STAFF REPORT FOR THE PLANNING COMMISSION MEETING OF FEBRUARY 28, 2024

FILE NO: LU-2023-0451 **AGENDA ITEM: 6.A**

STAFF CONTACT: Heather Ferris, Planning Manager

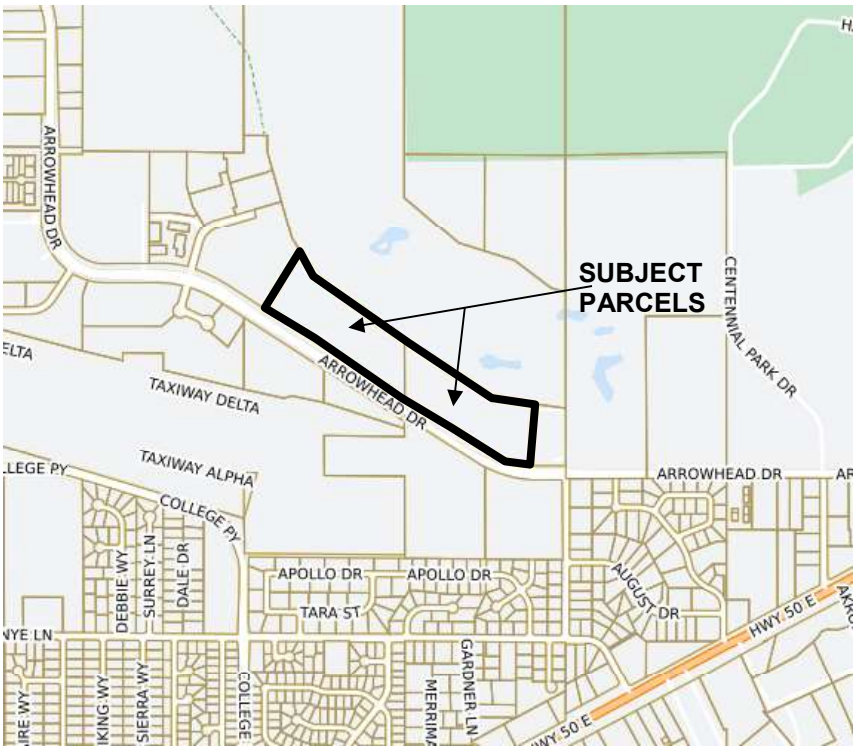
AGENDA TITLE: For Possible Action: Discussion and possible action regarding a request for a special use permit ("SUP") to allow for a maximum roof height of 36 feet 2 inches and a maximum parapet height of 41 feet 6 inches for four new warehouse and distribution buildings on parcels zoned Limited Industrial ("LI"), located on the north side of Arrowhead Drive between Technology Way and Bowers Lane, immediately south of the Eagle Valley Golf Course, Assessor's Parcel Number ("APN") 005-051-22 and 005-051-23. (Heather Ferris, hferris@carson.org)

Staff Summary: Tolles Development Company, LLC ("Applicant") is proposing the construction of four new warehouse and distribution buildings. Carson City Municipal Code ("CCMC") 18.04.195 allows structures in the LI zoning district to exceed 32 feet in height with the approval of an SUP. The Planning Commission has the authority to approve the SUP.

RECOMMENDED MOTION:

I move to approve Special Use Permit LU-2023-0384 based on the ability to make the required findings and subject to the conditions of approval.

VICINITY MAP:



RECOMMENDED CONDITIONS OF APPROVAL:

1. All development shall be substantially in accordance with the plans presented to the Planning Commission.
2. All on and off-site improvements shall conform to city standards and requirements.
3. The use for which this permit is approved shall commence within 12 months of the date of final approval. A single, one year extension of time must be requested in writing to the Planning Division of the Community Development Department ("Planning Division") 30 days prior to the one-year expiration date. Should this permit not be initiated within one year and no extension granted, the permit shall become null and void.
4. The Applicant must sign and return the notice of decision for conditions of approval within 10 days of receipt of notification. If the notice of decision is not signed and returned within 10 days, then the item will be rescheduled for the next planning commission meeting for further considerations.
5. The buildings shall be limited to a maximum roof height of 36 feet 2 inches and a maximum parapet height of 41 feet 6 inches.

LEGAL REQUIREMENTS: CCMC 18.02.050 (Review); CCMC 18.02.080 (Special Use Permit); and CCMC 18.04.195 (Non-residential districts intensity and dimensional standards.)

MASTER PLAN DESIGNATION: Industrial
ZONING DISTRICT: Limited Industrial

KEY ISSUES: Will the request for additional height meet the required SUP findings?

SURROUNDING ZONING AND LAND USE INFORMATION
NORTH: Public Regional ("PR")/ golf-course
SOUTH: General Industrial ("GI") & PR/ vacant
WEST: LI/ Office building
EAST: LI/ warehouse with office space

ENVIRONMENTAL INFORMATION:
FLOOD ZONE: Zone X, X shaded, and AE
SLOPE/DRAINAGE: Generally flat
EARTHQUAKE POTENTIAL/FAULT: Zone II and Zone III, Moderate Severity/On-site

SITE DEVELOPMENT INFORMATION:
SUBJECT SITE AREA: 24.31 total acres
EXISTING LAND USE: vacant

DISCUSSION:
The subject property is 24.31 acres in size and located on the north side of Arrowhead Drive between Technology Way and Bowers Lane, immediately south of the Eagle Valley Golf Course. The Applicant plans to construct a warehouse and distribution center, including four separate buildings totaling 341,800 square feet with associated

infrastructure improvements and will also divide the property into 3 separate parcels via a Parcel Map. A warehouse and distribution center is an allowed use in the "LI" zoning district; however, the structures are proposed to be taller than the maximum of 32 feet as outlined in CCMC. The Applicant is proposing a maximum roof height of 36 feet 2 inches and a maximum parapet height of 41 feet 6 inches. CCMC 18.04.195 states that a structure may exceed the allowable maximum height subject to first obtaining an SUP. The Planning Commission is authorized to approve the SUP.

CCMC Title 16, Chapter 16.02 requires that all construction be compliant with Code of Federal Regulations ("CFR") Title 14 Part 77. According to the Federal Aviation Administration ("FAA") Notice Criteria Tool, the proposed development exceeds the FAA Notice Criteria. A Determination of No Hazard to Air Navigation following an Airspace Analysis from the FAA was required to demonstrate compliance with CCMC Chapter 16.02. The FAA issued a "Determination of No Hazard to Air Navigation" on January 19, 2024.

PUBLIC COMMENTS: Public notices were mailed on February 15, 2024 to 38 property owners within 900 feet of the subject site pursuant to the provisions of NRS and CCMC for the application. As of the completion of this staff report, no public comments have been received. Any written comments that are received after this report is completed will be submitted prior to or at the Planning Commission meeting on February 28, 2024 depending upon their submittal date to the Planning Division.

OTHER CITY DEPARTMENT OR OUTSIDE AGENCY COMMENTS: The following comments were received from City departments. Comments have been incorporated into the recommended conditions of approval, where applicable.

Development Engineering:

The Carson City Public Works Department, Development Engineering Division ("Development Engineering") has no preference or objection to the special use request. As part of the building permit the applicant will be required to submit revised sewer, water, drainage, and traffic impact studies prior to a building permit being issued, as discussed below, prior to a permit being issued.

ENGINEERING DISCUSSION:

Development Engineering has reviewed the application within our areas of purview relative to adopted standards and practices and to the provisions of CCMC 18.02.080, Conditional Uses. Development Engineering offers the following discussion:

CCMC 18.02.080(5)(a) - Master Plan
The request is not in conflict with any Engineering Master Plans.

CCMC 18.02.080(5)(b) – Use, Peaceful Enjoyment, Economic Value, Compatibility
Development Engineering has no comment on this finding.

CCMC 18.02.080(5)(c) - Traffic/Pedestrians
The request is for additional structure height. The height of the structure will have no impact on pedestrian or vehicular traffic. The traffic impact study is currently under review by the transportation division of Public Works, and any deficiencies will be required to be corrected before a permit is issued.

CCMC 18.02.080(5)(d) - Public Services
Sanitary Sewer: The additional requested building height has no impact on the sanitary sewer demand. Before a permit is issued, the sewer main analysis must be updated to show the imposed demand and capacity of the Morgan Mill lift station and propose mitigation if there is insufficient capacity. Any necessary mitigations must be executed or incorporated into the design.
Water: The additional requested building height has no impact on the domestic or fire water demand. Before a permit is issued, the water main analysis must be updated to confirm the available pressure and flow in the City main is sufficient to meet the demand.
Storm Drain: The additional requested building height has no impact on the site drainage. Before a permit is issued, a technical drainage study must be provided. The study must also address any mitigations required to meet CCMC 12.09 Flood Damage Prevention.
Public Lands: Project adjacent to City-owned property managed by the Parks, Recreation and Open Space Department and Carson City Airport Authority. There are no impacts from the project to this City owned land.

CCMC 18.02.080(5)(e) – Title 18 Standards
Development Engineering has no comment on this finding.

CCMC 18.02.080(5)(f) – Public health, Safety, Convenience, and Welfare
The project meets will meet engineering standards for health and safety if conditions are met.
Earthquake faults: There is a known earthquake fault line on the property. The proposed design includes minimum setbacks from the fault line.
FEMA flood zones: The property includes AE flood zones and will be required to show necessary mitigation and/or submit to FEMA to meet the requirements of CCMC 12.09 Flood Damage Prevention.
Site slope: The site is relatively level.

CCMC 18.02.080(5)(g) – Material Damage or Prejudice to Other Property
Development Engineering has no comment on this finding.

CCMC 18.02.080(5)(h) – Adequate Information
The plans and reports provided were adequate for this analysis.

Building Division

1. Plans for construction must specifically identify each of the respective adopted 2018 Code Series and Northern Nevada Amendments (Building and Fire) that govern the design, construction, and inspection of the proposed facility.

2. All plan submittals must comply with The Blue Book, A Reference Guide for the Nevada Design and Construction Industry.

3. Apply at Carson City permit center digitally at permitcenter.carson.org.

4. A formatted (minimum 11x17) set of plans shall be submitted for Building permit plan review. Plan set must include all Mechanical, Electrical, Plumbing ("MEPs"), Structural, Architectural, Entitlements, Energy, Special Inspections and Civil pages, etc.

SPECIAL USE PERMIT FINDINGS: Staff recommends approval of the SUP based on the findings below and the information contained in the attached reports and documents, pursuant to CCMC 18.02.080(5) (Findings), subject to the recommended conditions of approval, and further substantiated by the applicant's written justification. In making findings for approval, the Planning Commission must consider:

1. Will be consistent with the objectives of the Master Plan elements.

The subject property is designated as Industrial in the Master Plan. The anticipated primary uses associated with this designation include light and heavy manufacturing, warehousing and distribution, storage, and a wide range of other industrial uses. The proposed use for the site is warehousing and distribution which is consistent with the anticipated primary uses for the Industrial master plan designation. The need for the SUP is due to the request to allow for an increased height for the four structures, not the use itself. The proposed height is in keeping with the height limitations for other zoning districts which are compatible with the Industrial master plan designation.

2. Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare or physical activity;

The subject property is located just north of the airport, in an area that is industrial in nature. Based on the zoning districts in the area, maximum building heights could range from 32 feet to 45 feet. The proposed buildings will have a maximum roof height of 36 feet 2 inches and the maximum height to the top of the parapet will be 41 feet 6 inches. Staff required the applicant submit an Airspace Analysis to demonstrate compliance with CCMC 16.02 which requires all construction to be compliant with the Code of Federal Regulations, Title 14, Part 77. The FAA issued a "Determination of No Hazard to Air Navigation" on January 19, 2024. The proposed increase in height will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood.

3. Will have little or no detrimental effect on vehicular or pedestrian traffic;

The need for the SUP is due to the request to allow for an increased height for the four structures, not the use itself. The height of the structure will have no impact on pedestrian or vehicular traffic. The traffic impact study which is required as part of the building permit

is currently under review by the transportation division of Public Works, and any deficiencies will be required to be corrected before a permit is issued.

4. Will not overburden existing public services and facilities, including schools, police and fire protection, water, sanitary sewer, public roads, storm drainage and other public improvements;

The need for the SUP is due to the request to allow for an increased height for the four structures, not the use itself. The height of the structure will have no impact on existing public services. The sewer main analysis which is required as part of the building permit application must be updated to show the imposed demand and capacity of the Morgan Mill lift station and propose mitigation if there is insufficient capacity. Any necessary mitigations must be executed or incorporated into the design. The water main analysis, which is part of the building permit application must also be updated to confirm the available pressure and flow in the City main is sufficient to meet the demand. Additionally, a technical drainage study must be provided as part of the building permit application. The study must address any mitigations required to meet CCMC 12.09 Flood Damage Prevention.

5. Meets the definition and specific standards set forth elsewhere in this Title for such particular use and meets the purpose statement of that district;

The proposed use is a warehouse and distribution center consisting of four buildings which will exceed the 32-foot height limitation of the "LI" zoning district. The need for the SUP is due to the request to allow for an increased height for the four structures, not the use itself. The building permit(s) will be reviewed for compliance with all applicable sections of CCMC prior to issuance.

6. Will not be detrimental to the public health, safety, convenience and welfare; and

The increased building height will not be detrimental to the public health, safety convenience or welfare. The proposed use is a warehouse and distribution center consisting of four buildings which will exceed the 32-foot height limitation in the LI zoning district. The use is a permitted primary use in the LI zoning districts; however, the need for the SUP is triggered by the request to allow for an increased height for the four proposed structures. Based on the zoning districts in the area, maximum building heights could range from 32 feet to 45 feet. The proposed buildings will have a maximum roof height of 36 feet 2 inches and the maximum height to the top of the parapet will be 41 feet 6 inches. Staff required the applicant submit an Airspace Analysis to demonstrate compliance with CCMC 16.02 which requires all construction to be compliant with the Code of Federal Regulations, Title 14, Part 77. The FAA issued a "Determination of No Hazard to Air Navigation" on January 19, 2024.

7. Will not result in material damage or prejudice to other property in the vicinity, as a result of proposed mitigation measures.

As conditioned, the proposed project will not result in material damage or prejudice to other property in the vicinity. The proposed use is a warehouse and distribution center

consisting of four buildings which will exceed the 32-foot height limitation in the LI zoning district. The use is a permitted primary use in the LI zoning districts; however, the need for the SUP is triggered by the request to allow for an increased height for the four proposed structures. Based on the zoning districts in the area, maximum building heights could range from 32 feet to 45 feet. The proposed buildings will have a maximum roof height of 36 feet 2 inches and the maximum height to the top of the parapet will be 41 feet 6 inches. Staff required the applicant submit an Airspace Analysis to demonstrate compliance with CCMC 16.02 which requires all construction to be compliant with the Code of Federal Regulations, Title 14, Part 77. The FAA issued a "Determination of No Hazard to Air Navigation" on January 19, 2024.

Attachments

Application LU-2023-0451

ARROWHEAD DRIVE
WAREHOUSE/DISTRIBUTION CENTER

Special Use Permit

December 2023

Prepared For:

tolles

Tolles Development Company
241 Ridge Street, Suite 410 Reno, NV 89501

Prepared By:

Manhard CONSULTING

241 Ridge Street, Suite 400 Reno, NV 89501

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APPENDICES

- SUP Application Form (includes Applicant's Acknowledgement)
- SUP Plan Set
- Building Elevations/Floor Plans
- Master Plan Policy Checklist
- Documentation of Taxes Paid-to-Date
- Project Impact Reports (Water, Sewer, Drainage, Traffic)

PROJECT LOCATION

The project site is located on the north side of Arrowhead Drive and south of the Eagle Valley Golf Course, approximately 275 feet west of Bowers Lane (APNs 005-051-22, 005-051-23). The total project area is +/- 24.31 acres. Please note that a Parcel Map will be submitted to divide the parcels into 3 parcels, consistent with the site layout, and will be completed prior to issuance of any building permit.

Figure 1: Project Location

EXISTING CONDITIONS

The +/- 24.31 acre project site is undeveloped, with the majority of the area covered with vegetation consisting mainly of sagebrush and grasses.

The project site has a Master Plan designation of **Industrial (I)** and is zoned **Limited Industrial (LI)**. The site is surrounded by property that is zoned Limited Industrial, Public Regional, and General Industrial. Figure 2 below details the existing Master Plan designations, existing zoning, and current land uses for surrounding properties. Master Plan and Zoning designations are shown in Figure 3 and Figure 4.

Figure 2: Surrounding Property Designations

	Existing Master Plan	Existing Zoning	Current Land Use
North	Parks and Recreation	Public Regional	Golf Course
East	Industrial	Limited Industrial	Warehouse/distribution use
South	Industrial Public/Quasi-Public	General Industrial Public Regional	Undeveloped Carson City Airport
West	Industrial	Limited Industrial	Office (State of Nevada)

Figure 3: Existing Master Plan Designation (I)

Figure 4: Existing Zoning Designation (LI)

APPLICATION REQUEST

The enclosed application is for a:

> **SPECIAL USE PERMIT** to allow for an increase in the maximum building height within the Limited Industrial Zoning District, from a maximum building height of 32 ft. to 36 ft. 2 in.

PROJECT DESCRIPTION AND JUSTIFICATION

The applicant, Tolles Development Company, LLC, is requesting a Special Use Permit to increase the maximum height of a proposed warehouse/distribution center to accommodate a clear interior ceiling height of 32 ft. (maximum building height of 36 ft. 2 in.), allowing for increased warehouse efficiency and modern building design.

The proposed warehouse/distribution center is a permitted use in the Limited Industrial (LI) zoning district and this SUP is for the increase in maximum building height.

The proposed facility includes 4 separate buildings (Buildings A, B, C, & D), totaling 341,800 sq. ft., with associated pavement, landscaping, and infrastructure improvements on a +/- 24.31-acre site. The project will be built in phases; Building C is anticipated to be developed first with a warehouse/distribution use. Please note that a Parcel Map will be submitted to divide the parcels into 3 parcels, consistent with the site layout, and will be completed prior to issuance of any building permit.

The proposed uses will be consistent with the existing Limited Industrial zoning district, and the site has been designed to:

- Provide for needed warehouse/distribution space within the existing Limited Industrial (LI) zoning area designated for these uses.
- Reduce the post-development peak flows downstream of the site to less than pre-development peak flows.
- Accommodate the existing terrain with building layout

Figure 5: Proposed Building Area and Height

Building	Building Size	Building Height (Carson City/International Building Code definition of height)
A	45,000 sq. ft.	Max. 36 ft. 2 in.
B	60,000 sq. ft.	Max. 36 ft. 2 in.
C	161,280 sq. ft.	Max. 36 ft. 2 in.
D	76,960 sq. ft.	Max. 36 ft. 2 in.

Please note that the project is expected to be building in phases, with Building C being constructed first. The design for Building C is shown in this project. Buildings A, B, and D will be designed to complement Building C with similar architectural design.

The site is within the Carson City Airport navigable airspace. Any structure at this location requires an Airport Airspace Analysis (AAA) by the Federal Aviation Administration to ensure safety in the takeoff and landing of aircraft. The AAA will be requested to evaluate the effects of construction, to determine any potential hazards to air navigation, and to identify mitigation measures to enhance safe air navigation, and any mitigation measures will be incorporated into the design. The Carson City Airport Authority is aware of the AAA submittal timeline and of the project information.

Figure 6: Site Plan *(Full size sheets in application package)*

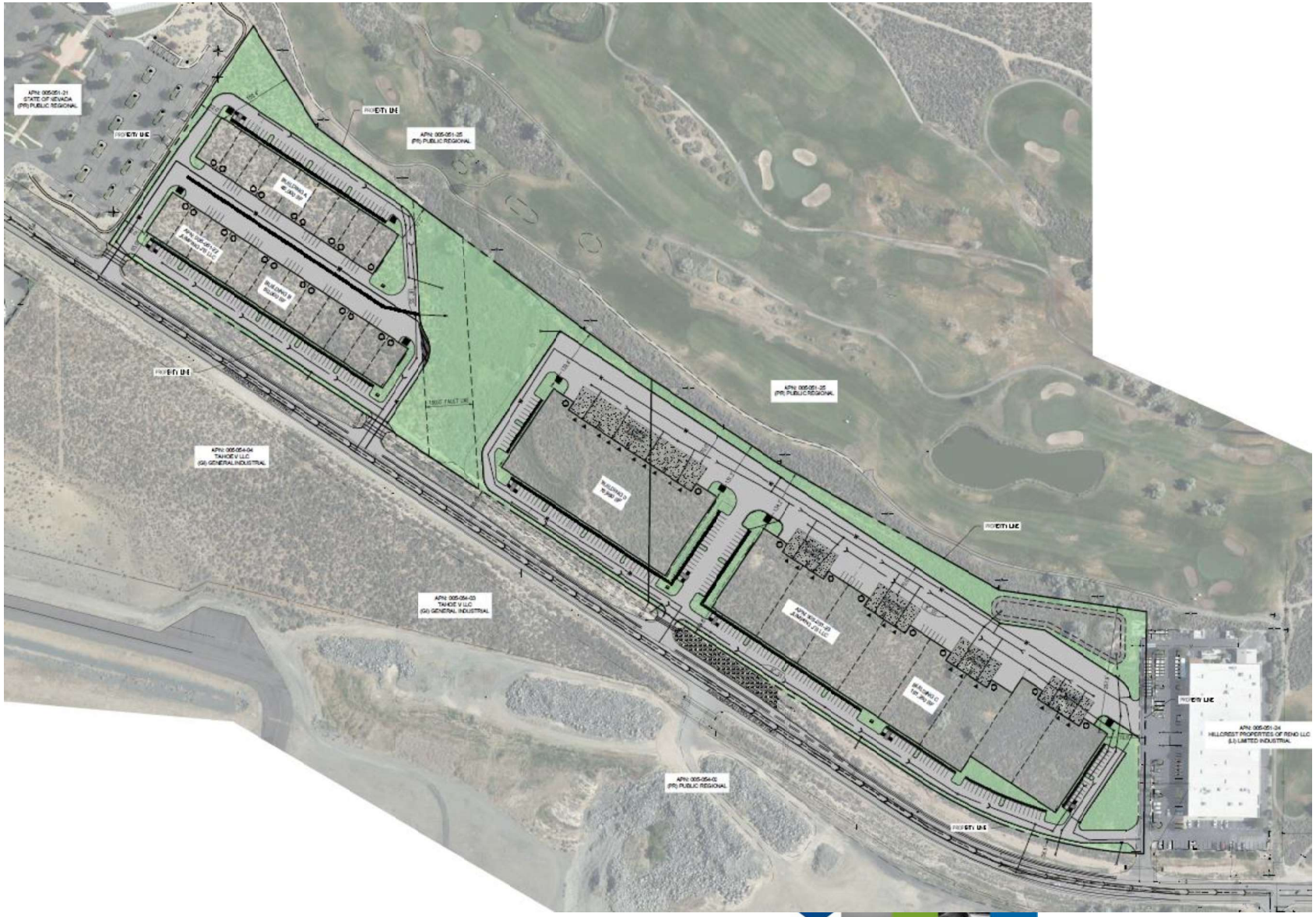
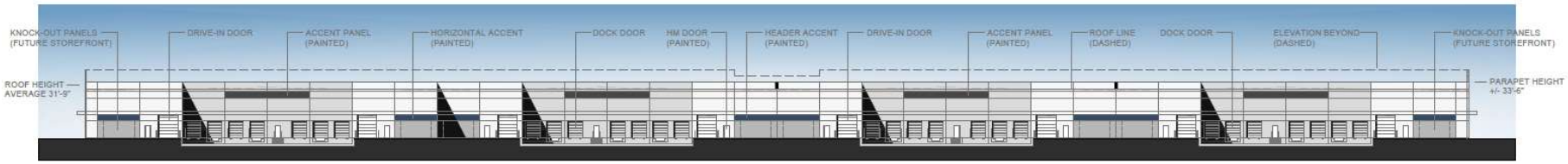
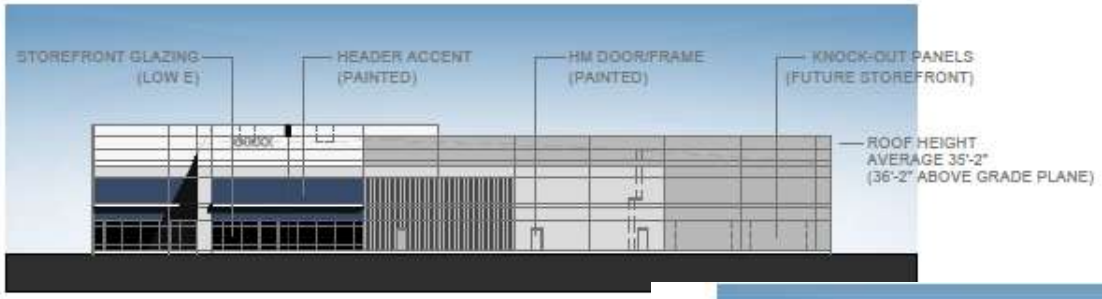


Figure 7: Conceptual Elevations - Building C

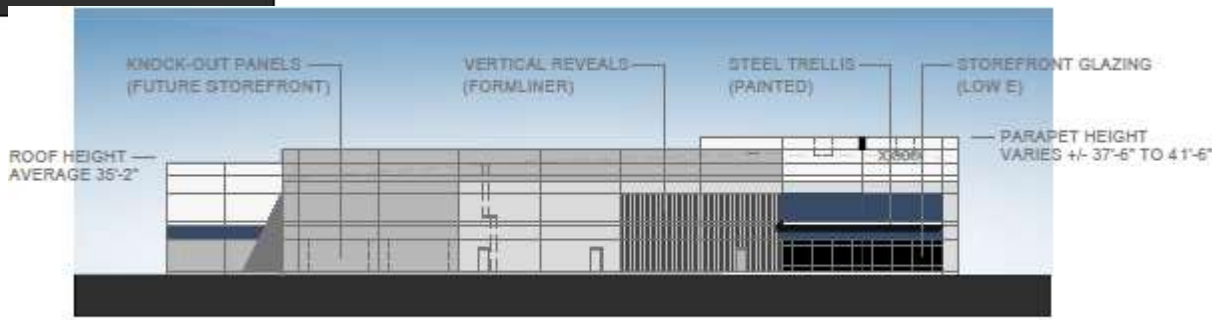
West Elevation (Arrowhead Drive)



East Elevation

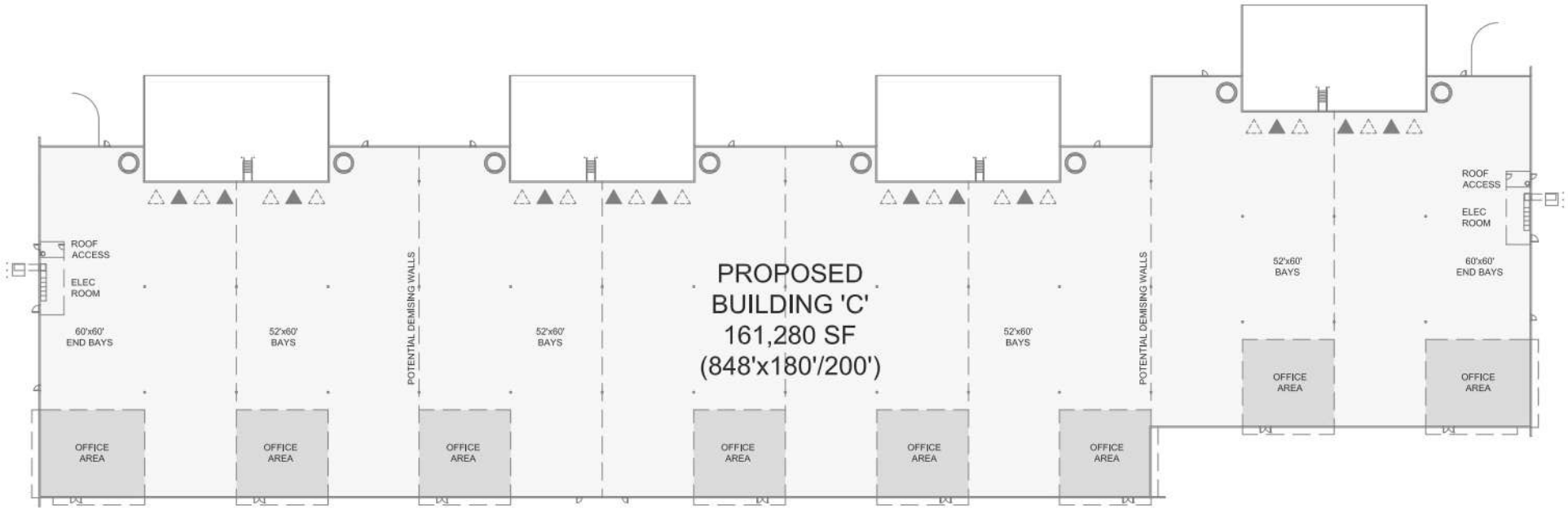


South Elevation



North Elevation

Figure 7: Conceptual Floor Plan - Building C



Development Standards

The project has been designed to meet the development standards established in the Limited Industrial zoning designation and are consistent with CCMC Section 18.04.195 – Non-residential districts intensity and dimensional standards. Additionally, any future Parcel Map will be designed to meet the LI development standards.

Figure 8: Limited Industrial Development Standards

	LI Development Standard	Proposed Building A	Proposed Building B	Proposed Building C	Proposed Building D
Minimum Area	21,000 sq. ft.	Parcel will meet standard	Parcel will meet standard	Parcel will meet standard	Parcel will meet standard
Minimum Lot Width	100 ft.	> 100 ft.	> 100 ft.	> 100 ft.	> 100 ft.
Maximum Building Height	32 ft.	Max. 36 ft. 2 in.	Max. 36 ft. 2 in.	Max. 36 ft. 2 in.	Max. 36 ft. 2 in.
Front Setback	30 ft.	30 ft. min.	65 ft. as shown	65 ft. as shown	65 ft. as shown
Side Setback	10 ft. If adjacent to LI district, side and rear yard setbacks may be reduced to 0 ft. subject to applicable building and fire codes.	52 ft. as shown	52 ft. as shown	79 ft. 8 in. as shown (east property line)	10 ft. min.
Street Side Setback	10 ft.	N/A	N/A	N/A	N/A
Rear Setback	30 ft. If adjacent to LI district, side and rear yard setbacks may be reduced to 0 FT subject to applicable building and fire codes.	77 ft. 2 in. as shown	30 ft. min	134 ft. 2 in. as shown	131 ft. 3 in. as shown
Off-Street Parking Institute of Traffic Engineers Parking Generation Handbook, 6th Generation, Land Use: 150 Warehousing	Average rate of 0.37 spaces per 1,000 sq. ft. of gross floor area (GFA) Or, .77 spaces per employee	**Demand:** 17 spaces (GFA) **Provided:** 40 spaces	**Demand:** 23 spaces (GFA) **Provided:** 57 spaces	**Demand:** 60 spaces (GFA), or 50 spaces (emp.) **Provided:** 120 spaces	**Demand:** 29 spaces (GFA) **Provided:** 69 spaces

Special Use Permit – Building Height

A building's clear height is defined as the usable height for a tenant to store its product on racks. Generally, current industrial buildings need a 32 ft. clear height for efficient operations. The proposed buildings are designed to accommodate a clear interior ceiling height of 32 ft. With this 32 ft. clear height, the proposed building height is 36 ft. 2 in. (based on Carson City's and the International Building Code definition of height from grade to the average roof height). The maximum height for the LI zoning designation is 32 ft., which can be increased with approval of a Special Use Permit.

The maximum height of the adjacent General Industrial (GI) zoning district (to the south) is 45 ft. Therefore, the height of this building would still be less than what would be permitted on the parcel to the south.

As previously discussed, the site is within the Carson City Airport navigable airspace. Any structure at this location requires an Airport Airspace Analysis (AAA) by the Federal Aviation Administration to ensure safety in the takeoff and landing of aircraft. The AAA will be requested to evaluate the effects of construction, to determine any potential hazards to air navigation, and to identify mitigation measures to enhance safe air navigation, and any mitigation measures will be incorporated into the design. The Carson City Airport Authority is aware of the AAA submittal timeline and of the project information.

Traffic

Based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition*, the project is expected to generate 1,157 daily trips, with 117 AM peak hour trips, and 117 PM peak hour trips.

Figure 9: Trip Generation (From Traffic Study)

Land Use (ITE Code)	Size[1]	Trips[2]				
		Daily	AM	AM In/Out	PM	PM In/Out
Industrial Park (130)	343.24 ksf	1,157	117	95 / 22	117	26 / 91

Notes: 1. ksf = 1,000 square feet
2. Trips were calculated based on the following rates per ksf: Daily – 3.37; AM – 0.34 (81% in / 19% out); PM – 0.34 (22% in / 78% out)
Source: Headway Transportation, 2023

The traffic study recommends the following improvements for both the initial development (Building C) (Opening Year) and the full build out of the project site:

Arrowhead Drive/Goni Road

The Arrowhead Drive/Goni Road intersection is expected to meet Four Hour and Peak Hour signal warrant criteria based on Future Year (no project) and Future Year Plus Project traffic volumes. A traffic signal is planned for the intersection and is expected to operate at LOS D or better during the AM and PM peak hours under Future Year Plus Project conditions.

The project should pay a pro-rata share contribution toward future installation of a traffic signal. The project's fair share contribution for future signalization of the Arrowhead Drive/Goni Road intersection is estimated to be $46,400 (approximately 5.8 percent of $800,000).

US 50/Arrowhead Drive

The US 50/Arrowhead Drive intersection is expected to operate at LOS E conditions under Future Year (no project) and Future Year Plus Project conditions. The project traffic is expected to increase the overall delay at the intersection by less than 4 seconds during peak hours and would be less than one (1) percent of the overall intersection traffic. The CAMPO *2050 Regional Transportation Plan* includes "US 50 East Highway Corridor Improvements – Congestion mitigation improvements between I-580 and the Town of Dayton" as an unconstrained, near-term project. Carson City is currently in the process of determining improvements needed on US 50 at this intersection through the US 50 Corridor Study. Improvements at this location will be addressed by studies/projects performed by the City.

Deceleration and Acceleration Lanes

NDOT's left-turn lane and right-turn lane warrant criteria was analyzed for the project driveway intersections. A left-turn lane on Arrowhead Drive is warranted at the Driveway 3 intersection based on Future Year Plus Project traffic volumes. Driveway 4 currently has a left-turn lane that should remain. Additionally, the right-turn lane warrant is met at the Driveway 3 and Driveway 4 intersections based on Opening Year Plus Project and Future Year Plus Project traffic volumes.

Acceleration lanes are not recommended on Arrowhead Drive at any of the project driveway intersections based on NDOT guidance.

Arrowhead Drive

Based on Carson City requirements, Arrowhead Drive should be widened to include three lanes (one lane in each direction and a two-way left-turn lane) along the project frontage, as well as right-turn lanes at Driveways 3 and 4. A two-way left-turn lane will accommodate the warranted left-turn lane at Driveway 3 and match the roadway width at both ends of the project frontage.

Half street improvements will be constructed on Arrowhead Drive along the project frontage and include a bicycle lane.

Note, the project is expected to be built in phases with the southern/eastern most building being constructed first. The Arrowhead Drive roadway improvements could be built in segments in coordination with construction of each adjacent building.

Bowers Lane

Residents have expressed concern about traffic on Bowers Lane, a residential roadway, near the project site. Level of service analysis was conducted at the Arrowhead Drive/Bowers Lane and E. Nye Lane/Bowers Lane intersections at both ends of the roadway. Both intersections are expected to operate at LOS B or

better under all analysis scenarios. The analysis does assume that some project traffic (approximately 10 percent) would use the roadway between E. Nye Lane/US 50 and Arrowhead Drive, however the small amount of additional traffic is not expected to change the operating conditions of the roadway. The project is estimated to add a total of 12 AM peak hour trips and 11 PM peak hour trips to the roadway, which equates to approximately 1 vehicle every 5 minutes.

Bowers Lane has a 25 mph speed limit that should be enforced regularly to ensure compliance. Bowers Lane currently has a "Local Access Only" sign on the south end of the roadway. The City should consider, and potentially have the project install, the same sign to the north end of the roadway, as well as "25 MPH" pavement legends on the roadway.

Off-Street Parking

The project has been designed based on the demand identified in the Institute of Transportation Engineers (ITE) publication, *Parking Generation Manual*, 6th *Edition*. The average parking rate is 0.37 spaces per 1,000 sq. ft. under Land Use Code 150 – Warehousing (proposed use). In total, the 4 proposed buildings total 341,800 sq. ft., which equates to a parking demand of 134 spaces. Based on this demand, the proposed total parking of 286 spaces will be more than sufficient based on published industry standards.

In accordance with CCMC, Title 18 Appendix, Division 2, Parking and Loading Section 2.2, the director is able to consider an alternative parking demand based on published industry standards.

Reduced parking in line with ITE standards, will allow for less impervious surface, and will allow for more impervious surface to assist with overall drainage in the region as shown in the Hydrology report. The reduced parking also more closely matches the needs of the proposed buildings and use.

The Carson City Municipal Code requirement for Building C (212 spaces) greatly exceeds what is needed for the proposed use (120 proposed). There will not typically be visitors to the site, other than the estimated 45-50 employees and deliveries. The proposed parking, based on ITE still exceeds what is needed for the proposed use, but it more in line with the needs of the proposed use.

Figure 10: Off Street Parking

	Building A	Building B	Building C	Building D
Building Sq. Ft.	45,000 sq. ft.	60,000 sq. ft.	161,280 sq. ft.	76,960 sq. ft.
Municipal Code- 1 space per 1,000 sq. ft. + 1 space per employee	45 + 1 space per employee	60 + 1 space per employee	162 + 50 spaces for employees = 212	77 + 1 space per employee
ITE, Land Use: 150 Warehousing Average rate of 0.37 spaces per 1,000 sq. ft. of gross floor area (GFA) Or, .77 spaces per employee	**Demand:** 17 spaces (GFA) **Provided:** 40 spaces	**Demand:** 23 spaces (GFA) **Provided:** 57 spaces	**Demand:** 60 spaces (GFA), or 50 spaces (emp.) **Provided:** 120 spaces	**Demand:** 29 spaces (GFA) **Provided:** 69 spaces

Landscaping

The preliminary landscape plan is consistent with Title 18, Division 3 Landscaping requirements: "A minimum of 20 percent of the site's impervious surfaces excluding the building coverage will be pervious areas of landscape material". Based on these calculations, 83,070 sq. ft. landscape area (20% of impervious surface (415,348 sq. ft.)) is required and a total of 300,509 sq. ft. is provided as open space within the project site. This includes the 10 ft. landscape setback adjacent to Arrowhead Drive.

Utilities

There are existing water and sewer services to the subject property, with public water and sewer provided by Carson City. Please see detailed Project Impact Statements included with this application.

Water

See attached Preliminary Water System Analysis that demonstrates that the pipe sizes and piping layouts within the project are adequately designed to meet the demands of the development. The analysis shows that the pressures are greater than the minimum requirement and may need to be reduced blow the maximum requirement. The project is in compliance and meets the minimum pressures during the maximum day, peak hour, and fire flow conditions.

Sewer

See attached Project Impact Report for sewer that demonstrates that the proposed 8" sewer mains on site are adequate and the existing 12" sewer main in Arrowhead drive has capacity. The project will have a minimal impact on the existing sewer infrastructure.

Drainage

The proposed Arrowhead Drive project is located within both a FEMA Zone AE Flood Hazard, which includes Base Flood Elevations (BFEs) that have been determined by detailed methods, as well as a FEMA 0.2% Annual Chance Flood Hazard, which are areas of 1% annual chance flood with an average depth less than one foot or with drainage areas of less than one square mile, as shown on the Effective FEMA Flood Insurance Rate Map (FIRM). A CLOMR-F will be submitted with the proposed development.

The detailed analysis demonstrates that post-development peak flows downstream of the site are less than pre-development peak flows.

MASTER PLAN POLICY CHECKLIST

The purpose of the Master Plan Policy Checklist is to provide a list of answers that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to this SUP application. This project complies with the Master Plan and accomplishes the following objectives:

Chapter 2: Vision, Themes, and Guiding Principles

1. The proposed project provides another service option to better serve the Carson City residents as well as the regional population. (1.2)
2. The proposed project incorporates and minimizes impact to floodplain in its vicinity. (1.3)
3. The proposed project adds to the economic vitality of Carson City by providing local employment and a unique and in-demand service along a major corridor. (3.0)

Chapter 3: A Balanced Land Use Pattern

1. The proposed project is located within Carson City and it is served by community water and wastewater facilities as identified in the Water and Wastewater Master Plans. (1.1b)
2. The proposed project is expected to utilize sustainable building materials and construction techniques. (1.1e)
3. The proposed site is in a moderate priority infill development area give that the property is designated for mixed-use development and is located along a major gateway corridor. (1.2a)
4. The proposed project minimizes disturbance to distinctive topographic features on site. (1.4c)
5. The proposed site is located to be adequately served by city services including fire and sheriff services. (1.5d)
6. The proposed project promotes mixed-use development appropriate for the surrounding area. (2.1b, 2.2b, 2.3b)
7. The proposed project is properly sited to protect environmentally sensitive areas. (3.1b)
8. The proposed site will be completely out of the primary floodplain located nearby. (3.3d)

9. The appropriate level of services will be provided for given the proposed project.

Chapter 5: Economic Vitality

1. The proposed project adds to diversity of local job opportunities. (5.1c)
2. The proposed project promotes vertical diversity by providing another option to local ranchers/farmers to effectively and efficiently harvest their livestock. (5.1g)
3. The proposed project is located in a manner to conserve local natural resources and open space and protect the adjacent floodplain. (5.5f)

Chapter 6: Livable Neighborhoods and Activity Centers

1. The proposed project is expected to utilize durable, long-lasting building materials. (6.1a)
2. The proposed project will provide a suitable building façade with clearly identifiable entrance and ample site landscaping. (6.1c)

FINDINGS

In accordance with Carson City Municipal Code Section 18.02.080, this project has been designed to consider the following:

1. **Will be consistent with the objectives of the Master Plan elements.**

   The Arrowhead Drive Warehouse/Distribution facility located on the subject property is consistent with the objectives of the Carson City Master Plan elements, specifically related to the Industrial Master Plan. The Master Plan Policy Checklist is included in this application package with additional information.

2. **Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties of the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare, or physical activity.**

   This project will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties of the general neighborhood. Adjacent properties to the east and west are zoned limited industrial with industrial uses, similar to the subject property. The adjacent uses to the north and south are zoned general industrial and public regional. Of these two properties, one has an industrial use located on it and the other is a golf course.

   Any outdoor lighting installed on the exterior of the building will be shielded from neighboring property through height, placement, and wattage. Outdoor lighting will be included with final design.

3. **Will have little or no detrimental effect on vehicular or pedestrian traffic.**

   The project will have an impact on the existing street network, and mitigation measures have been incorporated, as demonstrated in the Traffic Study. Based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition*, the project is expected to generate 1,157 daily trips, with 117 AM peak hour trips, and 117 PM peak hour trips.

4. **Will not overburden existing public services and facilities, including schools, police and fire protection, water, sanitary sewer, public roads, storm drainage, and other public improvements.**

   As demonstrated in the Project Impact Reports for water, sewer, and drainage, the project will not contribute to or overburden existing public services and facilities, or includes appropriate mitigation measures. The industrial project will have no impact on schools and limited impact on police and fire services. The project has been designed to meet Carson City Municipal Code and any associated required improvements.

5. **Meets the definition and specific standards set forth elsewhere in this Title for such particular use and meets the purpose statement of that district.**

   The proposed use/project is permitted in Limited Industrial zoning district and meets the definition and standards, with approval of this Special Use Permit regarding height. The Warehouse/Distribution center use assembles or manufactures from previously prepared materials, including processing, packaging, and distribution of such products. The proposed project meets or exceeds all of the specific intensity and dimensional standards for the district as well.

6. **Will not be detrimental to the public health, safety, convenience and welfare.**

   The proposed project incorporates appropriate mitigation measures and Carson City requirements to ensure that improvements to the site will benefit public health, safety, convenience, and welfare.

7. **Will not result in material damage or prejudice to other property in the vicinity, as a result of proposed mitigation measures.**

   The improvements to the site will not result in material damage or prejudice to other property in the vicinity.

SPECIAL USE PERMIT PLANS
for
ARROWHEAD DRIVE WAREHOUSES
CARSON CITY, NEVADA

Call 811 — Call before you Dig. Avoid cutting underground utility lines. It's costly.

LAND OWNER

JUMPING J'S, LLC
305 N CARSON ST SUITE 200
CARSON CITY, NV 89701

APPLICANT

TOLLES DEVELOPMENT COMPANY LLC
241 RIDGE STREET, SUITE 410
RENO, NV 89501
(775) 848-8090

BASIS OF BEARINGS

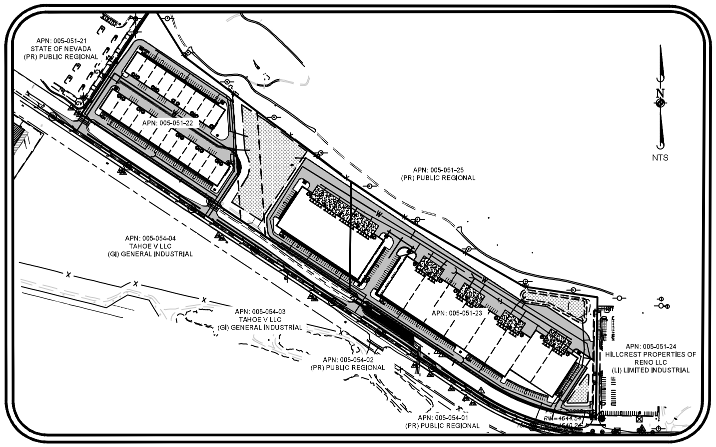
MODIFIED NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983/1994 (NAD 83/94) DETERMINED USING REAL TIME KINEMATIC GPS (RTK GPS) OBSERVATIONS OF CARSON CITY CONTROL MONUMENTS CC07 AND CC052 AS SHOWN ON RECORD OF SURVEY MAP NO. 2749 RECORDED AUGUST 11, 2010 IN THE OFFICIAL RECORDS OF CARSON CITY NEVADA, AS FILE NO. 403425. COMBINED GRID TO GROUND FACTOR = 1.0002. ALL DISTANCES SHOWN HEREIN ARE GROUND VALUES.

BASIS OF ELEVATION

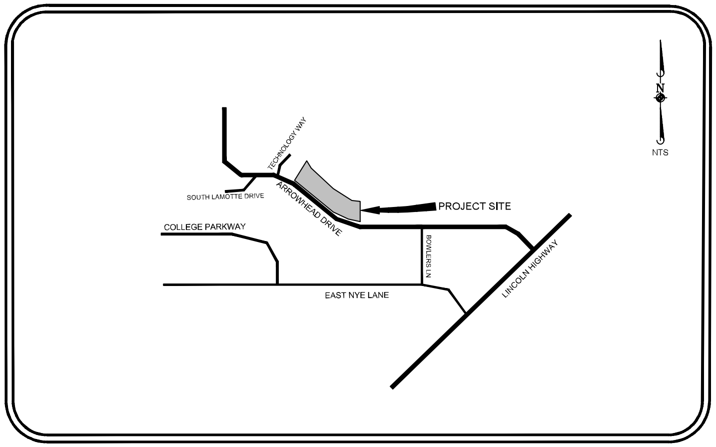
NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), AS TAKEN FROM CARSON CITY CONTROL MONUMENT CC07, HAVING A PUBLISHED ELEVATION OF 4688.95 U.S. FEET. CC07 IS DESCRIBED AS A 2 INCH BRASS DISK STAMPED "CC07 2010" APPROXIMATELY 65' SOUTHEAST OF INTERSECTION OF ARROWHEAD DRIVE AND TECHNOLOGY WAY, NEAR THE CENTER OF A CONCRETE HEADWALL.

ABBREVIATIONS

± .... APPROXIMATE
AC .... ASPHALTIC CONCRETE
AP .... ANGLE POINT
AWWA .... AMERICAN WATER WORKS ASSOCIATION
BC .... BEGIN CURVE
BW .... BACK OF WALK
BVC .... BEGIN VERTICAL CURVE
CAP .... CAPACITY
CB .... CATCH BASIN
CFS .... CUBIC FEET PER SECOND
CL .... CENTERLINE
CMP .... CORRUGATED METAL PIPE
CO .... CLEANOUT
CONC .... CONCRETE
CMU .... CONCRETE MASONARY UNIT
CONST. .... CONSTRUCT
CP .... CONCRETE PIPE
CR .... CURB RETURN
DET .... DETAIL
Δ .... CURVE DELTA
Ø .... DIAMETER
DI .... DROP INLET
DWY .... DRIVEWAY
DR .... DIAMETER RATIO
E .... ELECTRICAL
EC .... END OF CURVE
EG .... EXISTING GRADE
ELEV .... ELEVATION
EVC .... END OF VERTICAL CURVE
(e) .... EXISTING
EXIST .... EXISTING
FES .... FLARED END SECTION
FF .... FINISHED FLOOR
FDC .... FIRE DEPARTMENT CONNECTION
FFC .... FRONT FACE OF CURB
FG .... FINISHED GRADE
FH .... FIRE HYDRANT
FL .... FLOW LINE
FT .... FEET
G .... GAS
GB .... GRADE BREAK
HORIZ .... HORIZONTAL
HP .... HIGH POINT
HS .... HOUSE SERVICE
IE .... INVERT ELEVATION
INT .... INTERSECTION
L .... LENGTH
LF .... LINEAL FEET
LP .... LOW POINT
LT .... LEFT
MH .... MANHOLE
MDD .... MAX DRY DENSITY
NTS .... NOT TO SCALE
OD .... OUTSIDE DIAMETER
PCC .... PORTLAND CEMENT CONCRETE
PF .... PUBLIC FACILITY
PL .... PROPERTY LINE
PM .... PARCEL MAP
POT .... POINT OF TANGENT
PR .... PRESSURE RATING
PSI .... POUNDS PER SQUARE INCH
PUE .... PUBLIC UTILITY EASEMENT
PVC .... POLYVINYL CHLORIDE PIPE
PVI .... POINT OF VERTICAL INTERSECTION
Q .... VOLUME FLOW RATE
R .... RADIUS
RCP .... REINFORCED CONCRETE PIPE
REF .... REFERENCE
RET .... CURB RETURN
REQ .... REQUIRED
RT .... RIGHT
R/W .... RIGHT OF WAY
S .... SLOPE
SD .... STORM DRAIN
SDMH .... STORM DRAIN MANHOLE
SF .... SQUARE FEET
SS .... SANITARY SEWER
SSMH .... SANITARY SEWER MANHOLE
SUB .... SUBDRAIN
SW .... SIDEWALK
T .... TRANSFORMER
t .... TELEPHONE
TBC .... TOP BACK OF CURB
TC .... TOP OF CURB
TOP .... TOP OF STEP
TP .... TEST PIT
TW .... TOP OF WALL
TYP .... TYPICAL
VC .... VERTICAL CURVE
VG .... VALLEY GUTTER
VERT .... VERTICAL
VPI .... VERTICAL POINT OF INTERSECTION
W .... WATER
WM .... WATER MAIN



SITE MAP



VICINITY MAP

SHEET INDEX

1 .... TITLE SHEET
2 .... EXISTING SITE LAYOUT
3 .... EXISTING SITE LAYOUT
4 .... SITE PLAN
5 .... SITE PLAN
6 .... GRADING PLAN
7 .... GRADING PLAN

UTILITY PROVIDERS

CABLE TV: .... CHARTER SPECTRUM
ELECTRIC: .... NV ENERGY
GAS: .... SOUTHWEST GAS
SEWER: .... CARSON CITY PUBLIC WORKS
SOLID WASTE: .... CAPITOL SANITATION
TELEPHONE: .... A.T.&T.
WATER: .... CARSON CITY PUBLIC WORKS

PROJECT DATA

PROPERTY ADDRESS: TBD
ASSESSOR PARCEL NO.: 005-051-22 AND 005-051-23
MASTER PLAN DESIG.: INDUSTRIAL
CURRENT ZONING: LIMITED INDUSTRIAL
PARCEL SIZE: 24.31 Ac.±

PROJECT LOCATED WITHIN THE SW 1/4 OF SW 1/4 OF SECTION 34, T.16 N., R. 20 E. AND SECTION 3, T.15 N., R.20 E.

THERE IS A FAULT LINE WITHIN THIS SITE

ENGINEER'S STATEMENT

I, ALLEN W. GRAY, DO HEREBY CERTIFY THAT THESE PLANS (SHEET 1 OF 7 THROUGH SHEET 7 OF 7) HAVE BEEN PREPARED IN ACCORDANCE WITH ACCEPTED ENGINEERING PROCEDURES AND GUIDELINES, AND ARE IN SUBSTANTIAL COMPLIANCE WITH APPLICABLE STATUTES, CITY ORDINANCES, AND CODES. IN THE EVENT OF CONFLICT BETWEEN ANY PORTION OF THESE PLANS AND CITY CODES, THE CITY CODES SHALL PREVAIL.

PROFESSIONAL ENGINEER – STATE OF NEVADA – ALLEN W. GRAY – Exp 6-30-25 – CIVIL – No. 7141
12/11/23

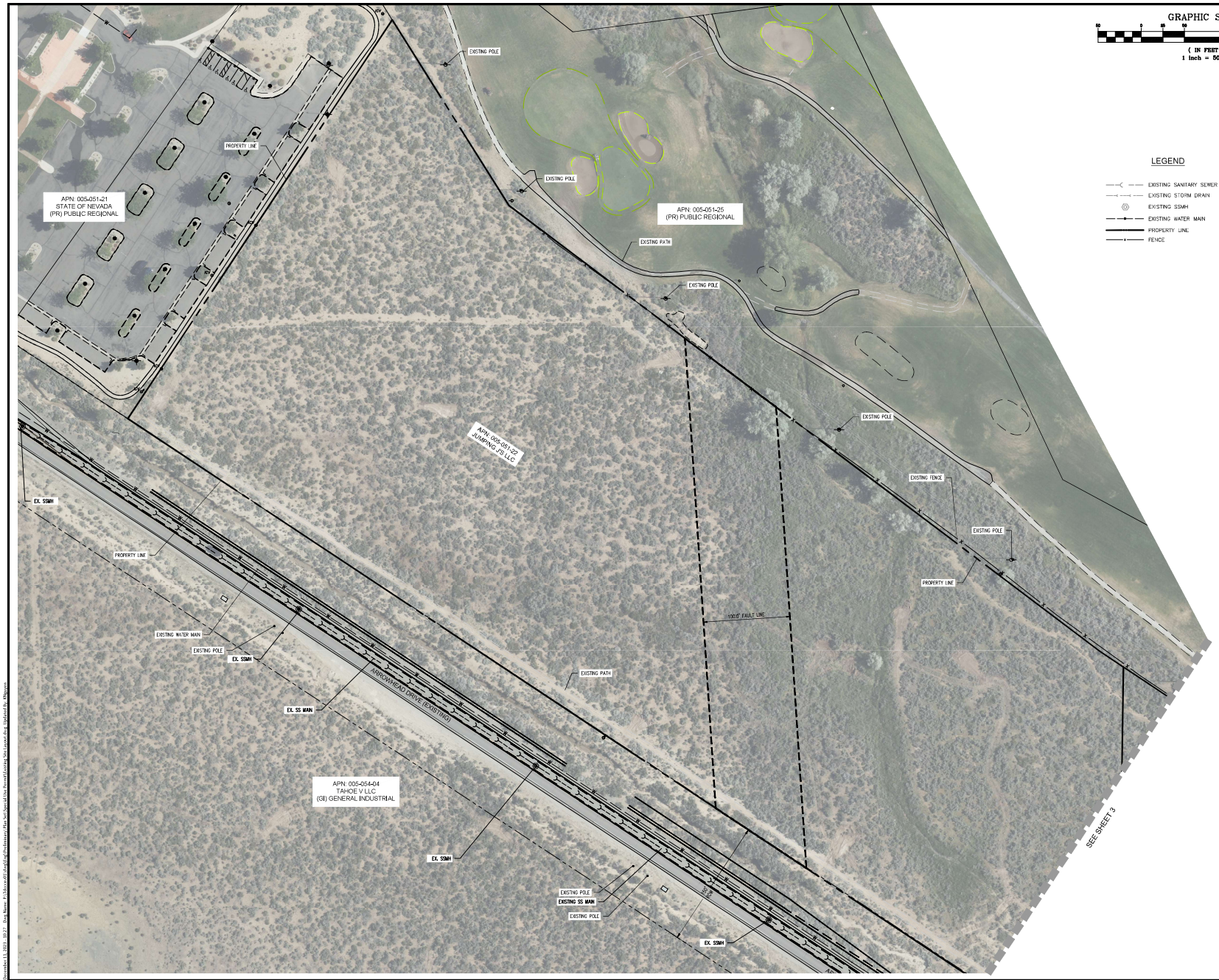
ALLEN W. GRAY P.E. #7141

Manhard CONSULTING LTD

ARROWHEAD DRIVE WAREHOUSES
CARSON CITY, NEVADA
TITLE SHEET

PROJ. MGR.: AWG
PROJ. ASSOC.: AWG
DRAWN BY: ----
DATE: DEC 2023
SCALE: N/A

SHEET 1 OF 7
TDCCCNV01



Manhard CONSULTING LTD

ARROWHEAD DRIVE WAREHOUSES

CARSON CITY, NEVADA

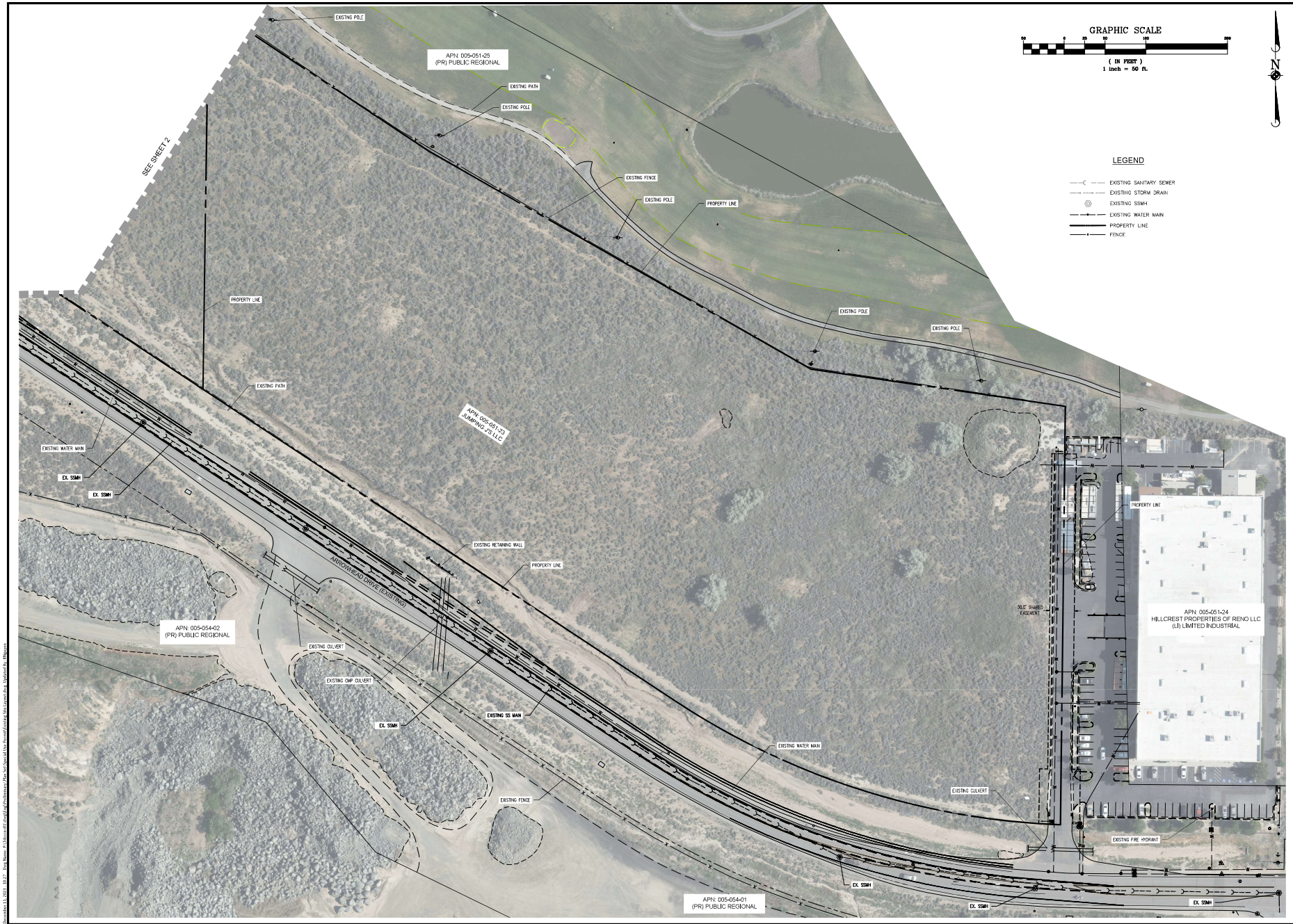
EXISTING SITE LAYOUT

ALLEN W. GRAY
Exp 6-30-25
CIVIL
No. 7141
12/11/23

PROJ. MGR.:	AWG
PROJ. ASSOC.:	AWG
DRAWN BY:	KHN
DATE:	DEC 2023
SCALE:	AS SHOWN

SHEET 2 OF 7

TDCCCNV01



Manhard CONSULTING LTD

ARROWHEAD DRIVE WAREHOUSES

CARSON CITY, NEVADA

EXISTING SITE LAYOUT

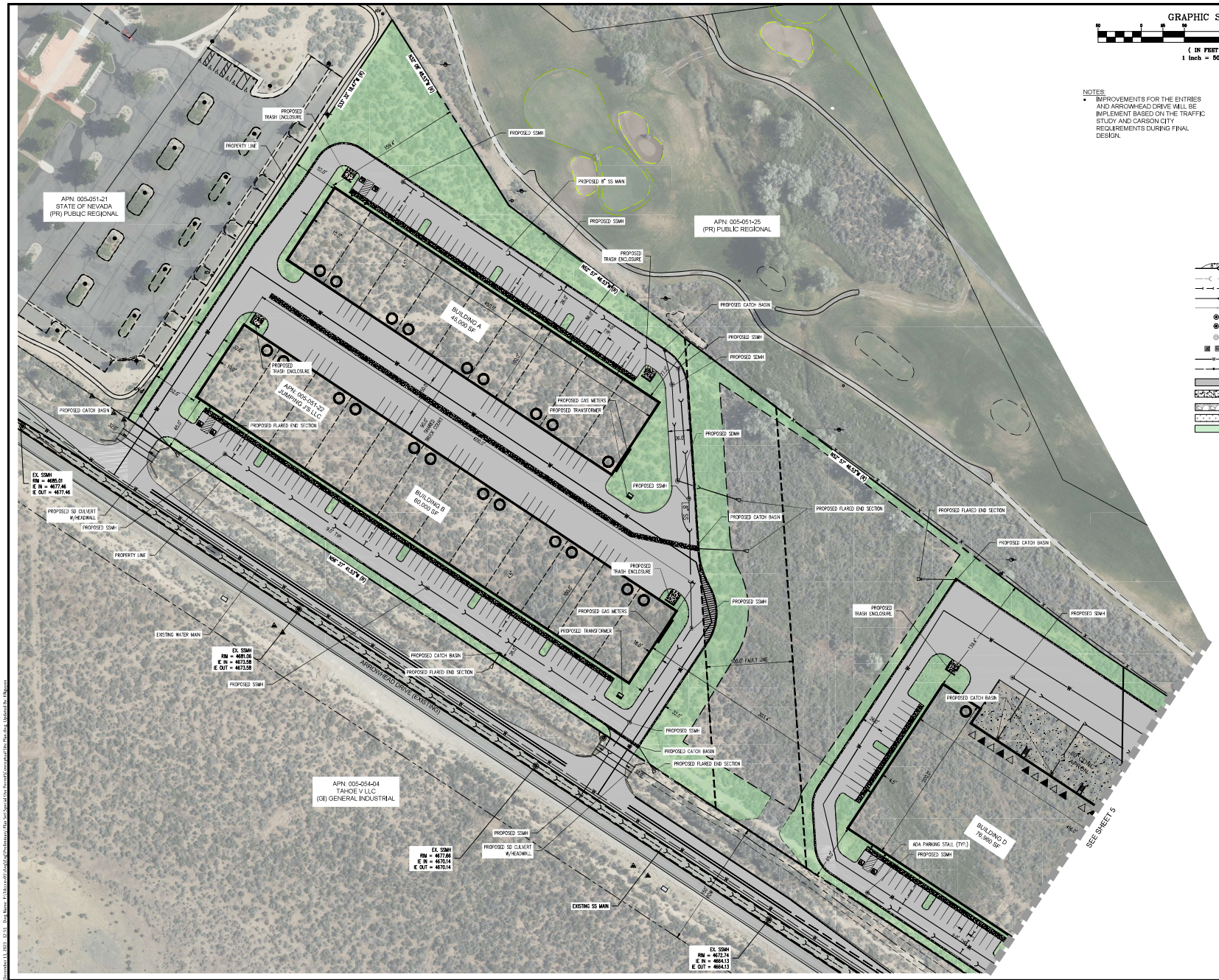
ALLEN W. GRAY
Exp 6-30-25
CIVIL
No. 21441
STATE OF NEVADA

12/11/23

PROJ. MGR.:	AWG
PROJ. ASSOC.:	AWG
DRAWN BY:	KHN
DATE:	DEC 2023
SCALE:	AS SHOWN

SHEET 3 OF 7

TDCCNV01



Manhard CONSULTING LTD

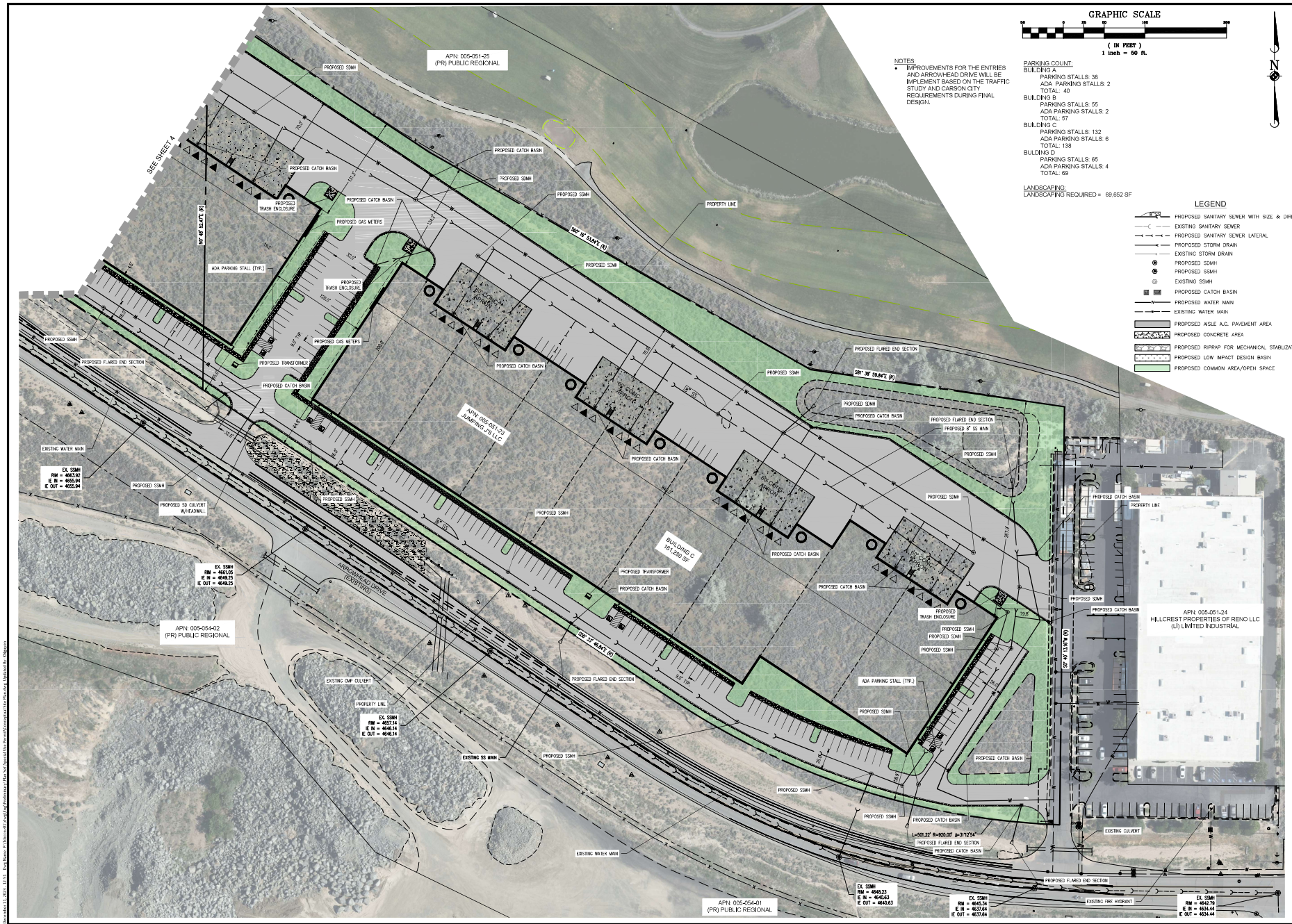
ARROWHEAD DRIVE WAREHOUSES
CARSON CITY, NEVADA
SITE PLAN

ALLEN W. GRAY
Exp 6-30-25
CIVIL
No. 7141
STATE OF NEVADA
12/11/23

PROJ. MGR.:	AWG
PROJ. ASSOC.:	AWG
DRAWN BY:	KHN
DATE:	DEC. 2023
SCALE:	AS SHOWN

SHEET 4 OF 7

TDCCNV01



Manhard CONSULTING LTD

ARROWHEAD DRIVE WAREHOUSES
CARSON CITY, NEVADA
SITE PLAN

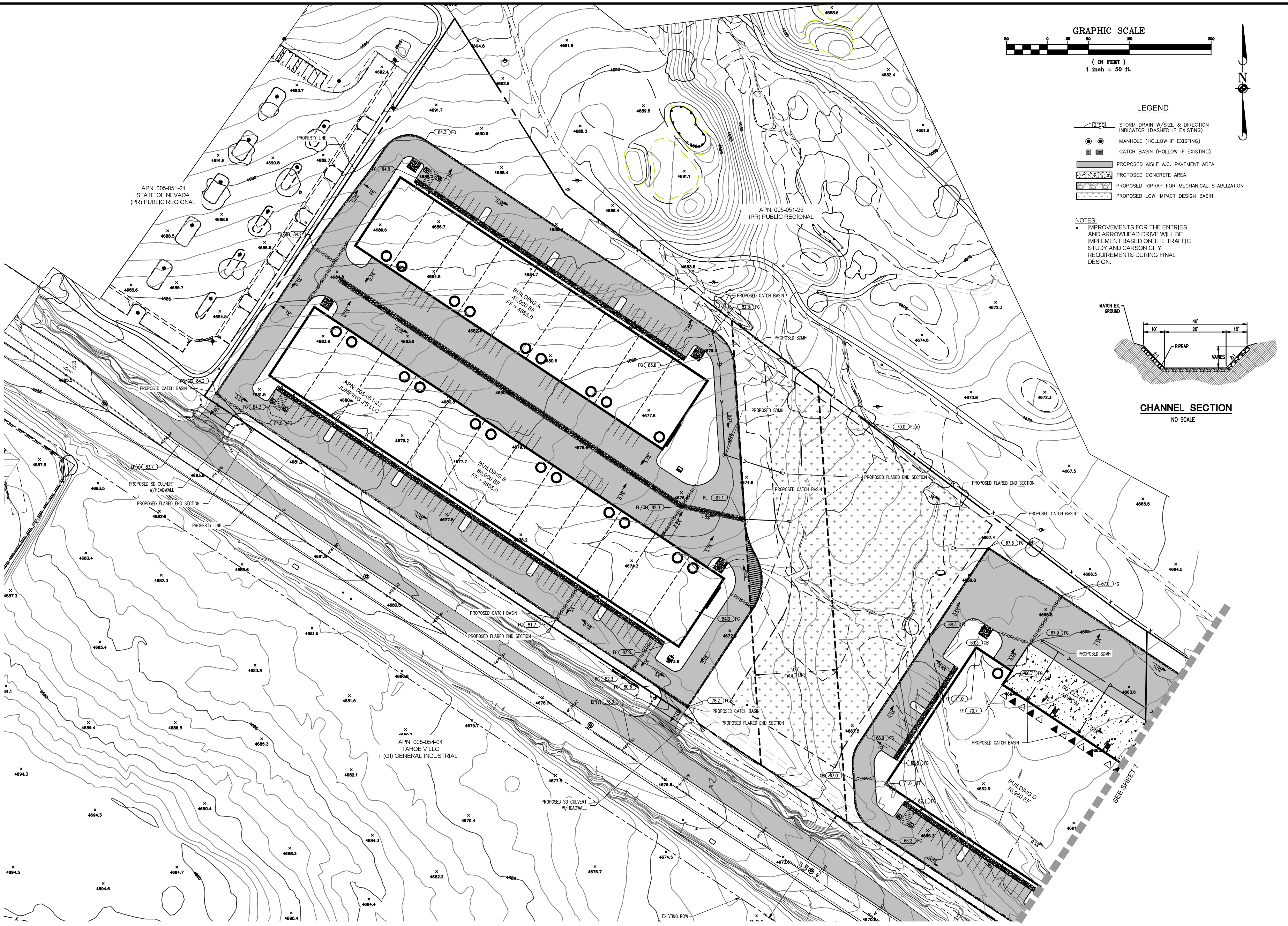
ALLEN W. GRAY
Exp 6-30-25
CIVIL
No. 7141
STATE OF NEVADA

12/11/23

PROJ. MGR.:	AWG
PROJ. ASSOC.:	AWG
DRAWN BY:	KHN
DATE:	DEC. 2023
SCALE:	AS SHOWN

SHEET 5 OF 7

TDCCNV01



ARROWHEAD DRIVE WAREHOUSES

CARSON CITY, NEVADA

GRADING PLAN

Manhard CONSULTING LTD

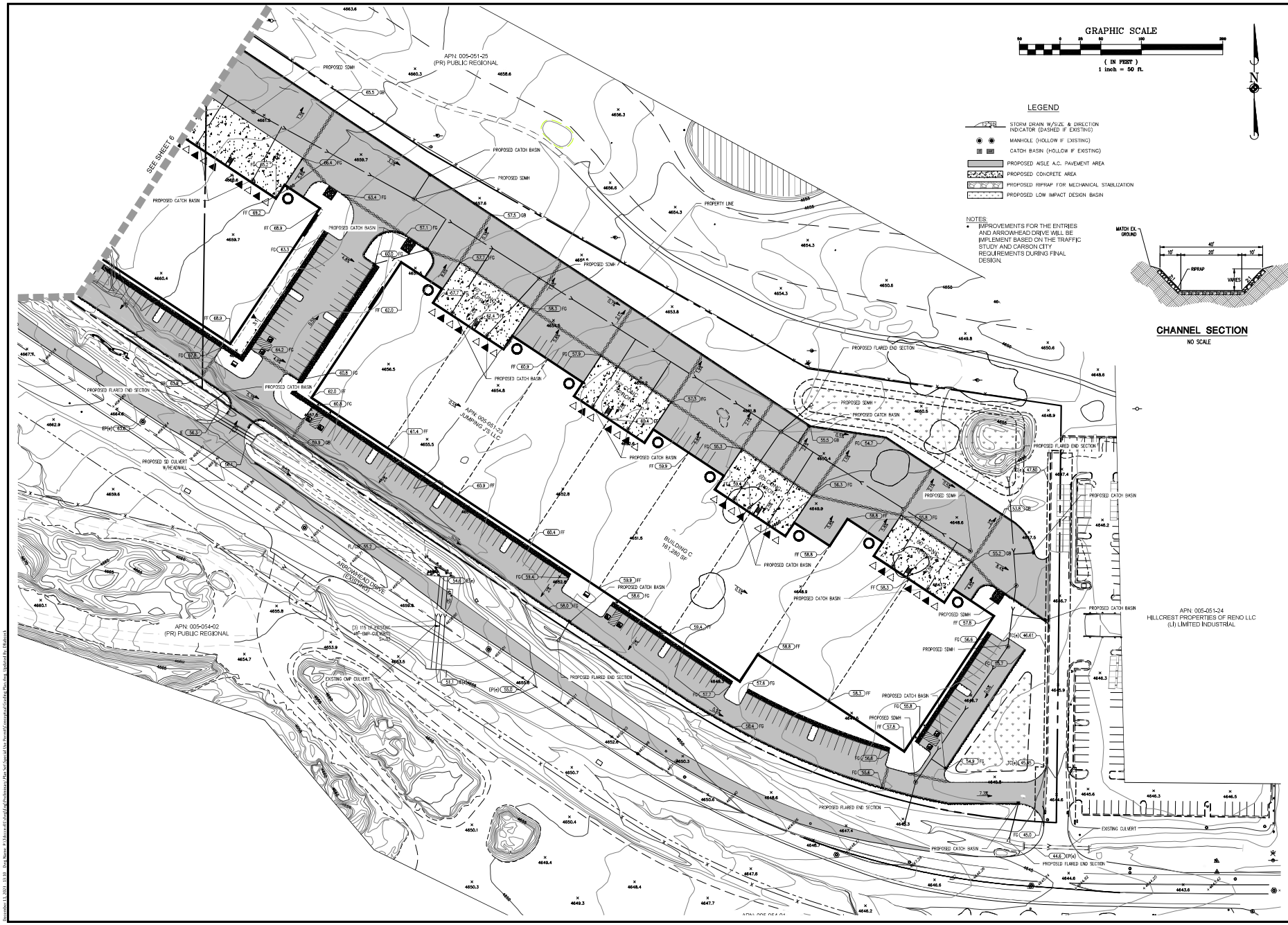
Civil Engineers • Surveyors • Water Resource Engineers • Water & Wastewater Engineers
Construction Managers • Environmental Scientists • Landscape Architects • Planners

ALLEN W. GRAY
Exp 6-30-25
CIVIL
No. 7141
12/11/23

PROJ. MGR.:	AWG
PROJ. ASSOC.:	AWG
DRAWN BY:	DRB
DATE:	DEC 2023
SCALE:	AS SHOWN

SHEET 6 OF 7

TDCCCNV01



ARROWHEAD DRIVE WAREHOUSES

CARSON CITY, NEVADA

GRADING PLAN

Manhard CONSULTING LTD

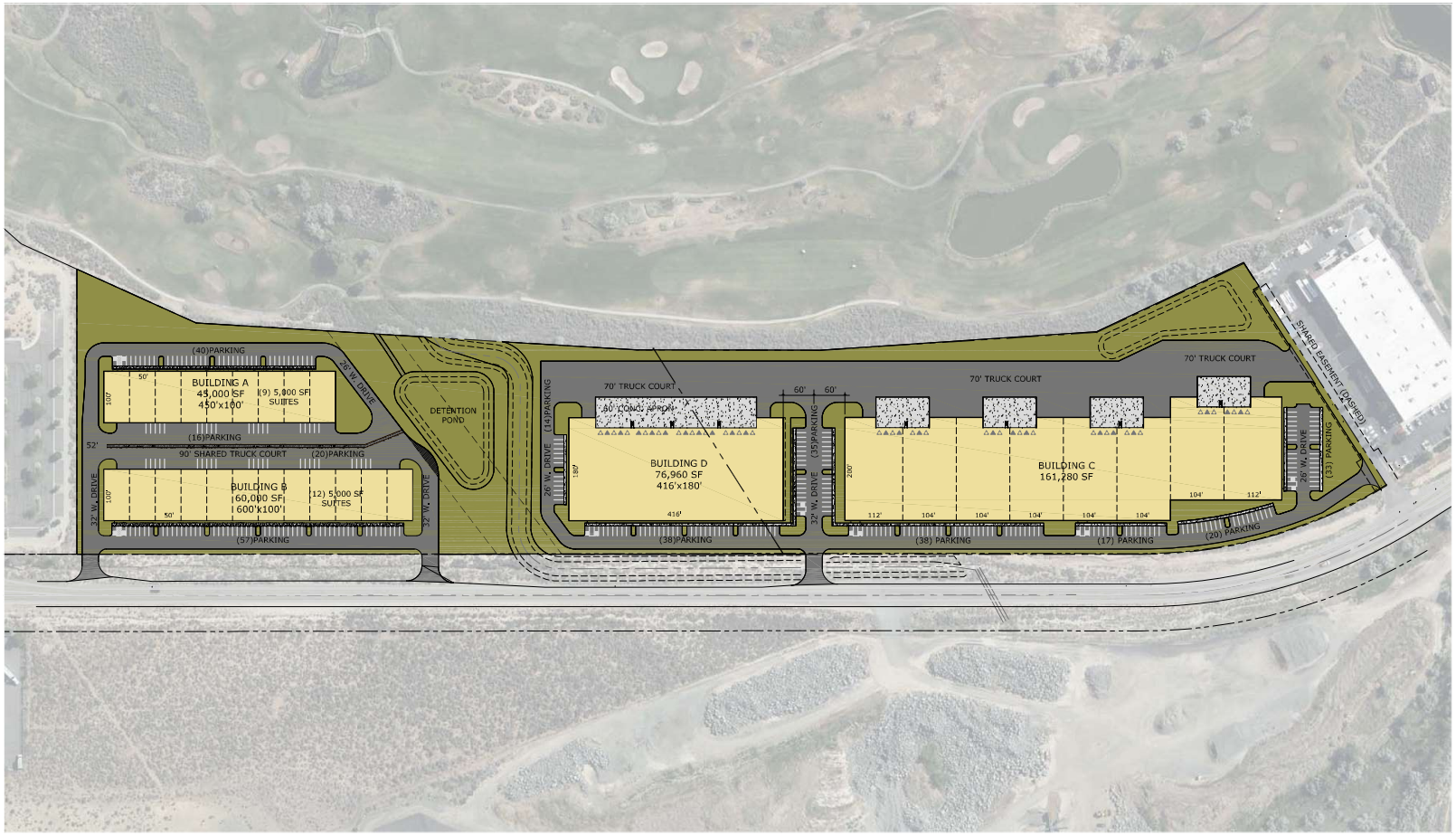
ALLEN W. GRAY
Exp 6-30-25
CIVIL
No. 21141
STATE OF NEVADA

12/11/23

PROJ. MGR.:	AWG
PROJ. ASSOC.:	AWG
DRAWN BY:	DMB
DATE:	DEC 2023
SCALE:	AS SHOWN

SHEET 7 OF 7

TDCCNV01



VICINITY MAP

N

SITE SUMMARY

APN:	005-051-22 & -23
JURISDICTION:	CARSON CITY
CURRENT ZONING:	(LI) LIMITED INDUSTRIAL
ANTICIPATED ZONING:	(LI) LIMITED INDUSTRIAL
ADJACENT ZONING:	(LI)LIMITED INDUSTRIAL, (PR) PUBLIC REGIONAL, (GI) GENERAL INDUSTRIAL
GROSS PARCEL AREA: (+/- 24.3 AC.)	+/- 1,059,097 SF
USABLE PARCEL AREA: (+/- 23.0 AC.)	+/- 1,005,119 SF
GROSS BUILDING AREA:	+/- 343,240 SF
BUILDING SETBACKS	
FRONT:	30 FT
SIDE:	10 FT OR 0 FT (ADJACENT TO LIMITED INDUSTRIAL)
REAR:	30 FT
MAXIMUM BUILDING HEIGHT (LI):	32 FT
LANDSCAPE REQUIREMENTS:	20% OF IMPERVIOUS AREA 10 FT LANDSCAPE SETBACK ADJACENT TO BUSINESS ARTERIAL
IMPERVIOUS SURFACE EXCLUDING BUILDING COVERAGE:	415, 348 SF
20% OF IMPERVIOUS SURFACE EXCLUDING BUILDING COVERAGE:	83, 070 SF
LANDSCAPE AREA:	300, 509 SF

NOTES

1. STREAM IS JURISDICTIONAL UNDER 404 REQUIREMENTS AND NEEDS AN INDIVIDUAL PERMIT, AND A 401 NDEP PERMIT FOR STREAM RELOCATION. EXTENSIVE CULVERT PIPE MAY BE REQUIRED TO REVISE STREAM LOCATION, UPDATED FLOOD MAPPING BASED ON RELOCATED STREAM WILL ALSO REQUIRE EVALUATION.
2. THIS PLAN IS CONCEPTUAL IN NATURE, BUILDING FOOTPRINT AND SITE PLAN MAY CHANGE BASED ON ADDITIONAL INFORMATION INCLUDING SURVEYS, GRADING, ETC.

N

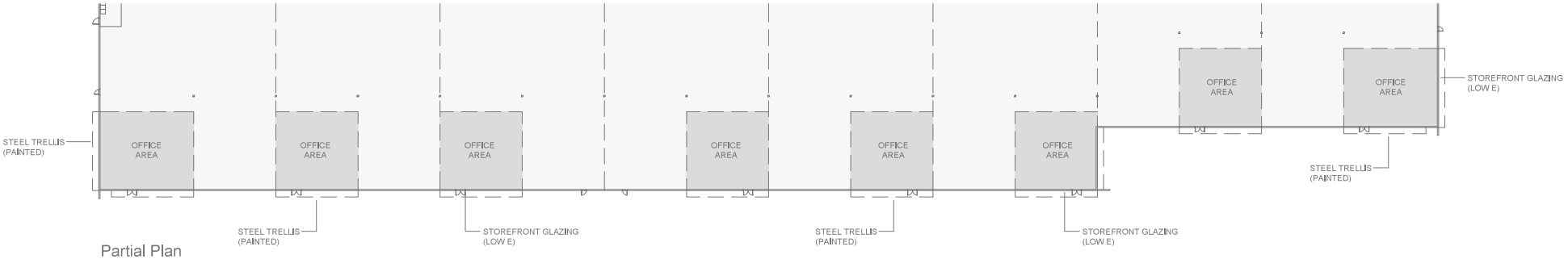
0' 50' 100' 200'

TECTONICS DESIGN GROUP

Arrowhead Drive Planning

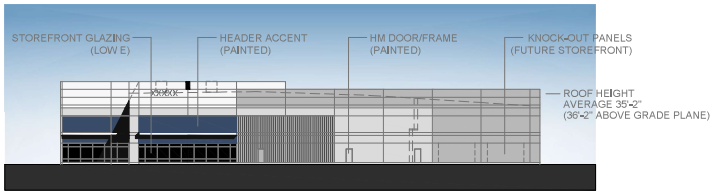
Conceptual Site Plan | Carson City, NV | 23111 PR6

tolles | SVN GOLD DUST COMMERCIAL ASSOCIATES

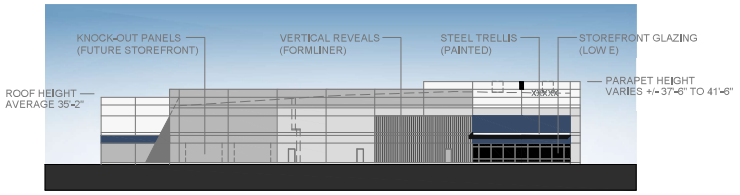


Partial Plan

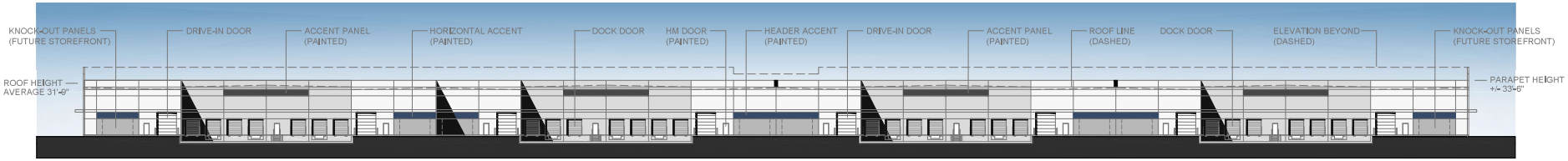
West Elevation (Arrowhead Drive)



South Elevation



North Elevation



East Elevation

TECTONICS DESIGN GROUP

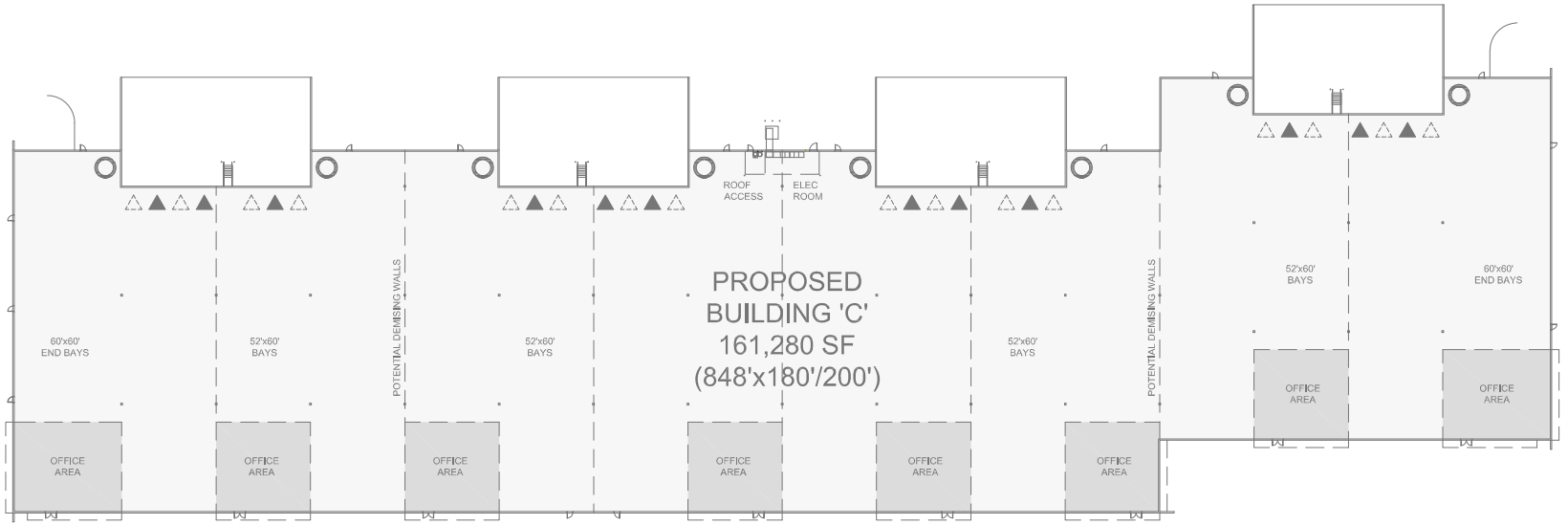
Arrowhead Drive

Conceptual Elevation - Bldg 'C' | Carson City, Nevada | 23111 PR2

tolles | SVN GOLD DUST COMMERCIAL ASSOCIATES

LEGEND

- DOCK DOOR W/ LEVELER, 9'-0" x 10'-0"
- DOCK DOOR, 9'-0" x 10'-0"
- DRIVE-IN DOOR, 12'-0" x 14'-0"



N PLAN 0' 15' 30' 60'

Arrowhead Drive

Conceptual Floor Plan - Bldg 'C' | Carson City, Nevada | 23111 PR2

TECTONICS DESIGN GROUP

tolles

SVN GOLD DUST COMMERCIAL ASSOCIATES

Carson City Planning Division
108 E. Proctor Street · Carson City NV 89701
Phone: (775) 887-2180 • E-mail: planning@carson.org

FILE

APPLICANT	PHONE #
Tolles Development Company LLC	(775) 848-8090

MAILING ADDRESS, CITY, STATE, ZIP
241 Ridge Street, Suite 410, Reno, NV 89501

EMAIL ADDRESS
craig.willcut@outlook.com

PROPERTY OWNER	PHONE #
Jumping J'S LLC	

MAILING ADDRESS, CITY, STATE, ZIP
305 N. Carson St. #200, Carson City, NV 89701

EMAIL ADDRESS

APPLICANT AGENT/REPRESENTATIVE	PHONE #
Karen Downs, Manhard Consulting Ltd.	(775) 321-6538

MAILING ADRESS, CITY STATE, ZIP
241 Ridge Street, Suite 400, Reno, NV 89501

EMAIL ADDRESS
kdowns@manhard.com

FOR OFFICE USE ONLY:

CCMC 18.02.080

SPECIAL USE PERMIT

FEE*: $2,450.00 MAJOR
$2,200.00 MINOR (Residential zoning districts)
+ noticing fee
***Due after application is deemed complete by staff**

☐ **SUBMITTAL PACKET – 4 Complete Packets (1 Unbound Original and 3 Copies) including:**
- ☐ Application Form
- ☐ Detailed Written Project Description
- ☐ Site Plan
- ☐ Building Elevation Drawings and Floor Plans
- ☐ Special Use Permit Findings
- ☐ Master Plan Policy Checklist
- ☐ Applicant's Acknowledgment Statement
- ☐ Documentation of Taxes Paid-to-Date
- ☐ Project Impact Reports (Engineering)

☐ **CD or USB DRIVE with complete application in PDF**

Application Received and Reviewed By:

Submittal Deadline: Planning Commission application submittal schedule.

Note: Submittals must be of sufficient clarity and detail for all departments to adequately review the request. Additional information may be required.

Project's Assessor Parcel Number(s):	Street Address
005-051-22, 005-051-23	Arrowhead Dr.

Project's Master Plan Designation	Project's Current Zoning	Nearest Major Cross Street(s)
Industrial (I)	Limited Industrial (LI)	Arrowhead Drive and Bowers Lane

Please provide a brief description of your proposed project and/or proposed use below. Provide additional pages to describe your request in more detail.
The proposed project is for a warehouse/distribution project on a total of 24.31 acres, including 4 separate buildings (Buildings A, B, C, D), with associated pavement, landscaping, and infrastructure improvements. See attached detailed project description.

PROPERTY OWNER'S AFFIDAVIT

I, Tomi Jo Lynch, being duly deposed, do hereby affirm that I am the record owner of the subject property, and that I have knowledge of, and I agree to, the filing of this application.

Signature | 305 N Carson St #200 Address | 12/8/23 Date

Use additional page(s) if necessary for additional owners.

STATE OF NEVADA)
COUNTY)

On December 8, 2023, Tomi Jo Lynch, personally appeared before me, a notary public, personally known (or proved) to me to be the person whose name is subscribed to the foregoing document and who acknowledged to me that he/she executed the foregoing document.

Notary Public

NICOLE MERWIN
Notary Public-State of Nevada
APPT. NO. 20-6893-02
My Appt. Expires 10-15-2024

NOTE: If your project is located within the Historic District or airport area, it may need to be scheduled before the Historic Resources Commission or the Airport Authority in addition to being scheduled for review by the Planning Commission. Planning staff can help you make this determination.

Master Plan Policy Checklist

Special Use Permits & Major Project Reviews & Administrative Permits

PURPOSE

The purpose of a development checklist is to provide a list of questions that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to non-residential and multi-family residential development. This checklist is designed for developers, staff, and decision-makers and is intended to be used as a guide only.

Development Name: _____

Reviewed By: _____

Date of Review: _____

DEVELOPMENT CHECKLIST

The following five themes are those themes that appear in the Carson City Master Plan and which reflect the community's vision at a broad policy level. Each theme looks at how a proposed development can help achieve the goals of the Carson City Master Plan. A check mark indicates that the proposed development meets the applicable Master Plan policy. The Policy Number is indicated at the end of each policy statement summary. Refer to the Comprehensive Master Plan for complete policy language.

CHAPTER 3: A BALANCED LAND USE PATTERN

The Carson City Master Plan seeks to establish a balance of land uses within the community by providing employment opportunities, a diverse choice of housing, recreational opportunities, and retail services.

Is or does the proposed development:

- ☑ Meet the provisions of the Growth Management Ordinance (1.1d, Municipal Code 18.12)?
- ☑ Use sustainable building materials and construction techniques to promote water and energy conservation (1.1e, f)?
- ☑ Located in a priority infill development area (1.2a)?
- ☑ Provide pathway connections and easements consistent with the adopted Unified Pathways Master Plan and maintain access to adjacent public lands (1.4a)?

- ☑ Protect existing site features, as appropriate, including mature trees or other character-defining features (1.4c)?
- ☐ At adjacent county boundaries or adjacent to public lands, coordinated with the applicable agency with regards to compatibility, access and amenities (1.5a, b)?
- ☑ In identified Mixed-Use areas, promote mixed-use development patterns as appropriate for the surrounding context consistent with the land use descriptions of the applicable Mixed-Use designation, and meet the intent of the Mixed-Use Evaluation Criteria (2.1b, 2.2b, 2.3b, Land Use Districts, Appendix C)?
- ☐ Meet adopted standards (e.g. setbacks) for transitions between non-residential and residential zoning districts (2.1d)?
- ☑ Protect environmentally sensitive areas through proper setbacks, dedication, or other mechanisms (3.1b)?
- ☑ Sited outside the primary floodplain and away from geologic hazard areas or follows the required setbacks or other mitigation measures (3.3d, e)?
- ☑ Provide for levels of services (i.e. water, sewer, road improvements, sidewalks, etc.) consistent with the Land Use designation and adequate for the proposed development (Land Use table descriptions)?
- ☐ If located within an identified Specific Plan Area (SPA), meet the applicable policies of that SPA (Land Use Map, Chapter 8)?

CHAPTER 4: EQUITABLE DISTRIBUTION OF RECREATIONAL OPPORTUNITIES

The Carson City Master Plan seeks to continue providing a diverse range of park and recreational opportunities to include facilities and programming for all ages and varying interests to serve both existing and future neighborhoods.

Is or does the proposed development:

- ☐ Provide park facilities commensurate with the demand created and consistent with the City's adopted standards (4.1b)?
- ☐ Consistent with the Open Space Master Plan and Carson River Master Plan (4.3a)?

CHAPTER 5: ECONOMIC VITALITY

The Carson City Master Plan seeks to maintain its strong diversified economic base by promoting principles which focus on retaining and enhancing the strong employment base, include a broader range of retail services in targeted areas, and include the roles of technology, tourism, recreational amenities, and other economic strengths vital to a successful community.

Is or does the proposed development:

- ☐ Encourage a citywide housing mix consistent with the labor force and non-labor force populations (5.1j)
- ☐ Encourage the development of regional retail centers (5.2a)
- ☐ Encourage reuse or redevelopment of underused retail spaces (5.2b)?
- ☐ Support heritage tourism activities, particularly those associated with historic resources, cultural institutions and the State Capitol (5.4a)?
- ☐ Promote revitalization of the Downtown core (5.6a)?
- ☐ Incorporate additional housing in and around Downtown, including lofts, condominiums, duplexes, live-work units (5.6c)?

CHAPTER 6: LIVABLE NEIGHBORHOODS AND ACTIVITY CENTERS

The Carson City Master Plan seeks to promote safe, attractive and diverse neighborhoods, compact mixed-use activity centers, and a vibrant, pedestrian-friendly Downtown.

Is or does the proposed development:

- ☑ Use durable, long-lasting building materials (6.1a)?
- ☐ Promote variety and visual interest through the incorporation of varied building styles and colors, garage orientation and other features (6.1b)?
- ☑ Provide variety and visual interest through the incorporation of well-articulated building facades, clearly identified entrances and pedestrian connections, landscaping and other features consistent with the Development Standards (6.1c)?
- ☐ Provide appropriate height, density and setback transitions and connectivity to surrounding development to ensure compatibility with surrounding development for infill projects or adjacent to existing rural neighborhoods (6.2a, 9.3b 9.4a)?
- ☐ If located in an identified Mixed-Use Activity Center area, contain the appropriate mix, size and density of land uses consistent with the Mixed-Use district policies (7.1a, b)?
- ☐ If located Downtown:
  - ☐ Integrate an appropriate mix and density of uses (8.1a, e)?
  - ☐ Include buildings at the appropriate scale for the applicable Downtown Character Area (8.1b)?
  - ☐ Incorporate appropriate public spaces, plazas and other amenities (8.1d)?
- ☐ Incorporate a mix of housing models and densities appropriate for the project location and size (9.1a)?

CHAPTER 7: A CONNECTED CITY

The Carson City Master Plan seeks promote a sense of community by linking its many neighborhoods, employment areas, activity centers, parks, recreational

amenities and schools with an extensive system of interconnected roadways, multi-use pathways, bicycle facilities, and sidewalks.

Is or does the proposed development:

- ☐ Promote transit-supportive development patterns (e.g. mixed-use, pedestrian-oriented, higher density) along major travel corridors to facilitate future transit (11.2b)?
- ☑ Maintain and enhance roadway connections and networks consistent with the Transportation Master Plan (11.2c)?
- ☐ Provide appropriate pathways through the development and to surrounding lands, including parks and public lands, consistent with the Unified Pathways Master Plan (12.1a, c)?

If there is any additional information that would provide a clearer picture of your proposal that you would like to add for presentation to the Planning Commission, please be sure to include it in your detailed description.

Please type and sign the statement on the following page at the end of your findings response.

ACKNOWLEDGMENT OF APPLICANT

I certify that the forgoing statements are true and correct to the best of my knowledge and belief. I agree to fully comply with all conditions as established by the Planning Commission. I am aware that this permit becomes null and void if the use is not initiated within one-year of the date of the Planning Commission's approval; and I understand that this permit may be revoked for violation of any of the conditions of approval. I further understand that approval of this application does not exempt me from all City code requirements.

Applicant's Signature	Print Name	Date
	Tomi Johnson	12/8/23

Manhard CONSULTING

Civil Engineering
Surveying
Water Resources Management
Construction Management
Landscape Architecture
Land Planning

ARROWHEAD DISTRIBUTION/WAREHOUSE PROPERTY TAXES PAID TO DATE

APN: 00505122

Payment History

	Fiscal Year	Total Due	Total Paid	Amount Unpaid
⊖	(2023 - 2024)	$10,842.13	$5,475.67	$5,366.46

Installment 1

Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Total Paid	Total Unpaid
8/21/2023	$2,685.11	$0.00	$0.00	$2,685.11	$2,685.11	$0.00

Installment 2

Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Total Paid	Total Unpaid
10/2/2023	$2,683.23	$0.00	$107.33	$2,790.56	$2,790.56	$0.00

Installment 3

Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Total Paid	Total Unpaid
1/1/2024	$2,683.23	$0.00	$0.00	$2,683.23	$0.00	$2,683.23

Installment 4

Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Total Paid	Total Unpaid
3/4/2024	$2,683.23	$0.00	$0.00	$2,683.23	$0.00	$2,683.23

APN: 00505123

Payment History

	Fiscal Year	Total Due	Total Paid	Amount Unpaid
⊖	(2023 - 2024)	$10,211.20	$5,157.08	$5,054.12

Installment 1

Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Total Paid	Total Unpaid
8/21/2023	$2,528.94	$0.00	$0.00	$2,528.94	$2,528.94	$0.00

Installment 2

Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Total Paid	Total Unpaid
10/2/2023	$2,527.06	$0.00	$101.08	$2,628.14	$2,628.14	$0.00

Installment 3

Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Total Paid	Total Unpaid
1/1/2024	$2,527.06	$0.00	$0.00	$2,527.06	$0.00	$2,527.06

Installment 4

Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Total Paid	Total Unpaid
3/4/2024	$2,527.06	$0.00	$0.00	$2,527.06	$0.00	$2,527.06

House Moran Consulting, Inc.
Water Resources and Environmental Engineering

December 11, 2023

Karen E. Downs
Senior Planner/Project Manager
Manhard Consulting
241 Ridge Street, Suite 400
Reno, NV 89501

Summary Report of Preliminary Hydrologic & Hydraulic Analysis for FEMA Conditional Letter of Map Revision (CLOMR) TDC Arrowhead Drive Project, Carson City, Nevada

Dear Karen:

House Moran Consulting, Inc. (House Moran) is pleased to present a summary of preliminary modeling and mitigation associated with the hydrologic and hydraulic floodplain analysis of Golf Course Creek B in support of the FEMA Conditional Letter of Map Revision (CLOMR) to be submitted in association of the proposed Arrowhead Drive development. The proposed project is in northern Carson City, just northeast of the Carson City Airport, along the north side of Arrowhead Drive, as shown in Figure 1 – Location and Floodplain Map.

Figure 1 – Location and Floodplain Map

BACKGROUND

The proposed Arrowhead Drive project is located within both a FEMA Zone AE Flood Hazard, which includes Base Flood Elevations (BFEs) that have been determined by detailed methods, as well as a FEMA 0.2% Annual Chance Flood Hazard, which are areas of 1% annual chance flood with an average depth less than one foot or with drainage areas of less than one square mile, as shown on the Effective FEMA Flood Insurance Rate Map (FIRM) panels #3200010103E and #32000101034E, both dated 01/16/2009. This area was updated under LOMR Case # 16-09-1091P, which became effective on 12/26/2017.

The Effective FEMA Floodplain Mapping in Golf Course Tribs Watershed including the Golf Course Creeks, was developed using the 2D model FLO-2D v.2009. FLO-2D v.2009 is no longer supported by the FLO-2D software developers. Areas upstream of the FLO-2D model area were modeled using HEC-HMS.

EXISTING CONDITIONS

The inflows for Golf Course Creek B consist of the outflow from the Carson City Flood Control Detention Dam in the northern portion of the Eagle Valley Golf Course and rain on grid for the 2D Model area. HEC-HMS was used to model the Carson City Flood Control Detention Dam (Det20) and contributing drainage area (Subbasin 20), as shown in Kimey-Horn's Eagle Valley Flood Study prepared for Carson City.

No changes were made to the HEC-HMS model or the rainfall input of the 2D model area rain on grid for this analysis. A review of the FLO-2D model and the associated results revealed the Green & Ampt layers to have less detail than the NDOT coverage, the impervious and n-value coverages to be overestimating and underestimating parameters of offsite landuse, and a loss of detail in the vicinity of the existing triple pipe culvert under Arrowhead Drive that affects the conveyance of flood flow.

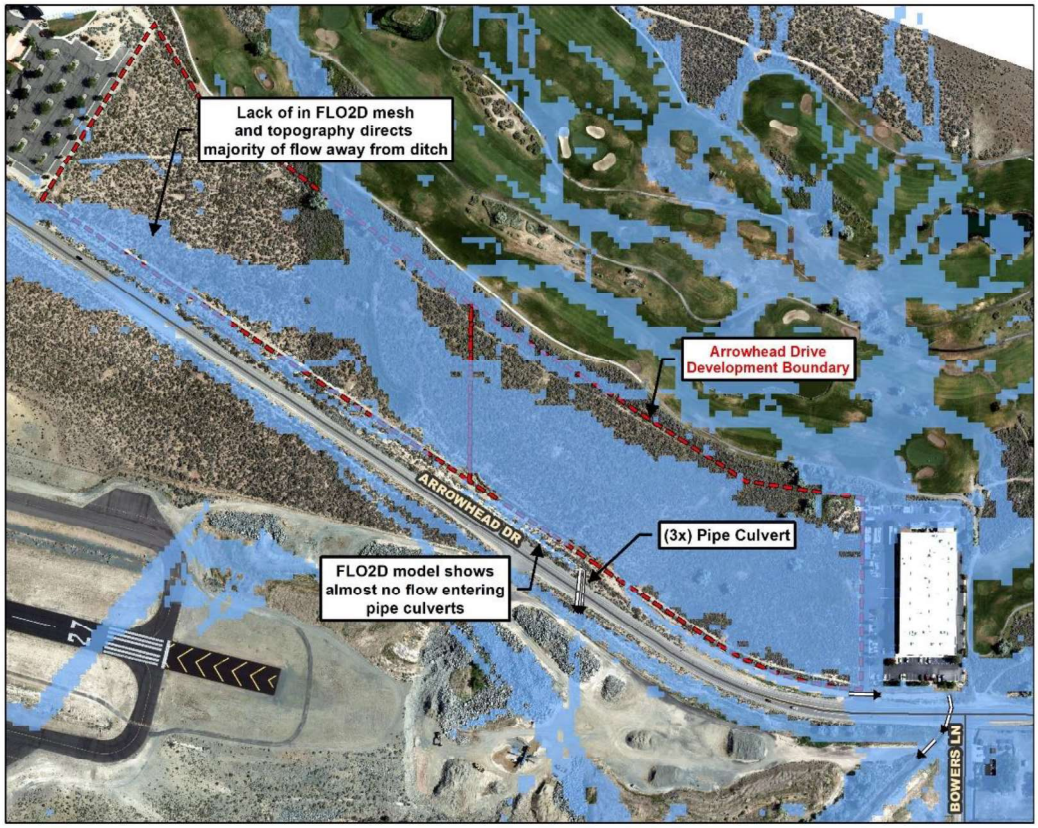


Figure 2 – Inaccurate FLO-2D Model Results

For this analysis, the 2D modeling was performed using HEC-RAS version 6.4.1. A revised Existing Conditions Model was created to address the items listed above from the review of the FLO-2D model. Infiltration parameters were updated using the Green & Ampt coverage developed by NDOT for their statewide research document. Additional detail was added to the impervious and n-value coverages for the offsite areas within the vicinity of the project. A more detailed 2D mesh was created in HEC-RAS and a new Existing Conditions terrain was created using 2017 USGS LiDAR and survey performed for this project.

The results of the revised Existing Conditions Model in HEC-RAS reveal that runoff from the northwest of the site that travels down the ditch along the north side of Arrowhead Drive is routed through the triple pipe culvert under Arrowhead Drive. An existing berm on the north side of the ditch directs all the flow from the northwest generated during the 1% Annual Chance Event (ACE) through the triple pipe culvert. Runoff conveyed by Golf Course Creek B from the north (Det20 outflow and runoff from the golf course) spreads out as it reaches the site. The existing berm and topography cause the flow to bypass the triple pipe culvert under Arrowhead Drive. It instead continues to the southeast towards the intersection of Arrowhead Drive and Bowers Lane. At the intersection some flow enters an undersized 24-inch pipe. The remaining flow overflows Arrowhead Drive to the south and to the southeast over Bowers Lane.

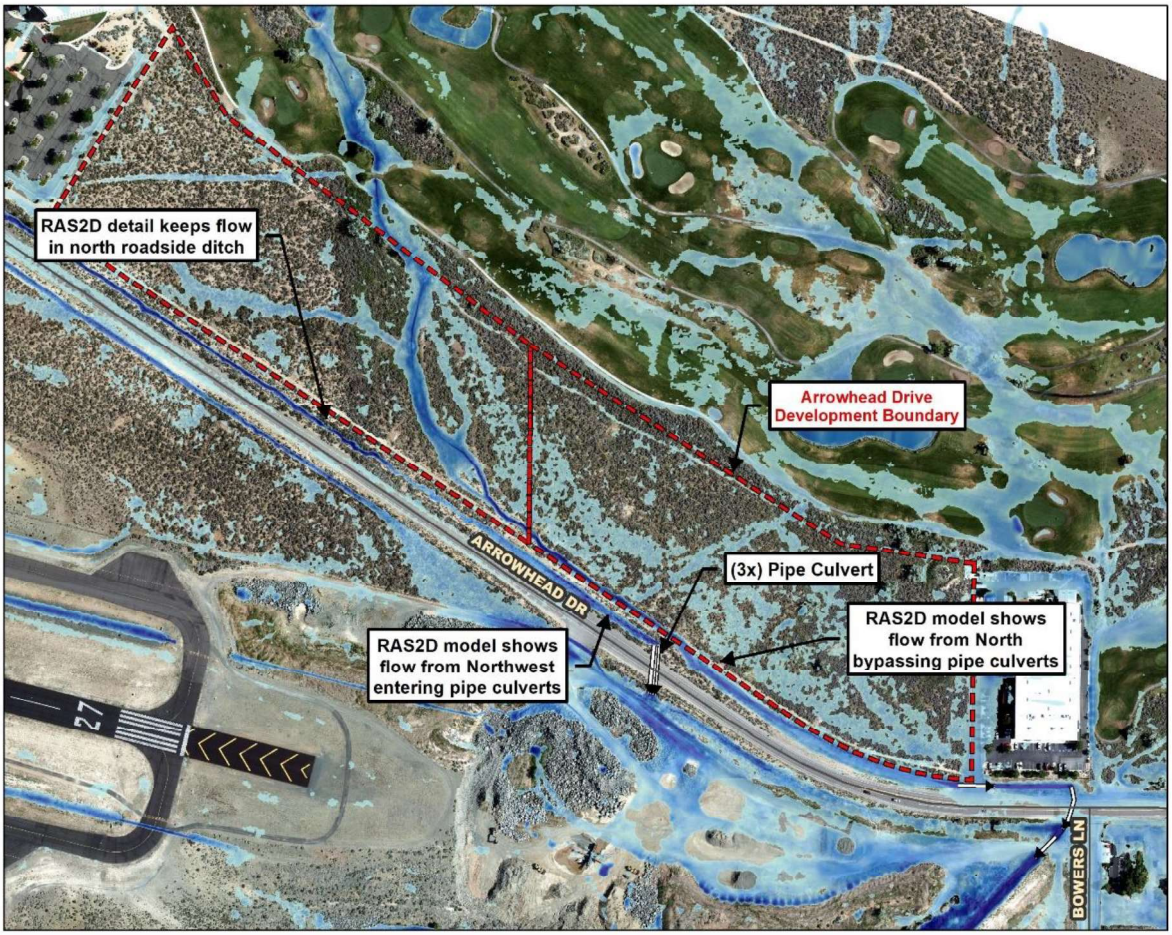


Figure 3 – RAS2D Revised Existing Conditions Model Results

PROPOSED CONDITIONS

To evaluate the proposed changes at Arrowhead Drive and the effect of mitigation, House Moran used the HEC-RAS 2D model prepared for Existing Conditions as the base model. The Proposed Conditions Model was created using the proposed grading plans provided by Manhard Consulting.

To minimize the effects of the proposed development on the floodplain, the site was designed with the intent to mimic existing conditions flow patterns and floodplain storage as much as possible. The ditch along the north side of Arrowhead Drive was improved along the full length of the site. It was sized to contain the 1% ACE with at least 1 foot of freeboard. To simulate the attenuation associated with Golf Course Creek B spreading out into a wide shallow floodplain as it enters the site, a detention basin was added between the northwest and southeast proposed developments. The in-line detention basin contains approximately 5.5 acre-feet of floodplain storage. Outflow from the proposed detention basin combines with flow from the northwest in the proposed channel and is conveyed southeast to the existing triple pipe culvert under Arrowhead Drive. To simulate existing conditions peak flows through the triple pipe culvert two 3-foot pipe culverts were added to convey flow southeast along the north side of Arrowhead Drive, similar to existing conditions. This design maintains the existing conditions peak flow through the triple pipe culvert and reduces the peak flow on the north side of Arrowhead Drive at the intersection of Bowers Lane.

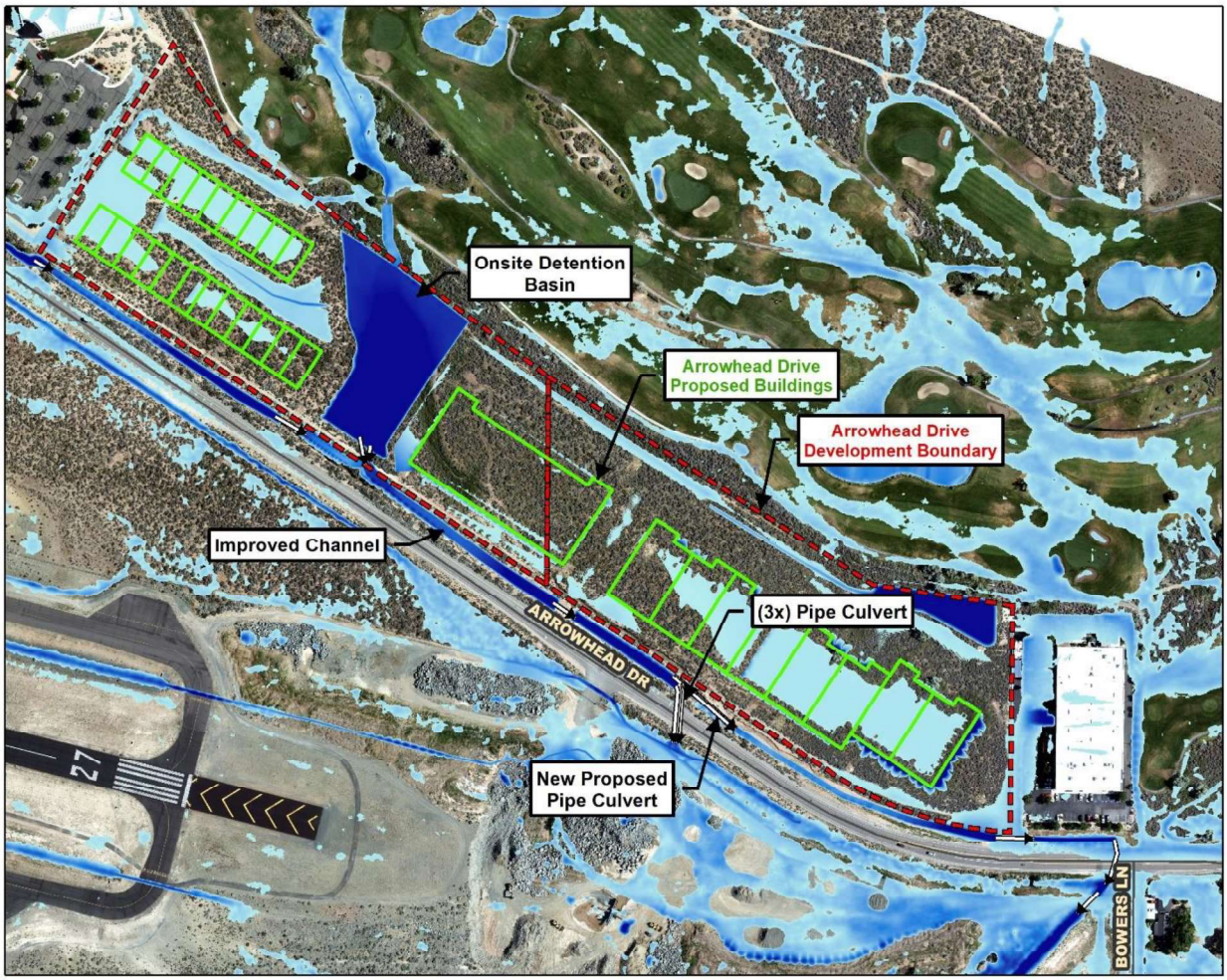


Figure 4 – RAS2D Proposed Conditions Model Results

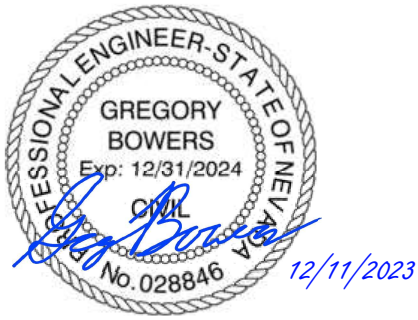
A comparison of the existing conditions and proposed conditions peak flows southeast of the Arrowhead Drive/Bowers Lane intersection and north of Apollo Drive shows a reduction of approximately 30% (200 cfs to 140 cfs) and 1% (260 cfs to 258 cfs) respectively. In summary, post-development peak flows downstream of the site are less than pre-development peak flows.

If you have any questions, please give us a call.

Sincerely,

HOUSE MORAN CONSULTING, INC.
Nevada PE Firm No. 23484

Greg Bowers, PE, CFM
Senior Project Manager



12/11/2023

Manhard CONSULTING

Civil Engineering
Surveying
Water Resources Management
Construction Management
Landscape Architecture
Land Planning

December 12, 2023

City of Carson City
Development Services Department
201 N. Carson Street
Carson, NV 89701

RE: Supplemental On-Site Drainage Memo

To Whom it May Concern:

The following is a supplement to the conceptual hydrologic analysis prepared by House Moran Consulting. This memo summarizes the on-site drainage facilities for the Arrowhead Warehouse project. The on-site runoff is proposed to be collected in a storm drain network and is distributed to on-site detention/retention basins. Three detention/retention areas are proposed: one for the westerly portion of the site and two for the easterly portion. Existing flows are proposed to be distributed through the detention/retention basins and then distributed to the improved existing channel that runs along Arrowhead Drive. The total sum of the existing on-site flows for the 10-year and 100-year storms are 13.0 cfs and 47.8 cfs.The total sum of the proposed on-site flows for the 10-year and 100-year storms are 35.6 cfs and 73.0 cfs. The increased flows will be treated and detained/retained in the proposed detention/retention drainage facilities. The methodology used to calculate the proposed on-site flows is the Rational Method.

If you have any questions or comments, please contact me at 775-321-6528 or agray@manhard.com,

Sincerely,
MANHARD CONSULTING

Allen Gray, P.E.
Senior Project Manager

PRELIMINARY SEWER REPORT

FOR

Arrowhead Drive Warehouses

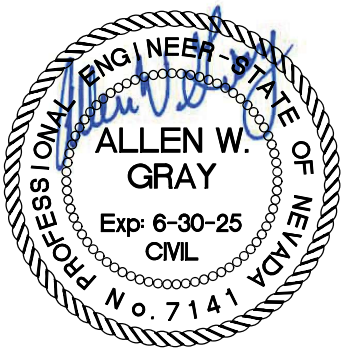
CARSON CITY, NEVADA

PREPARED FOR:

Tolles Development Company
241 Ridge Street, Suite 410
Reno, NV 89501

PREPARED BY:

Manhard Consulting Ltd.
241 Ridge Street, Suite 400
Reno, Nevada 89501



12/12/2023

Project: TDCCCNV01

Date: December 2023

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1 INTRODUCTION 1
2 PROPOSED ALIGNMENT AND QUANTITY OF SERVICE 1
3 CONCLUSION 2

Figures

FIGURE 1 – PROJECT LOCATION

FIGURE 2 – PROPOSED SEWER DISPLAY

Appendices

APPENDIX A - FLOWMASTER OUTPUT DATA

1 INTRODUCTION

1.1 Purpose of Analysis

This report represents a preliminary analysis of the proposed sanitary sewer system for the Arrowhead Drive Warehouses project. The purpose of this analysis is to establish peak flow rates for the subject property.

1.2 Project Location and Description

The proposed Arrowhead Drive Warehouses project is approximately 24.31 acres in size and located in the eastern portion of Carson City and is northwest of the Arrowhead Drive and Highway 50 intersection, northeast of Carson City Airport and directly south of Eagle Valley Golf Course. The proposed project site is situated within the Northeast 1/4 of the Southeast 1/4 of Section 3, Township 15 North, and Range 20 East of the Mount Diablo Meridian (refer to Figure 1, Project Location). The project site is within the existing parcel 005-051-22 and 005-051-23.

Figure 2, *Proposed Sewer Display*, illustrates the location and orientation of the project and its proposed buildings and roadway locations.

1.3 Project Description

The Arrowhead Drive Warehouses project is a proposed warehouse/distribution facility which consists of 4 buildings. The project site is currently zoned Limited Industrial (LI) with a Master Plan designation of Industrial (I).

2 PROPOSED ALIGNMENT AND QUANTITY OF SERVICE

2.1 Project Wastewater Collection System

Sewage flow from the Arrowhead Drive Warehouses project will be conveyed via 2 separate on site sewer networks consisting of new private 8" diameter PVC SDR-35 sewer mains that ultimately discharge into an existing 12" PVC sanitary sewer main network in Arrowhead Drive that routes flow to the south. The west site sewer network consists of buildings A and B. The east site sewer network consists of buildings C and D. The proposed sizes and locations of the sanitary sewers can be found on the *Proposed Sewer Display*, which is included in this report.

2.2 Estimated Peak Sewage Flows

For this analysis, a value of 500 gal per acre per day was applied to determine peak daily flow. The project consists of 24.31 acres in size. Peak flow calculations will be used for design flows on this project. The following table summarizes the results of the calculation of the peak daily flow for the warehouses:

Land Use	Acre	GPD/ Acre	Peak Flow (gpd)	Peak Flow (cfs)
Industrial	24.31	500	12,155	0.019
		Total	**12,155**	**0.019**

2.3 Proposed Sewer Mains

The information provided by Carson City Planning Division states that an existing 12" PVC sewer main running adjacent to the property in Arrowhead Drive is approximately 20% full (d/D). Its slope is approximately 1.5% based on surveying information. To determine the increase in flow from the project site to the existing 12" main, the proposed pipe flow value was added based on the flows determined in this report. Reference Appendix A for FlowMaster flow data.

3 CONCLUSION

Based on the sewer flow generation calculated in this report and existing flow provided for the existing 12" sewer in Arrowhead Drive, the proposed development will increase the flow in the existing pipe by 0.019 cfs. The proposed 8" PVC sewer mains on-site will be 10.3% full, and the existing 12" PVC sewer main in Arrowhead Drive will increase from 20% full to 24.8% full. Therefore, this project will have a minimal impact on the existing sewer infrastructure.

SANITARY SEWER CALCULATIONS FOR ARROWHEAD DRIVE WAREHOUSES

The following calculations were performed based on the following:

500 gal/day/acre

The site will consist of 24.31 acres; therefore, the following equation is used:

Peak flow = num. acres* gpd/acre

Peak flow = 24.31 * 500 = 12,155 gpd = 0.019 cfs

The design shall be for the peak flow; therefore, the design flow is determined to be 0.019 cfs.

APPENDIX A

FlowMaster Flow Data

Worksheet for 8" Cap.

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Diameter	8.0 in
Discharge	12,155.00 gpd

Results	
Normal Depth	0.8 in
Flow Area	0.0 ft²
Wetted Perimeter	0.4 ft
Hydraulic Radius	0.5 in
Top Width	0.40 ft
Critical Depth	0.7 in
Percent Full	10.3 %
Critical Slope	0.008 ft/ft
Velocity	1.00 ft/s
Velocity Head	0.02 ft
Specific Energy	0.08 ft
Froude Number	0.814
Maximum Discharge	594,039.99 gpd
Discharge Full	552,232.73 gpd
Slope Full	0.000 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	50.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.8 in
Critical Depth	0.7 in
Channel Slope	0.005 ft/ft
Critical Slope	0.008 ft/ft

Worksheet for 12" Cap.

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.015 ft/ft
Diameter	12.0 in
Discharge	12,155.00 gpd

Results	
Normal Depth	0.6 in
Flow Area	0.0 ft²
Wetted Perimeter	0.4 ft
Hydraulic Radius	0.4 in
Top Width	0.43 ft
Critical Depth	0.7 in
Percent Full	4.8 %
Critical Slope	0.008 ft/ft
Velocity	1.36 ft/s
Velocity Head	0.03 ft
Specific Energy	0.08 ft
Froude Number	1.336
Maximum Discharge	2,997,962.39 gpd
Discharge Full	2,786,972.24 gpd
Slope Full	0.000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	4.8 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.6 in
Critical Depth	0.7 in
Channel Slope	0.015 ft/ft
Critical Slope	0.008 ft/ft

Manhard CONSULTING

Civil Engineering
Surveying
Water Resources Management
Water & Wastewater Engineering
Construction Management
Environmental Sciences
Landscape Architecture
Land Planning

PRELIMINARY WATER SYSTEM ANALYSIS FOR

Arrowhead Industrial Special Use Permit

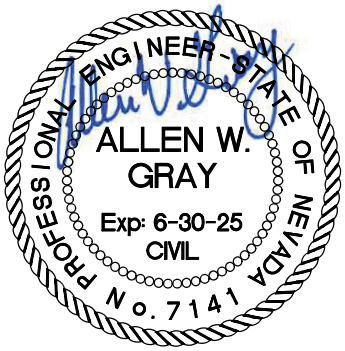
Carson City, Nevada

Prepared for:

Tolles Development Co
241 Ridge Street Ste 410
Reno, NV 89501

Prepared by:

Manhard Consulting, Ltd.
241 Ridge St, Suite 400
Reno, NV 89501



12/12/2023

Job No. TDC.CCNV01.00

December, 2023

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3 PROPOSED WATER SYSTEM IMPROVEMENTS 1

3.1 PROPOSED WATER MAIN SYSTEM 1

4 WATER SYSTEM ANALYSIS 2

5 CONCLUSION 2

ABBREVIATIONS

Ø	diameter
AAD	Average Annual Demand
ADD	Average Daily Demand
D	nominal pipe diameter
E	East
EDU	Equivalent Dwelling Unit
(f)	Future
fps	feet per second
GIS	Geographical Information System
gpd	gallons per day
gpm	gallons per minute
HDPE	High Density Polyethylene
LCUD	Lyon County Utility Department
MDD	Maximum Daily Demands
MG	Million Gallons
min.	minimum
N	North
NAC 445A	Nevada Administrative Code 445A.65505 to .6731 Water Controls Design, Construction, Operation and Maintenance
NV	Nevada
PF	Peaking Factor
PHD	Peak Hourly Demand
psi	Pounds per square inch
PVC	Polyvinyl Chloride
vel.	Velocity
WFMP	Water Facility Master Plan

1 INTRODUCTION

This preliminary water system analysis is prepared at the request of Tolles Development Company to determine if the current Carson City water system can support the Special Use Permit for Arrowhead Industrial facility.

The report describes the water system and the criteria used for design. The purpose of this analysis is to establish the adequacy of the proposed water main pipe diameters and layout to meet the needs of the project development.

1.1 PROJECT LOCATION AND SITE DESCRIPTION

The proposed Arrowhead Drive Industrial project is approximately 24.31 acres in size and located in the eastern portion of Carson City and is northwest of the Arrowhead Drive and Highway 50 intersection, northeast of Carson City Airport and directly south of Eagle Valley Golf Course. The proposed project site is situated within the Northeast 1/4 of the Southeast 1/4 of Section 3, Township 15 North, and Range 20 East of the Mount Diablo Meridian (refer to Figure 1, Project Location). The project site is within the existing parcel 005-051-22 and 005-051-23.

The Proposed Site Plan included in this SUP application illustrates the location and orientation of the project and its proposed buildings and roadway locations.

2 EXISTING SYSTEM

The existing water system consists of a 12-inch Ductile Iron Water Main in Arrowhead Drive immediately adjacent to the project.

3 PROPOSED WATER SYSTEM IMPROVEMENTS

3.1 PROPOSED WATER MAIN SYSTEM

The project water mains and distribution system are shown on the SUP Site Plan. These improvements consist of 8-inch mains looped around the buildings providing domestic, irrigation and fire services to the proposed site.

4 WATER SYSTEM ANALYSIS

The fire flow required for the project is 2000 gpm. The buildings will be used as warehousing and distribution with automated robotic systems reducing the employee requirements for the operation. Average water use within the buildings shall consist of standard restroom demands. The water demand for the entire project is based on standard usage of warehousing use, and final demands will be provided during the final design process.

The 2,000 gpm fire flow requirement was obtained from Section B105 and Table B105.1 of the 2012 International Fire Code.

Carson City Public Works provided an existing pressure of 128 psi in the existing water main in Arrowhead Drive (120 psi in the summer).

The site may require individual pressure reducing devices on an individual basis depending on final design and final demands.

5 CONCLUSION

The analysis of the water system shows that the pipe sizes and piping layouts within the Arrowhead Industrial project are adequately designed to meet the demands of the development. The analysis shows that the pressures are greater than the minimum requirement and may need to be reduced below the maximum requirement for Carson City and the NAC requirements. The Arrowhead Industrial project is in compliance and meets the minimum pressures per NAC 445A.6711 during maximum day, peak hour, and fire flow conditions.

TRAFFIC IMPACT STUDY

FOR

ARROWHEAD INDUSTRIAL

December 8, 2023

PREPARED FOR:

Tolles Development Company

PREPARED BY:

Marissa Harned

Digitally signed by Marissa Harned
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YOUR QUESTIONS ANSWERED QUICKLY

Why did you perform this study?

This Traffic Impact Study evaluates the potential traffic impacts associated with the proposed Arrowhead Industrial project in Carson City, Nevada. This study of potential transportation impacts was undertaken for planning purposes and to assist in determining what traffic controls or mitigations may be needed to reduce potential impacts, if any are found.

What does the project consist of?

The project consists of approximately 343,240 square feet of Industrial Park buildings located northeast of Arrowhead Drive and the Carson City Airport.

How much traffic will the project generate?

The project is anticipated to generate approximately 1,157 Daily, 117 AM peak hour, and 117 PM peak hour trips to the external roadway network.

How will project traffic affect the roadway network?

Under Opening Year (no project) and Opening Year Plus Project conditions, the Arrowhead Drive/Goni Road intersection is expected to operate at LOS E/F during the AM and PM peak hours. All other study intersections are expected to operate within policy level of service thresholds.

Under Future Year (no project) and Future Year Plus Project conditions, the Arrowhead Drive/Goni Road and US 50/Arrowhead Drive intersections are expected to operate at LOS E/F conditions. All other study intersections are expected to operate within policy level of service thresholds.

Are any improvements recommended?

Arrowhead Drive/Goni Road

The Arrowhead Drive/Goni Road intersection is expected to meet Four Hour and Peak Hour signal warrant criteria based on Future Year (no project) and Future Year Plus Project traffic volumes. A traffic signal is planned for the intersection and is expected to operate at LOS D or better during the AM and PM peak hours under Future Year Plus Project conditions.

The project should pay a pro-rata share contribution toward future installation of a traffic signal. The project's fair share contribution for future signalization of the Arrowhead Drive/Goni Road intersection is estimated to be $46,400 (approximately 5.8 percent of $800,000).

US 50/Arrowhead Drive

The US 50/Arrowhead Drive intersection is expected to operate at LOS E conditions under Future Year (no project) and Future Year Plus Project conditions. The project traffic is expected to increase the overall delay at the intersection by less than 4 seconds during peak hours and would be less than one (1) percent of the overall intersection traffic. The CAMPO *2050 Regional Transportation Plan* includes "US 50 East Highway Corridor Improvements – Congestion mitigation improvements between I-580 and the Town of Dayton" as an unconstrained, near-term project. Carson City is currently in the process of determining improvements needed on US 50 at this intersection through the US 50 Corridor Study. Improvements at this location will be addressed by studies/projects performed by the City.

Deceleration and Acceleration Lanes

NDOT's left-turn lane and right-turn lane warrant criteria was analyzed for the project driveway intersections. A left-turn lane on Arrowhead Drive is warranted at the Driveway 3 intersection based on Future Year Plus Project traffic volumes. Driveway 4 currently has a left-turn lane that should remain. Additionally, the right-turn lane warrant is met at the Driveway 3 and Driveway 4 intersections based on Opening Year Plus Project and Future Year Plus Project traffic volumes.

Acceleration lanes are not recommended on Arrowhead Drive at any of the project driveway intersections based on NDOT guidance.

Arrowhead Drive

Based on Carson City requirements, Arrowhead Drive should be widened to include three lanes (one lane in each direction and a two-way left-turn lane) along the project frontage, as well as right-turn lanes at Driveways 3 and 4. A two-way left-turn lane will accommodate the warranted left-turn lane at Driveway 3 and match the roadway width at both ends of the project frontage.

Half street improvements will be constructed on Arrowhead Drive along the project frontage and include a bicycle lane.

Note, the project is expected to be built in phases with the southern/eastern most building being constructed first. The Arrowhead Drive roadway improvements could be built in segments in coordination with construction of each adjacent building.

Bowers Lane

Residents have expressed concern about traffic on Bowers Lane, a residential roadway, near the project site. Level of service analysis was conducted at the Arrowhead Drive/Bowers Lane and E. Nye Lane/Bowers Lane intersections at both ends of the roadway. Both intersections are expected to operate at LOS B or better under all analysis scenarios. The analysis does assume that some project traffic (approximately 10

percent) would use the roadway between E. Nye Lane/US 50 and Arrowhead Drive, however the small amount of additional traffic is not expected to change the operating conditions of the roadway. The project is estimated to add a total of 12 AM peak hour trips and 11 PM peak hour trips to the roadway, which equates to approximately 1 vehicle every 5 minutes. Bowers Lane has a 25 mph speed limit that should be enforced regularly to ensure compliance.

Bowers Lane has a 25 mph speed limit that should be enforced regularly to ensure compliance.

Bowers Lane currently has a “Local Access Only” sign on the south end of the roadway. The City should consider, and potentially have the project install, the same sign to the north end of the roadway, as well as “25 MPH” pavement legends on the roadway.

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INTRODUCTION

This report presents the findings of a Traffic Impact Study completed to assess the potential traffic impacts on local intersections associated with the Arrowhead Industrial project in Carson City, Nevada. This Traffic Impact Study has been prepared to document existing traffic conditions, quantify traffic volumes generated by the proposed project, identify potential impacts, document findings, and make recommendations to mitigate impacts, if any are found. The location of the project is shown on **Figure 1** and **Figure 2** and the project site plan is shown on **Figure 3**.

Study Area and Evaluated Scenarios

The project consists of approximately 343,240 square feet of Industrial Park space located northeast of Arrowhead Drive and the Carson City Airport. The study intersections were identified based on scoping conversations with Carson City staff and are shown on **Figure 2**. The following intersections are included in this study:

1. Arrowhead Drive/Goni Road
2. Arrowhead Drive/Project Driveway 1 (plus project only)
3. Arrowhead Drive/Project Driveway 2 (plus project only)
4. Arrowhead Drive/Project Driveway 3 (plus project only)
5. Arrowhead Drive/Project Driveway 4
6. Arrowhead Drive/Bowers Lane
7. Bowers Lane/E. Nye Lane
8. E. College Parkway/Goni Road
9. Arrowhead Drive/US 50

This study includes analysis of both the weekday AM and PM peak hours as these are the periods of time in which peak traffic is anticipated to occur. The evaluated development scenarios are:

- Existing Conditions
- Opening Year Conditions
- Opening Year Plus Project Conditions
- Future Year (2050) Background Conditions
- Future Year Plus Project Conditions

HEADWAY TRANSPORTATION

NO SCALE

- Project Site

(#) - Study Intersection

Figure 1
Arrowhead Industrial
Traffic Impact Study
Project Area

HEADWAY TRANSPORTATION

NO SCALE

- Project Site

(#) - Study Intersection

Figure 2
Arrowhead Industrial
Traffic Impact Study
Study Intersections

HEADWAY TRANSPORTATION

NO SCALE

Figure 3
Arrowhead Industrial
Traffic Impact Study
Preliminary Site Plan

ANALYSIS METHODOLOGY

Level of service (LOS) is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades "A" through "F" with "A" representing optimum conditions and "F" representing breakdown or over capacity flows.

Intersections

The complete methodology for intersection level of service analysis is established in *the Highway Capacity Manual (HCM), 6th Edition* published by the Transportation Research Board (TRB). **Table 1** presents the delay thresholds for each level of service grade at signalized and unsignalized intersections.

Table 1: Level of Service Definition for Intersections

Level of Service	Brief Description	Average Delay (seconds per vehicle)	
		Signalized Intersections	Unsignalized Intersections
A	Free flow conditions.	< 10	< 10
B	Stable conditions with some affect from other vehicles.	10 to 20	10 to 15
C	Stable conditions with significant affect from other vehicles.	20 to 35	15 to 25
D	High density traffic conditions still with stable flow.	35 to 55	25 to 35
E	At or near capacity flows.	55 to 80	35 to 50
F	Over capacity conditions.	> 80	> 50

Source: *Highway Capacity Manual, 6th Edition*

Level of service calculations were performed for the study intersections using the Synchro 11 software package with analysis and results reported in accordance with *HCM* methodology.

Level of Service Policy

Carson City

The *Carson City Municipal Code* (Section 12.13.3.3 – Scope of Traffic Engineering Study) provides the following level of service policy:

> A traffic LOS D or better, in the context of providing a safe, efficient, and convenient transportation system, shall be maintained through mitigation of impacts from all conditions on all city maintained arterial and collector roads and at city road intersections, except as noted in the Carson City master plan.

Hence, LOS "D" has been used as the threshold criteria for this analysis.

Traffic engineering practitioners recognize that LOS E/F conditions for the side street approach, during the peak hour(s), does not indicate an intersection failure or the need for mitigation. This condition (LOS E/F for a minor side-street approach) commonly exists throughout urban and suburban areas and is manageable in most cases until both volumes and delay become excessive.

EXISTING CONDITIONS

Roadway Facilities

A brief description of the key roadways in the study area is provided below.

Arrowhead Drive is a two-lane roadway that connects I-580 in the west to US 50 in the east. Arrowhead Drive is classified as a Minor Arterial per NDOT's Roadway Functional Classification in the project vicinity. East of Goni Road, Arrowhead Drive primarily serves industrial and office type uses. West of Goni Road, the roadway serves primarily residential uses and heavy trucks (CDL Class A, B, and C vehicles) are prohibited. The posted speed limit in the project area is 35 mph.

Goni Road is a two-lane, north-south roadway that intersects Arrowhead Drive west of the Carson City Airport. North of Arrowhead Drive, Goni Road is classified as a Minor Collector by NDOT. South of Arrowhead Drive, Goni Road is classified as a Minor Arterial. The posted speed limit is 35 mph.

Bowers Lane is a short (approximately 1,300 feet), north-south, local roadway that connects Arrowhead Drive in the north to E. Nye Lane in the south. Bowers Lane serves residential uses and has a posted speed limit of 25 mph. A "Local Access Only" sign is also posted on the roadway, as it appears that some "cut through" traffic uses the roadway to access US 50 from Arrowhead Drive.

E. Nye Lane is generally a two-lane, east-west roadway that connects N. Lompa Lane in the west to US 50 in the east. NDOT classifies E. Nye Lane as a Minor Collector. The roadway serves primarily residential uses and the pavement near Bowers Lane is in notably poor condition. The posted speed limit is 25 mph.

E. College Parkway runs in an east-west direction from I-580 to the Carson City Airport where it turns to be a north-south roadway. E. College Parkway is a four-lane roadway (two lanes in each direction) with a two-way left-turn lane or left-turn pockets at intersections for its entire length. West of I-580, E. College Parkway becomes W. College Parkway, and south of US 50 the roadway is called Fairview Drive. The posted limit on E. College Drive near Goni Road is 40 mph.

US 50 within the study area is an east-west highway with five lanes (two lanes in each direction plus a two-way left-turn lane). US 50 is classified as a "Principal Arterial" per NDOT roadway classification. The posted speed limit is 55 mph within the study area.

Bicycle & Pedestrian Facilities

There are no bicycle or pedestrian facilities in the immediate project area on Arrowhead Drive, Bowers Lane, or E. Nye Lane. There is a short segment of sidewalk on Arrowhead Drive near Goni Road, and on the west side of Goni Road north of Arrowhead Drive. Between Arrowhead Drive and Old Hot Springs Road, sidewalks exist on the west side of Goni Road. South of Old Hot Springs Road sidewalks exist on both sides of Goni Road. Sidewalks also exist on both sides of E. College Parkway near Goni Road. There is also a marked crosswalk on the west leg of the Arrowhead Drive/Goni Road intersection and all four legs of the US 50/Arrowhead Drive and E. College Parkway/Goni Road intersections.

Transit Facilities

Jump Around Carson (JAC) provides four buses on four distinct fixed routes. While there are no transit routes in the immediate vicinity of the proposed project, stop locations for Routes 2A and 2B are located at the E. College Parkway/E. Nye Lane and E. College Parkway/Goni Road intersections. Busses operate on one hour headways from 6:30 AM to 7:30 PM on weekdays and from 8:30 AM to 4:30 PM on Saturdays.

Crash History

Vehicle crash data is available from NDOT and includes information from the 2016 to 2020 five-year period (the most current data available). **Exhibit 1** shows the crash locations. Some crashes overlap on the image. The crash data reports are provided in **Appendix A.**

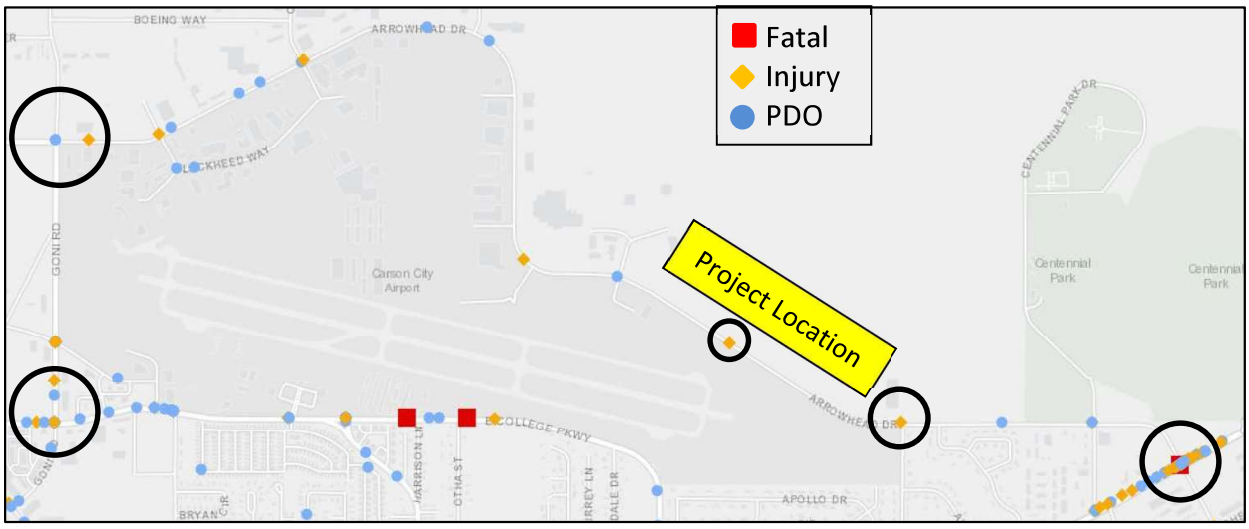


Exhibit 1: NDOT Crash Data (2016 – 2020)

During the five-year period, there were three crashes at or near (within approximately 300 feet) the Arrowhead Drive/Goni Road intersection. Two crashes were property damage only (PDO) and one was an

injury crash. One (1) injury crash occurred at the Arrowhead Drive/Bowers Lane intersection, and one (1) injury crash occurred on Arrowhead Drive along the project frontage. There were 42 crashes at or near the Arrowhead Drive/US 50 intersection (1 fatal, 24 injury, and 17 property damage only crashes; all on US 50), and 17 crashes at or near the E. College Parkway/Goni Road intersection (7 injury and 10 property damage only crashes).

Traffic Volumes

AM and PM peak hour traffic volumes were collected at the study intersections on September 6, September 7, and September 26, 2023 when Carson City School District was in regular session. NDOT's *2022 Seasonal Growth Factors* report was reviewed to determine if seasonal growth factors should be applied to the counts. The report showed that count stations in Carson City (the closest to the project) had higher volumes in September than other months of the year. Therefore, seasonal growth factors were not applied to the existing counts, as they would reduce the existing traffic volumes. The existing AM and PM peak hour intersection turning movement volumes are shown on **Figure 4**. The traffic count data sheets are provided in **Appendix B**.

Intersection Level of Service Analysis

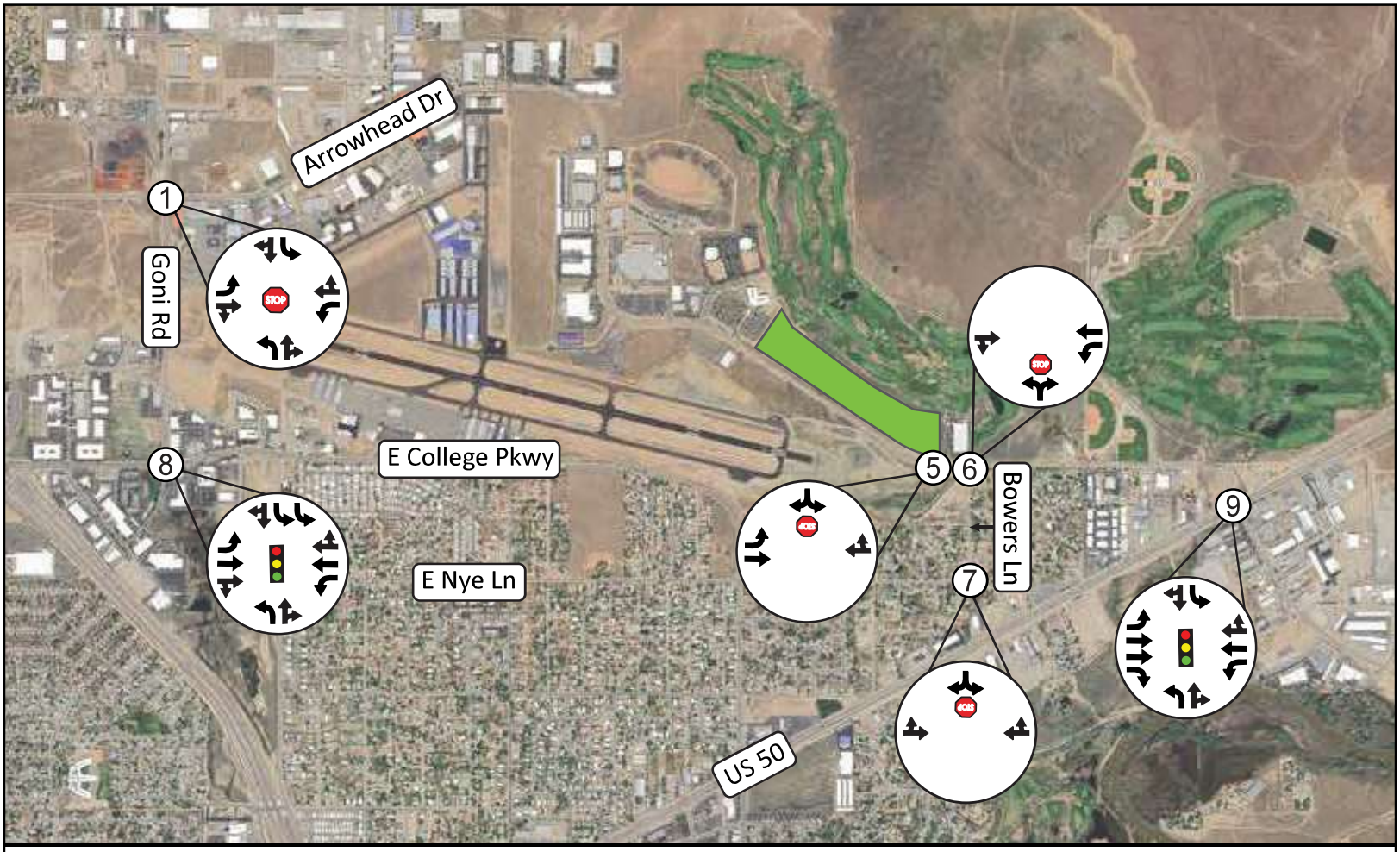
Existing AM and PM peak hour intersection level of service analysis was performed for the study intersections using Synchro 11 analysis software. The peak hour factors and heavy vehicles percentages from the counts were used in the analysis. Some intersections have peak hour factors ranging from 0.61 to 0.69 due to low traffic volumes. A minimum peak hour factor of 0.75 was used for any intersection with a peak hour factor less than that. Signal timing sheets provided by the City were used for the signalized intersections. The existing intersection lane configurations and controls are shown on **Figure 4. Table 2** shows the existing conditions level of service results and the technical calculations are provided in **Appendix C**.

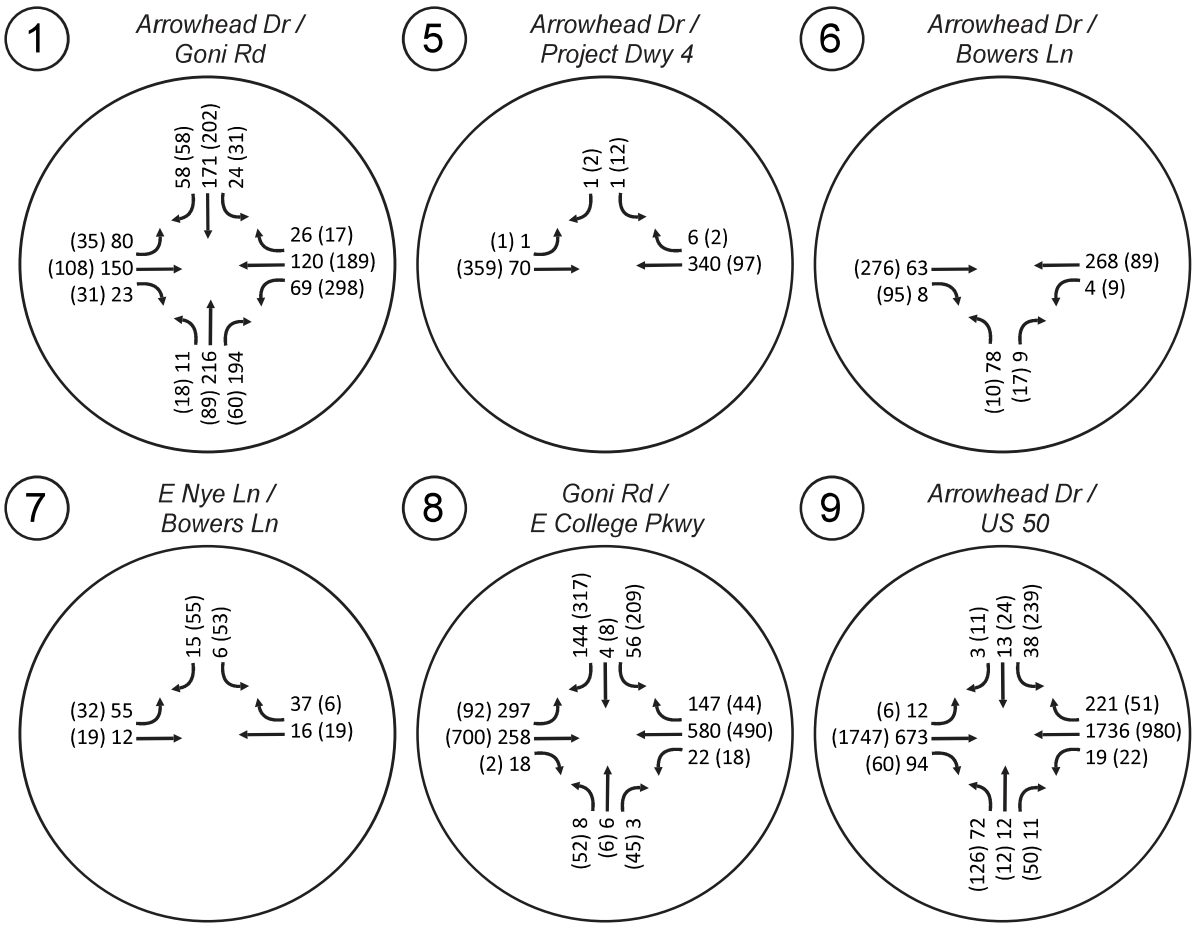
Table 2: Existing Intersection Level of Service

Int. ID	Intersection	Control	AM		PM	
			Delay[1]	LOS	Delay[1]	LOS
1	Arrowhead Dr/Goni Rd	All Way Stop				
	Overall		30	D	22	C
	Northbound Approach		51	F	15	C
	Southbound Approach		19	C	23	C
	Eastbound Approach		16	C	14	B
	Westbound Approach		15	C	26	D
5	Arrowhead Dr/Project Dwy 4	Side Street Stop				
	Southbound Approach		12	B	13	B
	Eastbound Left		8	A	8	A
6	Arrowhead Dr/Bowers Ln	Side Street Stop				
	Northbound Approach		13	B	12	B
	Westbound Left		7	A	8	A
7	E. Nye Ln/Bowers Ln	Side Street Stop				
	Southbound Approach		9	A	10	A
	Eastbound Left		8	A	7	A
8	E. College Pkwy/Goni Rd	Signal				
	Overall		25	C	21	C
	Northbound Approach		38	D	25	C
	Southbound Approach		35	D	24	C
	Eastbound Approach		21	C	20	B
	Westbound Approach		25	C	19	B
9	US 50/Arrowhead Dr	Signal				
	Overall		21	C	26	C
	Northbound Approach		40	D	35	D
	Southbound Approach		39	D	41	D
	Eastbound Approach		8	A	30	C
	Westbound Approach		24	C	15	B

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for signalized and all way stop controlled intersections, and for the worst approach/movement for side street stop controlled intersections.
Source: Headway Transportation, 2023

As shown in the table, the existing study intersections currently operate within policy level of service thresholds (LOS D or better) during the AM and PM peak hours.





HEADWAY TRANSPORTATION

NO SCALE

AM Peak Hour Volume (PM Peak Hour Volume)

(#) - Study Intersection STOP - Stop - Signal

Figure 4

Arrowhead Industrial
Traffic Impact Study

Existing Traffic Volumes, Lane Configurations, and Controls

OPENING YEAR CONDITIONS

The project is expected to be built in phases from 2024 to 2026. For analysis purposes, the Opening Year of the project is assumed to be approximately 2025.

Traffic Volume Forecasts

Opening Year (2025) background traffic volumes were developed using linear interpolation between the existing (2023) traffic volume counts and the Future Year (2050) traffic volumes. A description of the methods used to develop the Future Year traffic volumes is provided in the "Future Year Conditions – Traffic Volume Forecasts" section on pages 20 and 21. Traffic volumes from the Carson Medical Office, 1800 Boeing Way Warehouse, and R&K Ready Mix Concrete projects were also added to the Opening Year traffic volumes. **Figure 5** shows the Opening Year (no project) traffic volumes at the study intersections.

Intersection Level of Service Analysis

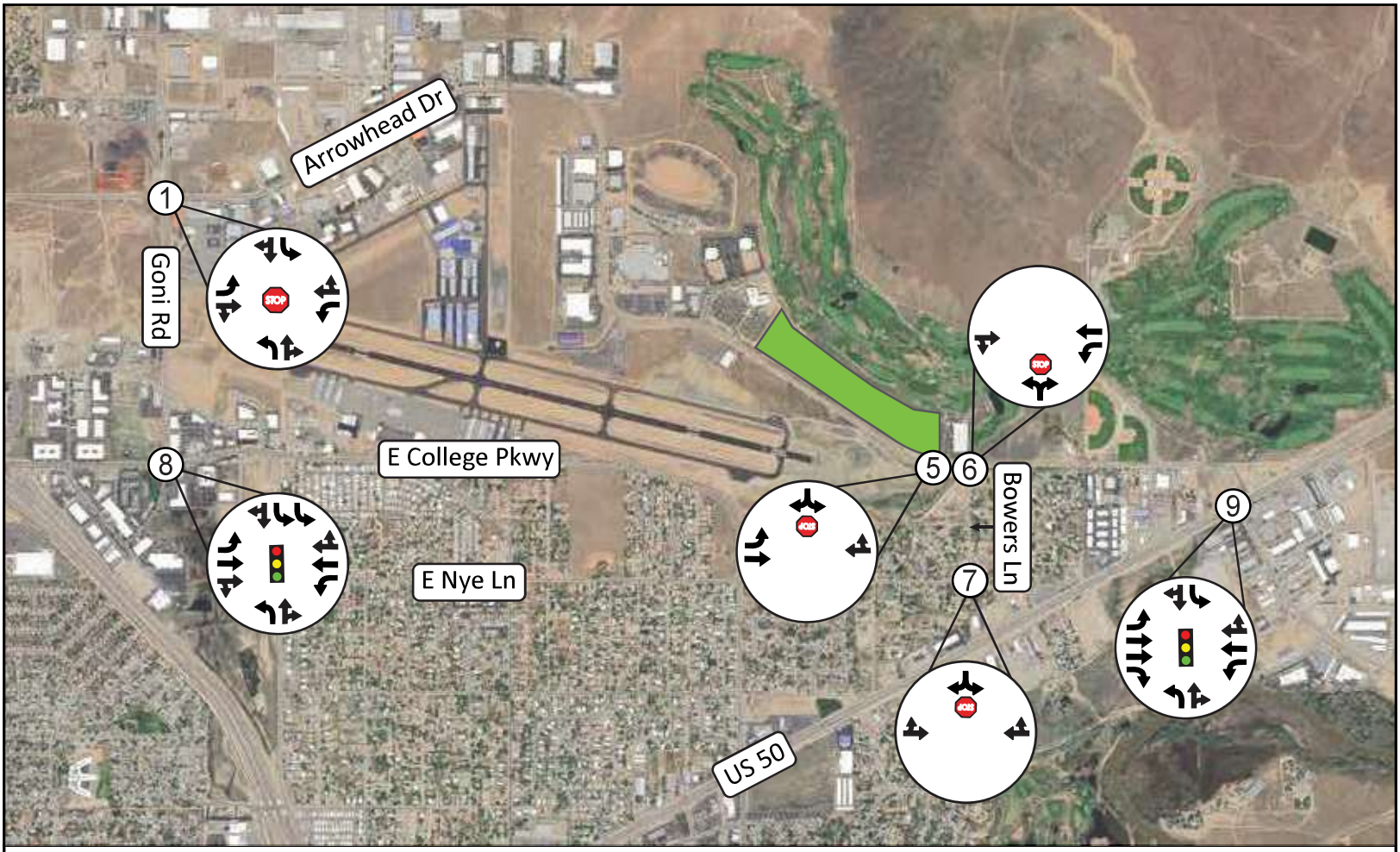
Opening Year AM and PM peak hour intersection level of service analysis was performed for the study intersections using Synchro 11 analysis software. The existing intersection lane configurations and controls were used in the analysis and are shown on **Figure 5. Table 3** shows the Opening Year conditions level of service results and the technical calculations are provided in **Appendix D**.

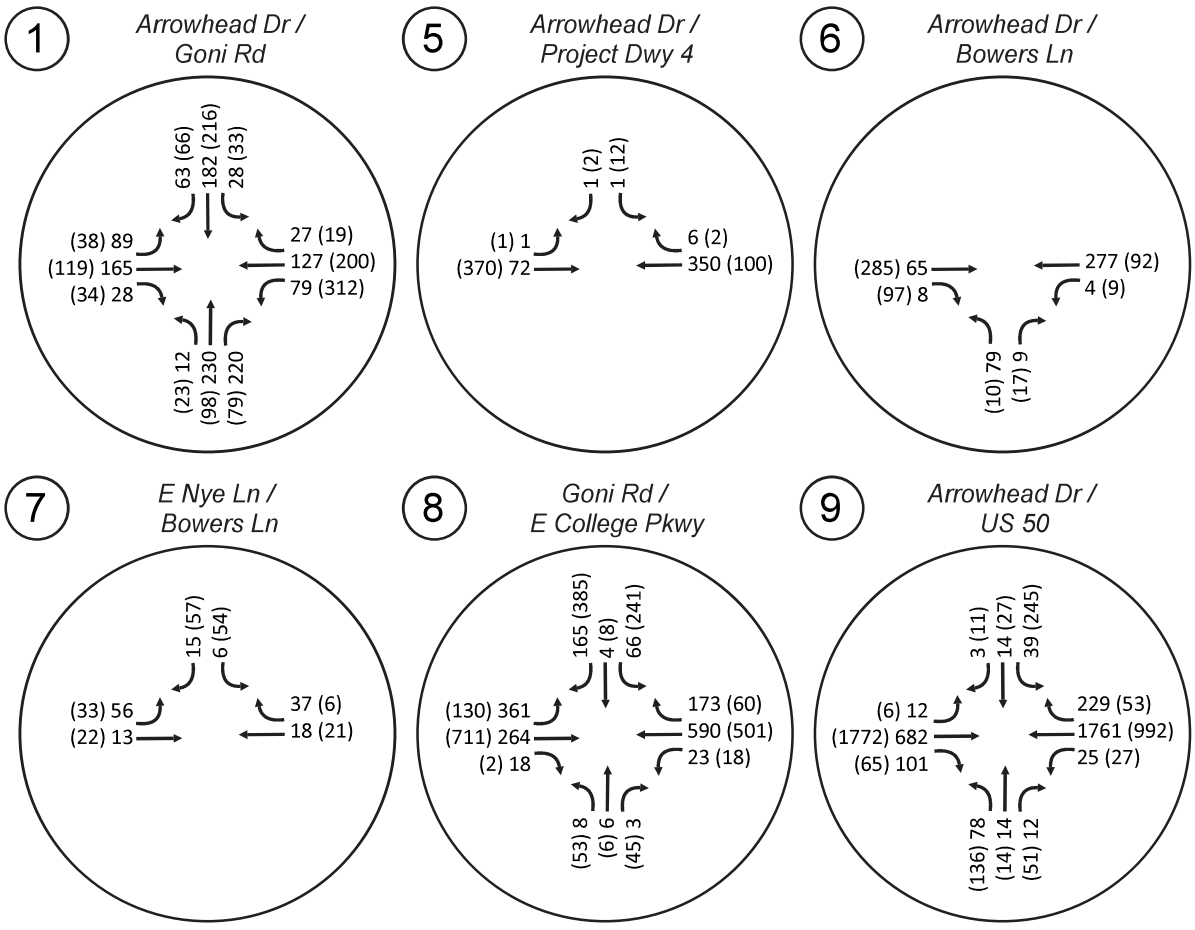
As shown in the table, the Arrowhead Drive/Goni Road intersection is expected to operate at LOS E during the AM peak hour under Opening Year conditions. The other study intersections are expected to operate at LOS C or better (within policy thresholds).

Table 3: Opening Year Intersection Level of Service

Int. ID	Intersection	Control	AM		PM	
			Delay[1]	LOS	Delay[1]	LOS
1	Arrowhead Dr/Goni Rd	All Way Stop				
	Overall		*46*	*E*	28	D
	Northbound Approach		*91*	*F*	18	C
	Southbound Approach		22	C	29	D
	Eastbound Approach		18	C	16	C
	Westbound Approach		17	C	34	D
5	Arrowhead Dr/Project Dwy 4	Side Street Stop				
	Southbound Approach		12	B	13	B
	Eastbound Left		8	A	8	A
6	Arrowhead Dr/Bowers Ln	Side Street Stop				
	Northbound Approach		13	B	12	B
	Westbound Left		7	A	8	A
7	E. Nye Ln/Bowers Ln	Side Street Stop				
	Southbound Approach		9	A	10	A
	Eastbound Left		8	A	7	A
8	E. College Pkwy/Goni Rd	Signal				
	Overall		32	C	24	C
	Northbound Approach		45	D	28	C
	Southbound Approach		43	D	26	C
	Eastbound Approach		26	C	22	C
	Westbound Approach		35	D	24	C
9	US 50/Arrowhead Dr	Signal				
	Overall		23	C	29	C
	Northbound Approach		41	D	36	D
	Southbound Approach		40	D	42	D
	Eastbound Approach		8	A	33	D
	Westbound Approach		27	C	16	B

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for signalized and all way stop controlled intersections, and for the worst approach/movement for side street stop controlled intersections.
Source: Headway Transportation, 2023





HEADWAY TRANSPORTATION

NO SCALE

AM Peak Hour Volume (PM Peak Hour Volume)

(#) - Study Intersection STOP - Stop - Signal

Figure 5

Arrowhead Industrial Traffic Impact Study

Opening Year Traffic Volumes, Lane Configurations, and Controls

PROJECT CONDITIONS

Trip Generation

Trip generation rates from *Trip Generation Manual, 11th Edition* published by the Institute of Transportation Engineers (ITE) were used to develop trip generation estimates for the proposed project based on the Industrial Park rates. **Table 4** shows the Daily, AM peak hour, and PM peak hour trip generation estimates.

Table 4: Trip Generation Estimates

Land Use (ITE Code)	Size[1]	Trips[2]				
		Daily	AM	AM In/Out	PM	PM In/Out
Industrial Park (130)	343.24 ksf	1,157	117	95 / 22	117	26 / 91

Notes: 1. ksf = 1,000 square feet
2. Trips were calculated based on the following rates per ksf: Daily – 3.37; AM – 0.34 (81% in / 19% out); PM – 0.34 (22% in / 78% out)
Source: Headway Transportation, 2023

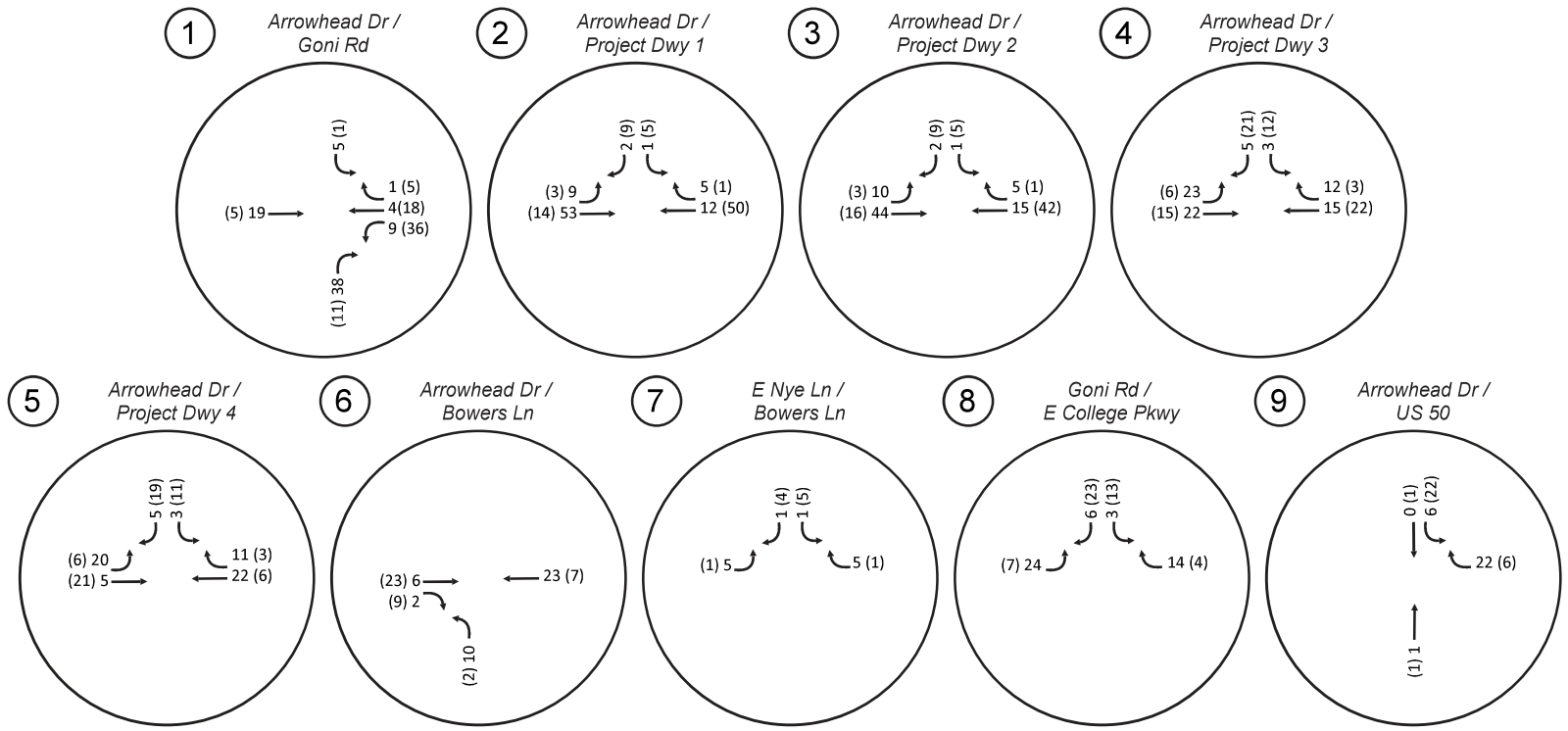
As shown in the table, the project is expected to generate 1,157 Daily, 117 AM peak hour, and 117 PM peak hour trips.

Trip Distribution

Project trips were distributed to the adjacent roadway network based on existing traffic volumes, the locations of complimentary land uses, and anticipated travel patterns. Project trips were distributed based on the following:

- 20% to/from the west via Arrowhead Drive
- 5% to/from the north via Goni Road
- 40% to/from the south via Goni Road
  - 25% to/from the west via E. College Parkway
  - 15% to/from the east via E. College Parkway
- 10% to/from the east/south via Bowers Lane
  - 5% to/from the west via E. Nye Lane
  - 5% to/from the east via E. Nye Lane
- 24% to/from the east via US 50 via Arrowhead Drive
- 1% to/from the south via Arrowhead Drive

Project trips were not assumed to travel to/from the west on US 50 via Arrowhead Drive, as there are other routes to get to/from the west. **Figure 6** shows the project trip distribution and assignment.



HEADWAY TRANSPORTATION

NO SCALE

AM Peak Hour Volume (PM Peak Hour Volume)

- Project Site
- # - Study Intersection
- XX% - Trip Distribution

Figure 6

Arrowhead Industrial
Traffic Impact Study

Project Trip Distribution and Assignment

Project Access

The proposed project includes four driveways on Arrowhead Drive between Bowers Lane and Technology Way. All driveways are spaced approximately 600 feet or more from each other and at least 275 feet from upstream and downstream driveways and roadways, which meets Carson City's spacing standards.

OPENING YEAR PLUS PROJECT CONDITIONS

Traffic Volumes

Project trips (**Figure 6**) were added to the Opening Year (2025) traffic volumes (**Figure 5**) to develop the Opening Year Plus Project conditions traffic volumes, shown on **Figure 7**.

Intersection Level of Service

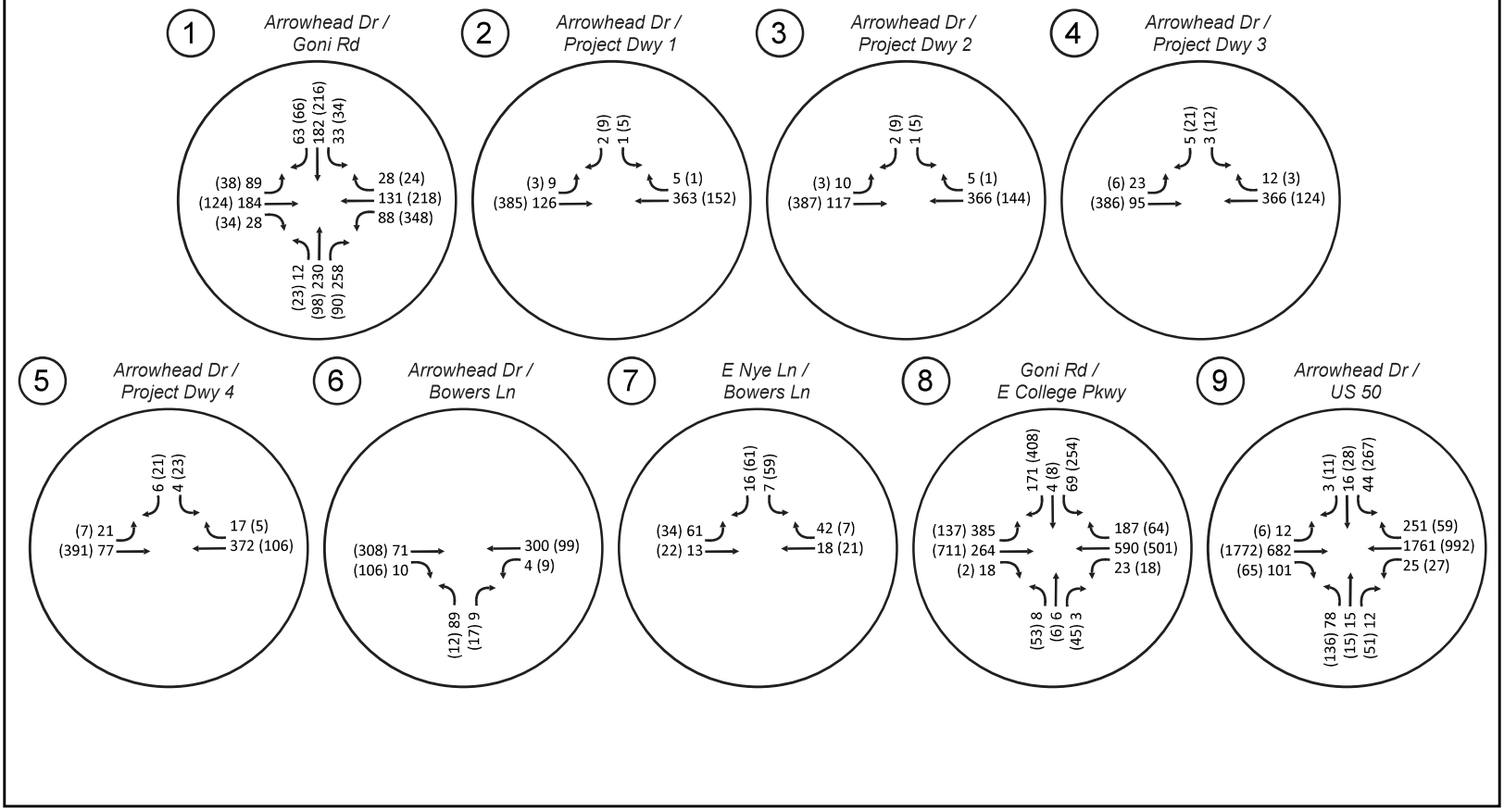
AM and PM peak hour intersection level of service analysis was performed for the study intersections based on the Opening Year Plus Project traffic volumes, the existing peak hour factors from the counts, and the lane configurations and controls shown on **Figure 8**. **Table 5** shows the level of service results and the technical calculations are provided in **Appendix E**.

As shown in the table, the Arrowhead Drive/Goni Road intersection is expected to operate at LOS F during the AM peak hour and LOS E during the PM peak hour with project traffic. The other study intersections and driveways are expected to operate at LOS D or better.

Table 5: Opening Year Plus Project Intersection Level of Service

Int. ID	Intersection	Control	Opening Year				Opening Year Plus Project			
			AM		PM		AM		PM	
			Delay[1]	LOS	Delay[1]	LOS	Delay[1]	LOS	Delay[1]	LOS
1	Arrowhead Dr/Goni Rd	All Way Stop								
	Overall		*46*	*E*	28	D	*62*	*F*	*36*	*E*
	Northbound Approach		*91*	*F*	18	C	*131*	*F*	20	C
	Southbound Approach		22	C	29	D	24	C	32	D
	Eastbound Approach		18	C	16	C	21	C	17	C
	Westbound Approach		17	C	34	D	18	C	*49*	*E*
2	Arrowhead Dr/Project Dwy 1	Side Street Stop								
	Southbound Approach		NA				11	B	11	B
	Eastbound Left						8	A	8	A
3	Arrowhead Dr/Project Dwy 2	Side Street Stop								
	Southbound Approach		NA				11	B	11	B
	Eastbound Left						8	A	8	A
4	Arrowhead Dr/Project Dwy 3	Side Street Stop								
	Southbound Approach		NA				11	B	11	B
	Eastbound Left						8	A	8	A
5	Arrowhead Dr/Project Dwy 4	Side Street Stop								
	Southbound Approach		12	B	13	B	13	B	13	B
	Eastbound Left		8	A	8	A	9	A	8	A
6	Arrowhead Dr/Bowers Ln	Side Street Stop								
	Northbound Approach		13	B	12	B	14	B	13	B
	Westbound Left		7	A	8	A	8	A	9	A
7	E. Nye Ln/Bowers Ln	Side Street Stop								
	Southbound Approach		9	A	10	A	9	A	10	A
	Eastbound Left		8	A	7	A	8	A	7	A
8	E. College Pkwy/Goni Rd	Signal								
	Overall		32	C	24	C	36	D	25	C
	Northbound Approach		45	D	28	C	47	D	29	C
	Southbound Approach		43	D	26	C	46	D	28	C
	Eastbound Approach		26	C	22	C	29	C	22	C
	Westbound Approach		35	D	24	C	40	D	25	C
9	US 50/Arrowhead Dr	Signal								
	Overall		23	C	29	C	24	C	32	C
	Northbound Approach		41	D	36	D	41	D	36	D
	Southbound Approach		40	D	42	D	40	D	42	D
	Eastbound Approach		8	A	33	D	8	A	38	D
	Westbound Approach		27	C	16	B	29	C	17	B

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for all way stop controlled intersections, and for the worst approach/movement for side street stop controlled intersections.
Source: Headway Transportation, 2023



HEADWAY TRANSPORTATION

NO SCALE

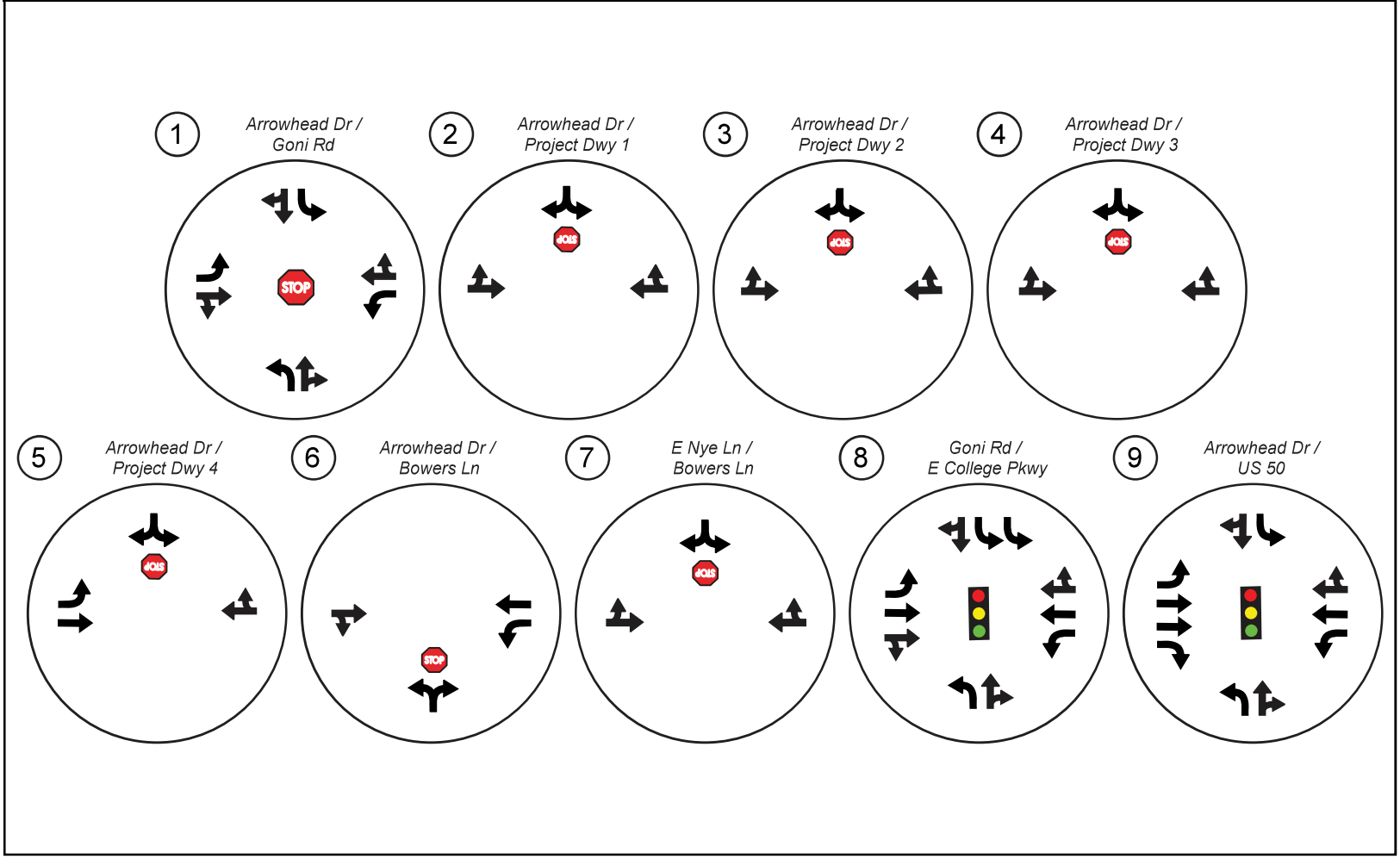
AM Peak Hour Volume (PM Peak Hour Volume)

- Project Site
(#) - Study Intersection

Figure 7

Arrowhead Industrial
Traffic Impact Study

Opening Year Plus Project Traffic Volumes



HEADWAY TRANSPORTATION

NO SCALE

AM Peak Hour Volume (PM Peak Hour Volume)

- Project Site
- # - Study Intersection
- STOP - Stop
- Signal

Figure 8

Arrowhead Industrial
Traffic Impact Study

Opening Year Plus Project Lane Configurations and Controls

FUTURE YEAR CONDITIONS

The Future Year analysis estimates operating conditions for the year 2050.

Planned Roadway Improvements

The Carson Area Metropolitan Planning Organization's (CAMPO) *2050 Regional Transportation Plan* (January 2021) includes a "Transportation Project List" that is split into two categories: Near-Term (2020 to 2030) and Long-Range (2031 to 2050). The project lists are further defined as: Fiscally Constrained (anticipated to be funded with existing revenue) and Unfunded/Unconstrained (projects that do not have an identified funding source).

The following improvement projects are programmed in the project vicinity:

Fiscally Constrained Transportation Projects 2020-2030

- College Parkway – Rehabilitate pavement and incorporate Complete Street elements between I-580 and US Highway 50 East

Unfunded/Unconstrained Transportation Projects 2020-2030

- US 50 East Highway Corridor Improvements – Congestion mitigation improvements between I-580 and the Town of Dayton

Unfunded/Unconstrained Transportation Projects 2031-2050

- College Parkway Connector – Construct new road to improve east-west circulation and access between College Parkway and Arrowhead Drive
- Traffic Control at Goni Road and Arrowhead Drive – Construct traffic control device at the intersection of Goni Road and Arrowhead Drive

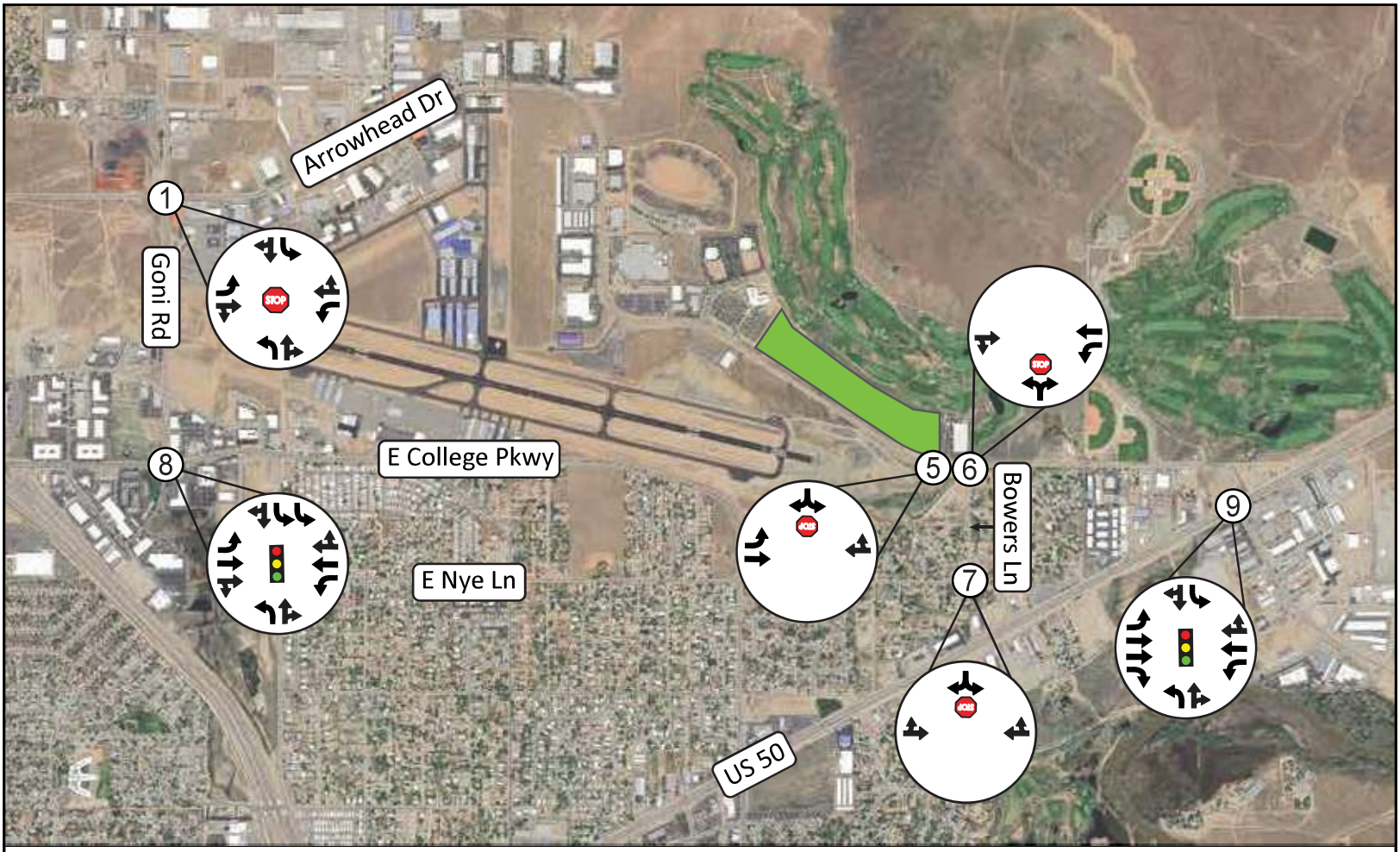
The College Parkway pavement and Complete Street project is not expected to affect level of service and the other projects are unfunded; therefore, while they are discussed in the Future conditions analysis, they are not assumed as a background condition.

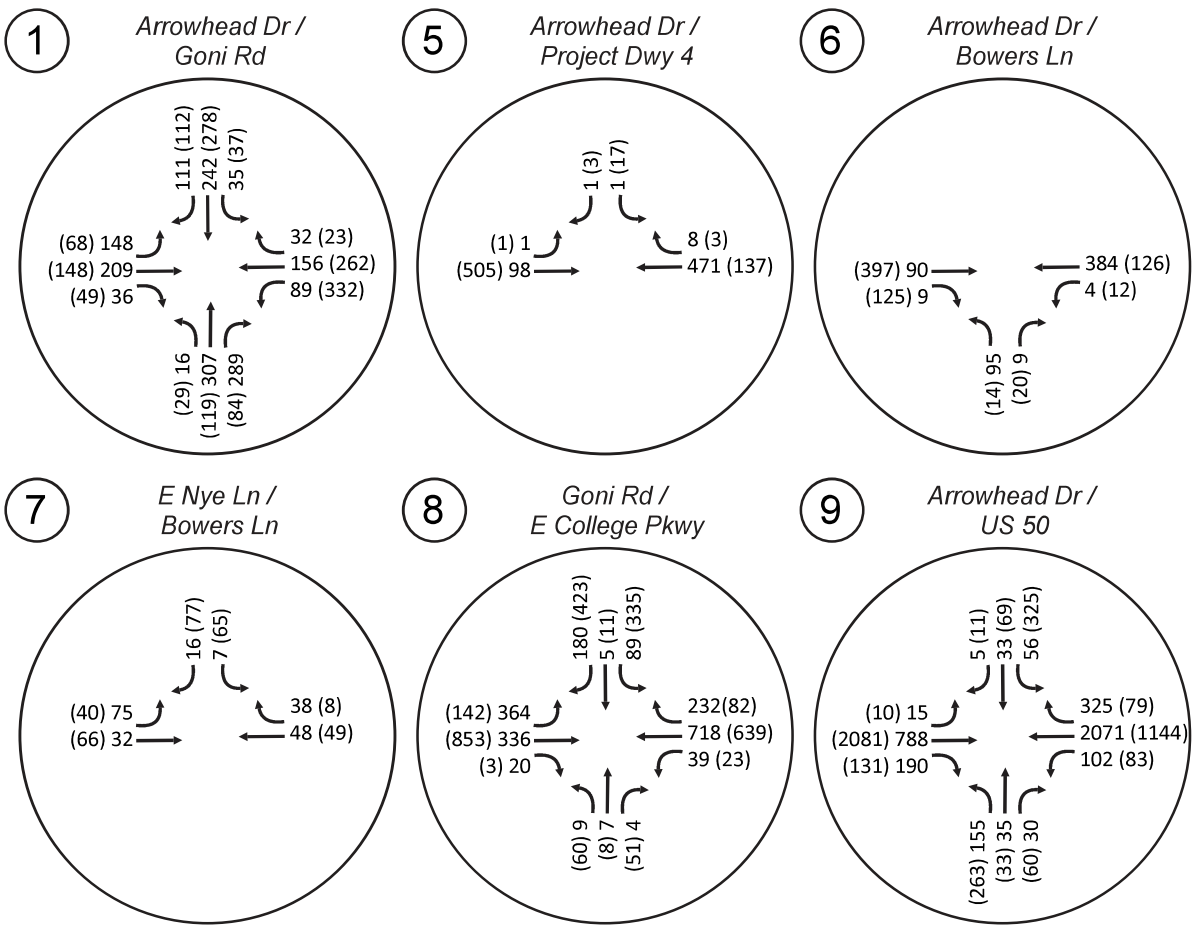
Traffic Volume Forecasts

Future Year (2050) background traffic volumes were developed using traffic volume forecasts from the CAMPO travel demand model and the "Growth Factor Technique" outlined in section 8.3.4 of NDOT's *Traffic Forecasting Guidelines* (August 2012). The following steps were taken to develop 2050 traffic volume forecasts at the study intersections:

- The existing turning movement volumes (shown on **Figure 4**) for each study intersection were used to develop approach and departure volumes for each leg of each study intersection.
- Base year (2020) and future year (2050) model volumes were used to calculate growth factors for the roadway segment legs of each study intersection.
- The growth factor for each approach/departure segment was applied to the existing approach and departure volumes to calculate future year approach and departure volumes for each leg of each study intersection (i.e. future trip "ins" and "outs"). The growth factors used for each approach/departure segment are shown in the table in **Appendix F**.
- The TurnsW32 software program, along with the existing intersection turning movement volumes and the future year approach and departure forecasts, was used to develop future year intersection turning movement counts for the study intersections. According to the NDOT *Traffic Forecasting Guidelines*, "The TurnsW32 tool is the recommended tool for estimating turning movement volumes in the State. TurnsW32 was developed by Dowling Associates to compute forecast turning volumes using the techniques described in NCHRP Report 255."
- "TurnsW32 computes forecast turning volumes from existing turning volumes and forecasted future approach and departure volumes. Based upon future trip 'ins' and 'outs' (obtained from the travel demand model) along each leg of the intersections, TurnsW32 runs several iterations to calculate future traffic volumes by turning movement. The iterative procedure alternately balances the approach flows and departure flows until the results converge (up to a user-specified maximum number of iterations)."
- Intersection turning movement volumes were balanced between intersections where needed.

Figure 9 shows the Future Year (No Project) traffic volumes at the study intersections.





HEADWAY TRANSPORTATION

NO SCALE

AM Peak Hour Volume (PM Peak Hour Volume)

(#) - Study Intersection STOP - Stop - Signal

Figure 9

Arrowhead Industrial Traffic Impact Study

Future Year Traffic Volumes, Lane Configurations, and Controls

Intersection Level of Service

AM and PM peak hour intersection level of service analysis was performed for the study intersections using Synchro analysis software. **Table 6** shows the Future Year conditions level of service results and the technical calculations are provided in **Appendix G**.

Table 6: Future Year Intersection Level of Service

Int. ID	Intersection	Control	AM		PM	
			Delay[1]	LOS	Delay[1]	LOS
1	Arrowhead Dr/Goni Rd	All Way Stop				
	Overall		*113*	*F*	*39*	*E*
	Northbound Approach		*249*	*F*	20	C
	Southbound Approach		*50*	*F*	*61*	*F*
	Eastbound Approach		26	D	19	C
	Westbound Approach		21	C	*40*	*E*
5	Arrowhead Dr/Project Dwy 4	Side Street Stop				
	Southbound Approach		12	B	14	B
	Eastbound Left		9	A	8	A
6	Arrowhead Dr/Bowers Ln	Side Street Stop				
	Northbound Approach		14	B	13	B
	Westbound Left		8	A	9	A
7	E. Nye Ln/Bowers Ln	Side Street Stop				
	Southbound Approach		9	A	10	A
	Eastbound Left		8	A	7	A
8	E. College Pkwy/Goni Rd	Signal				
	Overall		32	C	27	C
	Northbound Approach		41	D	34	C
	Southbound Approach		39	D	31	C
	Eastbound Approach		26	C	24	C
	Westbound Approach		34	C	27	C
9	US 50/Arrowhead Dr	Signal				
	Overall		*66*	*E*	*62*	*E*
	Northbound Approach		*56*	*E*	*69*	*E*
	Southbound Approach		51	D	*76*	*E*
	Eastbound Approach		15	B	*79*	*E*
	Westbound Approach		*86*	*F*	27	C

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for signalized and all way stop controlled intersections, and for the worst approach/movement for side street stop controlled intersections.
Source: Headway Transportation, 2023

As shown in the table, the Arrowhead Drive/Goni Road and US 50/Arrowhead Drive intersections are expected to operate at LOS E/F conditions under Future Year (no project) conditions. The other study intersections are expected to operate within policy level of service thresholds during the AM and PM peak hours.

FUTURE YEAR PLUS PROJECT CONDITIONS

Traffic Volumes

Project trips (**Figure 6**) were added to the Future Year traffic volumes (**Figure 9**) to develop the Future Year Plus Project conditions traffic volumes, shown on **Figure 10**.

Intersection Level of Service

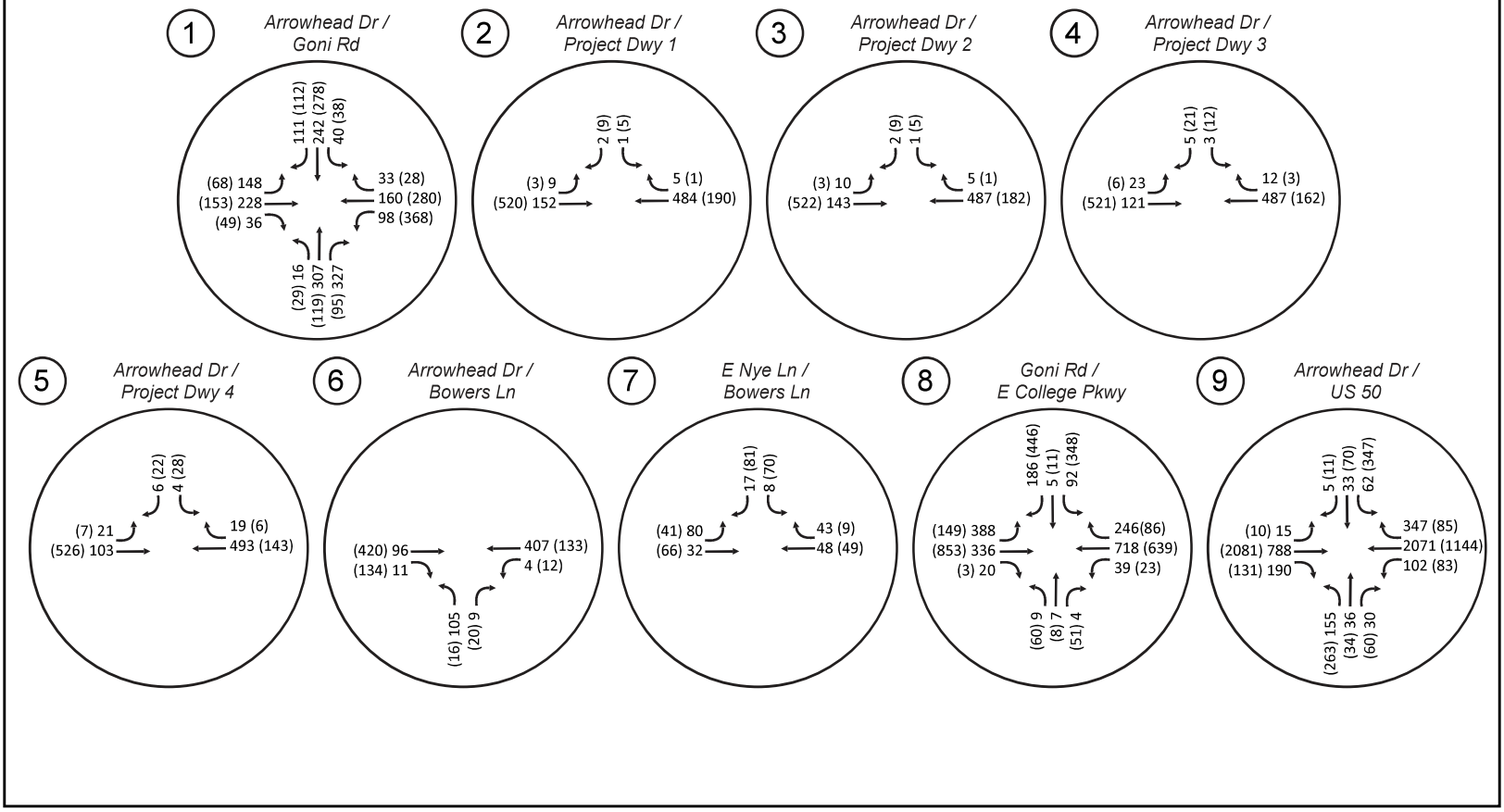
AM and PM peak hour intersection level of service analysis was performed for the study intersections based on the Future Year Plus Project traffic volumes and the lane configurations and controls on **Figure 11**. **Table 7** shows the level of service results and the technical calculations are provided in **Appendix H**.

As shown in the table, the Arrowhead Drive/Goni Road and US 50/Arrowhead Drive intersections are expected to operate at LOS E/F under Future Year (no project) and Future Year Plus Project conditions. The other study intersections are expected to operate within policy level of service thresholds during the AM and PM peak hours.

Table 7: Future Year Plus Project Intersection Level of Service

Int. ID	Intersection	Control	Future Year				Future Year Plus Project			
			AM		PM		AM		PM	
			Delay[1]	LOS	Delay[1]	LOS	Delay[1]	LOS	Delay[1]	LOS
1	Arrowhead Dr/Goni Rd	All Way Stop								
	Overall		*113*	*F*	*39*	*E*	*135*	*F*	*48*	*E*
	Northbound Approach		*249*	*F*	20	C	*301*	*F*	22	C
	Southbound Approach		*50*	*F*	*61*	*F*	*54*	*F*	*67*	*F*
	Eastbound Approach		26	D	19	C	29	D	20	C
	Westbound Approach		21	C	*40*	*E*	23	C	*57*	*F*
2	Arrowhead Dr/Project Dwy 1	Side Street Stop								
	Southbound Approach		NA				13	B	12	B
	Eastbound Left						9	A	8	A
3	Arrowhead Dr/Project Dwy 2	Side Street Stop								
	Southbound Approach		NA				13	B	11	B
	Eastbound Left						9	A	8	A
4	Arrowhead Dr/Project Dwy 3	Side Street Stop								
	Southbound Approach		NA				13	B	12	B
	Eastbound Left						9	A	8	A
5	Arrowhead Dr/Project Dwy 4	Side Street Stop								
	Southbound Approach		12	B	14	B	13	B	14	B
	Eastbound Left		9	A	8	A	9	A	8	A
6	Arrowhead Dr/Bowers Ln	Side Street Stop								
	Northbound Approach		14	B	13	B	15	B	13	B
	Westbound Left		8	A	9	A	8	A	9	A
7	E. Nye Ln/Bowers Ln	Side Street Stop								
	Southbound Approach		9	A	10	A	9	A	10	B
	Eastbound Left		8	A	7	A	8	A	7	A
8	E. College Pkwy/Goni Rd	Signal								
	Overall		32	C	27	C	36	D	29	C
	Northbound Approach		41	D	34	C	44	D	36	D
	Southbound Approach		39	D	31	C	42	D	33	C
	Eastbound Approach		26	C	24	C	30	C	25	C
	Westbound Approach		34	C	27	C	39	D	29	C
9	US 50/Arrowhead Dr	Signal								
	Overall		*66*	*E*	*62*	*E*	*69*	*E*	*63*	*E*
	Northbound Approach		*56*	*E*	*69*	*E*	*56*	*E*	*70*	*E*
	Southbound Approach		51	D	*76*	*E*	51	D	*89*	*F*
	Eastbound Approach		15	B	*79*	*E*	15	B	*79*	*E*
	Westbound Approach		*86*	*F*	27	C	*90*	*F*	27	C

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for all way stop controlled intersections, and for the worst approach/movement for side street stop controlled intersections.
Source: Headway Transportation, 2023



HEADWAY TRANSPORTATION

NO SCALE

AM Peak Hour Volume (PM Peak Hour Volume)

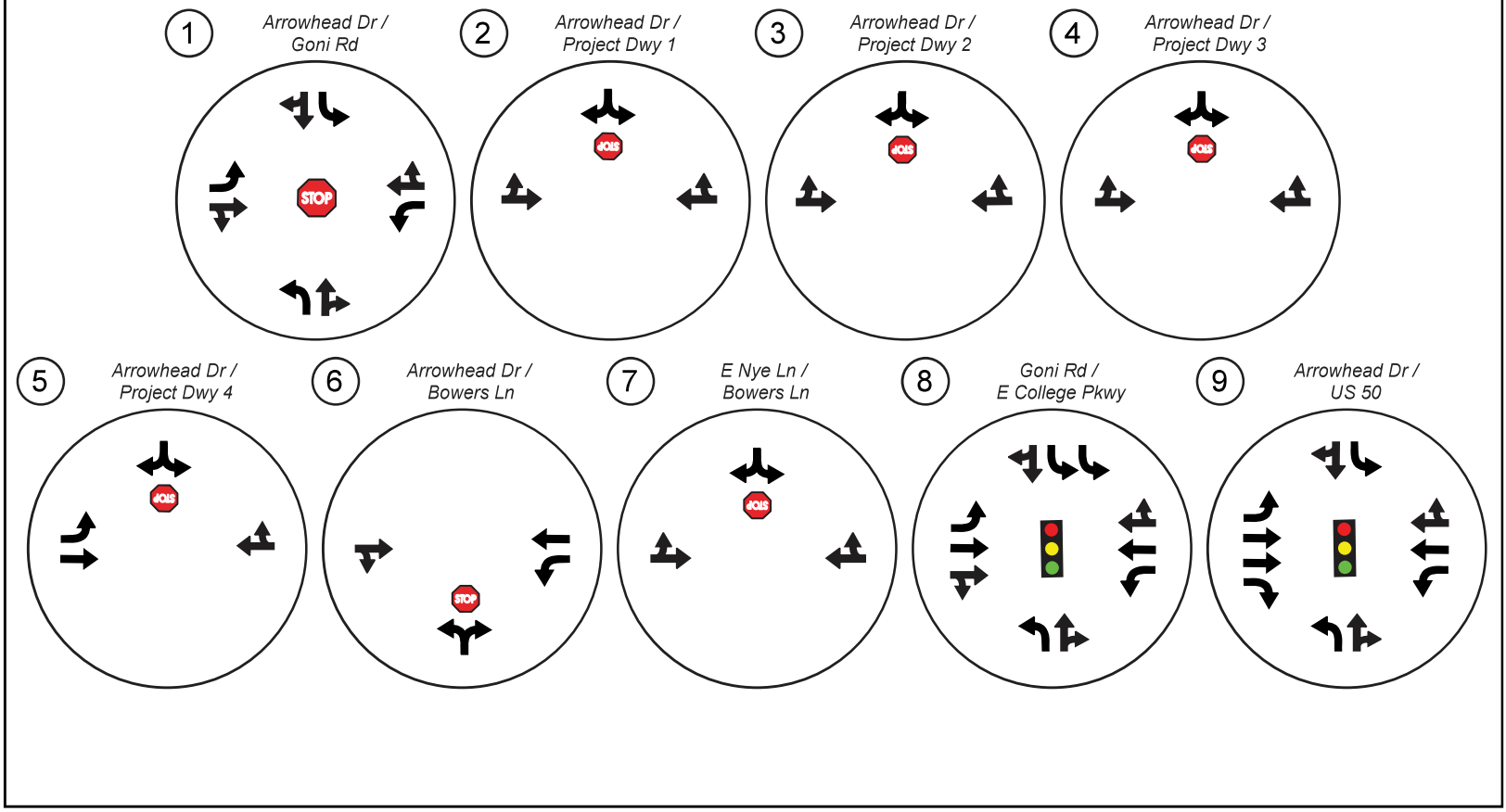
- Project Site

(#) - Study Intersection

Figure 10

Arrowhead Industrial
Traffic Impact Study

Future Year Plus Project Traffic Volumes



HEADWAY TRANSPORTATION

NO SCALE

AM Peak Hour Volume (PM Peak Hour Volume)

- Project Site
(#) - Study Intersection
STOP - Stop
- Signal

Figure 11

Arrowhead Industrial
Traffic Impact Study

Future Year Plus Project Lane Configurations and Controls

RECOMMENDED IMPROVEMENTS

Arrowhead Drive/Goni Road

The Arrowhead Drive/Goni Road intersection is expected to operate at LOS E/F conditions with Opening Year, Opening Year Plus Project, Future Year, and Future Year Plus Project volumes. A preliminary traffic signal warrant analysis was completed based on nationally accepted standards outlined in the current edition of the *Manual on Uniform Traffic Control Devices (MUTCD)*. The following warrants were evaluated using the 1 lane for the major street and 1 lane for the minor street criteria stated in the *MUTCD*:

Opening Year/Opening Year Plus Project

- Warrant 2: Four-Hour Vehicle Volume – Warrant not met
- Warrant 3: Peak-Hour – Warrant not met

Future Year/Future Year Plus Project

- Warrant 2: Four-Hour Vehicle Volume – Warrant met
- Warrant 3: Peak-Hour – Warrant met

Detailed calculations are provided in **Appendix I**.

The Arrowhead Drive/Goni Road intersection is expected to operate at LOS D or better with a traffic signal and existing lane configurations under Future Year and Future Year Plus Project conditions. The level of service results are shown in **Table 8**.

Table 8: Future Year Plus Project Intersection Level of Service (with Improvement)

Int. ID	Intersection	Control	Future Year				Future Year Plus Project			
			AM		PM		AM		PM	
			Delay[1]	LOS	Delay[1]	LOS	Delay[1]	LOS	Delay[1]	LOS
1	Arrowhead Dr/Goni Rd	Signal								
	Overall		34	C	31	C	41	D	36	D
	Northbound Approach		37	D	24	C	47	D	28	C
	Southbound Approach		18	B	34	C	19	B	37	D
	Eastbound Approach		41	D	35	D	50	D	40	D
	Westbound Approach		40	D	29	C	42	D	35	D

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for signalized intersections.
Source: Headway Transportation, 2023

Pro-Rata Calculation

As shown in **Table 5** and **Table 7**, the Arrowhead Drive/Goni Road intersection is expected to operate beyond level of service policy thresholds (LOS E/F) with and without project traffic. Since the LOS E/F condition is not triggered by the addition of project traffic, the project should pay a pro-rata share contribution toward future installation of a traffic signal. The project's fair share contribution for future signalization of the Arrowhead Drive/Goni Road intersection is calculated as follows based on peak hour volumes:

$$\$\ Contribution = \frac{Peak\ Hour\ Project\ Trips\ at\ Intersection}{Total\ Intersection\ Volume}\ x\ Estimated\ Construction\ Cost$$

Calculations were performed to determine the highest percentage of project trips at the intersection. The Opening Year Plus Project PM peak hour volumes resulted in the highest pro rata share (5.8 percent).

Calculation:

$$\frac{76\ PM\ peak\ hour\ Project\ trips}{1{,}313\ PM\ peak\ hour\ Opening\ Year\ Plus\ Project\ trips}\ x\ \$800{,}000 = \$46{,}400$$

US 50/Arrowhead Drive

The US 50/Arrowhead Drive intersection is expected to operate at LOS E conditions under Future Year (no project) and Future Year Plus Project conditions. The project traffic is expected to increase the overall delay of the intersection by less than 4 seconds and would be less than one (1) percent of the overall intersection traffic. The CAMPO *2050 Regional Transportation Plan* includes "US 50 East Highway Corridor Improvements – Congestion mitigation improvements between I-580 and the Town of Dayton" as an unconstrained, near-term project. Carson City is currently in the process of determining improvements needed on US 50 at this intersection through the US 50 Corridor Study. Improvements at this location will be addressed in future studies/projects performed by the City.

ACCESS MANAGEMENT

The proposed project includes four driveways on Arrowhead Drive between Bowers Lane and Technology Way.

Driveway Spacing

Table 12.12 of the *Carson City Municipal Code* provides standards for "Required Spacing Between Driveways." The preferred spacing on Arrowhead Drive, an arterial roadway with a 35 mph speed limit, is 245 feet. The minimum required spacing is 150 feet. All driveways are spaced approximately 600 feet or

more from each other and at least 275 feet from upstream and downstream driveways and roadways, which meets Carson City's preferred and minimum driveway spacing standards.

Deceleration Lanes

NDOT's *Access Management System and Standards* (November 2017) provides warrant criteria for left- and right-turn lanes at intersections and driveways. Carson City utilizes NDOT's standards to determine if left- and right-turn lanes should be implemented. "Table 4-12: Left-Turn Warrants at Unsignalized Intersections, Two-Lane Roadways in Urban Areas" was used to determine if left-turn lanes are needed at the four project driveway intersections based on hourly traffic volumes. "Table 4-16: Right-Turn Warrants at Unsignalized Intersections, Two-Lane Roadways in Urban Areas" was used to determine if right-turn lanes are needed at the four project driveway intersections based on hourly traffic volumes. **Table 9** shows the Opening Year Plus Project and Future Year Plus Project conditions traffic volumes for each driveway intersection. A left-turn lane currently exists on Arrowhead Drive at the Driveway 4 intersection.

Table 9: Left-Turn and Right-Turn Lane Warrant Analysis

Scenario	Intersection	AM Peak Hour			PM Peak Hour		
		Turning Volume	Volume in Adjacent Through Lane[1]	Warrant Met?	Turning Volume	Volume in Adjacent Through Lane[1]	Warrant Met?
Left-Turn Lane							
Opening Year Plus Project	Arrowhead Dr/Project Dwy 1	9	135	No	3	388	No
	Arrowhead Dr/Project Dwy 2	10	127	No	3	390	No
	Arrowhead Dr/Project Dwy 3	23	118	No	6	392	No
Future Year Plus Project	Arrowhead Dr/Project Dwy 1	9	161	No	3	523	May Be Required
	Arrowhead Dr/Project Dwy 2	10	153	No	3	525	May Be Required
	Arrowhead Dr/Project Dwy 3	23	144	No	6	527	**Yes**
Right-Turn Lane							
Opening Year Plus Project	Arrowhead Dr/Project Dwy 1	5	368	No	1	153	No
	Arrowhead Dr/Project Dwy 2	5	371	No	1	145	No
	Arrowhead Dr/Project Dwy 3	12	378	**Yes**	3	127	No
	Arrowhead Dr/Dwy 4	17	389	**Yes**	5	111	No
Future Year Plus Project	Arrowhead Dr/Project Dwy 1	5	489	No	1	191	No
	Arrowhead Dr/Project Dwy 2	5	492	No	1	183	No
	Arrowhead Dr/Project Dwy 3	12	499	**Yes**	3	165	No
	Arrowhead Dr/Dwy 4	19	512	**Yes**	6	149	No

Notes: Turn lane is warranted if the design year volumes are equal to or greater than the volumes provided in Tables 4-12 and 4-16 of NDOT's *Access Management System and Standards*.
1. The volume in the adjacent through lane includes through vehicles and turning vehicles.
Source: Headway Transportation, 2023

As shown in the table, the left-turn lane warrant is met at the Driveway 3 intersection based on Future Year Plus Project traffic volumes. Additionally, the right-turn lane warrant is met at the Driveway 3 and Driveway 4 intersections based on Opening Year Plus Project and Future Year Plus Project traffic volumes.

Acceleration Lanes

NDOT's *Access Management System and Standards* (November 2017) provides guidance for determining when acceleration lanes should be implemented. The standards state, "Acceleration lanes should be used on high speed (≥ 45 mph), high volume (≥ 10,000 vehicles per day, based on a 20-year forecast) roads, as determined by a traffic impact study, or when entering vehicles do not have a sufficient gap to enter traffic safely, or as required by the Department. Acceleration lanes should also be considered for use on roads with restricted sight distances."

Arrowhead Drive adjacent to the project site has a 35 mph speed limit and the 2050 ADT forecast in the CAMPO travel demand model is less than 7,000. All four project driveways are expected to operate at LOS B during the AM and PM peak hours under Future Year Plus Project conditions. Therefore, acceleration lanes are not recommended on Arrowhead Drive at any of the project driveway intersections.

Carson City Requirements

Carson City has stated that Arrowhead Drive will need to be widened and restriped along the project frontage to accommodate left- and right-turn lanes (if applicable) and to match the roadway width of either end of the property frontage. Arrowhead Drive should be widened to include three lanes (one lane in each direction and a two-way left-turn lane) along the project frontage, as well as right-turn lanes where warranted. A two-way left-turn lane will accommodate the warranted left-turn lane at Driveway 3 and match the roadway width at both ends of the project frontage.

The City also requires half street improvements along the frontage that include a bicycle lane.

The project is expected to be built in phases with the southern/eastern most building being constructed first. The Arrowhead Drive roadway improvements could be built in segments in coordination with construction of each adjacent building.

OTHER CONSIDERATIONS

Bowers Lane

Residents have expressed concern about traffic on Bowers Lane, a residential roadway, near the project site. Level of service analysis was conducted at the Arrowhead Drive/Bowers Lane and E. Nye Lane/Bowers Lane intersections at both ends of the roadway. Both intersections are expected to operate at LOS B or

better under all analysis scenarios. The analysis does assume that some project traffic (approximately 10 percent) would use the roadway between E. Nye Lane/US 50 and Arrowhead Drive, however the small amount of additional traffic is not expected to change the operating conditions of the roadway. The project is estimated to add a total of 12 AM peak hour trips and 11 PM peak hour trips to the roadway, which equates to approximately 1 vehicle every 5 minutes.

Bowers Lane has a 25 mph speed limit that should be enforced regularly to ensure compliance. The intersection of Bowers Lane/August Drive is located approximately halfway between Arrowhead Drive and E. Nye Lane and is all-way stop controlled and therefore limits speed and acceleration on Bowers Lane.

Bowers Lane currently has a "Local Access Only" sign on the south end of the roadway. The City should consider, and potentially have the install, the same sign to the north end of the roadway, as well as "25 MPH" pavement legends on the roadway.

CONCLUSIONS

The following is a list of our key findings and recommendations:

- The proposed project includes approximately 343,240 square feet of Industrial Park buildings and is anticipated to generate approximately 1,157 Daily, 117 AM peak hour, and 117 PM peak hour trips on the external roadway network.
- The study intersections currently operate within policy level of service thresholds during the AM and PM peak hours.
- Under Opening Year (no project) and Opening Year Plus Project conditions, the Arrowhead Drive/Goni Road intersection is expected to operate at LOS E/F conditions during the AM and PM peak hours. The other study intersections are expected to operate within policy level of service thresholds.
- Under Future Year (no project) and Future Year Plus Project conditions, the Arrowhead Drive/Goni Road and US 50/Arrowhead Drive intersections are expected to operate at LOS E/F conditions. The other study intersections are expected to operate within policy level of service thresholds.
- The Arrowhead Drive/Goni Road intersection is expected to meet Four Hour and Peak Hour signal warrant criteria based on Future Year (no project) and Future Year Plus Project traffic volumes. A traffic signal at the intersection is expected to operate at LOS D or better during the AM and PM peak hours under Future Year Plus Project conditions.
- The project should pay a pro-rata share contribution toward installation of a future traffic signal. The project's fair share contribution for future signalization of the Arrowhead

Drive/Goni Road intersection is estimated to be $46,400 (approximately 5.8 percent of $800,000).

- The US 50/Arrowhead Drive intersection is expected to operate at LOS E conditions under Future Year (no project) and Future Year Plus Project conditions. The project traffic is expected to increase the overall delay of the intersection by less than 4 seconds during peak hours and would be less than one (1) percent of the overall intersection traffic. The CAMPO *2050 Regional Transportation Plan* includes "US 50 East Highway Corridor Improvements – Congestion mitigation improvements between I-580 and the Town of Dayton" as an unconstrained, near-term project. Carson City is currently in the process of determining improvements needed on US 50 at this intersection through the US 50 Corridor Study. Improvements at this location will be addressed in future studies/projects performed by the City.
- NDOT's left-turn lane and right-turn lane warrant criteria was analyzed for the project driveway intersections. A left-turn lane on Arrowhead Drive is warranted at the Driveway 3 intersection based on Future Year Plus Project traffic volumes. Additionally, the right-turn lane warrant is met at the Driveway 3 and Driveway 4 intersections based on Opening Year Plus Project and Future Year Plus Project traffic volumes.
- Acceleration lanes are not recommended on Arrowhead Drive at any of the project driveway intersections based on NDOT guidance.
- Based on Carson City requirements, Arrowhead Drive should be widened to include three lanes (one lane in each direction and a two-way left-turn lane) along the project frontage, as well as right-turn lanes at Driveways 3 and 4. A two-way left-turn lane will accommodate the warranted left-turn lane at Driveway 3 and match the roadway width at both ends of the project frontage.
- Based on Carson City requirements, half street improvements will be constructed on Arrowhead Drive along the project frontage and include a bicycle lane.
- The project is expected to be built in phases with the southern/eastern most building being constructed first. The Arrowhead Drive roadway improvements could be built in segments in coordination with construction of each adjacent building.
- The intersection analysis assumes some project traffic (approximately 10 percent) would use Bowers Lane between E. Nye Lane/US 50 and Arrowhead Drive, however the small amount of additional traffic is not expected to change the operating conditions of the roadway. The project is estimated to add a total of 12 AM peak hour trips and 11 PM peak hour trips to the roadway, which equates to approximately 1 vehicle every 5 minutes.
- Bowers Lane has a 25 mph speed limit that should be enforced regularly to ensure compliance.

- Bowers Lane currently has a “Local Access Only” sign on the south end of the roadway. The City should consider, and potentially have the project install, the same sign to the north end of the roadway, as well as “25 MPH” pavement legends on the roadway.

Appendix A
Crash Data

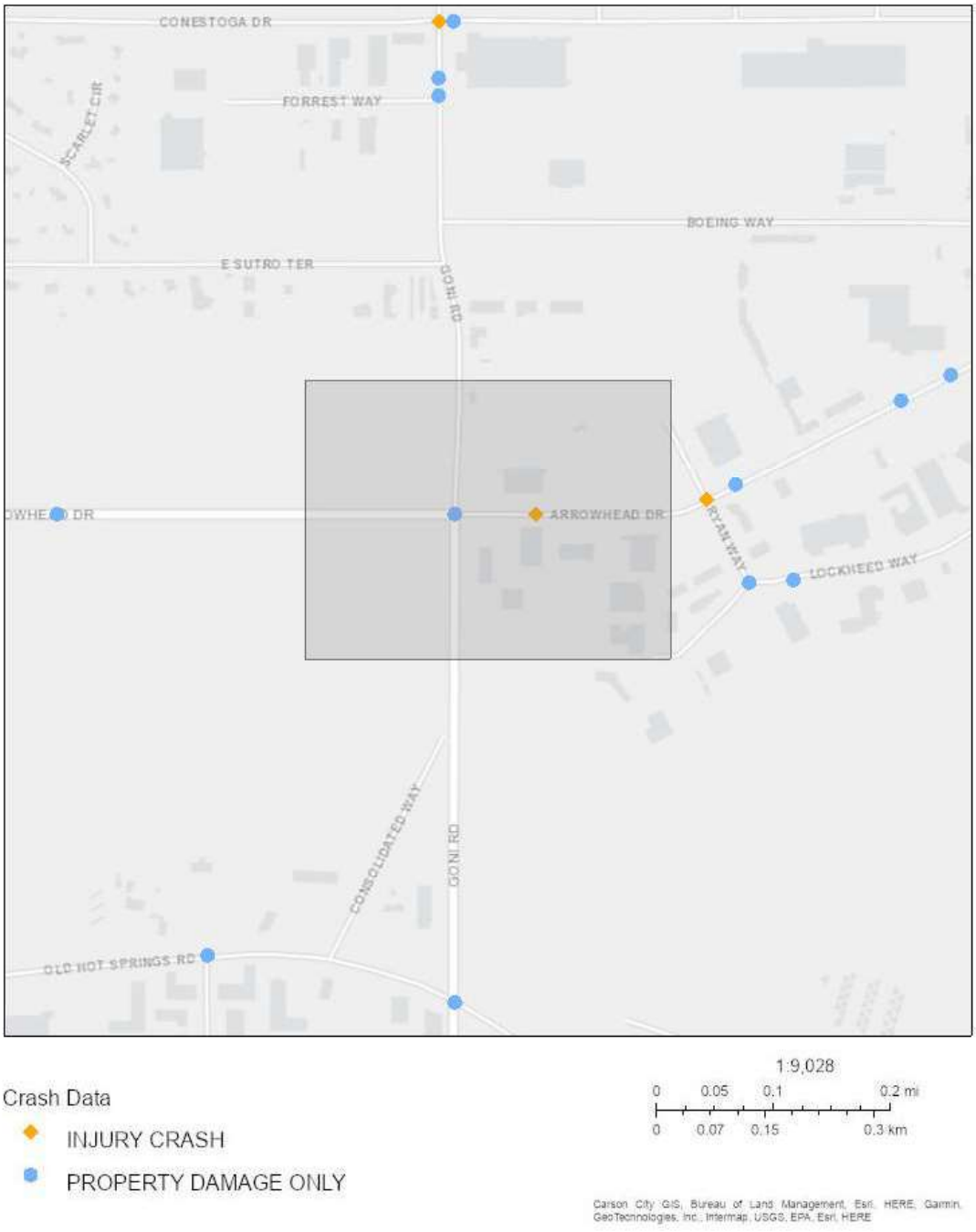
HEADWAY TRANSPORTATION

Arrowhead Drive/Goni Road

Area of Interest (AOI) Information

Area : 2,083,912.61 ft²

Oct 31 2023 12:54:24 Pacific Daylight Time



Summary

Name	Count	Area(ft²)	Length(ft)
Crash Data	3	N/A	N/A

Crash Data

#	Crash_Severity	County	Crash_Date	Crash_Year	Crash_Time
1	PROPERTY DAMAGE ONLY	CARSON CITY	5/4/2018, 8:29 AM	2,018	3:29:00 PM
2	INJURY CRASH	CARSON CITY	9/5/2019, 5:22 AM	2,019	12:22:00 PM
3	PROPERTY DAMAGE ONLY	CARSON CITY	11/25/2019, 1:46 AM	2,019	9:46:00 AM

#	Primary_Street	Distance	Dir	Secondary_Street	Weather
1	GONI RD	*No Data*	AT INT	ARROWHEAD DR	CLEAR
2	ARROWHEAD DR	366	E	GONI RD	CLOUDY
3	ARROWHEAD DR	*No Data*	AT INT	GONI RD	CLOUDY

#	Fatalities	Injured	Property_Damage_Only	Injury_Type	Crash_Type
1	*No Data*	*No Data*	PDO	*No Data*	ANGLE
2	*No Data*	1	*No Data*	B	NON-COLLISION
3	*No Data*	*No Data*	PDO	*No Data*	ANGLE

#	Total_Vehicles	V1_Type	V1_Dir	V1_Driver_Age	V1_Lane_Num
1	2	CARRY-ALL	S	*No Data*	1
2	2	MOTORCYCLE	E	23	1
3	2	SEDAN, 4 DOOR	S	68	1

#	V1_Action	V1_Driver_Factors	V1_Driver_Distracted	V1_Vehicle_Factors	V1_Most_Harmful_Event
1	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FAILED TO YIELD RIGHT OF WAY	MOTOR VEHICLE IN TRANSPORT
2	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	OVERTURN/ROLLOVER
3	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	MOTOR VEHICLE IN TRANSPORT

#	V1_All_Events	V2_Type	V2_Dir	V2_Driver_Age	V2_Lane_Num
1	SLOW/STOPPED VEHICLE	SEDAN, 4 DOOR	W	*No Data*	1
2	OVERTURN/ROLLOVER	HATCHBACK, 4 DOOR	E	*No Data*	1
3	*No Data*	VAN	E	67	1

#	V2_Action	V2_Driver_Factors	V2_Driver_Distracted	V2_Vehicle_Factors	V2_Most_Harmful_Event
1	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
2	GOING STRAIGHT	*No Data*	*No Data*	OPERATING VEHICLE IN ERRATIC, RECKLESS, CARELESS, NEGLIGENT OR AGGRESSIVE MANNER	*No Data*
3	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT

#	V2_All_Events	First_Harmful_Event	Nonmotorist_Factors	Factors_Roadway	Lighting
1	SLOW/STOPPED VEHICLE	*No Data*	*No Data*	*No Data*	*No Data*
2	*No Data*	OVERTURN/ROLLOVER	*No Data*	DRY	DAYLIGHT
3	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT

#	HWY_Factors	Agency	Accident_Rec_Num	Pedalcyclist	Pedestrian
1	*No Data*	CCSO	3,080,819	*No Data*	*No Data*
2	NONE	CCSO	3,162,285	*No Data*	*No Data*
3	NONE	CCSO	3,039,037	*No Data*	*No Data*

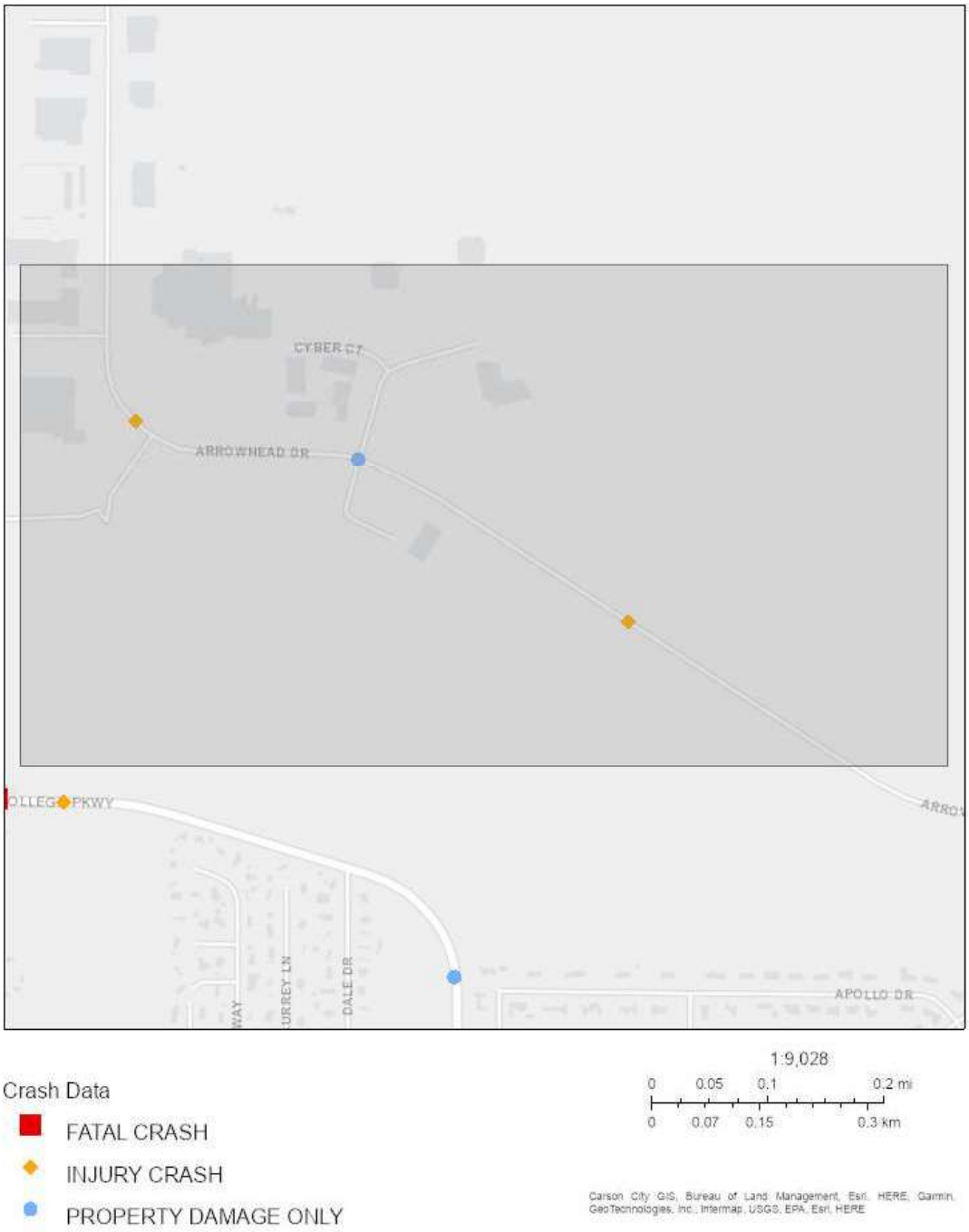
#	Motorcyclist	AnimalType	CrashDateTimeUTC	Count
1	*No Data*	*No Data*	*No Data*	1
2	YES	*No Data*	*No Data*	1
3	*No Data*	*No Data*	*No Data*	1

Arrowhead Drive on Project Frontage

Area of Interest (AOI) Information

Area : 9,640,555.59 ft²

Oct 31 2023 13:03:21 Pacific Daylight Time



Summary

Name	Count	Area(ft²)	Length(ft)
Crash Data	3	N/A	N/A

Crash Data

#	Crash_Severity	County	Crash_Date	Crash_Year	Crash_Time
1	PROPERTY DAMAGE ONLY	CARSON CITY	6/4/2018, 6:28 AM	2,018	1:28:00 PM
2	INJURY CRASH	CARSON CITY	9/28/2019, 9:30 AM	2,019	4:30:00 PM
3	INJURY CRASH	CARSON CITY	11/29/2019, 2:40 AM	2,019	10:40:00 AM

#	Primary_Street	Distance	Dir	Secondary_Street	Weather
1	ARROWHEAD DR	*No Data*	AT INT	TECHNOLOGY WAY	CLOUDY
2	ARROWHEAD DR	96.5999999999999	W	LAMOTTE RD	RAIN
3	ARROWHEAD DR	2112	N	BOWERS LN	FOG, SMOG, SMOKE

#	Fatalities	Injured	Property_Damage_Only	Injury_Type	Crash_Type
1	*No Data*	*No Data*	PDO	*No Data*	REAR-END
2	*No Data*	1	*No Data*	B	NON-COLLISION
3	*No Data*	1	*No Data*	C	NON-COLLISION

#	Total_Vehicles	V1_Type	V1_Dir	V1_Driver_Age	V1_Lane_Num
1	2	HATCHBACK, 4 DOOR	W	27	1
2	1	MOTORCYCLE	E	35	1
3	1	PICKUP	W	52	1

#	V1_Action	V1_Driver_Factors	V1_Driver_Distracted	V1_Vehicle_Factors	V1_Most_Harmful_Event
1	TURNING RIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	MOTOR VEHICLE IN TRANSPORT
2	GOING STRAIGHT	HAD BEEN DRINKING	*No Data*	EXCEEDED AUTHORIZED SPEED LIMIT	MOTOR VEHICLE IN TRANSPORT
3	GOING STRAIGHT	OTHER IMPROPER DRIVING	*No Data*	DRIVING TOO FAST FOR CONDITIONS	RAN OFF ROAD RIGHT

#	V1_All_Events	V2_Type	V2_Dir	V2_Driver_Age	V2_Lane_Num
1	SLOW/STOPPED VEHICLE	PICKUP	W	57	1
2	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
3	RAN OFF ROAD RIGHT	*No Data*	*No Data*	*No Data*	*No Data*

#	V2_Action	V2_Driver_Factors	V2_Driver_Distracted	V2_Vehicle_Factors	V2_Most_Harmful_Event
1	TURNING RIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
2	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
3	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*

#	V2_All_Events	First_Harmful_Event	Nonmotorist_Factors	Factors_Roadway	Lighting
1	SLOW/STOPPED VEHICLE	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
2	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	WET	DAYLIGHT
3	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	ICE	DAYLIGHT

#	HWY_Factors	Agency	Accident_Rec_Num	Pedalcyclist	Pedestrian
1	NONE	CCSO	3,085,217	*No Data*	*No Data*
2	WEATHER: WET, ICY, SNOW, SLUSH	CCSO	3,162,319	*No Data*	*No Data*
3	WEATHER: WET, ICY, SNOW, SLUSH	CCSO	3,039,010	*No Data*	*No Data*

#	Motorcyclist	AnimalType	CrashDateTimeUTC	Count
1	*No Data*	*No Data*	*No Data*	1
2	YES	*No Data*	*No Data*	1
3	*No Data*	*No Data*	*No Data*	1

Arrowhead Drive/Bowers Lane

Area of Interest (AOI) Information

Area : 1,430,390.36 ft²

Oct 31 2023 13:00:12 Pacific Daylight Time

Summary

Name	Count	Area(ft²)	Length(ft)
Crash Data	1	N/A	N/A

Crash Data

#	Crash_Severity	County	Crash_Date	Crash_Year	Crash_Time
1	INJURY CRASH	CARSON CITY	3/4/2020, 12:08 AM	2,020	8:08:00 AM

#	Primary_Street	Distance	Dir	Secondary_Street	Weather
1	ARROWHEAD DR	*No Data*	AT INT	BOWERS LN	CLEAR

#	Fatalities	Injured	Property_Damage_Only	Injury_Type	Crash_Type
1	*No Data*	1	*No Data*	C	ANGLE

#	Total_Vehicles	V1_Type	V1_Dir	V1_Driver_Age	V1_Lane_Num
1	2	HATCHBACK, 4 DOOR	N	46	L1

#	V1_Action	V1_Driver_Factors	V1_Driver_Distracted	V1_Vehicle_Factors	V1_Most_Harmful_Event
1	TURNING LEFT	APPARENTLY NORMAL	*No Data*	FAILED TO YIELD RIGHT OF WAY	MOTOR VEHICLE IN TRANSPORT

#	V1_All_Events	V2_Type	V2_Dir	V2_Driver_Age	V2_Lane_Num
1	*No Data*	SEDAN, 4 DOOR	E	26	1

#	V2_Action	V2_Driver_Factors	V2_Driver_Distracted	V2_Vehicle_Factors	V2_Most_Harmful_Event
1	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	SLOW/STOPPED VEHICLE

#	V2_All_Events	First_Harmful_Event	Nonmotorist_Factors	Factors_Roadway	Lighting
1	SLOW/STOPPED VEHICLE	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT

#	HWY_Factors	Agency	Accident_Rec_Num	Pedalcyclist	Pedestrian
1	NONE	CCSO	3,045,768	*No Data*	*No Data*

#	Motorcyclist	AnimalType	CrashDateTimeUTC	Count
1	*No Data*	*No Data*	*No Data*	1

College Parkway/Goni Road

Area of Interest (AOI) Information

Area : 688,459.04 ft²

Oct 31 2023 12:57:51 Pacific Daylight Time

Summary

Name	Count	Area(ft²)	Length(ft)
Crash Data	17	N/A	N/A

Crash Data

#	Crash_Severity	County	Crash_Date	Crash_Year	Crash_Time
1	PROPERTY DAMAGE ONLY	CARSON CITY	4/18/2016, 12:43 AM	2,016	7:43:00 AM
2	PROPERTY DAMAGE ONLY	CARSON CITY	5/31/2016, 6:00 AM	2,016	1:00:00 PM
3	INJURY CRASH	CARSON CITY	8/26/2016, 6:57 AM	2,016	1:57:00 PM
4	PROPERTY DAMAGE ONLY	CARSON CITY	8/30/2016, 10:11 AM	2,016	5:11:00 PM
5	PROPERTY DAMAGE ONLY	CARSON CITY	9/30/2016, 8:35 AM	2,016	3:35:00 PM
6	INJURY CRASH	CARSON CITY	2/6/2017, 12:35 AM	2,017	8:35:00 AM
7	PROPERTY DAMAGE ONLY	CARSON CITY	3/21/2017, 9:45 AM	2,017	4:45:00 PM
8	PROPERTY DAMAGE ONLY	CARSON CITY	5/30/2017, 5:09 AM	2,017	12:09:00 PM
9	PROPERTY DAMAGE ONLY	CARSON CITY	7/21/2017, 7:34 AM	2,017	2:34:00 PM
10	INJURY CRASH	CARSON CITY	11/2/2017, 12:56 AM	2,017	7:56:00 AM
11	INJURY CRASH	CARSON CITY	11/29/2017, 5:15 AM	2,017	1:15:00 PM
12	PROPERTY DAMAGE ONLY	CARSON CITY	9/12/2018, 12:55 AM	2,018	7:55:00 AM
13	INJURY CRASH	CARSON CITY	10/6/2018, 9:41 PM	2,018	4:41:00 AM
14	INJURY CRASH	CARSON CITY	6/13/2019, 9:30 AM	2,019	4:30:00 PM
15	INJURY CRASH	CARSON CITY	10/7/2019, 3:26 AM	2,019	10:26:00 AM
16	PROPERTY DAMAGE ONLY	CARSON CITY	1/3/2020, 6:25 AM	2,020	2:25:00 PM
17	PROPERTY DAMAGE ONLY	CARSON CITY	7/25/2020, 3:55 AM	2,020	10:55:00 AM

#	Primary_Street	Distance	Dir	Secondary_Street	Weather
1	GONI RD	*No Data*	AT INT	E COLLEGE PKWY	CLEAR
2	GONI RD	*No Data*	AT INT	E COLLEGE PKWY	CLEAR
3	E COLLEGE PKWY	*No Data*	AT INT	GONI RD	CLEAR
4	GONI RD	300	S	E COLLEGE PKWY	CLEAR
5	E COLLEGE PKWY	289	E	GONI RD	CLEAR
6	E COLLEGE PKWY	*No Data*	AT INT	GONI RD	RAIN
7	E COLLEGE PKWY	300	W	GONI RD	RAIN
8	E COLLEGE PKWY	*No Data*	AT INT	GONI RD	CLEAR
9	GONI RD	284	N	E COLLEGE PKWY	CLEAR
10	E COLLEGE PKWY	188	W	GONI RD	CLEAR
11	E COLLEGE PKWY	*No Data*	AT INT	GONI RD	CLEAR
12	COLLEGE PKWY	100	W	GONI RD	CLEAR
13	E COLLEGE PKWY	*No Data*	AT INT	GONI RD	CLEAR
14	GONI RD	*No Data*	AT INT	E COLLEGE PKWY	CLOUDY
15	GONI RD	*No Data*	AT INT	E COLLEGE PKWY	CLEAR
16	COLLEGE PKWY	*No Data*	AT INT	GONI RD	CLEAR
17	GONI RD	*No Data*	AT INT	COLLEGE PKWY	CLEAR

#	Fatalities	Injured	Property_Damage_Only	Injury_Type	Crash_Type
1	*No Data*	*No Data*	PDO	*No Data*	REAR-END
2	*No Data*	*No Data*	PDO	*No Data*	REAR-END
3	*No Data*	2	*No Data*	C	REAR-END
4	*No Data*	*No Data*	PDO	*No Data*	ANGLE
5	*No Data*	*No Data*	PDO	*No Data*	HEAD-ON
6	*No Data*	1	*No Data*	C	REAR-END
7	*No Data*	*No Data*	PDO	*No Data*	REAR-END
8	*No Data*	*No Data*	PDO	*No Data*	SIDESWIPE, OVERTAKING
9	*No Data*	*No Data*	PDO	*No Data*	ANGLE
10	*No Data*	1	*No Data*	B	REAR-END
11	*No Data*	1	*No Data*	C	ANGLE
12	*No Data*	*No Data*	PDO	*No Data*	NON-COLLISION
13	*No Data*	1	*No Data*	C	NON-COLLISION
14	*No Data*	1	*No Data*	C	REAR-END
15	*No Data*	4	*No Data*	B	ANGLE
16	*No Data*	*No Data*	PDO	*No Data*	REAR-END
17	*No Data*	*No Data*	PDO	*No Data*	REAR-END

#	Total_Vehicles	V1_Type	V1_Dir	V1_Driver_Age	V1_Lane_Num
1	2	HATCHBACK, 4 DOOR	S	64	*No Data*
2	2	PICKUP	E	*No Data*	*No Data*
3	2	HATCHBACK, 4 DOOR	E	28	*No Data*
4	2	SEDAN, 4 DOOR	S	*No Data*	*No Data*
5	2	HARDTOP	W	*No Data*	*No Data*
6	2	HATCHBACK, 4 DOOR	W	26	1
7	2	UTILITY	E	34	1
8	2	HARDTOP, 4 DOOR	S	27	*No Data*
9	2	SEDAN, 4 DOOR	S	16	*No Data*
10	3	SEDAN, 4 DOOR	W	25	1
11	2	SEDAN, 4 DOOR	W	62	*No Data*
12	1	SEDAN	E	*No Data*	2
13	1	SEDAN, 2 DOOR	*No Data*	20	2
14	2	VAN	S	54	R1
15	2	SEDAN, 4 DOOR	W	69	1
16	2	WAGON	E	47	2
17	2	CARRY-ALL	S	*No Data*	1

#	V1_Action	V1_Driver_Factors	V1_Driver_Distracted	V1_Vehicle_Factors	V1_Most_Harmful_Event
1	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	*No Data*
2	GOING STRAIGHT	*No Data*	*No Data*	UNKNOWN	*No Data*
3	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	*No Data*
4	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DROVE LEFT OF CENTER	*No Data*
5	TURNING LEFT	HAD BEEN DRINKING	*No Data*	FAILED TO YIELD RIGHT OF WAY	*No Data*
6	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	*No Data*
7	GOING STRAIGHT	INATTENTION/DISTRACTED	ANIMALS	FOLLOWED TOO CLOSELY	*No Data*
8	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD: HIT AND RUN: UNSAFE LANE CHANGE	*No Data*
9	TURNING LEFT	APPARENTLY NORMAL	*No Data*	FAILED TO YIELD RIGHT OF WAY	*No Data*
10	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	*No Data*
11	GOING STRAIGHT	INATTENTION/DISTRACTED	UNKNOWN	FAILED TO YIELD RIGHT OF WAY: DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	*No Data*
12	NOT REPORTED	APPARENTLY NORMAL	*No Data*	OBJECT AVOIDANCE	RAN OFF ROAD RIGHT
13	OTHER	HAD BEEN DRINKING	*No Data*	DRIVING TOO FAST FOR CONDITIONS	CURB
14	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	MOTOR VEHICLE IN TRANSPORT
15	CHANGING LANES	APPARENTLY NORMAL	*No Data*	UNSAFE LANE CHANGE	MOTOR VEHICLE IN TRANSPORT
16	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	SLOW/STOPPED VEHICLE
17	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	MOTOR VEHICLE IN TRANSPORT

#	V1_All_Events	V2_Type	V2_Dir	V2_Driver_Age	V2_Lane_Num
1	*No Data*	PICKUP	S	65	*No Data*
2	*No Data*	SEDAN, 4 DOOR	E	*No Data*	*No Data*
3	*No Data*	PICKUP	E	72	*No Data*
4	*No Data*	SEDAN, 4 DOOR	N	*No Data*	*No Data*
5	*No Data*	PICKUP	E	*No Data*	*No Data*
6	*No Data*	PICKUP	W	62	1
7	*No Data*	UTILITY	E	31	1
8	*No Data*	PICKUP	E	34	*No Data*
9	*No Data*	HATCHBACK, 4 DOOR	S	59	*No Data*
10	*No Data*	HARDTOP, 4 DOOR	*No Data*	*No Data*	1

11	*No Data*	SEMI	N	69	*No Data*
12	EQUIPMENT FAILURE (BLOWN TIRE, BRAKE FAILURE, ETC.): RAN OFF ROAD RIGHT	*No Data*	*No Data*	*No Data*	*No Data*
13	CURB: CURB	*No Data*	*No Data*	*No Data*	*No Data*
14	SLOW/STOPPED VEHICLE	STATION WAGON	S	63	R1
15	*No Data*	PICKUP	W	36	2
16	SLOW/STOPPED VEHICLE	UTILITY	E	36	2
17	*No Data*	HATCHBACK, 4 DOOR	S	*No Data*	1

#	V2_Action	V2_Driver_Factors	V2_Driver_Distracted	V2_Vehicle_Factors	V2_Most_Harmful_Event
1	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
2	STOPPED	*No Data*	*No Data*	UNKNOWN	*No Data*
3	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
4	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
5	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
6	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
7	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
8	TURNING LEFT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
9	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
10	STOPPED	*No Data*	*No Data*	*No Data*	*No Data*
11	TURNING LEFT	APPARENTLY NORMAL	*No Data*	UNKNOWN	*No Data*
12	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
13	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
14	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	SLOW/STOPPED VEHICLE
15	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
16	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
17	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	SLOW/STOPPED VEHICLE

#	V2_All_Events	First_Harmful_Event	Nonmotorist_Factors	Factors_Roadway	Lighting
1	SLOW/STOPPED VEHICLE	*No Data*	*No Data*	DRY	DAYLIGHT
2	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
3	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
4	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
5	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
6	SLOW/STOPPED VEHICLE	*No Data*	*No Data*	DRY	DAYLIGHT
7	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
8	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
9	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT

10	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
11	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
12	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
13	*No Data*	CURB	*No Data*	DRY	DARK - SPOT LIGHTING
14	SLOW/STOPPED VEHICLE	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT
15	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
16	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
17	SLOW/STOPPED VEHICLE	*No Data*	*No Data*	*No Data*	*No Data*

#	HWY_Factors	Agency	Accident_Rec_Num	Pedalcyclist	Pedestrian
1	NONE	CCSO	2,309,253	*No Data*	*No Data*
2	*No Data*	CCSO	2,316,073	*No Data*	*No Data*
3	NONE	CCSO	2,316,136	*No Data*	*No Data*
4	*No Data*	CCSO	2,316,141	*No Data*	*No Data*
5	*No Data*	CCSO	2,332,362	*No Data*	*No Data*
6	NONE	CCSO	2,361,599	*No Data*	*No Data*
7	NONE	CCSO	2,361,623	*No Data*	*No Data*
8	NONE	CCSO	2,372,745	*No Data*	*No Data*
9	NONE	CCSO	2,387,363	*No Data*	*No Data*
10	NONE	CCSO	2,404,822	*No Data*	*No Data*
11	NONE	CCSO	2,404,717	*No Data*	*No Data*
12	*No Data*	CCSO	3,099,257	*No Data*	*No Data*
13	NONE	CCSO	3,102,760	*No Data*	*No Data*
14	NONE	CCSO	3,014,794	*No Data*	*No Data*
15	NONE	CCSO	3,162,335	*No Data*	*No Data*
16	NONE	CCSO	3,030,843	*No Data*	*No Data*
17	*No Data*	CCSO	3,073,918	*No Data*	*No Data*

#	Motorcyclist	AnimalType	CrashDateTimeUTC	Count
1	*No Data*	*No Data*	*No Data*	1
2	*No Data*	*No Data*	*No Data*	1
3	*No Data*	*No Data*	*No Data*	1
4	*No Data*	*No Data*	*No Data*	1
5	*No Data*	*No Data*	*No Data*	1
6	*No Data*	*No Data*	*No Data*	1
7	*No Data*	*No Data*	*No Data*	1
8	*No Data*	*No Data*	*No Data*	1
9	*No Data*	*No Data*	*No Data*	1
10	*No Data*	*No Data*	*No Data*	1
11	*No Data*	*No Data*	*No Data*	1
12	*No Data*	*No Data*	*No Data*	1

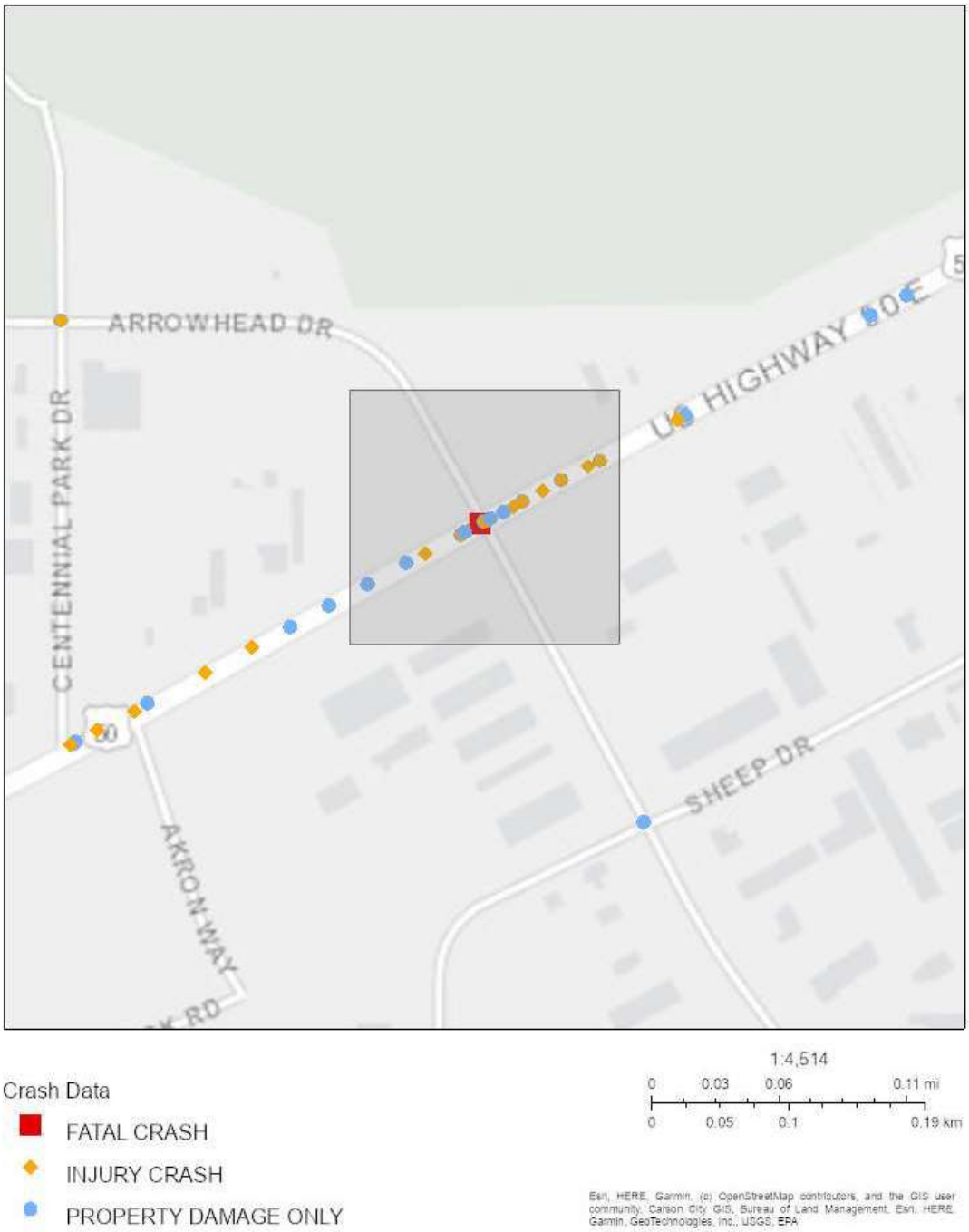
13	*No Data*	*No Data*	*No Data*	1
14	*No Data*	*No Data*	*No Data*	1
15	*No Data*	*No Data*	*No Data*	1
16	*No Data*	*No Data*	*No Data*	1
17	*No Data*	*No Data*	*No Data*	1

US 50/Arrowhead Drive

Area of Interest (AOI) Information

Area : 355,377.44 ft²

Oct 31 2023 13:06:08 Pacific Daylight Time



Summary

Name	Count	Area(ft²)	Length(ft)
Crash Data	42	N/A	N/A

Crash Data

#	Crash_Severity	County	Crash_Date	Crash_Year	Crash_Time
1	PROPERTY DAMAGE ONLY	CARSON CITY	9/26/2016, 11:49 PM	2,016	6:49:00 AM
2	INJURY CRASH	CARSON CITY	10/27/2016, 10:19 AM	2,016	5:19:00 PM
3	PROPERTY DAMAGE ONLY	CARSON CITY	11/15/2016, 9:24 AM	2,016	5:24:00 PM
4	INJURY CRASH	CARSON CITY	12/7/2016, 7:45 AM	2,016	3:45:00 PM
5	PROPERTY DAMAGE ONLY	CARSON CITY	1/17/2017, 8:25 AM	2,017	4:25:00 PM
6	INJURY CRASH	CARSON CITY	5/8/2017, 8:02 AM	2,017	3:02:00 PM
7	INJURY CRASH	CARSON CITY	5/27/2017, 4:00 AM	2,017	11:00:00 AM
8	INJURY CRASH	CARSON CITY	6/20/2017, 2:23 AM	2,017	9:23:00 AM
9	INJURY CRASH	CARSON CITY	7/6/2017, 9:00 AM	2,017	4:00:00 PM
10	INJURY CRASH	CARSON CITY	7/22/2017, 3:40 PM	2,017	10:40:00 PM
11	INJURY CRASH	CARSON CITY	9/27/2017, 10:03 AM	2,017	5:03:00 PM
12	PROPERTY DAMAGE ONLY	CARSON CITY	10/7/2017, 9:09 AM	2,017	4:09:00 PM
13	INJURY CRASH	CARSON CITY	12/7/2017, 8:08 AM	2,017	4:08:00 PM
14	INJURY CRASH	CARSON CITY	1/23/2018, 6:00 AM	2,018	2:00:00 PM
15	INJURY CRASH	CARSON CITY	3/10/2018, 7:05 AM	2,018	3:05:00 PM
16	INJURY CRASH	CARSON CITY	3/29/2018, 8:27 AM	2,018	3:27:00 PM
17	INJURY CRASH	CARSON CITY	7/6/2018, 5:31 AM	2,018	12:31:00 PM
18	PROPERTY DAMAGE ONLY	CARSON CITY	7/9/2018, 6:20 AM	2,018	1:20:00 PM
19	INJURY CRASH	CARSON CITY	11/19/2018, 10:41 PM	2,018	6:41:00 AM
20	PROPERTY DAMAGE ONLY	CARSON CITY	2/5/2019, 3:06 AM	2,019	11:06:00 AM
21	INJURY CRASH	CARSON CITY	3/21/2019, 11:31 AM	2,019	6:31:00 PM
22	INJURY CRASH	CARSON CITY	4/24/2019, 4:30 AM	2,019	11:30:00 AM
23	PROPERTY DAMAGE ONLY	CARSON CITY	9/20/2019, 4:26 AM	2,019	11:26:00 AM
24	PROPERTY DAMAGE ONLY	CARSON CITY	9/29/2019, 10:27 PM	2,019	5:27:00 AM
25	PROPERTY DAMAGE ONLY	CARSON CITY	9/27/2019, 7:19 AM	2,019	2:19:00 PM
26	PROPERTY DAMAGE ONLY	CARSON CITY	10/29/2019, 7:32 PM	2,019	2:32:00 AM
27	INJURY CRASH	CARSON CITY	11/5/2019, 9:57 AM	2,019	5:57:00 PM
28	FATAL CRASH	CARSON CITY	11/1/2019, 5:00 PM	2,019	3:42:00 PM
29	PROPERTY DAMAGE ONLY	CARSON CITY	11/22/2019, 12:50 AM	2,019	8:50:00 AM
30	PROPERTY DAMAGE ONLY	CARSON CITY	11/28/2019, 12:05 PM	2,019	8:05:00 PM
31	PROPERTY DAMAGE ONLY	CARSON CITY	12/10/2019, 9:05 AM	2,019	5:05:00 PM
32	INJURY CRASH	CARSON CITY	1/17/2020, 7:25 AM	2,020	3:25:00 PM
33	INJURY CRASH	CARSON CITY	1/25/2020, 4:20 AM	2,020	12:20:00 PM
34	INJURY CRASH	CARSON CITY	3/2/2020, 4:42 AM	2,020	12:42:00 PM
35	INJURY CRASH	CARSON CITY	3/10/2020, 11:09 AM	2,020	6:09:00 PM

36	INJURY CRASH	CARSON CITY	5/5/2020, 12:20 AM	2,020	7:20:00 AM
37	PROPERTY DAMAGE ONLY	CARSON CITY	6/16/2020, 10:23 AM	2,020	5:23:00 PM
38	INJURY CRASH	CARSON CITY	6/22/2020, 8:48 AM	2,020	3:48:00 PM
39	INJURY CRASH	CARSON CITY	7/4/2020, 11:20 PM	2,020	6:20:00 AM
40	PROPERTY DAMAGE ONLY	CARSON CITY	7/11/2020, 12:36 AM	2,020	7:36:00 AM
41	PROPERTY DAMAGE ONLY	CARSON CITY	11/20/2020, 11:54 AM	2,020	7:54:00 PM
42	PROPERTY DAMAGE ONLY	CARSON CITY	12/17/2020, 5:53 AM	2,020	1:53:00 PM

#	Primary_Street	Distance	Dir	Secondary_Street	Weather
1	US50	15	W	S DEER RUN RD	CLEAR
2	US50	300	W	S DEER RUN RD	CLEAR
3	US50	300	W	S DEER RUN RD	CLEAR
4	US50	200	W	S DEER RUN RD	CLEAR
5	US50	60	W	S DEER RUN RD	CLEAR
6	US50	17	N	S DEER RUN RD	CLOUDY
7	US50	270	E	ARROWHEAD DR	CLEAR
8	US50	*No Data*	AT INT	ARROWHEAD DR	CLEAR
9	US50	*No Data*	AT INT	S DEER RUN RD	CLEAR
10	US50	100	E	ARROWHEAD DR	CLEAR
11	US50	150	E	S DEER RUN RD	CLEAR
12	US50	200	E	ARROWHEAD DR	CLEAR
13	US50E	*No Data*	AT INT	ARROWHEAD DR	CLEAR
14	US50E	*No Data*	AT INT	N DEER RUN RD	CLEAR
15	US50E	200	E	N DEER RUN RD	CLOUDY
16	US50E	60	W	N DEER RUN RD	CLOUDY
17	US50E	*No Data*	AT INT	ARROWHEAD DR	CLOUDY
18	US50E	100	E	ARROWHEAD DR	CLEAR
19	US50E	20	W	ARROWHEAD DR	CLEAR
20	US50E	*No Data*	AT INT	ARROWHEAD DR	FOG, SMOG, SMOKE
21	US50E	150	W	N DEER RUN RD	CLOUDY
22	ARROWHEAD DR	*No Data*	AT INT	US50E	CLEAR
23	US50E	*No Data*	AT INT	N DEER RUN RD	CLEAR
24	US50E	*No Data*	AT INT	ARROWHEAD DR	CLEAR
25	US50E	20	W	N DEER RUN RD	CLOUDY
26	US50E	*No Data*	AT INT	N DEER RUN RD	CLEAR
27	US50E	40	W	N DEER RUN RD	CLEAR
28	US50E	10	W	N DEER RUN RD	CLEAR
29	US50E	*No Data*	AT INT	N DEER RUN RD	CLEAR
30	US50E	300	E	N DEER RUN RD	FOG, SMOG, SMOKE
31	US50E	*No Data*	AT INT	ARROWHEAD DR	CLOUDY
32	US50E	300	E	ARROWHEAD DR	CLOUDY

33	US50E	50	E	ARROWHEAD DR	CLEAR
34	US50E	10	E	ARROWHEAD DR	CLEAR
35	US50E	100	E	DEER RUN RD	CLOUDY
36	US50E	75	E	DEER RUN RD	CLEAR
37	US50E	50	W	DEER RUN RD	CLEAR
38	US50E	100	E	DEER RUN RD	CLEAR
39	US50E	*No Data*	AT INT	ARROWHEAD DR	CLEAR
40	US50E	18	E	ARROWHEAD DR	CLEAR
41	US50E	50	E	N DEER RUN RD	CLEAR
42	US50E	200	W	N DEER RUN RD	CLEAR

#	Fatalities	Injured	Property_Damage_Only	Injury_Type	Crash_Type
1	*No Data*	*No Data*	PDO	*No Data*	REAR-END
2	*No Data*	1	*No Data*	C	REAR-END
3	*No Data*	*No Data*	PDO	*No Data*	REAR-END
4	*No Data*	1	*No Data*	B	REAR-END
5	*No Data*	*No Data*	PDO	*No Data*	REAR-END
6	*No Data*	2	*No Data*	C	REAR-END
7	*No Data*	1	*No Data*	C	REAR-END
8	*No Data*	1	*No Data*	B	ANGLE
9	*No Data*	1	*No Data*	B	ANGLE
10	*No Data*	2	*No Data*	B	NON-COLLISION
11	*No Data*	1	*No Data*	C	REAR-END
12	*No Data*	*No Data*	PDO	*No Data*	REAR-END
13	*No Data*	1	*No Data*	C	ANGLE
14	*No Data*	1	*No Data*	C	REAR-END
15	*No Data*	1	*No Data*	C	REAR-END
16	*No Data*	1	*No Data*	C	REAR-END
17	*No Data*	2	*No Data*	A	ANGLE
18	*No Data*	*No Data*	PDO	*No Data*	REAR-END
19	*No Data*	1	*No Data*	C	REAR-END
20	*No Data*	*No Data*	PDO	*No Data*	ANGLE
21	*No Data*	2	*No Data*	C	REAR-END
22	*No Data*	1	*No Data*	C	REAR-END
23	*No Data*	*No Data*	PDO	*No Data*	REAR-END
24	*No Data*	*No Data*	PDO	*No Data*	NON-COLLISION
25	*No Data*	*No Data*	PDO	*No Data*	REAR-END
26	*No Data*	*No Data*	PDO	*No Data*	NON-COLLISION
27	*No Data*	2	*No Data*	B	REAR-END
28	1	3	*No Data*	K	HEAD-ON
29	*No Data*	*No Data*	PDO	*No Data*	ANGLE
30	*No Data*	*No Data*	PDO	*No Data*	REAR-END
31	*No Data*	*No Data*	PDO	*No Data*	REAR-END
32	*No Data*	3	*No Data*	C	REAR-END
33	*No Data*	1	*No Data*	C	REAR-END
34	*No Data*	1	*No Data*	B	HEAD-ON
35	*No Data*	4	*No Data*	B	REAR-END
36	*No Data*	1	*No Data*	C	REAR-END
37	*No Data*	*No Data*	PDO	*No Data*	REAR-END
38	*No Data*	1	*No Data*	C	REAR-END
39	*No Data*	2	*No Data*	B	ANGLE
40	*No Data*	*No Data*	PDO	*No Data*	REAR-END
41	*No Data*	*No Data*	PDO	*No Data*	NON-COLLISION
42	*No Data*	*No Data*	PDO	*No Data*	REAR-END

#	Total_Vehicles	V1_Type	V1_Dir	V1_Driver_Age	V1_Lane_Num
1	2	HARDTOP, 4 DOOR	E	28	2
2	2	SEDAN, 4 DOOR	E	19	1
3	2	SEDAN, 4 DOOR	E	53	2
4	2	SEDAN, 4 DOOR	E	20	1
5	2	PICKUP	S	21	*No Data*
6	2	UTILITY	E	29	1
7	2	SEDAN, 4 DOOR	W	39	1
8	2	SEDAN, 4 DOOR	E	84	*No Data*
9	2	DUMP	E	35	*No Data*
10	1	SEDAN, 2 DOOR	E	28	*No Data*
11	2	SEDAN, 4 DOOR	E	55	1
12	2	UTILITY	W	20	1
13	2	PICKUP	W	24	*No Data*
14	2	SEDAN, 4 DOOR	W	37	1
15	2	SEDAN, 4 DOOR	E	36	2
16	2	PICKUP	E	37	1
17	3	PICKUP	W	55	1
18	2	SEDAN	W	27	1
19	2	SEDAN, 2 DOOR	*No Data*	24	1
20	2	HATCHBACK, 4 DOOR	*No Data*	30	R1
21	2	SEDAN	*No Data*	23	1
22	2	PICKUP	S	26	L1
23	2	CARRY-ALL	E	48	1
24	1	SEDAN, 4 DOOR	W	*No Data*	1
25	2	PICKUP	E	72	2
26	1	CARRY-ALL	E	*No Data*	2
27	2	CARRY-ALL	E	54	1
28	3	SEDAN	W	61	1
29	2	*No Data*	W	*No Data*	1
30	2	VAN CAMPER	W	48	2
31	2	PICKUP	W	39	1
32	2	SEDAN, 4 DOOR	W	19	1
33	2	PICKUP	W	48	2
34	4	PICKUP	E	20	1
35	2	CARRY-ALL	E	29	1
36	2	PICKUP	W	19	1
37	3	PICKUP	E	45	2
38	2	PICKUP	E	37	1
39	2	PICKUP	W	40	1
40	2	SEDAN, 4 DOOR	W	42	2
41	1	SEDAN	E	34	1
42	2	PICKUP	E	22	1

#	V1_Action	V1_Driver_Factors	V1_Driver_Distracted	V1_Vehicle_Factors	V1_Most_Harmful_Event
1	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DRIVING TOO FAST FOR CONDITIONS	*No Data*
2	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
3	GOING STRAIGHT	INATTENTION/DISTRACTED	RADIO/CD PLAYER	*No Data*	*No Data*
4	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	OTHER IMPROPER DRIVING	*No Data*
5	GOING STRAIGHT	*No Data*	*No Data*	*No Data*	*No Data*
6	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	*No Data*
7	GOING STRAIGHT	DRUG INVOLVEMENT	*No Data*	DRIVING TOO FAST FOR CONDITIONS: FOLLOWED TOO CLOSELY	*No Data*
8	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	*No Data*
9	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	*No Data*
10	GOING STRAIGHT	HAD BEEN DRINKING	*No Data*	FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD: OVER-CORRECTING/OVER-STEERING: DROVE LEFT OF CENTER: RAN OFF ROAD: UNSAFE LANE CHANGE	*No Data*
11	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	*No Data*
12	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	*No Data*
13	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	*No Data*
14	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	UNKNOWN	*No Data*
15	GOING STRAIGHT	FELL ASLEEP, FAINTED, FATIGUED, ETC.	*No Data*	*No Data*	*No Data*
16	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
17	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	MOTOR VEHICLE IN TRANSPORT
18	GOING STRAIGHT	INATTENTION/DISTRACTED	CHILDREN	OTHER	SLOW/STOPPED VEHICLE
19	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	OTHER	SLOW/STOPPED VEHICLE
20	TURNING RIGHT	APPARENTLY NORMAL	*No Data*	DRIVING TOO FAST FOR CONDITIONS	CROSS CENTERLINE
21	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DRIVING TOO FAST FOR CONDITIONS	MOTOR VEHICLE IN TRANSPORT

22	GOING STRAIGHT	INATTENTION/DISTRACTED	OTHER	FOLLOWED TOO CLOSELY	MOTOR VEHICLE IN TRANSPORT
23	GOING STRAIGHT	HAD BEEN DRINKING	*No Data*	OTHER	SLOW/STOPPED VEHICLE
24	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
25	GOING STRAIGHT	OTHER IMPROPER DRIVING	*No Data*	FOLLOWED TOO CLOSELY	SLOW/STOPPED VEHICLE
26	GOING STRAIGHT	FELL ASLEEP, FAINTED, FATIGUED, ETC.	*No Data*	FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	OTHER FIXED OBJECTS (BUILDING, TUNNEL, ETC.)
27	GOING STRAIGHT	INATTENTION/DISTRACTED	RADIO/CD PLAYER	DRIVING TOO FAST FOR CONDITIONS	SLOW/STOPPED VEHICLE
28	TRAVELING WRONG WAY	DRUG INVOLVEMENT	*No Data*	WRONG SIDE OR WRONG WAY	MOTOR VEHICLE IN TRANSPORT
29	CHANGING LANES	UNKNOWN	*No Data*	HIT AND RUN	SLOW/STOPPED VEHICLE
30	GOING STRAIGHT	OTHER IMPROPER DRIVING	*No Data*	OTHER IMPROPER DRIVING	SLOW/STOPPED VEHICLE
31	GOING STRAIGHT	INATTENTION/DISTRACTED	UNKNOWN	DRIVING TOO FAST FOR CONDITIONS	SLOW/STOPPED VEHICLE
32	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DRIVING TOO FAST FOR CONDITIONS	SLOW/STOPPED VEHICLE
33	GOING STRAIGHT	OTHER IMPROPER DRIVING	*No Data*	OTHER IMPROPER DRIVING	SLOW/STOPPED VEHICLE
34	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	OBJECT AVOIDANCE	SLOW/STOPPED VEHICLE
35	GOING STRAIGHT	INATTENTION/DISTRACTED	OTHER INSIDE THE VEHICLE	OTHER IMPROPER DRIVING	SLOW/STOPPED VEHICLE
36	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DRIVING TOO FAST FOR CONDITIONS	SLOW/STOPPED VEHICLE
37	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	FOLLOWED TOO CLOSELY	SLOW/STOPPED VEHICLE
38	GOING STRAIGHT	INATTENTION/DISTRACTED	OTHER INSIDE THE VEHICLE	*No Data*	SLOW/STOPPED VEHICLE
39	GOING STRAIGHT	OBSTRUCTED VIEW	*No Data*	DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	MOTOR VEHICLE IN TRANSPORT
40	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	DRIVING TOO FAST FOR CONDITIONS	SLOW/STOPPED VEHICLE
41	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	HORSE
42	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	OTHER	SLOW/STOPPED VEHICLE

#	V1_All_Events	V2_Type	V2_Dir	V2_Driver_Age	V2_Lane_Num
1	SLOW/STOPPED VEHICLE	PICKUP	E	50	2
2	*No Data*	CARRY-ALL	E	61	1
3	*No Data*	CARRY-ALL	E	28	2
4	SLOW/STOPPED VEHICLE	SEDAN, 4 DOOR	E	67	1
5	SLOW/STOPPED VEHICLE	SEDAN, 4 DOOR	E	27	*No Data*
6	*No Data*	SEDAN	N	27	1
7	SLOW/STOPPED VEHICLE	SEDAN, 4 DOOR	W	66	1
8	RAN OFF ROAD RIGHT: DITCH	PICKUP	S	25	*No Data*
9	*No Data*	CARRY-ALL	N	56	*No Data*
10	TREE/SHRUB	*No Data*	*No Data*	*No Data*	*No Data*
11	SLOW/STOPPED VEHICLE	SEDAN, 2 DOOR	E	27	1
12	SLOW/STOPPED VEHICLE	PICKUP	W	30	1
13	*No Data*	CARRY-ALL	S	53	*No Data*
14	SLOW/STOPPED VEHICLE	CARRY-ALL	W	56	1
15	NOT REPORTED	CARRY-ALL	E	73	2
16	NOT REPORTED	SEDAN, 4 DOOR	E	22	1
17	*No Data*	MOTORCYCLE	S	27	1
18	SLOW/STOPPED VEHICLE	CARRY-ALL	W	45	1
19	SLOW/STOPPED VEHICLE	CARRY-ALL	W	52	1
20	CROSS CENTERLINE	PICKUP	S	48	R1
21	*No Data*	SEDAN	E	86	1
22	SLOW/STOPPED VEHICLE	PICKUP	S	75	L1
23	SLOW/STOPPED VEHICLE	UTILITY	E	35	1
24	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
25	SLOW/STOPPED VEHICLE	PICKUP	E	68	2
26	RAN OFF ROAD RIGHT: DITCH: OTHER FIXED OBJECTS (BUILDING, TUNNEL, ETC.)	*No Data*	*No Data*	*No Data*	*No Data*
27	SLOW/STOPPED VEHICLE	CARRY-ALL	E	54	1
28	CROSS CENTERLINE	PICKUP	E	47	1
29	SLOW/STOPPED VEHICLE	PICKUP	W	27	1
30	SLOW/STOPPED VEHICLE	PICKUP	W	20	2
31	SLOW/STOPPED VEHICLE	SEDAN, 4 DOOR	W	35	1

32	SLOW/STOPPED VEHICLE	SEDAN, 4 DOOR	W	75	1
33	SLOW/STOPPED VEHICLE	UTILITY	W	73	2
34	SLOW/STOPPED VEHICLE	PICKUP	W	23	L1
35	SLOW/STOPPED VEHICLE	SEDAN, 4 DOOR	E	34	1
36	SLOW/STOPPED VEHICLE	SEDAN, 4 DOOR	W	21	1
37	SLOW/STOPPED VEHICLE	STATION WAGON	E	26	2
38	SLOW/STOPPED VEHICLE	PICKUP	E	26	1
39	*No Data*	UTILITY	S	69	1
40	SLOW/STOPPED VEHICLE	CARRY-ALL	W	40	2
41	HORSE	*No Data*	*No Data*	*No Data*	*No Data*
42	SLOW/STOPPED VEHICLE	PICKUP	E	34	1

#	V2_Action	V2_Driver_Factors	V2_Driver_Distracted	V2_Vehicle_Factors	V2_Most_Harmful_Event
1	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
2	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
3	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
4	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
5	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
6	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
7	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
8	TURNING LEFT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
9	TURNING LEFT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
10	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
11	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
12	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
13	TURNING LEFT	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
14	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	UNKNOWN	*No Data*
15	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
16	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	*No Data*
17	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
18	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
19	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
20	TURNING LEFT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
21	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
22	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	SLOW/STOPPED VEHICLE
23	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
24	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
25	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
26	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
27	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
28	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
29	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	SLOW/STOPPED VEHICLE
30	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
31	STOPPED	HAD BEEN DRINKING	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
32	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
33	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	SLOW/STOPPED VEHICLE

34	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
35	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
36	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
37	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
38	*No Data*	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
39	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
40	STOPPED	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT
41	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
42	GOING STRAIGHT	APPARENTLY NORMAL	*No Data*	*No Data*	MOTOR VEHICLE IN TRANSPORT

#	V2_All_Events	First_Harmful_Event	Nonmotorist_Factors	Factors_Roadway	Lighting
1	*No Data*	*No Data*	*No Data*	DRY	DAWN
2	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
3	*No Data*	*No Data*	*No Data*	DRY	DARK - NO LIGHTING
4	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
5	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
6	SLOW/STOPPED VEHICLE	*No Data*	*No Data*	DRY	DAYLIGHT
7	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
8	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
9	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
10	*No Data*	*No Data*	*No Data*	DRY	DARK - SPOT LIGHTING
11	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
12	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
13	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
14	*No Data*	*No Data*	*No Data*	DRY	DAYLIGHT
15	NOT REPORTED	*No Data*	*No Data*	DRY	DAYLIGHT
16	NOT REPORTED	*No Data*	*No Data*	DRY	DAYLIGHT
17	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
18	*No Data*	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT
19	*No Data*	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT
20	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	SNOW	DAYLIGHT
21	*No Data*	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT
22	SLOW/STOPPED VEHICLE	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
23	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
24	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
25	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
26	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
27	*No Data*	SLOW/STOPPED VEHICLE	*No Data*	DRY	DARK - SPOT LIGHTING
28	OVERTURN/ROLLOVER	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
29	SLOW/STOPPED VEHICLE	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT
30	*No Data*	SLOW/STOPPED VEHICLE	*No Data*	SNOW	DARK - SPOT LIGHTING
31	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DARK - SPOT LIGHTING
32	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT

33	SLOW/STOPPED VEHICLE	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
34	SLOW/STOPPED VEHICLE	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT
35	*No Data*	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT
36	*No Data*	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT
37	SLOW/STOPPED VEHICLE	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
38	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
39	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
40	*No Data*	MOTOR VEHICLE IN TRANSPORT	*No Data*	DRY	DAYLIGHT
41	*No Data*	HORSE	*No Data*	DRY	DARK - NO LIGHTING
42	*No Data*	SLOW/STOPPED VEHICLE	*No Data*	DRY	DAYLIGHT

#	HWY_Factors	Agency	Accident_Rec_Num	Pedalcyclist	Pedestrian
1	NONE	NHP	2,357,285	*No Data*	*No Data*
2	NONE	NHP	2,339,381	*No Data*	*No Data*
3	NONE	NHP	2,340,433	*No Data*	*No Data*
4	NONE	NHP	2,341,695	*No Data*	*No Data*
5	NONE	NHP	2,358,697	*No Data*	*No Data*
6	NONE	NHP	2,381,174	*No Data*	*No Data*
7	NONE	NHP	2,382,239	*No Data*	*No Data*
8	NONE	NHP	2,383,632	*No Data*	*No Data*
9	NONE	NHP	2,384,454	*No Data*	*No Data*
10	NONE	NHP	2,394,620	*No Data*	*No Data*
11	OTHER HIGHWAY	NHP	2,398,420	*No Data*	*No Data*
12	*No Data*	NHP	2,398,974	*No Data*	*No Data*
13	NONE	NHP	2,416,808	*No Data*	*No Data*
14	NONE	NHP	2,419,615	*No Data*	*No Data*
15	OTHER HIGHWAY	NHP	2,521,279	*No Data*	*No Data*
16	NONE	NHP	2,522,423	*No Data*	*No Data*
17	NONE	NHP	3,089,868	*No Data*	*No Data*
18	NONE	NHP	3,090,024	*No Data*	*No Data*
19	NONE	NHP	3,110,388	*No Data*	*No Data*
20	WEATHER	CCSO	3,068,373	*No Data*	*No Data*
21	BACKUP DUE TO REGULAR CONGESTION	NHP	3,121,365	*No Data*	*No Data*
22	NONE	CCSO	3,014,751	*No Data*	*No Data*
23	NONE	NHP	3,153,212	*No Data*	*No Data*
24	*No Data*	CCSO	3,162,322	*No Data*	*No Data*
25	NONE	NHP	3,138,001	*No Data*	*No Data*

26	*No Data*	CCSO	3,020,115	*No Data*	*No Data*
27	NONE	NHP	3,026,078	*No Data*	*No Data*
28	NONE	NHP	3,025,890	*No Data*	*No Data*
29	NONE	NHP	3,027,250	*No Data*	*No Data*
30	WEATHER	NHP	3,027,704	*No Data*	*No Data*
31	NONE	NHP	3,028,394	*No Data*	*No Data*
32	NONE	NHP	3,035,244	*No Data*	*No Data*
33	NONE	NHP	3,035,614	*No Data*	*No Data*
34	NONE	NHP	3,047,130	*No Data*	*No Data*
35	NONE	NHP	3,047,566	*No Data*	*No Data*
36	NONE	NHP	3,053,709	*No Data*	*No Data*
37	NONE	NHP	3,056,501	*No Data*	*No Data*
38	BACKUP DUE TO REGULAR CONGESTION	NHP	3,057,385	*No Data*	*No Data*
39	GLARE	NHP	3,058,867	*No Data*	*No Data*
40	NONE	NHP	3,073,709	*No Data*	*No Data*
41	NONE	NHP	3,140,268	*No Data*	*No Data*
42	WORK ZONE (CONST. MAINT. UTILITY)	NHP	3,144,112	*No Data*	*No Data*

#	Motorcyclist	AnimalType	CrashDateTimeUTC	Count
1	*No Data*	*No Data*	*No Data*	1
2	*No Data*	*No Data*	*No Data*	1
3	*No Data*	*No Data*	*No Data*	1
4	*No Data*	*No Data*	*No Data*	1
5	*No Data*	*No Data*	*No Data*	1
6	*No Data*	*No Data*	*No Data*	1
7	*No Data*	*No Data*	*No Data*	1
8	*No Data*	*No Data*	*No Data*	1
9	*No Data*	*No Data*	*No Data*	1
10	*No Data*	*No Data*	*No Data*	1
11	*No Data*	*No Data*	*No Data*	1
12	*No Data*	*No Data*	*No Data*	1
13	*No Data*	*No Data*	*No Data*	1
14	*No Data*	*No Data*	*No Data*	1
15	*No Data*	*No Data*	*No Data*	1
16	*No Data*	*No Data*	*No Data*	1
17	YES	*No Data*	*No Data*	1
18	*No Data*	*No Data*	*No Data*	1
19	*No Data*	*No Data*	*No Data*	1
20	*No Data*	*No Data*	*No Data*	1
21	*No Data*	*No Data*	*No Data*	1
22	*No Data*	*No Data*	*No Data*	1
23	*No Data*	*No Data*	*No Data*	1
24	*No Data*	*No Data*	*No Data*	1
25	*No Data*	*No Data*	*No Data*	1
26	*No Data*	*No Data*	*No Data*	1
27	*No Data*	*No Data*	*No Data*	1
28	*No Data*	*No Data*	*No Data*	1
29	*No Data*	*No Data*	*No Data*	1
30	*No Data*	*No Data*	*No Data*	1
31	*No Data*	*No Data*	*No Data*	1
32	*No Data*	*No Data*	*No Data*	1
33	*No Data*	*No Data*	*No Data*	1
34	*No Data*	*No Data*	*No Data*	1
35	*No Data*	*No Data*	*No Data*	1
36	*No Data*	*No Data*	*No Data*	1
37	*No Data*	*No Data*	*No Data*	1
38	*No Data*	*No Data*	*No Data*	1
39	*No Data*	*No Data*	*No Data*	1
40	*No Data*	*No Data*	*No Data*	1
41	*No Data*	HORSE	*No Data*	1
42	*No Data*	*No Data*	*No Data*	1

Appendix B
Traffic Count Data Sheets

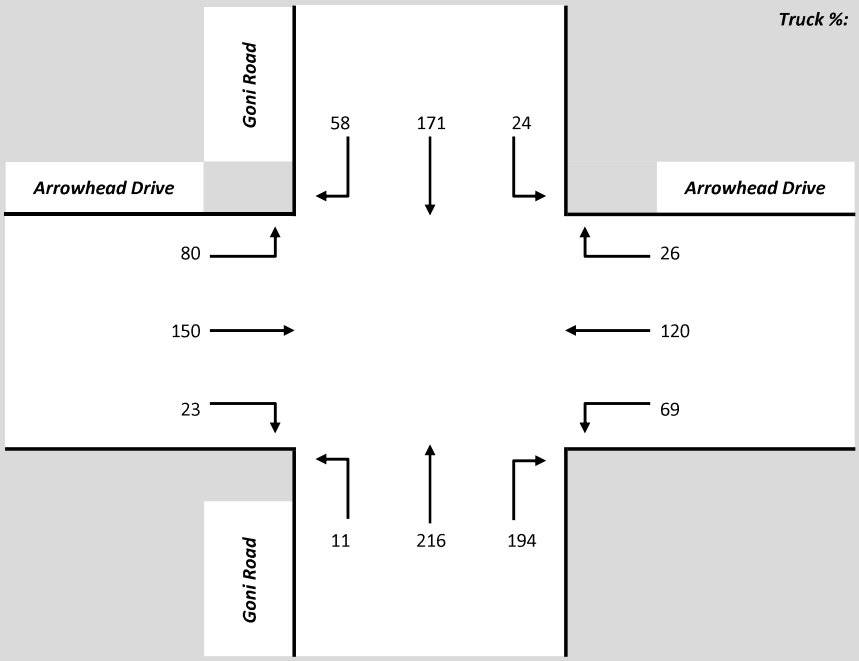
HEADWAY TRANSPORTATION

Intersection: Arrowhead Dr & Goni Rd

AM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/7/2023
School in Session: Yes

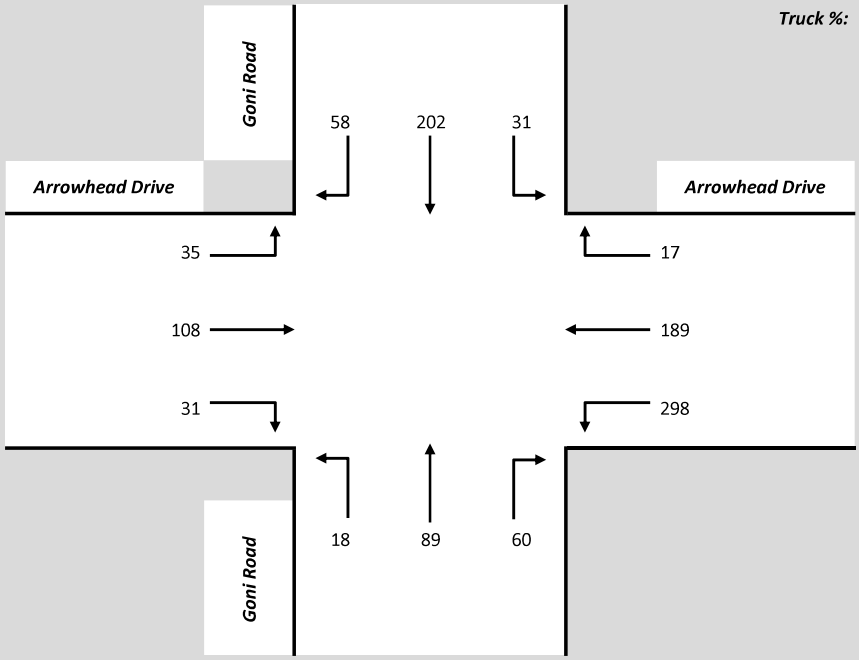
Peak Hour: 7:30 - 8:30
PHF: 0.85
Truck %: 7%



PM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/6/2023
School in Session: Yes

Peak Hour: 4:00 - 5:00
PHF: 0.81
Truck %: 0%

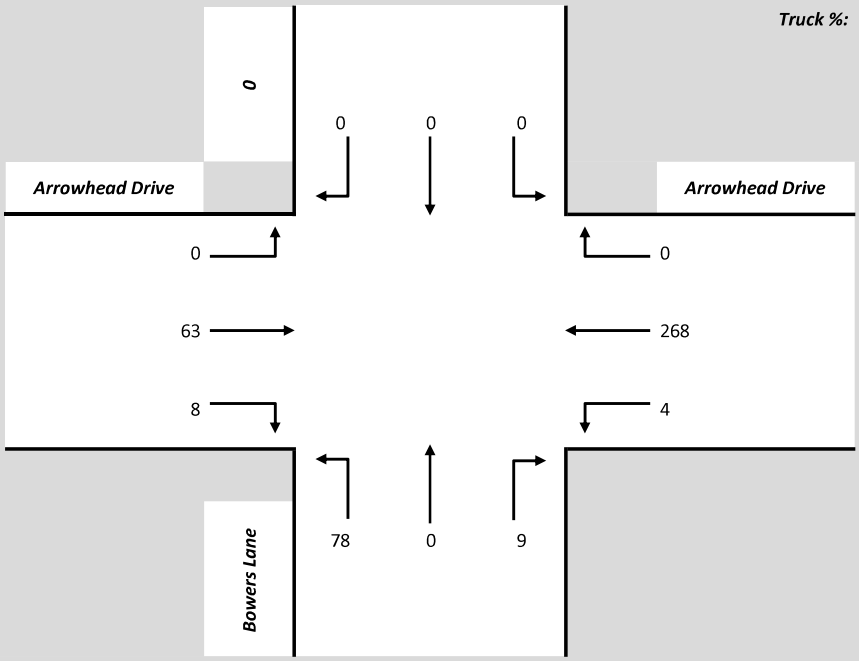


Intersection: Arrowhead Dr & Bowers Ln

AM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/7/2023
School in Session: Yes

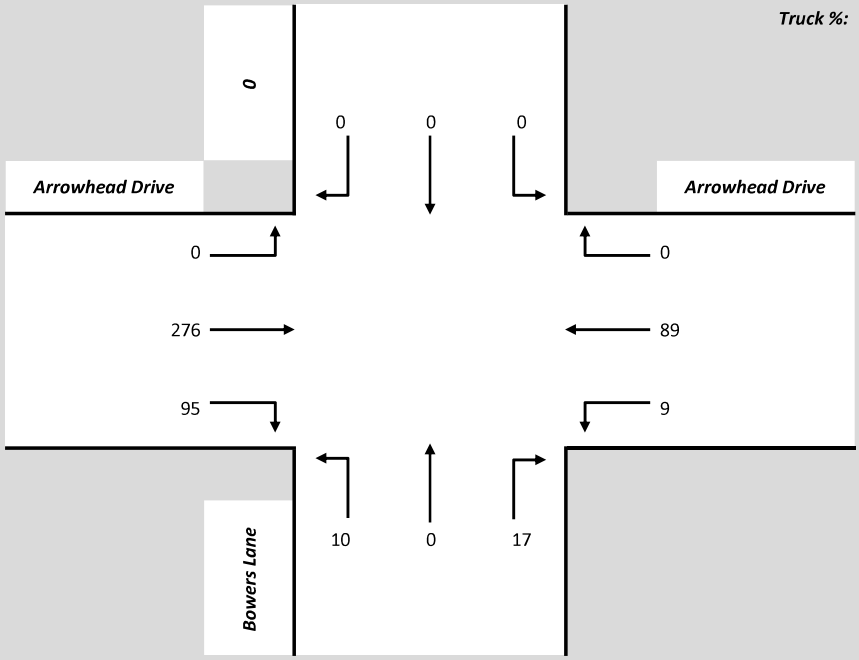
Peak Hour: 7:15 - 8:15
PHF: 0.67
Truck %: 4%



PM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/6/2023
School in Session: Yes

Peak Hour: 4:15 - 5:15
PHF: 0.75
Truck %: 2%

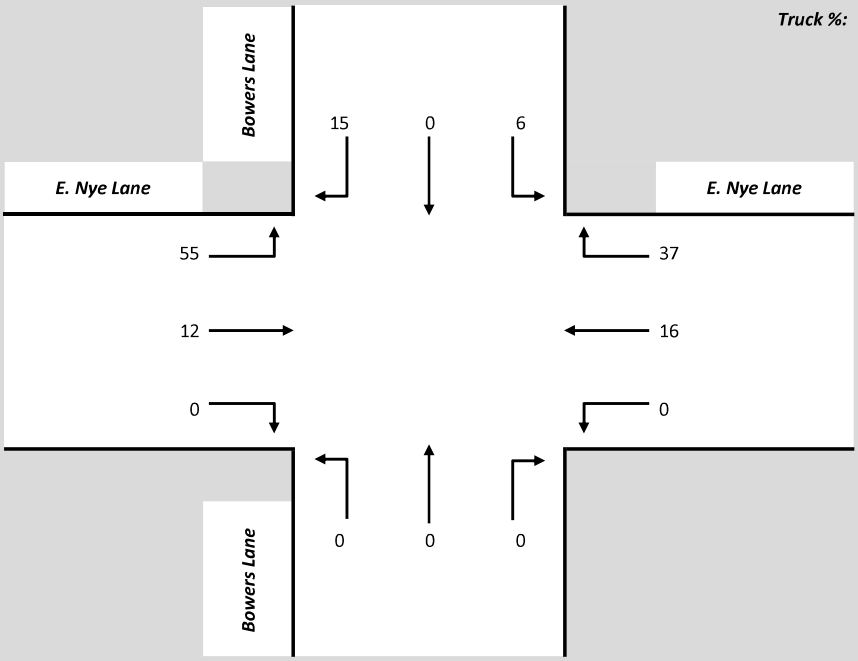


Intersection: Bowers Ln & E Nye Ln

AM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/7/2023
School in Session: Yes

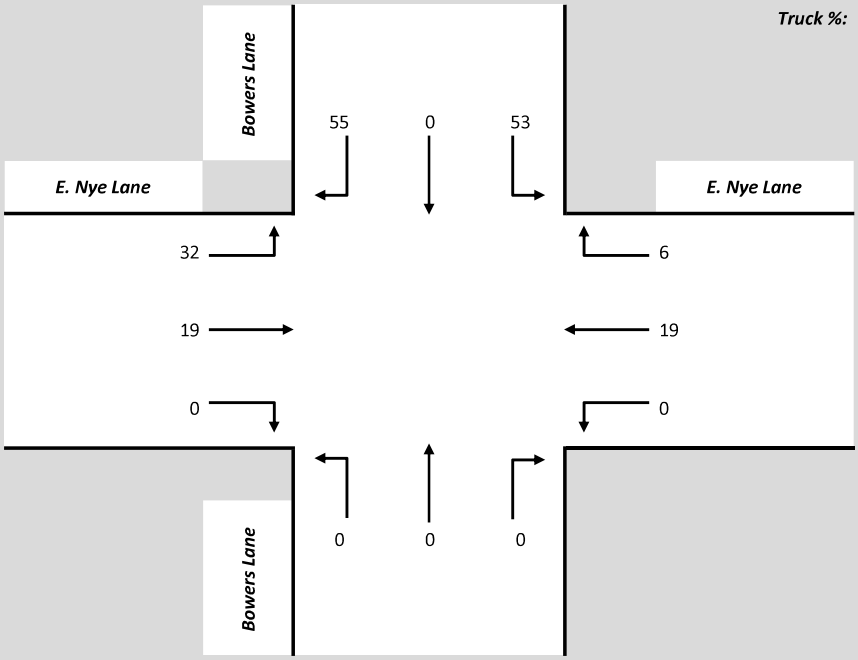
Peak Hour: 7:00 - 8:00
PHF: 0.61
Truck %: 2%



PM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/6/2023
School in Session: Yes

Peak Hour: 4:15 - 5:15
PHF: 0.69
Truck %: 1%

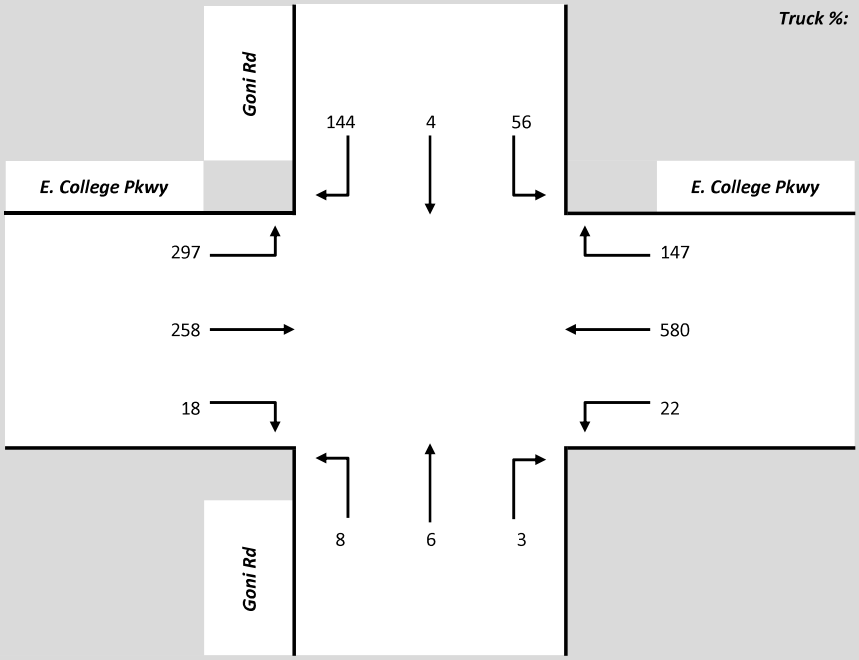


Intersection: E College Pkwy & Goni Rd

AM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/26/2023
School in Session: Yes

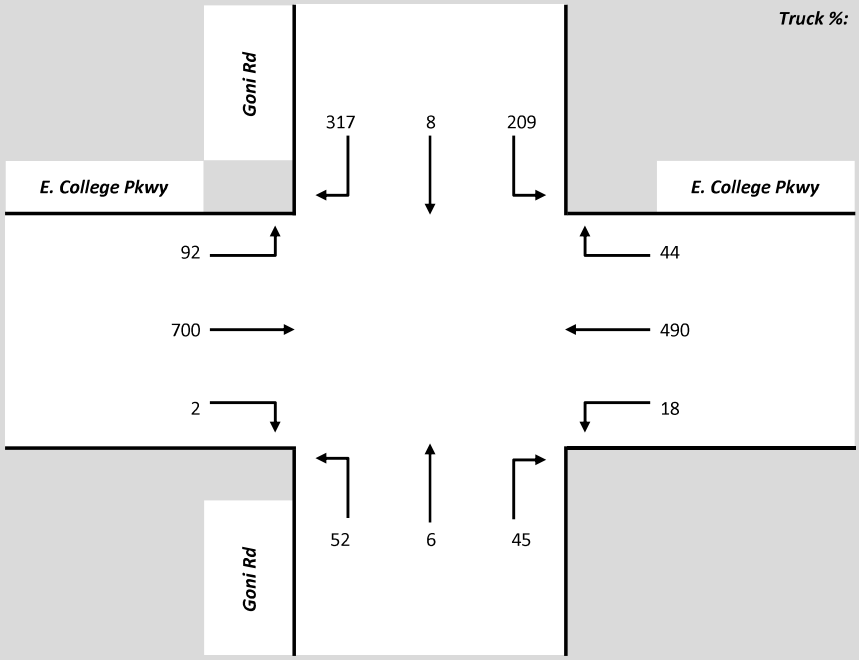
Peak Hour: 7:30 - 8:30
PHF: 0.79
Truck %: 5%



PM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/26/2023
School in Session: Yes

Peak Hour: 4:30 - 5:30
PHF: 0.91
Truck %: 2%

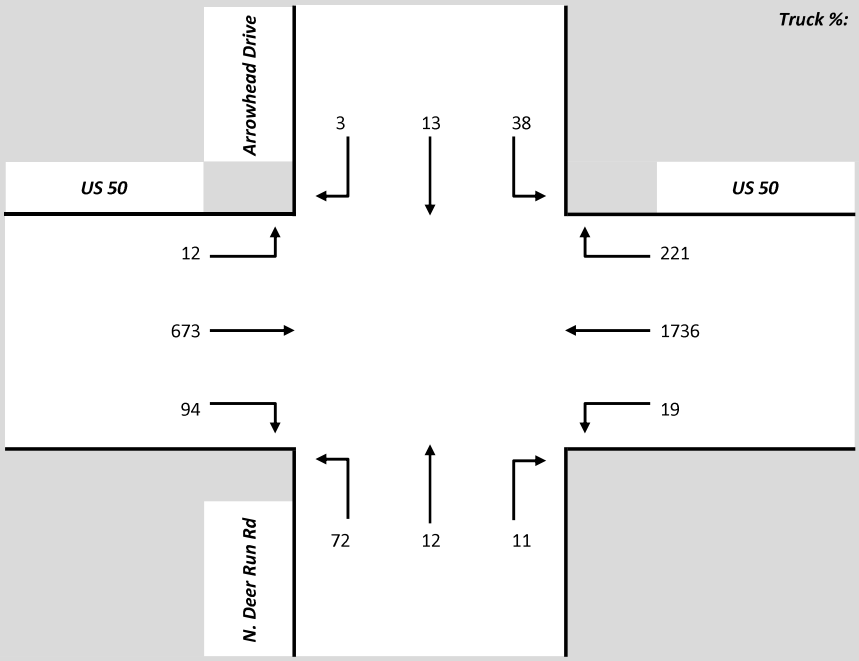


Intersection: Arrowhead Dr & US 50

AM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/26/2023
School in Session: Yes

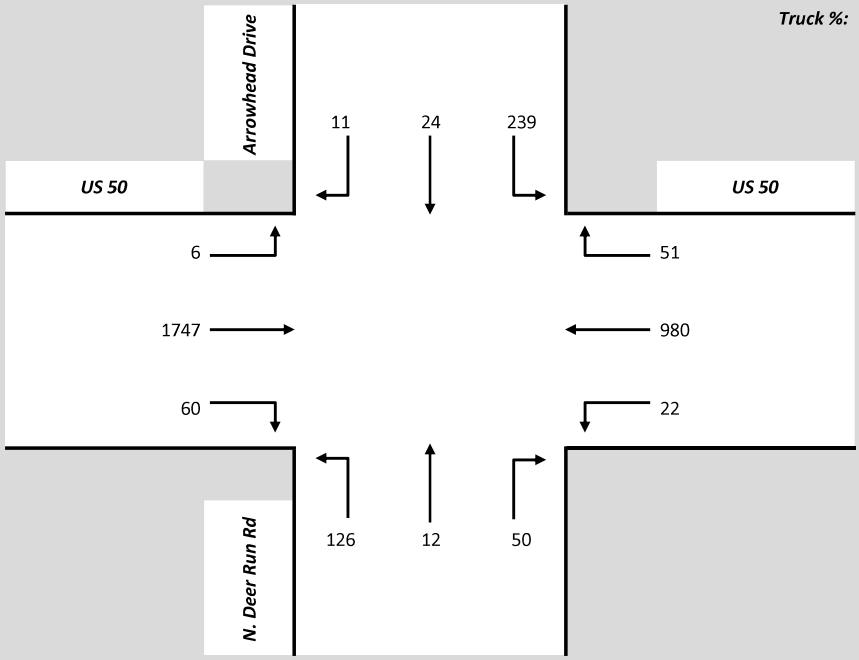
Peak Hour: 7:00 - 8:00
PHF: 0.94
Truck %: 7%



PM PEAK HOUR TURNING MOVEMENT VOLUME

Date Collected: 9/26/2023
School in Session: Yes

Peak Hour: 4:30 - 5:30
PHF: 0.97
Truck %: 2%



Appendix C
Existing LOS Calculations

HEADWAY TRANSPORTATION

Intersection	
Intersection Delay, s/veh	29.5
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	150	23	69	120	26	11	216	194	24	171	58
Future Vol, veh/h	80	150	23	69	120	26	11	216	194	24	171	58
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	94	176	27	81	141	31	13	254	228	28	201	68
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	16.2	15.1	51.1	19.2
HCM LOS	C	C	F	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	53%	0%	87%	0%	82%	0%	75%
Vol Right, %	0%	47%	0%	13%	0%	18%	0%	25%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	11	410	80	173	69	146	24	229
LT Vol	11	0	80	0	69	0	24	0
Through Vol	0	216	0	150	0	120	0	171
RT Vol	0	194	0	23	0	26	0	58
Lane Flow Rate	13	482	94	204	81	172	28	269
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.028	0.938	0.224	0.45	0.196	0.384	0.065	0.568
Departure Headway (Hd)	7.854	7.002	8.579	7.966	8.702	8.056	8.293	7.595
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	454	516	416	450	410	445	430	471
Service Time	5.63	4.777	6.375	5.762	6.501	5.854	6.085	5.386
HCM Lane V/C Ratio	0.029	0.934	0.226	0.453	0.198	0.387	0.065	0.571
HCM Control Delay	10.9	52.2	13.9	17.2	13.6	15.8	11.7	20
HCM Lane LOS	B	F	B	C	B	C	B	C
HCM 95th-tile Q	0.1	11.5	0.8	2.3	0.7	1.8	0.2	3.5

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	70	340	6	1	1
Future Vol, veh/h	1	70	340	6	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	1	93	453	8	1	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	461	0	-	0	552	457
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	95	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1084	-	-	-	490	597
Stage 1	-	-	-	-	631	-
Stage 2	-	-	-	-	921	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1084	-	-	-	490	597
Mov Cap-2 Maneuver	-	-	-	-	490	-
Stage 1	-	-	-	-	630	-
Stage 2	-	-	-	-	921	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1084	-	-	-	538
HCM Lane V/C Ratio	0.001	-	-	-	0.005
HCM Control Delay (s)	8.3	-	-	-	11.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	63	8	4	268	78	9
Future Vol, veh/h	63	8	4	268	78	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	84	11	5	357	104	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	95	0	457	90
Stage 1	-	-	-	-	90	-
Stage 2	-	-	-	-	367	-
Critical Hdwy	-	-	4.14	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.236	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1486	-	558	962
Stage 1	-	-	-	-	928	-
Stage 2	-	-	-	-	696	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1486	-	556	962
Mov Cap-2 Maneuver	-	-	-	-	556	-
Stage 1	-	-	-	-	928	-
Stage 2	-	-	-	-	694	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	581	-	-	1486	-
HCM Lane V/C Ratio	0.2	-	-	0.004	-
HCM Control Delay (s)	12.7	-	-	7.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	12	16	37	6	15
Future Vol, veh/h	55	12	16	37	6	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	16	21	49	8	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	70	0	-	0	208	46
Stage 1	-	-	-	-	46	-
Stage 2	-	-	-	-	162	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1531	-	-	-	780	1023
Stage 1	-	-	-	-	976	-
Stage 2	-	-	-	-	867	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1531	-	-	-	743	1023
Mov Cap-2 Maneuver	-	-	-	-	743	-
Stage 1	-	-	-	-	929	-
Stage 2	-	-	-	-	867	-

Approach	EB	WB	SB
HCM Control Delay, s	6.1	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1531	-	-	-	924
HCM Lane V/C Ratio	0.048	-	-	-	0.03
HCM Control Delay (s)	7.5	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	297	258	18	22	580	147	8	6	3	56	4	144
Future Volume (veh/h)	297	258	18	22	580	147	8	6	3	56	4	144
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	376	327	20	28	734	172	10	8	3	71	5	128
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	424	1789	109	51	923	216	22	89	33	173	7	169
Arrive On Green	0.24	0.54	0.54	0.03	0.33	0.33	0.01	0.07	0.07	0.05	0.11	0.11
Sat Flow, veh/h	1739	3322	202	1739	2789	654	1739	1266	475	3374	59	1498
Grp Volume(v), veh/h	376	170	177	28	456	450	10	0	11	71	0	133
Grp Sat Flow(s),veh/h/ln	1739	1735	1789	1739	1735	1708	1739	0	1740	1687	0	1556
Q Serve(g_s), s	15.8	3.8	3.8	1.2	18.1	18.1	0.4	0.0	0.4	1.5	0.0	6.3
Cycle Q Clear(g_c), s	15.8	3.8	3.8	1.2	18.1	18.1	0.4	0.0	0.4	1.5	0.0	6.3
Prop In Lane	1.00		0.11	1.00		0.38	1.00		0.27	1.00		0.96
Lane Grp Cap(c), veh/h	424	934	964	51	574	565	22	0	122	173	0	176
V/C Ratio(X)	0.89	0.18	0.18	0.55	0.80	0.80	0.46	0.00	0.09	0.41	0.00	0.76
Avail Cap(c_a), veh/h	1034	934	964	574	916	903	574	0	575	1114	0	514
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.6	8.9	8.9	36.2	23.0	23.0	37.1	0.0	32.9	34.8	0.0	32.6
Incr Delay (d2), s/veh	3.6	0.1	0.1	3.4	1.9	1.9	5.5	0.0	0.1	0.6	0.0	2.5
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	6.7	1.3	1.4	0.5	7.2	7.1	0.2	0.0	0.2	0.6	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.2	9.0	9.0	39.6	24.9	24.9	42.6	0.0	33.0	35.4	0.0	35.1
LnGrp LOS	C	A	A	D	C	C	D	A	C	D	A	D
Approach Vol, veh/h		723			934			21			204	
Approach Delay, s/veh		20.6			25.4			37.6			35.2	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.7	10.6	9.0	46.4	6.4	13.9	24.8	30.6
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	25.0	* 25	* 25	40.0	25.0	25.0	* 45	* 40
Max Q Clear Time (g_c+I1), s	3.5	2.4	3.2	5.8	2.4	8.3	17.8	20.1
Green Ext Time (p_c), s	0.1	0.0	0.0	1.7	0.0	0.4	0.7	5.0

Intersection Summary	
HCM 6th Ctrl Delay	24.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	673	94	19	1736	221	72	12	11	38	13	3
Future Volume (veh/h)	12	673	94	19	1736	221	72	12	11	38	13	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796
Adj Flow Rate, veh/h	13	716	70	20	1847	231	77	13	9	40	14	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	26	2210	986	37	2019	247	186	86	59	180	134	19
Arrive On Green	0.02	0.65	0.65	0.02	0.66	0.66	0.09	0.09	0.09	0.09	0.09	0.09
Sat Flow, veh/h	1711	3413	1522	1711	3060	375	1342	989	684	1335	1537	220
Grp Volume(v), veh/h	13	716	70	20	1012	1066	77	0	22	40	0	16
Grp Sat Flow(s),veh/h/ln	1711	1706	1522	1711	1706	1729	1342	0	1673	1335	0	1757
Q Serve(g_s), s	0.7	8.4	1.5	1.0	44.4	48.9	5.0	0.0	1.1	2.6	0.0	0.8
Cycle Q Clear(g_c), s	0.7	8.4	1.5	1.0	44.4	48.9	5.8	0.0	1.1	3.6	0.0	0.8
Prop In Lane	1.00		1.00	1.00		0.22	1.00		0.41	1.00		0.13
Lane Grp Cap(c), veh/h	26	2210	986	37	1126	1140	186	0	145	180	0	153
V/C Ratio(X)	0.49	0.32	0.07	0.53	0.90	0.93	0.41	0.00	0.15	0.22	0.00	0.10
Avail Cap(c_a), veh/h	382	2288	1021	287	1182	1198	744	0	841	735	0	883
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.7	7.0	5.8	43.3	12.7	13.5	40.3	0.0	37.8	39.5	0.0	37.6
Incr Delay (d2), s/veh	5.2	0.0	0.0	4.3	8.8	12.6	0.5	0.0	0.2	0.2	0.0	0.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.3	2.7	0.4	0.5	16.6	19.5	1.6	0.0	0.4	0.8	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.9	7.1	5.8	47.6	21.5	26.1	40.9	0.0	38.0	39.7	0.0	37.8
LnGrp LOS	D	A	A	D	C	C	D	A	D	D	A	D
Approach Vol, veh/h		799			2098			99			56	
Approach Delay, s/veh		7.6			24.1			40.2			39.2	
Approach LOS		A			C			D			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	15.3	9.5	64.8	15.3	8.4	65.8
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 45	* 15	* 60	* 45	20.0	62.0
Max Q Clear Time (g_c+I1), s	7.8	3.0	10.4	5.6	2.7	50.9
Green Ext Time (p_c), s	0.2	0.0	3.8	0.1	0.0	8.1

Intersection Summary	
HCM 6th Ctrl Delay	20.6
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	21.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	108	31	298	189	17	18	89	60	31	202	58
Future Vol, veh/h	35	108	31	298	189	17	18	89	60	31	202	58
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	133	38	368	233	21	22	110	74	38	249	72
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	14.3	26	15.1	22.7
HCM LOS	B	D	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	60%	0%	78%	0%	92%	0%	78%
Vol Right, %	0%	40%	0%	22%	0%	8%	0%	22%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	18	149	35	139	298	206	31	260
LT Vol	18	0	35	0	298	0	31	0
Through Vol	0	89	0	108	0	189	0	202
RT Vol	0	60	0	31	0	17	0	58
Lane Flow Rate	22	184	43	172	368	254	38	321
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.053	0.395	0.101	0.368	0.779	0.498	0.087	0.666
Departure Headway (Hd)	8.539	7.732	8.39	7.713	7.625	7.055	8.147	7.473
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	419	465	426	465	475	511	439	485
Service Time	6.302	5.495	6.157	5.48	5.382	4.811	5.902	5.227
HCM Lane V/C Ratio	0.053	0.396	0.101	0.37	0.775	0.497	0.087	0.662
HCM Control Delay	11.8	15.5	12.1	14.9	32.5	16.7	11.7	24
HCM Lane LOS	B	C	B	B	D	C	B	C
HCM 95th-tile Q	0.2	1.9	0.3	1.7	6.9	2.7	0.3	4.8

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	359	97	2	12	2
Future Vol, veh/h	1	359	97	2	12	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	466	126	3	16	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	129	0	-	0	596	128
Stage 1	-	-	-	-	128	-
Stage 2	-	-	-	-	468	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1457	-	-	-	466	922
Stage 1	-	-	-	-	898	-
Stage 2	-	-	-	-	630	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1457	-	-	-	466	922
Mov Cap-2 Maneuver	-	-	-	-	466	-
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	630	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1457	-	-	-	501
HCM Lane V/C Ratio	0.001	-	-	-	0.036
HCM Control Delay (s)	7.5	-	-	-	12.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	276	95	9	89	10	17
Future Vol, veh/h	276	95	9	89	10	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	368	127	12	119	13	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	495	0	575	432
Stage 1	-	-	-	-	432	-
Stage 2	-	-	-	-	143	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1069	-	480	624
Stage 1	-	-	-	-	655	-
Stage 2	-	-	-	-	884	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1069	-	475	624
Mov Cap-2 Maneuver	-	-	-	-	475	-
Stage 1	-	-	-	-	655	-
Stage 2	-	-	-	-	874	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	559	-	-	1069	-
HCM Lane V/C Ratio	0.064	-	-	0.011	-
HCM Control Delay (s)	11.9	-	-	8.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	32	19	19	6	53	55
Future Vol, veh/h	32	19	19	6	53	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	25	25	8	71	73

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	33	0	-	0	140	29
Stage 1	-	-	-	-	29	-
Stage 2	-	-	-	-	111	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1579	-	-	-	853	1046
Stage 1	-	-	-	-	994	-
Stage 2	-	-	-	-	914	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1579	-	-	-	829	1046
Mov Cap-2 Maneuver	-	-	-	-	829	-
Stage 1	-	-	-	-	966	-
Stage 2	-	-	-	-	914	-

Approach	EB	WB	SB
HCM Control Delay, s	4.6	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1579	-	-	-	927
HCM Lane V/C Ratio	0.027	-	-	-	0.155
HCM Control Delay (s)	7.3	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	92	700	2	18	490	44	52	6	45	209	8	317
Future Volume (veh/h)	92	700	2	18	490	44	52	6	45	209	8	317
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	769	2	20	538	44	57	7	34	230	9	244
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	133	1094	3	43	862	70	94	41	197	355	11	310
Arrive On Green	0.07	0.30	0.30	0.02	0.26	0.26	0.05	0.15	0.15	0.10	0.20	0.20
Sat Flow, veh/h	1781	3636	9	1781	3327	271	1781	278	1350	3456	57	1537
Grp Volume(v), veh/h	101	376	395	20	287	295	57	0	41	230	0	253
Grp Sat Flow(s),veh/h/ln	1781	1777	1869	1781	1777	1821	1781	0	1627	1728	0	1594
Q Serve(g_s), s	3.1	10.3	10.3	0.6	7.9	7.9	1.7	0.0	1.2	3.5	0.0	8.3
Cycle Q Clear(g_c), s	3.1	10.3	10.3	0.6	7.9	7.9	1.7	0.0	1.2	3.5	0.0	8.3
Prop In Lane	1.00		0.01	1.00		0.15	1.00		0.83	1.00		0.96
Lane Grp Cap(c), veh/h	133	534	562	43	460	472	94	0	238	355	0	321
V/C Ratio(X)	0.76	0.70	0.70	0.47	0.62	0.63	0.61	0.00	0.17	0.65	0.00	0.79
Avail Cap(c_a), veh/h	1455	1290	1357	808	1290	1323	808	0	739	1568	0	723
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.0	17.1	17.1	26.5	18.0	18.0	25.5	0.0	20.6	23.8	0.0	20.9
Incr Delay (d2), s/veh	4.8	1.3	1.2	3.0	1.0	1.0	2.3	0.0	0.1	0.7	0.0	1.6
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	1.4	3.9	4.1	0.3	3.0	3.1	0.7	0.0	0.4	1.4	0.0	3.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.8	18.3	18.3	29.5	19.1	19.1	27.9	0.0	20.7	24.5	0.0	22.5
LnGrp LOS	C	B	B	C	B	B	C	A	C	C	A	C
Approach Vol, veh/h		872			602			98			483	
Approach Delay, s/veh		19.6			19.4			24.9			23.5	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.5	13.3	8.1	22.2	8.4	16.4	10.4	19.9
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	25.0	* 25	* 25	40.0	25.0	25.0	* 45	* 40
Max Q Clear Time (g_c+I1), s	5.5	3.2	2.6	12.3	3.7	10.3	5.1	9.9
Green Ext Time (p_c), s	0.3	0.1	0.0	4.2	0.0	0.8	0.2	3.1

Intersection Summary	
HCM 6th Ctrl Delay	20.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	1747	60	22	980	51	126	12	50	239	24	11
Future Volume (veh/h)	6	1747	60	22	980	51	126	12	50	239	24	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	6	1801	43	23	1010	51	130	12	37	246	25	8
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	14	1937	864	41	1946	98	357	90	279	340	305	97
Arrive On Green	0.01	0.54	0.54	0.02	0.57	0.57	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1781	3554	1585	1781	3442	174	1376	403	1243	1356	1358	434
Grp Volume(v), veh/h	6	1801	43	23	521	540	130	0	49	246	0	33
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1839	1376	0	1647	1356	0	1792
Q Serve(g_s), s	0.4	49.1	1.3	1.3	19.0	19.0	8.7	0.0	2.5	18.6	0.0	1.5
Cycle Q Clear(g_c), s	0.4	49.1	1.3	1.3	19.0	19.0	10.2	0.0	2.5	21.1	0.0	1.5
Prop In Lane	1.00		1.00	1.00		0.09	1.00		0.76	1.00		0.24
Lane Grp Cap(c), veh/h	14	1937	864	41	1005	1040	357	0	369	340	0	402
V/C Ratio(X)	0.44	0.93	0.05	0.55	0.52	0.52	0.36	0.00	0.13	0.72	0.00	0.08
Avail Cap(c_a), veh/h	339	2029	905	254	1048	1085	638	0	705	617	0	767
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.9	22.1	11.2	50.8	14.1	14.1	36.2	0.0	32.6	41.0	0.0	32.2
Incr Delay (d2), s/veh	8.1	7.8	0.0	4.3	0.2	0.1	0.2	0.0	0.1	1.1	0.0	0.0
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.2	21.1	0.5	0.6	7.3	7.5	2.9	0.0	1.0	6.3	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.0	29.9	11.2	55.0	14.2	14.2	36.5	0.0	32.6	42.1	0.0	32.2
LnGrp LOS	E	C	B	E	B	B	D	A	C	D	A	C
Approach Vol, veh/h		1850			1084			179			279	
Approach Delay, s/veh		29.6			15.1			35.4			41.0	
Approach LOS		C			B			D			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	31.1	9.9	64.1	31.1	7.8	66.2
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 45	* 15	* 60	* 45	20.0	62.0
Max Q Clear Time (g_c+I1), s	12.2	3.3	51.1	23.1	2.4	21.0
Green Ext Time (p_c), s	0.4	0.0	6.1	0.5	0.0	5.2

Intersection Summary	
HCM 6th Ctrl Delay	26.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Appendix D
Opening Year LOS Calculations

HEADWAY TRANSPORTATION

Intersection	
Intersection Delay, s/veh	45.8
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	89	165	28	79	127	27	12	230	220	28	182	63
Future Vol, veh/h	89	165	28	79	127	27	12	230	220	28	182	63
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	105	194	33	93	149	32	14	271	259	33	214	74
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	18.4	16.6	91.2	22.4
HCM LOS	C	C	F	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	51%	0%	85%	0%	82%	0%	74%
Vol Right, %	0%	49%	0%	15%	0%	18%	0%	26%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	12	450	89	193	79	154	28	245
LT Vol	12	0	89	0	79	0	28	0
Through Vol	0	230	0	165	0	127	0	182
RT Vol	0	220	0	28	0	27	0	63
Lane Flow Rate	14	529	105	227	93	181	33	288
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.032	1.088	0.256	0.515	0.231	0.418	0.078	0.626
Departure Headway (Hd)	8.268	7.401	9.157	8.532	9.33	8.682	8.871	8.165
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	436	492	395	425	388	417	406	444
Service Time	5.968	5.101	6.857	6.232	7.03	6.382	6.571	5.865
HCM Lane V/C Ratio	0.032	1.075	0.266	0.534	0.24	0.434	0.081	0.649
HCM Control Delay	11.2	93.3	15	19.9	14.8	17.5	12.3	23.6
HCM Lane LOS	B	F	B	C	B	C	B	C
HCM 95th-tile Q	0.1	17	1	2.9	0.9	2	0.3	4.2

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	72	350	6	1	1
Future Vol, veh/h	1	72	350	6	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	1	96	467	8	1	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	475	0	-	0	569	471
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	98	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1072	-	-	-	479	587
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	918	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1072	-	-	-	479	587
Mov Cap-2 Maneuver	-	-	-	-	479	-
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	918	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1072	-	-	-	528
HCM Lane V/C Ratio	0.001	-	-	-	0.005
HCM Control Delay (s)	8.4	-	-	-	11.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	65	8	4	277	79	9
Future Vol, veh/h	65	8	4	277	79	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	87	11	5	369	105	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	98	0	472	93
Stage 1	-	-	-	-	93	-
Stage 2	-	-	-	-	379	-
Critical Hdwy	-	-	4.14	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.236	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1483	-	547	959
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	688	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1483	-	545	959
Mov Cap-2 Maneuver	-	-	-	-	545	-
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	686	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	570	-	-	1483	-
HCM Lane V/C Ratio	0.206	-	-	0.004	-
HCM Control Delay (s)	12.9	-	-	7.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.8	-	-	0	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	56	13	18	37	6	15
Future Vol, veh/h	56	13	18	37	6	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	17	24	49	8	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	73	0	-	0	216	49
Stage 1	-	-	-	-	49	-
Stage 2	-	-	-	-	167	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1527	-	-	-	772	1020
Stage 1	-	-	-	-	973	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1527	-	-	-	733	1020
Mov Cap-2 Maneuver	-	-	-	-	733	-
Stage 1	-	-	-	-	924	-
Stage 2	-	-	-	-	863	-

Approach	EB	WB	SB
HCM Control Delay, s	6.1	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1527	-	-	-	917
HCM Lane V/C Ratio	0.049	-	-	-	0.031
HCM Control Delay (s)	7.5	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	361	264	18	23	590	173	8	6	3	66	4	165
Future Volume (veh/h)	361	264	18	23	590	173	8	6	3	66	4	165
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	457	334	20	29	747	205	10	8	3	84	5	153
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	496	1934	115	50	887	243	21	109	41	162	6	188
Arrive On Green	0.29	0.58	0.58	0.03	0.33	0.33	0.01	0.09	0.09	0.05	0.13	0.13
Sat Flow, veh/h	1739	3326	198	1739	2690	738	1739	1266	475	3374	49	1506
Grp Volume(v), veh/h	457	174	180	29	482	470	10	0	11	84	0	158
Grp Sat Flow(s),veh/h/ln	1739	1735	1790	1739	1735	1693	1739	0	1740	1687	0	1555
Q Serve(g_s), s	23.4	4.3	4.3	1.5	23.7	23.7	0.5	0.0	0.5	2.2	0.0	9.1
Cycle Q Clear(g_c), s	23.4	4.3	4.3	1.5	23.7	23.7	0.5	0.0	0.5	2.2	0.0	9.1
Prop In Lane	1.00		0.11	1.00		0.44	1.00		0.27	1.00		0.97
Lane Grp Cap(c), veh/h	496	1008	1041	50	572	559	21	0	150	162	0	195
V/C Ratio(X)	0.92	0.17	0.17	0.59	0.84	0.84	0.47	0.00	0.07	0.52	0.00	0.81
Avail Cap(c_a), veh/h	852	1008	1041	474	756	738	474	0	474	919	0	423
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.8	8.9	8.9	44.1	28.5	28.5	45.0	0.0	38.6	42.7	0.0	39.1
Incr Delay (d2), s/veh	6.4	0.1	0.1	4.0	6.0	6.2	5.8	0.0	0.1	1.0	0.0	3.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	10.4	1.5	1.6	0.7	10.4	10.2	0.3	0.0	0.2	0.9	0.0	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.2	9.0	9.0	48.1	34.6	34.7	50.9	0.0	38.7	43.6	0.0	42.2
LnGrp LOS	D	A	A	D	C	C	D	A	D	D	A	D
Approach Vol, veh/h		811			981			21			242	
Approach Delay, s/veh		25.5			35.0			44.5			42.7	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.2	13.2	9.4	59.0	6.6	16.8	32.5	35.9
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	25.0	* 25	* 25	40.0	25.0	25.0	* 45	* 40
Max Q Clear Time (g_c+I1), s	4.2	2.5	3.5	6.3	2.5	11.1	25.4	25.7
Green Ext Time (p_c), s	0.1	0.0	0.0	1.8	0.0	0.4	0.8	4.6

Intersection Summary	
HCM 6th Ctrl Delay	32.3
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	682	101	25	1761	229	78	14	12	39	14	3
Future Volume (veh/h)	12	682	101	25	1761	229	78	14	12	39	14	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796
Adj Flow Rate, veh/h	13	726	76	27	1873	240	83	15	10	41	15	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	26	2194	978	46	2014	252	190	92	62	183	143	19
Arrive On Green	0.02	0.64	0.64	0.03	0.66	0.66	0.09	0.09	0.09	0.09	0.09	0.09
Sat Flow, veh/h	1711	3413	1522	1711	3051	383	1341	1005	670	1331	1552	207
Grp Volume(v), veh/h	13	726	76	27	1029	1084	83	0	25	41	0	17
Grp Sat Flow(s),veh/h/ln	1711	1706	1522	1711	1706	1727	1341	0	1676	1331	0	1759
Q Serve(g_s), s	0.7	8.8	1.7	1.4	47.3	52.4	5.5	0.0	1.3	2.7	0.0	0.8
Cycle Q Clear(g_c), s	0.7	8.8	1.7	1.4	47.3	52.4	6.3	0.0	1.3	3.9	0.0	0.8
Prop In Lane	1.00		1.00	1.00		0.22	1.00		0.40	1.00		0.12
Lane Grp Cap(c), veh/h	26	2194	978	46	1126	1140	190	0	154	183	0	162
V/C Ratio(X)	0.49	0.33	0.08	0.58	0.91	0.95	0.44	0.00	0.16	0.22	0.00	0.11
Avail Cap(c_a), veh/h	374	2237	998	280	1156	1170	726	0	824	715	0	865
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.7	7.4	6.1	44.0	13.3	14.2	41.0	0.0	38.3	40.1	0.0	38.1
Incr Delay (d2), s/veh	5.2	0.0	0.0	4.2	10.6	15.5	0.6	0.0	0.2	0.2	0.0	0.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.3	2.9	0.5	0.7	18.3	21.7	1.8	0.0	0.5	0.9	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.0	7.5	6.2	48.2	24.0	29.7	41.6	0.0	38.5	40.3	0.0	38.2
LnGrp LOS	D	A	A	D	C	C	D	A	D	D	A	D
Approach Vol, veh/h		815			2140			108			58	
Approach Delay, s/veh		8.0			27.2			40.9			39.7	
Approach LOS		A			C			D			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	15.9	10.0	65.6	15.9	8.4	67.2
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 45	* 15	* 60	* 45	20.0	62.0
Max Q Clear Time (g_c+I1), s	8.3	3.4	10.8	5.9	2.7	54.4
Green Ext Time (p_c), s	0.2	0.0	3.9	0.1	0.0	6.0

Intersection Summary	
HCM 6th Ctrl Delay	22.9
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	27.5
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	119	34	312	200	19	23	98	79	33	216	66
Future Vol, veh/h	38	119	34	312	200	19	23	98	79	33	216	66
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	147	42	385	247	23	28	121	98	41	267	81
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	16.2	34.1	17.7	29.4
HCM LOS	C	D	C	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	55%	0%	78%	0%	91%	0%	77%
Vol Right, %	0%	45%	0%	22%	0%	9%	0%	23%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	23	177	38	153	312	219	33	282
LT Vol	23	0	38	0	312	0	33	0
Through Vol	0	98	0	119	0	200	0	216
RT Vol	0	79	0	34	0	19	0	66
Lane Flow Rate	28	219	47	189	385	270	41	348
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.07	0.49	0.116	0.43	0.863	0.563	0.096	0.758
Departure Headway (Hd)	8.916	8.074	8.874	8.194	8.066	7.49	8.526	7.841
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	400	444	403	438	447	479	419	460
Service Time	6.7	5.857	6.664	5.983	5.844	5.267	6.3	5.615
HCM Lane V/C Ratio	0.07	0.493	0.117	0.432	0.861	0.564	0.098	0.757
HCM Control Delay	12.4	18.4	12.8	17.1	44.2	19.6	12.2	31.4
HCM Lane LOS	B	C	B	C	E	C	B	D
HCM 95th-tile Q	0.2	2.6	0.4	2.1	8.8	3.4	0.3	6.4

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	370	100	2	12	2
Future Vol, veh/h	1	370	100	2	12	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	481	130	3	16	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	133	0	-	0	615	132
Stage 1	-	-	-	-	132	-
Stage 2	-	-	-	-	483	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1452	-	-	-	455	917
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	620	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1452	-	-	-	455	917
Mov Cap-2 Maneuver	-	-	-	-	455	-
Stage 1	-	-	-	-	893	-
Stage 2	-	-	-	-	620	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1452	-	-	-	490
HCM Lane V/C Ratio	0.001	-	-	-	0.037
HCM Control Delay (s)	7.5	-	-	-	12.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	285	97	9	92	10	17
Future Vol, veh/h	285	97	9	92	10	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	380	129	12	123	13	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	509	0	592	445
Stage 1	-	-	-	-	445	-
Stage 2	-	-	-	-	147	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1056	-	469	613
Stage 1	-	-	-	-	646	-
Stage 2	-	-	-	-	880	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1056	-	464	613
Mov Cap-2 Maneuver	-	-	-	-	464	-
Stage 1	-	-	-	-	646	-
Stage 2	-	-	-	-	870	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	548	-	-	1056	-
HCM Lane V/C Ratio	0.066	-	-	0.011	-
HCM Control Delay (s)	12	-	-	8.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

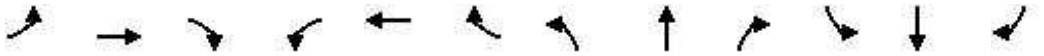
Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	33	22	21	6	54	57
Future Vol, veh/h	33	22	21	6	54	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	29	28	8	72	76

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	36	0	-	0	149	32
Stage 1	-	-	-	-	32	-
Stage 2	-	-	-	-	117	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1575	-	-	-	843	1042
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	908	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1575	-	-	-	819	1042
Mov Cap-2 Maneuver	-	-	-	-	819	-
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	908	-

Approach	EB	WB	SB
HCM Control Delay, s	4.4	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1575	-	-	-	920
HCM Lane V/C Ratio	0.028	-	-	-	0.161
HCM Control Delay (s)	7.4	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	711	2	18	501	60	53	6	45	241	8	385
Future Volume (veh/h)	130	711	2	18	501	60	53	6	45	241	8	385
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	143	781	2	20	551	62	58	7	34	265	9	315
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	1142	3	42	777	87	90	49	238	382	11	373
Arrive On Green	0.10	0.31	0.31	0.02	0.24	0.24	0.05	0.18	0.18	0.11	0.24	0.24
Sat Flow, veh/h	1781	3636	9	1781	3221	361	1781	278	1350	3456	44	1548
Grp Volume(v), veh/h	143	382	401	20	303	310	58	0	41	265	0	324
Grp Sat Flow(s),veh/h/ln	1781	1777	1869	1781	1777	1805	1781	0	1627	1728	0	1592
Q Serve(g_s), s	4.9	11.7	11.7	0.7	9.8	9.8	2.0	0.0	1.3	4.6	0.0	12.1
Cycle Q Clear(g_c), s	4.9	11.7	11.7	0.7	9.8	9.8	2.0	0.0	1.3	4.6	0.0	12.1
Prop In Lane	1.00		0.00	1.00		0.20	1.00		0.83	1.00		0.97
Lane Grp Cap(c), veh/h	186	558	587	42	429	435	90	0	287	382	0	384
V/C Ratio(X)	0.77	0.68	0.68	0.48	0.71	0.71	0.64	0.00	0.14	0.69	0.00	0.84
Avail Cap(c_a), veh/h	1281	1136	1194	712	1136	1154	712	0	650	1380	0	636
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.3	18.7	18.7	30.2	21.7	21.7	29.1	0.0	21.8	26.8	0.0	22.6
Incr Delay (d2), s/veh	3.6	1.1	1.1	3.1	1.6	1.6	2.8	0.0	0.1	0.9	0.0	2.4
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	2.2	4.6	4.8	0.3	4.0	4.0	0.9	0.0	0.5	1.8	0.0	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.9	19.9	19.8	33.3	23.3	23.4	31.9	0.0	21.9	27.7	0.0	25.0
LnGrp LOS	C	B	B	C	C	C	C	A	C	C	A	C
Approach Vol, veh/h		926			633			99			589	
Approach Delay, s/veh		21.5			23.7			27.8			26.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	16.3	8.3	25.3	8.7	20.4	12.8	20.7
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	25.0	* 25	* 25	40.0	25.0	25.0	* 45	* 40
Max Q Clear Time (g_c+I1), s	6.6	3.3	2.7	13.7	4.0	14.1	6.9	11.8
Green Ext Time (p_c), s	0.4	0.1	0.0	4.3	0.0	0.9	0.2	3.3

Intersection Summary	
HCM 6th Ctrl Delay	23.6
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	1772	65	27	992	53	136	14	51	245	27	11
Future Volume (veh/h)	6	1772	65	27	992	53	136	14	51	245	27	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	6	1827	48	28	1023	53	140	14	38	253	28	8
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	14	1925	859	47	1942	101	361	103	279	345	323	92
Arrive On Green	0.01	0.54	0.54	0.03	0.57	0.57	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1781	3554	1585	1781	3437	178	1372	445	1208	1352	1399	400
Grp Volume(v), veh/h	6	1827	48	28	529	547	140	0	52	253	0	36
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1838	1372	0	1653	1352	0	1798
Q Serve(g_s), s	0.4	52.5	1.5	1.7	20.0	20.0	9.7	0.0	2.7	19.8	0.0	1.7
Cycle Q Clear(g_c), s	0.4	52.5	1.5	1.7	20.0	20.0	11.4	0.0	2.7	22.5	0.0	1.7
Prop In Lane	1.00		1.00	1.00		0.10	1.00		0.73	1.00		0.22
Lane Grp Cap(c), veh/h	14	1925	859	47	1004	1039	361	0	381	345	0	415
V/C Ratio(X)	0.44	0.95	0.06	0.60	0.53	0.53	0.39	0.00	0.14	0.73	0.00	0.09
Avail Cap(c_a), veh/h	329	1969	878	247	1017	1052	615	0	687	595	0	747
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	53.5	23.4	11.7	52.2	14.6	14.6	37.2	0.0	33.1	42.0	0.0	32.7
Incr Delay (d2), s/veh	8.2	10.4	0.0	4.5	0.2	0.2	0.3	0.0	0.1	1.1	0.0	0.0
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.2	23.3	0.5	0.8	7.7	8.0	3.3	0.0	1.1	6.7	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.7	33.8	11.7	56.6	14.8	14.8	37.4	0.0	33.2	43.2	0.0	32.7
LnGrp LOS	E	C	B	E	B	B	D	A	C	D	A	C
Approach Vol, veh/h		1881			1104			192			289	
Approach Delay, s/veh		33.3			15.9			36.3			41.9	
Approach LOS		C			B			D			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	32.5	10.3	65.5	32.5	7.8	68.0
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 45	* 15	* 60	* 45	20.0	62.0
Max Q Clear Time (g_c+I1), s	13.4	3.7	54.5	24.5	2.4	22.0
Green Ext Time (p_c), s	0.4	0.0	4.2	0.5	0.0	5.3

Intersection Summary	
HCM 6th Ctrl Delay	28.6
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Appendix E

Opening Year Plus Project LOS Calculations

HEADWAY TRANSPORTATION

Intersection	
Intersection Delay, s/veh	62.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	89	184	28	88	131	28	12	230	258	33	182	63
Future Vol, veh/h	89	184	28	88	131	28	12	230	258	33	182	63
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	105	216	33	104	154	33	14	271	304	39	214	74
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	20.5	17.5	130.5	23.8
HCM LOS	C	C	F	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	47%	0%	87%	0%	82%	0%	74%
Vol Right, %	0%	53%	0%	13%	0%	18%	0%	26%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	12	488	89	212	88	159	33	245
LT Vol	12	0	89	0	88	0	33	0
Through Vol	0	230	0	184	0	131	0	182
RT Vol	0	258	0	28	0	28	0	63
Lane Flow Rate	14	574	105	249	104	187	39	288
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.033	1.2	0.258	0.572	0.26	0.437	0.094	0.643
Departure Headway (Hd)	8.423	7.526	9.47	8.853	9.677	9.026	9.218	8.509
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	426	482	382	412	374	402	391	427
Service Time	6.166	5.269	7.17	6.553	7.377	6.726	6.918	6.209
HCM Lane V/C Ratio	0.033	1.191	0.275	0.604	0.278	0.465	0.1	0.674
HCM Control Delay	11.5	133.4	15.4	22.7	15.7	18.5	12.9	25.3
HCM Lane LOS	B	F	C	C	C	C	B	D
HCM 95th-tile Q	0.1	21.7	1	3.5	1	2.2	0.3	4.4

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	126	363	5	1	2
Future Vol, veh/h	9	126	363	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	137	395	5	1	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	400	0	-	0	555	398
Stage 1	-	-	-	-	398	-
Stage 2	-	-	-	-	157	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1159	-	-	-	493	652
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	871	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1159	-	-	-	489	652
Mov Cap-2 Maneuver	-	-	-	-	489	-
Stage 1	-	-	-	-	672	-
Stage 2	-	-	-	-	871	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1159	-	-	-	587
HCM Lane V/C Ratio	0.008	-	-	-	0.006
HCM Control Delay (s)	8.1	0	-	-	11.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	117	366	5	1	2
Future Vol, veh/h	10	117	366	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	127	398	5	1	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	403	0	-	0	550	401
Stage 1	-	-	-	-	401	-
Stage 2	-	-	-	-	149	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1156	-	-	-	496	649
Stage 1	-	-	-	-	676	-
Stage 2	-	-	-	-	879	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1156	-	-	-	491	649
Mov Cap-2 Maneuver	-	-	-	-	491	-
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	879	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1156	-	-	-	586
HCM Lane V/C Ratio	0.009	-	-	-	0.006
HCM Control Delay (s)	8.1	0	-	-	11.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	95	366	12	3	5
Future Vol, veh/h	23	95	366	12	3	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	103	398	13	3	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	411	0	-	0	558	405
Stage 1	-	-	-	-	405	-
Stage 2	-	-	-	-	153	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1148	-	-	-	491	646
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	875	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1148	-	-	-	480	646
Mov Cap-2 Maneuver	-	-	-	-	480	-
Stage 1	-	-	-	-	658	-
Stage 2	-	-	-	-	875	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1148	-	-	-	572
HCM Lane V/C Ratio	0.022	-	-	-	0.015
HCM Control Delay (s)	8.2	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	77	372	17	4	6
Future Vol, veh/h	21	77	372	17	4	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	28	103	496	23	5	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	519	0	-	0	667	508
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	159	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1032	-	-	-	419	559
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	862	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	1032	-	-	-	408	559
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	862	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1032	-	-	-	487
HCM Lane V/C Ratio	0.027	-	-	-	0.027
HCM Control Delay (s)	8.6	-	-	-	12.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	2.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	71	10	4	300	89	9
Future Vol, veh/h	71	10	4	300	89	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	95	13	5	400	119	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	108	0	512	102
Stage 1	-	-	-	-	102	-
Stage 2	-	-	-	-	410	-
Critical Hdwy	-	-	4.14	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.236	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1470	-	518	948
Stage 1	-	-	-	-	917	-
Stage 2	-	-	-	-	666	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1470	-	516	948
Mov Cap-2 Maneuver	-	-	-	-	516	-
Stage 1	-	-	-	-	917	-
Stage 2	-	-	-	-	664	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	539	-	-	1470	-
HCM Lane V/C Ratio	0.242	-	-	0.004	-
HCM Control Delay (s)	13.8	-	-	7.5	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	61	13	18	42	7	16
Future Vol, veh/h	61	13	18	42	7	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	81	17	24	56	9	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	80	0	-	0	231	52
Stage 1	-	-	-	-	52	-
Stage 2	-	-	-	-	179	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1518	-	-	-	757	1016
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	852	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1518	-	-	-	716	1016
Mov Cap-2 Maneuver	-	-	-	-	716	-
Stage 1	-	-	-	-	918	-
Stage 2	-	-	-	-	852	-

Approach	EB	WB	SB
HCM Control Delay, s	6.2	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1518	-	-	-	901
HCM Lane V/C Ratio	0.054	-	-	-	0.034
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	385	264	18	23	590	187	8	6	3	69	4	171
Future Volume (veh/h)	385	264	18	23	590	187	8	6	3	69	4	171
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	487	334	20	29	747	221	10	8	3	87	5	158
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	523	1986	118	48	868	257	21	114	43	156	6	191
Arrive On Green	0.30	0.60	0.60	0.03	0.33	0.33	0.01	0.09	0.09	0.05	0.13	0.13
Sat Flow, veh/h	1739	3326	198	1739	2639	781	1739	1266	475	3374	48	1507
Grp Volume(v), veh/h	487	174	180	29	491	477	10	0	11	87	0	163
Grp Sat Flow(s),veh/h/ln	1739	1735	1790	1739	1735	1685	1739	0	1740	1687	0	1555
Q Serve(g_s), s	26.7	4.4	4.4	1.6	26.0	26.0	0.6	0.0	0.6	2.5	0.0	10.1
Cycle Q Clear(g_c), s	26.7	4.4	4.4	1.6	26.0	26.0	0.6	0.0	0.6	2.5	0.0	10.1
Prop In Lane	1.00		0.11	1.00		0.46	1.00		0.27	1.00		0.97
Lane Grp Cap(c), veh/h	523	1036	1069	48	571	555	21	0	156	156	0	197
V/C Ratio(X)	0.93	0.17	0.17	0.60	0.86	0.86	0.47	0.00	0.07	0.56	0.00	0.83
Avail Cap(c_a), veh/h	796	1036	1069	442	706	686	442	0	443	858	0	395
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.4	8.9	8.9	47.2	30.9	30.9	48.2	0.0	41.0	45.9	0.0	41.9
Incr Delay (d2), s/veh	10.7	0.1	0.1	4.4	8.4	8.6	6.0	0.0	0.1	1.2	0.0	3.3
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	12.5	1.6	1.6	0.8	11.9	11.6	0.3	0.0	0.2	1.1	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.1	8.9	8.9	51.6	39.2	39.4	54.2	0.0	41.0	47.1	0.0	45.2
LnGrp LOS	D	A	A	D	D	D	D	A	D	D	A	D
Approach Vol, veh/h		841			997			21			250	
Approach Delay, s/veh		29.3			39.7			47.3			45.8	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.3	14.1	9.5	64.3	6.7	17.8	35.9	37.9
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	25.0	* 25	* 25	40.0	25.0	25.0	* 45	* 40
Max Q Clear Time (g_c+I1), s	4.5	2.6	3.6	6.4	2.6	12.1	28.7	28.0
Green Ext Time (p_c), s	0.1	0.0	0.0	1.8	0.0	0.4	0.9	4.3

Intersection Summary	
HCM 6th Ctrl Delay	36.3
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	682	101	25	1761	251	78	15	12	45	14	3
Future Volume (veh/h)	12	682	101	25	1761	251	78	15	12	45	14	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796
Adj Flow Rate, veh/h	13	726	76	27	1873	263	83	16	10	48	15	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	26	2200	981	46	1995	274	190	95	60	181	143	19
Arrive On Green	0.02	0.64	0.64	0.03	0.66	0.66	0.09	0.09	0.09	0.09	0.09	0.09
Sat Flow, veh/h	1711	3413	1522	1711	3015	413	1341	1034	646	1330	1552	207
Grp Volume(v), veh/h	13	726	76	27	1041	1095	83	0	26	48	0	17
Grp Sat Flow(s),veh/h/ln	1711	1706	1522	1711	1706	1722	1341	0	1680	1330	0	1759
Q Serve(g_s), s	0.7	8.9	1.7	1.4	48.8	54.6	5.6	0.0	1.3	3.2	0.0	0.8
Cycle Q Clear(g_c), s	0.7	8.9	1.7	1.4	48.8	54.6	6.4	0.0	1.3	4.5	0.0	0.8
Prop In Lane	1.00		1.00	1.00		0.24	1.00		0.38	1.00		0.12
Lane Grp Cap(c), veh/h	26	2200	981	46	1129	1139	190	0	155	181	0	162
V/C Ratio(X)	0.49	0.33	0.08	0.58	0.92	0.96	0.44	0.00	0.17	0.26	0.00	0.10
Avail Cap(c_a), veh/h	371	2219	990	278	1146	1157	720	0	819	707	0	858
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	45.1	7.4	6.1	44.4	13.5	14.5	41.3	0.0	38.6	40.7	0.0	38.4
Incr Delay (d2), s/veh	5.3	0.0	0.0	4.3	11.7	17.6	0.6	0.0	0.2	0.3	0.0	0.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.3	2.9	0.5	0.7	19.1	23.0	1.8	0.0	0.5	1.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.3	7.4	6.1	48.6	25.2	32.1	41.9	0.0	38.8	41.0	0.0	38.5
LnGrp LOS	D	A	A	D	C	C	D	A	D	D	A	D
Approach Vol, veh/h		815			2163			109			65	
Approach Delay, s/veh		8.0			29.0			41.2			40.3	
Approach LOS		A			C			D			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	16.0	10.0	66.3	16.0	8.4	67.9
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 45	* 15	* 60	* 45	20.0	62.0
Max Q Clear Time (g_c+I1), s	8.4	3.4	10.9	6.5	2.7	56.6
Green Ext Time (p_c), s	0.2	0.0	3.9	0.1	0.0	4.5

Intersection Summary	
HCM 6th Ctrl Delay	24.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	35.6
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	124	34	348	218	24	23	98	90	34	216	66
Future Vol, veh/h	38	124	34	348	218	24	23	98	90	34	216	66
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	153	42	430	269	30	28	121	111	42	267	81
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	17.3	49.3	19.5	32.2
HCM LOS	C	E	C	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	52%	0%	78%	0%	90%	0%	77%
Vol Right, %	0%	48%	0%	22%	0%	10%	0%	23%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	23	188	38	158	348	242	34	282
LT Vol	23	0	38	0	348	0	34	0
Through Vol	0	98	0	124	0	218	0	216
RT Vol	0	90	0	34	0	24	0	66
Lane Flow Rate	28	232	47	195	430	299	42	348
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.072	0.534	0.119	0.458	0.982	0.634	0.102	0.783
Departure Headway (Hd)	9.158	8.29	9.132	8.456	8.229	7.643	8.787	8.101
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	390	434	391	423	438	469	407	446
Service Time	6.944	6.076	6.927	6.25	6.015	5.428	6.564	5.877
HCM Lane V/C Ratio	0.072	0.535	0.12	0.461	0.982	0.638	0.103	0.78
HCM Control Delay	12.7	20.3	13.2	18.3	67.7	22.9	12.6	34.6
HCM Lane LOS	B	C	B	C	F	C	B	D
HCM 95th-tile Q	0.2	3.1	0.4	2.3	12.1	4.3	0.3	6.9

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	3	385	152	1	5	9
Future Vol, veh/h	3	385	152	1	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	418	165	1	5	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	166	0	-	0	590	166
Stage 1	-	-	-	-	166	-
Stage 2	-	-	-	-	424	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1412	-	-	-	470	878
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	660	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1412	-	-	-	469	878
Mov Cap-2 Maneuver	-	-	-	-	469	-
Stage 1	-	-	-	-	860	-
Stage 2	-	-	-	-	660	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1412	-	-	-	669
HCM Lane V/C Ratio	0.002	-	-	-	0.023
HCM Control Delay (s)	7.6	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	3	387	144	1	5	9
Future Vol, veh/h	3	387	144	1	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	421	157	1	5	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	158	0	-	0	585	158
Stage 1	-	-	-	-	158	-
Stage 2	-	-	-	-	427	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1422	-	-	-	473	887
Stage 1	-	-	-	-	871	-
Stage 2	-	-	-	-	658	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1422	-	-	-	472	887
Mov Cap-2 Maneuver	-	-	-	-	472	-
Stage 1	-	-	-	-	868	-
Stage 2	-	-	-	-	658	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1422	-	-	-	675
HCM Lane V/C Ratio	0.002	-	-	-	0.023
HCM Control Delay (s)	7.5	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	386	124	3	12	21
Future Vol, veh/h	6	386	124	3	12	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	420	135	3	13	23

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	138	0	-	0	571	137
Stage 1	-	-	-	-	137	-
Stage 2	-	-	-	-	434	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1446	-	-	-	482	911
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	653	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1446	-	-	-	479	911
Mov Cap-2 Maneuver	-	-	-	-	479	-
Stage 1	-	-	-	-	885	-
Stage 2	-	-	-	-	653	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1446	-	-	-	686
HCM Lane V/C Ratio	0.005	-	-	-	0.052
HCM Control Delay (s)	7.5	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	391	106	5	23	21
Future Vol, veh/h	7	391	106	5	23	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	508	138	6	30	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	144	0	-	0	667	141
Stage 1	-	-	-	-	141	-
Stage 2	-	-	-	-	526	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1438	-	-	-	424	907
Stage 1	-	-	-	-	886	-
Stage 2	-	-	-	-	593	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1438	-	-	-	421	907
Mov Cap-2 Maneuver	-	-	-	-	421	-
Stage 1	-	-	-	-	881	-
Stage 2	-	-	-	-	593	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1438	-	-	-	566
HCM Lane V/C Ratio	0.006	-	-	-	0.101
HCM Control Delay (s)	7.5	-	-	-	12.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	308	106	9	99	12	17
Future Vol, veh/h	308	106	9	99	12	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	411	141	12	132	16	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	552	0	638	482
Stage 1	-	-	-	-	482	-
Stage 2	-	-	-	-	156	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1018	-	441	584
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	872	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1018	-	436	584
Mov Cap-2 Maneuver	-	-	-	-	436	-
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	862	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	512	-	-	1018	-
HCM Lane V/C Ratio	0.076	-	-	0.012	-
HCM Control Delay (s)	12.6	-	-	8.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

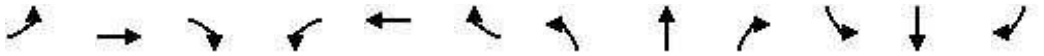
Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	34	22	21	7	59	61
Future Vol, veh/h	34	22	21	7	59	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	29	28	9	79	81

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	37	0	-	0	152	33
Stage 1	-	-	-	-	33	-
Stage 2	-	-	-	-	119	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1574	-	-	-	840	1041
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	906	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1574	-	-	-	816	1041
Mov Cap-2 Maneuver	-	-	-	-	816	-
Stage 1	-	-	-	-	960	-
Stage 2	-	-	-	-	906	-

Approach	EB	WB	SB
HCM Control Delay, s	4.5	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1574	-	-	-	917
HCM Lane V/C Ratio	0.029	-	-	-	0.174
HCM Control Delay (s)	7.4	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	711	2	18	501	64	53	6	45	254	8	408
Future Volume (veh/h)	137	711	2	18	501	64	53	6	45	254	8	408
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	151	781	2	20	551	66	58	7	34	279	9	334
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	195	1158	3	42	767	92	89	51	247	393	10	389
Arrive On Green	0.11	0.32	0.32	0.02	0.24	0.24	0.05	0.18	0.18	0.11	0.25	0.25
Sat Flow, veh/h	1781	3636	9	1781	3197	382	1781	278	1350	3456	42	1550
Grp Volume(v), veh/h	151	382	401	20	306	311	58	0	41	279	0	343
Grp Sat Flow(s),veh/h/ln	1781	1777	1869	1781	1777	1802	1781	0	1627	1728	0	1591
Q Serve(g_s), s	5.4	12.1	12.1	0.7	10.3	10.3	2.1	0.0	1.4	5.1	0.0	13.4
Cycle Q Clear(g_c), s	5.4	12.1	12.1	0.7	10.3	10.3	2.1	0.0	1.4	5.1	0.0	13.4
Prop In Lane	1.00		0.00	1.00		0.21	1.00		0.83	1.00		0.97
Lane Grp Cap(c), veh/h	195	566	595	42	427	433	89	0	298	393	0	400
V/C Ratio(X)	0.77	0.67	0.67	0.48	0.72	0.72	0.65	0.00	0.14	0.71	0.00	0.86
Avail Cap(c_a), veh/h	1234	1094	1151	685	1094	1109	685	0	626	1330	0	612
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.2	19.2	19.2	31.3	22.7	22.7	30.3	0.0	22.3	27.8	0.0	23.2
Incr Delay (d2), s/veh	3.6	1.0	1.0	3.2	1.7	1.7	3.0	0.0	0.1	0.9	0.0	4.8
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	2.4	4.7	5.0	0.3	4.2	4.3	0.9	0.0	0.5	2.0	0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.7	20.3	20.2	34.5	24.3	24.4	33.3	0.0	22.3	28.6	0.0	28.0
LnGrp LOS	C	C	C	C	C	C	C	A	C	C	A	C
Approach Vol, veh/h		934			637			99			622	
Approach Delay, s/veh		22.1			24.7			28.7			28.3	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.2	17.2	8.3	26.3	8.7	21.6	13.4	21.2
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	25.0	* 25	* 25	40.0	25.0	25.0	* 45	* 40
Max Q Clear Time (g_c+I1), s	7.1	3.4	2.7	14.1	4.1	15.4	7.4	12.3
Green Ext Time (p_c), s	0.4	0.1	0.0	4.3	0.0	1.0	0.2	3.3

Intersection Summary	
HCM 6th Ctrl Delay	24.8
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	1772	65	27	992	59	136	15	51	267	28	11
Future Volume (veh/h)	6	1772	65	27	992	59	136	15	51	267	28	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	6	1827	48	28	1023	59	140	15	38	275	29	8
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	14	1892	844	46	1897	109	380	115	293	364	348	96
Arrive On Green	0.01	0.53	0.53	0.03	0.56	0.56	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1781	3554	1585	1781	3415	197	1371	469	1188	1351	1411	389
Grp Volume(v), veh/h	6	1827	48	28	532	550	140	0	53	275	0	37
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1835	1371	0	1657	1351	0	1800
Q Serve(g_s), s	0.4	55.2	1.6	1.7	21.2	21.2	9.8	0.0	2.8	22.2	0.0	1.8
Cycle Q Clear(g_c), s	0.4	55.2	1.6	1.7	21.2	21.2	11.5	0.0	2.8	25.0	0.0	1.8
Prop In Lane	1.00		1.00	1.00		0.11	1.00		0.72	1.00		0.22
Lane Grp Cap(c), veh/h	14	1892	844	46	987	1019	380	0	408	364	0	443
V/C Ratio(X)	0.44	0.97	0.06	0.60	0.54	0.54	0.37	0.00	0.13	0.76	0.00	0.08
Avail Cap(c_a), veh/h	319	1909	851	239	987	1019	595	0	667	575	0	725
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	55.2	25.1	12.6	53.8	15.8	15.8	36.8	0.0	32.8	42.5	0.0	32.4
Incr Delay (d2), s/veh	8.2	13.2	0.0	4.7	0.3	0.3	0.2	0.0	0.1	1.2	0.0	0.0
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.2	25.3	0.6	0.8	8.4	8.7	3.3	0.0	1.1	7.5	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.4	38.3	12.6	58.5	16.1	16.1	37.1	0.0	32.8	43.7	0.0	32.4
LnGrp LOS	E	D	B	E	B	B	D	A	C	D	A	C
Approach Vol, veh/h		1881			1110			193			312	
Approach Delay, s/veh		37.8			17.2			35.9			42.4	
Approach LOS		D			B			D			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	35.0	10.4	66.3	35.0	7.8	68.8
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 45	* 15	* 60	* 45	20.0	62.0
Max Q Clear Time (g_c+I1), s	13.5	3.7	57.2	27.0	2.4	23.2
Green Ext Time (p_c), s	0.4	0.0	2.2	0.5	0.0	5.4

Intersection Summary	
HCM 6th Ctrl Delay	31.5
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Appendix F
Growth Factor Calculations

Appendix F
Growth Factor Calculations

Location -->	Arrowhead Dr	Arrowhead Dr	Goni Rd	Goni Rd	Arrowhead Dr	E. Nye Ln	E. College Pkwy	E. College Pkwy	Goni Rd	Goni Rd	US 50	US 50	Arrowhead Dr	Arrowhead Dr
	W of Goni Rd	E of Goni Rd	N of Arrowhead Dr	S of Arrowhead Dr	at Bowers Ln	at Bowers Ln	W of Goni Rrd	E of Goni Rrd	N of E. College Pkwy	S of E. College Pkwy	W of Arrowhead Dr	E of Arrowhead Dr	N of US 50	S of US 50
2020 Model Volume	3,051	10,413	3,866	11,146	4,785	3,400	27,548	16,745	10,944	13,034	35,396	32,433	3,144	463
2050 Model Volume	4,634	11,892	5,657	12,843	6,848	6,512	32,489	22,479	12,529	15,118	45,023	42,227	5,544	1,300
30-Year Model Difference	1,583	1,479	1,791	1,697	2,063	3,112	4,941	5,734	1,585	2,084	9,627	9,794	2,400	837
27-Year Model Difference	1,425	1,331	1,612	1,527	1,857	2,801	4,447	5,161	1,427	1,876	8,664	8,815	2,160	753
Growth Rates														
Growth Factor	**1.47**	**1.13**	**1.42**	**1.14**	**1.39**	**1.82**	**1.16**	**1.31**	**1.13**	**1.14**	**1.24**	**1.27**	**1.69**	**2.63**
27-Year Adjusted Growth Factor (2023-2050)	**1.47**	**1.13**	**1.42**	**1.14**	**1.39**	**1.82**	**1.16**	**1.31**	**1.13**	**1.14**	**1.24**	**1.27**	**1.69**	**2.63**
Annual Growth	1.7%	0.5%	1.5%	0.5%	1.4%	3.1%	0.6%	1.1%	0.5%	0.5%	0.9%	1.0%	2.5%	6.0%
Average	1.6%													

Appendix G
Future Year LOS Calculations

Intersection	
Intersection Delay, s/veh	112.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	148	209	36	89	156	32	16	307	289	35	242	111
Future Vol, veh/h	148	209	36	89	156	32	16	307	289	35	242	111
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	161	227	39	97	170	35	17	334	314	38	263	121
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	25.8	21.4	248.7	50.4
HCM LOS	D	C	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	52%	0%	85%	0%	83%	0%	69%
Vol Right, %	0%	48%	0%	15%	0%	17%	0%	31%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	596	148	245	89	188	35	353
LT Vol	16	0	148	0	89	0	35	0
Through Vol	0	307	0	209	0	156	0	242
RT Vol	0	289	0	36	0	32	0	111
Lane Flow Rate	17	648	161	266	97	204	38	384
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.044	1.491	0.418	0.647	0.26	0.513	0.096	0.894
Departure Headway (Hd)	9.156	8.284	10.517	9.881	10.901	10.245	10.094	9.337
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	391	441	344	368	332	354	357	391
Service Time	6.918	6.045	8.217	7.581	8.601	7.945	7.794	7.037
HCM Lane V/C Ratio	0.043	1.469	0.468	0.723	0.292	0.576	0.106	0.982
HCM Control Delay	12.3	255	20.6	29	17.4	23.3	13.9	54
HCM Lane LOS	B	F	C	D	C	C	B	F
HCM 95th-tile Q	0.1	33.6	2	4.3	1	2.8	0.3	9.1

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	98	471	8	1	1
Future Vol, veh/h	1	98	471	8	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	1	107	512	9	1	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	521	0	-	0	626	517
Stage 1	-	-	-	-	517	-
Stage 2	-	-	-	-	109	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1030	-	-	-	443	552
Stage 1	-	-	-	-	592	-
Stage 2	-	-	-	-	908	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1030	-	-	-	443	552
Mov Cap-2 Maneuver	-	-	-	-	443	-
Stage 1	-	-	-	-	591	-
Stage 2	-	-	-	-	908	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1030	-	-	-	492
HCM Lane V/C Ratio	0.001	-	-	-	0.004
HCM Control Delay (s)	8.5	-	-	-	12.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	90	9	4	384	95	9
Future Vol, veh/h	90	9	4	384	95	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	98	10	4	417	103	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	108	0	528	103
Stage 1	-	-	-	-	103	-
Stage 2	-	-	-	-	425	-
Critical Hdwy	-	-	4.14	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.236	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1470	-	507	946
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	655	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1470	-	505	946
Mov Cap-2 Maneuver	-	-	-	-	505	-
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	653	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	526	-	-	1470	-
HCM Lane V/C Ratio	0.215	-	-	0.003	-
HCM Control Delay (s)	13.7	-	-	7.5	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.8	-	-	0	-

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	32	48	38	7	16
Future Vol, veh/h	75	32	48	38	7	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	82	35	52	41	8	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	93	0	-	0	272	73
Stage 1	-	-	-	-	73	-
Stage 2	-	-	-	-	199	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1501	-	-	-	717	989
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	835	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1501	-	-	-	677	989
Mov Cap-2 Maneuver	-	-	-	-	677	-
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	835	-

Approach	EB	WB	SB
HCM Control Delay, s	5.3	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1501	-	-	-	867
HCM Lane V/C Ratio	0.054	-	-	-	0.029
HCM Control Delay (s)	7.5	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1

HCM 6th Signalized Intersection Summary
8: Goni Rd & E. College Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	364	336	20	39	718	232	9	7	4	89	5	180
Future Volume (veh/h)	364	336	20	39	718	232	9	7	4	89	5	180
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	396	365	19	42	780	228	10	8	3	97	5	144
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	436	1859	96	65	917	268	22	98	37	179	6	183
Arrive On Green	0.25	0.55	0.55	0.04	0.35	0.35	0.01	0.08	0.08	0.05	0.12	0.12
Sat Flow, veh/h	1739	3355	174	1739	2647	774	1739	1266	475	3374	52	1503
Grp Volume(v), veh/h	396	188	196	42	511	497	10	0	11	97	0	149
Grp Sat Flow(s),veh/h/ln	1739	1735	1795	1739	1735	1687	1739	0	1740	1687	0	1555
Q Serve(g_s), s	18.7	4.6	4.6	2.0	23.1	23.1	0.5	0.0	0.5	2.4	0.0	7.9
Cycle Q Clear(g_c), s	18.7	4.6	4.6	2.0	23.1	23.1	0.5	0.0	0.5	2.4	0.0	7.9
Prop In Lane	1.00		0.10	1.00		0.46	1.00		0.27	1.00		0.97
Lane Grp Cap(c), veh/h	436	961	995	65	601	584	22	0	135	179	0	189
V/C Ratio(X)	0.91	0.20	0.20	0.65	0.85	0.85	0.46	0.00	0.08	0.54	0.00	0.79
Avail Cap(c_a), veh/h	607	1173	1213	150	731	711	103	0	525	300	0	505
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.7	9.4	9.4	40.1	25.6	25.6	41.4	0.0	36.2	39.0	0.0	36.0
Incr Delay (d2), s/veh	12.1	0.1	0.1	4.1	7.6	7.8	5.7	0.0	0.1	0.9	0.0	2.7
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	9.0	1.6	1.7	0.9	10.3	10.0	0.2	0.0	0.2	1.0	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.8	9.5	9.5	44.2	33.2	33.4	47.1	0.0	36.3	39.9	0.0	38.8
LnGrp LOS	D	A	A	D	C	C	D	A	D	D	A	D
Approach Vol, veh/h		780			1050			21			246	
Approach Delay, s/veh		26.4			33.7			41.4			39.2	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.3	11.8	9.9	52.4	6.5	15.6	27.5	34.9
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	7.5	* 26	* 7.3	57.1	5.0	27.4	* 30	* 36
Max Q Clear Time (g_c+I1), s	4.4	2.5	4.0	6.6	2.5	9.9	20.7	25.1
Green Ext Time (p_c), s	0.0	0.0	0.0	2.0	0.0	0.4	0.5	4.2

Intersection Summary	
HCM 6th Ctrl Delay	31.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
9: N. Deer Run Rd/Arrowhead Dr & US 50

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	788	190	102	2071	325	155	35	30	56	33	5
Future Volume (veh/h)	15	788	190	102	2071	325	155	35	30	56	33	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796
Adj Flow Rate, veh/h	16	838	133	109	2203	336	165	37	0	60	35	3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	29	2053	916	132	1983	295	238	285	0	240	259	22
Arrive On Green	0.02	0.60	0.60	0.08	0.67	0.67	0.16	0.16	0.00	0.16	0.16	0.16
Sat Flow, veh/h	1711	3413	1522	1711	2980	443	1315	1796	0	1317	1631	140
Grp Volume(v), veh/h	16	838	133	109	1237	1302	165	37	0	60	0	38
Grp Sat Flow(s),veh/h/ln	1711	1706	1522	1711	1706	1717	1315	1796	0	1317	0	1771
Q Serve(g_s), s	1.2	17.4	5.1	8.4	89.2	89.2	16.5	2.4	0.0	5.5	0.0	2.5
Cycle Q Clear(g_c), s	1.2	17.4	5.1	8.4	89.2	89.2	19.0	2.4	0.0	7.9	0.0	2.5
Prop In Lane	1.00		1.00	1.00		0.26	1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	29	2053	916	132	1136	1142	238	285	0	240	0	281
V/C Ratio(X)	0.56	0.41	0.15	0.83	1.09	1.14	0.69	0.13	0.00	0.25	0.00	0.14
Avail Cap(c_a), veh/h	64	2053	916	236	1136	1142	368	462	0	369	0	456
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	65.4	14.1	11.7	61.0	22.4	22.4	56.6	48.4	0.0	51.8	0.0	48.5
Incr Delay (d2), s/veh	6.2	0.0	0.0	5.0	54.4	73.9	1.3	0.1	0.0	0.2	0.0	0.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.6	6.7	1.8	3.8	49.7	56.2	5.5	1.1	0.0	1.8	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.6	14.1	11.7	66.0	76.8	96.3	58.0	48.5	0.0	52.0	0.0	48.5
LnGrp LOS	E	B	B	E	F	F	E	D	A	D	A	D
Approach Vol, veh/h		987			2648			202			98	
Approach Delay, s/veh		14.7			85.9			56.2			50.7	
Approach LOS		B			F			E			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	28.8	17.8	87.4	28.8	9.2	96.0
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 35	* 19	* 76	* 35	5.0	89.2
Max Q Clear Time (g_c+I1), s	21.0	10.4	19.4	9.9	3.2	91.2
Green Ext Time (p_c), s	0.3	0.1	4.8	0.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	65.7
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	39.4
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	68	148	49	332	262	23	29	119	84	37	278	112
Future Vol, veh/h	68	148	49	332	262	23	29	119	84	37	278	112
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	74	161	53	361	285	25	32	129	91	40	302	122
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	19.3	40.2	20.3	61
HCM LOS	C	E	C	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	59%	0%	75%	0%	92%	0%	71%
Vol Right, %	0%	41%	0%	25%	0%	8%	0%	29%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	29	203	68	197	332	285	37	390
LT Vol	29	0	68	0	332	0	37	0
Through Vol	0	119	0	148	0	262	0	278
RT Vol	0	84	0	49	0	23	0	112
Lane Flow Rate	32	221	74	214	361	310	40	424
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.084	0.538	0.195	0.524	0.882	0.708	0.101	0.974
Departure Headway (Hd)	9.602	8.777	9.508	8.805	8.801	8.224	9	8.273
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	374	410	378	409	411	440	401	441
Service Time	7.353	6.527	7.263	6.559	6.554	5.977	6.7	5.973
HCM Lane V/C Ratio	0.086	0.539	0.196	0.523	0.878	0.705	0.1	0.961
HCM Control Delay	13.2	21.3	14.6	20.9	50	28.7	12.7	65.6
HCM Lane LOS	B	C	B	C	E	D	B	F
HCM 95th-tile Q	0.3	3.1	0.7	2.9	9	5.4	0.3	11.9

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	505	137	3	17	3
Future Vol, veh/h	1	505	137	3	17	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	549	149	3	18	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	152	0	-	0	702	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	551	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1429	-	-	-	404	895
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1429	-	-	-	404	895
Mov Cap-2 Maneuver	-	-	-	-	404	-
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	577	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1429	-	-	-	440
HCM Lane V/C Ratio	0.001	-	-	-	0.049
HCM Control Delay (s)	7.5	-	-	-	13.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	397	125	12	126	14	20
Future Vol, veh/h	397	125	12	126	14	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	432	136	13	137	15	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	568	0	663	500
Stage 1	-	-	-	-	500	-
Stage 2	-	-	-	-	163	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1004	-	426	571
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	866	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1004	-	420	571
Mov Cap-2 Maneuver	-	-	-	-	420	-
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	855	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	497	-	-	1004	-
HCM Lane V/C Ratio	0.074	-	-	0.013	-
HCM Control Delay (s)	12.8	-	-	8.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	66	49	8	65	77
Future Vol, veh/h	40	66	49	8	65	77
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	72	53	9	71	84

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	62	0	-	0	216	58
Stage 1	-	-	-	-	58	-
Stage 2	-	-	-	-	158	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1541	-	-	-	772	1008
Stage 1	-	-	-	-	965	-
Stage 2	-	-	-	-	871	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1541	-	-	-	750	1008
Mov Cap-2 Maneuver	-	-	-	-	750	-
Stage 1	-	-	-	-	937	-
Stage 2	-	-	-	-	871	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1541	-	-	-	871
HCM Lane V/C Ratio	0.028	-	-	-	0.177
HCM Control Delay (s)	7.4	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

HCM 6th Signalized Intersection Summary
8: Goni Rd & E. College Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	142	853	3	23	639	82	60	8	51	335	11	423
Future Volume (veh/h)	142	853	3	23	639	82	60	8	51	335	11	423
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	154	927	3	25	695	80	65	9	39	364	12	344
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	193	1288	4	48	898	103	88	52	224	465	14	397
Arrive On Green	0.11	0.35	0.35	0.03	0.28	0.28	0.05	0.17	0.17	0.13	0.26	0.26
Sat Flow, veh/h	1781	3633	12	1781	3211	369	1781	306	1326	3456	54	1540
Grp Volume(v), veh/h	154	453	477	25	384	391	65	0	48	364	0	356
Grp Sat Flow(s),veh/h/ln	1781	1777	1868	1781	1777	1804	1781	0	1632	1728	0	1593
Q Serve(g_s), s	6.3	16.5	16.5	1.0	14.8	14.8	2.7	0.0	1.9	7.6	0.0	15.9
Cycle Q Clear(g_c), s	6.3	16.5	16.5	1.0	14.8	14.8	2.7	0.0	1.9	7.6	0.0	15.9
Prop In Lane	1.00		0.01	1.00		0.20	1.00		0.81	1.00		0.97
Lane Grp Cap(c), veh/h	193	630	662	48	497	505	88	0	275	465	0	410
V/C Ratio(X)	0.80	0.72	0.72	0.52	0.77	0.77	0.74	0.00	0.17	0.78	0.00	0.87
Avail Cap(c_a), veh/h	423	1134	1193	143	872	886	203	0	521	927	0	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.4	20.9	20.9	35.8	24.7	24.7	34.9	0.0	26.5	31.2	0.0	26.5
Incr Delay (d2), s/veh	4.0	1.2	1.1	3.2	1.9	1.9	4.4	0.0	0.1	1.1	0.0	2.2
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	2.8	6.6	6.9	0.5	6.2	6.3	1.2	0.0	0.7	3.1	0.0	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.5	22.0	22.0	39.0	26.6	26.6	39.3	0.0	26.7	32.3	0.0	28.7
LnGrp LOS	D	C	C	D	C	C	D	A	C	C	A	C
Approach Vol, veh/h		1084			800			113			720	
Approach Delay, s/veh		24.0			27.0			33.9			30.5	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.8	17.9	8.8	32.0	9.2	24.5	14.4	26.5
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	20.0	* 24	* 6	47.6	8.5	34.7	* 18	* 37
Max Q Clear Time (g_c+I1), s	9.6	3.9	3.0	18.5	4.7	17.9	8.3	16.8
Green Ext Time (p_c), s	0.4	0.1	0.0	5.4	0.0	1.3	0.2	4.0

Intersection Summary	
HCM 6th Ctrl Delay	27.0
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
9: N. Deer Run Rd/Arrowhead Dr & US 50

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	2081	131	83	1144	79	263	33	60	325	69	11
Future Volume (veh/h)	10	2081	131	83	1144	79	263	33	60	325	69	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	10	2145	58	86	1179	79	271	34	0	335	71	8
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	20	1976	882	91	2026	136	330	464	0	369	409	46
Arrive On Green	0.01	0.56	0.56	0.05	0.60	0.60	0.25	0.25	0.00	0.25	0.25	0.25
Sat Flow, veh/h	1781	3554	1585	1781	3380	226	1320	1870	0	1375	1651	186
Grp Volume(v), veh/h	10	2145	58	86	619	639	271	34	0	335	0	79
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1830	1320	1870	0	1375	0	1837
Q Serve(g_s), s	0.8	83.7	2.5	7.2	32.3	32.4	30.6	2.1	0.0	35.2	0.0	5.1
Cycle Q Clear(g_c), s	0.8	83.7	2.5	7.2	32.3	32.4	35.7	2.1	0.0	37.3	0.0	5.1
Prop In Lane	1.00		1.00	1.00		0.12	1.00		0.00	1.00		0.10
Lane Grp Cap(c), veh/h	20	1976	882	91	1065	1096	330	464	0	369	0	455
V/C Ratio(X)	0.49	1.09	0.07	0.94	0.58	0.58	0.82	0.07	0.00	0.91	0.00	0.17
Avail Cap(c_a), veh/h	59	1976	882	91	1065	1096	330	464	0	369	0	455
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	74.0	33.4	15.4	71.2	18.5	18.6	58.5	43.4	0.0	58.4	0.0	44.5
Incr Delay (d2), s/veh	6.8	47.7	0.0	74.9	0.5	0.5	14.2	0.0	0.0	24.7	0.0	0.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.4	48.0	0.9	5.2	13.4	13.8	11.5	1.0	0.0	15.4	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	80.8	81.1	15.4	146.1	19.1	19.1	72.7	43.4	0.0	83.1	0.0	44.6
LnGrp LOS	F	F	B	F	B	B	E	D	A	F	A	D
Approach Vol, veh/h		2213			1344			305			414	
Approach Delay, s/veh		79.4			27.2			69.4			75.7	
Approach LOS		E			C			E			E	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	44.8	15.2	90.5	44.8	8.7	97.0
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 37	* 7.7	* 84	* 37	5.0	86.4
Max Q Clear Time (g_c+I1), s	37.7	9.2	85.7	39.3	2.8	34.4
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	6.9

Intersection Summary	
HCM 6th Ctrl Delay	61.9
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Goni Rd & Arrowhead Dr

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	148	209	36	89	156	32	16	307	289	35	242	111
Future Volume (veh/h)	148	209	36	89	156	32	16	307	289	35	242	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796
Adj Flow Rate, veh/h	161	227	39	97	170	35	17	334	314	38	263	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	197	286	49	123	215	44	34	362	340	62	514	236
Arrive On Green	0.11	0.19	0.19	0.07	0.15	0.15	0.02	0.42	0.42	0.04	0.44	0.44
Sat Flow, veh/h	1711	1493	257	1711	1445	298	1711	852	801	1711	1164	536
Grp Volume(v), veh/h	161	0	266	97	0	205	17	0	648	38	0	384
Grp Sat Flow(s),veh/h/ln	1711	0	1750	1711	0	1743	1711	0	1652	1711	0	1700
Q Serve(g_s), s	7.0	0.0	11.0	4.2	0.0	8.6	0.7	0.0	28.1	1.7	0.0	12.3
Cycle Q Clear(g_c), s	7.0	0.0	11.0	4.2	0.0	8.6	0.7	0.0	28.1	1.7	0.0	12.3
Prop In Lane	1.00		0.15	1.00		0.17	1.00		0.48	1.00		0.32
Lane Grp Cap(c), veh/h	197	0	336	123	0	259	34	0	702	62	0	750
V/C Ratio(X)	0.82	0.00	0.79	0.79	0.00	0.79	0.50	0.00	0.92	0.61	0.00	0.51
Avail Cap(c_a), veh/h	226	0	482	186	0	438	113	0	769	113	0	791
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.7	0.0	29.1	34.5	0.0	31.0	36.7	0.0	20.6	35.9	0.0	15.2
Incr Delay (d2), s/veh	18.5	0.0	5.8	12.2	0.0	5.4	10.9	0.0	15.9	9.3	0.0	0.5
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	3.8	0.0	4.9	2.1	0.0	3.9	0.4	0.0	12.9	0.8	0.0	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.2	0.0	34.9	46.7	0.0	36.4	47.6	0.0	36.5	45.2	0.0	15.8
LnGrp LOS	D	A	C	D	A	D	D	A	D	D	A	B
Approach Vol, veh/h		427			302			665			422	
Approach Delay, s/veh		41.0			39.7			36.8			18.4	
Approach LOS		D			D			D			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	37.3	10.6	19.7	6.7	38.6	13.9	16.4
Change Period (Y+Rc), s	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2
Max Green Setting (Gmax), s	* 5	* 35	* 8.2	* 21	* 5	* 35	* 10	* 19
Max Q Clear Time (g_c+I1), s	3.7	30.1	6.2	13.0	2.7	14.3	9.0	10.6
Green Ext Time (p_c), s	0.0	2.1	0.0	0.9	0.0	2.4	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	34.0
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Goni Rd & Arrowhead Dr

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	148	49	332	262	23	29	119	84	37	278	112
Future Volume (veh/h)	68	148	49	332	262	23	29	119	84	37	278	112
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	161	53	361	285	25	32	129	91	40	302	122
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	98	208	69	414	563	49	59	277	196	69	351	142
Arrive On Green	0.06	0.15	0.15	0.23	0.33	0.33	0.03	0.27	0.27	0.04	0.28	0.28
Sat Flow, veh/h	1781	1347	443	1781	1695	149	1781	1021	720	1781	1267	512
Grp Volume(v), veh/h	74	0	214	361	0	310	32	0	220	40	0	424
Grp Sat Flow(s),veh/h/ln	1781	0	1791	1781	0	1844	1781	0	1741	1781	0	1778
Q Serve(g_s), s	2.8	0.0	7.9	13.4	0.0	9.3	1.2	0.0	7.2	1.5	0.0	15.6
Cycle Q Clear(g_c), s	2.8	0.0	7.9	13.4	0.0	9.3	1.2	0.0	7.2	1.5	0.0	15.6
Prop In Lane	1.00		0.25	1.00		0.08	1.00		0.41	1.00		0.29
Lane Grp Cap(c), veh/h	98	0	277	414	0	612	59	0	473	69	0	493
V/C Ratio(X)	0.75	0.00	0.77	0.87	0.00	0.51	0.54	0.00	0.47	0.58	0.00	0.86
Avail Cap(c_a), veh/h	241	0	495	539	0	818	130	0	588	161	0	631
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	0.0	27.9	25.4	0.0	18.4	32.7	0.0	20.9	32.5	0.0	23.6
Incr Delay (d2), s/veh	11.1	0.0	4.6	11.9	0.0	0.7	7.4	0.0	0.7	7.4	0.0	9.5
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	1.5	0.0	3.6	6.7	0.0	3.8	0.6	0.0	2.9	0.8	0.0	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.1	0.0	32.4	37.3	0.0	19.1	40.2	0.0	21.6	39.9	0.0	33.1
LnGrp LOS	D	A	C	D	A	B	D	A	C	D	A	C
Approach Vol, veh/h		288			671			252			464	
Approach Delay, s/veh		35.2			28.9			23.9			33.7	
Approach LOS		D			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	23.9	21.2	15.8	7.5	24.2	9.0	28.0
Change Period (Y+Rc), s	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2
Max Green Setting (Gmax), s	* 6.2	* 23	* 21	* 19	* 5	* 24	* 9.3	* 31
Max Q Clear Time (g_c+I1), s	3.5	9.2	15.4	9.9	3.2	17.6	4.8	11.3
Green Ext Time (p_c), s	0.0	1.0	0.6	0.8	0.0	1.5	0.0	1.7

Intersection Summary	
HCM 6th Ctrl Delay	30.5
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Appendix H

Future Year Plus Project LOS Calculations

HEADWAY TRANSPORTATION

Intersection	
Intersection Delay, s/veh	135
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	148	228	36	98	160	33	16	307	327	40	242	111
Future Vol, veh/h	148	228	36	98	160	33	16	307	327	40	242	111
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	7	7	7	7	7	7	7	7	7	7	7	7
Mvmt Flow	161	248	39	107	174	36	17	334	355	43	263	121
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	29.3	22.7	301.4	53.7
HCM LOS	D	C	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	48%	0%	86%	0%	83%	0%	69%
Vol Right, %	0%	52%	0%	14%	0%	17%	0%	31%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	634	148	264	98	193	40	353
LT Vol	16	0	148	0	98	0	40	0
Through Vol	0	307	0	228	0	160	0	242
RT Vol	0	327	0	36	0	33	0	111
Lane Flow Rate	17	689	161	287	107	210	43	384
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.045	1.615	0.421	0.704	0.289	0.533	0.112	0.909
Departure Headway (Hd)	9.332	8.436	10.836	10.205	11.249	10.59	10.455	9.695
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	383	434	335	356	322	344	345	376
Service Time	7.095	6.198	8.536	7.905	8.949	8.29	8.155	7.395
HCM Lane V/C Ratio	0.044	1.588	0.481	0.806	0.332	0.61	0.125	1.021
HCM Control Delay	12.5	308.7	21.2	33.9	18.5	24.8	14.5	58.1
HCM Lane LOS	B	F	C	D	C	C	B	F
HCM 95th-tile Q	0.1	39.1	2	5.1	1.2	3	0.4	9.3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	152	484	5	1	2
Future Vol, veh/h	9	152	484	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	165	526	5	1	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	531	0	-	0	714	529
Stage 1	-	-	-	-	529	-
Stage 2	-	-	-	-	185	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1036	-	-	-	398	550
Stage 1	-	-	-	-	591	-
Stage 2	-	-	-	-	847	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1036	-	-	-	394	550
Mov Cap-2 Maneuver	-	-	-	-	394	-
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	847	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1036	-	-	-	486
HCM Lane V/C Ratio	0.009	-	-	-	0.007
HCM Control Delay (s)	8.5	0	-	-	12.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	143	487	5	1	2
Future Vol, veh/h	10	143	487	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	155	529	5	1	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	534	0	-	0	709	532
Stage 1	-	-	-	-	532	-
Stage 2	-	-	-	-	177	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1034	-	-	-	401	547
Stage 1	-	-	-	-	589	-
Stage 2	-	-	-	-	854	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1034	-	-	-	396	547
Mov Cap-2 Maneuver	-	-	-	-	396	-
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	854	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1034	-	-	-	485
HCM Lane V/C Ratio	0.011	-	-	-	0.007
HCM Control Delay (s)	8.5	0	-	-	12.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	121	487	12	3	5
Future Vol, veh/h	23	121	487	12	3	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	132	529	13	3	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	542	0	-	0	718	536
Stage 1	-	-	-	-	536	-
Stage 2	-	-	-	-	182	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1027	-	-	-	396	545
Stage 1	-	-	-	-	587	-
Stage 2	-	-	-	-	849	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1027	-	-	-	386	545
Mov Cap-2 Maneuver	-	-	-	-	386	-
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	849	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1027	-	-	-	472
HCM Lane V/C Ratio	0.024	-	-	-	0.018
HCM Control Delay (s)	8.6	0	-	-	12.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	103	493	19	4	6
Future Vol, veh/h	21	103	493	19	4	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	23	112	536	21	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	557	0	-	0	705	547
Stage 1	-	-	-	-	547	-
Stage 2	-	-	-	-	158	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	999	-	-	-	398	531
Stage 1	-	-	-	-	574	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	999	-	-	-	389	531
Mov Cap-2 Maneuver	-	-	-	-	389	-
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	863	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	999	-	-	-	463
HCM Lane V/C Ratio	0.023	-	-	-	0.023
HCM Control Delay (s)	8.7	-	-	-	13
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	96	11	4	407	105	9
Future Vol, veh/h	96	11	4	407	105	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	104	12	4	442	114	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	116	0	560	110
Stage 1	-	-	-	-	110	-
Stage 2	-	-	-	-	450	-
Critical Hdwy	-	-	4.14	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.236	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1460	-	486	938
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	638	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1460	-	485	938
Mov Cap-2 Maneuver	-	-	-	-	485	-
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	636	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	504	-	-	1460	-
HCM Lane V/C Ratio	0.246	-	-	0.003	-
HCM Control Delay (s)	14.5	-	-	7.5	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0	-

Intersection	
Int Delay, s/veh	3.7

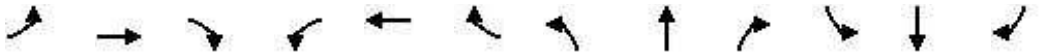
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	80	32	48	43	8	17
Future Vol, veh/h	80	32	48	43	8	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	87	35	52	47	9	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	99	0	-	0	285	76
Stage 1	-	-	-	-	76	-
Stage 2	-	-	-	-	209	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1494	-	-	-	705	985
Stage 1	-	-	-	-	947	-
Stage 2	-	-	-	-	826	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1494	-	-	-	663	985
Mov Cap-2 Maneuver	-	-	-	-	663	-
Stage 1	-	-	-	-	891	-
Stage 2	-	-	-	-	826	-

Approach	EB	WB	SB
HCM Control Delay, s	5.4	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1494	-	-	-	853
HCM Lane V/C Ratio	0.058	-	-	-	0.032
HCM Control Delay (s)	7.6	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1

HCM 6th Signalized Intersection Summary
8: Goni Rd & E. College Pkwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	388	336	20	39	718	246	9	7	4	92	5	186
Future Volume (veh/h)	388	336	20	39	718	246	9	7	4	92	5	186
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	422	365	20	42	780	253	10	8	3	100	5	152
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	458	1901	104	63	892	289	21	106	40	172	6	189
Arrive On Green	0.26	0.57	0.57	0.04	0.35	0.35	0.01	0.08	0.08	0.05	0.13	0.13
Sat Flow, veh/h	1739	3345	183	1739	2575	835	1739	1266	475	3374	50	1505
Grp Volume(v), veh/h	422	189	196	42	525	508	10	0	11	100	0	157
Grp Sat Flow(s),veh/h/ln	1739	1735	1793	1739	1735	1676	1739	0	1740	1687	0	1555
Q Serve(g_s), s	21.2	4.7	4.8	2.1	25.6	25.6	0.5	0.0	0.5	2.6	0.0	8.8
Cycle Q Clear(g_c), s	21.2	4.7	4.8	2.1	25.6	25.6	0.5	0.0	0.5	2.6	0.0	8.8
Prop In Lane	1.00		0.10	1.00		0.50	1.00		0.27	1.00		0.97
Lane Grp Cap(c), veh/h	458	986	1019	63	601	581	21	0	145	172	0	195
V/C Ratio(X)	0.92	0.19	0.19	0.67	0.87	0.87	0.47	0.00	0.08	0.58	0.00	0.81
Avail Cap(c_a), veh/h	570	1101	1138	141	686	663	97	0	493	281	0	473
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.2	9.4	9.4	42.8	27.6	27.6	44.2	0.0	38.0	41.8	0.0	38.3
Incr Delay (d2), s/veh	16.8	0.1	0.1	4.5	10.6	11.0	5.8	0.0	0.1	1.2	0.0	3.0
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	10.8	1.7	1.8	1.0	11.9	11.6	0.3	0.0	0.2	1.1	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.0	9.5	9.5	47.3	38.2	38.5	49.9	0.0	38.1	42.9	0.0	41.2
LnGrp LOS	D	A	A	D	D	D	D	A	D	D	A	D
Approach Vol, veh/h		807			1075			21			257	
Approach Delay, s/veh		30.1			38.7			43.8			41.9	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	12.8	10.1	56.8	6.6	16.6	30.0	36.8
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	7.5	* 26	* 7.3	57.1	5.0	27.4	* 30	* 36
Max Q Clear Time (g_c+I1), s	4.6	2.5	4.1	6.8	2.5	10.8	23.2	27.6
Green Ext Time (p_c), s	0.0	0.0	0.0	2.0	0.0	0.5	0.5	3.6

Intersection Summary												
HCM 6th Ctrl Delay			35.9									
HCM 6th LOS			D									

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
9: N. Deer Run Rd/Arrowhead Dr & US 50

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	788	190	102	2071	347	155	36	30	62	33	5
Future Volume (veh/h)	15	788	190	102	2071	347	155	36	30	62	33	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796
Adj Flow Rate, veh/h	16	838	133	109	2203	359	165	38	0	66	35	3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	29	2053	916	132	1964	311	238	285	0	239	259	22
Arrive On Green	0.02	0.60	0.60	0.08	0.67	0.67	0.16	0.16	0.00	0.16	0.16	0.16
Sat Flow, veh/h	1711	3413	1522	1711	2951	468	1315	1796	0	1315	1631	140
Grp Volume(v), veh/h	16	838	133	109	1248	1314	165	38	0	66	0	38
Grp Sat Flow(s),veh/h/ln	1711	1706	1522	1711	1706	1712	1315	1796	0	1315	0	1771
Q Serve(g_s), s	1.2	17.4	5.1	8.4	89.2	89.2	16.5	2.4	0.0	6.1	0.0	2.5
Cycle Q Clear(g_c), s	1.2	17.4	5.1	8.4	89.2	89.2	19.0	2.4	0.0	8.5	0.0	2.5
Prop In Lane	1.00		1.00	1.00		0.27	1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	29	2053	916	132	1136	1139	238	285	0	239	0	281
V/C Ratio(X)	0.56	0.41	0.15	0.83	1.10	1.15	0.69	0.13	0.00	0.28	0.00	0.14
Avail Cap(c_a), veh/h	64	2053	916	236	1136	1139	368	462	0	368	0	456
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	65.4	14.1	11.7	61.0	22.4	22.4	56.6	48.4	0.0	52.1	0.0	48.5
Incr Delay (d2), s/veh	6.2	0.0	0.0	5.0	58.1	79.3	1.3	0.1	0.0	0.2	0.0	0.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.6	6.7	1.8	3.8	50.8	57.7	5.5	1.1	0.0	2.0	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.6	14.2	11.7	66.0	80.5	101.7	58.0	48.5	0.0	52.3	0.0	48.5
LnGrp LOS	E	B	B	E	F	F	E	D	A	D	A	D
Approach Vol, veh/h		987			2671			203			104	
Approach Delay, s/veh		14.7			90.3			56.2			50.9	
Approach LOS		B			F			E			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	28.8	17.8	87.4	28.8	9.2	96.0
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 35	* 19	* 76	* 35	5.0	89.2
Max Q Clear Time (g_c+I1), s	21.0	10.4	19.4	10.5	3.2	91.2
Green Ext Time (p_c), s	0.3	0.1	4.8	0.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	68.7
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	48.2
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	68	153	49	368	280	28	29	119	95	38	278	112
Future Vol, veh/h	68	153	49	368	280	28	29	119	95	38	278	112
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	74	166	53	400	304	30	32	129	103	41	302	122
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	20.4	56.5	22.1	67.4
HCM LOS	C	F	C	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	56%	0%	76%	0%	91%	0%	71%
Vol Right, %	0%	44%	0%	24%	0%	9%	0%	29%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	29	214	68	202	368	308	38	390
LT Vol	29	0	68	0	368	0	38	0
Through Vol	0	119	0	153	0	280	0	278
RT Vol	0	95	0	49	0	28	0	112
Lane Flow Rate	32	233	74	220	400	335	41	424
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.086	0.578	0.2	0.55	0.996	0.779	0.106	0.999
Departure Headway (Hd)	9.797	8.948	9.722	9.022	8.96	8.375	9.215	8.487
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	366	405	370	400	404	432	391	432
Service Time	7.546	6.697	7.474	6.773	6.714	6.129	6.915	6.187
HCM Lane V/C Ratio	0.087	0.575	0.2	0.55	0.99	0.775	0.105	0.981
HCM Control Delay	13.5	23.3	14.9	22.3	74.4	35.1	13	72.7
HCM Lane LOS	B	C	B	C	F	E	B	F
HCM 95th-tile Q	0.3	3.5	0.7	3.2	12.1	6.7	0.4	12.6

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	3	520	190	1	5	9
Future Vol, veh/h	3	520	190	1	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	565	207	1	5	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	208	0	-	0	779	208
Stage 1	-	-	-	-	208	-
Stage 2	-	-	-	-	571	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1363	-	-	-	364	832
Stage 1	-	-	-	-	827	-
Stage 2	-	-	-	-	565	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1363	-	-	-	363	832
Mov Cap-2 Maneuver	-	-	-	-	363	-
Stage 1	-	-	-	-	825	-
Stage 2	-	-	-	-	565	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1363	-	-	-	569
HCM Lane V/C Ratio	0.002	-	-	-	0.027
HCM Control Delay (s)	7.6	0	-	-	11.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	3	522	182	1	5	9
Future Vol, veh/h	3	522	182	1	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	567	198	1	5	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	199	0	-	0	772	199
Stage 1	-	-	-	-	199	-
Stage 2	-	-	-	-	573	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1373	-	-	-	368	842
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	564	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1373	-	-	-	367	842
Mov Cap-2 Maneuver	-	-	-	-	367	-
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	564	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1373	-	-	-	576
HCM Lane V/C Ratio	0.002	-	-	-	0.026
HCM Control Delay (s)	7.6	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	521	162	3	12	21
Future Vol, veh/h	6	521	162	3	12	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	566	176	3	13	23

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	179	0	-	0	758	178
Stage 1	-	-	-	-	178	-
Stage 2	-	-	-	-	580	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1397	-	-	-	375	865
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	560	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1397	-	-	-	372	865
Mov Cap-2 Maneuver	-	-	-	-	372	-
Stage 1	-	-	-	-	847	-
Stage 2	-	-	-	-	560	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1397	-	-	-	584
HCM Lane V/C Ratio	0.005	-	-	-	0.061
HCM Control Delay (s)	7.6	0	-	-	11.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	526	143	6	28	22
Future Vol, veh/h	7	526	143	6	28	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	572	155	7	30	24

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	162	0	-	0	747	159
Stage 1	-	-	-	-	159	-
Stage 2	-	-	-	-	588	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1417	-	-	-	381	886
Stage 1	-	-	-	-	870	-
Stage 2	-	-	-	-	555	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1417	-	-	-	379	886
Mov Cap-2 Maneuver	-	-	-	-	379	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	555	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1417	-	-	-	507
HCM Lane V/C Ratio	0.005	-	-	-	0.107
HCM Control Delay (s)	7.6	-	-	-	13
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	420	134	12	133	16	20
Future Vol, veh/h	420	134	12	133	16	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	80	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	457	146	13	145	17	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	603	0	701	530
Stage 1	-	-	-	-	530	-
Stage 2	-	-	-	-	171	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	975	-	405	549
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	859	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	975	-	400	549
Mov Cap-2 Maneuver	-	-	-	-	400	-
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	848	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	471	-	-	975	-
HCM Lane V/C Ratio	0.083	-	-	0.013	-
HCM Control Delay (s)	13.3	-	-	8.7	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	5.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	41	66	49	9	70	81
Future Vol, veh/h	41	66	49	9	70	81
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	72	53	10	76	88

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	63	0	-	0	220	58
Stage 1	-	-	-	-	58	-
Stage 2	-	-	-	-	162	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1540	-	-	-	768	1008
Stage 1	-	-	-	-	965	-
Stage 2	-	-	-	-	867	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1540	-	-	-	745	1008
Mov Cap-2 Maneuver	-	-	-	-	745	-
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	867	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1540	-	-	-	866
HCM Lane V/C Ratio	0.029	-	-	-	0.19
HCM Control Delay (s)	7.4	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7

HCM 6th Signalized Intersection Summary
8: Goni Rd & E. College Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	853	3	23	639	86	60	8	51	348	11	446
Future Volume (veh/h)	149	853	3	23	639	86	60	8	51	348	11	446
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	162	927	3	25	695	84	65	9	39	378	12	369
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	201	1298	4	48	886	107	86	55	237	474	14	419
Arrive On Green	0.11	0.36	0.36	0.03	0.28	0.28	0.05	0.18	0.18	0.14	0.27	0.27
Sat Flow, veh/h	1781	3633	12	1781	3192	386	1781	306	1326	3456	50	1543
Grp Volume(v), veh/h	162	453	477	25	387	392	65	0	48	378	0	381
Grp Sat Flow(s),veh/h/ln	1781	1777	1868	1781	1777	1801	1781	0	1632	1728	0	1593
Q Serve(g_s), s	7.0	17.2	17.2	1.1	15.7	15.8	2.8	0.0	1.9	8.3	0.0	17.9
Cycle Q Clear(g_c), s	7.0	17.2	17.2	1.1	15.7	15.8	2.8	0.0	1.9	8.3	0.0	17.9
Prop In Lane	1.00		0.01	1.00		0.21	1.00		0.81	1.00		0.97
Lane Grp Cap(c), veh/h	201	635	667	48	493	500	86	0	292	474	0	432
V/C Ratio(X)	0.81	0.71	0.71	0.52	0.78	0.79	0.76	0.00	0.16	0.80	0.00	0.88
Avail Cap(c_a), veh/h	402	1080	1135	136	830	841	193	0	496	882	0	705
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.9	21.7	21.7	37.6	26.1	26.1	36.8	0.0	27.2	32.7	0.0	27.3
Incr Delay (d2), s/veh	4.1	1.1	1.1	3.3	2.1	2.1	4.9	0.0	0.1	1.2	0.0	4.4
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	3.2	7.0	7.3	0.5	6.6	6.7	1.3	0.0	0.7	3.5	0.0	7.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.0	22.9	22.8	40.9	28.2	28.2	41.8	0.0	27.3	33.9	0.0	31.7
LnGrp LOS	D	C	C	D	C	C	D	A	C	C	A	C
Approach Vol, veh/h		1092			804			113			759	
Approach Delay, s/veh		25.1			28.6			35.6			32.8	
Approach LOS		C			C			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.5	19.3	8.9	33.6	9.3	26.6	15.1	27.3
Change Period (Y+Rc), s	5.8	* 5.3	* 6.8	5.6	5.5	5.3	* 6.3	* 5.6
Max Green Setting (Gmax), s	20.0	* 24	* 6	47.6	8.5	34.7	* 18	* 37
Max Q Clear Time (g_c+I1), s	10.3	3.9	3.1	19.2	4.8	19.9	9.0	17.8
Green Ext Time (p_c), s	0.4	0.1	0.0	5.4	0.0	1.3	0.2	4.0

Intersection Summary	
HCM 6th Ctrl Delay	28.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
9: N. Deer Run Rd/Arrowhead Dr & US 50

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	2081	131	83	1144	85	263	34	60	347	70	11
Future Volume (veh/h)	10	2081	131	83	1144	85	263	34	60	347	70	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	10	2145	58	86	1179	86	271	35	0	358	72	8
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	20	1976	882	91	2013	147	329	464	0	369	410	46
Arrive On Green	0.01	0.56	0.56	0.05	0.60	0.60	0.25	0.25	0.00	0.25	0.25	0.25
Sat Flow, veh/h	1781	3554	1585	1781	3358	245	1319	1870	0	1373	1654	184
Grp Volume(v), veh/h	10	2145	58	86	623	642	271	35	0	358	0	80
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1826	1319	1870	0	1373	0	1837
Q Serve(g_s), s	0.8	83.7	2.5	7.2	32.6	32.7	30.6	2.2	0.0	35.1	0.0	5.2
Cycle Q Clear(g_c), s	0.8	83.7	2.5	7.2	32.6	32.7	35.8	2.2	0.0	37.3	0.0	5.2
Prop In Lane	1.00		1.00	1.00		0.13	1.00		0.00	1.00		0.10
Lane Grp Cap(c), veh/h	20	1976	882	91	1065	1094	329	464	0	369	0	455
V/C Ratio(X)	0.49	1.09	0.07	0.94	0.59	0.59	0.82	0.08	0.00	0.97	0.00	0.18
Avail Cap(c_a), veh/h	59	1976	882	91	1065	1094	329	464	0	369	0	455
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	74.0	33.4	15.4	71.2	18.6	18.6	58.6	43.4	0.0	59.5	0.0	44.5
Incr Delay (d2), s/veh	6.8	47.7	0.0	74.9	0.6	0.6	14.4	0.0	0.0	39.0	0.0	0.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.4	48.0	0.9	5.2	13.5	13.9	11.6	1.0	0.0	17.9	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	80.8	81.1	15.4	146.1	19.2	19.2	73.0	43.4	0.0	98.5	0.0	44.6
LnGrp LOS	F	F	B	F	B	B	E	D	A	F	A	D
Approach Vol, veh/h		2213			1351			306			438	
Approach Delay, s/veh		79.4			27.3			69.6			88.7	
Approach LOS		E			C			E			F	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	44.8	15.2	90.5	44.8	8.7	97.0
Change Period (Y+Rc), s	* 7.5	* 7.5	* 6.8	* 7.5	7.0	6.8
Max Green Setting (Gmax), s	* 37	* 7.7	* 84	* 37	5.0	86.4
Max Q Clear Time (g_c+I1), s	37.8	9.2	85.7	39.3	2.8	34.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	7.0

Intersection Summary	
HCM 6th Ctrl Delay	63.3
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Goni Rd & Arrowhead Dr

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	148	228	36	98	160	33	16	307	327	40	242	111
Future Volume (veh/h)	148	228	36	98	160	33	16	307	327	40	242	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796	1796
Adj Flow Rate, veh/h	161	248	39	107	174	36	17	334	355	43	263	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	194	289	46	135	226	47	34	347	369	65	529	243
Arrive On Green	0.11	0.19	0.19	0.08	0.16	0.16	0.02	0.44	0.44	0.04	0.45	0.45
Sat Flow, veh/h	1711	1515	238	1711	1444	299	1711	797	847	1711	1164	536
Grp Volume(v), veh/h	161	0	287	107	0	210	17	0	689	43	0	384
Grp Sat Flow(s),veh/h/ln	1711	0	1753	1711	0	1742	1711	0	1644	1711	0	1700
Q Serve(g_s), s	7.5	0.0	12.8	5.0	0.0	9.4	0.8	0.0	33.1	2.0	0.0	12.9
Cycle Q Clear(g_c), s	7.5	0.0	12.8	5.0	0.0	9.4	0.8	0.0	33.1	2.0	0.0	12.9
Prop In Lane	1.00		0.14	1.00		0.17	1.00		0.52	1.00		0.32
Lane Grp Cap(c), veh/h	194	0	335	135	0	272	34	0	716	65	0	772
V/C Ratio(X)	0.83	0.00	0.86	0.79	0.00	0.77	0.51	0.00	0.96	0.66	0.00	0.50
Avail Cap(c_a), veh/h	202	0	419	194	0	408	105	0	721	105	0	772
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.2	0.0	31.7	36.7	0.0	32.8	39.4	0.0	22.3	38.5	0.0	15.6
Incr Delay (d2), s/veh	23.2	0.0	13.4	13.3	0.0	5.1	11.3	0.0	24.5	10.7	0.0	0.5
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	4.3	0.0	6.5	2.5	0.0	4.2	0.4	0.0	16.6	1.0	0.0	4.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.4	0.0	45.2	50.0	0.0	37.9	50.7	0.0	46.8	49.2	0.0	16.1
LnGrp LOS	E	A	D	D	A	D	D	A	D	D	A	B
Approach Vol, veh/h		448			317			706			427	
Approach Delay, s/veh		49.9			42.0			46.9			19.4	
Approach LOS		D			D			D			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	40.5	11.6	20.7	6.8	42.0	14.4	17.9
Change Period (Y+Rc), s	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2
Max Green Setting (Gmax), s	* 5	* 36	* 9.2	* 19	* 5	* 36	* 9.6	* 19
Max Q Clear Time (g_c+I1), s	4.0	35.1	7.0	14.8	2.8	14.9	9.5	11.4
Green Ext Time (p_c), s	0.0	0.3	0.0	0.7	0.0	2.4	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	40.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Goni Rd & Arrowhead Dr

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	153	49	368	280	28	29	119	95	38	278	112
Future Volume (veh/h)	68	153	49	368	280	28	29	119	95	38	278	112
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	166	53	400	304	30	32	129	103	41	302	122
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	96	207	66	442	582	57	57	284	226	67	380	154
Arrive On Green	0.05	0.15	0.15	0.25	0.35	0.35	0.03	0.29	0.29	0.04	0.30	0.30
Sat Flow, veh/h	1781	1359	434	1781	1675	165	1781	963	769	1781	1267	512
Grp Volume(v), veh/h	74	0	219	400	0	334	32	0	232	41	0	424
Grp Sat Flow(s),veh/h/ln	1781	0	1792	1781	0	1841	1781	0	1732	1781	0	1778
Q Serve(g_s), s	3.2	0.0	9.2	17.0	0.0	11.3	1.4	0.0	8.5	1.8	0.0	17.1
Cycle Q Clear(g_c), s	3.2	0.0	9.2	17.0	0.0	11.3	1.4	0.0	8.5	1.8	0.0	17.1
Prop In Lane	1.00		0.24	1.00		0.09	1.00		0.44	1.00		0.29
Lane Grp Cap(c), veh/h	96	0	273	442	0	639	57	0	510	67	0	534
V/C Ratio(X)	0.77	0.00	0.80	0.90	0.00	0.52	0.56	0.00	0.45	0.61	0.00	0.79
Avail Cap(c_a), veh/h	213	0	437	498	0	744	114	0	510	142	0	534
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.4	0.0	31.9	28.4	0.0	20.3	37.2	0.0	22.4	36.9	0.0	25.1
Incr Delay (d2), s/veh	12.4	0.0	5.5	18.5	0.0	0.7	8.3	0.0	2.9	8.6	0.0	11.6
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	1.7	0.0	4.3	9.2	0.0	4.7	0.7	0.0	3.7	0.9	0.0	8.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.8	0.0	37.3	46.9	0.0	21.0	45.5	0.0	25.3	45.6	0.0	36.6
LnGrp LOS	D	A	D	D	A	C	D	A	C	D	A	D
Approach Vol, veh/h		293			734			264			465	
Approach Delay, s/veh		40.2			35.1			27.8			37.4	
Approach LOS		D			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	28.2	24.6	17.1	7.7	28.6	9.4	32.3
Change Period (Y+Rc), s	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2	* 5.2
Max Green Setting (Gmax), s	* 6.2	* 22	* 22	* 19	* 5	* 23	* 9.3	* 32
Max Q Clear Time (g_c+I1), s	3.8	10.5	19.0	11.2	3.4	19.1	5.2	13.3
Green Ext Time (p_c), s	0.0	1.0	0.4	0.7	0.0	1.0	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	35.5
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Appendix I
Signal Warrant Calculations

HEADWAY TRANSPORTATION

Opening Year Plus Project
Four-Hour Vehicular Volume Warrant

MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Total Number of Unique Hours Met On Figure 4C-1
2

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	548	307	Met
6:30 AM	548	307	Met
6:45 AM	548	307	Met
7:00 AM	548	307	Met
7:15 AM	439	245	
7:30 AM	439	245	
7:45 AM	439	245	
8:00 AM	439	245	
8:15 AM	0	0	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
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2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	786	267	Met
3:30 PM	786	267	Met
3:45 PM	786	267	Met
4:00 PM	786	267	Met
4:15 PM	566	192	
4:30 PM	566	192	
4:45 PM	566	192	
5:00 PM	566	192	
5:15 PM	0	0	
5:30 PM	0	0	
5:45 PM	0	0	
6:00 PM	0	0	
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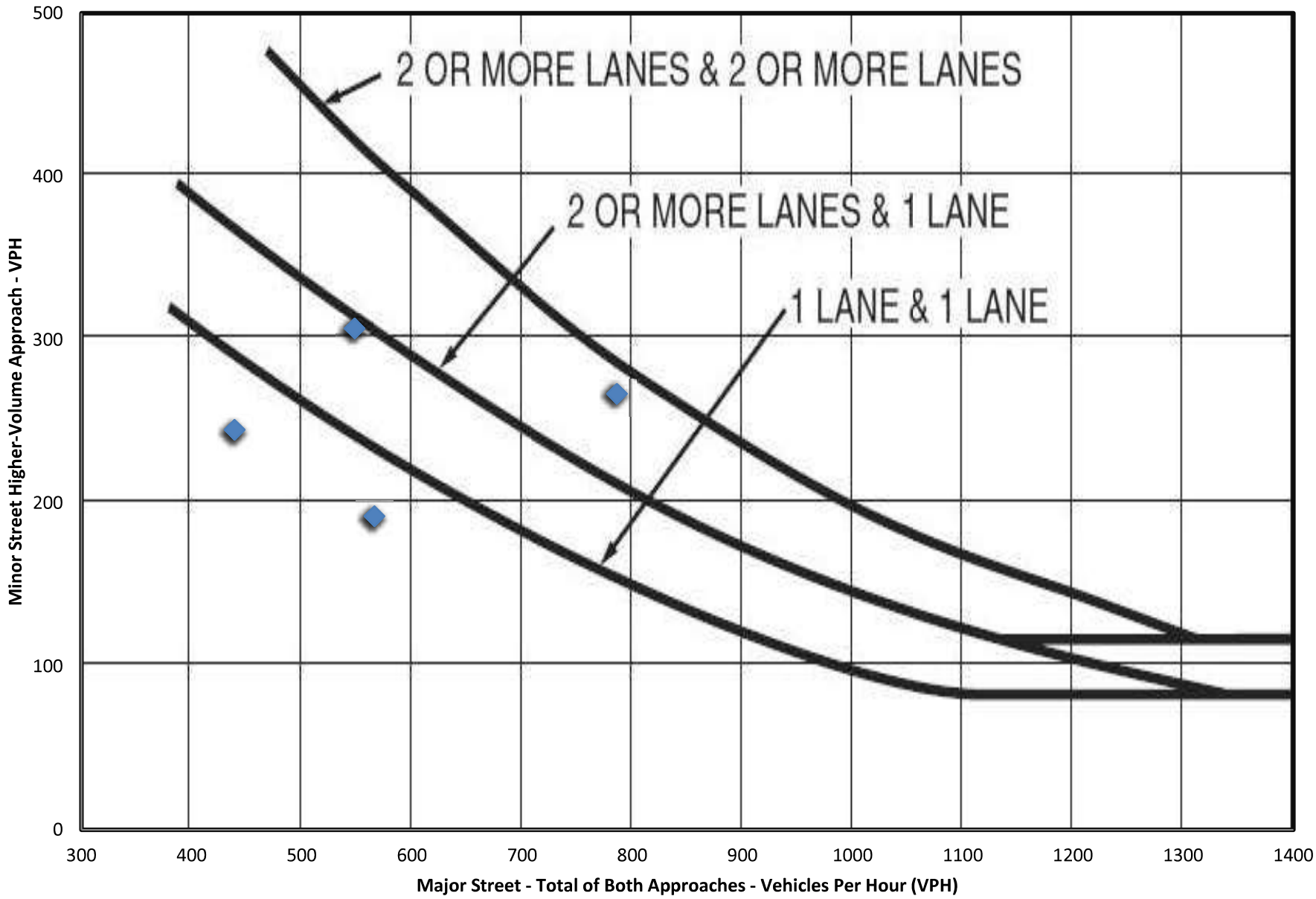
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

HEADWAY TRANSPORTATION

MUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



Opening Year Plus Project
Peak Hour Vehicular Volume

MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No
Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	No

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	No
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	No
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	No
**If applicable, attach all supporting calculations and documentation.*	

Total Number of Unique Hours Met On Figure 4C-3
0

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	548	307	
6:30 AM	548	307	
6:45 AM	548	307	
7:00 AM	548	307	
7:15 AM	439	245	
7:30 AM	439	245	
7:45 AM	439	245	
8:00 AM	439	245	
8:15 AM	0	0	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
11:00 AM	0	0	
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11:45 AM	0	0	
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3:30 PM	786	267	
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6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
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7:30 PM	0	0	
7:45 PM	0	0	
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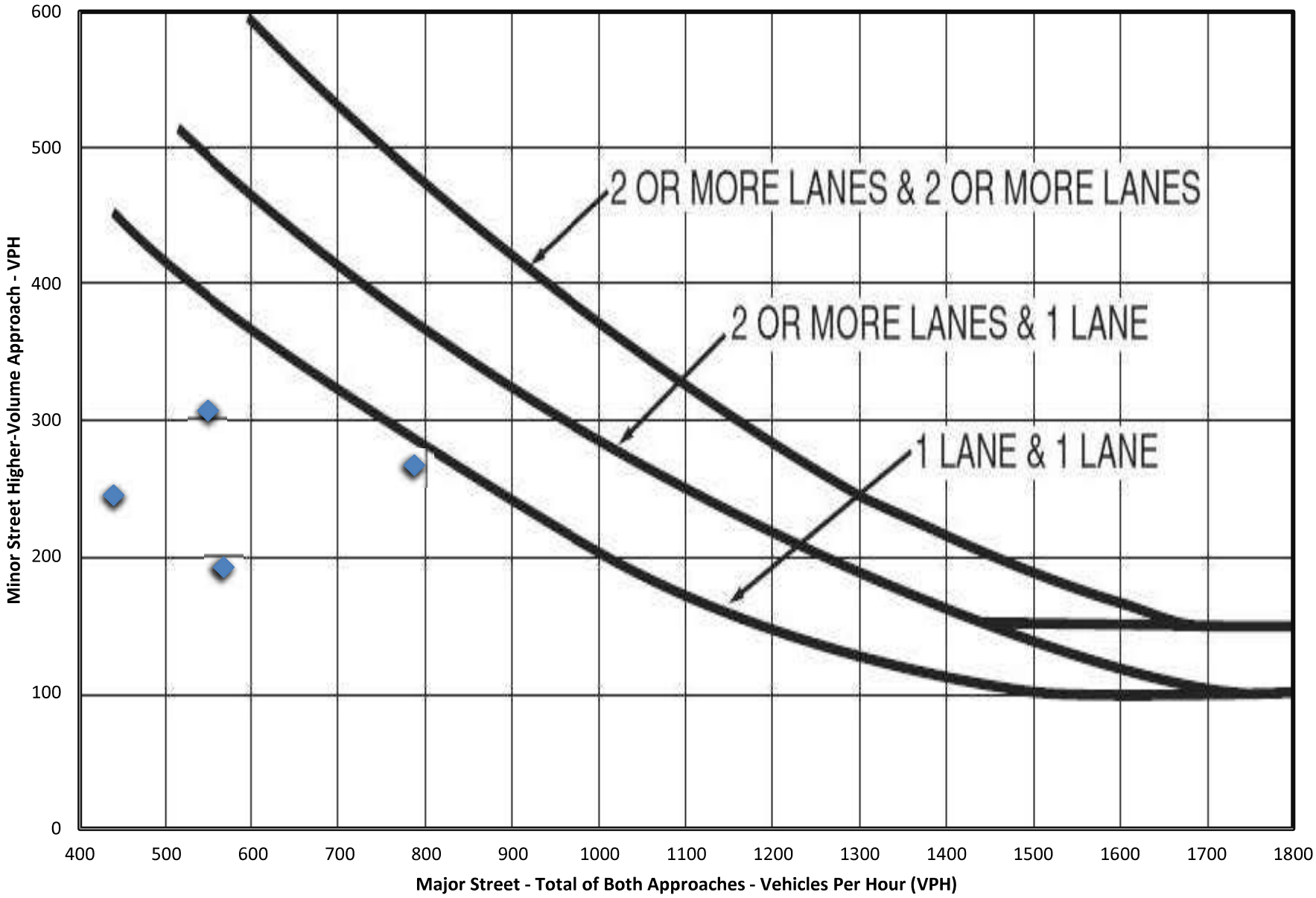
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

HEADWAY TRANSPORTATION

MUTCD Figure 4C-3. Warrant 3, Peak Hour



Future Year Plus Project
Four-Hour Vehicular Volume Warrant

MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Total Number of Unique Hours Met On Figure 4C-1
4

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	703	405	Met
6:30 AM	703	405	Met
6:45 AM	703	405	Met
7:00 AM	703	405	Met
7:15 AM	563	324	Met
7:30 AM	563	324	Met
7:45 AM	563	324	Met
8:00 AM	563	324	Met
8:15 AM	0	0	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
11:00 AM	0	0	
11:15 AM	0	0	
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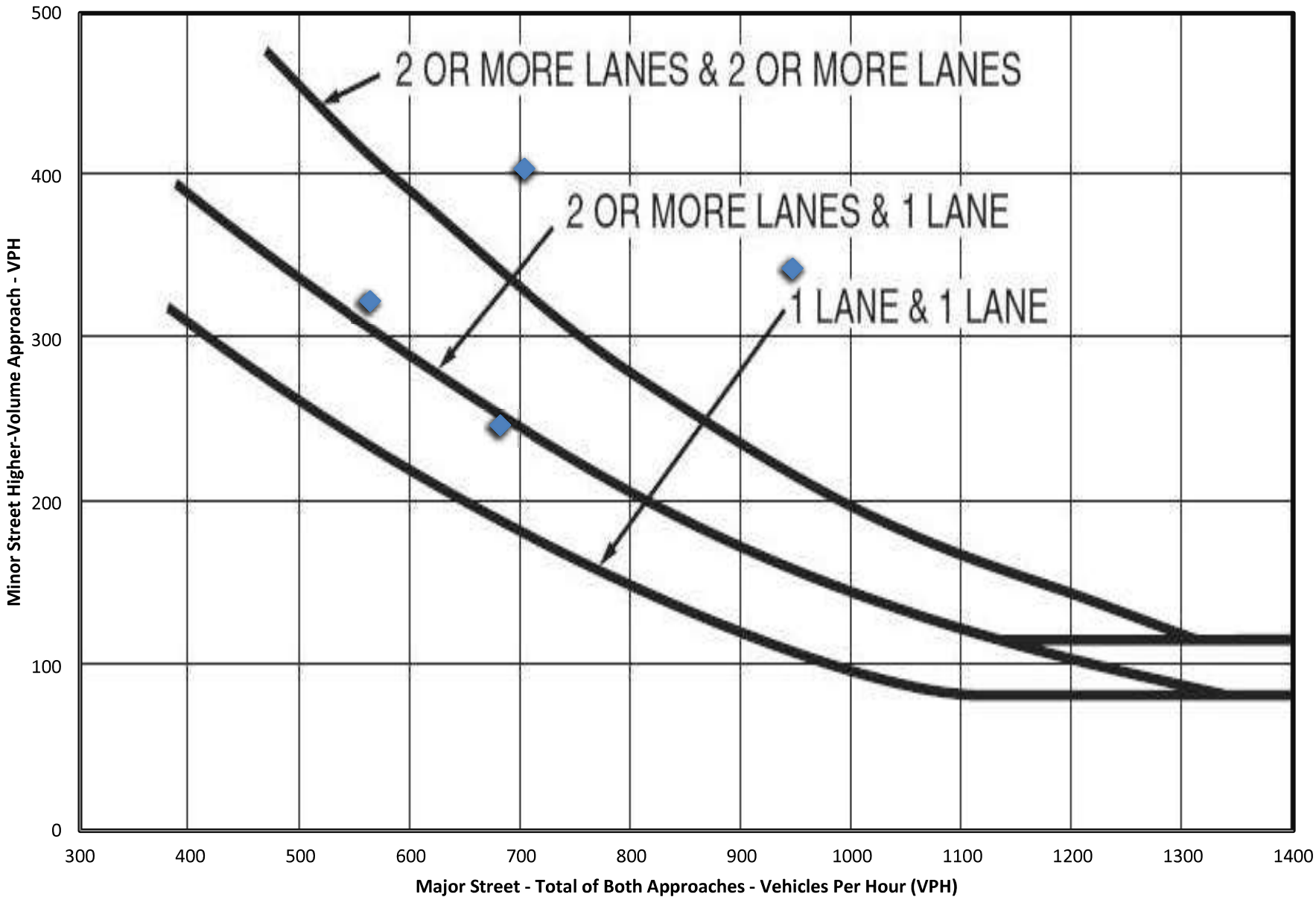
12:00 PM	0	0	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	946	344	Met
3:30 PM	946	344	Met
3:45 PM	946	344	Met
4:00 PM	946	344	Met
4:15 PM	681	248	Met
4:30 PM	681	248	Met
4:45 PM	681	248	Met
5:00 PM	681	248	Met
5:15 PM	0	0	
5:30 PM	0	0	
5:45 PM	0	0	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

HEADWAY TRANSPORTATION

MUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



Future Year Plus Project
Peak Hour Vehicular Volume Warrant

MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No
Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	No

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	No
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	No
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	No
**If applicable, attach all supporting calculations and documentation.*	

Total Number of Unique Hours Met On Figure 4C-3
2

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	703	405	Met
6:30 AM	703	405	Met
6:45 AM	703	405	Met
7:00 AM	703	405	Met
7:15 AM	563	324	
7:30 AM	563	324	
7:45 AM	563	324	
8:00 AM	563	324	
8:15 AM	0	0	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
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10:15 AM	0	0	
10:30 AM	0	0	
10:45 AM	0	0	
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11:45 AM	0	0	
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2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	946	344	Met
3:30 PM	946	344	Met
3:45 PM	946	344	Met
4:00 PM	946	344	Met
4:15 PM	681	248	
4:30 PM	681	248	
4:45 PM	681	248	
5:00 PM	681	248	
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5:30 PM	0	0	
5:45 PM	0	0	
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10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

HEADWAY TRANSPORTATION

MUTCD Figure 4C-3. Warrant 3, Peak Hour