

# LOOP 360

## IMPROVEMENT STUDY

SUMMARY REPORT



OCTOBER 2016



## EXECUTIVE SUMMARY

Growing congestion on Loop 360 impacts both local and regional users. Over the last 15 years, TxDOT has proposed two corridorwide solutions. Both proposals languished for lack of public support. TxDOT realized it must more fully engage the public in understanding the challenges involved in seeking suitable solutions. The TxDOT Austin District thus initiated a grassroots process centered around six working groups representing all areas of the highway, a survey with more than 3,600 responses from across the region, and 43 meetings with neighborhood and stakeholder groups.

The goal was to determine a method or methods to maximize safety and mobility in the corridor while maintaining reasonable access and minimizing environmental and aesthetic impacts – all at an acceptable cost and minimum disruption during construction. This was a tall order.

Initial contact with the public revealed many different ideas on how to cure congestion but there were few facts upon which to compare them. Scenarios were then created to demonstrate how a technique would fare, if applied corridorwide. They ranged from relying solely on intersection improvements to a full highway cross-section. Ultimately, the evaluation of each scenario helped define how effective it might be and where and when it would prove useful. Some scenarios proved to be suitable for interim use or as part of a larger, longer term solution, while others proved to be impractical.

As a result of public interaction and technical analysis, the number of scenarios grew from five to nine. Additional scenarios were added to address

corridor constraints and to balance opposing issues like increasing lane capacity while limiting environmental and construction costs. Each scenario was modeled using regional growth data and then evaluated using ten criteria.

As you would expect, each scenario had its own set of advantages and disadvantages. The first of these options was the no-build, or do nothing, option. This option was considered unresponsive to the congestion problem and posed safety, mobility, and environmental concerns that only increased over time. The other two options that did not fit into the interim or ultimate solutions were scenarios 6 and 6.M. These scenarios proposed building an eight-lane highway and adding managed lane options to Loop 360. Although these two options provided the greatest increase in capacity, they did so with significant increases in environmental and construction costs, as well as generated the most disruption to existing traffic during construction.

The remaining scenarios 2-5 – which include the intersection improvements, adding a pair of lanes, grade-separating the existing four-lanes and grade-separating six-lanes options – can all play a role in constructing an effective solution. They all would generally fit within the usable right-of-way and are relatively affordable. They are also inclusive and can be constructed incrementally as funding is available, which means that improvements could potentially start sooner and be implemented quicker.

As 56 percent of those surveyed predicted, the greatest increase in mobility, safety and access comes from removing traffic signals from

the mainlanes. This would involve systematic installation of over/underpasses at all the key intersections (grade-separating) and eventually eliminating any at-grade cross traffic. Left turns and U-turns would be achieved at the over/underpasses. Meanwhile, adequate room would be preserved between the existing lanes to eventually add an additional lane in each direction, which could be either a managed or general purpose lane.

This incremental approach not only accelerates the elimination of traffic signals and at-grade crossings on the mainlanes, but localizes the impact of congestion caused by construction. Once all the major intersections are grade-separated, the corridor would have the capacity to adequately handle the additional demand generated by the flyover connections to US 183 and south MoPac. These flyovers could be connected to the existing general purpose lanes or to an additional pair of lanes, either managed or general purpose. The advantage of adding the pair of lanes would be to better handle traffic attracted by these enhanced connections during peak hours, minimize the decline in the intersections' level of service, and provide the opportunity for improved emergency service and transit.

As this process unfolds, bicycle and pedestrian accommodations could be upgraded, as feasible. Pedestrian crossings would be more convenient and safer using over/underpasses and be designed to connect common destinations like schools and shopping. The wide shoulders for biking along Loop 360 would remain, with attention paid to highway entrance/exit ramp crossing safety.

Following the review and acceptance of this report, TxDOT's Austin District intends to proceed with a conceptual layout of the ultimate roadway from US 183 to US 290/SH 71. During this phase, intersections would be prioritized for grade-separation and processed through environmental clearance. Once environmentally cleared, these intersections would proceed to final design. When funding is available, they would be ready to go out to bid for construction.

This integrated and incremental approach combines practicality, flexibility and opportunity for improving Loop 360. It maximizes the use of existing roadways, requires smaller amounts of funding to accomplish major improvements, and limits the amount of construction at any one time to minimize disruption of existing traffic.

TxDOT is committed to incorporating community values and implementing changes to Loop 360 to address the mobility and safety needs, while also maintaining the aesthetic and environmental appeal of this iconic central Texas roadway.

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## Glossary

**At-grade intersection** – The junction of two or more roads either meeting or crossing at the same level. Most intersections on Loop 360 are at-grade intersections with signals or stop signs.

**Cut-through traffic** – Traffic that utilizes local roads to avoid certain congested intersections or roadway segments. Rather than wait at a signal to be served, some motorists may decide to turn upstream of the bottleneck and utilize local roads to reduce the total delay.

**Express lanes** – Variable priced toll lanes separated from existing non-tolled lanes that provide public transit buses, registered vanpools, and emergency vehicles a reliable, toll-free route to their destination. Additional capacity is available to travelers willing to pay a toll. To provide reliable travel times within the express lanes, variable tolls would manage the number of vehicles entering the lanes at any given time.

**Flyover** – A bridge that facilitates a connection between two roadways where the motorist does not have to go through any at-grade intersections. Many of the connections between US 183 and MoPac involve flyovers. These are sometimes referred to as direct connectors.

**General purpose lanes** – Traffic lanes available for use by the general public without any restrictions or tolls.

**Grade-separated intersection** – The junction of two or more roads where the roads cross each other at different heights, typically utilizing bridges. Grade-separated intersections along Loop 360 include RM 2222 and RM 2244.

**HOT** – High Occupancy Toll lanes are available to high occupancy vehicles and other exempt vehicles, such as emergency vehicles and transit, without charge. Other vehicles are required to pay a toll.

**HOV** – High Occupancy Vehicle lanes are a method of managing usage by restricting use to those vehicles with 2 or more occupants or to vanpools and buses.

**Induced demand** – Additional travel on a roadway that results from implementation of a transportation improvement. It reflects changes in peoples' travel decisions based on improved travel conditions.

**Level of service (LOS)** – Level of service or LOS is a commonly used measure of traffic congestion. It is similar to a school grading system, where A and B represent freeflow traffic conditions, C and D represents tolerable conditions, but increasingly unpredictable levels of traffic with some slow-downs, and E and F represent increasingly worse conditions with breakdowns in the system.

**Limited access** – A roadway with very few or no intersecting cross-streets or driveways. This is often accomplished through the use of grade-separated interchanges.

**Managed lanes** – Lanes that are designed to more efficiently handle traffic by using tolls or other regulations based on the number of occupants per vehicle or time of day.

**Overpass** – A type of grade-separated intersection where the main highway goes over the cross-street. An example of this is at Loop 360 and RM 2222, where Loop 360 goes over the RM 2222 cross-street.

**Underpass** – A type of grade-separated intersection where the main highway goes under the cross-street. An example of this is at I-35 and 11th Street, where I-35 goes under the 11th Street cross-street.

**Variable tolls** – A method of tolling where the price fluctuates based on demand. To ensure the tolled lanes provide a reliable travel time, variable tolls are used to manage the number of vehicles entering the lanes at any given time. When traffic is heavy and demand for the express lanes is high, toll rates increase. When demand is low, toll rates go down.

## FORWARD

Loop 360 is a major transportation corridor for the Capital Area region. It has severe and ever-increasing traffic problems, which causes lack of mobility and growing safety concerns. The Texas Department of Transportation, the primary agency responsible for solving the corridor's congestion and safety issues, recognizes both the public's expectation of TxDOT to fix the problem and the importance of involving stakeholders in efforts to do so.

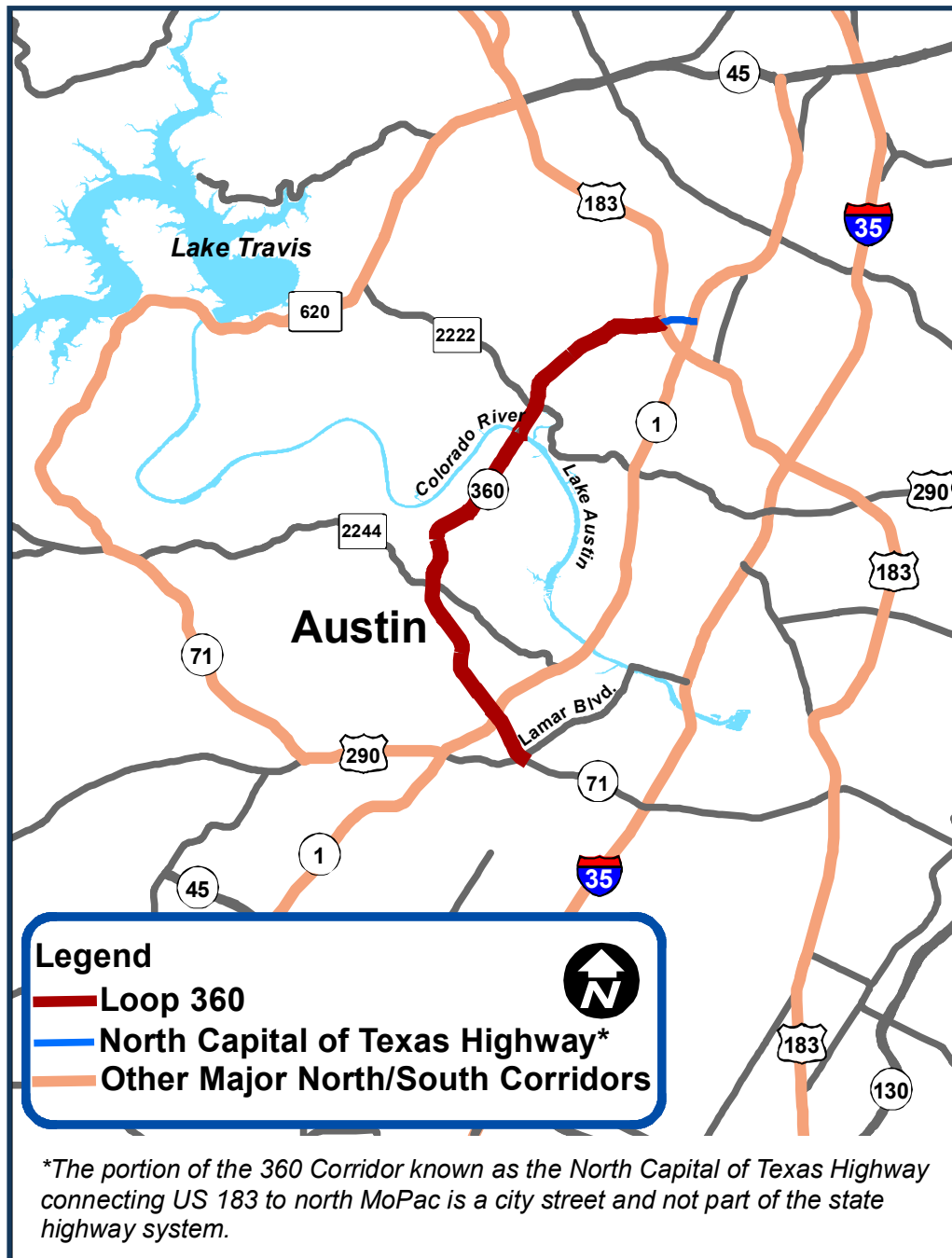
## LOOP 360 BACKGROUND

In 1962, Loop 360 was envisioned as a “west loop” connecting Ben White Boulevard on the southwest side of Austin to Braker Lane on the north end of Austin. The loop was to be completed by taking Braker Lane east to Springdale Road and heading south on US 183 back to Ben White. It has been categorized as both a highway and a major arterial route. The initial section from US 290/SH 71 to RM 2244 was opened in 1970, with the remainder of the road finally opening with the completion of the iconic Pennybacker bridge in December 1982. The end result was described as a four-lane lowered median arterial with at-grade signalized intersections.

The usable right-of-way and the bridge can accommodate six continuous lanes. In 2003, there was a proposal to construct a pair of tolled lanes down the center of Loop 360 with flyovers at US 183 and south MoPac. General opposition to tolling ended that proposal. In 2011, TxDOT proposed a program of innovative intersections to mitigate growing congestion in the corridor. Limited public outreach led to major opposition to these new innovative intersections. Both proposals stalled because of considerable neighborhood opposition. However, in the last few years, ever-increasing traffic congestion has led to a growing demand to do something. Since previous improvement efforts failed because of public opposition, TxDOT embarked on a new comprehensive process focused on public involvement to address the problem and find feasible solutions. The 2014 Loop 360 Improvement Study embodied a four-step process incorporating a wide range of public engagement strategies to help identify and evaluate potential short- and long-term transportation solutions for the corridor.



## Loop 360 Study Area



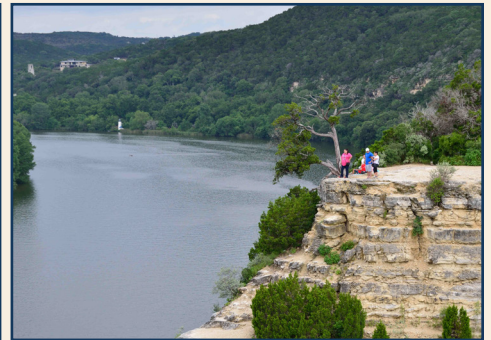
Loop 360 is part of a network of critical roadways in the Capital Area region, often serving as a connecting or alternate route to other highly-congested north/south corridors such as MoPac and US 183.

The current transportation plan for the region, which looks ahead to the year 2040, does not include any improvements for Loop 360. This study is the first step towards identifying proposed short- and long-term improvements for the corridor to address growing traffic concerns, which results in mobility and safety issues.

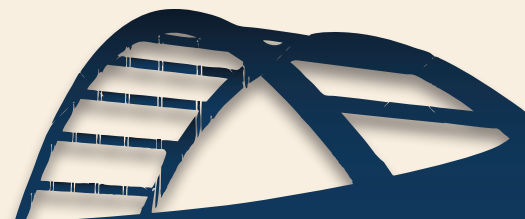
## LOOP 360 SERVES MANY FUNCTIONS

As a component of the network of critical roadways in the Capital Area region, Loop 360 serves as a north/south corridor roughly parallel to MoPac and functions as a connector between US 183 and US 290/SH 71. The 14.5-mile corridor runs from north MoPac to US 290/SH 71 and serves the dual function of highway and thoroughfare by providing primary access to far west Austin and to residents and commuters who live and work near and along the highway.

In addition to serving residents and commuters, Loop 360 also provides access to businesses located along the route, as well as other citizens such as bicyclists, photographers, geologists, hikers, and Lake Austin boating enthusiasts. The natural beauty and unique Hill Country environmental features along Loop 360 draw regional, national and even international visitors to the area. The Pennybacker bridge located at the roadway's crossing of the Colorado River serves as an iconic symbol of central Texas. The scenic overlook at the bridge is very popular, but has some significant safety concerns. Opportunities to improve safety, while maintaining this popular attraction, would be investigated as part of the project development process.



In the last several years, traffic congestion has gone from being an annoyance to being a quality of life issue. In 2016, three sections of the highway landed on the Texas A&M Transportation Institute's (TTI) top 100 "Most Congested Roadways" list. The corridor is particularly congested during rush hour, taking approximately 70 percent longer to travel during peak travel periods than during normal, free-flow conditions.





## A NEW APPROACH

As noted, previous efforts to improve Loop 360, including a 2003 proposal to add tolled grade-separated lanes and a 2011 proposal to implement innovative intersections, were not well-received by the community. While TxDOT's overall goal was to improve travel conditions along Loop 360, the community was not brought into the planning process; therefore, members of the public did not understand how the determination was made to use a particular improvement method, nor did the public embrace or support the results of the planned improvement. So, although some intersection improvements resulted from these efforts, most of the transportation issues remain largely unaddressed and continue to deteriorate. TxDOT initiated the current improvement study as a fresh start to address the ongoing transportation issues along and across Loop 360. Lessons learned from previous efforts led to a different approach to actively engage the public throughout the planning process. The study is not a continuation of previous efforts, but a new community-driven effort to identify and address problems in both the short- and long-term.

The Loop 360 Improvement Study team took a grassroots approach by working closely with stakeholder groups and individuals throughout the community. The outreach effort focused on engaging a wide variety of stakeholders, including those who live or own property along the corridor or have a specific interest in it, as well as those who simply use the corridor to travel to and from their destinations.

Stakeholder outreach and engagement strategies included working groups, small group meetings, an online public survey, electronic newsletters, informational kiosks, postcards, newspaper advertisements, social media posts, fact sheets, a website offering updated study information and opportunities to comment, and personal phone calls and emails.

Initial stakeholders were identified based on their participation in past study efforts, demonstrated interest in unique corridor issues, and/or their location within six distinct sections of the corridor defined by major intersections or geographic features.

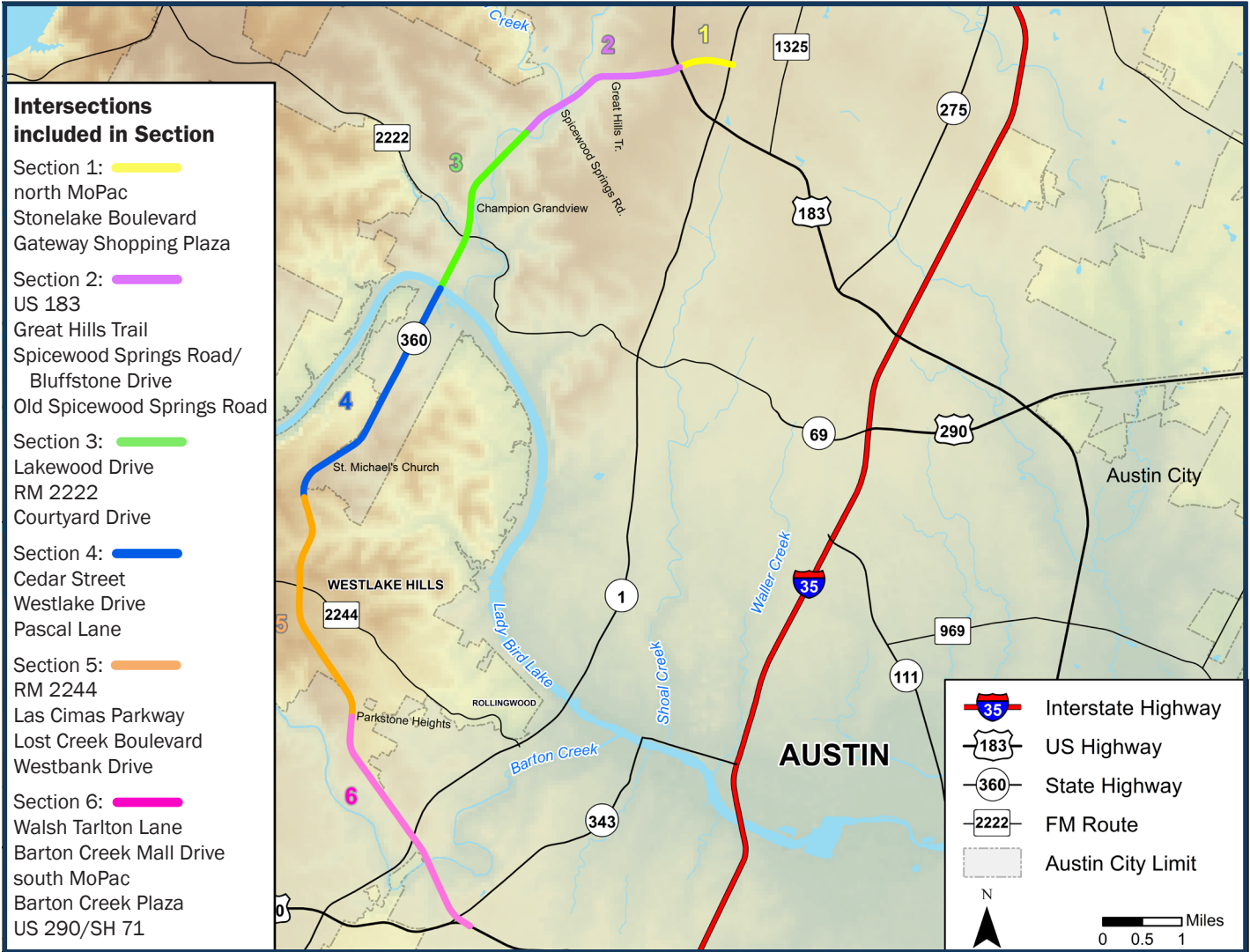
These stakeholders included adjacent property owners, leaders of neighborhood and civic organizations, school administrators, emergency response staff, and business owners along the corridor, as well as representatives from local bicycle and environmental organizations.

Approximately 80 stakeholders were invited to represent their respective organizations on one of six section working groups corresponding with the six distinct corridor sections. Environmental and bicycle representatives were invited to participate in issue-specific group meetings to address their unique concerns, while all other stakeholders were encouraged to request small group meetings or submit questions and comments on the study.

Additional stakeholders were identified and engaged as study information was distributed through newspaper advertisements, electronic notifications, online participation opportunities, and word-of-mouth. The online survey tool was particularly useful in helping the study team reach a broad range of stakeholders, as demonstrated by responses received from 85 unique zip codes.

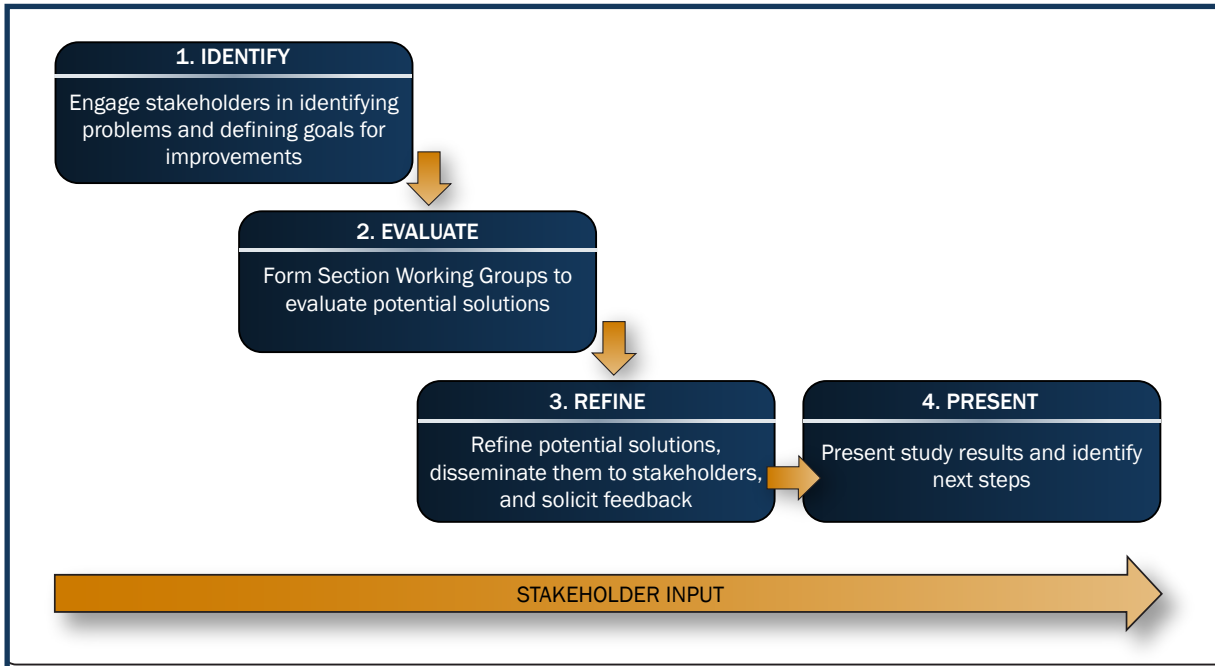
To date, TxDOT has held 11 section working group meetings and 43 stakeholder meetings, and has received more than 3,600 survey responses and 2,085 comments. The input gathered through these efforts has been incorporated into each phase of the study, including the identification of problems and potential solutions, as well as the evaluation, refinement and presentation of solutions.

# Loop 360 Sections

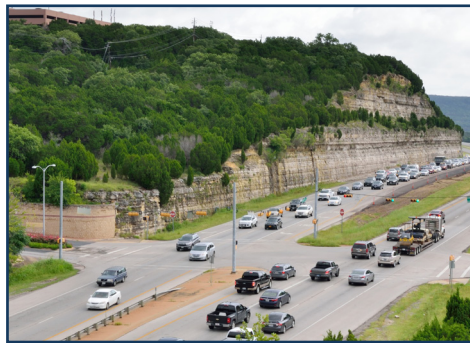


## LOOP 360 IMPROVEMENT STUDY PROCESS

Through this process, TxDOT heard from corridor neighborhoods, businesses, commuters, emergency responders, school administrators, bicyclists, environmental advocates, and other stakeholders with an interest in the future of Loop 360.

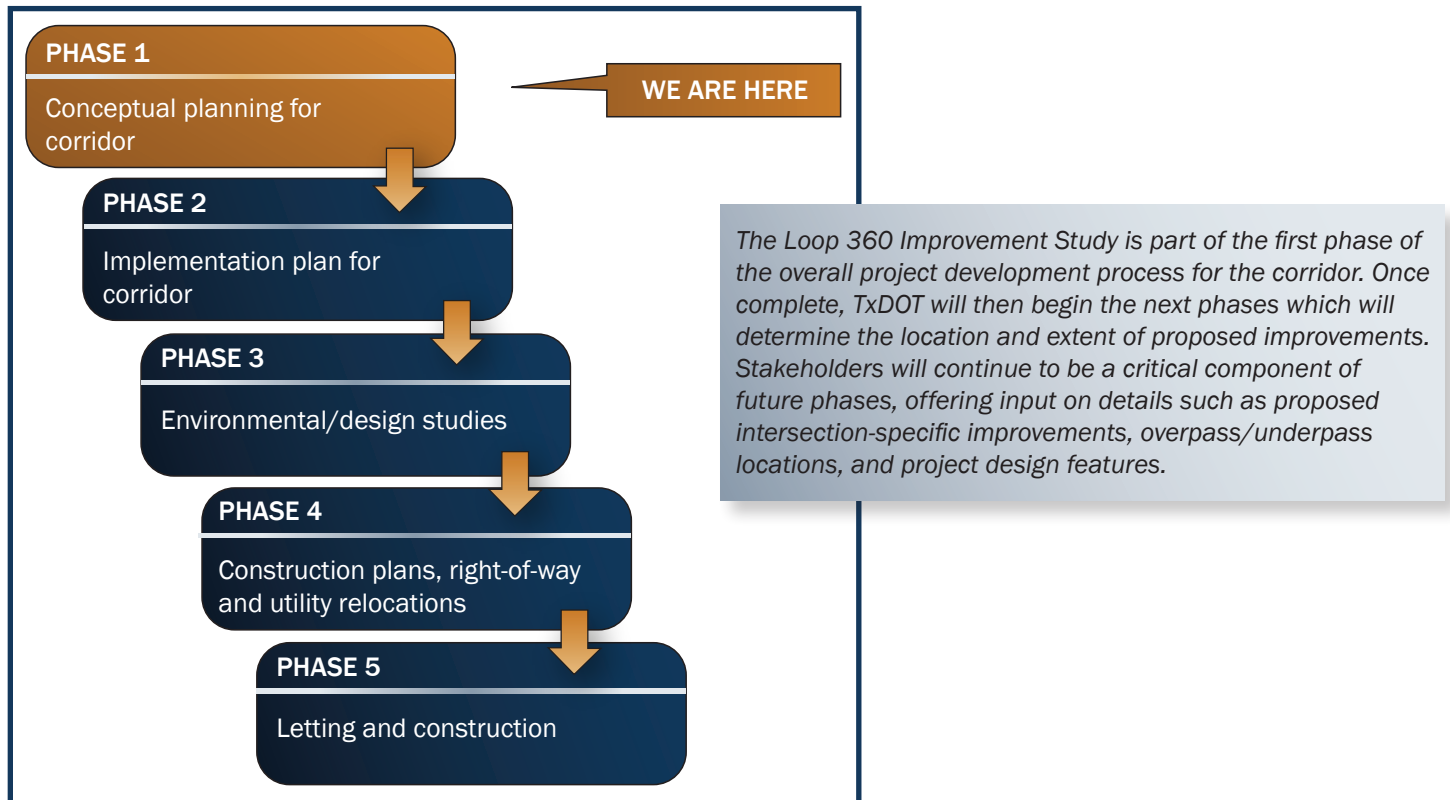


This study report reflects the results of public input received to date, as well as the technical analysis of possible improvement options – also known as scenarios – for the corridor. The study intends to show how the various improvement scenarios could impact mobility, safety, environmental resources, aesthetics, and other corridor characteristics. This will help TxDOT and stakeholders understand the trade-offs and compromises necessary to balance the wide range of needs along the corridor, concluding with a recommendation of improvements to be carried forward for more detailed study in the future.



*Not only does the scenic Loop 360 highway offer commuter, neighborhood and business connections, it also serves as a popular bicycle route and provides access to a major Lake Austin boat ramp and Travis County greenbelts. The Loop 360 Improvement Study will help TxDOT and stakeholders understand what the trade-offs are and what compromises can be made to balance the wide range of needs along the corridor.*

## TYPICAL TXDOT PROJECT DEVELOPMENT PROCESS



This report presents the scenarios studied and summarizes the key results. It does not present a detailed analysis or recommendation of specific proposed improvements or design features associated with each scenario. It is instead intended to present a high-level comparison of how various improvement scenarios could impact mobility, safety, environmental resources, aesthetics, and other corridor characteristics, and recommend proposed short- and long-term improvements to be carried forward for future, more detailed study.

The future traffic analysis for all the scenarios is conducted based on traffic forecasts developed using the 2040 Capital Area Metropolitan Planning Organization's (CAMPO) travel demand model. Although the model forecasts anticipated traffic demand based on parameters such as projected population, households and employment growth throughout the region, planned and approved improvements to the roadway network, transit and mode choice data, it should be noted that these forecasts are merely estimates since modeling for 25 years in the future has its limits. The CAMPO model is capable of providing peak hour specific traffic projections for morning, midday, afternoon peak hours, but it does not take into account the variability of traffic demand over the year. Also, it does not account for any dynamic shift of traffic demand due to traffic incidents, severe congestion, etc.

The Loop 360 Improvement Study Report will help TxDOT and stakeholders understand the trade-offs and compromises necessary to balance the wide range of needs along the corridor. The study results will determine which improvements are carried forward to the next phase of project development.

## CORRIDOR CHALLENGES AND OPPORTUNITIES

As previously mentioned, the first step in the Loop 360 Improvement Study was to “identify problems and define goals for improvements.” Part of this process involved looking at existing conditions and noting any challenges and opportunities that they present.

The study team identified existing conditions through both technical data analysis and public involvement activities. Technical data included, but was not limited to, real-time traffic counts gathered for the study in December 2014, TxDOT’s 2012-2014 crash data, structural characteristics of the Pennybacker bridge, environmental constraints mapping, and other information such as traffic data from TTI. Public input gathered through the online public survey, section working group meetings, stakeholder meetings, and public comment submissions helped supplement this data, providing additional details on specific issues and problems along the corridor.

Based on the analysis of existing technical data and public input received to date, the following are key challenges and opportunities for the corridor:

### Challenges

- A considerable portion of the corridor’s intersections and mainlanes are already failing.
- The 26 existing at-grade intersections have safety challenges due to multiple conflict points/increasing traffic congestion.
- There are no Loop 360 improvements currently in the 2040 CAMPO Plan and no construction funding has been identified.
- Trade-offs are needed to address local mobility vs. regional mobility needs.
- Loop 360 ultimate capacity is limited by adjoining highway capacities.
- Trade-offs are needed to address mobility/safety needs while preserving the natural beauty and environmental resources along the corridor.
- Bicyclists/pedestrians do not have a consistent, safe way to travel along the corridor.
- Little opportunity exists for viable transit options and other alternative transportation modes along the corridor, outside of adding managed lane capacity.
- Emergency responders have few options to bypass congested areas, increasing critical response time, outside of adding managed lane capacity.

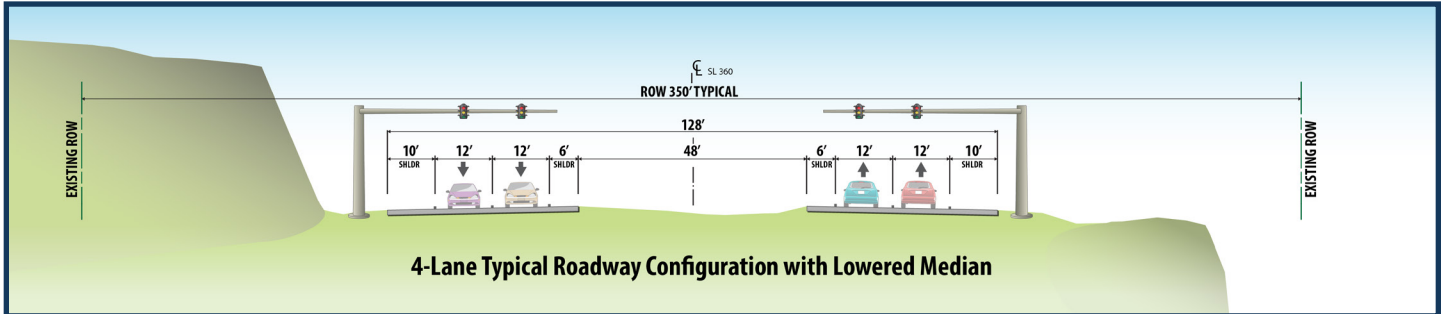
### Opportunities

- With no predetermined improvements to be made, the corridor can be tailored to match what is most needed and desired.
- Short-term improvements can be made to provide some immediate congestion relief while progressing towards a long-term vision.
- If needed, the Pennybacker bridge can likely carry at least two additional lanes of traffic.
- TxDOT owns a considerable amount of right-of-way along the corridor, providing flexibility in implementation options.
- Opportunities exist to improve drainage, access to parks and greenbelts, bicycle facilities, and other “accessory” corridor features.

## EXISTING ROADWAY CONDITIONS

The following pages highlight key existing characteristics of the corridor, focusing on existing traffic conditions and environmental features.

### Existing Typical Roadway Configuration



The right-of-way along Loop 360 is approximately 350-feet wide in most sections, with a 48-foot wide center median and a considerable amount of undeveloped space on either side of the existing mainlanes. The Hill Country cliffs encroach on the right-of-way in many locations, such as the area just north of the Pennybacker bridge. These geological features factor significantly into the potential cost, feasibility, and environmental impacts of several improvement options considered in this study.

### Existing Corridor Mobility

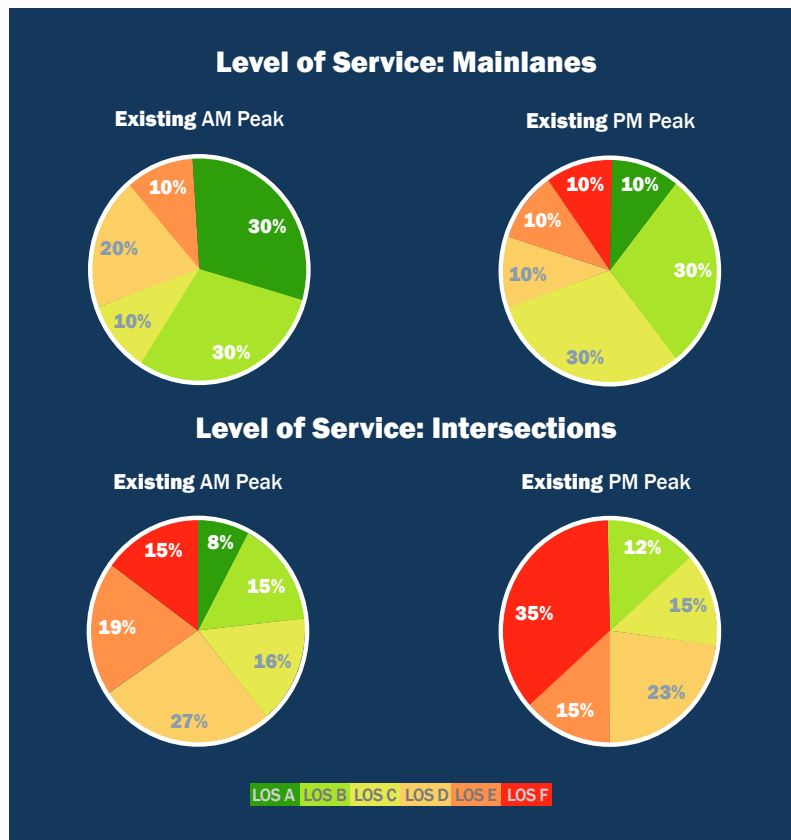
Loop 360 currently holds the undesirable distinction of having three sections listed on TTI's Most Congested Roadways list. In 2016, the section from RM 2244 to US 290/SH 71 ranks #50, the section from US 183 to RM 2222 ranks #58, and the section from RM 2222 to RM 2244 ranks #93. Traffic conditions along the corridor vary a great deal throughout the day, with congestion increasing significantly during peak travel periods, such as morning and afternoon rush hours.

The same three sections of Loop 360 from US 183 to RM 2222, RM 2222 to RM 2244, and from RM 2244 to US 290/SH 71 currently rank #16, #18, and #35, respectively, for their Texas Congestion Index (TCI) ratings in 2016. The TCI is a measure that describes how much longer a trip takes during peak periods vs. off-peak (or free-flow) traffic periods. Currently, it takes approximately 70 percent longer to travel on Loop 360 during peak periods than during free-flow conditions.

Definition of Intersection LOS		
Level of Service	Traffic Signals Delay (Sec/Veh)	Description
A	≤10	Free Flow
B	>10 - 20	Stable Flow (slight delays)
C	>20 - 35	Stable flow (acceptable delays)
D	>35 - 55	Approaching unstable flow (tolerable delay)
E	>55 - 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Level of Service (LOS) is a commonly used measure of traffic congestion. It is similar to a school grading system. Traffic signal delay is the additional time experienced by a driver either stopped or slowed at a traffic signal as compared to a free-flow condition.

Traffic counts were conducted by the Loop 360 Improvement Study team in December 2014. During the morning rush hour, nine of the corridor’s 26 signalized intersections were “failing,” meaning that they were experiencing LOS E or F operating conditions. Average times to travel the entire corridor between north MoPac and US 290/SH 71 ranged from 27 to 31 minutes; with an average travel speed of 32 to 33 mph. Southbound Loop 360 witnessed the worst morning peak period, taking approximately 41 minutes to travel at an average of 21 mph.

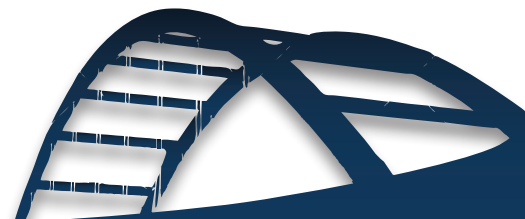
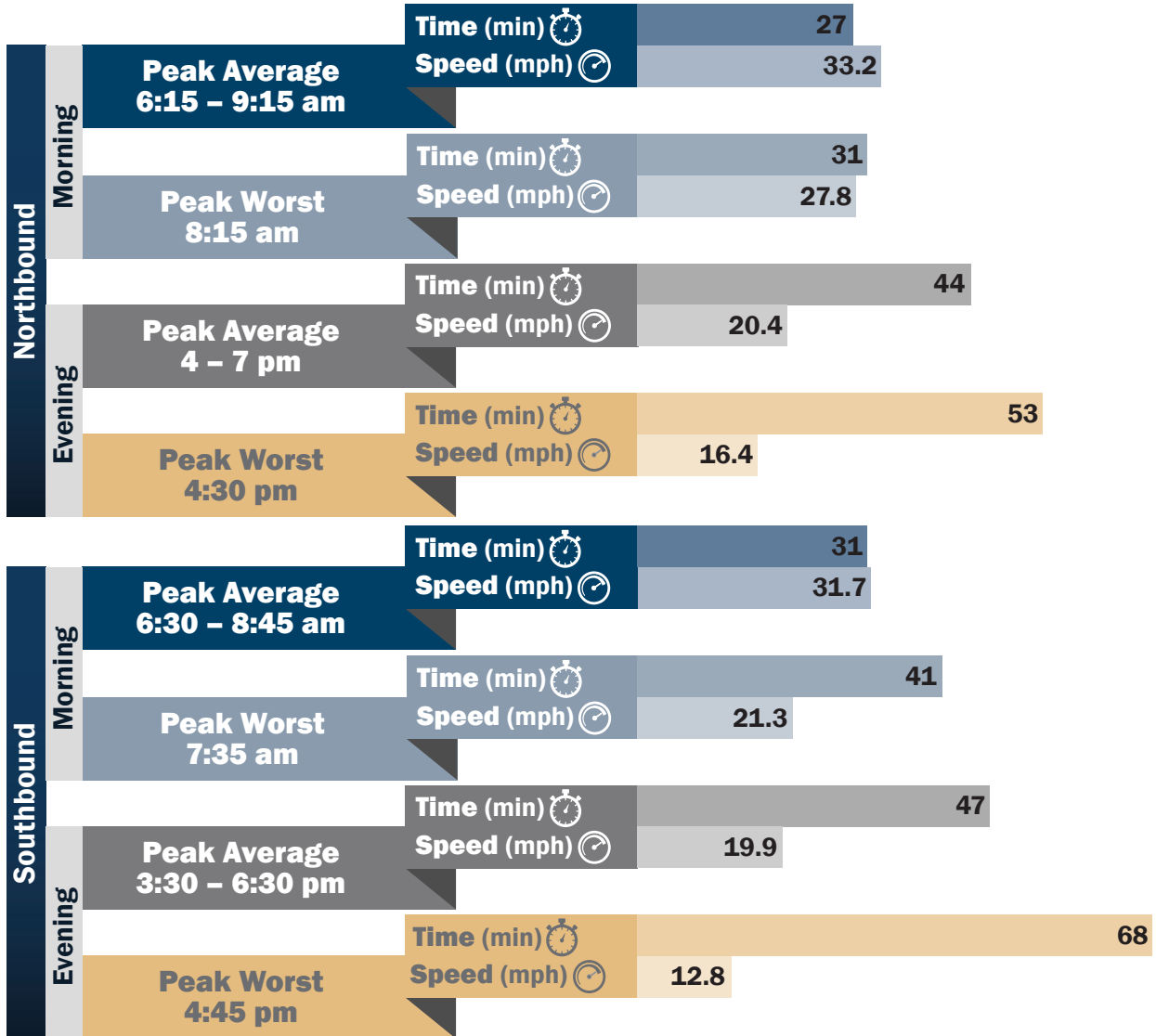


Thirteen intersections were failing during the afternoon rush hour. Average times to travel the entire corridor ranged from 44 to 47 minutes at an average speed of 20 mph. The worst peak period occurred in the afternoon from 4:30-4:45 p.m., with northbound trips taking up to 53 minutes at 16 mph, and southbound trips taking almost 68 minutes at speeds as low as 13 mph.

LOS along the corridor, as identified through traffic counts conducted for the study, confirm there are significant congestion issues during peak periods. As shown in the Level of Service Mainlanes/ Intersections and the Existing Travel Time graphs, while mainlane traffic flow between the major intersecting roadways (north MoPac, US 183, RM 2222, RM 2244, south MoPac and US 290/SH 71) is generally acceptable during these periods, with the exception of the northernmost section of the corridor, the LOS at individual intersections is significantly lower.

These mobility issues present significant challenges to drivers who are making both local trips and longer “through” trips along the corridor. They also present hurdles for emergency responders to reach their destinations quickly and discourage the development of any transit since emergency vehicles, buses, and vanpools are stuck in the same congested lanes as single-occupant vehicles.

# Existing Travel Times





## Existing Corridor Safety

Corridor safety is an ongoing issue for both automobiles and bicyclists along Loop 360. The 26 at-grade intersections present the biggest challenge, introducing multiple conflict points that can result in collisions. Growing traffic congestion at the intersections exacerbates the problem, resulting in long turning-lane queues that back up into the mainlanes tempting drivers to run red lights, use shoulders and neighborhood streets to bypass vehicles at intersections (creating a significant safety issue for bicyclists and neighborhood residents), and drivers easily becoming distracted by cell phones or other devices while they sit in traffic.

A crash analysis of Loop 360 from US 183 to US 290/SH 71 revealed several important findings on corridor safety. The analysis was based on TxDOT data for 2012-2014. Data was not available for the northern-most section of the corridor from north MoPac to US 183, since this section is not part of the state highway system.

- Approximately 81 percent of the crashes were due to unsafe driving behaviors, such as distracted/inattentive driving, speeding, failing to obey traffic controls, failing to yield, following too closely, using lanes improperly, and making unsafe lane changes.
- There were 942 total crashes in the corridor from 2012-2014. The overall crash rate was higher than the statewide average for urban highways, which are defined as roadways in areas with a population of 5,000 or more and that connect cities/towns.
- The southern-most section of Loop 360 from Parkstone Heights Drive to US 290/SH 71 had a crash rate that was 1.5 times higher than the statewide average. This corresponds with much higher traffic volumes in this section compared to other sections of the corridor.
- The majority of crashes (66 percent) were rear-end collisions, which is slightly higher than the typical range of 50-60 percent.
- The majority of crashes (53 percent) did not result in injuries, though there were two fatalities, 30 incapacitating injuries, and 206 non-incapacitating injuries during the three-year data collection period.
- There were 15 crashes involving bicycle/pedestrians, making up less than 2 percent of the total crashes, but did include one of the two fatalities.



*Critical issues involving congestion and crash rates along the roadway highlight the overwhelming need for TxDOT to identify solutions for the corridor, especially reducing points of conflict which could be accomplished with grade-separations.*

## SCENARIO DESCRIPTIONS

There are varying ideas on how best to solve Loop 360's congestion problems. They include a broad array of potential solutions from intersection improvements to a full highway cross-section. The decision was made to study all of the different scenario options to see how each one would perform if they were implemented along the corridor. Each solution was analyzed in order to understand how, when and where the different techniques might work.

The first scenario considered in this study looked at potential outcomes if no significant improvements to Loop 360 were made in the next 25 years. The remaining eight scenarios looked at what could happen if different sets of improvements along the corridor were implemented. These are known as Build (Do Something) scenarios. Steps 2 and 3 of the study process (see Page 6) focused on the identification, evaluation, and refinement of these scenarios, incorporating public input throughout.

Since highway corridors don't exist in a vacuum, the influence of adjacent major highways must be taken into account. When modeling Loop 360 as part of the 2040 highway network, certain major restrictions come into play. First, even after the addition of Express Lanes to north MoPac, the proposed addition of Express Lanes to south MoPac, and the addition of Express Lanes and general purpose lanes to US 183, capacity in these adjoining highways is very limited. For Loop 360, this means that there are limitations as to how much traffic can be off-loaded to these connecting highways, even with flyovers. Thus, Scenarios 1-4 contained no flyovers or intersection improvements to the connecting highways; otherwise, whatever improvements that were made within the corridor would have been diminished by additional traffic attracted to the corridor.

The following pages provide an overview of each scenario, while the next section of the report compares the results of all scenarios based on the study's evaluation criteria.

### Scenario 1 - No-Build (Do Nothing)

This scenario serves as a baseline for comparison for the other scenarios. It assumes that only the improvements that are already in the CAMPO 2040 plan are constructed. For Loop 360, there are no significant improvements currently planned in the next 25 years.

### Scenario 2 - Intersection Improvements

This scenario assumes major intersections throughout the corridor would be “optimized” to handle as much traffic as possible. It includes signal timing, turn lanes, intersection design changes, and other improvements that the transportation model shows to be most effective at each intersection.



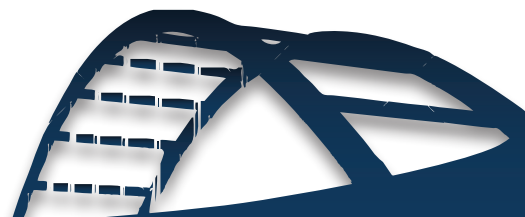
This scenario does not take into account potential public support for or opposition to the improvements. Such feedback would be gathered through discussions with local neighborhoods and other public input opportunities during the next phase of project development. Based on this public feedback, changes to the specific types of improvements that are recommended at each intersection could be made, potentially reducing the effectiveness of this scenario.

### Scenario 3 - Add Two Lanes, Keep Existing Traffic Signals

This scenario maintains the existing at-grade signalized intersections and adds one lane in each direction. (“At-grade” improvements are those where Loop 360 and the cross-streets are at the same level, thus requiring a traffic signal to control the flow and turning movements.) This scenario also includes all intersection improvements evaluated in Scenario 2.



*Some portions of Loop 360, such as the southbound section between south MoPac and US 290/SH 71, already have three lanes in each direction. Scenario 3 would add one additional lane in each direction to the remaining portions of the corridor.*



## Scenario 4 - Grade-Separate Existing Four Lanes

This scenario removes the traffic signals from the Loop 360 mainlanes between US 183 and south MoPac. Major intersecting streets would be accessible via ramps to/from the mainlanes, grade-separated by building overpasses and/or underpasses.<sup>1</sup> Access modifications would be made at minor intersections to improve safety and reduce wait times to access Loop 360 where overpasses/underpasses are not feasible or cost-effective.



Loop 360 currently has two grade-separated intersections at RM 2222 (shown in aerial view, left) and at RM 2244. These overpasses minimize conflicts between the heavy eastbound/westbound traffic on these cross-streets and the northbound/southbound traffic on Loop 360. An example of an underpass is at I-35 and 11th Street (shown in street view, right), where the I-35 mainlanes go underneath the 11th Street cross-street bridge. Scenario 4 would add overpasses and/or underpasses at other major intersections between US 183 and US 290/SH 71, and would modify access at minor intersections to improve traffic flow and minimize conflicts throughout the corridor.

Existing signalized connections at US 183 and south MoPac, as well as the signals along the city street portion known as the “Capital of Texas Highway” from US 183 to north MoPac, would remain as they are today. These signals are necessary in Scenario 4 to help control the flow of traffic entering and exiting the Loop 360 corridor.

### Scenario 4.C - Grade-Separate Existing Four Lanes, Add Flyovers and Improved Connections

This scenario includes all improvements outlined in Scenario 4 and would also improve connections and add flyovers from Loop 360 to US 183 and south MoPac.

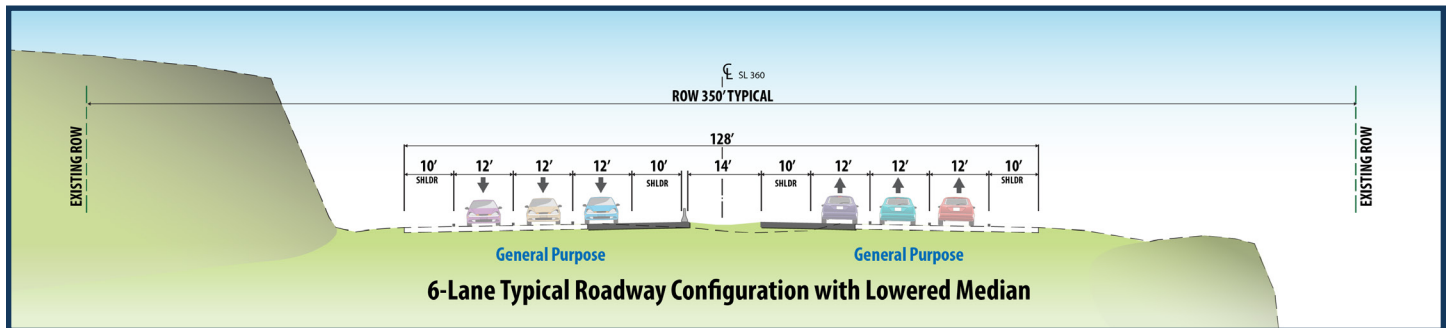
In Scenario 4, the congestion at US 183 and south MoPac controls the flow of traffic entering and exiting the Loop 360 corridor. Scenario 4.C is primarily intended to show the anticipated mobility impacts of alleviating some of the traffic bottlenecks at US 183 and south MoPac.

<sup>1</sup>For purposes of analysis, “major” intersections were identified as the “worst” intersections along the corridor (for modeling purposes only) based on existing and projected traffic conditions. Additional intersections may be considered for overpasses/underpasses in future, more detailed environmental and design studies. Any such additions would increase the overall project costs, but would not significantly impact travel times and levels of service within the corridor.

## Scenario 5 - Grade-Separate Existing Four Lanes, Add Two General Purpose Lanes, Add Flyovers and Improved Connections

This scenario includes all improvements outlined in Scenario 4, improve connections, and add flyovers to connect Loop 360 to US 183 and south MoPac.

This scenario also adds one grade-separated, general purpose lane in each direction.



Scenario 5 would not only grade-separate the mainlanes of Loop 360 from the intersecting cross-streets, but would also add an additional travel lane in each direction. Additionally, it would include flyovers and improved connections.

## Scenario 5.M - Grade-Separate Existing Four Lanes, Add Two Managed (Tolled/HOV/Transit) Lanes, Add Flyovers and Improved Connections

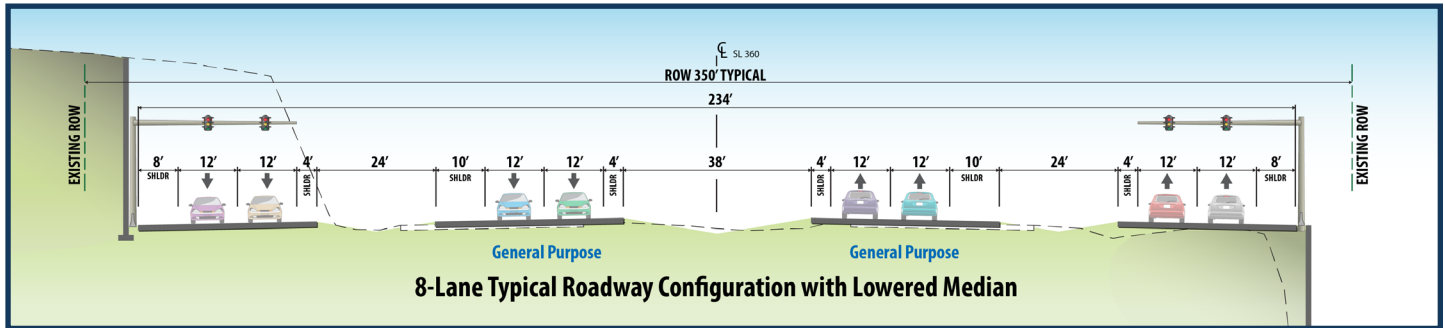
This scenario includes all improvements outlined in Scenario 4 and adds one grade-separated, managed lane in each direction. Because these additional lanes would be managed, they would have restricted access from the existing general purpose lanes. Managing the lanes would also provide the additional benefit of improving emergency vehicle access and transit viability. This scenario would also improve connections and add flyovers to connect Loop 360 to US 183 and south MoPac.



Scenario 5.M would look much like Scenario 5, though the two additional lanes would be managed. This would look similar to the new lanes that are currently being constructed on MoPac (left). Managing the lanes would allow more viable transit opportunities and quicker emergency access, as well as connect to the Express Lanes on US 183 and to the proposed Express Lanes on south MoPac.

## Scenario 6 - Maintain Existing Four Lanes, Add Four General Purpose Lanes, Add Flyovers and Improved Connections

This scenario maintains the four existing at-grade general purpose signalized lanes. These lanes would serve as local access lanes for neighborhoods, businesses, schools, etc., along the corridor. This scenario also adds two grade-separated, general purpose lanes in each direction to serve as through-lanes for longer trips, and includes improved connections and additional flyovers to connect Loop 360 to US 183 and south MoPac.



Scenario 6 would look much like other major highways in the Capital Area region, with grade-separated mainlanes for longer “through” trips, and at-grade frontage roads to provide local access to neighborhoods, businesses, schools, and other destinations along the corridor.

## Scenario 6.M - Maintain Existing Four Lanes, Add Four Managed (Tolled/HOV/Transit) Lanes, Add Flyovers and Improved Connections

This scenario maintains the four existing at-grade general purpose signalized lanes to serve as local access lanes for neighborhoods, businesses, schools, etc., along the corridor. It also adds two grade-separated, limited-access managed lanes in each direction to serve as through-lanes for longer trips. Managing the lanes would also provide the additional benefit of improving emergency vehicle access and transit viability. This scenario would also improve connections and add flyovers to connect Loop 360 to US 183 and south MoPac.



Scenario 6.M would look much like Scenario 6, though the four additional lanes would be managed to control their traffic flow. The existing general purpose lanes would serve as frontage roads. This is a similar configuration to tolled projects in the region, such as SH 130 (above) and the 290 toll road.











## SCENARIO EVALUATION LISTED BY CRITERIA

Next, the study looked into the future to predict potential outcomes if we implemented each of the scenarios. The Loop 360 Improvement Study team, with input from the public, identified and analyzed the nine unique scenarios representing a broad range of improvement options for the corridor.

Each scenario was defined by a certain set of assumptions such as forecasted 2040 regional traffic volumes, population and employment growth, and specific proposed improvements to be made. These assumptions along with the CAMPO 2040 traffic model served as inputs to predict future traffic patterns for each scenario. The modeling results were then compiled with other assumptions for each scenario such as right-of-way requirements, physical features, and estimated costs to help evaluate how each scenario would impact key corridor characteristics.

The nine Loop 360 Improvement Study scenarios were evaluated using the following criteria. Evaluation results presented in this report help compare and contrast proposed corridor improvements.

### Loop 360 Improvement Study — Scenario Evaluation Criteria

 <p><b>Safety:</b> How effectively could each scenario address safety issues for cars, bicycles and pedestrians?</p>	 <p><b>Potential Aesthetics/Visual Impacts:</b> How could each scenario impact the visual characteristics of the surrounding area, including the Pennybacker bridge?</p>
 <p><b>Regional Mobility:</b> How could each scenario improve travel to/from locations outside the corridor or on congested connecting or “cut-through” roadways?</p>	 <p><b>Potential Environmental Impacts:</b> How could each scenario impact environmental features along the corridor such as water resources, wildlife habitats, parks and greenbelts, rights-of-way, etc.?</p>
 <p><b>Corridor Mobility:</b> How could each scenario improve travel within the corridor?</p>	 <p><b>Longevity:</b> How far into the future would each scenario effectively handle mobility needs along the corridor?</p>
 <p><b>Cost:</b> How much funding would be needed to implement each scenario?</p>	 <p><b>Transit/Emergency Access:</b> How well would each scenario accommodate public transit options and handle emergency vehicle access?</p>
 <p><b>Constructability:</b> How easily could each scenario be constructed? How much disruption of existing traffic/neighborhoods?</p>	 <p><b>Implementation Time:</b> How long would it take to complete construction of each scenario, including environmental approvals and necessary funding?</p>

These criteria were identified and refined over the course of the study. See Page 4 to see how public input influenced the scenario evaluation process.

## SCENARIO ANALYSIS RESULTS SUMMARY



### Safety

- At-grade scenarios are the least safe option for both automobile drivers and bicyclists due to multiple conflict points at intersections.
- Grade-separated scenarios are safer than at-grade scenarios because they separate turning or cross-traffic from through traffic; however, because of the addition of entrance/exit ramps on Loop 360, they pose a risk to bicyclists using the mainlane shoulders.
- Grade-separation with controlled access scenarios are safer than grade-separation only scenarios.

The adjacent graphic compares the relative level of safety projected for each scenario.

Findings specific to safety for the Loop 360 Improvement Study include:

- Scenarios 1, 2, and 3 are the least safe options because they do not remove any of the at-grade intersections. As traffic increases, safety along the corridor would deteriorate under these scenarios.
- Safety would be improved with scenarios 4, 4.C, 5, and 5.M because many of the existing at-grade intersections would be converted to grade-separated intersections.
- Scenarios 6 and 6.M would likely provide the safest roadway because the intersections would be grade-separated and access would be controlled.



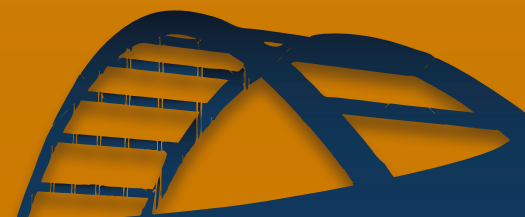
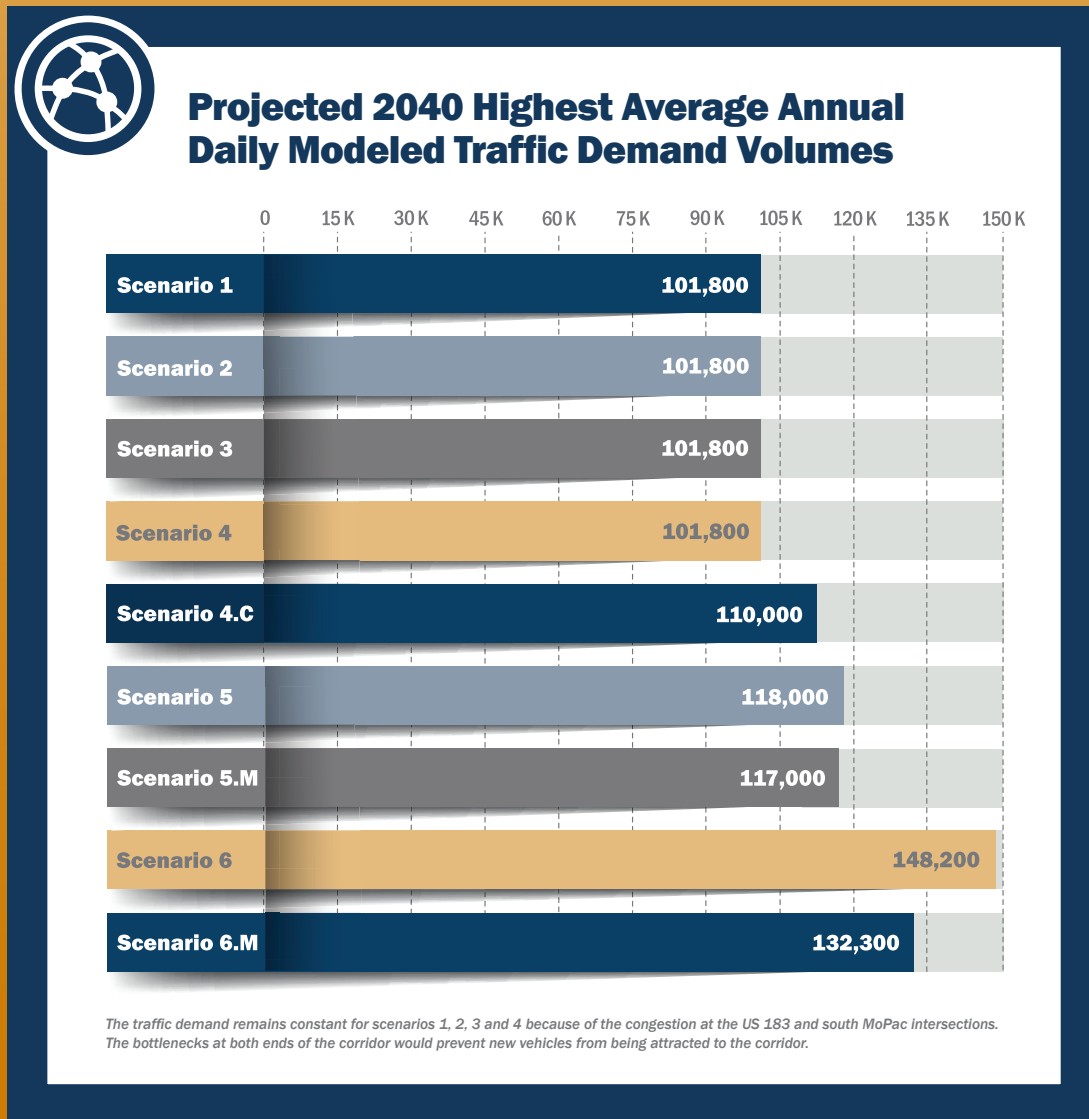
Specific safety features for vehicle, bicycle, and pedestrian travel along the corridor would be evaluated in much more detail as specific improvements are carried forward for further study and eventual design. For each scenario, careful consideration would need to be given to the safest, most effective methods for accommodating bicyclists. The most dangerous situations for bicyclists are those where they must interact with or cross vehicular traffic. On Loop 360, these situations occur at ramps and at-grade intersections. Additionally, previous coordination with the bicycle community has revealed concerns with Diverging Diamond Intersections (DDI). Should these be implemented at RM 2222 and RM 2244, bicycle safety would need to be carefully considered during the design process.



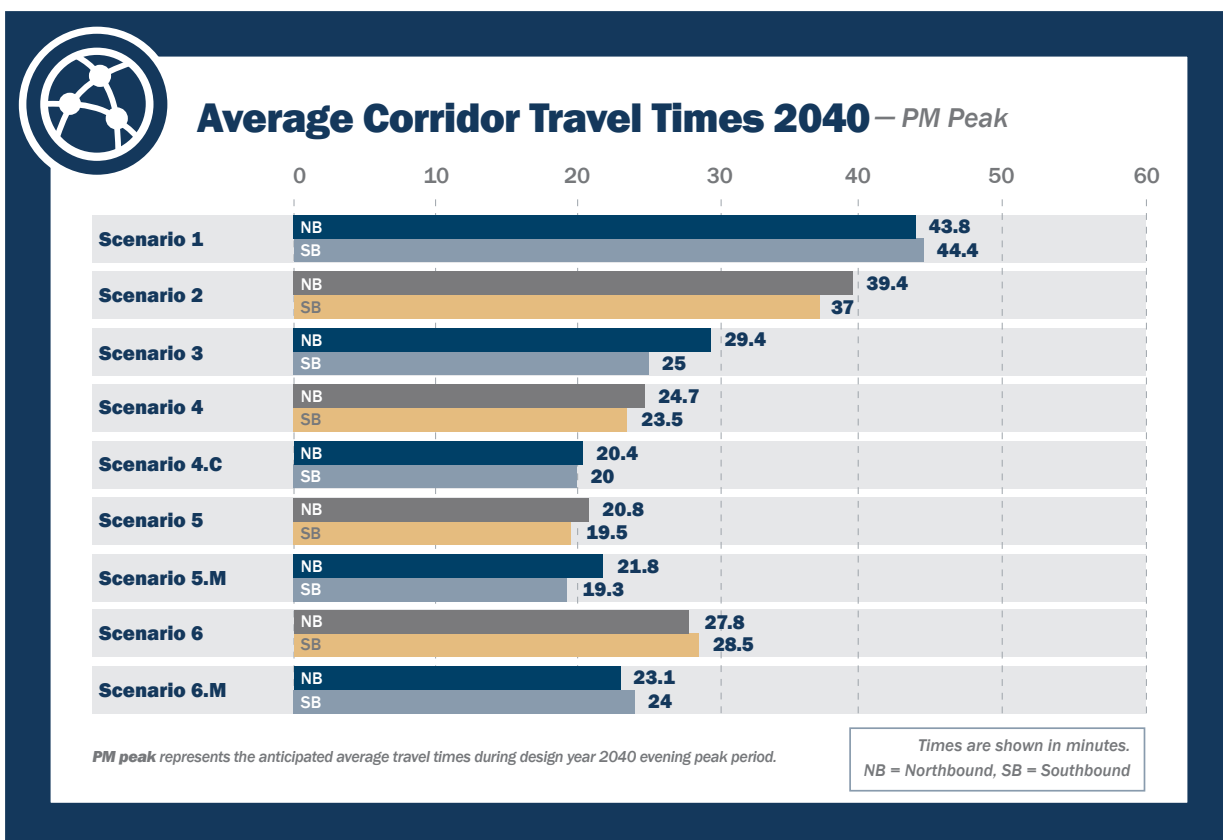
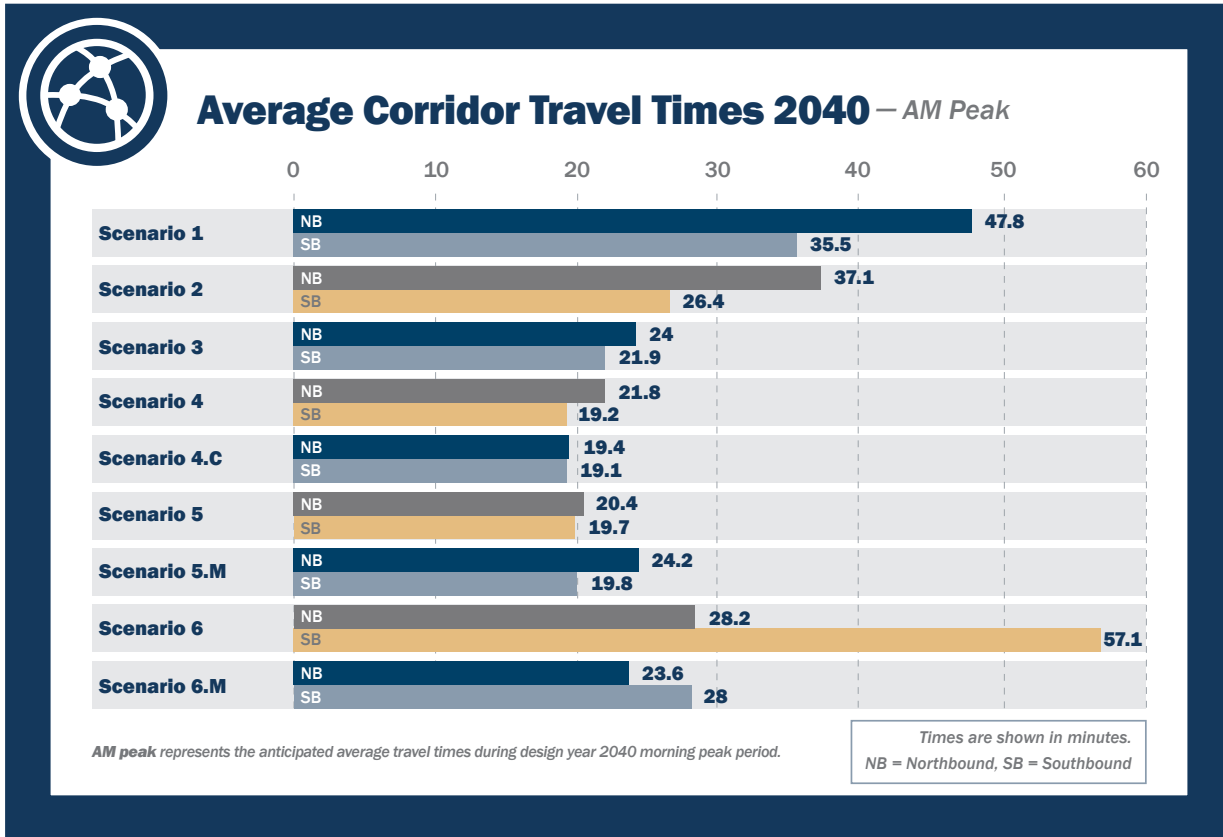


## Regional Mobility

Regional mobility was evaluated based on the overall traffic volumes that the corridor can carry at an acceptable LOS, as well as corridorwide travel times and speeds. The graphic below compares the highest annual average daily traffic (AADT) volumes projected for each scenario. (It is important to note that this is a model predicting the future traffic patterns.) AADT is the total volume of traffic on the road in a year divided by 365. It averages out the cycles of peaks and lulls accounting for day of the week, seasonal variations, and/or vehicle classification.

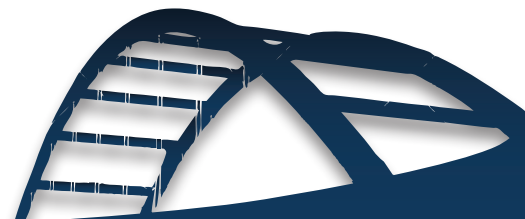


Projected 2040 peak hour average travel times are shown for comparison below.



The following are key findings from the analysis of potential regional mobility impacts:

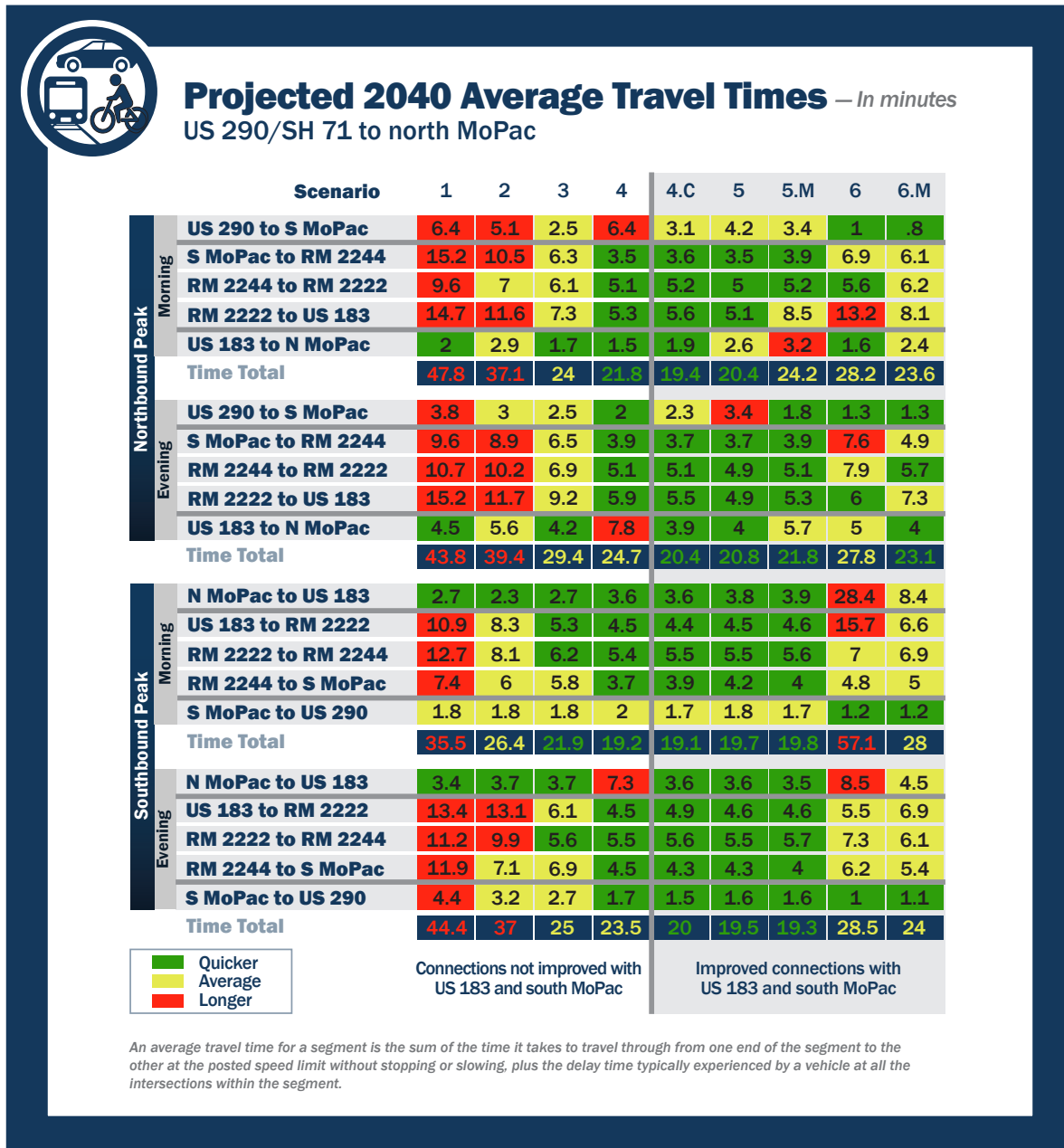
- Scenarios 3 through 6.M are all expected to help reduce local cut-through traffic. Cut-through movements happen because some motorists choose to avoid certain congested intersections or roadway segments. Rather than wait at a signal to be served, some motorists may decide to turn upstream of the bottleneck and utilize local roads to reduce the total delay. Scenarios 3 through 6.M show reductions to overall travel times and improvements to the level of service for the intersections, so it is anticipated that cut-through traffic on local streets would be reduced under these alternatives.
- Assuming higher volumes indicate the corridor is carrying additional traffic that would otherwise be using parallel/connecting highways or local neighborhood streets, the grade-separated scenarios would have greater regional mobility impacts than the at-grade scenarios.
- Of the grade-separated scenarios, Scenario 6 would have the most significant regional impact, though it would come at a cost to local mobility and travel times by overwhelming some sections of the corridor. Scenario 6 considers 4 additional general purpose lanes (two in each direction) along Loop 360. These additional lanes add a significant amount of capacity throughout Loop 360. Based on the 2040 travel demand forecasts, it is anticipated that at least 26,600 vehicles from MoPac and 27,800 vehicles from elsewhere would be diverted onto Loop 360. Thus, this alternative is anticipated to provide the greatest relief to MoPac (12% reduction in anticipated demand along MoPac) and to the region. Since a significant amount of traffic is getting diverted onto Loop 360, it was observed that this scenario would experience significant friction at major junctions such as interchanges with south MoPac, US 183, north MoPac, etc., and along Loop 360 segments adjacent to these major junctions.
- With a managed lane system there is an opportunity to enhance regional connectivity when adding a pair of lanes to Loop 360. Adding managed lanes to Loop 360 not only allows for better emergency and transit service and reliable travel time in the corridor, it has the potential to provide needed regional connectivity through the expansion of roadway connections to proposed toll lanes on US 183 and south MoPac. By connecting to a managed lane system, it contributes to a transportation network that provides motorists with predictable travel times that can be reliably maintained, despite future growth.



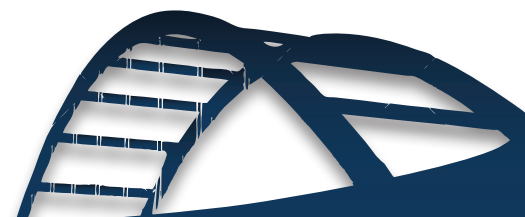
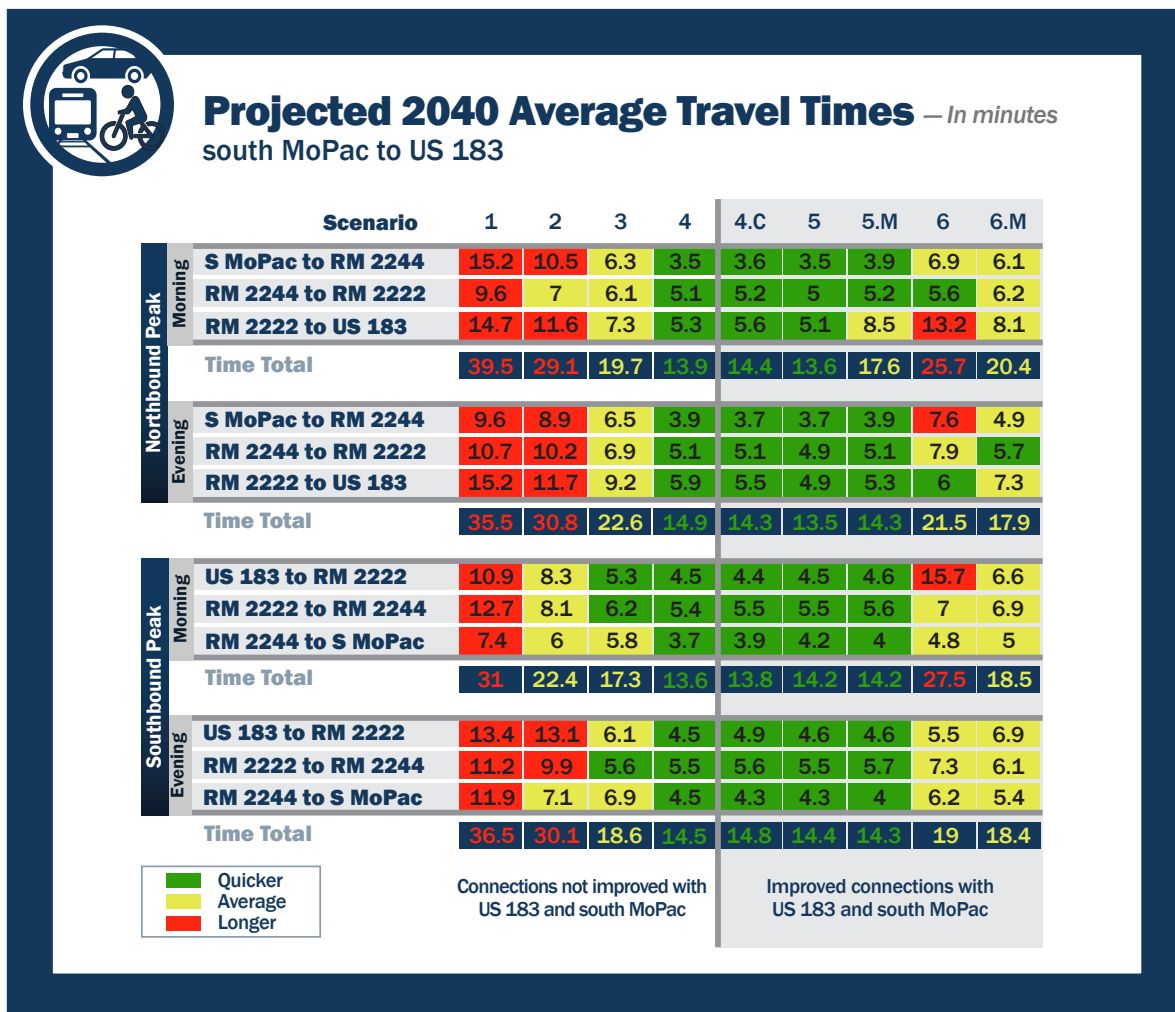


## Corridor Mobility

Corridor mobility was evaluated based on the travel times and levels of congestion that users experience in key sections of the corridor, as well as at individual intersections. The graphics below summarize the projected mainlane travel times for each corridor section, as well as the overall LOS of the 26 at-grade intersections for each scenario. (See Page 9 for a description of Level of Service).

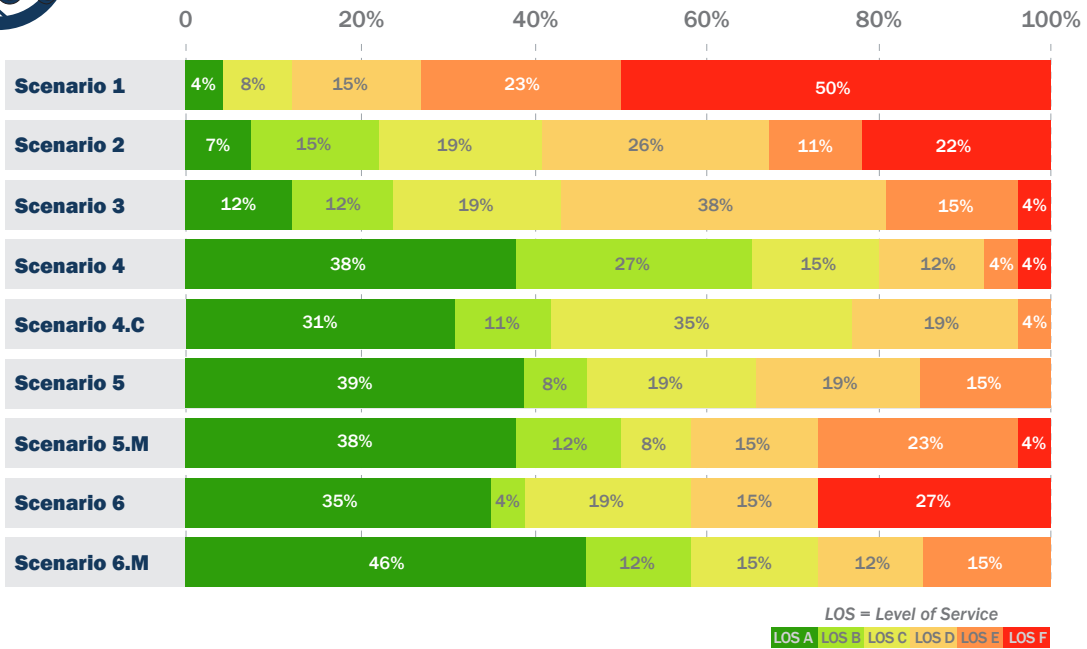


The graphic on the previous page provided travel times for the entire corridor from US 290/SH 71 to north MoPac. Loop 360 actually operates in three distinctly different segments. The south segment – US 290/SH 71 to south MoPac – effectively starts as a highway and then becomes a six-lane divided roadway. The north Capital of Texas Highway segment – US 183 to north MoPac – is a city street and is already an at-grade six-lane divided roadway with congestion problems that are in no small part due to north MoPac and US 183. The center segment – which makes up the majority of the length of the Loop 360 corridor – would likely be the segment that would benefit from the most significant improvements. The graphic on this page highlights the projected travel times within the middle segment from south MoPac to US 183.

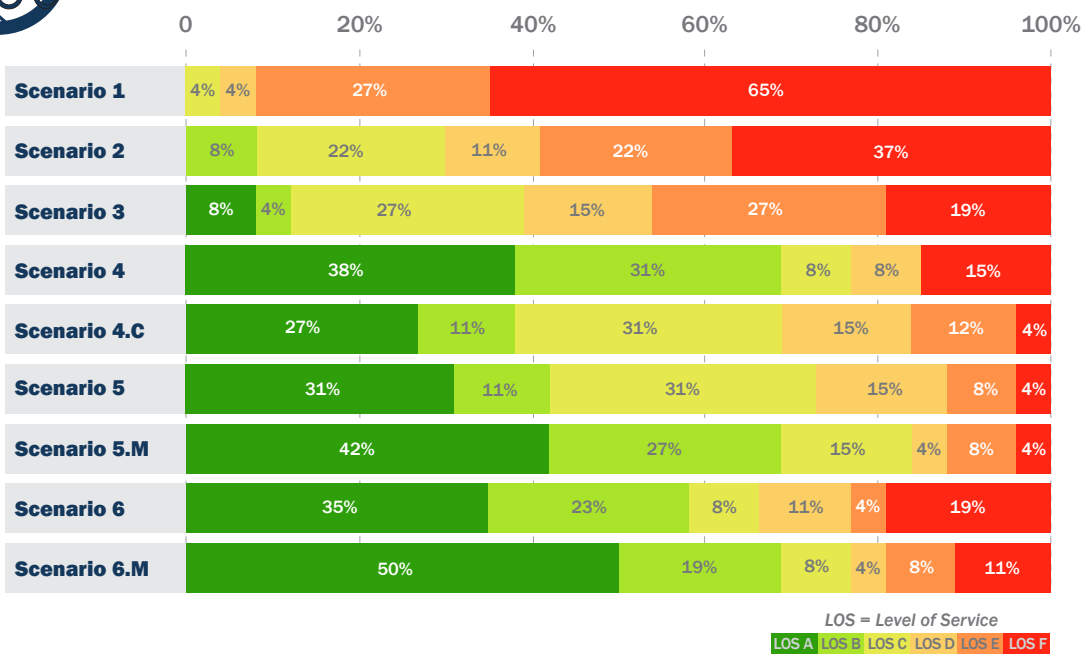




### Percentage of Signalized Intersections Operating at LOS A-F 2040 – AM Peak

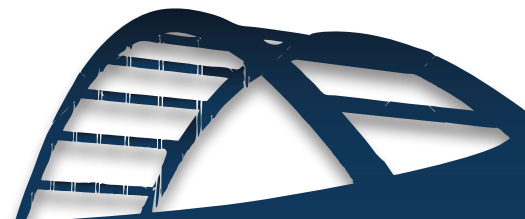


### Percentage of Signalized Intersections Operating at LOS A-F 2040 – PM Peak



The following are key findings from the analysis of potential corridor mobility impacts:

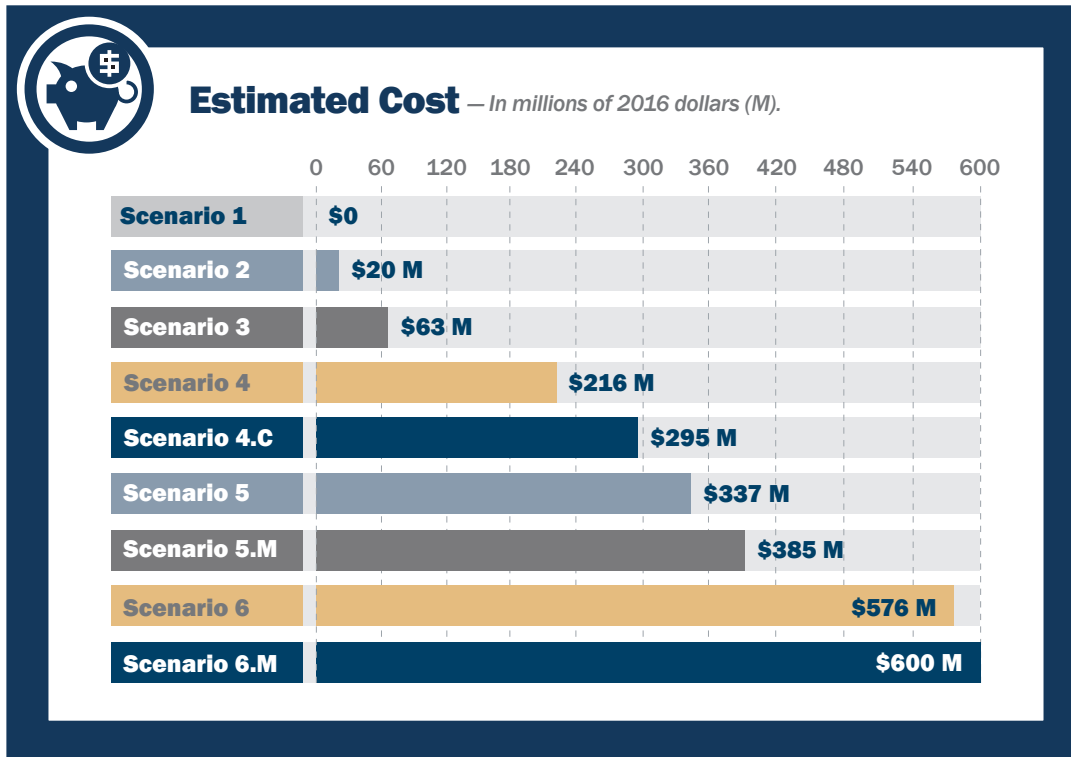
- A vast majority of intersections would be failing by 2040 if we do not make any significant corridor improvements over the next twenty-five years. During the morning peak, 19 of the 26 existing intersections (73 percent) would be operating at LOS E or F. This number increases to 24 intersections (92 percent) during the afternoon peak. Therefore, the No-Build Scenario would not meet the mobility needs along the corridor.
- Scenarios 2 and 3 would improve conditions in some sections and at certain intersections compared to the No-Build Scenario, but would still result in unacceptable failure rates by 2040.
- The mainlane section and related intersections between US 183 and north MoPac are congested in all scenarios due to development constraints and high traffic volumes accessing Loop 360 from these two other main roadways.
- The traffic forecasts for US 183 and north MoPac near the Loop 360 interchanges predict demand near capacity for these corridors, despite the proposed lane expansions along these corridors. Although Loop 360 could accommodate additional trips, US 183 would not be able to accommodate more than a one-lane flyover because it would already be operating near capacity. It is anticipated that a flyover at US 183 would alleviate congestion and safety concerns along the US 183 southbound frontage road, since a portion of the Loop 360 southbound demand would divert to the flyover. Similarly, building grade-separated access from Loop 360 to north MoPac would be of little benefit as there would be little, if any, capacity at peak hours to receive the additional traffic.
- Some sections of the corridor in Scenario 6 are overwhelmed, resulting in higher intersection failure rates than for other grade-separated scenarios.





## Estimated Cost

Estimated cost ranges were identified for each scenario in 2016 dollars. The graphic below compares the estimated costs for each scenario.







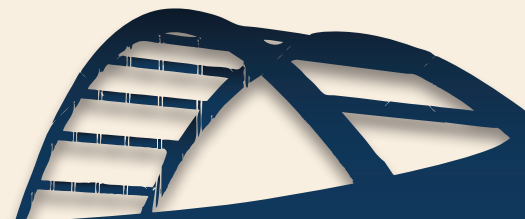
## Constructability

Constructability was evaluated on a scale based on the level of complexity associated with each scenario. The complexity of construction and the ability to maintain traffic during construction are directly related. It is typically easiest to elevate the mainlanes over the cross-street. The proposed ramps and frontage roads could be built first, in order to provide motorists a way to travel along the corridor while the grade-separation is being constructed. This could be done with lowered mainlanes as well, but the limestone in this area could potentially add cost and time to this method. Elevating or lowering the cross-street is often seen as an attractive option because it has less visual impact since it does not require elevation of the mainlanes. This can complicate construction, though, because it is difficult to maintain traffic when long detours are needed.

Another important factor is the difference between actual right-of-way and the right-of-way that is currently usable. In many cases, there are large amounts of actual right-of-way along Loop 360, but in some instances, using it is quite complicated and expensive because of the cliffs. These rock faces would need to be cut back in some scenarios.

Key findings regarding constructability include:

- Scenario 2 would be relatively easy to construct and would cause little disruption to traffic during construction.
- Scenario 3 is fairly easy to construct, but would require some temporary lane and shoulder closures to provide adequate space for workers to widen the pavement and bridges.
- Scenarios 4, 4.C, 5, 5.M, 6, and 6.M become increasingly more complicated to construct. They would likely require multiple long-term lane and shoulder closures. Construction would need to be phased to allow traffic to shift to new pavement areas while old intersections are reconstructed to be grade-separated. The higher the scenario number, the more complicated it would be to construct.
- Scenarios 6 and 6.M would require further study of the Pennybacker bridge to verify it could structurally support the bridge widening that would be needed. If not, separate parallel bridges would be needed. In either case, substantial amounts of cliff face would need to be removed to provide for the north approach lanes.





## Potential Aesthetic and Visual Impacts

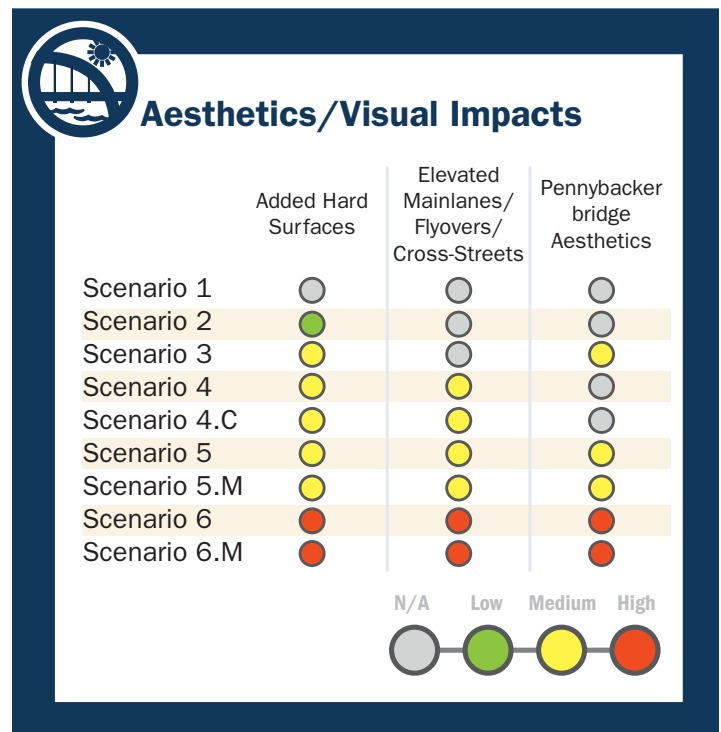
Potential aesthetics and visual impacts were identified based on the following physical changes associated with each scenario:

- Adding hard surfaces such as additional lanes or pavement at intersections, which could reduce the amount of open space and “natural” vegetative look of the corridor.
- Elevating mainlanes or adding flyovers, which could change the views of the corridor from the current street level or from higher elevations overlooking the corridor.
- Elevating cross-streets, which could change the views from the current street level of the corridor.
- Making structural changes to the Pennybacker bridge to accommodate additional traffic lanes or bicycle/pedestrian accommodations, which could result in a change to its “look,” or require a new parallel bridge to accommodate additional traffic or bicycle/pedestrian lanes.

The adjacent graphic compares the potential aesthetic and visual impacts for each scenario.

The following are key findings from the analysis of these potential impacts:

- Scenarios 1 and 2 would have the lowest impacts on the corridor’s aesthetics.
- Scenario 3 would add more hard surfaces than Scenarios 4 or 4.C, without the added mobility benefits.
- Scenarios 6 and 6.M would have the greatest impacts on the corridor’s aesthetics, adding pavement to the majority of the existing right-of-way. The scenarios would require mainlane elevation in some locations and elevated cross-streets in others, as well as require significant changes to the Pennybacker bridge or possibly a new, separate bridge structure.

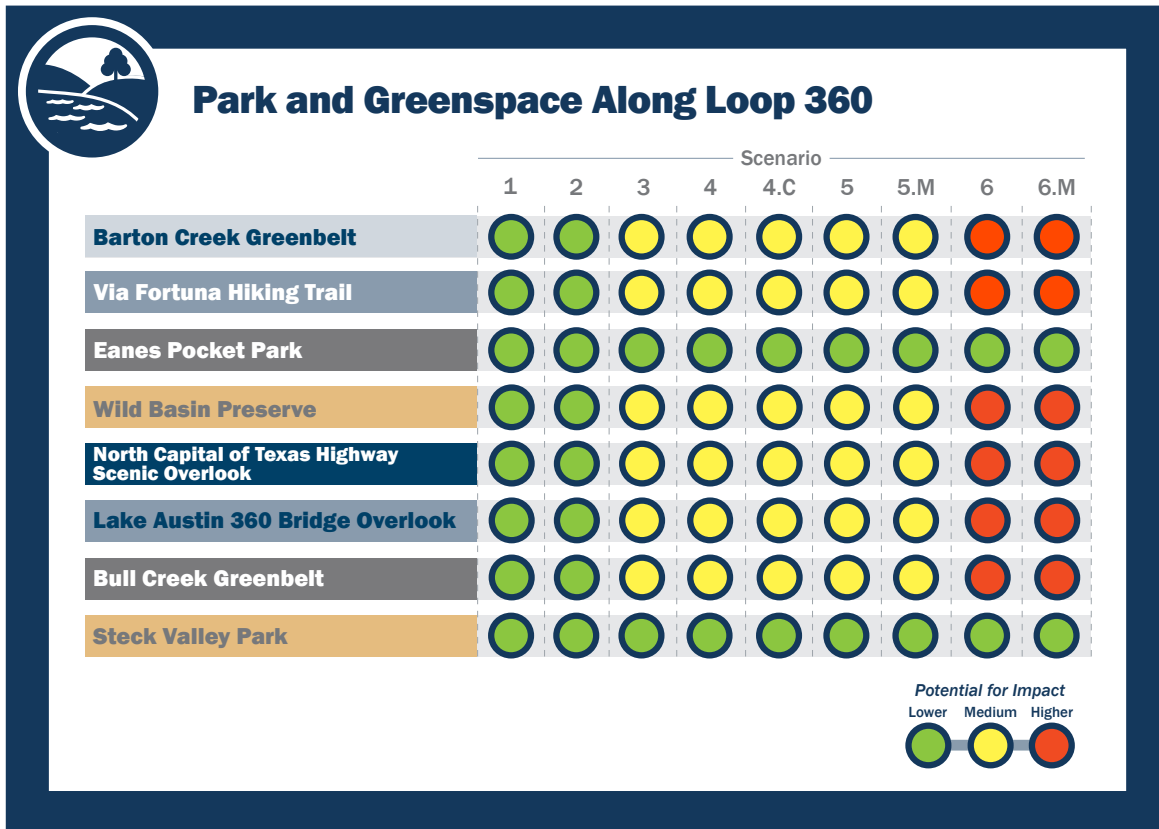




## Potential Environmental Impacts

All scenarios were evaluated for their potential to impact the following resources and characteristics along the corridor (section descriptions are noted on page 5):

Parks and greenspace - There are a total of eight parkland areas located in the Loop 360 corridor, four are on the west side and seven are on the east. (Note: the total number of parks/greenspace is greater than the sum of east and west due to a few park areas being bisected by Loop 360.) Safe access to these parks and greenspaces, as well as the Lake Austin boat ramp at the Pennybacker bridge, would be considered during the design of any improvements.



The following are key findings from the analysis of these potential impacts:

- Scenarios requiring no additional right-of-way (1 and 2) would have a low impact to parkland.
- Scenarios requiring limited additional right-of-way (3, 4, 4.C, 5, and 5.M) could potentially impact parkland.
- Scenarios 6 and 6.M would require the most right-of-way and would have a higher impact to parkland in sections 2 through 6.

Community and Historical Resources – The following nine community resource land uses were discovered during field and Geographic Information System (GIS) studies:

- On the west were St. Michaels Episcopal Church and Day School, St. Stephens School, Bridge Point Elementary School, Riverbend Church, and International Buddhist Progress Society.
- On the east were Tarleton Cemetery at Walsh Tarleton Lane, Westlake Fire Department north of Westbank Drive, and Forest Trail and Valley View Elementary School off Lost Creek Boulevard.
- A Texas Historic Sites Atlas search revealed 31 Texas Archeological Research Laboratory (TARL) sites and historical markers in the project corridor. There are no listed National Register of Historic Places (NRHP) properties or historic districts in the project corridor.

The following are key findings from the analysis of these potential impacts:

- Riverbend Church, the International Buddhist Progress Society and Tarleton Cemetery could potentially be impacted by scenarios 3, 4, 4.C, 5, 5.M, 6, and 6.M.
- There are two TARL sites and areas on parkland to the east of Loop 360 and one near the Spicewood Springs to the west of Loop 360. Any alignment would have to consider the multiple constraints in this area. It could be impacted by scenarios 3, 4, 4.C, 5, 5.M, 6, and 6.M.
- Scenarios 6 and 6.M could have a higher impact as they would require the most ROW and would likely occur in sections 2, 3, 4, and 6.

Water and Drainage – The following named creeks are crossed by Loop 360 in all scenarios:

- Laurel Oaks crossing at one location in section 2
- Bull Creek crossing (2 locations in section 2 and one location in section 3)
- West Bull Creek crossing at one location in section 3
- Bee Creek has one crossing in section 4
- Barton Creek has one crossing in section 6

The following are key findings from the analysis of these potential impacts:

- Scenario 1 would have no impact to water resources.
- Scenario 2 would have low impact to water resources.
- Scenario 3, 4, 4.C, 5, and 5.M could have medium impact to water resources as they would require limited additional ROW.
- Scenario 6 and 6.M could have a high impact as they would require additional ROW.

Threatened and Endangered Species – The following habitats have been identified in the corridor:

- Wild Basin Preserve is home to threatened and endangered species.
- Each scenario would cross a karst zone, where there is an increased potential for threatened and endangered species.
- The proposed project crosses five areas which fall into Karst Zone 1 (known occurrence of endangered cave species).
- Twelve areas fall into Karst Zone 3 (low probability of endangered cave species).

The following are key findings from the analysis of these potential impacts:

- Scenarios requiring no additional right-of-way (1 and 2) would have a low impact to karst zones. Scenarios requiring limited right-of-way (3, 4, 4.C, 5, and 5.M) would have a medium impact to karst areas.
- Scenarios 6 and 6.M would require the most right-of-way and could have a higher impact to karst areas.
- Scenarios requiring additional right-of-way (3, 4, 4.C, 5, 5.M, 6, and 6.M) within Karst Zone 1 would likely require surveys by a qualified karst biologist to determine the presence or absence of karst features and endangered karst species.

Edwards Aquifer – The proposed project crosses through two areas of the Edwards Aquifer Recharge Zone and one area within the Edwards Aquifer Contributing Zone. Additions in impervious cover would require the construction of permanent stormwater treatment measures such as vegetated filtration along the roadside and/or water quality ponds.

The following are key findings from the analysis of these potential impacts:

- Scenarios requiring no additional pavement (1 and 2) would likely require no additional stormwater controls.
- Scenarios requiring limited additional pavement (3, 4, 4.C, 5, and 5.M) would require additional stormwater controls to comply with Edwards Rules.
- Scenarios 6 and 6.M which include the most additional pavement could require ROW to accommodate extensive stormwater controls for Edwards compliance.

Noise and Air Quality – Noise and air quality were considered in the environmental resources and constraints identification.

- Scenarios 1 and 2 would have a high impact to noise and air quality due to increased congestion.
- Scenarios requiring limited ROW (3, 4, 4.C, 5, and 5.M) could have a medium impact to noise and air quality.
- Scenarios 6 and 6.M would increase capacity, therefore, would have the potential for a higher impact to noise and air quality.

Cliff Excavation – Cliff excavation could be needed in locations where additional ROW is needed, therefore it was considered in the study.

- Scenarios requiring no additional right-of-way (1 and 2) would have a low impact to cliff excavation.
- Scenarios requiring limited additional right-of-way (3, 4, 4.C, 5, and 5.M) could potentially have a medium impact to cliff excavation.
- Scenarios requiring the most additional right-of-way (6 and 6.M) would have a higher impact to cliff excavation.

Right-of-Way – Right-of-way needs were considered in the environmental evaluation of the Loop 360 corridor.

- Scenarios requiring no additional right-of-way (1 and 2) would have a low impact.
- Scenarios requiring limited additional right-of-way (3, 4, 4.C, 5, and 5.M) could potentially have a medium impact.
- Scenarios requiring the most additional right-of-way (6 and 6.M) would have a higher impact.



## Environmental

	Parkland/ Greenspace	Community/ Historical/ Cultural	Water Resources/ Drainage	Threatened/ Endangered Species	Edwards Aquifer	Air Quality/ Noise	Cliff Excavation	Right-of- Way
Scenario 1	○	○	○	○	○	●	○	○
Scenario 2	●	●	●	●	●	●	●	●
Scenario 3	●	●	●	●	●	●	●	●
Scenario 4	●	●	●	●	●	●	●	●
Scenario 4.C	●	●	●	●	●	●	●	●
Scenario 5	●	●	●	●	●	●	●	●
Scenario 5.M	●	●	●	●	●	●	●	●
Scenario 6	●	●	●	●	●	●	●	●
Scenario 6.M	●	●	●	●	●	●	●	●

N/A   Low   Medium   High

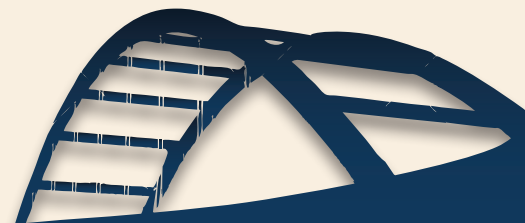


## Longevity

Longevity is a measure of how long we expect a particular scenario to last. Typically, a project is analyzed to determine if it would still provide an acceptable LOS in some future design year, typically 20 years from construction. The exact timing for implementing improvements on Loop 360 is still being determined and would in large part depend on which scenario is chosen. For analyzing longevity of the Loop 360 scenarios, a design year of 2040 was chosen.

### Key Findings from the Loop 360 Improvement Study:

- Scenarios 1 and 2 fail today. Scenario 2 would improve things over existing condition, but little to no improvement would be seen during peak travel times.
- Under Scenario 3, it is expected that at least 50 percent of the intersections along Loop 360 would operate at LOS D or worse by 2032.
- Scenarios 4, 4.C, 5, 5.M, 6, and 6.M would all provide improvements that are expected to last up to and potentially beyond 2040.





## Transit/Emergency Access

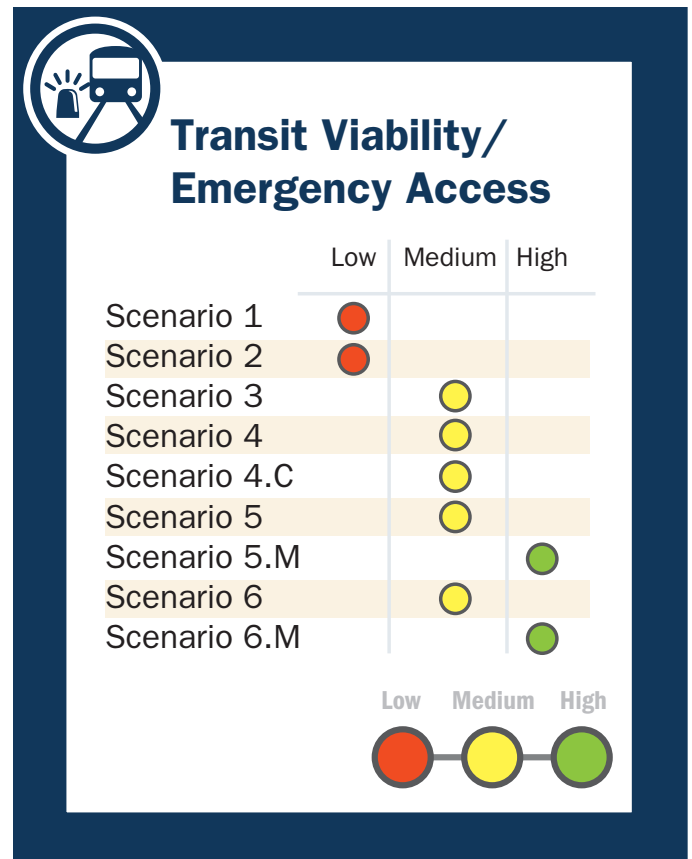
All scenarios were evaluated for their ability to accommodate transit and to ensure timely emergency access based on the following assumptions:

- At-grade scenarios are least effective at meeting transit and emergency response needs due to the unpredictability and congestion caused by traffic signals, particularly during peak periods.
- Grade-separated scenarios are more effective than at-grade scenarios by removing traffic signals from the main travel lanes and reducing the signal wait times on cross-streets, thus minimizing the number and length of stops required throughout the corridor.
- Grade-separation with managed access scenarios are more effective than grade-separation only scenarios because managed lanes are designed to more efficiently handle traffic by using tolls or regulations based on the number of occupants per vehicle or time of day. These factors can help ensure a guaranteed rate of speed, incentivize the use of public transit, and ensure less congested travel for emergency vehicles.

The adjacent graphic compares the potential for viable transit options and efficient emergency access for each scenario.

Findings from the Loop 360 Improvement Study include:

- Scenarios 1 and 2 would not do anything to improve transit viability or emergency access.
- Scenario 3 would provide some improvement for emergency access with an additional travel lane and improved inside shoulders. Scenario 3 would not likely improve transit viability.
- Scenarios 4, 4.C, 5, and 6 are expected to have a moderate improvement for emergency access and transit viability. There would be no guaranteed reliable route, but the grade-separated crossings and flyovers would improve traffic operations.
- Scenarios 5.M and 6.M would provide the greatest improvement to emergency access and transit viability. The managed lanes in these scenarios would provide a reliable route that could support both emergency vehicles and transit.







## Implementation Time

Implementation time is a function of several factors including:

- How long it takes to get through the planning/environmental and design processes
- If funding is available, and if not, when would it be
- How long it takes to construct the project

These factors contain many unknowns until more detailed studies are completed, and if funding is not already available, it is often unclear when it would be. Generally speaking, the bigger and more complicated the project, the longer it would take to implement. This would likely be true for the Loop 360 scenarios as well. Scenario 1 would be by far the quickest to implement and Scenario 6 would likely take the longest. Implementation time for scenarios 5.M and 6.M may be improved if additional lanes are tolled and revenues can be used to help fund the project.

Implementation Time (All timelines are dependent on funding which is currently unidentified)

Scenario 1 – Doing nothing would not require any time or funding, as no improvements would be made.

Scenario 2 – Intersection improvements can be done in six to 18 months, depending on complexity.

Scenario 3 – Adding a pair of lanes would take the normal sequence of the development path with a 24 to 30 month construction phase.

Scenario 4 – Grade-separating all the major intersections would depend on how many could be funded at one time, but would follow the normal development sequence. The construction phase timeline would vary, depending on if the grade-separation takes place over or under the cross-streets.

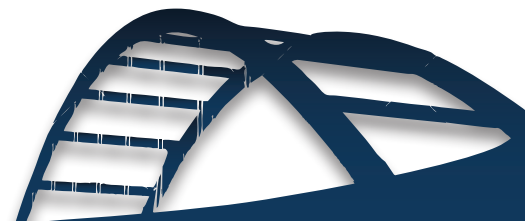
Scenario 4.C – Same as 4, but with additional time to finish the flyovers to US 183 and south MoPac.

Scenario 5 – Would depend on whether the additional lanes are added at the same time as the grade-separations or at a later date.

Scenario 5.M – Essentially the same as 5.

Scenario 6 – This would be the most complicated of the scenarios in both design and construction. It would require significantly more time to construct due to the relocation and reconstruction of most of the existing mainlanes, the expansion of the usable right-of-way, and expansion of the Pennybacker bridge.

Scenario 6.M – Essentially the same as 6.



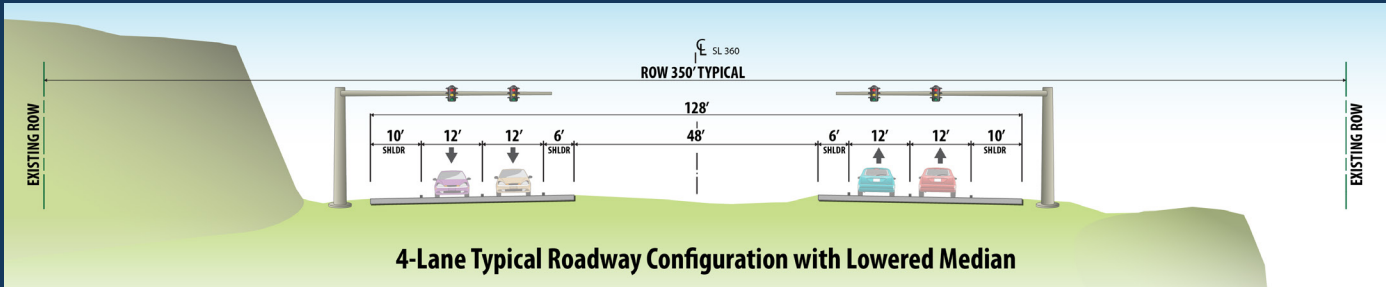
## EVALUATION BY SCENARIO

As noted in the previous section, each of the nine scenarios were evaluated based on 10 criteria to gather a preliminary understanding of potential impacts. The following pages include a snapshot of each of the scenarios and key data points collected regarding their projected impact for 2040.

# Scenario 1: No-Build (Do Nothing)

## Scenario Overview

This scenario serves as the benchmark against which all other scenarios are compared. It looks at what would happen if no improvements are made, other than those that are already included in the regional transportation plan for 2040. There are currently no improvements identified for Loop 360 in the regional plan.



4-Lane Typical Roadway Configuration with Lowered Median



### Mobility

#### Pros +

- No cost and doesn't take any time to construct.
- Keeps existing character.

#### Cons -

- Mobility would continue to deteriorate.
- Cut-through traffic may increase.
- Provides no relief to other regional corridors.
- Does nothing to improve transit or emergency access.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

79,600

2040

101,800

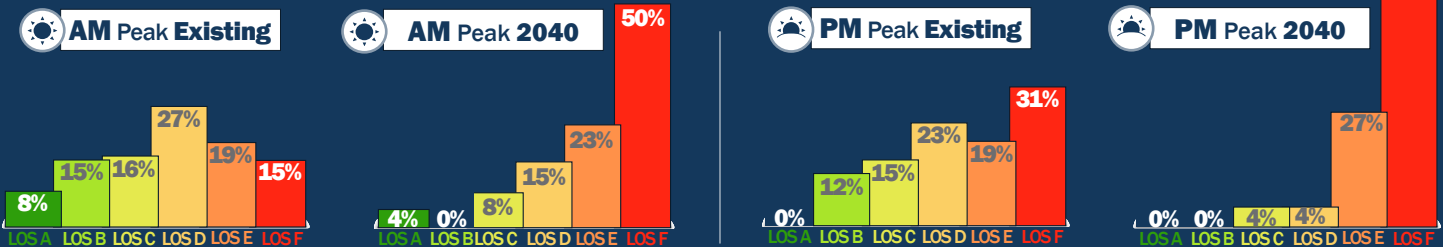


### Estimated Cost

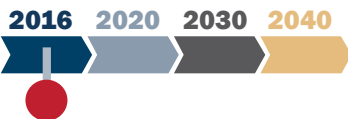
\$0.00

Because Scenario 1 assumes that no improvements would be made other than those already identified in the regional transportation plan, there is no cost associated with it.

## Accessibility — Percentages of Intersections at Each Level of Service



### Duration of Effectiveness



Many segments and intersections along Loop 360 are already failing, as measured by a Level of Service E or F. Because Scenario 1 would not make any improvements to alleviate the existing traffic conditions, it is assumed that this scenario would fail immediately.



### Other Considerations

- Increased congestion would increase noise and negatively impact air quality, but other environmental impacts would be limited.
- Does nothing to improve safety for motorists, pedestrians or bicyclists.
- Keeps the existing character of the road and Pennybacker bridge.



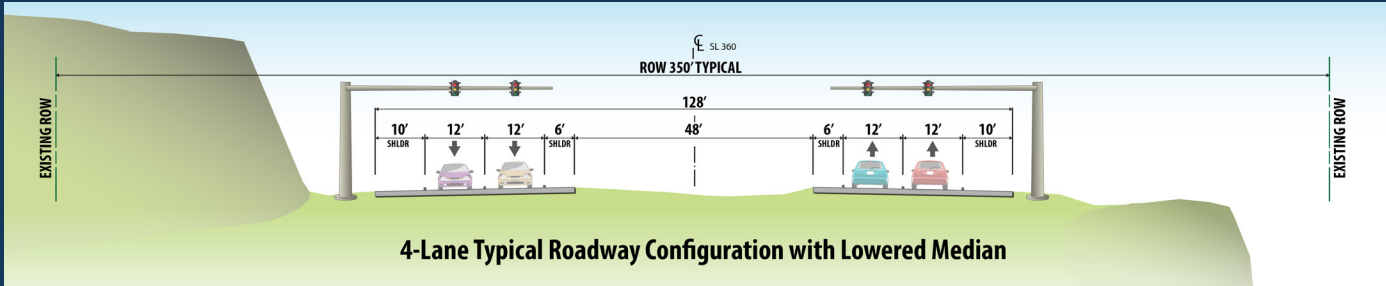
### Conclusion

Scenario 1 does nothing to improve the growing mobility and safety problems on Loop 360. The problems experienced today would only worsen along with increased noise and air pollution.

# Scenario 2: Intersection Improvements

## Scenario Overview

This scenario assumes major intersections throughout the corridor would be “optimized” to handle as much traffic as possible. It includes signal timing, turn lanes, intersection design changes, and other improvements that the transportation model shows to be most effective at each intersection.



### Mobility

#### Pros +

- Low cost.
- Relatively quick to implement.

#### Cons -

- Any mobility improvements would be short-lived.
- Cut-through traffic may increase.
- Provides no relief to other regional corridors.
- Does nothing to improve transit or emergency access.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

**79,600**

2040

**101,800**



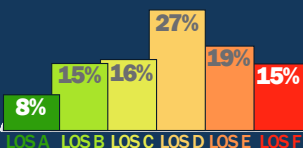
### Estimated Cost

**\$20 Million**

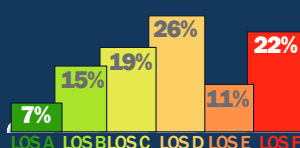
In 2016 dollars

## Accessibility — Percentages of Intersections at Each Level of Service

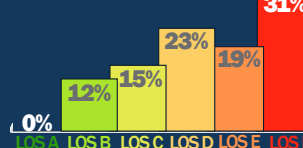
### AM Peak Existing



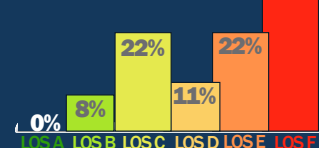
### AM Peak 2040



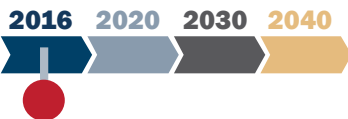
### PM Peak Existing



### PM Peak 2040



### Duration of Effectiveness



Many segments and intersections along Loop 360 are already failing, as measured by a Level of Service E or F. Scenario 2 would improve things over existing conditions, but little to no improvement would be seen during peak travel times.



### Other Considerations

- Increased congestion would increase noise and negatively impact air quality, but other environmental impacts would be limited.
- Does nothing to improve safety for motorists, pedestrians or bicyclists.
- Keeps the existing character of the road and Pennybacker bridge.



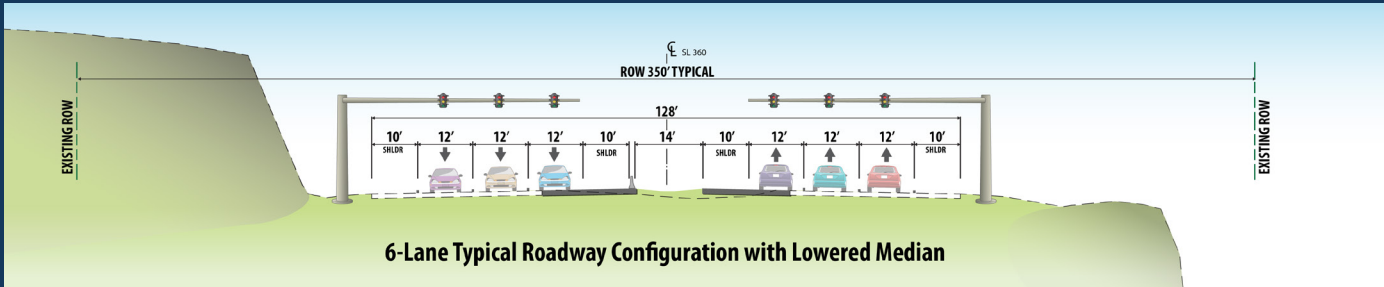
### Conclusion

Mobility improvements associated with Scenario 2 would be minimal and short-lived. The problems experienced today would only worsen along with increased noise and air pollution.

# Scenario 3: Add Two Lanes, Keep Existing Traffic Signals

## Scenario Overview

This scenario maintains the existing at-grade signalized intersections and adds one lane in each direction. ("At-grade" improvements are those where Loop 360 and the cross-streets are at the same level, thus requiring a traffic signal to control the flow and turning movements). This scenario also includes all intersection improvements evaluated in Scenario 2.



### Mobility

#### Pros +

- Low cost.
- Moderate implementation time.
- Mid-term mobility improvements.

#### Cons -

- Mobility improvements not long-term.
- Provides no relief to other regional corridors.
- Does nothing to improve transit or emergency access.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

79,600

2040

101,800



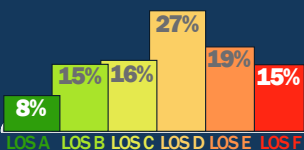
### Estimated Cost

**\$63 Million**

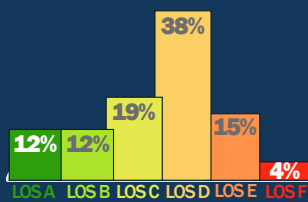
In 2016 dollars

## Accessibility — Percentages of Intersections at Each Level of Service

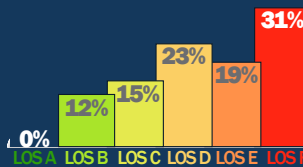
### AM Peak Existing



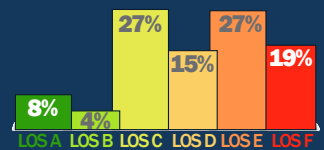
### AM Peak 2040



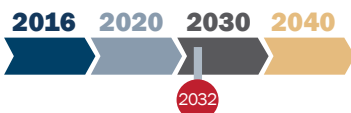
### PM Peak Existing



### PM Peak 2040



### Duration of Effectiveness



Under Scenario 3, it is expected that at least 50 percent of the intersections along 360 would operate at LOS D or worse by 2032.



### Other Considerations

- Moderate environmental impacts due to increased pavement.
- Does nothing to improve safety for motorists, pedestrians or bicyclists.
- Keeps most of the existing character of the road and Pennybacker bridge.



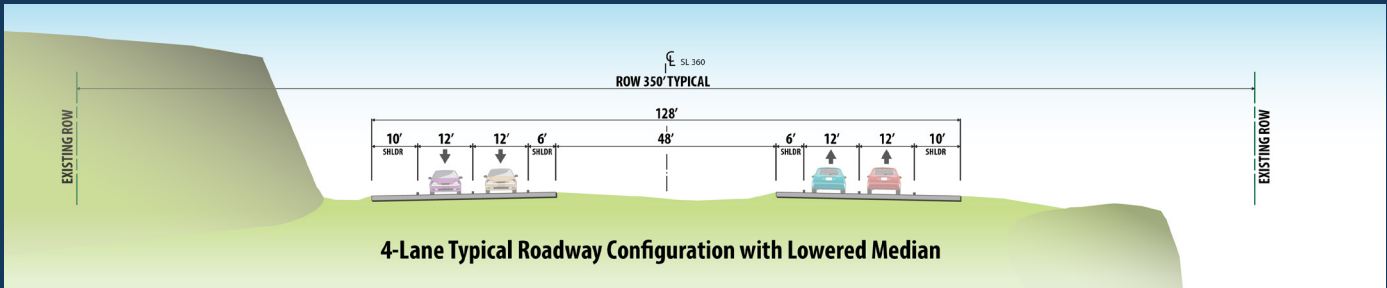
### Conclusion

Scenario 3 would provide moderate mobility improvements, but they would not last until the 2040 design year. The relatively low cost and moderate implementation time may make this a viable mid-term solution for some sections of Loop 360.

# Scenario 4: Grade-Separate Existing Four Lanes

## Scenario Overview

This scenario removes the traffic signals from the Loop 360 mainlanes between US 183 and south MoPac. Major intersecting streets would be accessible via ramps to/from the mainlanes, grade-separated by building overpasses and/or underpasses. Access modifications would be made at minor intersections to improve safety and reduce wait times to access Loop 360 where overpasses/underpasses are not feasible or cost-effective.



### Mobility

#### Pros +

- Moderate cost.
- Long-term solution.
- Moderate implementation time.
- Small improvement for transit viability and emergency access.

#### Cons -

- Provides no relief to other regional corridors.
- Does not improve connections with US 183 and south MoPac.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

79,600

2040

101,800

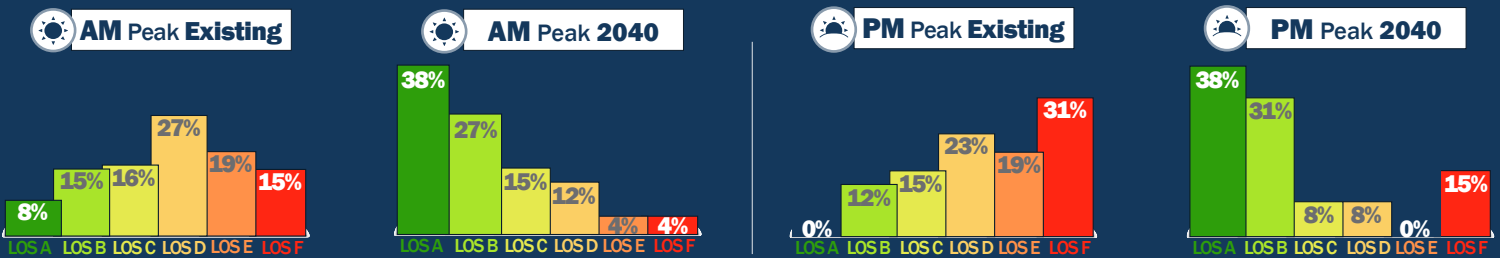


### Estimated Cost

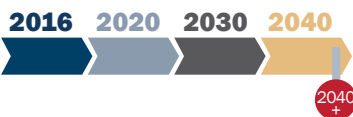
**\$216 Million**

In 2016 dollars

## Accessibility — Percentages of Intersections at Each Level of Service



### Duration of Effectiveness



Scenario 4 would provide improvements that are expected to last up to and potentially beyond 2040.



### Other Considerations

- Moderate environmental impacts.
- Improves safety for motorists, pedestrians and bicyclists.
- Changes the character of the road, but not the Pennybacker bridge.



### Conclusion

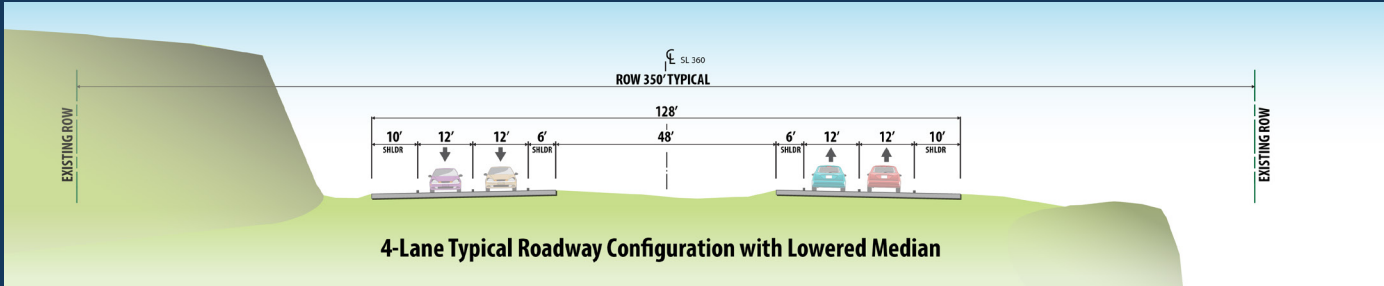
Scenario 4 is a potential long-term solution, although it would not improve the connections at US 183 and south MoPac. Congestion at these intersections would likely continue to get worse. The relatively moderate cost and environmental impacts, combined with the ability to phase this project, make this a viable solution for improving local mobility.

# Scenario 4.C: Grade-Separate Existing Four Lanes, Add Flyovers and Improved Connections

## Scenario Overview

This scenario includes all improvements outlined in Scenario 4 and would also improve connections and add flyovers to connect:

- Southbound US 183 to southbound Loop 360
- Northbound Loop 360 to northbound US 183
- Southbound Loop 360 to southbound south MoPac
- Northbound south MoPac to northbound Loop 360
- Northbound Loop 360 to northbound south MoPac



### Mobility

#### Pros +

- Moderate cost.
- Long-term solution.
- Moderate implementation time.
- Small improvement for transit viability and emergency access.
- Provides some relief to other regional corridors.

#### Cons -

- Does not take advantage of available space and maximize capacity.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

**79,600**

2040

**110,000**



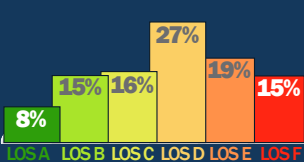
### Estimated Cost

**\$295 Million**

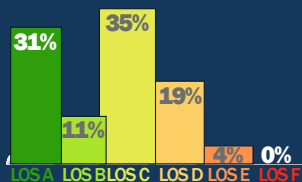
In 2016 dollars

## Accessibility — Percentages of Intersections at Each Level of Service

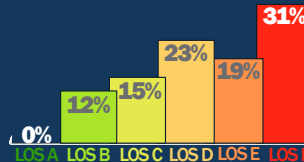
### AM Peak Existing



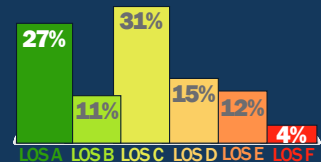
### AM Peak 2040



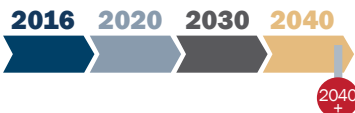
### PM Peak Existing



### PM Peak 2040



### Duration of Effectiveness



Scenario 4.C would provide improvements that are expected to last up to and potentially beyond 2040.



### Other Considerations

- Moderate environmental impacts.
- Improves safety for motorists, pedestrians and bicyclists.
- Changes the character of the road, but not the Pennybacker bridge.



### Conclusion

Scenario 4.C is a potential long-term solution and would improve the connections at US 183 and south MoPac. The relatively moderate cost and environmental impacts, combined with the ability to phase this project, make this a viable solution for improving local and regional mobility. With no additional lanes, this scenario does not maximize the available capacity of Loop 360 right-of-way.

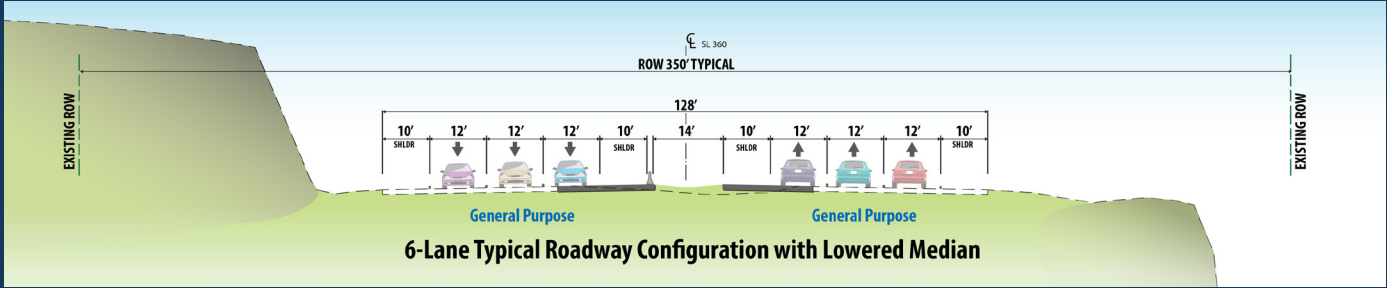
# Scenario 5: Grade-Separate Existing Four Lanes, Add Two General Purpose Lanes, Add Flyovers and Improved Connections

## Scenario Overview

This scenario includes all improvements outlined in Scenario 4, would improve connections, and add flyovers to connect the following:

- Southbound US 183 to southbound Loop 360
- Northbound Loop 360 to northbound US 183
- Southbound Loop 360 to southbound south MoPac
- Northbound south MoPac to northbound Loop 360
- Northbound Loop 360 to northbound south MoPac

This scenario also adds one grade-separated, general purpose lane in each direction.



### Mobility

#### Pros +

- Long-term solution.
- Moderate implementation time.
- Small improvement for transit viability and emergency access.
- Provides relief to other regional corridors.

#### Cons -

- Moderate to high cost.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

79,600

2040

118,000



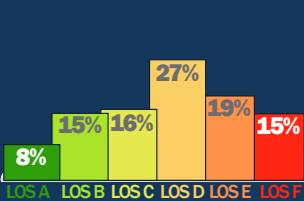
### Estimated Cost

**\$337 Million**

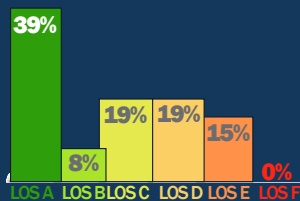
In 2016 dollars

## Accessibility — Percentages of Intersections at Each Level of Service

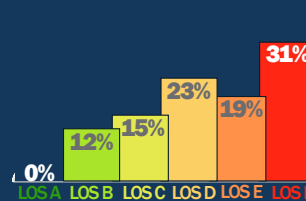
### AM Peak Existing



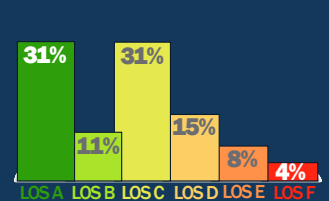
### AM Peak 2040



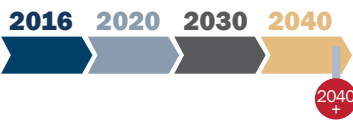
### PM Peak Existing



### PM Peak 2040



### Duration of Effectiveness



Scenario 5 would provide improvements that are expected to last up to and potentially beyond 2040.



### Other Considerations

- Moderate environmental impacts due to increased pavement.
- Improves safety for motorists, pedestrians and bicyclists.
- Changes the character of the road and requires minor changes to the Pennybacker bridge for pedestrian accessibility.



### Conclusion

Scenario 5 is a potential long-term solution and would improve the connections at US 183 and south MoPac. The moderate environmental impacts, combined with the ability to phase this project, make this a viable solution for improving local and regional mobility. This scenario would maximize mobility benefits within the existing usable right-of-way.

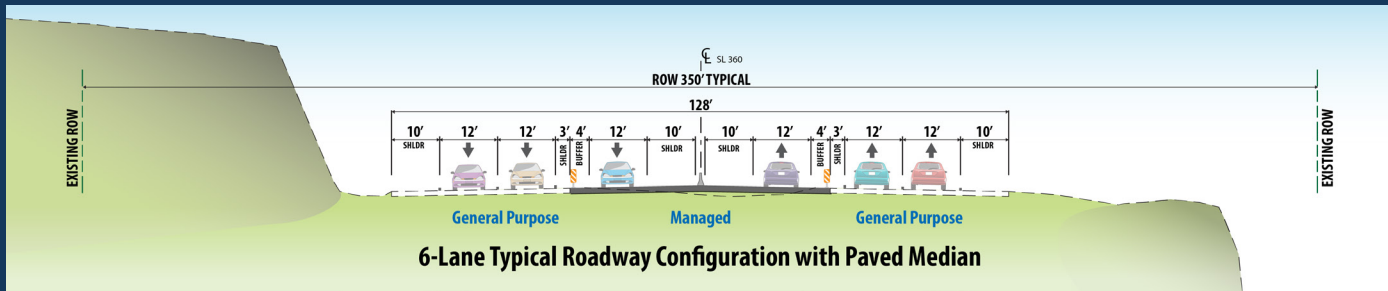


# Scenario 5.M: Grade-Separate Existing Four Lanes, Add Two Managed (Tolled/HOV/Transit) Lanes, Add Flyovers and Improved Connections

## Scenario Overview

This scenario includes all improvements outlined in Scenario 4 and adds one grade-separated, managed lane in each direction. Managing the lanes would provide the additional benefit of improving emergency vehicle access and transit viability. This scenario would also improve connections and add flyovers to connect the following:

- Southbound US 183 express lanes to southbound Loop 360 proposed managed lanes
- Northbound Loop 360 proposed managed lanes to northbound US 183 express lanes
- Southbound Loop 360 proposed managed lanes to southbound south MoPac proposed express lanes
- Northbound south MoPac proposed express lanes to northbound Loop 360 proposed managed lanes
- Northbound Loop 360 proposed managed lanes to northbound south MoPac proposed express lanes



### Mobility

#### Pros +

- Long-term solution.
- Moderate implementation time.
- Biggest improvement for transit viability and emergency access.
- Provides relief to other regional corridors.

#### Cons -

- Moderate to high cost.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

79,600

2040

117,000



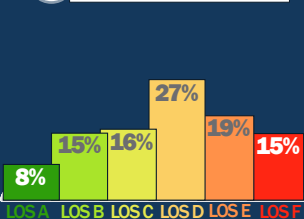
### Estimated Cost

**\$385 Million**

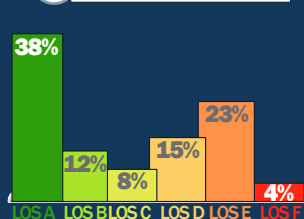
In 2016 dollars

## Accessibility — Percentages of Intersections at Each Level of Service

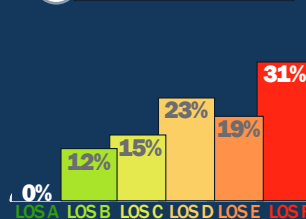
### AM Peak Existing



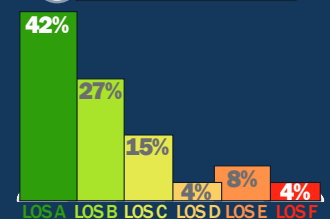
### AM Peak 2040



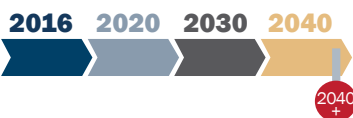
### PM Peak Existing



### PM Peak 2040



### Duration of Effectiveness



Scenario 5.M would provide improvements that are expected to last up to and potentially beyond 2040.



### Other Considerations

- Moderate environmental impacts due to increased pavement.
- Improves safety for motorists, pedestrians and bicyclists.
- Changes the character of the road and requires minor changes to the Pennybacker bridge for pedestrian accessibility.



### Conclusion

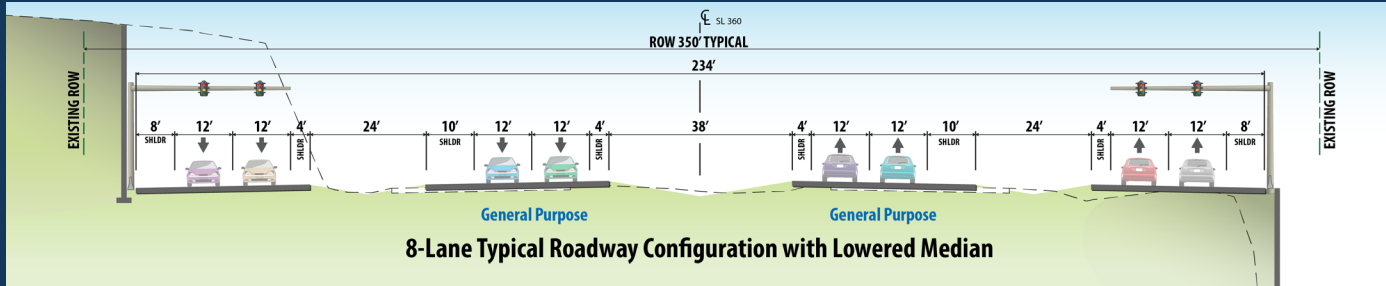
Scenario 5.M is a potential long-term solution and would improve the connections at US 183 and south MoPac. The moderate environmental impacts, combined with the ability to phase this project, make this a viable solution for improving local and regional mobility. This scenario would maximize mobility benefits within the existing usable right-of-way and improve transit viability and emergency access. The moderate to high costs could be partially offset if additional lanes were tolled.

# Scenario 6: Maintain Existing Four Lanes, Add Four General Purpose Lanes, Add Flyovers and Improved Connections

## Scenario Overview

This scenario maintains the existing four at-grade general purpose lanes with traffic signals. These lanes would serve as local access lanes for neighborhoods, businesses, schools, etc., along the corridor. This scenario also adds two grade-separated, general purpose lanes in each direction to serve as through-lanes for longer trips, and includes improved connections and additional flyovers to connect the following:

- Southbound US 183 to southbound Loop 360
- Northbound Loop 360 to northbound US 183
- Southbound Loop 360 to southbound south MoPac
- Northbound south MoPac to northbound Loop 360
- Northbound Loop 360 to northbound south MoPac



### Mobility

#### Pros +

- Long-term solution.
- Some improvement for transit viability and emergency access.
- Provides biggest relief to other regional corridors.

#### Cons -

- Regional mobility improvements compromise local mobility.
- Lengthy implementation time.
- Very high cost.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

79,600

2040

148,200



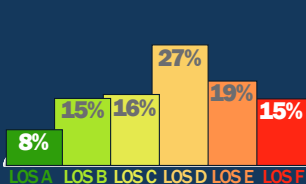
### Estimated Cost

**\$576 Million**

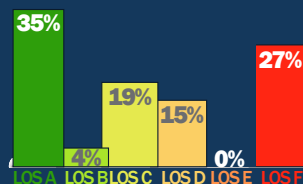
In 2016 dollars

## Accessibility — Percentages of Intersections at Each Level of Service

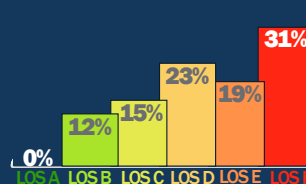
### AM Peak Existing



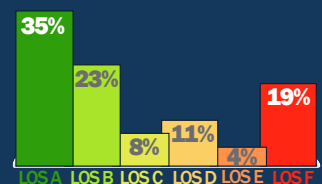
### AM Peak 2040



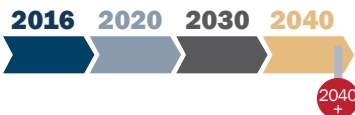
### PM Peak Existing



### PM Peak 2040



### Duration of Effectiveness



Scenario 6 would provide improvements that are expected to last up to and potentially beyond 2040.



### Other Considerations

- Largest environmental impacts.
- Greatest safety improvements for motorists, pedestrians and bicyclists.
- Changes the character of the road.
- Requires removing additional cliff face and filling of valleys to allow construction of additional lanes.
- Requires expansion of the Pennybacker bridge or construction of a parallel bridge.



### Conclusion

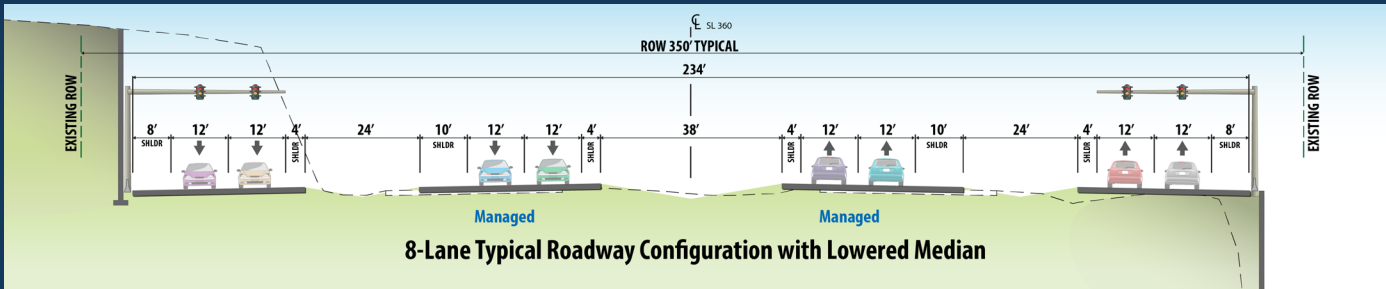
Scenario 6 is a potential long-term solution and would improve the connections at US 183 and south MoPac. The regional mobility benefits are expected to overload the corridor, resulting in negative impacts to local mobility. The environmental, aesthetic and right-of-way impacts, plus added cost and implementation time, compromise the feasibility of this scenario.

# Scenario 6.M: Maintain Existing Four Lanes, Add Four Managed (Tolled/HOV/Transit) Lanes, Add Flyovers and Improved Connections

## Scenario Overview

This scenario maintains the existing four at-grade general purpose lanes with traffic signals to serve as local access lanes for neighborhoods, businesses, schools, etc., along the corridor. This scenario also adds two grade-separated, limited-access managed lanes in each direction to serve as through-lanes for longer trips. Managing the lanes would provide the additional benefit of improving emergency vehicle access and transit viability. This scenario would also improve connections and add flyovers to connect the following:

- Southbound US 183 express lanes to southbound Loop 360 proposed managed lanes
- Northbound Loop 360 proposed managed lanes to northbound US 183 express lanes
- Southbound Loop 360 proposed managed lanes to southbound south MoPac proposed express lanes
- Northbound south MoPac proposed express lanes to northbound Loop 360 proposed managed lanes
- Northbound Loop 360 proposed managed lanes to northbound south MoPac proposed express lanes



### Mobility

#### Pros +

- Long-term solution.
- Biggest improvement for transit viability and emergency access.
- Provides good relief to other regional corridors.

#### Cons -

- Lengthy implementation time.
- Very high cost.



### Maximum Modeled Traffic Demand

South of Barton Creek Plaza

Existing

79,600

2040

132,300



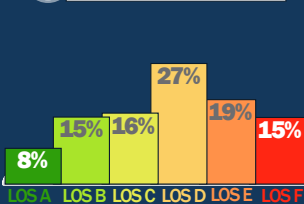
### Estimated Cost

\$600 Million

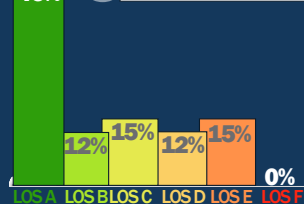
In 2016 dollars

## Accessibility — Percentages of Intersections at Each Level of Service

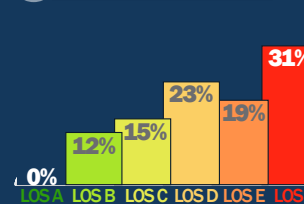
### AM Peak Existing



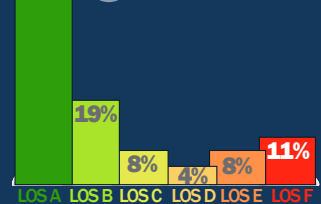
### AM Peak 2040



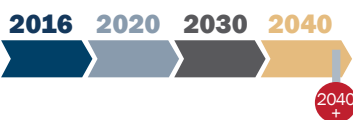
### PM Peak Existing



### PM Peak 2040



### Duration of Effectiveness



Scenario 6.M would provide improvements that are expected to last up to and potentially beyond 2040.



### Other Considerations

- Largest environmental impacts.
- Greatest safety improvements for motorists, pedestrians and bicyclists.
- Changes the character of the road.
- Requires removing additional cliff face and filling of valleys to allow construction of additional lanes.
- Requires expansion of the Pennybacker bridge or construction of a parallel bridge.



### Conclusion

Scenario 6.M is a potential long-term solution and would improve the connections at US 183 and south MoPac. This scenario improves regional mobility, transit viability and emergency access. The environmental, aesthetic and right-of-way impacts, plus added cost and implementation time, compromise the feasibility of this scenario.

## CONCLUSION

There is no simple or inexpensive solution to fix Loop 360, as many factors have to be weighed and balanced. This study considers many factors, including through capacity and safe and reasonable access from adjoining businesses and neighborhoods; the costs of construction and the impacts to the environment; the availability of funding and the urgent need for improvements; and understanding Loop 360's role in the regional road network. Achieving a balance of all these factors leads to an incremental and integrated approach that embraces all scenarios, except Scenario 1 which is the no-build option and the corridorwide use of the eight-lane roadways of Scenarios 6 and 6.M.

Scenario 1, or the no-build option, was considered unresponsive to the congestion problem and growing safety concerns on Loop 360, as well as mobility and environmental issues. At the other extreme, the full highway and managed lane options of Scenarios 6 and 6.M provided the greatest capacity gain, but with heavy environmental impacts, traffic disruption and construction costs.

Attempting to build eight continuous lanes – two pairs of mainlanes and two pairs of local access roads – throughout the corridor exceeds the usable right-of-way. Although TxDOT possesses adequate right-of-way on Loop 360, much of it is encumbered by cliffs and valleys. Fitting eight lanes through some of the corridor's natural bottlenecks would require removal of significant cliff face and filling many valleys. In addition, there are serious challenges to adding four more lanes to the Pennybacker bridge. While the bridge appears to be able to handle six lanes, accommodating eight lanes would require significant modification, expansion, or duplication of this iconic structure.

These factors nearly double the construction cost of the eight-lane scenarios, opposed to the six-lane scenarios, while significantly increasing environmental costs. Also, the ultimate capacity of Loop 360 must be balanced with the limited future capacity of the adjoining highways (US 183, north and south MoPac). While Scenario 6 accommodates a significantly greater number of vehicles, it does so by attracting traffic from other corridors, thereby causing considerable increases in Loop 360 travel times.

Finally, the need for increased safety and congestion relief is immediate, and obtaining funding for a large, expensive project may take a long time. Even if the environmental, aesthetic and constructability issues could be resolved, it is doubtful if this option could provide timely relief.

On the other hand, all of the remaining options are inclusive and can be used as building blocks. They stand a greater chance of being funded earlier because they are less expensive. Thus, the ultimate cross-section is one that maximizes use of the existing Loop 360 roadway, the carrying capacity of the Pennybacker bridge, and use of the existing cleared right-of-way.

In the short term, the Austin District will continue its program of enhancing intersections with lane additions and extensions, as is cost effective and feasible. Also, there are still locations where innovative intersection treatments would be effective. The two roadway connections at RM 2222 and RM 2244 could be greatly improved using the Diverging Diamond Intersection design (see graphic in Appendix A) to better handle the distribution of traffic onto Loop 360.

While the exact configuration awaits more detailed study in the design phase, it is likely that different sections would warrant different treatments. Although the corridor was broken into six sections for public involvement purposes, Loop 360 actually operates in three distinctly different segments. Those segments are: the south segment – US 290/SH 71 to south MoPac – which is the most traveled section; the center segment – south MoPac to US 183 – which is the longest section; and the north Capital of Texas Highway segment – US 183 to north MoPac – which is a city street.

The south segment effectively starts as a highway and then becomes a six-lane divided roadway. Work on this section includes the possible addition of auxiliary lanes (or extended entrance/exit lanes), an overpass at Barton Creek Plaza, more effective at-grade connections to south MoPac, as well as flyovers. This section would become the most intensely developed section and would most closely resemble the cross-section in Scenario 6.

The center segment may ultimately become six continuous lanes with additional extended entrance/exit lanes where required and practical, as well as over/underpasses at major intersections. The ultimate corridor would ideally have no at-grade crossings and no traffic signals on the mainlanes, as this would make the greatest impact on improved mobility and safety.

Lastly, the north Capital of Texas Highway segment is already an at-grade six-lane divided roadway with mobility problems that are in no small part due to congestion on north MoPac and US 183. Congestion reduction here would depend on improvements to the ramps and access roads in the US 183/Loop 360/MoPac triangle. The solution to this congestion is beyond the scope of this study and would require

a study that looks specifically at the complicated interaction of these three major highways.

Going forward, the focus should be on grade-separating the existing four lanes – intersection by intersection. These improvements can be accomplished incrementally as funding is available. Once all the major intersections are grade-separated, an additional pair of lanes, either managed or general purpose, could be added in the center median and connected directly via flyovers to US 183 and south MoPac. Because of capacity limitations on those highways, the flyovers may be limited to one lane. The added pair of lanes on Loop 360 would be needed to handle the increased traffic generated by these enhanced connections without degrading the levels of service on intersections along the corridor.

As this process unfolds, bicycle and pedestrian accommodations could be upgraded, as feasible. Wide shoulders used by bicyclists would remain and ramp crossings would be improved. Pedestrian and bicycle crossings would be more hospitable using over/underpasses.

The customized corridor approach outlined here allows immediate implementation of an array of improvements. These improvements would ultimately lead to a highly effective corridor that safely serves both throughput and access with relatively low environmental impacts, high constructability, cost-effective improvements, high reuse of existing roadway, and neighborhood scale improvements.

TxDOT is committed to incorporating community values and implementing changes to Loop 360 to address the mobility and safety needs, while also maintaining the aesthetic and environmental appeal of this iconic central Texas roadway.

## NEXT STEPS

This study is the beginning of a process. Because of the serious and critical nature of the safety and congestion problems, the process will seek to bring relief as quickly as possible.

The next steps will be as follows:

### To bring short term relief (1-4 years):

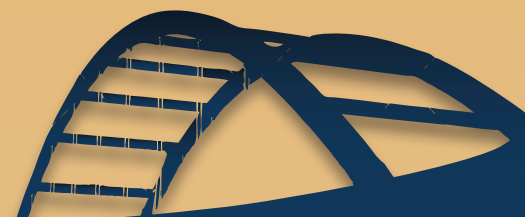
- Continue implementing bottleneck and safety projects as they can be devised and funded
  - Turn lane and signal improvements
  - Intersection reconstruction
  - Lane extensions
- Consider Diverging Diamond Intersections at RM 2244 and RM 2222 (see graphic in Appendix A)
- Project completions within 1-4 years depending on funding

### To achieve mid-term relief (5-10 years):

- Conceptual layout - Develop a conceptual layout of the corridor from US 290/SH 71 to US 183. This would determine the best locations for grade-separations and help prioritize projects with the greatest impact on reducing congestion.
- Environmental clearance and design - Determine the first two or three intersections to proceed to environmental clearance. Once cleared, they would then be designed and, when funding is available, constructed.
- Funding - Identify funding for initial grade-separation projects.
- Project completions within 5-10 years depending on environmental review and funding.

### To achieve long-term relief (10+ years):

- Over/underpasses - Continue environmental clearance and design of all major intersections to systematically eliminate all traffic signals and at-grade crossings of Loop 360 between US 290/SH 71 to US 183.
- Major highway connections - Coordinate design of Loop 360 with other major highway projects, such as US 183 North, MoPac Improvement Project, and proposed MoPac South, so that projects in those corridors may be constructed to integrate future Loop 360 improvements as effectively and efficiently as possible.
- Section 1 - city street segment from US 183 to north MoPac - Conduct a detailed study of all the access roads and ramps in the triangle of intersections created by US 183, north MoPac and Capital of Texas Highway to improve their ability to handle increasing traffic demand.
- Project completions beyond 10 years depending on environmental review and funding.



**Appendix A**  
**Diverging Diamond Intersection**

APPENDIX A

Sample of a Diverging Diamond Intersection

