

July 11, 2016

Andre H Betit, Jr. PE
Dipti Borkat-Desai, PE
Upal Barua, P. Eng., PE
City of Austin
Austin Transportation Department

RE: Austin Oaks TIA – TIA Comment Response

Dear Mr. Betit, Mr Borkar-Desai, and Mr. Barua:

Please accept this Comment Response Letter for the above referenced project. This submittal is in response to the comments provided by the Austin Transportation Department. The original comments have also been included below for reference.

Traffic Engineering and Arterial Management Division staff comments received 7/1/2016.

1. The TIA reduces the area trips by removing the existing office development traffic. However, the traffic is estimated using ITE LUG 710 (General Office Building) rather than actual traffic counts of the existing facility. We recommend that the trip reduction be based on actual count data versus ITE Trip Generation.

Response: The methodology of estimating the existing office development traffic using ITE LUG 710 was submitted in the scoping meeting notes. For consistency, it is appropriate to estimate existing office trips using ITE LUG 710 as this methodology was used to estimate proposed office trips.

2. Existing Traffic Volumes: Traffic counts were taken in March 2014 and are greater than 2 years old. We recommend that new traffic counts be obtained as opposed to applying a growth factor to old data.

Response: This approach was used during the Austin Oaks charrette. 24 hour counts were collected in 2016 to verify the practicality of growing the TMCs collected March 2014 by 2%. Please also note the City utilizes 2% growth in the scoping document. Attached is an analysis showing the validity of using the 2014 counts grown at 2% and volume balanced. See **Attachment**

3. Existing Traffic Volumes: Traffic volumes are reported for the Loop 1 on and off ramps. However no count data was provided in the Appendix. We recommend that the count data be included in the Appendix or an explanation of how the volumes were determined be provided.

Response: These volumes were calculated based upon volumes collected at intersections adjacent to each ramp:

- SB Off-Ramp – the volume difference between SB receiving lanes of Mopac & Spicewood Springs and SB approach lanes of Mopac & Executive Center
- SB On-Ramp – the volume difference between SB receiving lanes of Mopac & Executive Center Drive and SB approach lanes of Mopac & Far West
- NB On-Ramp – the NB receiving lanes of Mopac & Far West

- NB Off-Ramp – the NB approach lanes of Mopac & Spicewood Springs

4. Existing Traffic Volumes: It appears that the volumes shown in Exhibit 4 do not always agree with the peak hour counts included in Appendix E. It is unclear if the volumes presented are to use a uniform peak hour or are from balancing. We recommend that the Applicant clarify this discrepancy.

Response: The peak hour of each intersection was used. The peak hour counts included in Appendix E are year 2014. The volumes shown in Exhibit 4 are year 2016 (2014 volumes grown by 2% annually). Also, volume balancing will be completed in response to Comments 5,6, and 7 which will lead to the count exhibits and count volumes varying. Please also note the City utilizes 2% growth in the scoping document.

5. Existing Traffic Volumes: It appears that there may be an issue with intersection balancing between Executive Center Drive and Greystone Drive at their intersections with the Loop 1 southbound frontage road. The volume of traffic leaving the Executive Center Drive/ Loop 1 southbound frontage road intersection is 2,681 vehicles in the AM Peak Hour and 2,034 vehicles in the PM Peak Hour. However the number of vehicles arriving at the Greystone Drive/Loop 1 southbound frontage road intersection is 3,277 vehicles in the AM Peak Hour and 1,908 vehicles in the PM Peak Hour. This is a difference of a 596 vehicle increase in the AM Peak Hour and a 126 vehicle decrease in the PM Peak Hour. We recommend that the Applicant clarify this discrepancy.

Response: There are existing driveways between the intersections and the intersections have varying peak hours. Both these factors can contribute to discrepancies in volume balance between adjacent intersections. Were the volumes between intersections to be balanced, the recommendations of the analysis are not expected to change. The volumes will be balanced in the updated analysis.

6. Existing & 2016 Traffic Volumes: It appears that there may be an issue with traffic counts at the intersections of Mopac Service Road (NB and SB) and Spicewood Springs. Specifically during the PM peak hour, there appears to be a difference of 483 vehicles in the westbound direction and a difference of 254 vehicles in the eastbound direction along Spicewood Springs bridge between NB and SB Mopac (there is no access in between). All the analyses for 2016, 2018, and so forth were based on this count. We recommend that the Applicant review the balancing of intersections and clarify this discrepancy.

Response: The volumes used for the analysis reflect the data collected. Were the volumes between intersections to be balanced, the recommendations of the analysis are not expected to change. The volumes will be balanced in the updated analysis.

7. Existing | 2016 Traffic Volumes: Similar concerns exist in the traffic counts along Spicewood Springs between SB Mopac and Wood Hollow. During the PM peak hour, there is a difference of 271 vehicles in the eastbound direction between Wood Hollow and SB Mopac (there is no access in between). On the westbound direction, despite a Ri/Ro access between SB Mopac and Wood Hollow, it is concerning that there is a deficit of 729 vehicles in the westbound direction, from SB Mopac to Wood Hollow. It is not conceivable that 729 vehicles could make right-in and no vehicles made right-out from at the Ri/Ro access in the PM peak hour. We recommend that the Applicant review the balancing of intersections and clarify this discrepancy.

Response: The volumes used for the analysis reflect the data collected. Were the volumes between intersections to be balanced, the recommendations of the analysis are not expected to change. The volumes will be balanced in the updated analysis. The volumes balancing was focused on the thru movements of Spicewood Springs.

8. Background Growth: The TIA indicates that a 2% background growth rate was used as identified in the scoping document. The TIA indicates that this rate was reviewed based on count data from TXDOT. However, the TIA does not appear to contain information or supporting calculations showing this review. We recommend that the Applicant provide this information and supporting calculations as an Appendix to the TIA.

Response: Supporting calculations for the background growth rate will be provided as an Appendix to the TIA. Please also note the City utilizes 2% growth in the scoping document. See **Attachment**.

9. Trip Distribution: Site trips were assigned to the various site driveways as part of the analysis. However, no explanation or discussion of how the trips were assigned to each driveway is provided in the TIA. We recommend that the Applicant provide this information in the TIA.

Response: Trips were assigned to driveways based on the quantity of trips generated by the land uses the driveway provides access to. In other words, the trips were distributed among driveways based on the square footage of development served. Local distribution information will be provided as an Appendix to the TIA. See **Attachment**.

10. Trip Distribution: From the information provided in Exhibit 6, it appears that 8% of the exiting site trips are anticipated to turn right onto the Loop 1 SB frontage road and then make 2 left turns at Far West Blvd. to take Loop 1 north and then exit Loop 1 and make a right onto Anderson Lane rather than using Spicewood Springs Road from either Hart Lane or Wood Hollow Drive. We recommend that the Applicant provide justification why such a significant number of trips will use the proposed indirect route, as opposed to eastbound Spicewood Springs which is more of a direct route (noted that 10% exiting trips were assigned to this route).

Response: Using the frontage road, although a greater distance, is comparable to traveling north on Wood Hollow Drive and East on Spicewood Springs Road; particularly vehicles accessing the southbound frontage road via Greystone Drive.

11. Trip Distribution: Site trips were assigned to the various site driveways as part of the analysis. However, no explanation or discussion of how the trips were assigned to each driveway is provided in the TIA. We recommend that the Applicant provide this information in the TIA.

Response: See **Response #9**.

12. 2018 Traffic Volumes: The traffic volumes shown on Exhibit 12 at the site driveway differ from those shown on Exhibit 10. The TIA does not include an explanation of why these volumes are different and provides no supporting documentation for the difference. This discrepancy was noted on all other analysis periods as well. We recommend that the Applicant clarify this discrepancy with an explanation as well as documentation and calculations supporting the explanation provided.

Response: We understand that the combination of Exhibit 10 and Exhibit 12 may be confusing. We intend to eliminate Exhibit 10 and clarify that the public intersection analysis is based on the net new traffic while the driveway analysis is based on the entire site trip generation.

13. 2020 Global Trip Assignment: The traffic volumes shown on Exhibit 16 appear to have some calculation discrepancies between the distribution percentage and the volumes reported. For example at the Loop 1 SB on ramp, the reported volumes are 30 AM peak hour and 43 PM peak hour trips. However, when the distribution percentages shown on Exhibit 6 are applied, the volumes for the Loop 1 SB on ramp calculate to be, 50 AM peak hour and 71 PM peak hour trips. These types of discrepancies were noted in other analysis periods as well. We recommend that the Applicant clarify these discrepancies and verify all trip calculations.

Response: We agree; ramp volumes have been updated. However, this does not affect the results of the analysis as volumes at the ramps were not used for the analysis.

14. 2020 Local Trip Distribution: From the information provided in Exhibit 17, the percentage of site trips entering the phase 1 portion of the site is lower than it was with the 2018 Local Trip Distribution. We recommend that the Applicant provide an explanation for this difference.

Response: As additional phases of the development are constructed, the percent of overall trips allocated to one portion (or phase) of the site decreases. Each analysis year was analyzed independently.

15. Advisory Comment on Intersection Capacity Analysis: The TIA Scope (included in Appendix A) asked for
f)

- existing conditions (am + pm on one sheet),
- six (6) future conditions:
 - (am background, am background + site, am background + site + mitigation)
 - (pm background, pm background + site, pm background + site + mitigation)

The scope specifically asked for future conditions am/pm background, am/pm background+ site, then am/pm background+ site+ **MITIGATION**. It was asked to compare Build and No-Build scenarios without mitigation, and then with mitigation. Introducing mitigation on existing condition and assuming them in the No-Build scenario on the opening day, made it very difficult to compare Build and No-Build scenarios, and assess the impact(s) from the proposed development. It is recommended that the mitigation analysis focus on the Build and Phasing years, rather than existing conditions as per the approved scope.

Response: The existing (2016) mitigation will be moved into the 2018 scenario. No mitigation will be assumed with the existing scenario. For future years mitigation recommended in previous years is incorporated into build analyses in order to identify improvements in the current phase. A comparison of build without mitigation and build with previous phase & current phase mitigation would not allow one to identify the impacts of mitigation recommended in the current phase. The OPCC has been updated and is provided as an **Attachment**.

16. The TIA scope asked for v/c, LOS, delay and 95% queue length by movements, the TIA report provided the parameters by approaches. Please update the analysis tables so they agree with what was identified in the approved scope.

Response: Acknowledged that the review will be by movement.

17. LOS Analysis: The LOS analysis presented uses an overall intersection Peak Hour Factor (PHF) rather than the PHFs by approach. We recommend that the analysis be prepared using the PHF by approach

Response: Note the HCM 2010 recommends one peak hour for the entire intersection. This was a change for the HCM 2000. As described in the HCM 2010: "The use of a single peak hour factor for the entire intersection is intended to avoid the likelihood of creating demand scenarios with conflicting volumes that are disproportionate to the actual volumes during the 15-min analysis period."

18. 2016 Improvements at Spicewood Springs Road & Hart Lane: About 27% of inbound trips and 17% outbound trips were shown to use this intersection to access the site (Exhibit 6). However, there was no discussion about this impacted intersection under 2018 Build Analysis Results section. Please include discussion(s) on the impact of the site traffic on this intersection and propose appropriate recommendation(s) accordingly. The northbound taper length shown appears to be substandard. We recommend that the Applicant review this length.

In addition, the intersection at Spicewood Springs & Hart Lane is at a steep downhill east to west in combination with a tight horizontal curve. There are significant safety concerns associated with eastbound vehicles driving on a downhill with very limited sight distance, if a traffic signal is constructed. We recommend that a more conventional intersection configuration be considered which eliminates the existing center triangle island on the westbound roadway.

Due to the safety concern associated with the eastbound vehicles (in case of a traffic signal), it is recommended to install an advance warning flasher west of the intersection synchronized with the traffic signal to address this potential safety issue.

Response: The intersection of Spicewood Springs Road & Hart Lane operates at LOS B in the 2018 Build condition and the northbound taper is adequate to provide storage for the 95th percentile queue length reported. No improvements to the intersection are necessary in year 2018.

We agree, it is recommended to install an advance warning flasher west of the intersection synchronized with the traffic signal to address this potential safety issue. Furthermore, the design of the traffic signal at the intersection at Spicewood Springs & Hart Lane should address safety concerns and consider more conventional intersection configurations.

19. Spicewood Springs & Wood Hollow Drive: It appears that westbound left-turn bay extension and right-turn overlap phase were recommended at the intersection of Spicewood Springs & Wood Hollow Drive; however, the Applicant contribution to these improvements was not included in the TIA report. From the data presented in the TIA it appears that about 15% of the inbound trips and 15% of the outbound trips were shown to use these left-turn and right-turn lanes to access the site (Exhibit 6). No discussions were included about these impacted movements under 2018 Build Analysis Results section and how any proposed improvements would address these impacts. Please include discussions on the impact of the site traffic on these movements and propose appropriate recommendation(s) accordingly

In addition, The TIA report recommended adjustment of signal timing at the intersection of Spicewood Springs & Wood Hollow Drive. However, no specific signal timing plan(s) were proposed or included in the TIA report. We recommend that these be included in the TIA for review.

Response: The westbound left-turn bay extension and right-turn overlap phase improvements are recommended at the intersection of Spicewood Springs & Wood Hollow Drive to improve existing

traffic operations. Note this existing (2016) mitigation will be moved into the 2018 scenario. Further improvements to the intersection are not required to mitigate site traffic. A specific signal timing plan for the intersection will be provided as an Appendix to the TIA. See **Attachment**.

20. Executive Center & Wood Hollow Drive: A multi-lane roundabout was recommended at the intersection of Executive Center & Wood Hollow Drive. Reviewing the analysis results at this intersection, it appears that the recommended multi-lane roundabout would be warranted at the opening day (2018). No analysis results were included supporting that an all-way stop would work in the interim. Reviewing the traffic volume during the peak hour, it appears that an all-way Stop may not work in the interim. Therefore, we recommend that the roundabout be constructed opening day to accommodate the proposed 2018 build traffic.

Response: The roundabout improvement requires right-of-way. It is recommended the traffic volumes at the intersection be monitored until the volumes merit the construction of the roundabout. An analysis will be provided which indicates that an all-way stop would work in the interim (years 2020 and 2022). The updated TIA will recommend future analysis in 2020/2022 and the roundabout in 2024. See **Attachment**.

21. Mopac Southbound Frontage Road from Spicewood Springs Road to Far West Boulevard: The TIA report recommended improvements at Mopac Southbound Frontage Road & Spicewood Springs Eastbound to Southbound Right-turn, at the Mopac Southbound Frontage Road & Executive Center Drive intersection, and Mopac Southbound Frontage Road & Greystone Drive intersection, back and forth between 2016 and 2018 (Exhibit C). However, the exhibits provided didn't show how the improvements interact with each other, i.e. how the weaving, merging, diverging would occur along Mopac Southbound Frontage Road from Spicewood Springs to Greystone Drive. Please present / provide all these improvements in one conceptual figure / drawing, with existing and proposed right of way (ROW), dimension and scale (including the tapers; the tapers appeared to be deficient from cursory review) from Spicewood Springs to Greystone Drive.

Based on the cursory review of the proposed improvement concepts of southbound Mopac Service Road, from Spicewood Springs Road to Far West Boulevard, it appeared that there may be significant safety concerns with weaving, merging, diverging. It is recommended that a continuous additional lane be considered along Mopac Service Road from Spicewood Springs Road to Far West Boulevard.

Additionally, at the intersection of Executive Center Drive & Mopac Loop 1 SB Frontage Road: the 2016 improvements show 4 SB thru lanes approaching this intersection while only 3 receiving lanes currently exist.

Response: To the extent possible, an 8' sidewalk will be provided along Mopac Southbound Frontage Road. The improvements recommended along Mopac Southbound Frontage Road will be incorporated into a single exhibit. Any improvements at Mopac Frontage Road are subject to TxDOT approval. See **Attachment**.

A continuous additional lane was considered along Mopac Service Road from Spicewood Springs Road to Far West Boulevard. This improvement was not incorporated into this analysis as it is not expected to be constructed in the foreseeable future.

A southbound right-turn deceleration lane is recommended as the 2016 (now 2018) improvement along Mopac Loop 1 SB Frontage Road at Executive Center Drive. The exhibit intends to show 3 SB thru lanes and 1 SB right-turn lane.

22. Intersection of Southbound Mopac & Spicewood Springs Road: The intersection of Southbound Mopac & Spicewood Springs Road was reported to fail under 2018 build scenario (e.g. PM peak: EST v/c 1.49, LOS F, queue length 1095 feet etc. and continue to deteriorate in the following phases). However, no discussion was included in the TIA report on the failing movements, and how the proposed development impacts these movements during the peak hour(s). No mitigation measures were recommended to address these failing movements and no discussion / justification was not provided. We recommend that Applicant review operations at this intersection and include a discussion of needed mitigation to address the failing conditions.

Also, in Table 11, at the intersection of Spicewood Springs & SB Mopac, it shows that during the AM peak hour, the EB approach improves from v/c of 1.52 & delay of 253 sec/veh under No-build Condition to v/c 1.27 & delay of 121 sec/veh under Build Condition (without mitigation). Please provide discussion / justification how additional site traffic would/could improve traffic operation (v/c, delay etc.) without any mitigation(s).

Additionally, the proposed improvements at Spicewood Springs Road/ Mopac /Loop 1 Service Road show 2-11' receiving lanes as part of the improvements at the intersection. We recommend that these receiving lanes be a minimum of 12'.

Response: Issues along Loop 1 are due to limited capacity. Regional improvements are required to achieve an acceptable LOS at the intersections along Loop 1. Applicant will ask TxDOT to provide any regional improvement plans for Mopac. Applicant requests that the City also seek any regional improvement plans for Mopac from TxDOT.

It was recommended the eastbound right-turn at Spicewood Springs onto Mopac SB Frontage Road be improved to function as a free movement in 2016. The 2018 Build analysis incorporates the improvements recommended in 2016, where the No Build analysis does not. This accounts for the better operations between scenarios in the AM peak hour.

To the extent possible, an 8' sidewalk will be provided along Mopac Southbound Frontage Road. Recommended lane widths along Mopac SB Frontage Road will be shown at a minimum of 12'. Any improvements at Mopac Frontage Road are subject to TxDOT approval.

23. Intersection of Northbound Mopac & Spicewood Springs Road: The intersection of Northbound Mopac & Spicewood Springs Road was reported to fail under 2018 build scenario (e.g. AM peak: NBL v/c 1.43, LOS F, queue length 609 feet etc. and continue to deteriorate in the following phases). However, no discussion was included in the TIA report on the failing movements, and how the proposed development impacts these movements during the peak hour(s). No mitigation measures were recommended to address these failing movements and no discussion / justification was not provided. We recommend that Applicant review operations at this intersection and include a discussion of needed mitigation to address the failing conditions

Response: Issues along Loop 1 are due to limited capacity. Regional improvements are required to achieve an acceptable LOS at the intersections along Loop 1. Applicant will ask TxDOT to provide any regional improvement plans for Mopac. Applicant requests that the City also seek any regional improvement plans for Mopac from TxDOT.

To the extent possible, an 8' sidewalk will be provided along Mopac Southbound Frontage Road. Any improvements at Mopac Frontage Road are subject to TxDOT approval.

24. Intersection of Greystone Drive & Southbound Mopac: The TIA report under the 2018 build condition identifies that the right-out movement fails at the intersection of Greystone Drive & Southbound Mopac due to lack of acceptable and safe gap in the southbound Mopac traffic stream (as reported in Section B 2018 Build Analysis Results). However, the TIA report didn't identify how to address / mitigate this safety and operational concern with the right-out movement at Greystone Drive. Please provide recommendations to address these concerns.

Response: To the extent possible, an 8' sidewalk will be provided along Mopac Southbound Frontage Road. Any improvements at Mopac Frontage Road are subject to TxDOT approval.

It was recommended a southbound deceleration lane be provided along Mopac Loop 1 SB Frontage Road at Greystone Drive in 2016. As a result, the intersection reports improved operations between no build and build scenarios.

25. Intersection of Hart Lane and Greystone Drive: The proposed improvement(s) / re-configuration at the intersection of Hart Lane & Greystone Drive as presented in Exhibit C 2024 Improvements, call(s) for removal of the bi-cycle lane from Hart Lane north of Greystone Drive. What alternative bicycle facility is being proposed to facilitate Bicycle movements on Hart Lane, north of Greystone Drive? Also, please provide dimensions on Greystone Drive at the intersection approaches, so that the reviewers can complete geometric review.

Response: At the north leg of the intersection of Hart Lane and Greystone Drive, bicycles and vehicles will share a lane. Because additional vehicle capacity is only needed at the intersection, Hart Lane north of the intersection will transition to a single-lane northbound. Similar to Mesa Drive at its intersection with Greystone Drive, the bike lane will remain approximately 250' north of the intersection. In Exhibit C 2024 Improvements, dimensions will be provided on Greystone Drive at the intersection approaches.

26. Intersection of Hart Lane and Executive Center Drive: The proposed improvement(s) / re-configuration at the intersection of Hart Lane & Executive Center Drive is presented in Exhibit A 2024 Improvements. However, the figure was not dimensioned on Hart Lane at the intersection approach. Based on the cursory review, it appears that the intersection approaches on Hart Lane may not work geometrically. The Northbound lane on Hart Lane was aligned with the opposing left-turn lane, leaving a full lane off-set with the northbound through receiving lane. Also, the northbound receiving lane appeared to have conflict between northbound vehicles and bicycles. Please provide revised recommendation(s)/figure(s) with proper intersection geometry.

Response: Exhibit A 2024 Improvements will be revised.

27. Intersection of Far West Boulevard and Hart Lane: The reviewer acknowledges recommended improvement(s)/reconfiguration at the intersection of Far West Boulevard & Hart Lane. However, the reviewer was unable to compare no-build and build scenario to assess the impact from additional traffic from the proposed development (as per the scope), as improvements were already assumed in the existing condition (2016). See previous comments regarding this. Exhibit (Exhibit F) was included in the Appendix; however, necessary dimensions (lane widths) were not provided to assess the feasibility, geometry, and need for additional ROW. Proposed sidewalk at the northbound approach was proposed as 4 feet, which is deficient. Please include minimum standard sidewalk on the northbound approach.

Response: The study's methodology assumes mitigation recommended in previous years is incorporated into build analyses of later years (see **Response 15**). Exhibit F A 2016 Improvements will be revised to include the minimum standard sidewalk on the northbound approach.

28. Intersection of Northbound Mopac Service Road & Far West Boulevard: The intersection of Northbound Mopac & Far West Boulevard was reported to fail under 2018 build scenario (e.g. PM peak: EBL v/c over 1, LOS F, queue length 879 feet etc. and continue to deteriorate in the following phases). However, no discussion was included in the TIA report on the failing movement, and how the proposed development impacts this movement during the peak hour(s). No mitigation measures were recommended to address this failing movement and no discussion / justification was provided. We recommend that Applicant review operations at this intersection and include a discussion of needed mitigation to address the failing conditions.

Response: Issues along Loop 1 are due to limited capacity. Regional improvements are required to achieve an acceptable LOS at the intersections along Loop 1.

29. There may be additional comments based on the review of any additional addendum / analysis / revision submitted.

Response: Acknowledged.

30. TxDOT Review: The Applicant should be aware that TxDOT also needs to approve and review all proposed improvements along their roadways.

Response: Acknowledged. A TIA was submitted to TxDOT.

Please contact me at 817-335-6511 if additional information is required.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.

Jeff Whitacre, P.E., AICP, PTP
Transportation Engineer

Comment Response Attachment – Additional Documentation

Response 2: Supporting calculations for using the 2014 counts:

The 2014 counts were compared to the 2016 24-hour counts and the percent difference (actual-expected)/expected) was calculated. The table below shows the data for this comparison.

Roadway	24-Hour	TMC	% Difference
Executive Center Dr	176	190	8%
Far West Blvd	4418	5142	16%
Hart Lane	939	1020	9%
Spicewood Springs Rd	4174	4791	15%
Wood Hollow Dr	1013	1148	13%

Note: The 24-hour volume shown is the sum of the 2016 AM and PM peak hour bi-directional volume along the designated roadway. The TMC volume shown is the corresponding approach volumes used for the Existing conditions analysis (2014 TMCs grown at 2% and adjusted for volume balancing).

The results of the comparison show the TMCs to be within an acceptable margin of error when compared to the 24-hour counts. Furthermore, in all cases the TMCs were shown to be greater than the 24-hour counts at the same location.

Response 8: Supporting calculations for background growth:

Background Traffic—Annual growth rate of 2% will be assumed. This rate will be verified in comparison with surrounding development data. The table below shows historic AADT on roadways in the vicinity of the proposed development provided by the TxDOT Statewide Planning Map. The average annual growth rate for the total AADT between 2007 and 2013 is approximately 2.1%.

Year	Volume				Annual Growth Rate	Average Annual Growth Rate
	SH 360	US 183	Loop 1	Total		
2013	47,881	188,725	172,032	408,638	1.40%	2.1%
2012	46,000	186,000	171,000	403,000	4.40%	
2011	44,000	178,000	164,000	386,000	-4.93%	
2010	45,000	187,000	174,000	406,000	5.73%	
2009	49,000	167,000	168,000	384,000	-1.29%	
2008	52,000	165,000	172,000	389,000	7.46%	
2007	55,000	141,000	166,000	362,000		

Response 9: Local distribution information:

% Of Total Development Site Trips		Analysis Year			
		2024	2022	2020	2018
Phase	Phase I	20%	30%	60%	100%
	Phase II	15%	20%	40%	
	Phase III	40%	50%		
	Phase IV	25%			

The table above shows the breakdown (by phase) of total site traffic for each analysis year. ie. Phase II generates approximately 40% of total site traffic in year 2020 and 20% in year 2022. Driveways which provide access to each phase were assigned trips accordingly.

Response 15: Revised Mitigation OPCC

The Opinion of Probable Cost Summary (Tables 22 and 23) have been updated to reflect changes to mitigation. Namely, no improvements recommended in year 2016 and recommendations at the intersection of Executive Center Drive and Wood Hollow Drive, prior to the roundabout being recommended in year 2024.

The Opinion Of Probable Cost Summary – 2018 Improvements

Improvement Name	Improvement Description	Opinion of Probable Cost (\$)	Site Traffic (%)	Pro-Rata Cost Share (\$)
1. Spicewood Springs Road & Hart Lane (2018)	Install a fully actuated traffic signal at the intersection of Spicewood Springs Road and Hart Lane.	\$ 420,000	11.0%	\$ 46,200
2. Spicewood Springs Road & Wood Hollow Drive (2018)	Extend the westbound left-turn bay of Spicewood Springs Road to Wood Hollow Drive.	\$ 50,000	42.5%	\$ 21,250
3. Spicewood Springs Road & Wood Hollow Drive (2018)	Provide a right-turn overlap operation at the northbound right-turn movement of Wood Hollow Drive to Spicewood Springs Road.	\$ 10,000	29.3%	\$ 2,930
4. Spicewood Springs Road & Loop 1 SBFR (2018)	Provide a FREE eastbound right-turn movement from Spicewood Springs Road to Loop 1 SBFR	\$ 25,000	0.0%	\$ -
5. Executive Center Drive & Loop 1 SBFR (2018)	Construct a southbound right-turn deceleration lane on Loop 1 SBFR (upstream of Executive Center Drive).	\$ 150,000	77.5%	\$ 116,250
6. Greystone Drive & Loop 1 SBFR (2018)	Construct a southbound right-turn deceleration lane on Loop 1 SBFR (upstream of Greystone Drive).	\$ 150,000	39.5%	\$ 59,250
7. Far West Boulevard & Hart Lane (2018)	Widen the northbound approach and restripe the southbound approach of Hart Lane at the intersection of Far West Boulevard.	\$ 95,000	8.6%	\$ 8,170
8. Far West Boulevard & Wood Hollow Drive (2018)	Provide a right-turn overlap operation at the northbound right-turn movement from Wood Hollow Drive to Far West Boulevard.	\$ 20,000	0.0%	\$ -
9. Far West Boulevard & Loop 1 SBFR (2018)	Provide a FREE, channelized operation at the southbound right-turn movement from Loop 1 SBFR to Far West Boulevard (westbound)	\$ 150,000	7.5%	\$ 11,250
10. Spicewood Springs Road & Wood Hollow Drive (2018)	Adjust signal timing at the intersection of Spicewood Springs Road and Wood Hollow Drive.	\$ 10,000	14.2%	\$ 1,420
11. Executive Center Drive & Wood Hollow Drive (2018)	Provide stop-control at the northbound and southbound approaches of Wood Hollow Drive.	\$ 10,000	52.6%	\$ 5,500
12. Executive Center Drive & Wood Hollow Drive (2018)	Restripe Wood Hollow Drive between Executive Center Drive and Spicewood Springs Road.	\$ 20,000	40.1%	\$ 8,020
13. Executive Center Drive & Loop 1 SBFR (2018)	Construct a southbound acceleration lane on Loop 1 SBFR (downstream of Executive Center Drive).	\$ 120,000	85.6%	\$ 102,720
14. Far West Boulevard & Wood Hollow Drive (2018)	Adjust signal timing at the intersection of Far West Boulevard and Wood Hollow Drive.	\$ 10,000	5.6%	\$ 560
2018 Improvements Subtotal		\$ 1,240,000	-	\$ 383,520

The Opinion Of Probable Cost Summary – 2020, 2022, 2024 Improvements

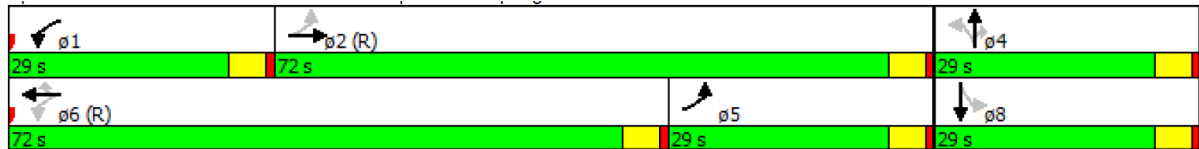
Improvement Name	Improvement Description	Opinion of Probable Cost (\$)	Site Traffic (%)	Pro-Rata Cost Share (\$)
2020 improvements				
1. Executive Center Drive & Wood Hollow Drive (2020)	Widen Wood Hollow Drive to include a four-lane cross-section at the northbound and southbound approaches	\$ 20,000	52.6%	\$ 10,500
2. Far West Boulevard & Wood Hollow Drive (2020)	Adjust signal timing at the intersection of Far West Boulevard and Wood Hollow Drive.	\$ 10,000	5.6%	\$ 560
2022 improvements				
1. Executive Center Drive & Wood Hollow Drive (2022)	Widen Executive Center Drive to include a four-lane cross-section at eastbound and westbound approaches	\$ 20,000	52.6%	\$ 10,500
2. Far West Boulevard & Wood Hollow Drive (2022)	Restripe the eastbound approach of Far West Boulevard at Wood Hollow Drive.	\$ 10,000	3.0%	\$ 300
2024 improvements				
1. Executive Center Drive & Hart Lane (2024)	Restripe the westbound approach of Executive Center Drive at Hart Lane (1a) and restripe Hart Lane between Executive Center Drive and Spicewood Springs Road (1b).	\$ 20,000	79.1%	\$ 15,820
2. Executive Center Drive & Wood Hollow Drive (2024)	Construct a multi-lane roundabout at intersection of Executive Center Drive and Wood Hollow Drive.	\$ 2,000,000	52.6%	\$ 1,052,000
3. Greystone Drive & Hart Lane (2024)	Restripe the southbound approach of Hart Lane at Greystone Drive.	\$ 20,000	9.7%	\$ 1,940
4. Greystone Drive & Wood Hollow Drive (2024)	Restripe the northbound approach of Wood Hollow Drive at Greystone Drive.	\$ 20,000	40.2%	\$ 8,040
5. Far West Boulevard & Wood Hollow Drive (2024)	Adjust signal timing at the intersection of Spicewood Springs Road and Wood Hollow Drive.	\$ 10,000	5.6%	\$ 560
Future Improvements Subtotal		\$ 2,130,000	-	\$ 1,100,220

Response 19: Signal timing plan for the intersection of Spicewood Springs & Wood Hollow Drive:

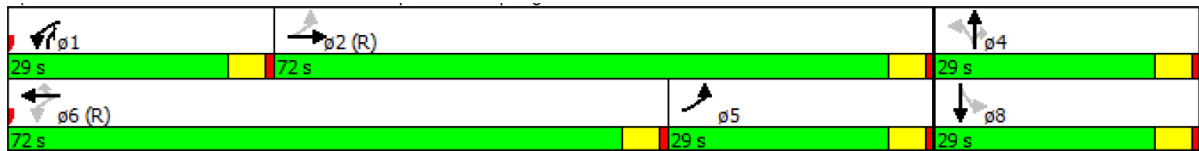
Signal timing adjustments were made to the AM and PM peak hours in years 2016 and 2018. The suggested signal timing plans for the intersection of Spicewood Springs & Wood Hollow Drive are shown in the following graphics:

AM Peak Hour

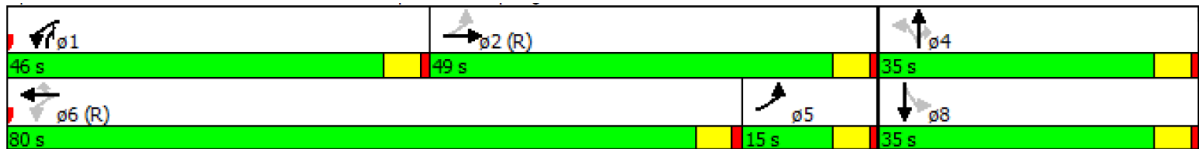
2016 Existing:



2016 Mitigated:



2018 Mitigated:



PM Peak Hour

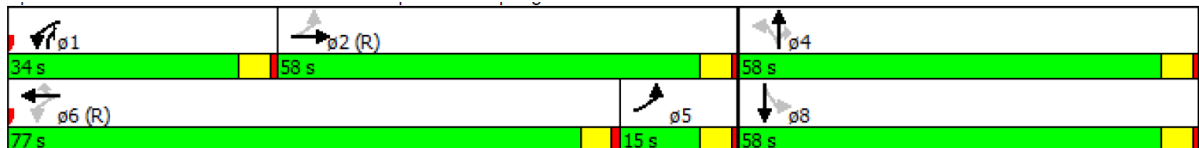
2016 Existing:



2016 Mitigated:



2018 Mitigated:



Response 20: All-way stop controlled (alternative mitigation) analyses at Executive Center & Wood Hollow Drive.

As an alternative to the multi-lane roundabout, all-way stop control can be implemented alongside roadway widening improvements to mitigate impacts of the proposed development. The table below is a summary of the assumptions used to analyze each of these alternative scenarios.

Scenario	Development	Roadway	Traffic Volume
2020 Build	Existing Conditions + Net Development (Phases I&II)	Widen Wood Hollow Drive to include a 4-lane cross-section at NB and SB approaches	2020 No Build Conditions + Net Development Volumes (Phases I&II)
2022 Build	Existing Conditions + Net Development (Phases I,II&III)	2020 Build Condition	2022 No Build Conditions + Net Development Volumes (Phases I,II&III)
2022 Mitigated	2022 Build Conditions	Widen Executive Center Drive to include a 4-lane cross-section at EB and WB approaches	2022 Build Conditions

The table below is a summary of the PM Peak Hour LOS analyses (only the PM peak hour is shown as it is the worst case scenario) for years 2020 and 2022.

PM PEAK HOUR LOS			2020 Build Condition		2022 Build Condition		2022 Mitigated Condition	
Intersection	Traffic Control	Approach	Delay	LOS	Delay	LOS	Delay	LOS
Executive Center Drive & Wood Hollow Drive	AWSC	EB	27.1	D	75.2	F	31.6	D
		WB	28.6	D	74.2	F	34	D
		NB	19.8	C	41.7	E	42	E
		SB	15.3	C	23.3	C	23.8	C
		INT	22.8	C	54	F	33.8	D

Response 21: See Exhibit A.



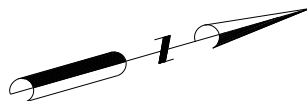
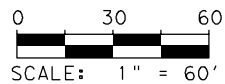
MATCHLINE A-A



MATCHLINE A-A

NOTE:

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Nathan Wilkes comments regarding Conceptual Improvements received by phone 7/7/2016.

Comments were verbalized over the telephone and brief description of each comment is recorded below.

1. 2016 Exhibit A: Spicewood Springs Road & Hart Lane - Connect Bike Lane from Northbound Hart Lane to eastbound Spicewood Springs Road

Response: See **Revised Exhibit**.

2. 2016 Exhibit B: Spicewood Springs Road & Wood Hollow Drive – None

3. 2016 Exhibit C: Spicewood Springs Road & Loop 1 SBFR – Provide 12' lanes along Mopac Southbound Frontage Road; provide 5' bike lane westbound along Spicewood Springs Road.

Response: Subject to TxDOT approval. See **Revised Exhibit**.

4. 2016 Exhibit D: Executive Center Drive & Loop 1 SBFR – Provide 8' sidewalk along Mopac Southbound Frontage Road; show right-turn arrow to indicate direction of travel.

Response: Subject to TxDOT approval. See **Revised Exhibit**.

5. 2016 Exhibit E: Greystone Drive & Loop 1 SBFR - Provide 8' sidewalk along Mopac Southbound Frontage Road; show right-turn arrow to indicate direction of travel.

Response: Subject to TxDOT approval. See **Revised Exhibit**.

6. 2016 Exhibit F: Far West Boulevard & Hart Lane – Restripe the north-leg of the intersection to provide three 10' approach lanes and a single 14' receiving lane.

Response: See **Revised Exhibit**.

7. 2016 Exhibit G: Far West Boulevard & Wood Hollow Drive – None

8. 2016 Exhibit H: Far West Boulevard & Loop 1 SBFR – Provide a concept which will accommodate the 5' bike lane that is planned along the north-side of Far West Boulevard.

Response: The proposed southbound channelized right-turn movement is intended to accommodate the planned bike lane. However, it remains unclear what further improvements will be necessary to accommodate the bike lane west of the intersection. See **Revised Exhibit**.

9. 2018 Exhibit A: Executive Center Drive & Wood Hollow Drive – None

10. 2018 Exhibit B: Spicewood Springs Road & Wood Hollow Drive – None

11. 2018 Exhibit C: Executive Center Drive at Loop 1 SBFR - Provide 8' sidewalk along Mopac Southbound Frontage Road; show right-turn arrow to indicate direction of travel.

Response: Subject to TxDOT approval. See **Attachment**.

12. 2022 Exhibit A: Far West Boulevard & Wood Hollow Drive – None
13. 2024 Exhibit A: Executive Center Drive & Hart Lane – Provide lane alignment along Hart Lane through the intersection of Executive Center Drive' Provide bike lanes along Hart Lane and Executive Center Drive.

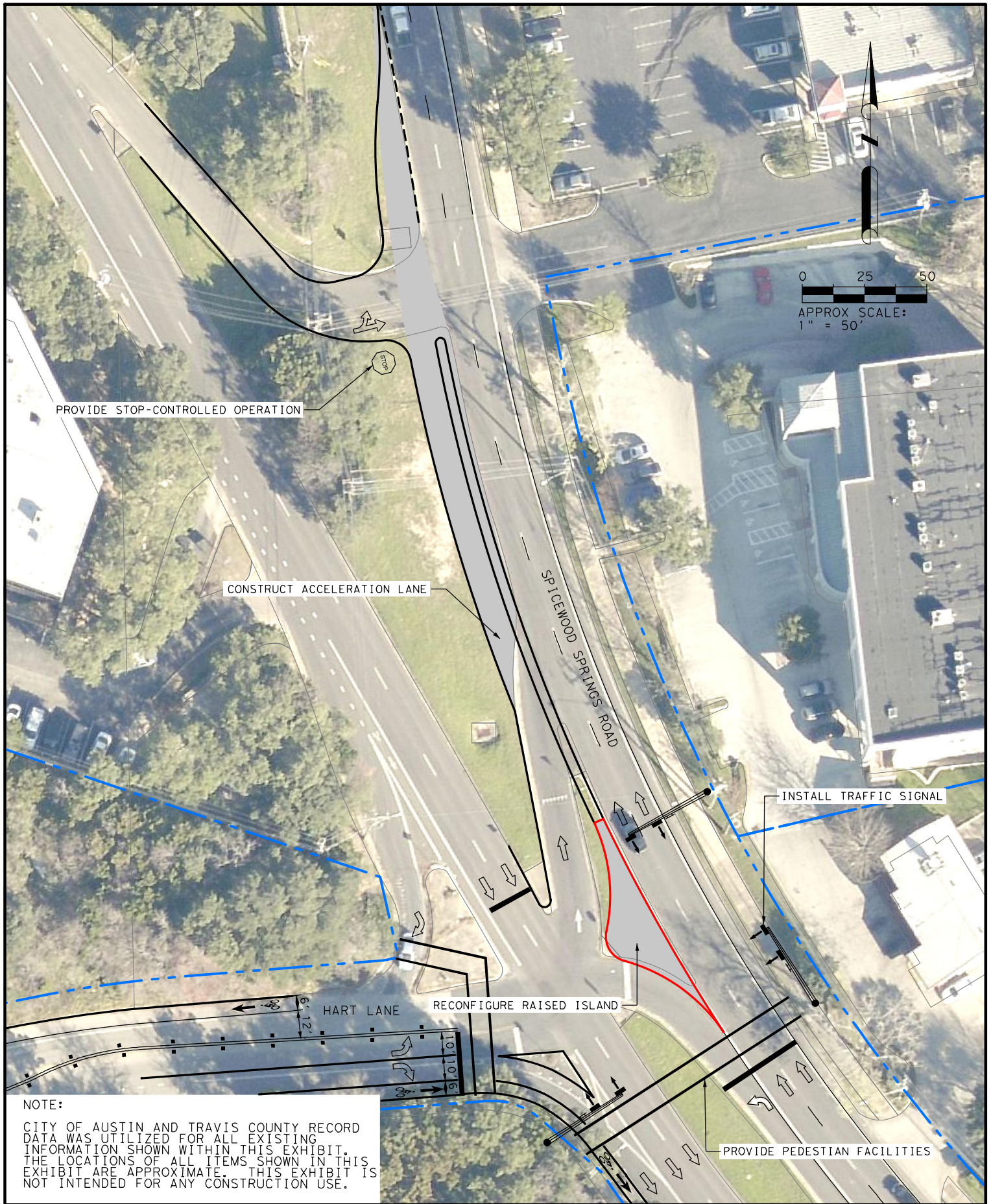
Response: See *Attachment*.

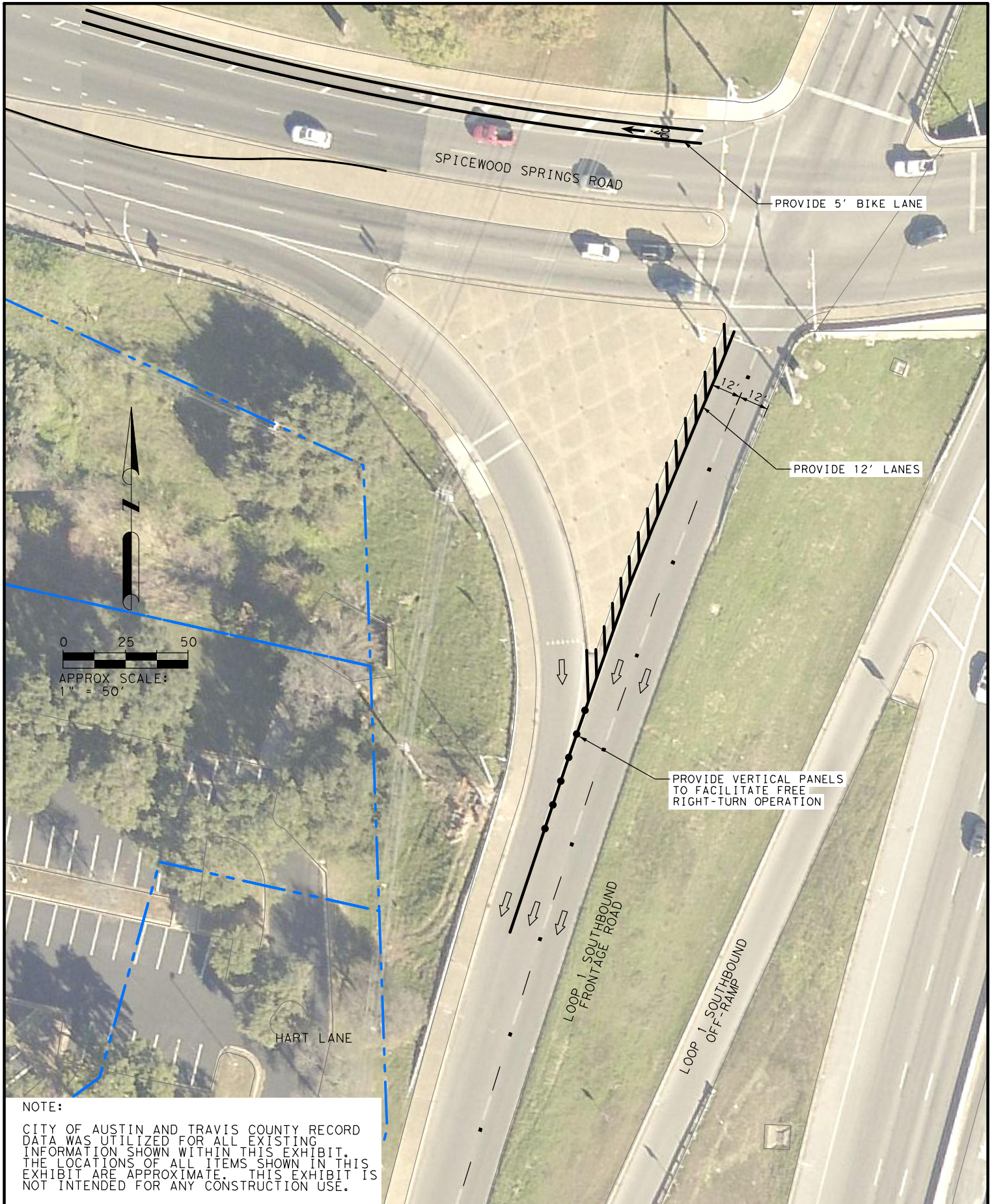
14. 2024 Exhibit B: Greystone Drive & Hart Lane – None

15. 2024 Exhibit C: Greystone Drive & Wood Hollow Drive – None

End.

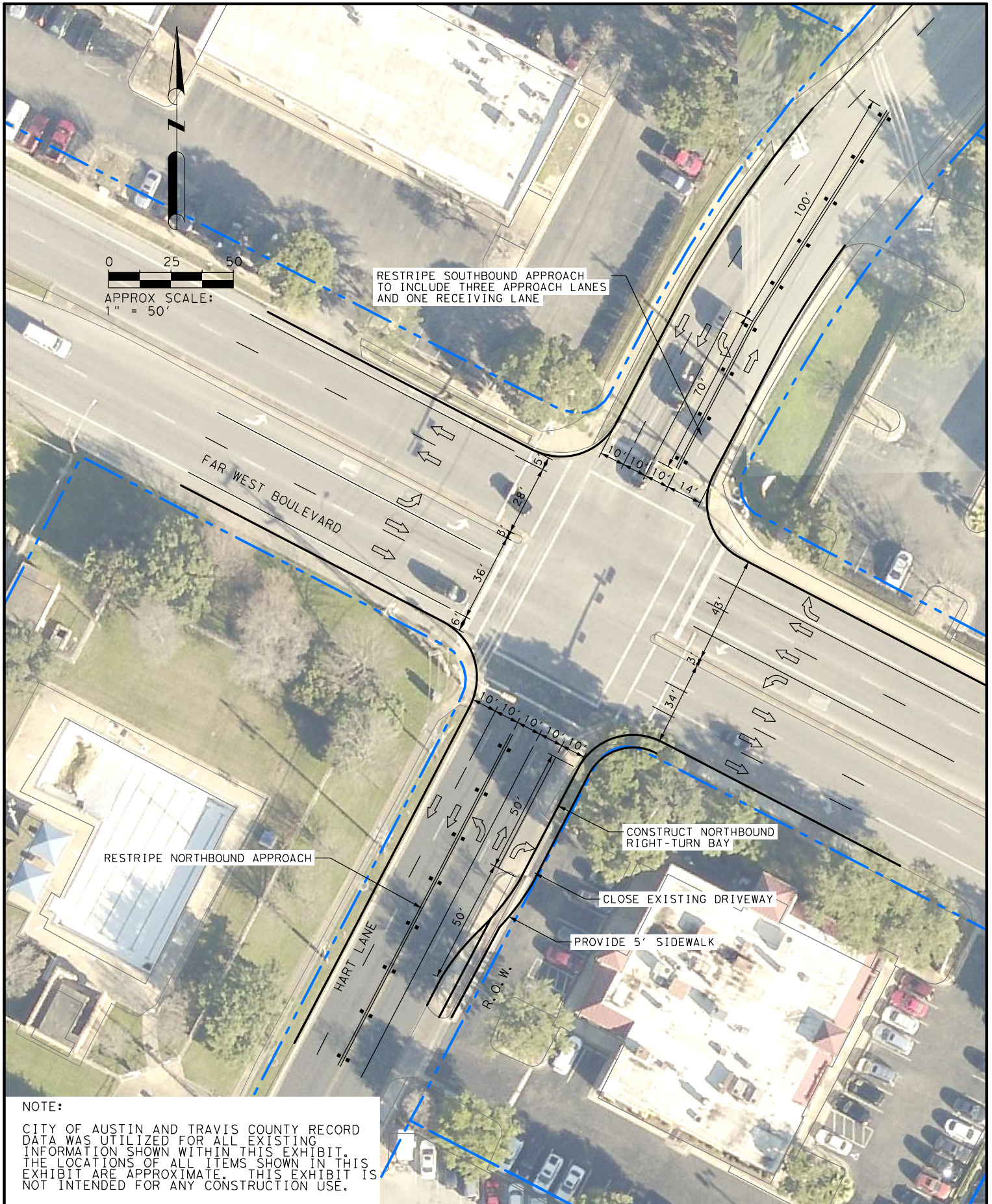
Comment Response – Revised Exhibits

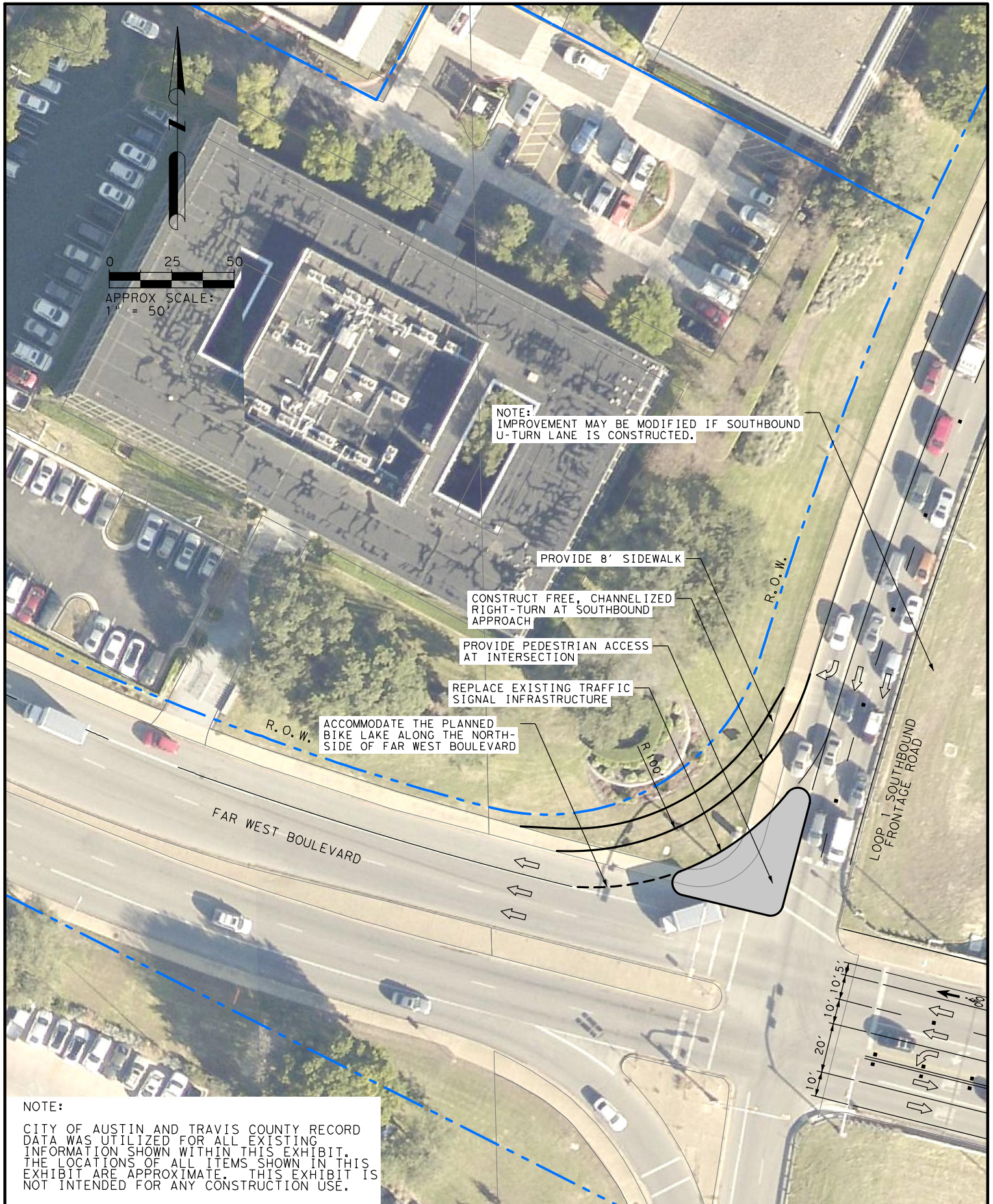














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