WGMGROUP
Community Values. Inspired Futures.

February 1, 2023

Mr. Ryan Guelff
Transportation Engineer
City of Missoula
1345 West Broadway
Missoula, MT 59802

Re: Hillview Subdivision Traffic Analysis – Response to City Comments

Dear Ryan:

Thank you for coordinating with WGM Group, Inc. (WGM) regarding the Hillview Subdivision Traffic Analysis update. The original Hillview Subdivision Traffic Impact Study (TIS), completed by Cushing Terrell and dated December 27, 2021, was reviewed by the City of Missoula (City) staff, resulting in comments dated February 2022. Those City comments, and subsequent comments from email correspondence between City staff and Cushing Terrell in August 2022, have been compiled below *in italics*, followed by our comment responses in standard font. Updated traffic analysis incorporating changes to traffic volumes resulting from the City comments is presented following the comment response section of this letter. We appreciate the City's continued cooperation and assistance with our update to the 2021 traffic analysis.

FEBRUARY 2022 CITY COMMENTS

C1. 2020 AADT is not typical and should not be used, use 2019 values.

R1. This comment was directed at AADT (Annual Average Daily Traffic) data from Montana Department of Transportation (MDT) traffic count locations presented in the Existing Conditions portion of the original TIS. In addition to the 2019 data referenced by the City, data from 2021 is also available. This updated count data is summarized in **Table 1.**

TABLE 1: 2019 TO 2021 AVERAGE ANNUAL DAILY TRAFFIC (AADT)

	AADT		
COUNT LOCATION	**2019**	**2020**	**2021**
55th Street east of Gharrett Street (MDT Location ID 32-3A-065)	1633	1901	1587
55th Street b/w Hillview Way and 23rd Avenue (MDT Location ID 32-3A-066)	1499	1146	841
Hillview Way south of 39th Street (MDT Location ID 32-3A-180)	4491	4177*	4511*

*Not actual count (grown from previous year by MDT)

C2. MCPWSS 7.2.3.A.1 "latest edition" ITE should be 11th edition (for trip generation calculations). For multi-family trip generation use ITE Land Use Code (LUC) 220 (Low Rise), for townhomes use LUC 215 (Single Family Housing-Attached), the daycare should be calculated with pass-by trips, additionally should make case for pass-by trips for coffee shop.

R2. Because the site development plan was modified after the original review comments were prepared by the City, the site trip-generation calculations have been fully updated using the 11th edition of the ITE Trip Generation Manual. These updated trip-generation estimates are presented below in the **Updated Traffic Impact Analysis** section of this letter and were used throughout the remainder of the analysis presented. Daycare and coffee shop land uses are no longer part of the proposed development plan.

C3. What is the rationale for assigning 20% (of site-generated traffic) to SB on Hillview Way? And later as part of additional email comments from the City - *Need to determine split between those who use 23rd St vs Hillview Way. This % should be used to show volume that would use Clearview vs Hillview. 23rd is a more direct route to US 93 and US 12.*

R3. As directed in separate correspondence from the City, turning movement volume data was collected at Hillview Way and 23rd Avenue to determine the proportion of site-generated traffic that may utilize 23rd Avenue for trips to/from Reserve Street and US 93 South. Cushing Terrell collected this additional **Traffic Count Data** in August 2022, included in this letter. Based on the existing traffic patterns observed at Hillview Way and 23rd Avenue it was estimated that a 70/20/10 split for site-generated traffic would more closely match existing travel patterns, with 70 percent of site-generated traffic expected to travel north on Hillview Way toward 39th Street, 20 percent expected to take Clearview Way/Garland Drive west to then proceed north on 23rd Street toward Reserve Street or US 93 south, and 10 percent expected to travel south on Hillview Way toward Gharrett Street via 55th Street. The anticipated arrival and departure patterns for both Phase 1 and Full Buildout of the proposed development are illustrated in **Figures 4 – 7** following this letter.

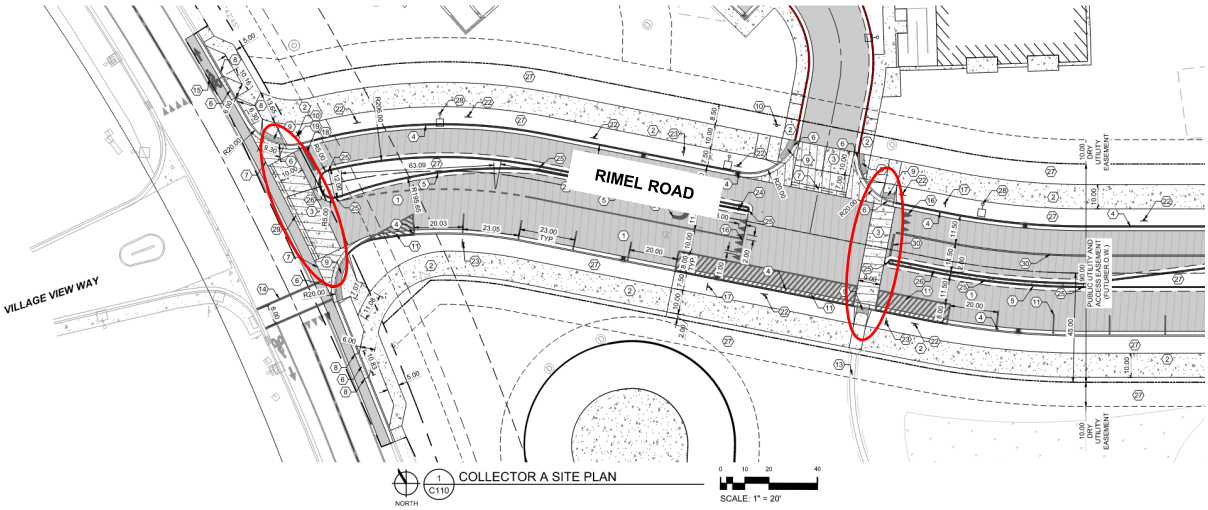
C4. (Hillview) Way already has a dedicated right turn lane (at Clearview Way). 3 SB lanes plus a NB lane will create a long crossing distance for pedestrians. Please elaborate on ped crossing treatments.

R4. Right-turn lane and left-turn lane warrants were checked for this intersection and completed **Turn Lane Nomographs** are enclosed with this letter. It was determined that the existing southbound right-turn lane on Hillview Way at Clearview Way is not warranted either presently or after the addition of the development traffic. However, a left-turn lane will be warranted at this location during buildout of Phase 5 of the Hillview Subdivision. The existing southbound right-turn lane can be removed to shorten the crossing distance if that is the City's preference.

C5. We didn't see any pedestrian crossings of Village View Way within the Multifamily preliminary design. Would like to see multiple crossings, for both the commercial facilities and for the parkland.

R5. As previously mentioned, commercial facilities are no longer included in the proposed development. The area south of Rimel Road is now envisioned to be a park. To address

pedestrian access to the park, the proposed development includes a crosswalk on the east leg of the Hillview Way and Rimel Road intersection. An additional crosswalk is proposed at the west driveway approach to the proposed multifamily development. These proposed crosswalks are indicated below in red.



In addition to the two proposed crosswalks shown above, a midblock crosswalk is under consideration in a future phase approximately 100 feet east of the second multifamily approach (not shown above). Please note, the eastbound left-turn lane on Rimel Road shown above is no longer being proposed based on a turn lane analysis described in the **Turn Lane Warrant Analysis – Summary of Results** section of this letter.

C6. *(Pointing to the existing southbound right-turn volume on Hillview Way at Clearview Way) - Does this justify the existing right-turn bay? Could it become a thru/right lane and use the existing thru as a left turn?*

R6. As described above in **R4**, the existing southbound right-turn lane on Hillview Way at Clearview Way is not warranted based on existing or future traffic volumes. It is recommended that the geometrics of this intersection be constructed with the added left-turn lane in a manner that avoids alignment shifts for through traffic.

ADDITIONAL COMMENT RECEIVED THROUGH AUGUST 2022 CITY STAFF EMAILS

C7. *The left-turn lanes into the multi-family development (from Rimel Road) can only be installed if left-turn warrants are satisfied. If left turn lanes are not warranted, the City would like to see on-street parking installed on the north side.*

R7. Vehicular warrants for left turn lanes into the multifamily development are discussed in the **Turn Lane Warrant Analysis – Summary of Results** section of this letter in the context of the new site-generated traffic assignment.

UPDATED TRAFFIC IMPACT ANALYSIS

Hillview Subdivision is a proposed development in Missoula, Montana located on the east side of Hillview Way (see **Figure 1**; all report figures are enclosed at the end of this letter) that will consist of 204 multifamily residential units, 21 townhomes, and 240 single family homes. The revised proposed development is expected to generate much less traffic than the 2021 proposed development studied in the original Cushing Terrell TIS primarily due to the removal of commercial facilities from the development plan. Buildout and occupancy of the development is expected to occur over seven phases and require approximately three years. Phase 1 consists of the multifamily development and is expected to be completed in 2024 while the remaining six phases will be completed by 2026. The proposed development and phasing plan is provided in **Figure 2**.

Traffic analysis presented in this letter was prepared using standard traffic engineering techniques to forecast traffic volumes and operations at the study intersections. Capacity analysis is presented based on existing 2021/2022 traffic volumes, existing volumes plus Phase 1 site-generated traffic, and existing volumes plus Full Buildout (Phases 1 through 7) traffic volumes to determine what impacts the development will have on surrounding traffic operations. Detailed traffic analysis was completed for each of the intersections addressed in the original TIS, plus the intersection of 23rd Avenue and Garland Drive which was added at the City's request.

EXISTING TRAFFIC VOLUME

In addition to the existing traffic volumes presented in the original Cushing Terrell TIS, traffic counts were completed at Hillview Way and 23rd Avenue on Tuesday, August 23, 2022, and at Garland Drive and 23rd Avenue on Wednesday, August 24, 2022. AM peak-period counts were conducted between 7:00 and 9:00 AM. PM peak-period counts were conducted between 4:00 and 6:00 PM. The **Traffic Count Data** was analyzed to determine the existing AM and PM peak-hour traffic volumes at each location. The 2021/2022 existing peak-hour volumes used for the analysis presented in this letter are illustrated in **Figure 3**.

After reviewing AADT data in the vicinity of the proposed development and discussing with City staff, WGM agreed with the approach taken in the original TIS to not apply a background traffic growth rate to the existing volumes.

SITE-GENERATED TRAFFIC

Hillview Subdivision is planned to consist of 204 multifamily residential units, 21 townhomes, and 240 single family homes. Data from the Institute of Transportation Engineers (ITE) publication *Trip Generation* (11th Edition) was used to estimate the number of vehicle trips that will be generated by the proposed development. **Table 2** shows the results of these trip generation calculations. As can be seen from the final two rows of **Table 2**, the total site-generated trips associated with the current land use analyzed in this letter are markedly lower than the trips assumed in the original TIS. This is primarily because of the elimination of the commercial land uses south of Rimel Road (daycare and coffee shop) included in the original TIS.

TABLE 2: HILLVIEW SUBDIVISION SITE-GENERATED VEHICLE TRIPS

LAND USE AND PROPOSED PHASING	SIZE	ITE LAND USE CODE	AM PEAK-HOUR TRIPS		PM PEAK-HOUR TRIPS		AVERAGE DAILY TRAFFIC (ADT)
			ENTERING	EXITING	ENTERING	EXITING	
Residential Apartments (Phase 1)	204 units	220	21	65	68	40	1383
Townhomes (Phases 2-7)	21 units	215	1	4	5	4	110
Single Family Homes (Phases 2-7)	240 units	210	41	124	143	83	2258
Total			**63**	**193**	**216**	**127**	**3751**
2021 Cushing Terrell TIS Trip Generation Total (ITE Trip Generation Manual 10th Edition & including commercial uses)			*177*	*294*	*262*	*182*	*4437*
Difference Between 2021 & Currently Proposed Volumes			*-114*	*-101*	*-46*	*-55*	*-686*

ASSIGNMENT OF SITE-GENERATED TRIPS

Roadway network connections were analyzed, the Missoula area's retail and employment distribution/density was considered, and traffic volumes on the adjoining streets were reviewed to identify potential arrival and departure patterns for site-generated traffic.

In response to City staff comments, existing traffic patterns at the intersection of Hillview Way and 23rd Avenue were evaluated to estimate the proportion of site-generated trips that may utilized 23rd Avenue (via Clearview Way/Garland Drive) to travel to/from Reserve Street and US Highway 93 South. Review of the existing peak AM hour northbound split between left-turning and through vehicles (considered "departing" trips), and the peak PM hour southbound through and eastbound right-turning volumes (considered "arriving" trips) at Hillview Way and 23rd Avenue, it was estimated that 70% of traffic south of this decision point elects to use Hillview Way, and 30% 23rd Avenue to travel down out of South Hills. Applying this finding to the Hillview Subdivision site-generated traffic suggests that 70% should be assigned to/from Hillview Way to the north (toward 39th Street); with the remaining 30% further divided with 20% traveling to/from the west on Clearview Way to 23rd Avenue and the remaining 10% estimated to travel south on Hillview Way, likely taking 55th Street to Gharrett Street. Both of these final trip distribution routes (20% west, 10% south) are associated with trips to/from Reserve Street and US 93 South.

The expected Phase 1 site arrival and departure patterns are illustrated in **Figures 4** and **5**, respectively. The expected Phase 2 through 7 site arrival and departure patterns are illustrated in **Figures 6** and **7**, respectively.

The site-generated vehicle trips from **Table 2** were distributed through the study intersections in accordance with the estimated arrival and departure patterns, resulting in the AM and PM peak-hour site-generated vehicle trips shown in **Figure 8** (for Phase 1) and **Figure 9** (Phases 2-7). These are the vehicle trips that are new to the roadway network as a direct result of the proposed development.

2024 BUILD TRAFFIC VOLUMES

Combining the Phase 1 site-generated trips from **Figure 8** with the 2021/2022 existing traffic volumes from **Figure 3** results in the projected 2024 build traffic volumes shown in **Figure 10**. These are the total traffic volumes projected to exist at the study intersections when the multifamily development of Phase 1 is fully built and occupied.

2026 BUILD TRAFFIC VOLUMES

Combining the 2021/2022 existing traffic volumes from **Figure 3** with the Phase 1 site-generated trips from **Figure 8** and the Phase 2-7 site-generated trips from **Figure 9** results in the projected 2026 build traffic volumes shown in **Figure 11**. These are the total traffic volumes projected to exist at the study intersections when all seven phases of the Hillview Subdivision are fully built and occupied.

ADJACENT DEVELOPMENT

The original 2021 TIS discussed potential development of the vacant land to the east of Hillview Subdivision and projected it to include a 500 student K-8 school and 210 single family homes (See page 13-15 of the 2021 Cushing Terrell report). To account for this potential future development in the analysis, peak AM and PM hour site-generated traffic volumes were determined using the ITE Trip Generation Manual (11th Edition). The **Adjacent Development Trip Generation Table** for this potential adjacent development is enclosed with this letter. Although it is not used in the capacity analysis of the study intersections, the adjacent development traffic volumes are used to analyze turn lane vehicle volume warrants on Rimmel Road, as described in the next section.

TURN LANE WARRANT ANALYSIS – SUMMARY OF RESULTS

As requested by City staff, a turn-lane warrant analysis was completed for the following intersection movements:

- Hillview Way at Clearview Way (southbound right & left-turn lane treatments)
  - The existing southbound right-turn lane is not warranted based on existing or forecasted future Full Buildout vehicle volumes.
  - A southbound left-turn lane will be warranted during buildout and occupancy of Phase 5 of the Hillview Subdivision.
- Hillview Way at Village View Way/Rimel Road (southbound left-turn lane treatment)
  - A southbound left-turn lane will be warranted during buildout and occupancy of Phase 2 of the Hillview Subdivision.
- Rimel Road at Two Approaches of Phase 1 (eastbound left-turn lane treatment)
  - An eastbound left-turn lane is not warranted at either of the two proposed approaches for the multifamily development (Phase 1) of the Hillview Subdivision based on Full Buildout traffic volumes, nor will one be warranted at Full Buildout plus estimated future adjacent development to the east of Hillview Subdivision.

The intersection geometrics modeled in the revised capacity analysis conducted for this updated traffic analysis include the warranted southbound left turn lanes (based on the respective phasing threshold). **Turn Lane Nomographs** are enclosed with this letter and are based on the methodology presented in Chapter 28 of the MDT Traffic Engineering Manual.

CAPACITY ANALYSIS – SUMMARY OF RESULTS

Capacity analysis was completed for each of the study intersections using the peak AM and PM existing, Phase 1 build, and Full Buildout traffic volumes forecasted for this letter, including the

updated site-generated traffic calculations and trip-distribution patterns. Intersections were evaluated in accordance with the procedures presented in the *Highway Capacity Manual*, 7th Edition (2022), published by the Transportation Research Board. The analysis results are discussed below and the **Capacity Analysis Worksheets** are attached to this letter. Findings from the analysis are presented in the following order:

2021 TIS Study Intersections

- **Table 3**: 39th Street/SW Higgins Avenue & Hillview Way/S. Russell Street
- **Table 4**: Hillview Way & Clearview Way
- **Table 5**: Hillview Way & Village View Way/Rimel Road

2023 TIS Update – Additional Intersection

- **Table 6**: 23rd Avenue & Garland Drive

TABLE 3: REVISED 39TH ST/SW HIGGINS AVE & HILLVIEW WAY/S. RUSSELL ST LOS SUMMARY

	Peak AM Hour						Peak PM Hour					
	2021/2022 Existing		2024 Phase 1 Build		2026 Full Buildout (Phase 1-7)		2021/2022 Existing		2024 Phase 1 Build		2026 Full Buildout (Phase 1-7)	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Eastbound Left	8.9	A	9.5	A	10.7	B	15.3	B	16.0	B	17.4	B
Eastbound Through	15.0	B	16.0	B	18.2	B	18.5	B	19.8	B	22.7	C
Eastbound Right	9.2	A	9.8	A	11.1	B	12.6	B	13.4	B	15.3	B
Westbound Left	10.8	B	11.6	B	13.1	B	12.2	B	13.1	B	14.8	B
Westbound Through	13.6	B	14.5	B	16.2	B	21.5	C	22.4	C	24.3	C
Westbound Right	11.9	B	12.7	B	14.1	B	13.4	B	13.9	B	14.9	B
Northbound Left	32.8	C	32.1	C	30.8	C	34.0	C	34.3	C	35.1	D
Northbound Through	33.8	C	33.1	C	32.0	C	30.0	C	29.6	C	29.0	C
Northbound Right	34.8	C	34.4	C	33.8	C	29.2	C	29.0	C	28.5	C
Southbound Left	42.8	D	42.6	D	42.4	D	41.2	D	41.4	D	42.0	D
Southbound Through	31.2	C	30.3	C	28.7	C	30.7	C	30.5	C	30.3	C
Southbound Right	31.8	C	30.7	C	28.8	C	32.0	C	31.4	C	30.0	C
Overall Intersection	20.5	C	21.3	C	22.5	C	23.1	C	23.7	C	24.9	C

Delay is measured in seconds per vehicle.

The capacity analysis results summarized in **Table 3** show that the Hillview Subdivision will have minimal impacts on traffic operations at the signalized intersection of 39th Street/SW Higgins Avenue and Hillview Way/S. Russell Street. The eastbound through and northbound left LOS drop in the peak PM hour due to additional delay of less than a few seconds. However, the overall intersection LOS remains unchanged after Full Buildout of the Hillview Subdivision. No mitigation needs are indicated at this intersection.

TABLE 4: REVISED HILLVIEW WAY & CLEARVIEW WAY LOS SUMMARY

	Peak AM Hour						Peak PM Hour					
	2021/2022 Existing		2024 Phase 1 Build		2026 Full Buildout (Phase 1-7)		2021/2022 Existing		2024 Phase 1 Build		2026 Full Buildout (Phase 1-7)	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Eastbound Lt/Th/Rt	11.9	B	12.4	B	16.8	C	11.5	B	11.6	B	16.3	C
Westbound Lt/Th/Rt	---	---	---	---	14.6	B	---	---	---	---	12.9	B
Northbound Lt/Th/Rt	7.5	A	7.6	A	7.6	A	8.0	A	8.2	A	8.3	A
Southbound Left	---	---	---	---	8.3	A	---	---	---	---	7.8	A

Delay is measured in seconds per vehicle.

As shown above, the Hillview Way and Clearview Way intersection is expected to operate at an acceptable LOS once the Hillview Subdivision is fully built and occupied. Capacity analysis results summarized above include the existing southbound right-turn lane. The intersection of Hillview Way and Clearview Way was also modeled without a southbound right-turn lane. Findings from that capacity analysis conclude that the removal of the southbound right-turn lane would result in additional fractions of a second delay for eastbound traveling vehicles. This insignificant change in delay coupled with not meeting the vehicular volume warrant mean that this lane can be removed as part of the future improvements at the intersection, should that be the City's preference.

TABLE 5: REVISED HILLVIEW WAY & VILLAGE VIEW WAY/RIMEL ROAD LOS SUMMARY

	Peak AM Hour						Peak PM Hour					
	2021/2022 Existing		2024 Phase 1 Build		2026 Full Buildout (Phase 1-7)		2021/2022 Existing		2024 Phase 1 Build		2026 Full Buildout (Phase 1-7)	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Eastbound Lt/Th/Rt	11.3	B	13.3	B	14.7	B	11.3	B	13.6	B	15.5	C
Westbound Lt/Th/Rt	---	---	11.6	B	12.5	B	---	---	10.0	B	10.7	B
Northbound Lt/Th/Rt	7.5	A	7.5	A	7.5	A	8.0	A	8.0	A	8.0	A
Southbound Lt/Th/Rt	---	---	8.1	A	---	---	---	---	7.7	A	---	---
Southbound Left	---	---	---	---	8.2	A	---	---	---	---	7.9	A

Delay is measured in seconds per vehicle.

The analysis summarized in **Table 5** shows that the subject intersection operates at a good LOS and that the site-generated traffic will have minimal impact on delay or traffic operations at this intersection. As previously discussed, a southbound left-turn lane will be warranted at this intersection during buildout of Phase 2 of the Hillview Subdivision and this lane is included in the analysis for the Full Buildout scenario.

TABLE 6: 23RD AVENUE & GARLAND DRIVE LOS SUMMARY

	Peak AM Hour						Peak PM Hour					
	2021/2022 Existing		2024 Phase 1 Build		2026 Full Buildout (Phase 1-7)		2021/2022 Existing		2024 Phase 1 Build		2026 Full Buildout (Phase 1-7)	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Eastbound Lt/Th/Rt	10.1	B	10.3	B	10.6	B	11.2	B	11.6	B	12.5	B
Westbound Lt/Th/Rt	9.2	A	9.3	A	9.4	A	9.8	A	9.8	A	9.8	A
Northbound Lt/Th/Rt	7.3	A	7.3	A	7.3	A	7.7	A	7.7	A	7.7	A
Southbound Lt/Th/Rt	7.6	A	7.6	A	7.6	A	7.6	A	7.6	A	7.6	A

Delay is measured in seconds per vehicle.

The intersection of 23rd Avenue and Garland Drive was added to the Hillview Subdivision traffic impact analysis at the request of City staff. 23rd Avenue is a primarily north/south collector street with one travel lane in each direction. Garland Drive is a local street that is oriented northwest/southeast and eventually becomes Clearview Way less than 800 feet east of the intersection with 23rd Avenue. The two approaches of Garland Drive are stop controlled. The speed limit on both corridors is 25 miles per hour.

The analysis summarized in **Table 6** shows that the subject intersection operates at a good LOS and that the site-generated traffic will have no appreciable impact on delay or traffic operations at this intersection.

INTERNAL SITE ACCESS APPROACH INTERSECTIONS

The two proposed site access approaches to the multifamily development on Rimel Road are expected to operate at a good LOS when considering the site-generated traffic and traffic from the estimated adjacent developments to the east of Hillview Subdivision as described in the original TIS.

TRANSPORTATION OPTIONS

In support of the City's mode share goals, consideration was given to the various transportation options available for residents of the Hillview Subdivision. The closest Mountain Line transit stop is at the corner of 55th Street and 23rd Avenue (stop ID 1330), which is about a quarter mile distance from the Hillview Way and Village View Way/Rimel Road intersection. The headway for this green route varies from 30 minutes to 60 minutes depending on time of day and inbound versus outbound buses. There are on-street bicycle lanes along Hillview Way but the natural topography of the corridor may limit some ages and abilities without e-bike assistance. There are continuous sidewalks along Hillview Way offering good connectivity for recreational walking. However, the rather homogenized residential land use likely limits the number of utility-type walking trips. Finally, residents can consider ridesharing as an option to reduce their sole reliance on single occupancy vehicle trips for commuting.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

- The Hillview Subdivision is planned to consist of 204 multifamily residential units, 21 townhomes, and 240 single family homes. The current expected site-generated traffic is much less than it was in the original 2021 TIS due to the removal of commercial facilities (coffee shop and daycare).
- Existing traffic patterns at Hillview Way and 23rd Avenue were analyzed to determine arrival and departure patterns for the site-generated traffic. It is estimated that a 70/20/10 split for site-generated traffic would more closely match existing travel patterns, with 70 percent of site-generated traffic expected to travel north on Hillview Way toward 39th Street, 20 percent expected to take Clearview Way/Garland Drive west to then proceed north on 23rd Avenue toward Reserve Street or US Highway 93 south, and 10 percent expected to travel south on Hillview Way toward Gharrett Street via 55th Street.
- At the request of City staff, the intersection of 23rd Avenue and Garland Drive was analyzed to determine the proposed development's impact on traffic operations. This analysis concluded that the site-generated traffic will have no appreciable impact on delay or traffic operations at this intersection.
- The proposed Hillview Subdivision will generate new traffic through the study intersections. *Highway Capacity Manual* based analysis shows that this traffic can be accommodated at the study intersections without the need for additional capacity to mitigate the site-generated trips.
- Based on the completed turn lane warrant analysis a southbound left-turn lane on Hillview Way will be warranted at two locations: at the intersection with Clearview Way during construction of Phase 5 of the subdivision, and at the intersection with Village View Way/Rimel Road during construction of Phase 2. Eastbound left-turn lanes on Rimel Road at the two Phase 1 site approaches will not be warranted at any time.
- The existing southbound right-turn lane at Hillview Way and Clear View Way is not warranted based on existing or future Full Buildout traffic volumes and can be removed during construction of the recommended southbound left-turn lane at Clear View Way if the City so desires.
- Marked crosswalks are proposed across Rimel Road near the multifamily development for convenient access to the proposed park on the south side of Rimel Road.
- While active transportation facilities in the vicinity of the Hillview Subdivision may offer opportunity for recreational use, residents of Hillview Subdivision have limited transit access at this time. Ridesharing can be utilized to reduce sole reliance on single occupancy vehicle commuting trips.

This concludes WGM's response to the City of Missoula's staff review comments of the 2021 Hillview Subdivision TIS completed by Cushing Terrell. We have done our best to address each comment, but please feel free to contact us with any remaining questions.

Sincerely,
WGM Group, Inc.

Mark Bancale, PE, PTOE
Senior Traffic Engineer

MDB:dbg

Encl.

Figures 1-11
Adjacent Development Trip Generation Table
Turn Lane Nomographs
2022 Traffic Count Data for 23rd Avenue & Garland Drive and Hillview Way & 23rd Avenue
Capacity Analysis Worksheets

FIGURE 1: SITE VICINITY MAP

PHASING PLAN

Phasing has been established to maximize the number of lots along the planned constructed roadways in each phase.

Roadway stubs into future phases will be limited to 150' length to comply with International Fire Code, Appendix D. Section D103.4 Dead Ends are limited to 150' in length before an additional turn around is required.

CALCULATIONS							
	TOTAL PHASE AREA	**NETTED LOT AREA**	**DWELLING UNITS**	**REQUIRED PARKLAND**	**PROPOSED PARKLAND**	**OPEN SPACE**	**TRAILS**
PHASE 1 2023	898,033.17 SF (20.62 AC)	396,051.66 SF (9.09 AC)	204 MF	1.84 AC	4.69 AC	191,431.90 SF (4.39 AC)	3,985 LF
PHASE 2 2023	259,144.83 SF (5.95 AC)	90,984.38 SF (2.09 AC)	21 TH	.23 AC	-	118,658.42 SF (2.72 AC)	875 LF
PHASE 3 2024	1,522,123.04 SF (34.94 AC)	482,207.77 SF (11.07 AC)	65 SFD	1.22 AC	1.90 AC	528,279.98 SF (12.13 AC)	5,210 LF
PHASE 4 2025	652,154.69 SF (14.97 AC)	411,555.30 SF (9.45 AC)	61 SFD	1.04 AC	-	18,085.13 SF (0.42 AC)	566 LF
PHASE 5 2025	320,990.81 SF (7.37 AC)	260,048.90 SF (5.97 AC)	33 SFD	.66 AC	-	0 SF	0 LF
PHASE 6 2026	517,861.19 SF (11.89 AC)	364,773.55 SF (8.37 AC)	44 SFD	.92 AC	-	2,557.16 SF (0.06 AC)	0 LF
PHASE 7 2026	444,534.54 SF (10.21 AC)	320,458.95 SF (7.36 AC)	37 SFD	.81 AC	0.81 AC	0 SF	723 LF
TOTAL	**105.95 AC**	**53.40 AC**	**465 UNITS**	**6.72 AC**	**7.40 AC**	**19.72 AC**	**11,359 LF**

FIGURE 2: HILLVIEW SUBDIVISION PRELIMINARY PHASING PLAN

HILLVIEW SUBDIVISION MISSOULA, MONTANA

Pre-application Meeting

Janurary 2023

PANDO Cushing Terrell.

FIGURE 3: 2021/2022 EXISTING PEAK HOUR TRAFFIC

FIGURE 4: PHASE 1 SITE TRAFFIC ARRIVAL PATTERN

FIGURE 5: PHASE 1 SITE TRAFFIC DEPARTURE PATTERN

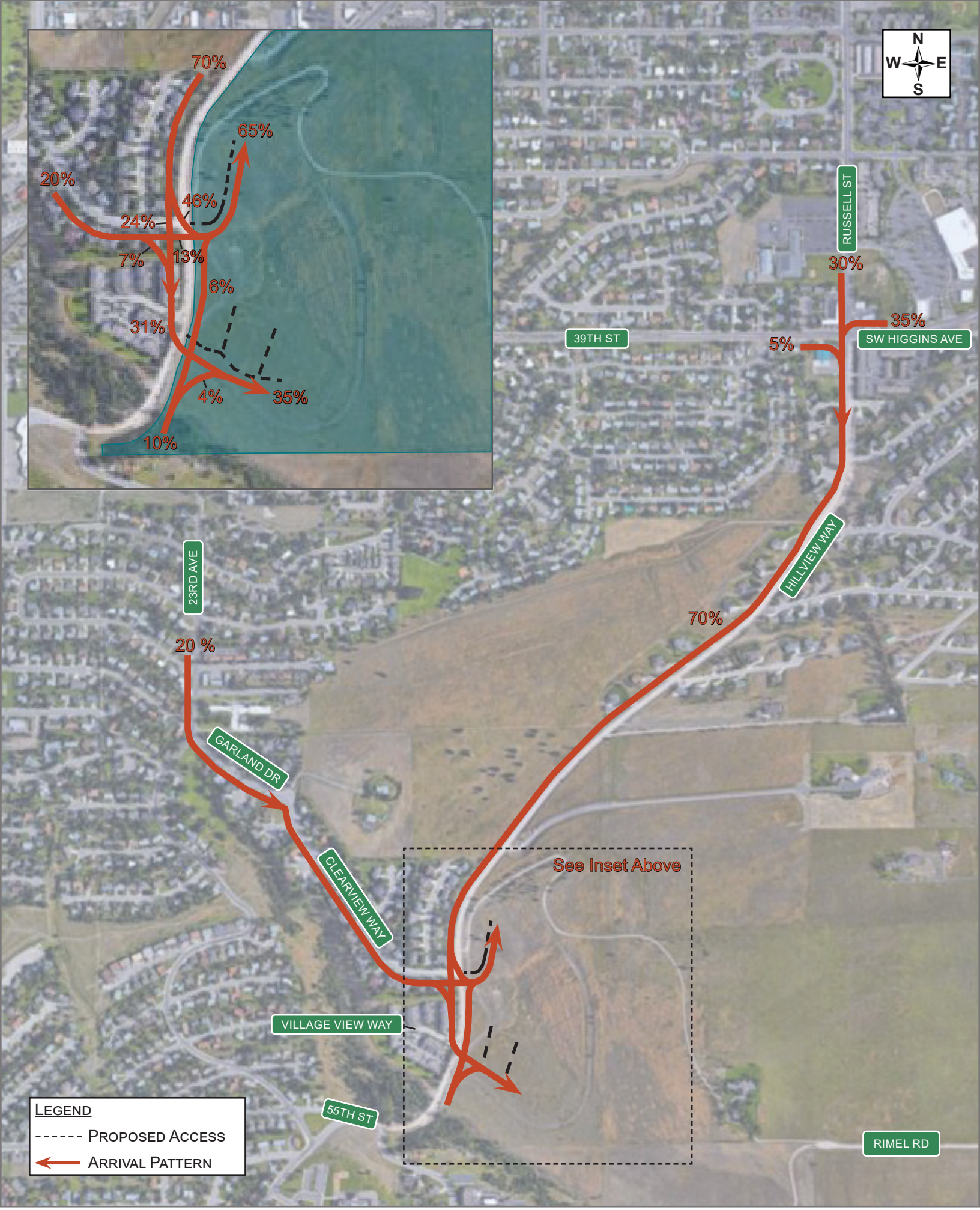


FIGURE 6: PHASES 2-7 SITE TRAFFIC ARRIVAL PATTERN

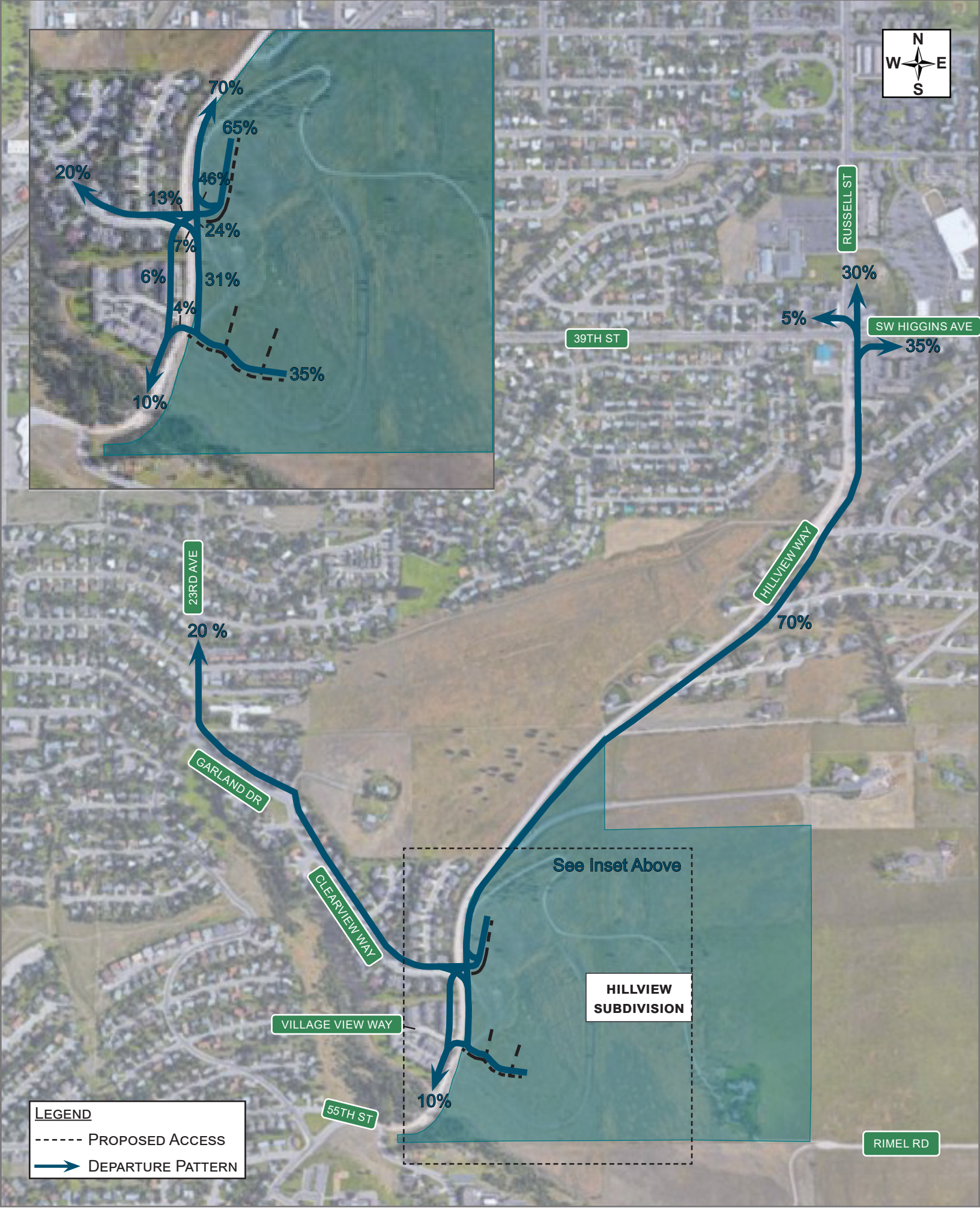


FIGURE 7: PHASES 2-7 SITE TRAFFIC DEPARTURE PATTERN

FIGURE 8: PHASE 1 SITE-GENERATED PEAK HOUR TRAFFIC

FIGURE 9: PHASES 2-7 SITE-GENERATED PEAK HOUR TRAFFIC

FIGURE 10: 2024 PHASE 1 BUILD PEAK HOUR TRAFFIC

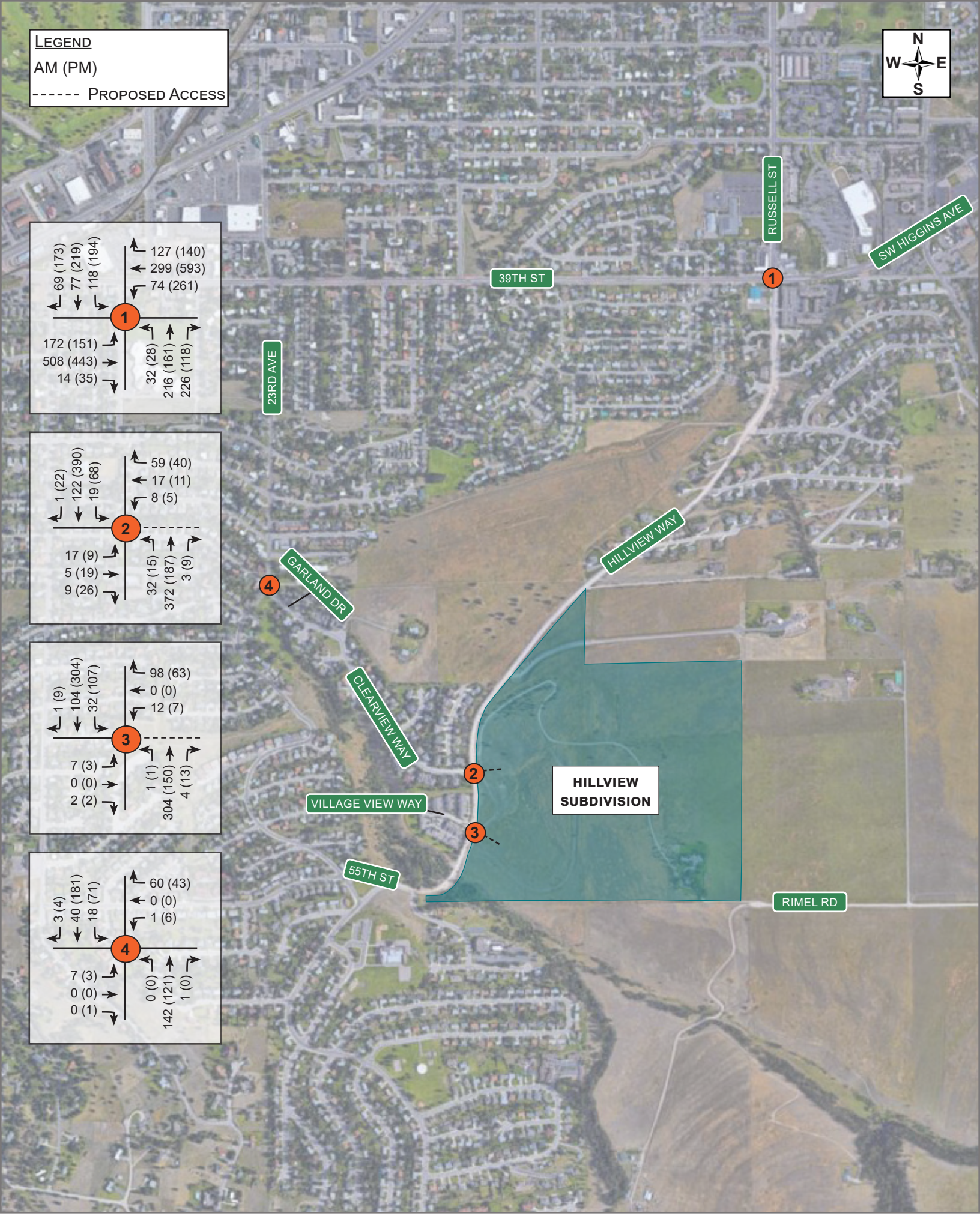


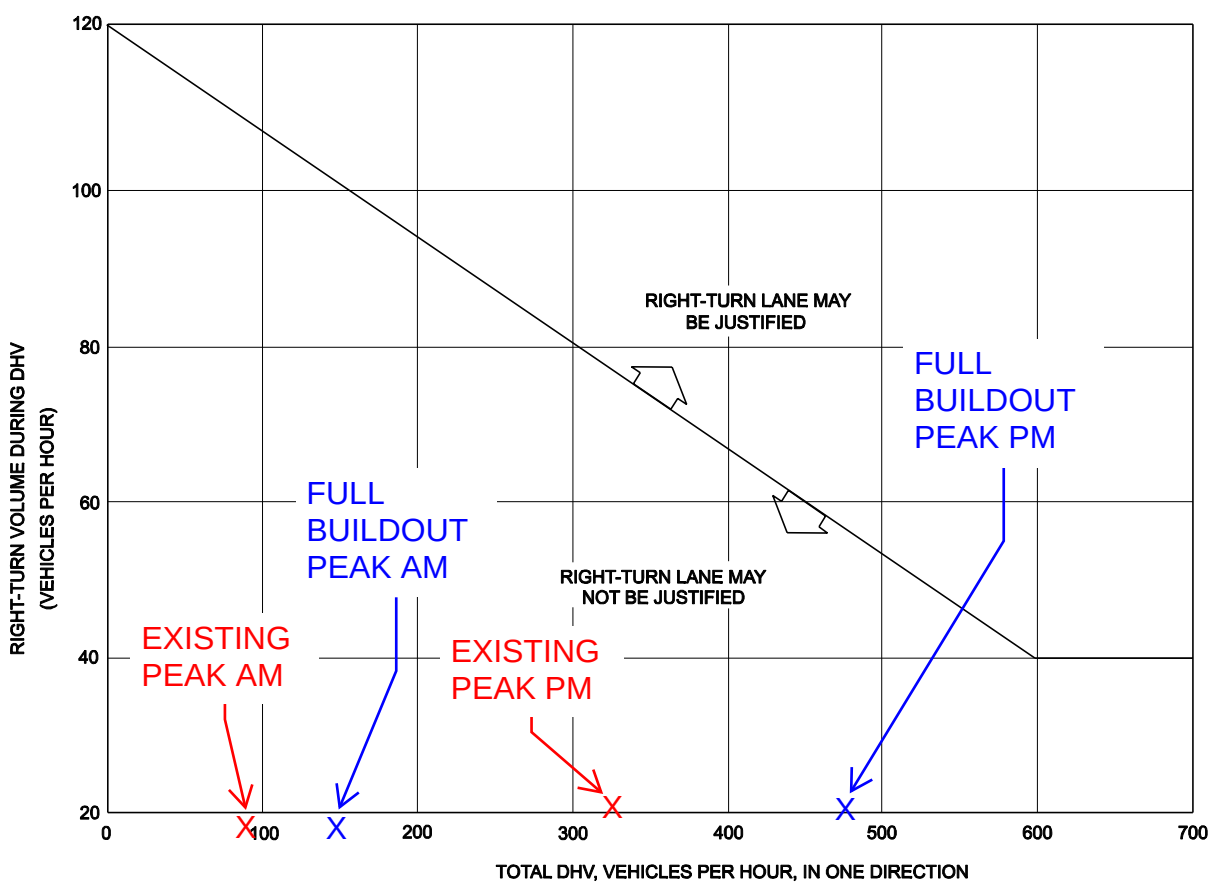
FIGURE 11: 2026 FULL BUILDOUT PEAK HOUR TRAFFIC

Date: 1/30/2023
Project ID: 220905 - Hillview TIS
Type of Computation: Trip Generation - Future Estimated Adjacent Development
Calculated by: DBG

Land Use Description	Size	Independent Variable	ITE Land Use Code	AM Peak Hour Trips		PM Peak Hour Trips		ADT
				Entering	Exiting	Entering	Exiting	
School	500	Students	520 (Elementary School)	200	170	37	43	1135
Single-Family Homes	210	Dwelling Units	210 (Single Family Home-Detached)	37	109	126	74	1997
			Total	**237**	**279**	**163**	**117**	**3132**

Notes:

1 Data based on Trip Generation Manual 11th Edition
2 Time Period: Weekday, Peak Hour of adjacent street traffic, one hour between 7 & 9AM; one hour between 4 & 6pm and Weekday
3 Estimated land use based on 2021 Cushing Terrell Hillview Subdivision TIS, as described on report page 15
3 Cushing Terrell Report assumes all traffic will travel Rimel Road to Hillview Way



Note: For highways with a design speed below 50 mph (80 km/h) with a DHV < 300 and where right turns are > 40, an adjustment should be used. To read the vertical axis of the chart, subtract 20 from the actual number of right turns.

Example

EXISTING TRAFFIC - AM PEAK HOUR
SOUTHBOUND DHV = 98
SOUTHBOUND RIGHT TURN VOLUME = 1

EXISTING TRAFFIC - PM PEAK HOUR
SOUTHBOUND DHV = 329
SOUTHBOUND RIGHT TURN VOLUME = 22

FULL BUILDOUT TRAFFIC - AM PEAK HOUR
SOUTHBOUND DHV = 142
SOUTHBOUND RIGHT TURN VOLUME = 1

FULL BUILDOUT TRAFFIC - PM PEAK HOUR
SOUTHBOUND DHV = 480
SOUTHBOUND RIGHT TURN VOLUME = 22

Given: Design Speed = 35 mph (60 km/h)
DHV = 250 vph
Right Turns = 100 vph

Problem: Determine if a right-turn lane is necessary.

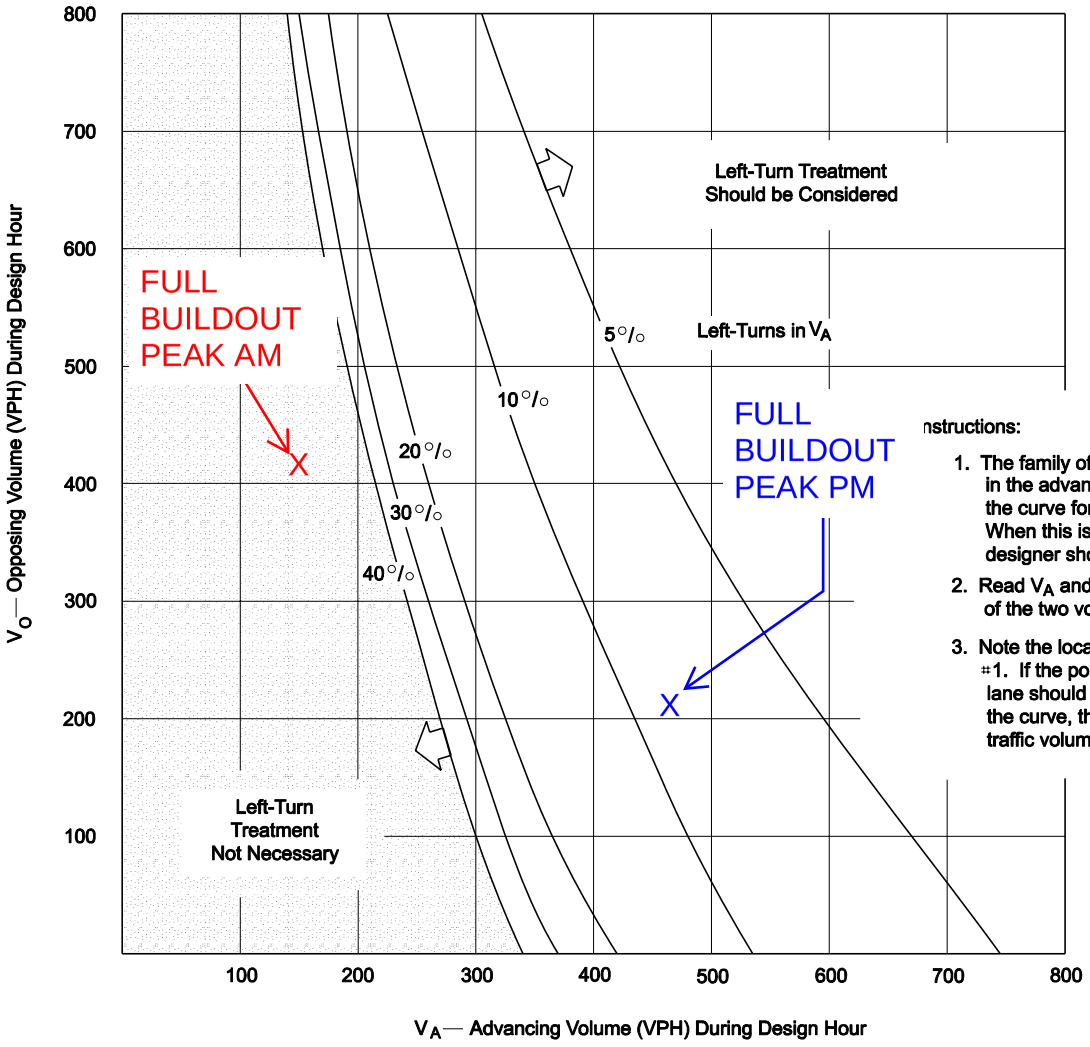
Solution: To read the vertical axis, use 100 - 20 = 80 vph. The figure indicates that a right-turn lane is not necessary, unless other factors (e.g., high crash rate) indicate a lane is needed.

GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS

Figure 28.4A

Conclusion:
The existing southbound right turn lane is not warranted based on the existing and full buildout volumes.

HILLVIEW SUBDIVISION
INTERSECTION: HILLVIEW WAY & CLEARVIEW WAY



V_A = Total advancing traffic volume which includes all turning traffic

V_O = Total opposing traffic volume which includes all turning traffic

nstructions:

1. The family of curves represent the percent of left turns in the advancing volume (V_A). The designer should locate the curve for the actual percentage of left turns. When this is not an even increment of five, the designer should estimate where the curve lies.
2. Read V_A and V_O into the chart and locate the intersection of the two volumes.
3. Note the location of the point in #2 relative to the curve in #1. If the point is to the right of the curve, then a left-turn lane should be considered. If the point is to the left of the curve, then a left-turn lane is not warranted based on traffic volumes.

FULL BUILDOUT TRAFFIC - AM PEAK HOUR
(SOUTHBOUND) Va = 142
(NORTHBOUND) Vo = 407
SOUTHBOUND LEFT = 19 (13%)

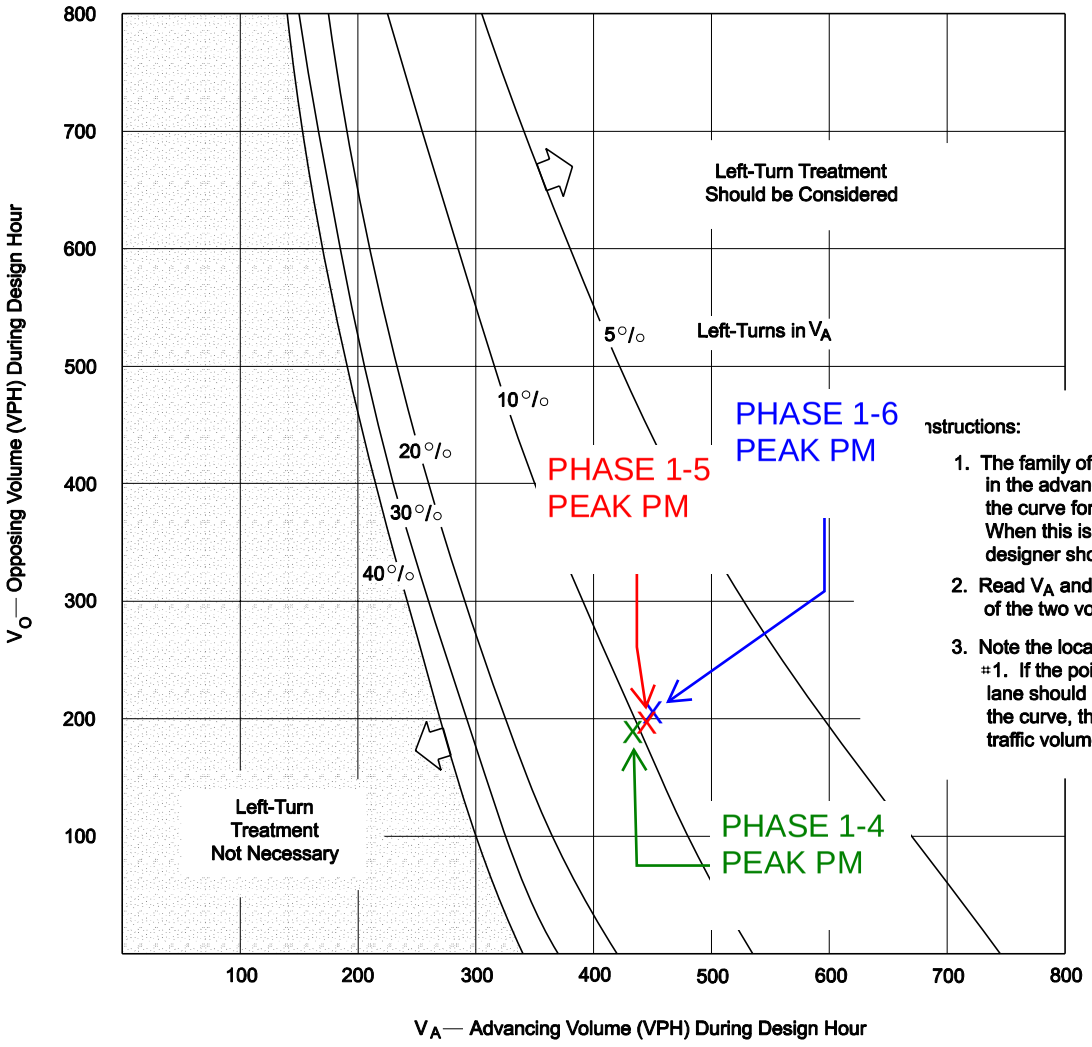
FULL BUILDOUT TRAFFIC - PM PEAK HOUR
(SOUTHBOUND) Va = 480
(NORTHBOUND) Vo = 211
SOUTHBOUND LEFT = 68 (14%)

VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH) (US Customary)

Figure 28.4F

Conclusion:
Southbound left-turn treatment should be considered based on full buildout peak pm hour volumes.

HILLVIEW SUBDIVISION
INTERSECTION: HILLVIEW WAY & CLEARVIEW WAY (SENSITIVITY ANALYSIS)



V_A = Total advancing traffic volume which includes all turning traffic

V_O = Total opposing traffic volume which includes all turning traffic

nstructions:

1. The family of curves represent the percent of left turns in the advancing volume (V_A). The designer should locate the curve for the actual percentage of left turns. When this is not an even increment of five, the designer should estimate where the curve lies.
2. Read V_A and V_O into the chart and locate the intersection of the two volumes.
3. Note the location of the point in #2 relative to the curve in #1. If the point is to the right of the curve, then a left-turn lane should be considered. If the point is to the left of the curve, then a left-turn lane is not warranted based on traffic volumes.

PHASE 1-4 TRAFFIC - PM PEAK HOUR
(SOUTHBOUND) Va = 433
(NORTHBOUND) Vo = 195
SOUTHBOUND LEFT = 37 (9%)

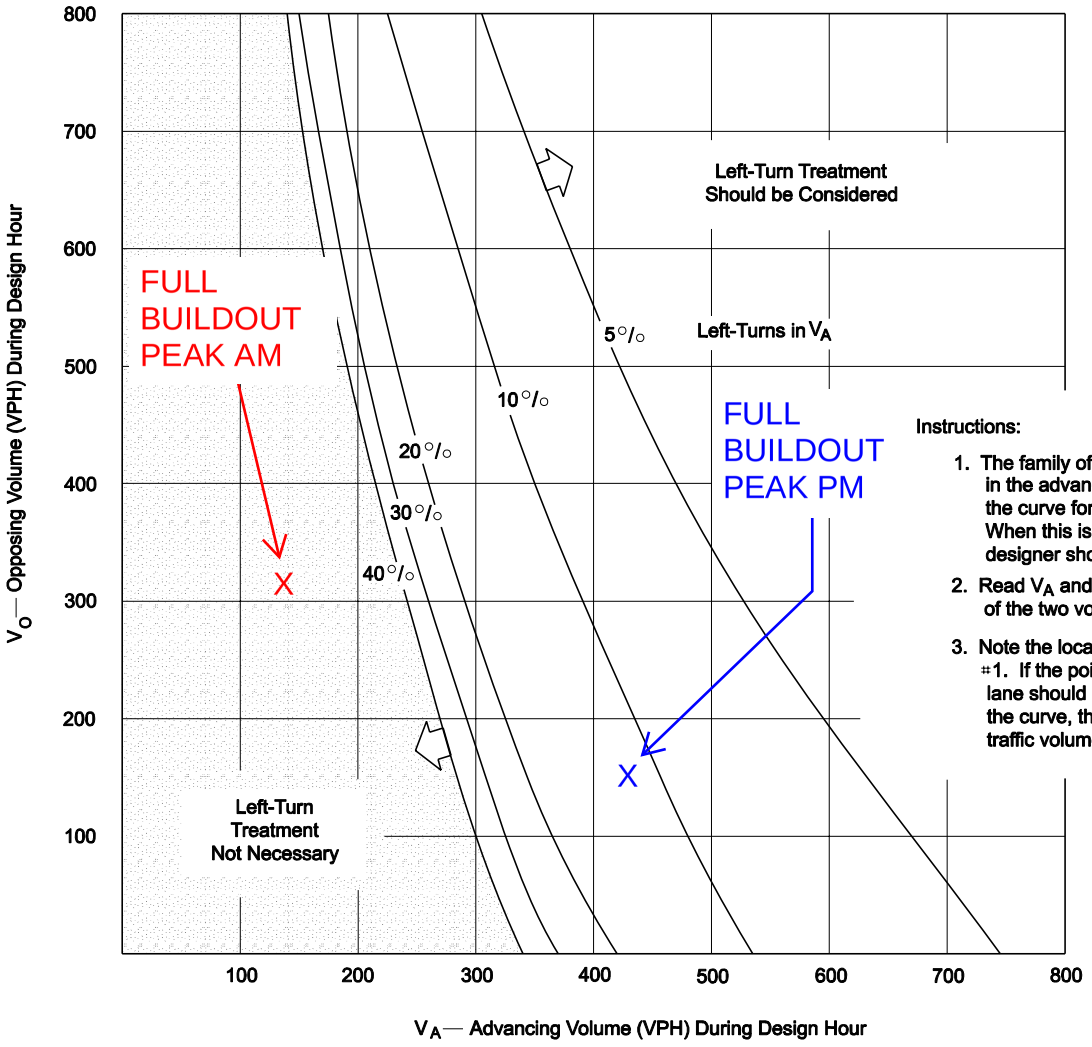
PHASE 1-5 TRAFFIC - PM PEAK HOUR
(SOUTHBOUND) Va = 446
(NORTHBOUND) Vo = 199
SOUTHBOUND LEFT = 46 (10%)

PHASE 1-6 TRAFFIC - PM PEAK HOUR
(SOUTHBOUND) Va = 464
(NORTHBOUND) Vo = 205
SOUTHBOUND LEFT = 58 (13%)

VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH) (US Customary)

Figure 28.4F

Conclusion:
Southbound left-turn treatment should be considered during Phase 5 based on Phase 1-5 Peak PM hour volumes.



V_A = Total advancing traffic volume which includes all turning traffic

V_O = Total opposing traffic volume which includes all turning traffic

Instructions:

1. The family of curves represent the percent of left turns in the advancing volume (V_A). The designer should locate the curve for the actual percentage of left turns. When this is not an even increment of five, the designer should estimate where the curve lies.
2. Read V_A and V_O into the chart and locate the intersection of the two volumes.
3. Note the location of the point in #2 relative to the curve in #1. If the point is to the right of the curve, then a left-turn lane should be considered. If the point is to the left of the curve, then a left-turn lane is not warranted based on traffic volumes.

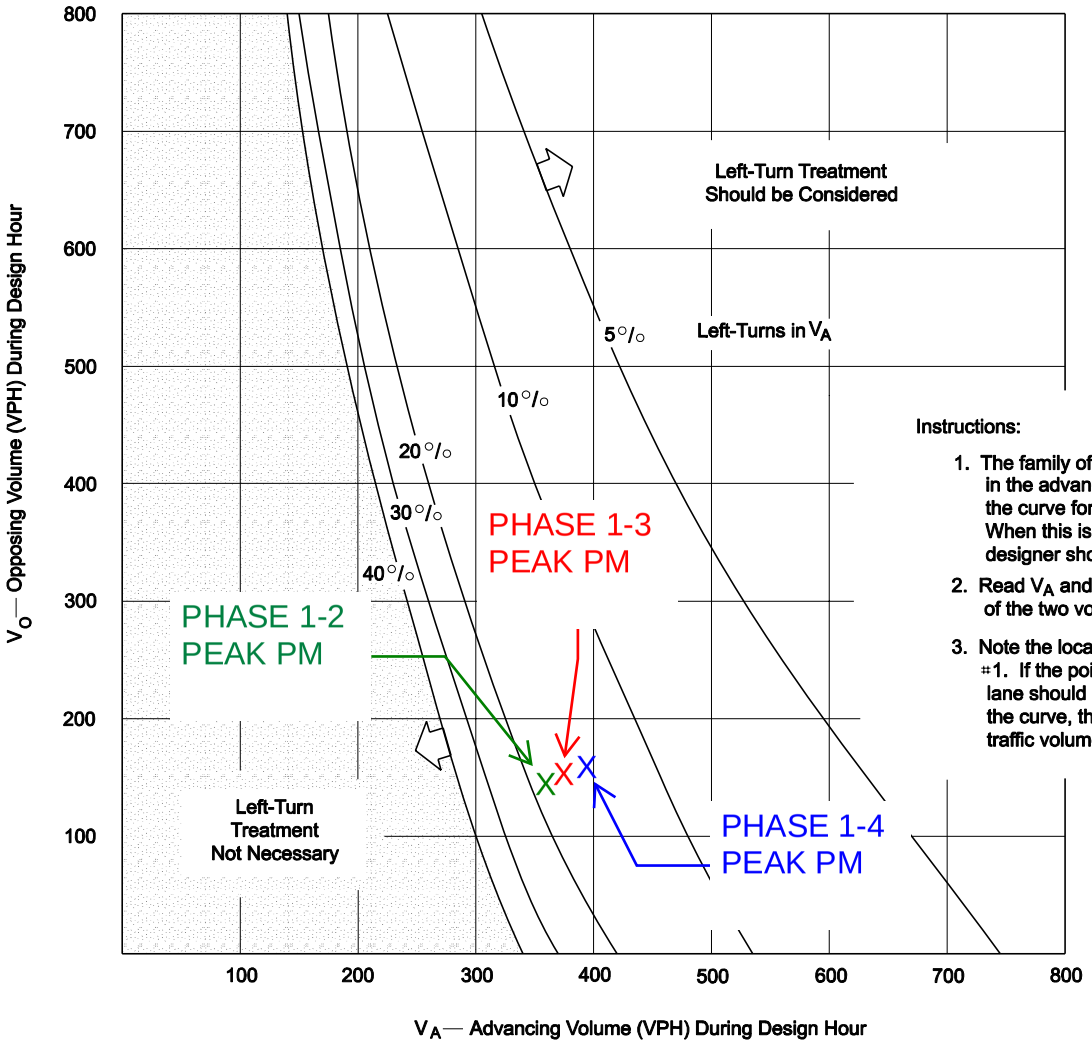
FULL BUILDOUT TRAFFIC - AM PEAK HOUR
(SOUTHBOUND) Va = 137
(NORTHBOUND) Vo = 308
SOUTHBOUND LEFT = 32 (23%)

FULL BUILDOUT TRAFFIC - PM PEAK HOUR
(SOUTHBOUND) Va = 420
(NORTHBOUND) Vo = 164
SOUTHBOUND LEFT = 107 (25%)

VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH) (US Customary)

Figure 28.4F

Conclusion:
Southbound left-turn treatment should be considered based on full buildout peak pm hour volumes.



V_A = Total advancing traffic volume which includes all turning traffic

V_O = Total opposing traffic volume which includes all turning traffic

Instructions:

1. The family of curves represent the percent of left turns in the advancing volume (V_A). The designer should locate the curve for the actual percentage of left turns. When this is not an even increment of five, the designer should estimate where the curve lies.
2. Read V_A and V_O into the chart and locate the intersection of the two volumes.
3. Note the location of the point in #2 relative to the curve in #1. If the point is to the right of the curve, then a left-turn lane should be considered. If the point is to the left of the curve, then a left-turn lane is not warranted based on traffic volumes.

PHASE 1-2 TRAFFIC - PM PEAK HOUR
(SOUTHBOUND) Va = 371
(NORTHBOUND) Vo = 149
SOUTHBOUND LEFT = 63 (17%)

PHASE 1-3 TRAFFIC - PM PEAK HOUR
(SOUTHBOUND) Va = 384
(NORTHBOUND) Vo = 153
SOUTHBOUND LEFT = 75 (20%)

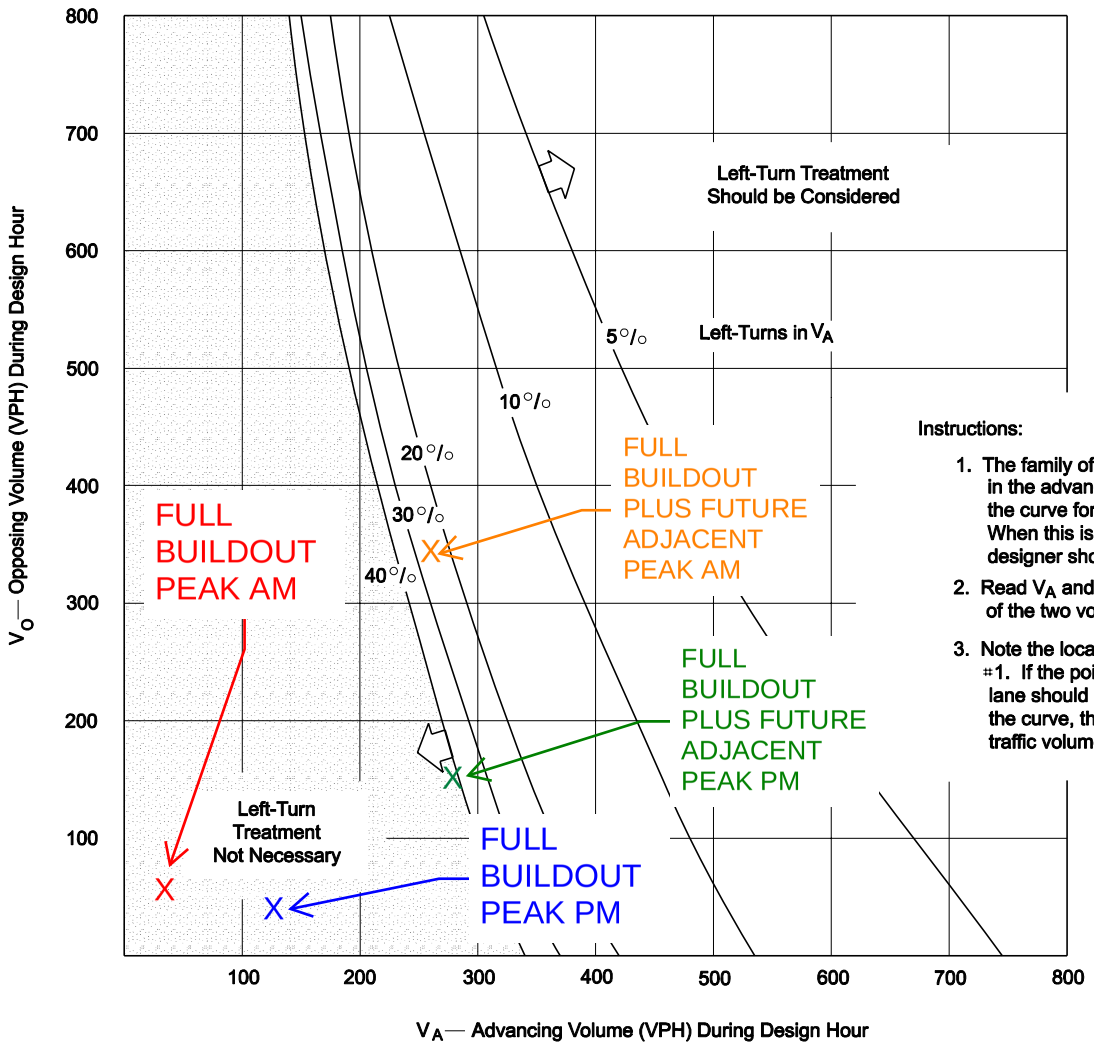
PHASE 1-4 TRAFFIC - PM PEAK HOUR
(SOUTHBOUND) Va = 397
(NORTHBOUND) Vo = 157
SOUTHBOUND LEFT = 86 (22%)

VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH) (US Customary)

Figure 28.4F

Conclusion:
Southbound left-turn treatment should be considered with Phase 2.

HILLVIEW SUBDIVISION
INTERSECTION: RIMEL ROAD & PHASE 1 WEST APPROACH



V_A = Total advancing traffic volume which includes all turning traffic

V_O = Total opposing traffic volume which includes all turning traffic

Instructions:

1. The family of curves represent the percent of left turns in the advancing volume (V_A). The designer should locate the curve for the actual percentage of left turns. When this is not an even increment of five, the designer should estimate where the curve lies.
2. Read V_A and V_O into the chart and locate the intersection of the two volumes.
3. Note the location of the point in #2 relative to the curve in #1. If the point is to the right of the curve, then a left-turn lane should be considered. If the point is to the left of the curve, then a left-turn lane is not warranted based on traffic volumes.

FULL BUILDOUT TRAFFIC - AM PEAK HOUR
(EASTBOUND) Va = 36
(WESTBOUND) Vo = 64
EASTBOUND LEFT = 15 (42%)

FULL BUILDOUT TRAFFIC - PM PEAK HOUR
(EASTBOUND) Va = 119
(WESTBOUND) Vo = 42
EASTBOUND LEFT = 48 (40%)

FULL BUILDOUT WITH FUTURE ADJACENT TRAFFIC - AM PEAK HOUR
(EASTBOUND) Va = 273
(WESTBOUND) Vo = 343
EASTBOUND LEFT = 15 (5%)

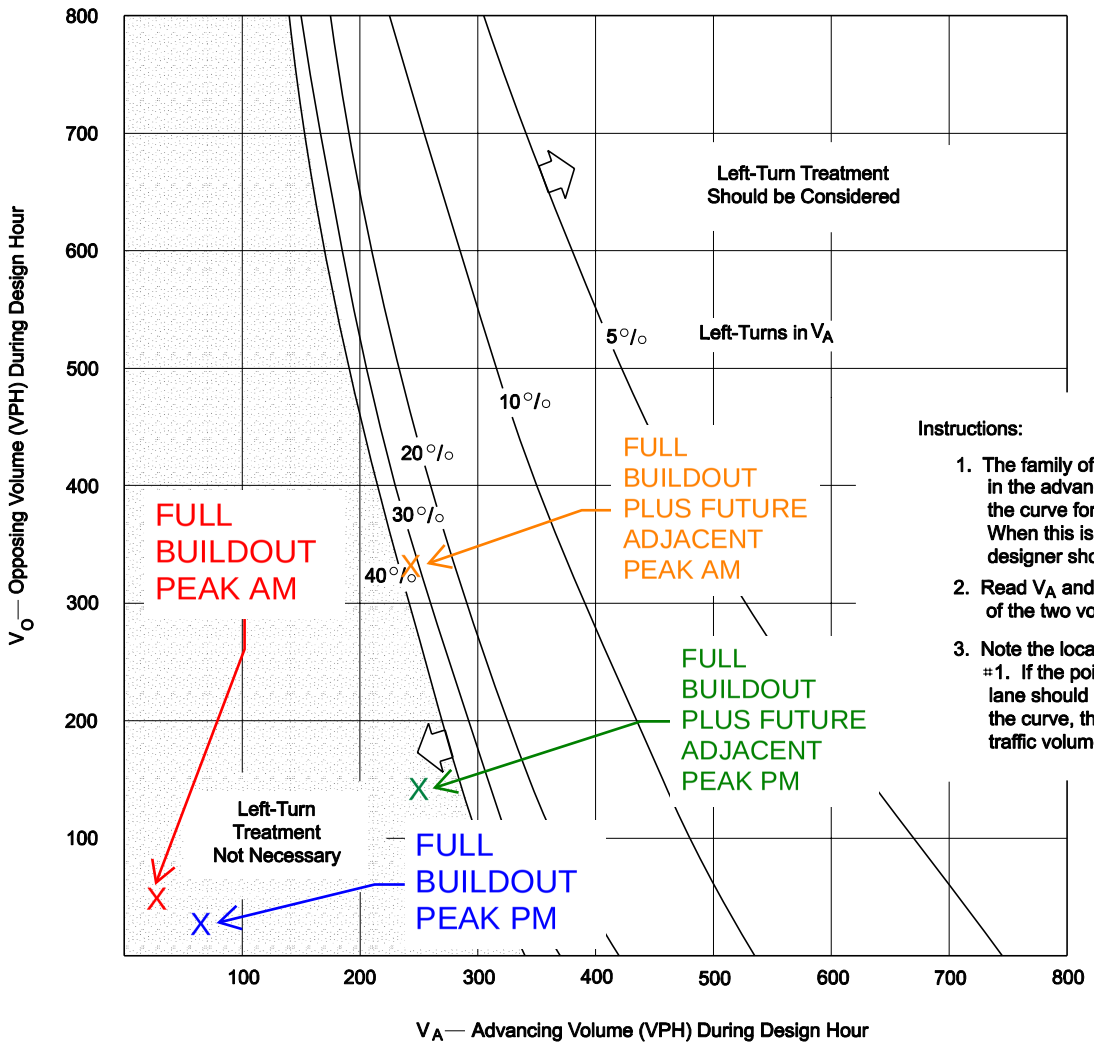
FULL BUILDOUT WITH FUTURE ADJACENT TRAFFIC - PM PEAK HOUR
(EASTBOUND) Va = 282
(WESTBOUND) Vo = 159
EASTBOUND LEFT = 48 (17%)

VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH) (US Customary)

Figure 28.4F

Conclusion:
Eastbound left-turn treatment is not necessary based on full buildout traffic volumes as well as full buildout plus estimated future adjacent development to the east of subject development.

HILLVIEW SUBDIVISION
INTERSECTION: RIMEL ROAD & PHASE 1 EAST APPROACH



V_A = Total advancing traffic volume which includes all turning traffic

V_O = Total opposing traffic volume which includes all turning traffic

Instructions:

1. The family of curves represent the percent of left turns in the advancing volume (V_A). The designer should locate the curve for the actual percentage of left turns. When this is not an even increment of five, the designer should estimate where the curve lies.
2. Read V_A and V_O into the chart and locate the intersection of the two volumes.
3. Note the location of the point in #2 relative to the curve in #1. If the point is to the right of the curve, then a left-turn lane should be considered. If the point is to the left of the curve, then a left-turn lane is not warranted based on traffic volumes.

FULL BUILDOUT TRAFFIC - AM PEAK HOUR
(EASTBOUND) Va = 21
(WESTBOUND) Vo = 45
EASTBOUND LEFT = 6 (29%)

FULL BUILDOUT TRAFFIC - PM PEAK HOUR
(EASTBOUND) Va = 72
(WESTBOUND) Vo = 30
EASTBOUND LEFT = 20 (28%)

FULL BUILDOUT WITH FUTURE ADJACENT TRAFFIC - AM PEAK HOUR
(EASTBOUND) Va = 258
(WESTBOUND) Vo = 324
EASTBOUND LEFT = 6 (2%)

FULL BUILDOUT WITH FUTURE ADJACENT TRAFFIC - PM PEAK HOUR
(EASTBOUND) Va = 235
(WESTBOUND) Vo = 147
EASTBOUND LEFT = 20 (9%)

VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON 2-LANE HIGHWAYS (45 MPH) (US Customary)

Figure 28.4F

Conclusion:
Eastbound left-turn treatment is not necessary based on full buildout traffic volumes as well as full buildout plus estimated future adjacent development to the east of the subject development.

Manual Traffic Count (Completed by Cushing Terrell)
Intersection: Garland Drive and 23rd Avenue
Missoula, MT

$$PHF = \frac{V}{V_{15} * 4}$$

Wednesday, August 24, 2022
Peak AM Period

		Southbound			Westbound			Northbound			Eastbound			Interval	Hourly	
		Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Total	Total	
7:00 AM	7:15 AM	1	4	2	0	0	0	0	26	0	1	0	0	34		
7:15 AM	7:30 AM	0	5	0	5	0	0	1	17	0	0	0	0	28		
7:30 AM	7:45 AM	0	5	1	6	0	0	1	36	0	0	0	1	50		
7:45 AM	8:00 AM	1	12	1	8	0	1	0	36	0	0	0	2	61	173	
8:00 AM	8:15 AM	0	10	2	7	0	0	1	36	0	0	0	1	57	196	
8:15 AM	8:30 AM	2	9	1	3	0	0	0	33	0	0	0	1	49	217	
8:30 AM	8:45 AM	0	9	1	3	0	0	0	37	0	0	0	3	53	220	<-- Peak Hour
8:45 AM	9:00 AM	1	13	2	7	0	0	0	32	0	0	0	1	56	215	
	Peak Hour Volume	3	40	5	21	0	1	1	142	0	0	0	7			

PHF = **0.90**

Wednesday, August 24, 2022
Peak PM Period

		Southbound			Westbound			Northbound			Eastbound			Interval	Hourly	
		Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Total	Total	
4:00 PM	4:15 PM	0	38	4	2	0	0	0	14	0	0	0	0	58		
4:15 PM	4:30 PM	0	31	6	5	0	1	2	33	0	0	0	0	78		
4:30 PM	4:45 PM	0	38	9	3	1	0	0	25	0	0	0	1	77		
4:45 PM	5:00 PM	1	36	8	8	0	0	0	20	0	0	0	0	73	286	
5:00 PM	5:15 PM	3	50	7	7	0	2	0	33	0	0	0	0	102	330	
5:15 PM	5:30 PM	0	42	9	3	0	3	0	32	0	0	0	0	89	341	
5:30 PM	5:45 PM	1	45	3	3	0	1	0	24	0	1	0	3	81	345	
5:45 PM	6:00 PM	0	44	9	5	0	0	0	32	0	0	0	0	90	362	<-- Peak Hour
	Peak Hour Volume	4	181	28	18	0	6	0	121	0	1	0	3			

PHF = **0.89**

Manual Traffic Count (Completed by Cushing Terrell)
Intersection: Hillview Way and 23rd Avenue
Missoula, MT

$$PHF = \frac{V}{V_{15} * 4}$$

Tuesday, August 23, 2022
Peak AM Period

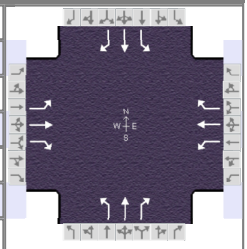
		Southbound		Northbound		Eastbound		Interval	Hourly	
		Right	Thru	Thru	Left	Right	Left	Total	Total	
7:00 AM	7:15 AM	0	6	30	11	1	0	48		
7:15 AM	7:30 AM	2	3	26	11	4	3	49		
7:30 AM	7:45 AM	1	5	45	22	10	2	85		
7:45 AM	8:00 AM	1	8	50	23	9	1	92	274	
8:00 AM	8:15 AM	1	8	39	10	8	1	67	293	
8:15 AM	8:30 AM	0	14	34	21	7	4	80	324	<-- Peak Hour
8:30 AM	8:45 AM	4	7	39	14	13	2	79	318	
8:45 AM	9:00 AM	0	12	23	19	8	2	64	290	
	Peak Hour Volume	3	35	168	76	34	8			
							PHF=	**0.88**		

Tuesday, August 23, 2022
Peak PM Period

		Southbound		Northbound		Eastbound		Interval	Hourly	
		Right	Thru	Thru	Left	Right	Left	Total	Total	
4:00 PM	4:15 PM	5	30	13	14	18	2	82		
4:15 PM	4:30 PM	6	31	22	13	21	4	97		
4:30 PM	4:45 PM	5	33	23	22	25	1	109		
4:45 PM	5:00 PM	5	30	14	16	18	2	85	373	
5:00 PM	5:15 PM	5	47	16	18	26	2	114	405	
5:15 PM	5:30 PM	6	57	16	20	21	0	120	428	
5:30 PM	5:45 PM	8	38	21	16	22	0	105	424	
5:45 PM	6:00 PM	4	34	19	15	32	1	105	444	<-- Peak Hour
	Peak Hour Volume	23	176	72	69	101	3			
							PHF=	**0.93**		

HCS Signalized Intersection Results Summary

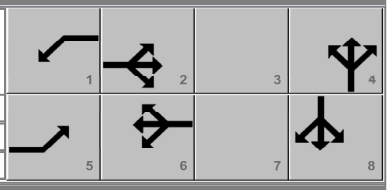
General Information				Intersection Information	
Agency	WGM Group			Duration, h	0.250
Analyst	DBG	Analysis Date	Jan 27, 2023	Area Type	Other
Jurisdiction		Time Period	AM Existing	PHF	0.89
Urban Street	39th Ave/SW Higgins	Analysis Year	2023	Analysis Period	1> 7:00
Intersection	Hillview/S Russell & 39t…	File Name	1_AM_Existing.xus		
Project Description	Hillview Subdivision				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	172	508	11	52	299	127	22	158	158	118	58	69

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.0	3.1	54.3	22.6	0.0	0.0
Yellow	3.0	0.0	3.6	3.6	0.0	0.0
Red	1.0	0.0	2.4	2.4	0.0	0.0



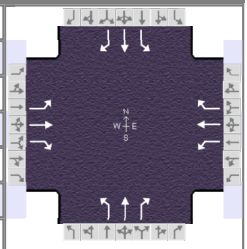
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		8
Case Number	1.1	3.0	1.1	3.0		5.0		5.0
Phase Duration, s	11.1	63.4	8.0	60.3		28.6		28.6
Change Period, ($Y+R_c$), s	4.0	6.0	4.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time (g_s), s	6.6		3.4			11.8		20.6
Green Extension Time (g_e), s	0.6	0.0	0.1	0.0		2.4		2.0
Phase Call Probability	1.00		0.80			1.00		1.00
Max Out Probability	0.00		0.00			0.01		0.12

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	193	571	12	58	336	143	25	178	178	133	65	78
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781	1870	1585	1781	1870	1585	1336	1870	1585	1207	1870	1585
Queue Service Time (g_s), s	4.6	18.7	0.3	1.4	10.0	4.5	1.5	8.1	9.8	10.5	2.8	4.0
Cycle Queue Clearance Time (g_c), s	4.6	18.7	0.3	1.4	10.0	4.5	4.3	8.1	9.8	18.6	2.8	4.0
Green Ratio (*g/C*)	0.63	0.57	0.57	0.58	0.54	0.54	0.23	0.23	0.23	0.23	0.23	0.23
Capacity (*c*), veh/h	660	1073	910	451	1015	860	337	423	358	247	423	358
Volume-to-Capacity Ratio (*X*)	0.293	0.532	0.014	0.129	0.331	0.166	0.073	0.420	0.496	0.536	0.154	0.216
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	2.9	12.3	0.2	0.9	7.5	2.9	0.9	6.6	6.8	5.8	2.3	2.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.55	0.00	0.04	0.14	0.00	0.06	0.24	0.00	0.24	1.46	0.00	0.70
Uniform Delay (d_1), s/veh	8.6	13.1	9.1	10.7	12.7	11.5	32.7	33.1	33.7	41.0	31.0	31.5
Incremental Delay (d_2), s/veh	0.2	1.9	0.0	0.1	0.9	0.4	0.1	0.7	1.1	1.8	0.2	0.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	8.9	15.0	9.2	10.8	13.6	11.9	32.8	33.8	34.8	42.8	31.2	31.8
Level of Service (LOS)	A	B	A	B	B	B	C	C	C	D	C	C
Approach Delay, s/veh / LOS	13.4	B		12.9	B		34.2	C		37.0	D	
Intersection Delay, s/veh / LOS	20.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

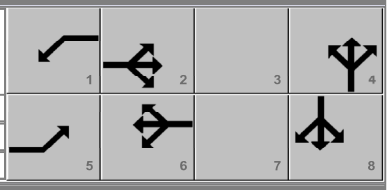
General Information				Intersection Information	
Agency	WGM Group			Duration, h	0.250
Analyst	DBG	Analysis Date	Jan 27, 2023	Area Type	Other
Jurisdiction		Time Period	AM Phase 1 Build	PHF	0.89
Urban Street	39th Ave/SW Higgins	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Hillview/S Russell & 39t…	File Name	1_AM_Ph1_Build.xus		
Project Description	Hillview Subdivision				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	172	508	12	59	299	127	25	178	181	118	64	69

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.2	3.1	52.8	23.9	0.0	0.0
Yellow	3.0	0.0	3.6	3.6	0.0	0.0
Red	1.0	0.0	2.4	2.4	0.0	0.0



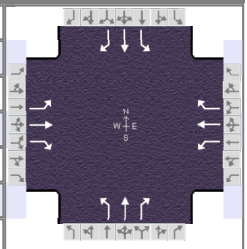
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		8
Case Number	1.1	3.0	1.1	3.0		5.0		5.0
Phase Duration, s	11.3	61.9	8.2	58.8		29.9		29.9
Change Period, ($Y+R_c$), s	4.0	6.0	4.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time (g_s), s	6.7		3.7			13.2		21.8
Green Extension Time (g_e), s	0.6	0.0	0.1	0.0		2.7		2.1
Phase Call Probability	1.00		0.84			1.00		1.00
Max Out Probability	0.00		0.00			0.02		0.20

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	193	571	13	66	336	143	28	200	203	133	72	78
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781	1870	1585	1781	1870	1585	1328	1870	1585	1182	1870	1585
Queue Service Time (g_s), s	4.7	19.4	0.4	1.7	10.3	4.7	1.7	9.1	11.2	10.8	3.0	3.9
Cycle Queue Clearance Time (g_c), s	4.7	19.4	0.4	1.7	10.3	4.7	4.7	9.1	11.2	19.8	3.0	3.9
Green Ratio (*g/C*)	0.61	0.56	0.56	0.57	0.53	0.53	0.24	0.24	0.24	0.24	0.24	0.24
Capacity (*c*), veh/h	645	1045	886	437	988	837	350	447	379	247	447	379
Volume-to-Capacity Ratio (*X*)	0.300	0.546	0.015	0.152	0.340	0.170	0.080	0.447	0.537	0.536	0.161	0.205
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	3.1	12.8	0.2	1.1	7.8	3.0	1.0	7.4	7.7	5.7	2.5	2.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.58	0.00	0.04	0.16	0.00	0.06	0.27	0.00	0.27	1.46	0.00	0.68
Uniform Delay (d_1), s/veh	9.3	14.0	9.8	11.4	13.6	12.2	32.0	32.4	33.2	40.8	30.1	30.4
Incremental Delay (d_2), s/veh	0.3	2.1	0.0	0.2	0.9	0.4	0.1	0.7	1.2	1.8	0.2	0.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	9.5	16.0	9.8	11.6	14.5	12.7	32.1	33.1	34.4	42.6	30.3	30.7
Level of Service (LOS)	A	B	A	B	B	B	C	C	C	D	C	C
Approach Delay, s/veh / LOS	14.3	B		13.7	B		33.7	C		36.2	D	
Intersection Delay, s/veh / LOS	21.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

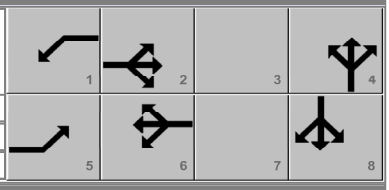
General Information				Intersection Information	
Agency	WGM Group			Duration, h	0.250
Analyst	DBG	Analysis Date	Jan 27, 2023	Area Type	Other
Jurisdiction		Time Period	AM Full Buildout	PHF	0.89
Urban Street	39th Ave/SW Higgins	Analysis Year	2026	Analysis Period	1> 7:00
Intersection	Hillview/S Russell & 39t…	File Name	1_AM_FBO_Build.xus		
Project Description	Hillview Subdivision				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	172	508	14	74	299	127	32	216	226	118	77	69

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.5	3.0	50.2	26.3	0.0	0.0
Yellow	3.0	0.0	3.6	3.6	0.0	0.0
Red	1.0	0.0	2.4	2.4	0.0	0.0



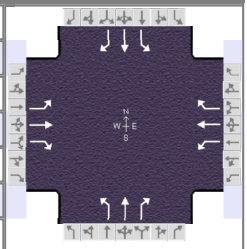
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		8
Case Number	1.1	3.0	1.1	3.0		5.0		5.0
Phase Duration, s	11.5	59.2	8.5	56.2		32.3		32.3
Change Period, ($Y+R_c$), s	4.0	6.0	4.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time (g_s), s	7.0		4.2			16.1		24.1
Green Extension Time (g_e), s	0.5	0.0	0.1	0.0		3.0		2.2
Phase Call Probability	1.00		0.90			1.00		1.00
Max Out Probability	0.00		0.03			0.07		0.44

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	193	571	16	83	336	143	36	243	254	133	87	78
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781	1870	1585	1781	1870	1585	1311	1870	1585	1137	1870	1585
Queue Service Time (g_s), s	5.0	20.6	0.5	2.2	10.9	4.9	2.2	11.0	14.1	11.2	3.6	3.8
Cycle Queue Clearance Time (g_c), s	5.0	20.6	0.5	2.2	10.9	4.9	5.7	11.0	14.1	22.1	3.6	3.8
Green Ratio (*g/C*)	0.59	0.53	0.53	0.55	0.50	0.50	0.26	0.26	0.26	0.26	0.26	0.26
Capacity (*c*), veh/h	616	995	843	410	939	795	370	492	417	246	492	417
Volume-to-Capacity Ratio (*X*)	0.314	0.574	0.019	0.203	0.358	0.179	0.097	0.494	0.609	0.538	0.176	0.186
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	3.3	13.6	0.3	1.5	8.2	3.2	1.2	8.6	9.2	5.7	2.9	2.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.63	0.00	0.06	0.22	0.00	0.07	0.33	0.00	0.32	1.46	0.00	0.66
Uniform Delay (d_1), s/veh	10.4	15.8	11.1	12.9	15.1	13.6	30.7	31.2	32.3	40.6	28.5	28.6
Incremental Delay (d_2), s/veh	0.3	2.4	0.0	0.2	1.1	0.5	0.1	0.8	1.5	1.8	0.2	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	10.7	18.2	11.1	13.1	16.2	14.1	30.8	32.0	33.8	42.4	28.7	28.8
Level of Service (LOS)	B	B	B	B	B	B	C	C	C	D	C	C
Approach Delay, s/veh / LOS	16.2	B		15.2	B		32.8	C		34.8	C	
Intersection Delay, s/veh / LOS	22.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

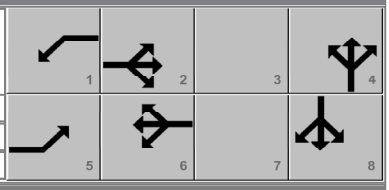
General Information				Intersection Information	
Agency	WGM Group			Duration, h	0.250
Analyst	DBG	Analysis Date	Jan 27, 2023	Area Type	Other
Jurisdiction		Time Period	PM Existing	PHF	0.92
Urban Street	39th Ave/SW Higgins	Analysis Year	2023	Analysis Period	1> 7:00
Intersection	Hillview/S Russell & 39t…	File Name	1_PM_Existing.xus		
Project Description	Hillview Subdivision				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	151	443	24	186	593	140	22	123	74	194	154	173

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.6	1.2	50.5	25.8	0.0	0.0
Yellow	3.0	0.0	3.6	3.6	0.0	0.0
Red	1.0	0.0	2.4	2.4	0.0	0.0



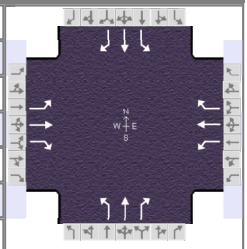
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		8
Case Number	1.1	3.0	1.1	3.0		5.0		5.0
Phase Duration, s	10.6	56.5	11.7	57.6		31.8		31.8
Change Period, ($Y+R_c$), s	4.0	6.0	4.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time (g_s), s	6.4		7.4			10.9		23.8
Green Extension Time (g_e), s	0.3	0.0	0.4	0.0		3.0		2.0
Phase Call Probability	0.99		1.00			1.00		1.00
Max Out Probability	0.12		0.04			0.02		0.49

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	164	482	26	202	645	152	24	134	80	211	167	188
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781	1870	1585	1781	1870	1585	1218	1864	1580	1256	1870	1585
Queue Service Time (g_s), s	4.4	17.2	0.8	5.4	25.4	5.1	1.6	5.7	4.0	16.1	7.3	10.0
Cycle Queue Clearance Time (g_c), s	4.4	17.2	0.8	5.4	25.4	5.1	8.9	5.7	4.0	21.8	7.3	10.0
Green Ratio (*g/C*)	0.57	0.50	0.50	0.58	0.52	0.52	0.26	0.26	0.26	0.26	0.26	0.26
Capacity (*c*), veh/h	379	944	800	514	966	819	298	481	408	324	482	409
Volume-to-Capacity Ratio (*X*)	0.433	0.510	0.033	0.394	0.667	0.186	0.080	0.278	0.197	0.650	0.347	0.460
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	3.0	11.9	0.5	3.6	16.6	3.3	0.9	4.6	2.7	8.8	5.9	6.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.57	0.00	0.10	0.52	0.00	0.07	0.23	0.00	0.10	2.23	0.00	1.75
Uniform Delay (d_1), s/veh	14.5	16.5	12.5	11.8	17.8	12.9	33.9	29.7	29.0	38.4	30.2	31.2
Incremental Delay (d_2), s/veh	0.8	2.0	0.1	0.5	3.6	0.5	0.1	0.3	0.2	2.8	0.4	0.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	15.3	18.5	12.6	12.2	21.5	13.4	34.0	30.0	29.2	41.2	30.7	32.0
Level of Service (LOS)	B	B	B	B	C	B	C	C	C	D	C	C
Approach Delay, s/veh / LOS	17.5	B		18.4	B		30.1	C		35.1	D	
Intersection Delay, s/veh / LOS	23.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

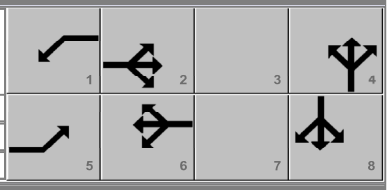
General Information				Intersection Information	
Agency	WGM Group			Duration, h	0.250
Analyst	DBG	Analysis Date	Jan 27, 2023	Area Type	Other
Jurisdiction		Time Period	PM Phase 1 Build	PHF	0.92
Urban Street	39th Ave/SW Higgins	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Hillview/S Russell & 39t…	File Name	1_PM_Ph1_Build.xus		
Project Description	Hillview Subdivision				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	151	443	27	210	593	140	24	135	88	194	174	173

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.7	2.0	48.8	26.5	0.0	0.0
Yellow	3.0	0.0	3.6	3.6	0.0	0.0
Red	1.0	0.0	2.4	2.4	0.0	0.0



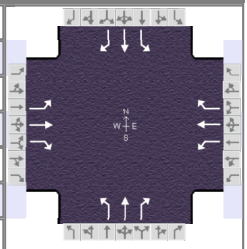
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		8
Case Number	1.1	3.0	1.1	3.0		5.0		5.0
Phase Duration, s	10.7	54.8	12.7	56.8		32.5		32.5
Change Period, ($Y+R_c$), s	4.0	6.0	4.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time (g_s), s	6.5		8.3			12.1		24.6
Green Extension Time (g_e), s	0.2	0.0	0.4	0.0		3.2		2.0
Phase Call Probability	0.99		1.00			1.00		1.00
Max Out Probability	0.24		0.13			0.04		0.61

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	164	482	29	228	645	152	26	147	96	211	189	188
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781	1870	1585	1781	1870	1585	1194	1864	1580	1241	1870	1585
Queue Service Time (g_s), s	4.5	17.8	1.0	6.3	25.9	5.2	1.8	6.3	4.7	16.3	8.3	9.9
Cycle Queue Clearance Time (g_c), s	4.5	17.8	1.0	6.3	25.9	5.2	10.1	6.3	4.7	22.6	8.3	9.9
Green Ratio (*g/C*)	0.55	0.49	0.49	0.57	0.51	0.51	0.27	0.27	0.27	0.27	0.27	0.27
Capacity (*c*), veh/h	371	913	773	510	950	805	290	495	419	324	496	421
Volume-to-Capacity Ratio (*X*)	0.443	0.528	0.038	0.448	0.679	0.189	0.090	0.297	0.228	0.652	0.381	0.447
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	3.2	12.3	0.6	4.3	17.0	3.4	1.0	5.0	3.2	8.8	6.7	6.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.59	0.00	0.12	0.62	0.00	0.07	0.26	0.00	0.11	2.24	0.00	1.73
Uniform Delay (d_1), s/veh	15.2	17.7	13.4	12.5	18.5	13.4	34.1	29.3	28.7	38.3	30.0	30.6
Incremental Delay (d_2), s/veh	0.8	2.2	0.1	0.6	3.9	0.5	0.1	0.3	0.3	3.1	0.5	0.7
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	16.0	19.8	13.4	13.1	22.4	13.9	34.3	29.6	29.0	41.4	30.5	31.4
Level of Service (LOS)	B	B	B	B	C	B	C	C	C	D	C	C
Approach Delay, s/veh / LOS	18.6	B		19.1	B		29.9	C		34.7	C	
Intersection Delay, s/veh / LOS	23.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

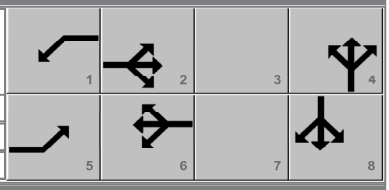
General Information				Intersection Information	
Agency	WGM Group			Duration, h	0.250
Analyst	DBG	Analysis Date	Jan 27, 2023	Area Type	Other
Jurisdiction		Time Period	PM Full Buildout	PHF	0.92
Urban Street	39th Ave/SW Higgins	Analysis Year	2026	Analysis Period	1> 7:00
Intersection	Hillview/S Russell & 39t…	File Name	1_PM_FBO_Build.xus		
Project Description	Hillview Subdivision				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	151	443	35	261	593	140	28	161	118	194	219	173

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.9	3.5	45.5	28.0	0.0	0.0
Yellow	3.0	0.0	3.6	3.6	0.0	0.0
Red	1.0	0.0	2.4	2.4	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		4		8
Case Number	1.1	3.0	1.1	3.0		5.0		5.0
Phase Duration, s	10.9	51.5	14.4	55.0		34.0		34.0
Change Period, ($Y+R_c$), s	4.0	6.0	4.0	6.0		6.0		6.0
Max Allow Headway (*MAH*), s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time (g_s), s	6.8		10.1			14.7		26.2
Green Extension Time (g_e), s	0.2	0.0	0.4	0.0		3.6		1.8
Phase Call Probability	0.99		1.00			1.00		1.00
Max Out Probability	0.98		1.00			0.10		0.90

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	164	482	38	284	645	152	30	175	128	211	238	188
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781	1870	1585	1781	1870	1585	1142	1864	1580	1210	1870	1585
Queue Service Time (g_s), s	4.8	18.9	1.3	8.1	26.8	5.4	2.3	7.5	6.4	16.8	10.5	9.7
Cycle Queue Clearance Time (g_c), s	4.8	18.9	1.3	8.1	26.8	5.4	12.7	7.5	6.4	24.2	10.5	9.7
Green Ratio (*g/C*)	0.52	0.46	0.46	0.57	0.49	0.49	0.28	0.28	0.28	0.28	0.28	0.28
Capacity (*c*), veh/h	354	852	722	501	917	777	272	523	443	321	524	444
Volume-to-Capacity Ratio (*X*)	0.463	0.565	0.053	0.566	0.703	0.196	0.112	0.335	0.290	0.657	0.454	0.423
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	3.4	13.2	0.9	5.5	17.7	3.6	1.1	6.0	4.3	8.9	8.2	6.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.65	0.00	0.17	0.80	0.00	0.08	0.30	0.00	0.15	2.26	0.00	1.68
Uniform Delay (d_1), s/veh	16.5	20.0	15.2	13.8	19.8	14.4	34.9	28.6	28.2	38.2	29.7	29.4
Incremental Delay (d_2), s/veh	0.9	2.7	0.1	1.0	4.5	0.6	0.2	0.4	0.4	3.8	0.6	0.6
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	17.4	22.7	15.3	14.8	24.3	14.9	35.1	29.0	28.5	42.0	30.3	30.0
Level of Service (LOS)	B	C	B	B	C	B	D	C	C	D	C	C
Approach Delay, s/veh / LOS	21.0	C		20.5	C		29.4	C		34.1	C	
Intersection Delay, s/veh / LOS	24.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Two-Way Stop-Control Report

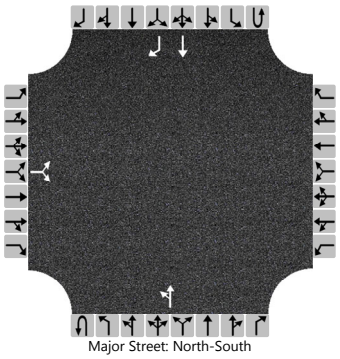
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/20/2023
Analysis Year	2023
Time Analyzed	AM Existing
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Clearview Way
Jurisdiction	
East/West Street	Clearview Way
North/South Street	Hillview Way
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	1
Configuration			LR							LT					T	R
Volume (veh/h)		17		2						10	296				97	1
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized														No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			23							12						
Capacity, c (veh/h)			546							1462						
v/c Ratio			0.04							0.01						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
Control Delay (s/veh)			11.9							7.5	0.1					
Level of Service (LOS)			B							A	A					
Approach Delay (s/veh)		11.9								0.3						
Approach LOS		B								A						

HCS Two-Way Stop-Control Report

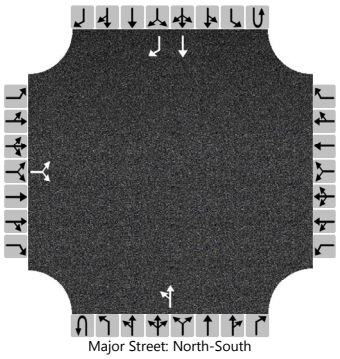
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2024
Time Analyzed	Ph 1 - AM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Clearview Way
Jurisdiction	
East/West Street	Clearview Way
North/South Street	Hillview Way
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	1
Configuration			LR							LT					T	R
Volume (veh/h)		17		6						23	342				112	1
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized														No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			28							28						
Capacity, c (veh/h)			513							1440						
v/c Ratio			0.05							0.02						
95% Queue Length, Q_{95} (veh)			0.2							0.1						
Control Delay (s/veh)			12.4							7.6	0.2					
Level of Service (LOS)			B							A	A					
Approach Delay (s/veh)		12.4								0.7						
Approach LOS		B								A						

HCS Two-Way Stop-Control Report

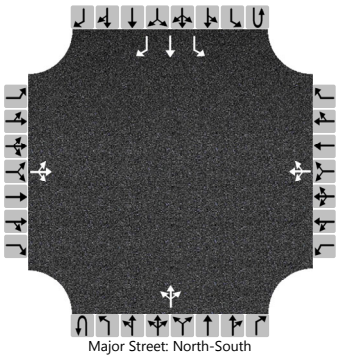
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2026
Time Analyzed	Full Buildout - AM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Clearview Way
Jurisdiction	
East/West Street	Clearview Way
North/South Street	Hillview Way
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	1
Configuration			LTR				LTR				LTR			L	T	R
Volume (veh/h)		17	5	9		8	17	59		32	372	3		19	122	1
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized													No			
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			38				102			39				23		
Capacity, c (veh/h)			342				478			1425				1098		
v/c Ratio			0.11				0.21			0.03				0.02		
95% Queue Length, Q_{95} (veh)			0.4				0.8			0.1				0.1		
Control Delay (s/veh)			16.8				14.6			7.6	0.3	0.3		8.3		
Level of Service (LOS)			C				B			A	A	A		A		
Approach Delay (s/veh)	16.8				14.6				0.9				1.1			
Approach LOS	C				B				A				A			

HCS Two-Way Stop-Control Report

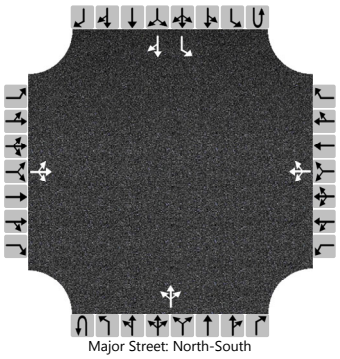
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2026
Time Analyzed	FBO - AM Build No SB RTTL
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Clearview Way
Jurisdiction	
East/West Street	Clearview Way
North/South Street	Hillview Way
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		17	5	9		8	17	59		32	372	3		19	122	1
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			38				102			39				23		
Capacity, c (veh/h)			341				478			1425				1098		
v/c Ratio			0.11				0.21			0.03				0.02		
95% Queue Length, Q_{95} (veh)			0.4				0.8			0.1				0.1		
Control Delay (s/veh)			16.9				14.6			7.6	0.3	0.3		8.3		
Level of Service (LOS)			C				B			A	A	A		A		
Approach Delay (s/veh)	16.9				14.6				0.9				1.1			
Approach LOS	C				B				A				A			

HCS Two-Way Stop-Control Report

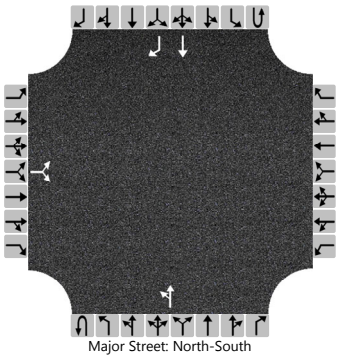
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/20/2023
Analysis Year	2023
Time Analyzed	PM Existing
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Clearview Way
Jurisdiction	
East/West Street	Clearview Way
North/South Street	Hillview Way
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	1
Configuration			LR							LT					T	R
Volume (veh/h)		9		2						1	138				307	22
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized														No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			12							1						
Capacity, c (veh/h)			562							1196						
v/c Ratio			0.02							0.00						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
Control Delay (s/veh)			11.5							8.0	0.0					
Level of Service (LOS)			B							A	A					
Approach Delay (s/veh)		11.5								0.1						
Approach LOS		B								A						

HCS Two-Way Stop-Control Report

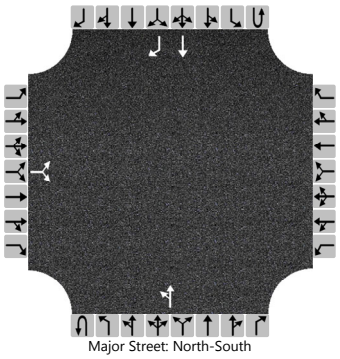
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2024
Time Analyzed	Phase 1 - PM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Clearview Way
Jurisdiction	
East/West Street	Clearview Way
North/South Street	Hillview Way
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	1
Configuration			LR							LT					T	R
Volume (veh/h)		9		16						9	166				355	22
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized														No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			27							10						
Capacity, c (veh/h)			574							1144						
v/c Ratio			0.05							0.01						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
Control Delay (s/veh)			11.6							8.2	0.1					
Level of Service (LOS)			B							A	A					
Approach Delay (s/veh)		11.6								0.5						
Approach LOS		B								A						

HCS Two-Way Stop-Control Report

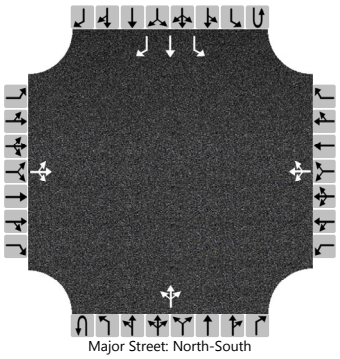
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2026
Time Analyzed	Full Buildout - PM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Clearview Way
Jurisdiction	
East/West Street	Clearview Way
North/South Street	Hillview Way
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	1
Configuration			LTR				LTR				LTR			L	T	R
Volume (veh/h)		9	19	26		5	11	40		15	187	9		68	390	22
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized													No			
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			59				61			16				74		
Capacity, c (veh/h)			377				518			1107				1351		
v/c Ratio			0.16				0.12			0.01				0.05		
95% Queue Length, Q_{95} (veh)			0.5				0.4			0.0				0.2		
Control Delay (s/veh)			16.3				12.9			8.3	0.1	0.1		7.8		
Level of Service (LOS)			C				B			A	A	A		A		
Approach Delay (s/veh)	16.3				12.9				0.7				1.1			
Approach LOS	C				B				A				A			

HCS Two-Way Stop-Control Report

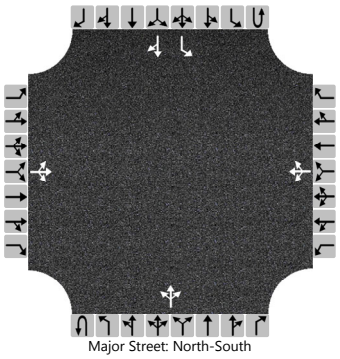
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2026
Time Analyzed	FBO - PM Build no RT TL
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Clearview Way
Jurisdiction	
East/West Street	Clearview Way
North/South Street	Hillview Way
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		9	19	26		5	11	40		15	187	9		68	390	22
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			59				61			16				74		
Capacity, c (veh/h)			370				518			1107				1351		
v/c Ratio			0.16				0.12			0.01				0.05		
95% Queue Length, Q_{95} (veh)			0.6				0.4			0.0				0.2		
Control Delay (s/veh)			16.5				12.9			8.3	0.1	0.1		7.8		
Level of Service (LOS)			C				B			A	A	A		A		
Approach Delay (s/veh)	16.5				12.9				0.7				1.1			
Approach LOS	C				B				A				A			

HCS Two-Way Stop-Control Report

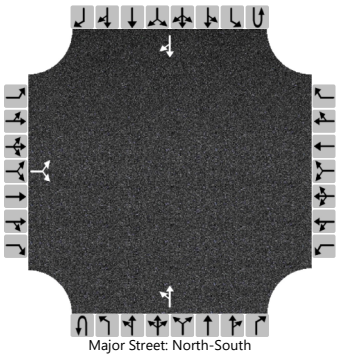
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2023
Time Analyzed	AM Existing
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Villageview Way
Jurisdiction	
East/West Street	Villageview Way
North/South Street	Hillview Way
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		7		2						1	301				96	1
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11							1						
Capacity, c (veh/h)			584							1460						
v/c Ratio			0.02							0.00						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
Control Delay (s/veh)			11.3							7.5	0.0					
Level of Service (LOS)			B							A	A					
Approach Delay (s/veh)		11.3								0.0						
Approach LOS		B								A						

HCS Two-Way Stop-Control Report

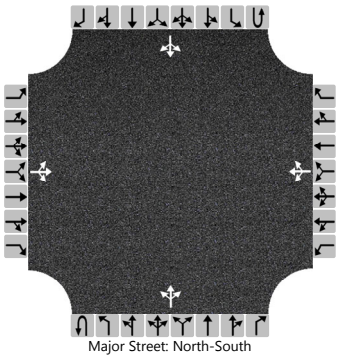
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2024
Time Analyzed	Ph 1 - AM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Villageview Way
Jurisdiction	
East/West Street	Villageview Way
North/South Street	Hillview Way
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	0	2		7	0	59		1	301	2		19	96	1
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11				83			1				24		
Capacity, c (veh/h)			446				631			1460				1174		
v/c Ratio			0.03				0.13			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.1				0.4			0.0				0.1		
Control Delay (s/veh)			13.3				11.6			7.5	0.0	0.0		8.1	0.2	0.2
Level of Service (LOS)			B				B			A	A	A		A	A	A
Approach Delay (s/veh)	13.3				11.6				0.0				1.5			
Approach LOS	B				B				A				A			

HCS Two-Way Stop-Control Report

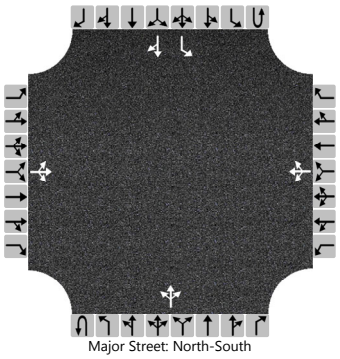
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2026
Time Analyzed	Full Buildout - AM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Villageview Way
Jurisdiction	
East/West Street	Villageview Way
North/South Street	Hillview Way
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		7	0	2		12	0	98		1	304	4		32	104	1
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11				138			1				40		
Capacity, c (veh/h)			381				618			1448				1168		
v/c Ratio			0.03				0.22			0.00				0.03		
95% Queue Length, Q_{95} (veh)			0.1				0.8			0.0				0.1		
Control Delay (s/veh)			14.7				12.5			7.5	0.0	0.0		8.2		
Level of Service (LOS)			B				B			A	A	A		A		
Approach Delay (s/veh)		14.7				12.5				0.0				1.9		
Approach LOS		B				B				A				A		

HCS Two-Way Stop-Control Report

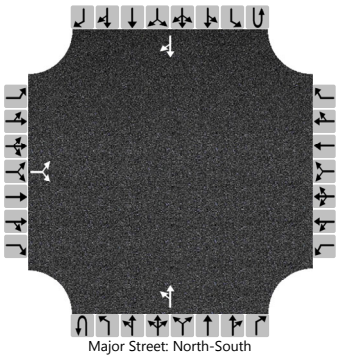
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/20/2023
Analysis Year	2023
Time Analyzed	PM Existing
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Villageview Way
Jurisdiction	
East/West Street	Villageview Way
North/South Street	Hillview Way
Peak Hour Factor	0.87
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		3		2						1	141				299	9
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			6							1						
Capacity, c (veh/h)			577							1199						
v/c Ratio			0.01							0.00						
95% Queue Length, Q_{95} (veh)			0.0							0.0						
Control Delay (s/veh)			11.3							8.0	0.0					
Level of Service (LOS)			B							A	A					
Approach Delay (s/veh)		11.3								0.1						
Approach LOS		B								A						

HCS Two-Way Stop-Control Report

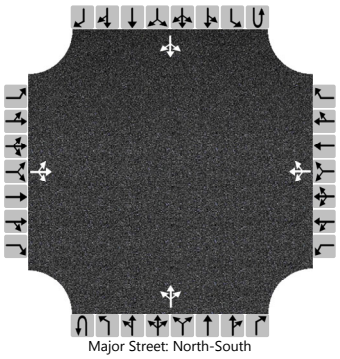
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2024
Time Analyzed	Ph 1 - PM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Villageview Way
Jurisdiction	
East/West Street	Villageview Way
North/South Street	Hillview Way
Peak Hour Factor	0.87
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	0	2		4	0	36		1	141	7		61	299	9
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			6				46			1				70		
Capacity, c (veh/h)			425				763			1199				1401		
v/c Ratio			0.01				0.06			0.00				0.05		
95% Queue Length, Q_{95} (veh)			0.0				0.2			0.0				0.2		
Control Delay (s/veh)			13.6				10.0			8.0	0.0	0.0		7.7	0.5	0.5
Level of Service (LOS)			B				B			A	A	A		A	A	A
Approach Delay (s/veh)		13.6				10.0				0.1				1.7		
Approach LOS		B				B				A				A		

HCS Two-Way Stop-Control Report

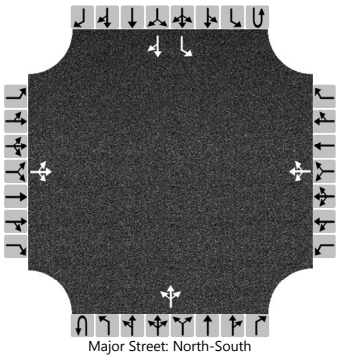
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2026
Time Analyzed	Full Buildout - PM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	Hillview Way & Villageview Way
Jurisdiction	
East/West Street	Villageview Way
North/South Street	Hillview Way
Peak Hour Factor	0.87
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		3	0	2		7	0	63		1	150	13		107	304	9
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			6				80			1				123		
Capacity, c (veh/h)			348				715			1193				1381		
v/c Ratio			0.02				0.11			0.00				0.09		
95% Queue Length, Q_{95} (veh)			0.1				0.4			0.0				0.3		
Control Delay (s/veh)			15.5				10.7			8.0	0.0	0.0		7.9		
Level of Service (LOS)			C				B			A	A	A		A		
Approach Delay (s/veh)		15.5				10.7				0.1				2.0		
Approach LOS		C				B				A				A		

HCS Two-Way Stop-Control Report

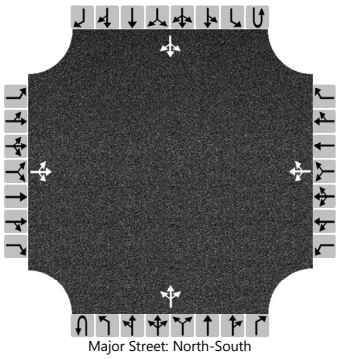
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/20/2023
Analysis Year	2023
Time Analyzed	AM Existing
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	23rd Ave & Garland Drive
Jurisdiction	
East/West Street	Garland Drive
North/South Street	23rd Avenue
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	0	0		1	0	21		0	142	1		5	40	3
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			8				24			0				6		
Capacity, c (veh/h)			717				876			1553				1414		
v/c Ratio			0.01				0.03			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			10.1				9.2			7.3	0.0	0.0		7.6	0.0	0.0
Level of Service (LOS)			B				A			A	A	A		A	A	A
Approach Delay (s/veh)	10.1				9.2				0.0				0.8			
Approach LOS	B				A				A				A			

HCS Two-Way Stop-Control Report

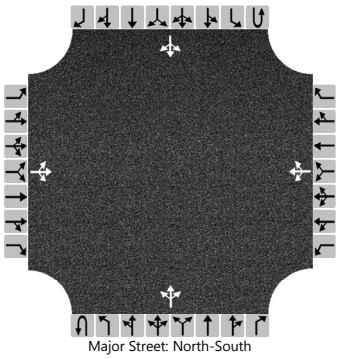
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2024
Time Analyzed	Phase 1 - AM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	23rd Ave & Garland Drive
Jurisdiction	
East/West Street	Garland Drive
North/South Street	23rd Avenue
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	0	0		1	0	34		0	142	1		9	40	3
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			8				39			0				10		
Capacity, c (veh/h)			693				879			1553				1414		
v/c Ratio			0.01				0.04			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			10.3				9.3			7.3	0.0	0.0		7.6	0.1	0.1
Level of Service (LOS)			B				A			A	A	A		A	A	A
Approach Delay (s/veh)	10.3				9.3				0.0				1.4			
Approach LOS	B				A				A				A			

HCS Two-Way Stop-Control Report

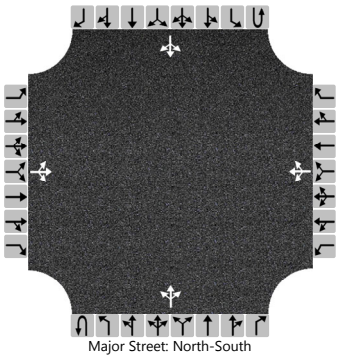
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2026
Time Analyzed	Full Buildout - AM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	23rd Ave & Garland Drive
Jurisdiction	
East/West Street	Garland Drive
North/South Street	23rd Avenue
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	0	0		1	0	60		0	142	1		18	40	3
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

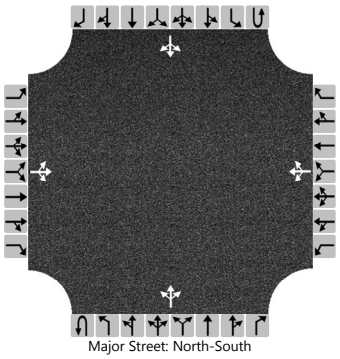
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			8				68			0				20		
Capacity, c (veh/h)			645				881			1553				1414		
v/c Ratio			0.01				0.08			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.0				0.2			0.0				0.0		
Control Delay (s/veh)			10.6				9.4			7.3	0.0	0.0		7.6	0.1	0.1
Level of Service (LOS)			B				A			A	A	A		A	A	A
Approach Delay (s/veh)	10.6				9.4				0.0				2.3			
Approach LOS	B				A				A				A			

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBG	Intersection	23rd Ave & Garland Drive
Agency/Co.	WGM Group	Jurisdiction	
Date Performed	1/18/2023	East/West Street	Garland Drive
Analysis Year	2023	North/South Street	23rd Avenue
Time Analyzed	PM Existing	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Hillview Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	0	1		6	0	18		0	121	0		28	181	4
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			4				27			0				31		
Capacity, c (veh/h)			582				778			1357				1442		
v/c Ratio			0.01				0.03			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.1		
Control Delay (s/veh)			11.2				9.8			7.7	0.0	0.0		7.6	0.2	0.2
Level of Service (LOS)			B				A			A	A	A		A	A	A
Approach Delay (s/veh)		11.2				9.8				0.0				1.2		
Approach LOS		B				A				A				A		

HCS Two-Way Stop-Control Report

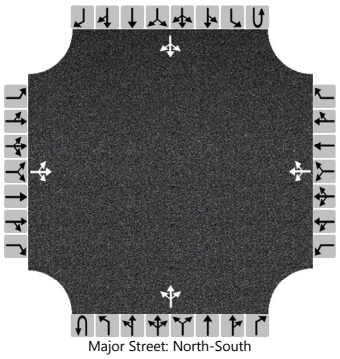
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2024
Time Analyzed	Phase 1 - PM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	23rd Ave & Garland Drive
Jurisdiction	
East/West Street	Garland Drive
North/South Street	23rd Avenue
Peak Hour Factor	0.89
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	0	1		6	0	26		0	121	0		42	181	4
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			4				36			0				47		
Capacity, c (veh/h)			549				794			1357				1442		
v/c Ratio			0.01				0.05			0.00				0.03		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.1		
Control Delay (s/veh)			11.6				9.8			7.7	0.0	0.0		7.6	0.3	0.3
Level of Service (LOS)			B				A			A	A	A		A	A	A
Approach Delay (s/veh)		11.6				9.8				0.0				1.6		
Approach LOS		B				A				A				A		

HCS Two-Way Stop-Control Report

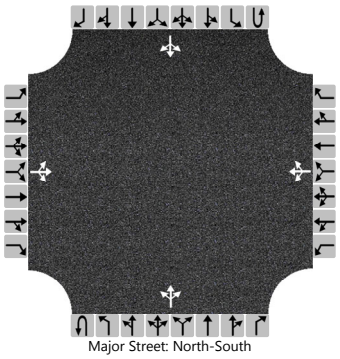
General Information

Analyst	DBG
Agency/Co.	WGM Group
Date Performed	1/24/2023
Analysis Year	2026
Time Analyzed	Full Buildout - PM Build
Intersection Orientation	North-South
Project Description	Hillview Subdivision

Site Information

Intersection	23rd Ave & Garland Drive
Jurisdiction	
East/West Street	Garland Drive
North/South Street	23rd Avenue
Peak Hour Factor	0.89
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	0	1		6	0	43		0	121	0		71	181	4
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			4				55			0				80		
Capacity, c (veh/h)			484				809			1357				1442		
v/c Ratio			0.01				0.07			0.00				0.06		
95% Queue Length, Q_{95} (veh)			0.0				0.2			0.0				0.2		
Control Delay (s/veh)			12.5				9.8			7.7	0.0	0.0		7.6	0.5	0.5
Level of Service (LOS)			B				A			A	A	A		A	A	A
Approach Delay (s/veh)		12.5				9.8				0.0				2.5		
Approach LOS		B				A				A				A		