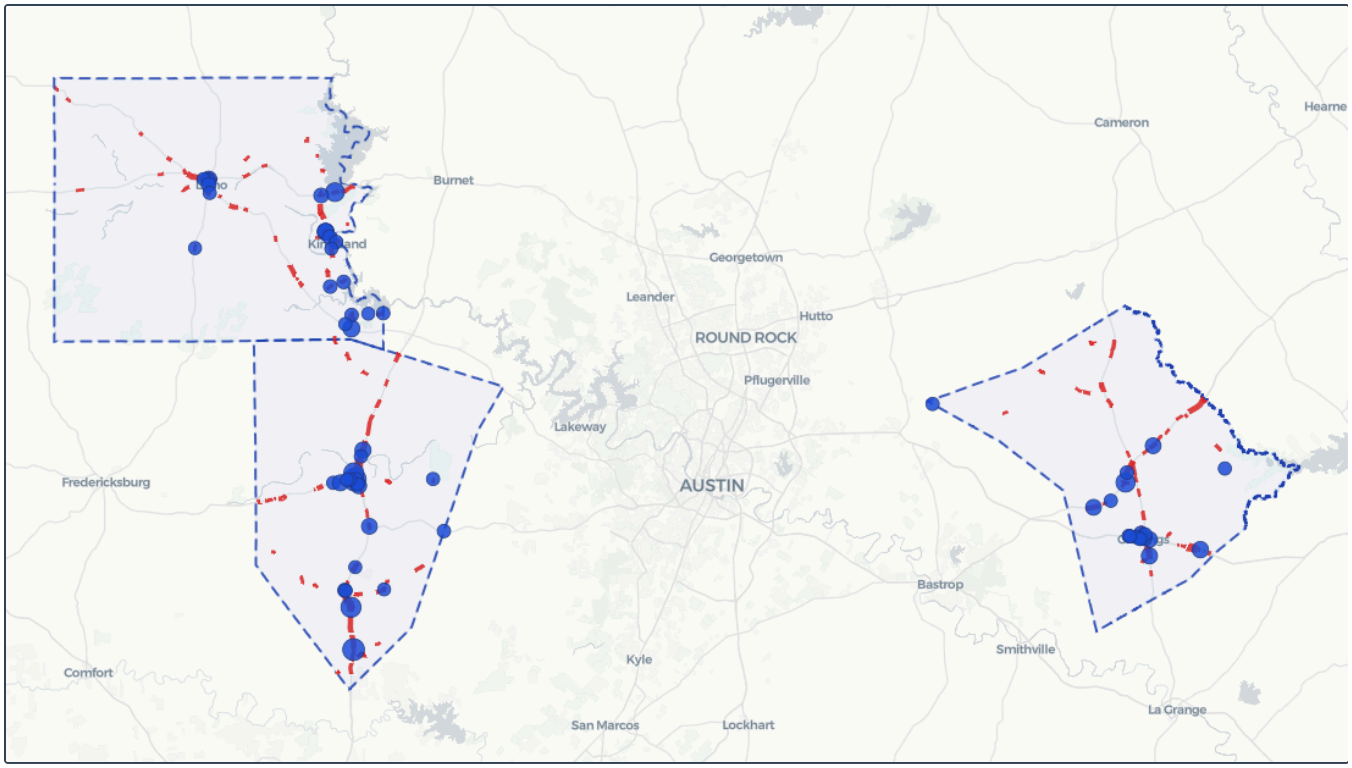
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector

Road geometry: TxDOT Roadway Inventory, accessed via ArcGIS REST (organization KTcxiTD9dsQw4r7Z). Each segment record includes 113+ fields: lane width (SURF_WD), shoulder type and width (S_TYPE_O, S_WID_O), average daily traffic (ADT_CUR), and posted speed limit. TxDOT updates this dataset annually; this extract uses 2024 data.

This map excludes local roads (functional class 7). The plan focuses on the arterial and collector network, where through-traffic and severe crashes concentrate.

TxDOT's on-system data covers most MIRE Fundamental Data Elements required by 23 CFR 924.17, Table 1. Off-system roads (county and city maintained) and local roads have data gaps, particularly for intersection attributes like Traffic Control type.

9. **Where Crashes Concentrate**



The **High-Injury Network (HIN)** is the set of road segments and intersections where fatal and serious injury crashes concentrate. We ranked every segment and intersection by EPDO score (defined below) and selected the top 5%.

133.4 miles of high-injury network (6.3% of the classified road system) captured 370fatal and serious injury (KA) crashes over five years (2020–2024).

As of March 2026, the worst segments are US 290 in Lee County (108 EPDO, 107 crashes, 5 KA) and US 290 in Blanco County (88 EPDO, 26 crashes, 5 KA). **EPDO (Equivalent Property Damage Only)** converts crashes of different severity levels into a single score; we abbreviate fatal and serious injury crashes as **KA** throughout this plan. RM 1431 in Llano and SH 21 in Lee also rank in the top five. US 281 appears multiple times in Blanco County, from Johnson City south toward the county line.

The two worst intersections are both in Blanco County (March 2026). US 281 at US 290 recorded 46 crashes and 4 KA (83 EPDO). US 281 at RM 473 recorded 41 crashes and 4 KA (71 EPDO). In Llano County, SH 71 at RM 2147 had 14 crashes with 2 KA. In Lee County, SH 21 at FM 1624 had 12 crashes and 3 KA.

County	KA Crashes	Fatalities	HIN Miles
Blanco	130	28	58.2
Lee	124	23	34.1
Llano	116	31	41.1
Total	**370**	**82**	**133.4**

Crash Types by KA Severity

Single-vehicle roadway departures account for the largest share of fatal and serious-injury crashes. Head-on collisions are less frequent but produce the highest KA rate at over 30%.

Crash Type	Crashes	KA	KA Rate
Single vehicle going straight	2,111	189	9.0%
Head-on	193	59	30.6%
Angle both going straight	389	29	7.5%
Opposite direction one straight one left turn	187	20	10.7%
Same direction rear end	275	17	6.2%
Angle one straight one left turn	285	14	4.9%
Same direction one straight one stopped	337	13	3.9%
Same direction one straight one left turn	133	8	6.0%

Collision type from TxDOT CRIS field FHE_Collsn_ID. Codes mapped per CRIS Public Extract File Specification v29.0.

MAP LEGEND

HIN segment (line width scaled by EPDO)

HIN intersection (radius scaled by EPDO)

We screened the network following the AASHTO Highway Safety Manual (1st Edition, 2010, Chapter 4): simple ranking by EPDO score. EPDO weights each crash relative to a property-damage-only crash to produce a single severity-adjusted score.

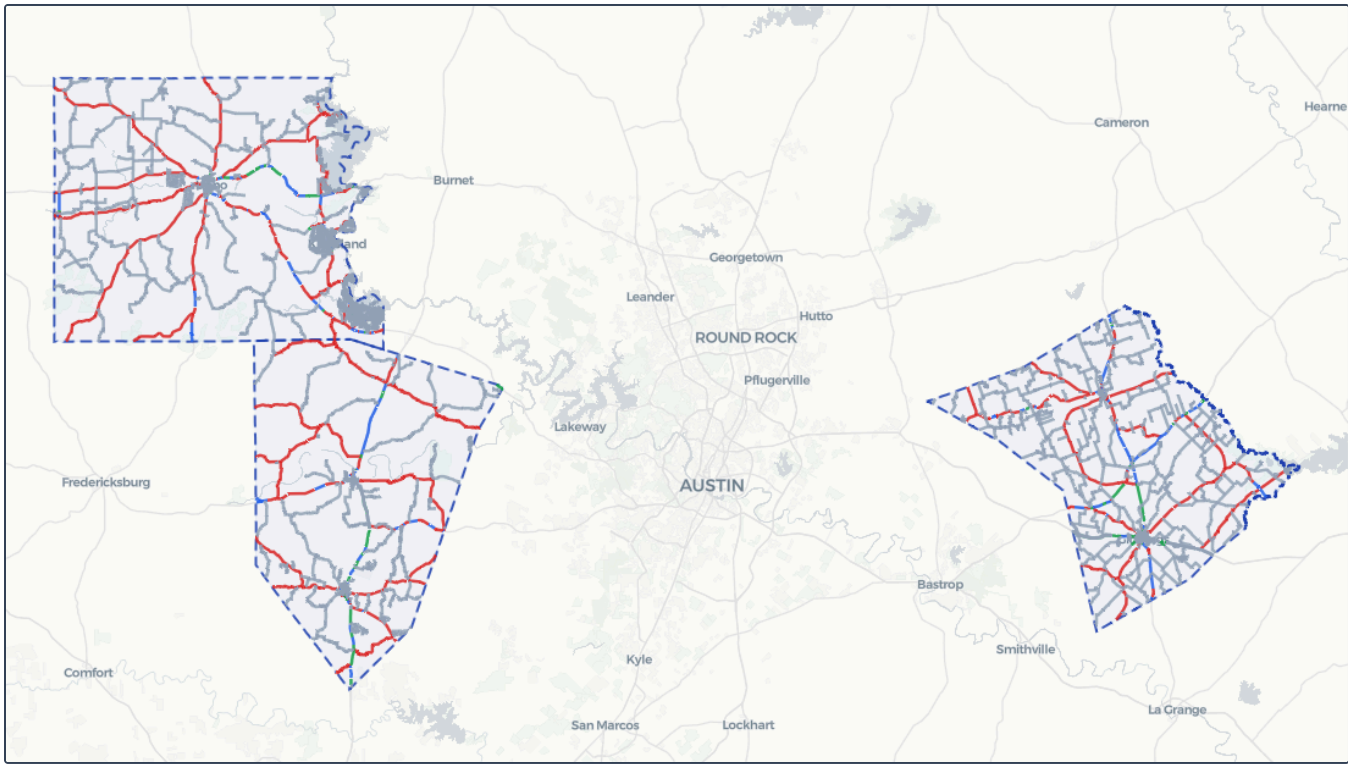
EPDO weights: K=15, A=15, B=2, C=1, O=0. This is a simplified KA-focused scheme. The Highway Safety Manual documents several weight schemes in Table 4-7. Pure cost-ratio weights (K≈930, A≈53 per FHWA-SA-17-071) would skew results toward any location with a single fatal crash. These weights prevent that.

Threshold: top 5% by EPDO percentile. Louisville KY uses 5% (capturing 55% of KA crashes); Caltrans uses 6% (capturing 60%). Reference: FHWA-SA-17-008 (2017).

We assigned each crash to the nearest road segment within 50 meters. Rural crash geocoding accuracy runs about 75% vs. 90% in urban areas; some crashes near segment boundaries may snap to the wrong segment.

Intersection analysis: TxDOT's Intersection Inventory stores one point per approach leg, not per physical intersection. A four-way stop appears as four or more records within meters of each other. We consolidated approach-leg points into physical intersections using DBSCAN spatial clustering (250 ft / 76 m radius, matching the FHWA intersection influence area per FHWA-HRT-17-106). We then assigned each crash to its nearest consolidated intersection. The raw inventory has 4,789 points; after clustering, 3,349 physical intersections remain. Traffic Control (MIRE Element 131) is 99.96% Unknown (4,787 of 4,789 intersections, checked May 29, 2026).

10. **Why These Roads**



The High-Injury Network in the previous chapter identifies roads where fatal and serious crashes have already occurred. Systemic analysis takes a different approach: it identifies road characteristics that predict crashes even where no crashes have been recorded yet.

FHWA's systemic approach supplements site-specific analysis with network-wide screening. FHWA published the method in 2013 (FHWA-SA-13-019) and updated it in 2023 (FHWA-SA-23-008). The process follows six steps: identify focus crash types, identify focus facility types, identify risk factors, screen the network, select countermeasures, and prioritize projects.

We drew risk factors from the TxDOT Roadway Inventory: narrow lanes (SURF_WD under 11 ft), unpaved or absent shoulders (S_TYPE_O coded as Earth, Sod, or null), sharp horizontal curves, a gap between posted speed limit and roadway design speed, and missing pavement markings or delineators (raised reflective markers on the road edge). We scored each segment by counting how many of these factors apply. Crash-reported road alignment confirms the pattern: curves have an 11% KA rate versus 7% on straight level roads, and roads posted at 55 mph or above account for 75% of KA crashes in the three-county area.

566 segments totaling 527.1 miles have Critical or High systemic risk. The Critical tier alone accounts for 441 miles, where each segment has the most risk factors of any tier.

Systemic risk tiers

- Critical: 376 segments, 441 mi (avg 5.9 risk factors)

- High: 190 segments, 86.1 mi (avg 4.2 risk factors)
- *Moderate: 136 segments, 49 mi (avg 2.5 risk factors) — not displayed; toggle at movingcentraltexas.org/rsap*
- *Low: 1,873 segments, 1,478.9 mi (avg 1 risk factors) — not displayed; toggle at movingcentraltexas.org/rsap*

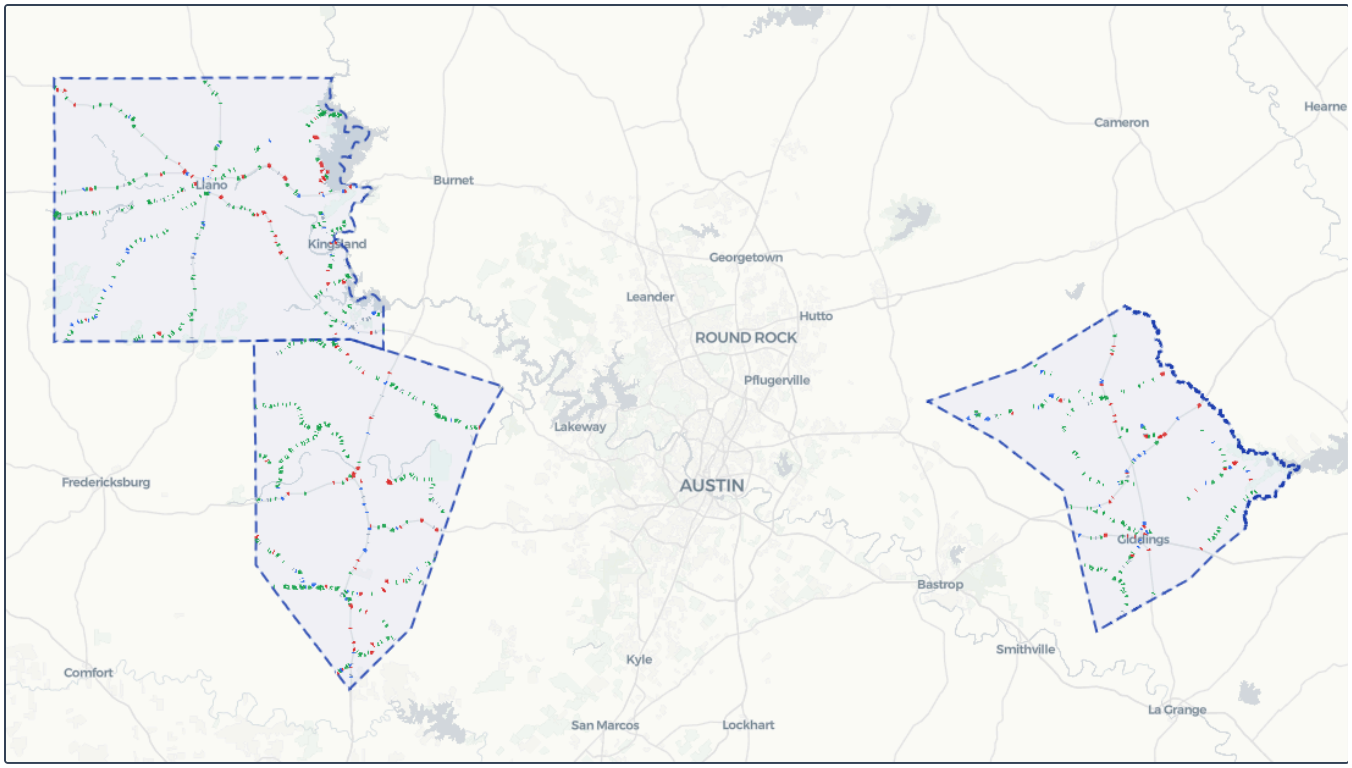
Data Limitations

TxDOT does not publish rumble strip data in its Roadway Inventory. MIRE fields 105 through 108 cover rumble strips, but FHWA does not require states to report them. When this plan lists "no rumble strips" as a risk factor, it means we found no data indicating their presence, not that a field visit confirmed them absent.

Shoulder type (S_TYPE_O) values include Earth, Sod, Gravel, and Paved. Where the field is null, we treated the shoulder type as unknown.

Methodology: FHWA Systemic Safety Project Selection Tool (FHWA-SA-13-019, 2013; FHWA-SA-23-008, 2023). Road data: TxDOT Roadway Inventory.

11. **Dangerous Curves**



Roadway departure crashes concentrate at horizontal curves on rural two-lane roads. The TxDOT Highway Curve Inventory records each curve's sharpness (degree of curvature) and condition grade (HPMS curve class, A through F, where A is gentlest and F is sharpest).

We scored each curve on four factors: crash history, degree of curvature, posted speed, and shoulder width. The composite score places each curve into a priority tier (Critical, High, Moderate, or Low). Higher-tier curves are the best candidates for low-cost treatments — chevrons, advance warning signs, high-friction surface overlays, and shoulder rumble strips. All four countermeasures have benefit-cost ratios above 1:1, and a county or TxDOT district can install them within a single construction season.

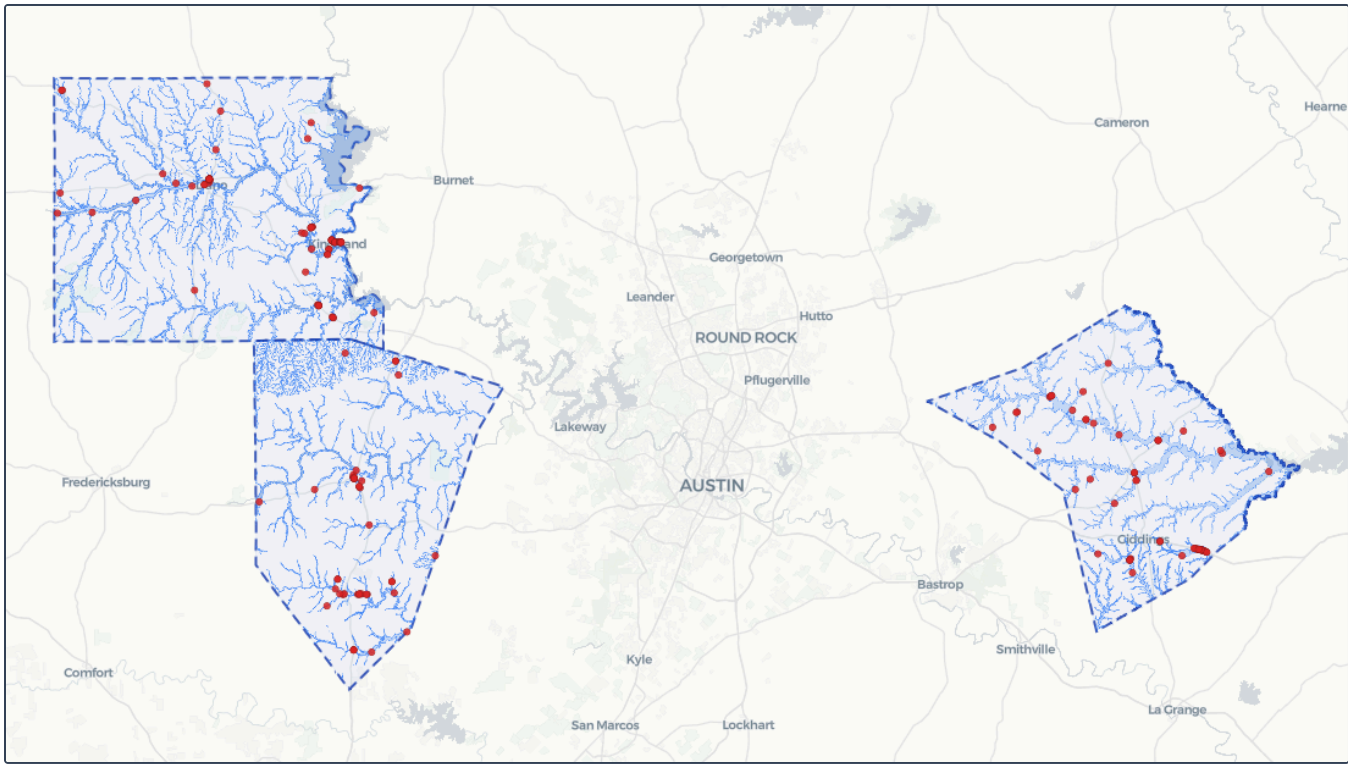
We screened **837 curves** across Blanco, Lee, and Llano counties. 210 score Critical or High priority, spanning 40.6 miles.

Priority curve tiers

- Critical: 117 curves, 24.8 mi
- High: 93 curves, 15.8 mi
- *Moderate: 525 curves, 73 mi — not displayed; toggle at movingcentraltexas.org/rsap*
- *Low: 102 curves, 8.6 mi — not displayed; toggle at movingcentraltexas.org/rsap*

Curve data: TxDOT Highway Curve Inventory. Reference: NCHRP Report 500, Volume 7, A Guide for Reducing Collisions on Horizontal Curves. Countermeasure effectiveness: FHWA CMF Clearinghouse.

12. **Flash Flood Alley**



Blanco, Lee, and Llano counties sit in **Flash Flood Alley**, the zone along the Balcones Escarpment where thin soil over limestone karst produces rapid runoff. The Pedernales, Llano, and San Gabriel rivers drain steep, narrow watersheds. When storms hit, water reaches low-water crossings in minutes rather than hours.

The map shows two layers: floodplain boundaries and crashes that occurred inside them. Over the five-year study period (2020–2024), 250 crashes fell within mapped floodplains as of March 2026. Fourteen of those were fatal (K) or serious-injury (A) on the KABCO severity scale.

125.5 road miles cross mapped floodplains in Blanco, Lee, and Llano counties.

Blanco	30.1 mi in floodplain
Lee	42 mi in floodplain
Llano	53.4 mi in floodplain

NWS flood fatality data show that vehicle-related incidents account for the majority of flood deaths nationally, most at road crossings.

Where the Flood Data Comes From

The flood polygons on this map come from four sources. TWDB merged them into its State Flood Plan Viewer (SFPV, gis2.twdb.texas.gov). Each polygon carries a source attribute that records which methodology produced it.

FEMA National Flood Hazard Layer (NFHL) Effective (44 CFR Part 65)

Regulatory floodplains based on detailed hydraulic studies. Lee County has 816 features and Llano County has 1,751. Blanco County has zero digital features because its FEMA flood maps date to 1991, before FEMA's Digital FIRM (DFIRM) program. The dataset also includes 60 Effective Approximate features (Zone A without base flood elevations).

Base Level Engineering (BLE)

TWDB and FEMA produced this approximate hydraulic study. It is not regulatory (it does not set insurance requirements). 39,943 features cover the study area. BLE provides flood elevations in Zone A areas where NFHL data has none.

FATHOM (Swiss Re)

A commercial flood model produced by Swiss Re. Not regulatory. 20,591 features. FATHOM covers areas where neither NFHL nor BLE data exists. Because Blanco County has no digital FEMA maps, FATHOM is the only source of flood hazard polygons there.

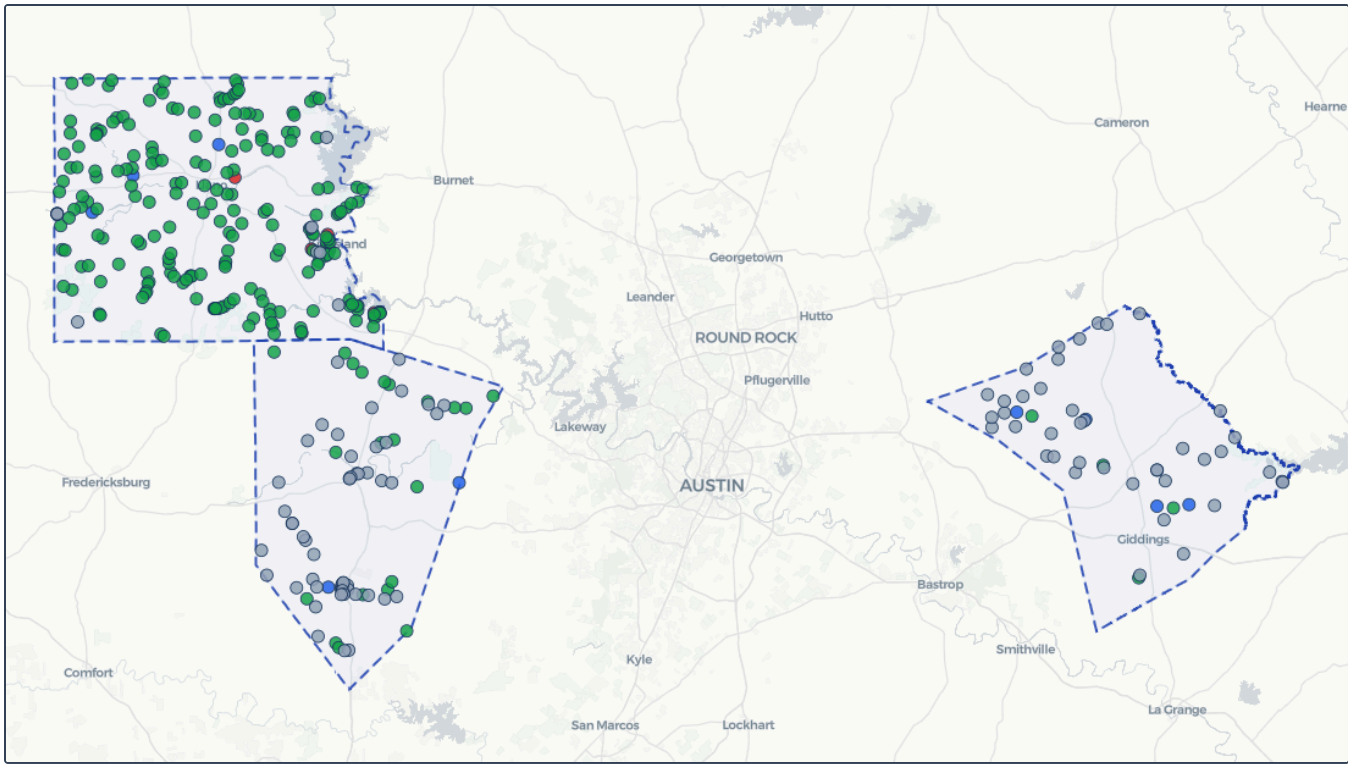
Cursory Floodplain (TWDB, 2025)

A statewide 3-meter raster product from TWDB. It covers 5-year, 10-year, 100-year, and 500-year return periods. Unlike the three vector sources above, this layer provides wall-to-wall coverage with no gaps.

Not all polygons are equal: FEMA derived its Lee County floodplains from detailed hydraulic study, while FATHOM modeled Blanco County polygons statistically. Both appear on this map. Check the source attribute to distinguish them.

Flood data: TWDB State Flood Plan Viewer (gis2.twdb.texas.gov (https://gis2.twdb.texas.gov)). Authorizing framework: 2024 Texas State Flood Plan, mandated by Senate Bill 8 (86th Texas Legislature, 2019), adopted by TWDB board August 15, 2024. NWS flood fatality statistics: Turn Around Don't Drown campaign (weather.gov (https://www.weather.gov/safety/flood-turn-around-dont-drown)).

13. **Low Water Crossings**



Blanco, Lee, and Llano counties have 354 low water crossings (LWCs): 78 in Blanco, 48 in Lee, 228 in Llano. A low water crossing is a point where the road surface dips below the bank of a creek, river, or drainage channel. When that waterway rises, the road goes underwater and becomes impassable or deadly.

Two federal programs fund LWC replacement: SS4A Implementation Grants and HSIP (23 USC 148). This section ranks which crossings to replace first.

Composite Risk Score

We scored each crossing from 0 to 100 using six weighted factors:

Crash proximity (150 m buffer)	40%
County flood risk (FEMA National Risk Index)	20%
Bridge scour rating	15%
LWC type (unimproved vs. improved)	10%
Warning signage present	10%
Posted speed limit	5%

Critical-Tier Crossings

All 4sit in Llano County. Llano has the highest inland flood risk of the three counties: FEMA NRI composite score 82.5, rated “Relatively Moderate.”

HI CIRCLE N Llano County · 6 crashes within 150m	**75.7**
RIVER OAKS DR Llano County · 1 crash within 150m (1 KA)	**75.6**
RR 1431 Llano County · 15 crashes within 150m	**73.6**
CR 201 Llano County · 2 crashes within 150m	**70.1**

NWS Flood Depth Thresholds

Six inches of moving water can knock down an adult on foot. Twelve inches is enough to float a passenger car. Eighteen inches floats most small SUVs and sedans. Twenty-four inches carries full-size trucks and SUVs.

LWC Count by County

Blanco	78 crossings
Lee	48 crossings
Llano	228 crossings

LWC locations: TxDOT Low Water Crossing inventory (354 points across Blanco, Lee, and Llano counties) and TWDB State Flood Plan Viewer (SFPV) FeatureServer layer 5 (249 records with inundation depth, velocity, Social Vulnerability Index, and flood frequency attributes).

Bridge scour data: TxDOT Bridge Division.

County flood risk scores: FEMA National Risk Index (NRI), inland flood composite. Llano County scores 82.5 (“Relatively Moderate”), the highest of the three counties.

CAPCOG developed the composite scoring formula for planning-level prioritization. The weights reflect professional judgment, not empirical calibration. Reference: FHWA HEC-17, Highways in the River Environment (FHWA-HIF-16-018, 2016).

14. Stakeholder Engagement

The Capital Area Rural Transportation Planning Organization (CARTPO) is responsible for this plan. CARTPO is a committee of representatives appointed by the commissioners courts of all ten CAPCOG member counties. Members are typically elected officials — county commissioners, judges, mayors, and city council members — though counties may appoint any representative. Tucker Ferguson, P.E., serves as TxDOT Austin District's ex officio representative. Ashby Johnson (CAMPO) serves as a second ex officio member.

Blanco County's appointees include Commissioners Emil Uecker and Thomas Weir and member Mike Arnold. Lee County's appointees include Commissioners Alan Turner and Richard Wagner. Llano County's appointees include Judge Ron Cunningham, Commissioner Linda Raschke, and Councilmember Buck Weatherby. The full membership roster is posted on the CAPCOG website.

CARTPO meets quarterly. The RSAP was presented at four consecutive meetings: August 1, 2025; November 7, 2025; February 6, 2026; and May 1, 2026. Each meeting included a public comment period. No public comments on the RSAP were received at any of the four meetings.

County Commissioners Court Presentations

CAPCOG presented the RSAP to the Blanco County Commissioners Court on August 12, 2025. The presentation covered crash trends, the High-Injury Network, and project recommendations for Blanco County. The meeting was held in the Hoppe Room of the Blanco County Courthouse Annex in Johnson City.

CAPCOG presented the RSAP to the Llano County Commissioners Court on August 25, 2025. The meeting was held at the JP4 Courtroom, 752 Andy Taylor Drive, Llano.

CAPCOG requested a presentation to the Lee County Commissioners Court. Lee County could not schedule the item. Lee County participates through its CARTPO appointees, Commissioners Turner and Wagner, both of whom attended the November 7, 2025 meeting where the RSAP was presented.

TxDOT Coordination

TxDOT Austin District funded this plan through its transportation planning allocation to CAPCOG. District staff participated in CARTPO meetings during plan development. The roadway inventory, crash data, curve inventory, intersection inventory, and bridge data used in this plan come from TxDOT's published data services.

Plan Adoption

On May 1, 2026, CARTPO is scheduled to consider a resolution adopting this plan and committing to the goal of zero roadway fatalities and serious injuries in the CAPCOG region.

SS4A NOFO Component 4 requires documentation of engagement with the public and relevant stakeholders (FY 2026 NOFO, Section C.3.b.iv). Commissioners court agendas are posted per the Texas Open Meetings Act (Texas Government Code Chapter 551).

15. **What to Build**

The previous chapters identified where crashes concentrate (HIN corridors), which road characteristics predict future crashes (systemic screening), and which curves carry the highest geometric risk. This chapter converts those findings into a project list.

For each flagged location, we matched countermeasures from the FHWA CMF Clearinghouse and calculated a benefit-cost ratio. Single-vehicle departures and head-on collisions account for 69% of fatal and serious-injury crashes in the study area (CRIS 2020–2024 extract); centerline rumble strips, shoulder rumble strips, edge-line delineation, and chevrons all target those crash types. The benefit-cost ratio compares the dollar value of crashes a countermeasure would prevent over its service life against the cost to install it. We then merged flagged locations on the same route within one mile of each other into project segments that a county or TxDOT district can bid as a single contract.

The result is **142 corridor projects** averaging 3.1 miles each and **60 intersection projects**. These are planning-level recommendations: they identify locations and countermeasures but do not substitute for engineering design. Actual project scoping requires field evaluation by a licensed engineering consultant. The purpose is to identify where safety investment produces the highest return per dollar and to qualify Blanco, Lee, and Llano counties for SS4A Implementation Grant funding.

Benefit-Cost Formula

B/C = (Targeted Crashes × (1 − CMF) × KABCO Cost × Annuity Factor) / Countermeasure Cost

CMF is the Crash Modification Factor (a decimal less than 1 means the treatment reduces crashes). **KABCO Cost** is the FHWA comprehensive dollar value for each crash severity level. The **Annuity Factor** converts future avoided-crash savings into a present value over the countermeasure's service life using a 7% real discount rate.

How Costs and Benefits Are Calculated

We selected countermeasures from the FHWA CMF Clearinghouse using four criteria: applicable to rural two-lane facilities, star rating of 3 or higher (indicating moderate to high confidence in the research), targets the crash types prevalent in the study area (roadway departures and head-on collisions account for 69% of KA crashes per the CRIS 2020–2024 extract), and deployable within TxDOT or county maintenance capabilities without major capital construction. The full countermeasure reference table with CMF values, target crash types, and CRIS field definitions is in the Methodology & Sources chapter.

Each countermeasure's CMF is applied only to the crash types it targets. Shoulder rumble strips reduce run-off-road KA crashes; centerline rumble strips reduce head-on KA crashes; lighting reduces nighttime crashes; high-friction surface treatment reduces wet-weather curve crashes. Countermeasures targeting “all crashes” (roundabouts, wider edge lines) use total crash counts. This prevents a rumble strip from taking credit for reducing angle or rear-end crashes it does not affect.

Where two countermeasures would typically be bid in the same contract, this plan evaluates them as a combined treatment package with a single benefit-cost ratio. For example, shoulder and centerline rumble strips are almost always installed together on rural two-lane roads. Because the two CMFs target overlapping crash populations (shoulder rumble reduces all crashes; centerline rumble specifically reduces head-on crashes, which are a subset of all crashes), the plan uses the FHWA sequential combination method: the broader CMF is applied first, and the narrower CMF reduces only the residual crashes not already prevented. Package cost is the sum of member costs. This reflects construction reality — a county or TxDOT district would bid both treatments in one contract, not two separate lettings.

Countermeasure costs are all-in estimates including mobilization, traffic control, labor, and materials. Rumble strip unit costs come from TxDOT Austin District average low bid data (2024): $0.28/LF for shoulder, $0.33/LF for centerline, plus mobilization and traffic control markup. High-friction surface treatment costs use the FHWA all-in average of $59/yd² (EDC-2 documentation). Roundabout costs are inflated from the FHWA-RD-00-067 study to 2024 dollars using the NHCCI construction cost index. SafetyEdge is an incremental treatment applied during scheduled resurfacing; its $500/mile cost assumes a concurrent resurfacing contract. The minimum project cost is $8,000, representing realistic rural mobilization.

Limitations

Countermeasures are matched to locations by roadway characteristics (lane width, shoulder type, curve geometry) and crash type, but not by site-specific conditions that an engineer would evaluate in the field. A location flagged for rumble strips may already have them installed; TxDOT does not publish rumble strip data (MIRE fields 105–108).

We used a one-mile gap tolerance to merge project segments: if two flagged locations sit on the same route within one mile, they become one project. Actual project limits depend on field conditions. Each project lists all applicable countermeasures; a county may implement one or several.

Where the primary recommendation is a treatment package, the benefit-cost ratio reflects the combined benefit and cost of all treatments in the package. For packages containing countermeasures that target overlapping crash populations (such as curve warning signs and chevron signs, where nighttime curves are a subset of all curves), the FHWA conservative combination method is applied: the broader CMF is applied first, and the narrower CMF is applied only to the residual crashes not already addressed. This avoids double-counting benefits. The CMF Clearinghouse FAQ (cmfclearinghouse.fhwa.dot.gov/faqs.php) documents this approach under “How can I apply multiple CMFs?”

CMFs from FHWA CMF Clearinghouse (star ratings 3–5 only). KABCO comprehensive crash costs per FHWA-SA-25-021 (October 2025, 2024 dollars): K=$15,988,000, A=$1,705,100, B=$384,000, C=$204,600, O=$18,100. Discount rate 7% per reinstated OMB Circular A-94 (Oct 1992), consistent with May 2025 USDOT BCA Guidance. Countermeasure costs from TxDOT Austin District average low bid unit prices (2024), FHWA EDC-1/EDC-2 documentation, and NHCCI construction cost index for inflation adjustments. Countermeasure cost estimates labeled “Estimate” in the seed data are professional judgment informed by FHWA-SA-24-005, Proven Safety Countermeasures in Rural Communities (January 2024).

16. **Corridor Projects**

The sliding-window analysis, systemic screening, and benefit-cost calculations from the previous chapters produce a list of 142 corridor projects spanning 441 miles, with 330 KA crashes between them. Each project is a segment of road where the data indicates a countermeasure would reduce crashes at a favorable cost ratio. The tables below show the five highest-priority corridors per county, ranked by KA crash count.

The planning-level caveats from the previous chapter apply. The “From–To” column shows TxDOT DFO (distance from origin) mile markers so a district office can locate the segment on the state highway system.

Blanco County — top 5 of 46 projects, 83 KA in top 5

ROUTE	AUTH.	FROM–TO	MI	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
US 281	TxDOT	262.2–272.9	10.7	**29**	209	1,210:1	$172K	**Rumble Strip Package** (shoulder + centerline rumble strips)
US 290	TxDOT	169.8–177.5	7.7	**24**	427	1,098:1	$124K	**Rumble Strip Package** (shoulder + centerline rumble strips)
US 290	TxDOT	60.2–70.4	10.2	**12**	75	201:1	$168K	**Curve Safety Package** (curve warning + chevron signs)
US 281	TxDOT	288.1–293.2	5.1	**10**	82	1,680:1	$98K	**Rumble Strip Package** (shoulder + centerline rumble strips)
US 281	TxDOT	284.0–287.7	3.7	**8**	112	269:1	$98K	**Rumble Strip Package** (shoulder + centerline rumble strips)

Lee County — top 5 of 41 projects, 32 KA in top 5

ROUTE	AUTH.	FROM–TO	MI	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
US 77	TxDOT	211.7–220.6	8.9	**8**	58	858:1	$153K	**Install shoulder rumble strips**
SH 21	TxDOT	69.9–75.5	5.6	**6**	85	1,052:1	$136K	**Rumble Strip Package** (shoulder + centerline rumble strips)
FM 141	TxDOT	2.3–20.1	17.8	**6**	90	885:1	$320K	**Rumble Strip Package** (shoulder + centerline rumble strips)
SH 21	TxDOT	59.8–65.1	5.3	**6**	64	836:1	$132K	**Rumble Strip Package** (shoulder + centerline rumble strips)
US 77	TxDOT	234.6–238.3	3.7	**6**	79	501:1	$87K	**Rumble Strip Package** (shoulder + centerline rumble strips)

Llano County — top 5 of 55 projects, 29 KA in top 5

ROUTE	AUTH.	FROM–TO	MI	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
RM 1431	TxDOT	1.6–4.7	3.1	**6**	36	1,427:1	$78K	**Rumble Strip Package** (shoulder + centerline rumble strips)
SH 71	TxDOT	73.7–78.6	4.9	**6**	46	974:1	$124K	**Rumble Strip Package** (shoulder + centerline rumble strips)
SH 71	TxDOT	56.7–60.4	3.7	**6**	28	639:1	$112K	**Curve Safety Package** (curve warning + chevron signs)
SH 16	TxDOT	206.5–220.4	13.9	**6**	93	639:1	$190K	**Curve Safety Package** (curve warning + chevron signs)
SH 29	TxDOT	82.6–87.3	4.7	**5**	70	642:1	$152K	**Curve Safety Package** (curve warning + chevron signs)

The full list of 142 corridor projects functions as the project appendix to this plan. Each project includes all applicable countermeasures, individual benefit-cost ratios, and location details that a county or TxDOT district can use to scope an SS4A Implementation Grant application.

17. **Intersection Projects**

The intersection analysis identified 60 locations with elevated crash concentrations, totaling 87 KA crashes. Each intersection is matched to a countermeasure from the FHWA CMF Clearinghouse based on intersection geometry, traffic control type, and crash history. The tables below show the five highest-priority intersections per county.

The same planning-level caveats apply. Intersection names reflect the TxDOT inventory designation. Where a state highway meets a county road, TxDOT controls the intersection and would lead any implementation project.

Blanco County — top 5 of 20 projects, 16 KA in top 5

INTERSECTION	AUTH.	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
US 281 / US 290 (N)	TxDOT	**4**	46	86:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
RM 473 / US 281	TxDOT	**4**	41	51:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
SS 356 / US 281	TxDOT	**3**	14	109:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
RM 32 / US 281	TxDOT	**3**	24	40:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
US 281 / US 290 (S)	TxDOT	**2**	3	165:1	$70K	**Intersection Safety Package** (lighting + conflict warning)

Lee County — top 5 of 20 projects, 11 KA in top 5

INTERSECTION	AUTH.	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
FM 1624 / SH 21	TxDOT	**3**	12	104:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
CR 223 / US 77	TxDOT	**2**	3	167:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
FM 2440 / SH 21	TxDOT	**2**	5	159:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
SH 21	TxDOT	**2**	4	107:1	$60K	**Install intersection conflict warning system**
SANDRIDGE DR / US 290	TxDOT	**2**	4	25:1	$70K	**Intersection Safety Package** (lighting + conflict warning)

Llano County — top 5 of 20 projects, 10 KA in top 5

INTERSECTION	AUTH.	KA	TOTAL	B/C	COST	RECOMMENDED TREATMENTS (COUNTERMEASURES)
BOULDER DR / SH 261	TxDOT	**3**	6	34:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
INDUSTRIAL BLVD / RM 1431	TxDOT	**2**	7	93:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
DILLEY ST / RM 1431 / ROSE HILL / ROSE HILL ST / TEXAS AVE	TxDOT	**2**	18	35:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
RM 2147 / SH 71	TxDOT	**2**	14	33:1	$70K	**Intersection Safety Package** (lighting + conflict warning)
ANGLE AVE / SH 29	TxDOT	**1**	5	151:1	$70K	**Intersection Safety Package** (lighting + conflict warning)

The full list of 60 intersection projects functions as the project appendix to this plan. Each includes all applicable countermeasures, benefit-cost ratios, and location data for SS4A Implementation Grant scoping.

18. **Implementation**

The previous chapters identify where fatal and serious-injury crashes concentrate, which road characteristics predict future crashes, and which locations produce the highest return per safety dollar. This chapter describes how that analysis gets used and by whom.

CAPCOG is an advisory body. We do not build roads, control construction budgets, or direct project selection. The value of this plan is data aggregation and analysis: assembling crash records, roadway inventory, flood data, and benefit-cost calculations that no single county has the staff or tools to produce on its own. The plan gives every jurisdiction in the study area a common fact base for grant applications and project selection.

Where the Problem Is

The High-Injury Network and systemic screening in this plan make one fact plain: the roads with the most fatalities and serious injuries are state-system roads — US highways, state highways, farm-to-market roads, and ranch-to-market roads maintained by TxDOT. That is not a criticism of TxDOT. State highways carry higher speeds and higher volumes than county roads, and higher speed means higher severity when a crash occurs.

Blanco, Lee, and Llano county governments do not control TxDOT roads. They cannot widen shoulders on US 281, install rumble strips on SH 29, or add chevrons to curves on RM 1431. TxDOT decides what gets built on the state system, when, and how it gets funded.

What CAPCOG Will Do

In fall 2025, CAPCOG applied for a Rural and Tribal Assistance (RTA) Pilot Program grant from USDOT's Build America Bureau. Notice of award came in April 2026: $400,000 for engineering work on safety improvements in Blanco, Lee, and Llano counties. CAPCOG will use this grant to take the highest-priority recommendations in this plan from planning-level to engineering-level design, and in some cases to site plans, depending on the scope of the final engagement with the engineering consultant. An engineering study moves a project from planning-level recommendation to construction-ready design — the step between “this location needs safety treatment” and “here is a bid package a contractor can build from.” CAPCOG will update this page with a chronology of the work as it progresses and report on milestones at CARTPO meetings.

CAPCOG will not apply for an SS4A grant in FY2026. We encourage Blanco, Lee, and Llano counties and their cities to apply for SS4A Planning Grants and SS4A Implementation Grants, and we will assist any member jurisdiction that wants help preparing an application — letters of support, data from this plan, benefit-cost analysis, and application review. Jurisdictions that want assistance should contact CAPCOG.

Low-cost systemic treatments (signing, striping, rumble strips, chevrons) can move from funding obligation to installation within one construction season. These treatments have the highest benefit-cost ratios in this plan, and counties can deploy them on their own roads without waiting for federal funding. Projects that require engineering

design — shoulder widening, guardrail, curve corrections, low water crossing replacements — need an engineering study first. That is what the RTA grant will fund. Capital projects on the state system depend on TxDOT's programming and project selection timeline.

CAPCOG will maintain this website as a living document. When TxDOT publishes updated roadway inventory or crash data, CAPCOG will rerun the analysis. When TxDOT meets its federal deadline to collect MIRE Fundamental Data Element 131 (Traffic Control at intersections) by September 30, 2026, the intersection analysis will improve and CAPCOG will update the benefit-cost calculations and project recommendations accordingly.

Every two years, TxDOT updates the Rural Transportation Improvement Program (RTIP) for the Austin District. CAPCOG reviews that process through CARTPO and uses this plan to advocate for including high-benefit, low-cost safety projects, particularly where TxDOT already has construction planned and adding a safety treatment would cost relatively little. CAPCOG cannot direct TxDOT's project selection, but we can make the case with data.

CAPCOG monitors federal and state grant programs and notifies Blanco, Lee, and Llano counties and their cities of opportunities through Moving Central Texas and CARTPO.

What Counties and Local Governments Can Do

The most direct thing a county can do is fix safety problems on its own roads. This plan identifies county-maintained segments with high systemic risk scores. The countermeasures listed — signing, striping, edge-line rumble strips, shoulder improvements — are treatments a county can deploy with its own maintenance crews or through a standard construction contract. Counties do not need a federal grant to install a chevron sign on a county road.

For state-system roads, counties have one formal channel: public comment during the RTIP process. This plan gives counties specific data to bring to that table: route names, crash counts, benefit-cost ratios, countermeasure recommendations. "US 281 south of Johnson City has 12 KA crashes over five years and a benefit-cost ratio of 200:1 for edge-line rumble strips" is a stronger argument than "this road feels dangerous."

Counties can also apply for federal grants that fund work on state roads. SS4A implementation grants, HSIP funds, and FEMA HMGP funds can all support projects on TxDOT roads when the applicant coordinates with TxDOT. The last round of SS4A implementation funding may come in FY 2026. CAPCOG encourages all three counties to apply.

Funding Programs

Program	Administering agency	Eligible uses
SS4A Implementation Grants (IIJA Section 24112)	USDOT / FHWA	Construction of safety projects identified in an adopted safety action plan. Requires 20% local match.
SS4A Planning Grants (IIJA Section 24112)	USDOT / FHWA	Engineering studies, project scoping, and design for projects in an adopted safety action plan.
Highway Safety Improvement Program (23 USC 148)	TxDOT	Formula-funded safety improvements on any public road. Systemic treatments, intersection improvements, roadway departure countermeasures.
TxDOT Safety Bond Program	TxDOT	State-funded safety projects on the TxDOT system.
FEMA Hazard Mitigation Grant Program	FEMA / TDEM	Low water crossing replacements and flood mitigation where the applicant documents a flood nexus.

Ongoing Monitoring

CAPCOG updates crash data annually from TxDOT CRIS. This website is the public-facing progress report. If crash trends improve on a corridor after treatment, the data will show it. If they do not, that is useful information too.

Separately, CAPCOG maintains an automated change-detection system that tracks every TxDOT project in the Austin District across four TxDOT data systems. When a project's information changes — stage, letting date, cost estimate, scope, percent complete, or any of several other tracked fields — the system detects the change within 24 hours and classifies it by severity. CAPCOG cross-references the TxDOT project inventory against the High-Injury Network to identify which HIN corridors have programmed safety work and which do not. That investment gap analysis informs where to target future grant applications and where to advocate for adding safety treatments to projects TxDOT already has in the pipeline.

Funding programs: IIJA Section 24112 (SS4A), 23 USC 148 (HSIP), FEMA Hazard Mitigation Grant Program (44 CFR Part 206).

19. **Data & References**

Every number in this plan traces to a public government data source. The tables and maps are generated from those sources through an automated pipeline.

All datasets referenced in this plan are available for download at **movingcentraltexas.org/rsap** in CSV, GeoJSON, and JSON API formats. The interactive version includes download buttons for each dataset listed below.

References

Publications, standards, and reports cited in this plan. Each chapter includes source footnotes with full citations. For data source details (fields, access methods, update frequency, and limitations), see the data source table in How This Plan Works.

U.S. Department of Transportation / FHWA

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- Safe Streets and Roads for All, FY 2026 NOFO. USDOT, March 2026. (https://www.transportation.gov/sites/dot.gov/files/2026-03/SS4A-FY26-NOFO.pdf)
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- FHWA-SA-17-071, Crash Costs for Highway Safety Analysis (2018). Superseded by FHWA-SA-25-021 for cost values.
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- TxDOT Austin District Average Low Bid Unit Prices (2024). (https://www.dot.state.tx.us/insdtdot/geodist/aus/cserve/bidprice/s_0501.htm)
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AASHTO

- Highway Safety Manual, 1st Edition (2010), Chapter 4: Network Screening.
- NCHRP Report 500, Volume 7: A Guide for Reducing Collisions on Horizontal Curves.

Texas

- 88th Texas Legislature, General Appropriations Act (2023). TxDOT biennial appropriation.
- 2024 Texas State Flood Plan. Mandated by Senate Bill 8, 86th Texas Legislature (2019). Adopted by TWDB board August 15, 2024.

Capital Area Metropolitan Planning Organization (CAMPO)

- Regional Safety Action Plan, completed November 2025. Funded by SS4A Planning Grant. (https://www.campotexas.org/local-plans-and-studies/regional-safety-action-plan/)

Other

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20. **Methodology & Sources**

Data Pipeline

CAPCOG built this plan on an open-source data pipeline using PostGIS (spatial database), dbt (transformation and testing), Dagster (orchestration), Martin (vector tile server), and MapLibre GL (map rendering). We extract crash, roadway, flood, and intersection data from TxDOT and TWDB web services, transform it through a series of tested models, and publish the results as vector tile layers that this interactive map renders as you scroll through each chapter.

This stack is reproducible. Anyone with access to the same public data services can stand up a similar pipeline. The transformation logic is version-controlled and automated tests catch data quality issues — null values, broken joins, row count changes — before they reach the map. When a source agency updates its data, the system detects the change and re-runs the pipeline.

How the Plan Stays Current

Crash data from TxDOT CRIS is re-extracted annually. Flood data updates with TWDB State Flood Plan revisions; regional plans are due January 2028 and the state plan is due September 2029.

As TxDOT populates its MIRE Fundamental Data Elements (especially Element 131, Traffic Control), the systemic and benefit-cost analyses will use intersection-specific countermeasures instead of broad-category treatments. The CRIS extract now includes collision type, contributing factor, light condition, and time of day. Future updates may add person-level data (mode of travel, age, restraint use) if CAPCOG obtains a CRIS Standard Extract with unit and person tables.

Data Sources

Source	Agency	Access	Update frequency	Fields used	Limitations
TxDOT CRIS	TxDOT	GeoJSON extract + CSV	Annual	severity, date, county, geom, collision type, contributing factor, light condition, weather, road alignment, traffic control, time of day, speed limit	No person-level data (mode, age, restraint use)
TxDOT Roadway Inventory	TxDOT	ArcGIS REST	Annual	SURF_WD, S_TYPE_O, S_WID_O, ADT_CUR, speed limit	Off-system gaps
TxDOT Highway Curve Inventory	TxDOT	ArcGIS REST	Annual	estcurvedegree, hpmscurveclass	None noted
TxDOT Intersection Inventory	TxDOT	ArcGIS REST	Annual	TRFC_CTRL, INTSECT_GMTRY, GRADE	One point per approach leg (clustered to physical intersections); 99.96% of traffic control records are Unknown (4,787 of 4,789)
TxDOT LWC Inventory	TxDOT	ArcGIS REST	Periodic	type, signage, owner	None noted
TxDOT Bridge Division	TxDOT	ArcGIS REST	Annual	scour rating, channel condition	None noted
TWDB SFPV	TWDB	FeatureServer	With State Flood Plan updates	flood hazard, exposure, LWC, vulnerability	Mixed source quality across counties
FEMA NFHL	FEMA	ArcGIS REST	Periodic	flood zones	Blanco County: 0 digital features (1991 FIRMs predate digital mapping)
FEMA NRI	FEMA	Download	Periodic	county flood risk score	None noted
FHWA CMF Clearinghouse	FHWA	Web	Ongoing	CMF values, star ratings	None noted

Countermeasure Reference

This plan evaluates 12 countermeasures from the FHWA CMF Clearinghouse (cmfclearinghouse.fhwa.dot.gov). Each countermeasure's CMF was measured against a specific crash type in the original research study. The benefit-cost analysis applies each CMF only to the crashes matching that target type in the TxDOT CRIS data. The table below shows the full mapping.

Countermeasure	CMF	Stars	Target Crash Type	CRIS Filter	Cost	Life (yrs)
Install shoulder rumble strips	0.68	★★★★★	All crashes	All crashes on the corridor (Storm 2020 measured total-crash reduction on rural 2-lane)	$5,500/mi	10
Install centerline rumble strips	0.55	★★★★★	Head-on KA	Head-on collision, fatal or serious only (collision_type 30, KABCO K/A)	$6,500/mi	10
Advance static curve warning signs	0.7	★★★	All curve crashes	Any crash at a horizontal curve (road_alignment 4/5/6)	$800/loc	10
Install chevron signs and curve warning signs	0.78	★★★★★	All curve crashes	All crashes on the curve (Srinivasan 2009 measured reduction across head-on, run-off-road, nighttime, and sideswipe)	$1,500/loc	10
Install high friction surface treatment (wet weather)	0.43	★★★★★	Wet weather curve	Crashes at curves in rain or on wet pavement (weather_condition 2/3 or surface_condition 2/3, + road_alignment 4/5/6)	$35,000/loc	12
Install high friction surface treatment (all weather)	0.584	★★★★★	All curve crashes	Any crash at a horizontal curve (road_alignment 4/5/6)	$35,000/loc	12
Install safety edge treatment	0.591	★★★★★	Run-off-road	Single-vehicle leaving roadway, all severities (collision_type 1-5, harmful_event 7/10 or road_related 2)	$500/mi*	8
Install wider edgelines (4 in to 6 in)	0.839	★★★	All crashes	No filter — all crashes on the segment	$1,000/mi	3
Increase clear zone to 30 ft	0.56	★★★	Run-off-road at curves	Single-vehicle leaving roadway at a curve (collision_type 1-5, harmful_event 7/10 or road_related 2, + road_alignment 4/5/6)	$50,000/loc	20
Convert stop-controlled intersection to roundabout	0.42	★★★★	All intersection crashes	No filter — all crashes within 250 ft of intersection	$750,000/loc	25
Install intersection conflict warning system	0.742	★★★★	All crashes	No filter — all crashes within 250 ft of intersection	$60,000/loc	10
Provide highway lighting	0.72	★★★	Nighttime crashes	Crashes in the dark (light_condition 3/4/6: dark not lighted, dark lighted, dark unknown)	$10,000/loc	20

* SafetyEdge cost is incremental during a concurrent resurfacing project. Star ratings are assigned by the FHWA CMF Clearinghouse based on study quality: 5 stars indicates multiple well-designed studies with consistent results; 3 stars indicates fewer studies or less rigorous design. This plan uses only CMFs rated 3 stars or higher. CRIS filter field names and codes per TxDOT CRIS Public Extract File Specification v29.0. Costs sourced from TxDOT Austin District average low bid data, FHWA EDC-1/EDC-2 documentation, FHWA ITS research, NCHRP Synthesis 586, and NHCCI construction cost index. Items marked “Estimate” in the source data are professional judgment informed by FHWA-SA-24-005. Eleven of twelve countermeasures are FHWA Proven Safety Countermeasures; ICWS is an FHWA-researched countermeasure not included in the PSC designation.

Treatment Packages

When multiple countermeasures are recommended at the same location and target non-overlapping crash populations, this plan combines them into a treatment package with a single benefit-cost ratio. This reflects how safety projects are actually bid and constructed.

Package	Countermeasures	Combination Method
Rumble Strip Package	Shoulder + centerline rumble strips	Sequential (shoulder rumble reduces all corridor crashes first; centerline rumble reduces residual head-on crashes not already prevented)
Curve Safety Package	Curve warning signs + chevron signs	Sequential (curve warning signs reduce all curve crashes first; chevrons reduce residual curve crashes not already prevented)
Intersection Safety Package	Highway lighting + ICWS	Sequential (ICWS reduces all intersection crashes first; lighting reduces residual nighttime crashes)
Corridor Resurfacing Add-Ons	Safety edge + wider edgelines	Sequential (wider edgelines reduce all crashes first; safety edge reduces residual run-off-road crashes). Requires concurrent resurfacing.

All four packages use the FHWA CMF Clearinghouse sequential-combination method (cmfclearinghouse.fhwa.dot.gov/faqs.php, “How can I apply multiple CMFs?”). The broader CMF is applied first; the second CMF reduces only the crashes not already prevented. This avoids double-counting when two treatments target overlapping populations.

MIRE Alignment

FHWA's Model Inventory of Roadway Elements (MIRE) defines the Fundamental Data Elements that states must collect under 23 USC 148. This analysis uses the following MIRE elements from TxDOT's published inventory.

MIRE Element	Description	TxDOT field	Status
8	Surface Type	SUR_TYP	Populated
12	Lane Width	SURF_WD	Populated
20	Shoulder Type	S_TYPE_O	Populated (some nulls)
21	Shoulder Width	S_WID_O	Populated (some nulls)
81	Annual Average Daily Traffic (AADT)	ADT_CUR	Populated
131	Traffic Control	TRFC_CTRL	99.96% Unknown
105-108	Rumble Strips	Not published	Not Available

Data completeness checked May 29, 2026.

21. Acknowledgements

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CAPCOG Staff

Chris Miller, Executive Director

Charles Simon, Director, Regional Planning & Services

Simon Fichter — data pipeline development, spatial analysis, benefit-cost modeling, and plan authorship

TxDOT Austin District

TxDOT Austin District funded this plan through its transportation planning allocation to CAPCOG and provided the roadway inventory, crash, curve, intersection, and bridge data through its published data services.

CARTPO Members

The Capital Area Rural Transportation Planning Organization reviewed this plan at four consecutive quarterly meetings from August 2025 through May 2026. The full CARTPO membership roster, including Blanco, Lee, and Llano county appointees named in the Stakeholder Engagement chapter, is posted on the CAPCOG website.

Contact

For questions, corrections, or data requests related to this plan, contact sfichter@capcog.org.

End of Document

This document was generated from the interactive plan published at movingcentraltexas.org/rsap. The interactive version contains live data and is updated as source agencies publish new records.

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