RESILIENCY IMPROVEMENT PLAN

APPROVED BY THE TRANSPORTATION POLICY COMMITTEE -



Adopted on _

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Chapter 1: Introduction and Purpose

Incorporating this resilience-focused planning document into the Metropolitan Transportation Plan (MTP) will help the region be better prepared to respond to natural disasters and other future events. The planning studies detailed in the Systemic Approach to Transportation System Resilience section highlight the in-depth analysis and community engagement efforts being conducted within the Amarillo Area MPO boundaries. These initiatives empower decision-makers and the public to critically evaluate regional risks, guiding the creation of targeted programs and infrastructure projects that strengthen resilience.

The Resilience Improvement Plan (RIP) for the Amarillo Area MPO aims to strengthen the region's transportation infrastructure, ensuring that the system can withstand, respond to, and recover rapidly from disruptions caused by extreme weather events and natural disasters. By emphasizing resilience in transportation planning, the Amarillo Area MPO addresses risk-proneness such as extreme weather, flooding, and other natural disasters that can damage roads, bridges, and transit systems. This approach helps protect critical transportation assets and maintain system functionality during and after disruptive events.

Resilience refers to the ability to anticipate, prepare for, and adapt to changing conditions while withstanding, responding to, and recovering from disruptions. The increasing risks posed by climate change and extreme weather events, including heat waves, droughts, storms, wildfires, and flooding, have become significant concerns for transportation reliability. These events can accelerate the deterioration of infrastructure assets, sometimes leading to complete failure. The frequency and intensity of these impacts are expected to increase over time.

Transportation systems are susceptible to extreme weather, which can disrupt traffic, increase delays, and cause long-lasting damage to infrastructure. For example, in a case study, heavy rainfall reduced vehicle speeds by 25%, halved traffic volumes, and damaged bridges, underpasses, and road surfaces, resulting in significant financial losses. Freight operators alone face \$3.4 billion annually in weather-related delays, and a single-day highway shutdown can cost a metropolitan area up to \$76 million in lost productivity and wages.

Resilience policies in transportation have evolved through key federal and state initiatives. The 2005 SAFETEA-LU Act mandated consideration of climate in long-range plans, followed by the 2012 MAP-21 Act's focus on performance-based planning. The 2015 FAST Act required DOTs and MPOs to integrate resilience into transportation planning, assessing investments to reduce infrastructure susceptibility. The 2021 Bipartisan Infrastructure Law (BIL) established the PROTECT program, which will fund resilience projects and guide Metropolitan Planning Organizations (MPOs) in resilience planning by 2023.

Texas has advanced resilience with the 2013 State Flood Mitigation Plan, the 2019 Flood Infrastructure Fund, and the 2021 Statewide Resilience Planning Act. In 2022, TxDOT

introduced a climate risk framework, and in 2024, PROTECT grants will support Texas MPOs and local agencies.

Through these initiatives, the Amarillo Area MPO is enhancing transportation resilience, ensuring long-term sustainability and reliability.

Chapter 2: The Resiliency Planning Process

The Metropolitan Planning Organization (MPO) has developed this Resilience Improvement Plan (RIP) to align with the objectives of the Federal Highway Administration's (FHWA) Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Program. This plan provides a risk-based assessment of vulnerable transportation assets. It supports both immediate and long-term transportation planning in the region, under the PROTECT Program RIP guidance (23 U.S.C. 176(e)).

What is a Resilience Improvement Plan?

Voluntary plan developed by a State Department of Transportation (DOT) or Metropolitan Planning Organization (MPO) for short and long-range planning activities and investments with respect to the resilience of surface transportation within the boundaries of the State or MPO

Demonstrates a systemic approach to transportation system resilience and includes a riskbased assessment of vulnerabilities of transportation assets and systems to current and future weather events and natural disasters

(23 U.S.C. 176(e))

As required by 23 U.S.C. 176(e), the plan:

- Integrates immediate and long-range planning activities and investments, with the Systemic Approach to Transportation System Resilience and Project List sections detailing both ongoing and future resilience strategies.
- Demonstrates a systemic approach to transportation system resilience through coordinated planning efforts to improve infrastructure resilience.
- Aligns with state and local hazard mitigation plans, ensuring consistency with state and local hazard mitigation strategies.
- Incorporates a risk-based assessment of weakness to weather events and natural hazards, including evaluations conducted by the MPO and regional partners to identify risks related to climate conditions, extreme weather, and natural hazards.

Additionally, the plan:

- Enhances response capabilities for natural disasters and extreme weather preparedness, with strategies for improved disaster response and infrastructure resilience discussed in the final section.
- Outlines relevant codes, standards, and regulatory frameworks, detailing applicable transportation infrastructure regulations at the state and federal levels.
- Assesses community infrastructure resilience by examining regional and local hazard mitigation efforts to enhance infrastructure resilience across communities.
- Utilizes a long-term planning framework, demonstrating the MPO's commitment to sustainable transportation development through forward-looking strategies.

This RIP aims to mitigate risks at regional, county, and local levels, thereby enhancing system reliability and fostering a unified approach to transportation resilience. It aligns with the 2023 Texas State Hazard Mitigation Plan and will be integrated into the Metropolitan Transportation Plan (MTP), extending the planning horizon through the upcoming update to the MTP.

Resilience planning has been integral to the MPO's efforts to strengthen the transportation network against extreme weather events and long-term climate challenges. The MPO has collaborated closely with TxDOT, local governments, and regional partners to assess infrastructure operational sensitivity and incorporate resilience-focused strategies into transportation planning. These efforts include:

- Risk and vulnerability assessments to evaluate the impact of natural disasters on transportation assets within the region.
- Infrastructure adaptation strategies to enhance the ability to withstand and recover from extreme weather conditions.
- Data collection and analysis to inform resilience planning decisions and enhance regional preparedness.

Recognizing the link between transportation resilience and broader sustainability efforts, the MPO integrates resilience considerations into the MTP to contribute to a safer, more reliable, and future-ready infrastructure network. This Resilience Improvement Plan builds on ongoing efforts and aligns with Texas state and federal resilience policies to strengthen the region's transportation system for future generations.



The resilience planning process is supported by a framework illustrated in the "Key Building Blocks" graphic (Figure 1), which highlights six core components: Leadership and Agency Structure, Capacity and Competency, Collaboration and Communication, Resource Requirements, Risk and Resilience Assessment, and Business Processes. These interconnected elements form the foundation for successful resilience planning, ensuring that transportation infrastructure is prepared to face future challenges effectively.

Chapter 3: Regional Environmental Conditions and Stressors

This chapter summarizes significant disruptions that have impacted the Amarillo Area Metropolitan Planning Organization (MPO). The region faces a variety of environmental challenges that impact transportation infrastructure and long-term resilience planning. Texas, particularly the **Panhandle region**, is subject to extreme weather conditions, climate variability, and natural hazards that can affect roadway safety, mobility, and infrastructure durability.

The Office of the Texas State Climatologist and the Texas Department of Transportation (TxDOT) have conducted extensive research on climate-related risks affecting the state's transportation network. Reports such as the Texas State Hazard Mitigation Plan and studies from the Texas A&M Center for Extreme Weather (formerly Texas Center for Climate Studies) highlight key environmental stressors in the region, including:

Extreme Weather Impacts	Details
Severe Drought and Extreme Heat	• Prolonged drought conditions, common in the Texas Panhandle, can

Course Storme and Elegh Elegding	 lead to soil instability, increasing the risk of pavement deterioration and infrastructure damage. Rising temperatures contribute to thermal expansion in roadways, bridges, and rail systems, potentially causing structural failures and maintenance challenges.
Severe Storms and Flash Flooding	 The region experiences intense thunderstorms, which can produce flash flooding, roadway washouts, and damage to drainage systems. Increased frequency of extreme precipitation events puts additional stress on transportation networks, requiring improved stormwater management and flood-resistant infrastructure.
High Winds and Tornadoes	 The Texas Panhandle is located within Tornado Alley, making it highly vulnerable to extreme wind events that can damage transportation infrastructure, traffic control systems, and utility lines. High winds contribute to roadway debris hazards and increased maintenance needs for signage, lighting, and bridge structures.
Wildfires and Dust Storms	 Persistent drought conditions combined with high temperatures and strong winds contribute to wildfire risks, which can threaten roadways, bridges, and evacuation routes. Dust storms, exacerbated by dry conditions, reduce visibility on highways, increasing the likelihood of traffic accidents and road closures.
Winter Storms and Ice Events	• Freezing temperatures, ice accumulation, and snowstorms create hazardous driving conditions, which impact roadway safety and

increase maintenance costs for deicing and snow removal.

• Extreme cold can lead to pavement cracking and expansion joint failures in bridges and highways.

Chapter 4: Risk-Based Assessments

Hazard Identification

Hazard identification and assessment is the process of pinpointing areas within transportation systems that are susceptible to risks or disruptions within the Amarillo MPO Boundary Area. This exercise is designed to help you understand how to effectively eliminate or reduce the

risk associated with a hazard. Each hazard type is assessed based on its frequency of occurrence, warning time, and potential severity, which are directly related to the impacts on the transportation system.

Vulnerability Assessment

A vulnerability and impact assessment evaluates the susceptibility of transportation systems to hazards and threats. This fosters an understanding of the areas most exposed to risks and the hazards or threats that pose the greatest



challenges to transportation systems. The magnitude and type of impact for each combination of a hazard and transportation system must be identified.

Strategies

Actions should be considered that help adapt, mitigate, or recover from the effects of a hazard. Strategies can be drafted to help identify and evaluate potential actions, using assessments of risk exposure and potential impacts as a foundation. An objective statement for each hazard/asset/impact item should be developed. Then, for each objective, determine the type(s) of actions (i.e., mitigation, adaptation, or recovery) that would be appropriate, followed by specific actions for each category. After that, MPO's establish actions into cohesive plans that focus on responding to disaster in the short-term while also incorporating long-term plans. Assign responsibilities and roles, allocate funds, generate a timeline, update older plans.



A critical task in resilience planning is community outreach. After identifying hazards and vulnerable assets, communities should engage residents and work with them to adopt practices that support broader goals in the community and specific actions that improve long-term resilience. The Federal Highway Administration's (FHWA) Climate Change and Extreme Weather Vulnerability Assessment Framework is a guide for transportation agencies interested in assessing the hazard potential of their systems and assets to climate change and extreme weather. After conducting

assessments, agencies can develop strategies to tackle identified weaknesses and enhance resilience. Resilience strategies that can be implemented through the transportation planning process include:

- Evaluate materials used in construction to determine sustainability in the event of a natural disaster.
- Consider soil type and ecology in the area to incorporate this into the project design.
- Invest in workforce development to educate employees about resilience, evaluating how workforce needs may change as the climate shifts (e.g., more frequent maintenance may be required in certain areas).
- Conduct multi-criteria analysis to evaluate and compare resilience options.
- Use corridor studies to identify vulnerable infrastructure and develop adaptation strategies in those areas.
- Conduct evacuation route planning and develop alternative routes in vulnerable areas.
- Use the results of a vulnerability assessment to inform infrastructure design, such as bridge or roadbed elevation.

Identify undeveloped areas that are vulnerable to extreme weather and changes in climate, and limit or prohibit development in those areas; and develop partnerships with mapping providers or smart vehicle operators to provide real-time updates to route information in extreme weather situations.

Being flexible in the adaptation strategies allows agencies to address new trends and problems as they arise. Interagency collaboration, getting buy-in for resilience strategies through public participation, and training MPO staff about extreme weather and resilience, are good practices to anticipate and prepare resiliency for these situations.

The following approaches offer ways to deal with extreme weather based on historical extreme-weather events:

One approach to resilience is to have redundancy in routes—multiple routes that can accommodate the same shipment.

To ensure minimal disruption and a swift return to normal operations, intermodal coordination and cooperation are essential. A study of Hurricane Sandy cited a lack of intermodal coordination.

The Research Foundation of the National Association of Development Organizations recommends involving regional transportation planning entities to improve coordination among local and state agencies and formalizing these entities' roles in transportation disaster response.

Current research has developed methods of identifying dollar value benefits of winter maintenance operations in terms of safety, mobility, and fuel savings. Future efforts may help provide a cost-benefit basis for expenditures on resilience.

Sustainability

Beyond meeting federal highway safety planning requirements, the MPO identifies critical safety needs to inform investment decisions aimed at reductions in highway fatalities and serious injuries on public roads. A primary objective is to cultivate a driving culture in the Amarillo Metropolitan Area that prioritizes safety, economy, and civility. Analyzing collision data, roadway congestion, grade separation, traffic control devices, and driver behavior is

essential to understanding how to create a safer driving environment. To enhance the transportation system's ability to support homeland security and ensure the personal security of all users, the Potter & Randall County Local Emergency Planning Committee has devised comprehensive plans addressing various emergencies and residents' security in Potter



and Randall Counties. These plans encompass disasters resulting from weather or other events, incorporating state-approved routes for hazardous materials. The Potter & Randall County Local Emergency Planning Committee includes the Randall County Judge, who serves as a member of the MPO Transportation Policy Committee.

Amarillo City Transit has maintained Safety, Security, and Emergency Preparedness Plan since 2005. The plan delineates the transit system, outlines security plan management, including specific roles and responsibilities, and conducts threat and susceptibility identifications and assessments. An annual work program is also part of the plan, updated every three years during the Federal Transit Administration's Triennial Review of Amarillo City Transit.

Chapter 5: Goals of the Amarillo MPO's Resiliency Improvement Plan

1. Improve System Reliability

Ensuring transportation systems are dependable and can handle disruptions is a cornerstone of the Amarillo MPO's Resilience Improvement Plan. This involves building infrastructure that remains functional during adverse conditions and can recover quickly from unexpected events. Dependability is achieved through proactive measures such as strengthening vulnerable infrastructure, improving maintenance practices, and integrating smart technologies that provide real-time monitoring and alerts for potential disruptions.

Key strategies include identifying critical transportation assets most susceptible to weather extremes or natural disasters, such as roads, bridges, and transit systems. For example, reinforcing bridges to withstand flooding or retrofitting roadways to handle temperature fluctuations can mitigate damage during extreme events. Furthermore, ensuring redundancy in the transportation network, such as alternate routes or backup transit options, provides continued connectivity even when primary systems are compromised.

Incorporating advanced modeling and data analytics tools into transportation planning allows for forecasting disruptions and preparing contingency plans. For instance, using weather prediction models to preemptively reroute traffic or deploying emergency response teams to affected areas ensures continuity of operations. Ultimately, a dependable transportation system minimizes interruptions, ensuring that residents, businesses, and freight operators experience minimal impact, even during challenging circumstances.

2. Focus on reducing delays and maintaining consistent travel times

Reducing delays and ensuring consistent travel times is vital to keeping the transportation network efficient and user-friendly, even during adverse conditions. The Amarillo MPO's Resilience Improvement Plan emphasizes optimizing traffic flow through improved signal timing, dynamic traffic management systems, and the integration of predictive analytics to anticipate and address bottlenecks before they escalate. Proactive planning also includes identifying and addressing infrastructure weaknesses that can cause delays, such as areas prone to flooding or deterioration. By prioritizing upgrades and repairs to these critical points, the MPO minimizes disruptions caused by infrastructure failures. Additionally, strategies such as implementing dedicated freight corridors and increasing public transit efficiency help ensure reliable travel for both individuals and commercial operators.

Technology plays a crucial role, with tools like GPS-enabled navigation systems and realtime traffic apps offering drivers alternate routes to bypass congestion. Similarly, coordinated incident management practices, such as rapid clearance of accidents or stalled vehicles, can significantly reduce unexpected delays. By focusing on these initiatives, the MPO ensures that travel across the network remains predictable and efficient, fostering economic activity and improving quality of life for the region's residents.

3. Incorporate Resilience into Planning

For the Amarillo MPO, incorporating resilience strategies into transportation planning means embedding adaptability and risk mitigation into every stage of the planning process. This includes conducting vulnerability assessments to identify critical infrastructure at risk from hazards, such as extreme weather events or long-term environmental changes, and ensuring that planned projects address these risks.

Resilience strategies are also integrated by aligning transportation investments with climate adaptation goals, such as designing infrastructure to withstand extreme heat or enhanced drainage systems to prevent flooding. The MPO leverages modeling tools and scenario analysis to evaluate how proposed projects would perform under various disruptive scenarios, ensuring that new infrastructure can endure future challenges.

Collaboration with regional stakeholders is essential, enabling the MPO to coordinate with city planners, emergency management teams, and utility providers to create cohesive strategies that extend beyond transportation alone. For instance, aligning land use and transportation plans ensures that growth areas are developed with resilience in mind, reducing the exposure of infrastructure to high-risk zones.

Additionally, integrating resilience into planning requires regular updates to policies and plans to reflect emerging risks and technological advancements. This iterative process allows the MPO to stay ahead of evolving challenges while maintaining a focus on long-term sustainability and reliability across the transportation network.

4. Prepare for and adapt to potential challenges like extreme weather

The Amarillo Area MPO's Resilience Improvement Plan emphasizes proactive preparation and adaptability to address both environmental and economic challenges. Preparing for extreme weather involves implementing data-driven forecasting models to anticipate events such as severe storms, droughts, or flooding. This allows for timely interventions, such as deploying emergency response teams or preemptively rerouting traffic to minimize disruptions. Adaptation efforts include designing infrastructure with built-in flexibility, such as using materials and construction methods that can endure extreme temperatures, heavy rainfall, or shifting soil conditions. Additionally, adaptive strategies may involve raising roadways in flood-prone areas or incorporating natural buffers like green infrastructure to reduce the impact of severe weather events.

Economic shifts, such as fluctuations in regional growth, trade patterns, or fuel prices, are addressed by diversifying transportation investments to ensure the system supports both current and future needs. For example, enhancing multimodal options such as public transit or bike networks provides affordable alternatives for users during economic downturns, while improving freight corridors ensures the region remains competitive in the face of shifting trade dynamics.

Stakeholder engagement is another key component, allowing the MPO to gather insights from local businesses, residents, and industry experts to better understand emerging challenges and prioritize adaptive solutions. By continuously monitoring trends and updating plans accordingly, the Amarillo Area MPO ensures the transportation network remains resilient, functional, and economically viable in the face of an uncertain future.

5. Support Sustainable Transportation

The Amarillo Area MPO's Resilience Improvement Plan prioritizes sustainable transportation solutions to mitigate environmental impacts while enhancing the long-term viability of the region's transportation network. Promoting eco-friendly options begins with integrating energy-efficient technologies, such as electric vehicle (EV) charging infrastructure, to encourage the adoption of EVs among residents and businesses. Investments in renewable energy-powered transit systems, such as buses that run on electricity or compressed natural gas, further reduce greenhouse gas emissions and dependency on fossil fuels.

Land use and transportation planning are aligned to support compact, mixed-use developments that reduce the need for long vehicle trips. This planning approach promotes shorter, more sustainable commutes, encouraging the use of shared transportation options. Policies that incentivize carpooling or ride-sharing services further reduce the number of single-occupancy vehicles on the road, lessening traffic congestion and emissions.

Additionally, the MPO supports green infrastructure projects, such as tree-lined streets and permeable pavements, which not only improve environmental conditions but also enhance the experience for pedestrians and cyclists. Public education campaigns emphasize the environmental and health benefits of sustainable transportation, fostering community support for eco-friendly choices.

By prioritizing these strategies, the Amarillo Area MPO reduces the transportation system's carbon footprint, improves air quality, and ensures that future generations benefit from a cleaner, more sustainable environment.

6. Encourage the use of public transit, cycling, and walking

The Amarillo Area MPO's Resilience Improvement Plan emphasizes creating a transportation network that actively supports public transit, cycling, and walking as viable and appealing alternatives to driving. Encouraging public transit use begins with investments in reliable, accessible, and efficient transit services. Enhancing transit infrastructure, such as adding sheltered bus stops, real-time tracking systems, and improved scheduling, makes public transportation more convenient and attractive for residents.

To foster cycling and walking, the MPO prioritizes the development of connected and safe active transportation networks. Building dedicated bike lanes, shared-use paths, and pedestrian-friendly streets ensures that cyclists and walkers have secure and enjoyable routes. Expanding bike-share programs and offering incentives for using non-motorized modes of transport further promote their adoption.

Urban design also plays a significant role in encouraging these sustainable modes of transportation. Creating walkable neighborhoods with mixed-use developments reduces dependence on cars by placing residential, commercial, and recreational destinations within easy reach. Streetscape improvements, such as wider sidewalks, pedestrian crossings, street lighting, and landscaping, enhance the walking and cycling experience, making these options more appealing.

Community outreach and education programs help raise awareness of the benefits of public transit, cycling, and walking, such as reduced transportation costs, improved health, and lower environmental impact. By ing these strategies into the Resilience Improvement Plan, the Amarillo Area MPO aims to shift travel behavior toward more sustainable modes, reducing reliance on single-occupancy vehicles and contributing to a healthier, more resilient transportation system.

Chapter 6: Systemic Approach to Transportation System Resilience

The Metropolitan Planning Organization (MPO) is committed to improving the resiliency and reliability of the regional transportation system by addressing climate-related risks and extreme weather impacts. This commitment aligns with federal and state planning initiatives, including the need to integrate climate adaptation into long-term infrastructure planning.

The Texas Department of Transportation (TxDOT) and regional partners have developed a framework for transportation system resilience, incorporating climate risk assessments, infrastructure adaptation strategies, and emergency preparedness measures. The MPO's approach follows best practices from the Federal Highway Administration (FHWA), the Texas State Hazard Mitigation Plan, and the Texas Statewide Resiliency Plan. The key steps in these plans include:

1. Define Objectives and Scope

• Establishing a clear study focus to pinpoint areas of risk in the regional transportation network, ensuring data collection and analysis are tailored to Amarillo and Canyon's specific environmental stressors. Studies are categorized by geographic

scope, covering statewide, regional, county, and municipal levels to ensure comprehensive planning.

2. Collect Infrastructure and Asset Data

- Identifying critical transportation assets vulnerable to extreme weather, including highways, bridges, transit facilities, and drainage systems.
- Collaborating with TxDOT, local municipalities, universities, and private-sector partners to share infrastructure data and minimize redundancy in data collection.

3. Analyze Climate Data and Future Risks

- Using historical climate data, predictive modeling, and geospatial analysis to assess potential risks to transportation assets.
- Partnering with agencies such as NOAA and the Texas State Climatologist to leverage expertise in climate projections, extreme weather pattern analysis, and mitigation strategies.

4. Conduct Vulnerability and Risk Assessments

- Evaluating exposure, sensitivity, and adaptive capacity of the transportation system to climate-related hazards, including:
 - **Extreme heat and drought** (impacting pavement integrity and infrastructure longevity).
 - Severe storms and flooding (damaging roadways and bridges).
 - **High winds and tornadoes** (causing debris hazards and transportation disruptions).
 - Winter weather and ice storms (creating unsafe travel conditions and increased maintenance costs).
- Assigning a **risk level** to each identified hazard based on its potential consequences for transportation safety, mobility, and economic stability.

5. Develop and Prioritize Adaptation Strategies

- Implementing a mix of natural, structural, and policy-based solutions to improve transportation resilience.
- Applying multi-criteria and economic analysis to compare adaptation options, balancing cost-effectiveness, long-term benefits, and environmental sustainability.
- Examples of adaptation measures include:
 - Roadway elevation and improved drainage systems to prevent flooding.

- Heat-resistant materials for pavement construction to reduce infrastructure degradation.
- Enhanced emergency response planning and evacuation routes to minimize storm-related disruptions.

6. Integrate Findings into Decision-Making

• Ensuring risk assessments guide the Metropolitan Transportation Plan (MTP) and the Transportation Improvement Plan (TIP) to secure federal and state funding. Collaborating with state and local agencies to align resilience efforts with broader hazard mitigation planning initiatives.

7. Monitor, Evaluate, and Adjust Strategies

- Establishing continuous monitoring and assessment processes to adapt to evolving climate conditions and new scientific data.
- Updating risk assessments and adaptation plans periodically to incorporate lessons learned from recent extreme weather events.

Extreme Weather Impacts	Mitigation Actions	
Severe Drought and Extreme Heat	 Water conservation measures for road maintenance and landscaping. Heat emergency response plans for public transit to prevent vehicle breakdowns and protect passengers. Incorporating heat resilience in planning by adjusting work schedules for construction crews and increasing tree canopy coverage along roadways. 	
Severe Storms and Flash Flooding	 Early warning and monitoring systems to detect flooding risks and provide real-time updates. Flood-resistant design standards for transportation infrastructure, such as reinforced culverts and elevated transit stations. Emergency response and evacuation plans to ensure safe transportation routes during severe weather events. 	

High Winds and Tornadoes	 Deploying real-time weather monitoring and alerts to warn drivers, transit operators, and aviation personnel of approaching storms. Designing wind-resistant bus and train stations with anchored structures and protective barriers. Establishing emergency detour routes and ensuring rapid debris removal to restore transportation access after a storm.
Wildfires and Dust Storms	 Real-time air quality and visibility monitoring to provide early warnings for travelers and transit operators. Evacuation route planning and signage to ensure clear, safe exits from wildfire-prone areas. Traffic management systems that adjust speed limits and reroute traffic during low-visibility events.
Winter Storms and Ice Events	 Upgrading vehicle and infrastructure resilience, such as reinforced road surfaces to prevent ice buildup. Implementing intelligent transportation systems (ITS) for real-time weather monitoring and traveler alerts. Emergency response planning to ensure rapid snow and ice removal and maintain public transit operations.

Chapter 7: Next Steps for the MPO Resiliency Improvement Plan

The MPO's Metropolitan Transportation Plan (MTP) includes strategies and actions aligned with the Resiliency Improvement Plan (RIP). The following steps will guide the next phase of development:

- Collaborate with Partner Agencies: Support regional agencies and local governments in evaluating and updating operations to reflect current and projected climate impacts and risks.
- Fund Vulnerability Studies: Invest in efforts aimed at understanding the susceptibility of transportation infrastructure to climate change impacts, thereby ensuring the durability and resilience of roads, bridges, and transit services. Enhance Transit Services: Improve the reliability and capacity of existing bus and rail services by upgrading maintenance facilities, replacing outdated vehicles, and implementing resiliency measures.
- **Promote Green Infrastructure:** Encourage the integration of green infrastructure measures into roadways, stormwater systems, and urban planning to better manage runoff and reduce strain on sewer systems and water sources.

Once these actions are incorporated, the next step for the RIP will be its integration into the MTP, ensuring long-term climate resilience and sustainable transportation planning for the region. Following the incorporation, the RIP will be adopted into the next version of the MTP, which will be updated every four years to remain compliant with federal regulations and the goal of creating a comprehensive, multimodal transportation system.

2) Ongoing Regional Resilience Planning Efforts

The RIP marks an important milestone but is just one part of an ongoing resilience planning effort in the MPO region. The following initiatives will continue to advance regional resilience:

- **Regional Resilience Planning:** As part of regional planning efforts, assessments will be conducted to identify and address climate-related hazards, including extreme weather events and flooding.Local resilience action plans will guide municipalities in adopting projects to enhance community resilience.
- **Priority Resilience Projects:** Ongoing efforts will prioritize resilience projects through collaborative assessments. Local and regional agencies will continue to evaluate and invest in strategic projects that increase resilience against climate-related challenges, including addressing flood risks and enhancing infrastructure durability.
- **Hazard Mitigation Updates:** Local jurisdictions will continue to update hazard mitigation plans to address emerging climate risks and ensure coordinated action in the face of future climate change impacts, including potential flooding, droughts, and extreme weather events.

Through these efforts, the MPO will continue building upon the Resiliency Improvement Plan, ensuring a comprehensive, cooperative, and adaptive transportation and climate resilience strategy for the future.

Chapter 8: Conclusion

The Amarillo Area MPO's Resilience Improvement Plan (RIP) establishes a comprehensive framework for strengthening the transportation system against climate-related risks and extreme weather events. By integrating resilience into transportation planning, the MPO ensures that infrastructure remains reliable, travel times are consistent, and communities are prepared for potential disruptions.

Key strategies outlined in the plan focus on improving system reliability through proactive infrastructure enhancements, optimizing traffic flow with advanced technology, and incorporating resilience into long-term planning. The MPO also emphasizes sustainable transportation by promoting public transit, cycling, and walking while investing in energy-efficient and environmentally friendly infrastructure.

Mitigation actions tailored to specific climate hazards, such as extreme heat, flooding, high winds, wildfires, and winter storms, provide targeted solutions to protect critical transportation assets. These include early warning systems, climate-adaptive materials, real-time monitoring, and emergency response planning. By aligning these efforts with federal and state resilience initiatives, including the PROTECT program and Texas Statewide Resilience Planning Act, the MPO ensures a coordinated and well-supported approach.

Looking ahead, the MPO will continue to collaborate with regional and state agencies to fund vulnerability studies, enhance transit services, and integrate green infrastructure. The ongoing updates to hazard mitigation plans and regional resilience initiatives will further solidify the region's ability to adapt to evolving climate challenges.

Through these efforts, the Amarillo Area MPO remains committed to fostering a resilient, sustainable, and efficient transportation system that supports the long-term economic and environmental well-being of the region.