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Ref.: 12015

January 12, 2017

Mr. Andrew Vorce, Director
Nantucket Planning & Economic Development Commission
2 Fairgrounds Road
Nantucket, MA 02554

Reg.: Response to Traffic Peer Review Comments
Old South Road Mixed-Use Development
Nantucket, Massachusetts

Dear Mr. Vorce:

Ron Müller & Associates (RMA) has prepared this letter to respond to the comments by TetraTech in their October 21, 2016 review letter regarding the Traffic Impact and Access Study submitted for the above-referenced project. For ease of reading, the comments that requested or require responses are paraphrased below, followed by responses to these comments.

Comment 1: *"Existing pedestrian and bicycle accommodations and volumes in the study area should be documented."*

Response 1: Pedestrian and bicycle accommodations along Old South Road are provided via the Old South Road Bike Path, which parallels Old South Road along the north side from the Milestone Rotary to Macy's Lane. Crosswalks across Old South Road are provided at the Milestone Rotary, at Fairgrounds Road, at Amelia Drive, at Youngs Way, at Lover's Lane, and at Macy's Lane, although many of these are currently faded. At the Milestone Rotary, a crosswalk is also provided across Sparks Avenue. At the Milestone Road and Nobadeer Farm Road intersection, the Sconset Bike Path parallels Milestone Road along the south side with a crosswalk provided across Nobadeer Farm Road. Pedestrian and bicycle counts were conducted at each of the study intersections and were provided in the Appendix of the traffic study. The following table summarizes the volume of pedestrians and bicycles counted during peak hours at each of these locations.

Table 1
Summary of Pedestrian & Bicycle Counts

Intersection	AM Peak Hour	PM Peak Hour	Saturday Peak Hour
Milestone Rd. at Nobadeer Farm Rd.	0	0	18
Old South Rd. at Nobadeer Farm Rd.	11	7	15
Old South Road at Macy's Lane	34	29	23
Old South Road at Goldfinch Drive and Greglen Ave.	17	13	17
Old South Road at Lover's Lane	68	46	94
Old South Road at Youngs Way	13	10	6
Old South Road at Amelia Drive	18	17	15
Old South Road at Fairgrounds Road	12	11	21
Milestone Rotary	51	34	86

Comment 2: *"Tetra Tech compared the count data included in the report's Appendix to the traffic volumes presented on Figures 2, 3 and 4 and confirmed that the figures accurately depict the count data. However, one notable error was found on Figure 4 – 2016 Existing Saturday Peak Hour Traffic Volumes. At the Old South Road/Nobadeer Farm Road intersection the southbound right turn volume was reported as 117 whereas the count sheets provided in the Appendix indicate this volume is 177 vehicles per hour. This incorrect volume was subsequently used to calculate the 2023 No-Build and Build volumes shown on Figures 7 and 16. The figures should be updated to show the correct volumes."*

Response 2: The traffic flow networks have been corrected and are attached to this letter.

Comment 3: *"Traffic associated with any significant projects built and occupied in the vicinity of the study area intersections since the counts were obtained should have been accounted for in the 2016 existing volumes."*

Response 3: Based on discussions with Nantucket planning staff, the only development project that had a significant effect on traffic within the study area was the Stop & Shop expansion project, which was accounted for in the traffic projections.

Comment 4: *"Tetra Tech recommends that the crash data be provided for review."*

Response 4: The 2012 through 2014 crash data are attached to this letter.

Comment 5: *"The study did not address the existing transit schedule for residents traveling to/from work, include transit ridership data or confirm that the service has adequate capacity to accommodate the additional ridership potentially generated by the proposed project."*

Response 5: In conjunction with the consideration of the prospective action on the development applications for the proposed housing components of the project by the Planning Board, Richmond Great Point Development LLC staff has initiated / conducted a meeting with the Nantucket Regional Transportation Authority (NRTA) staff to discuss the prospective future usage and specific ridership demands on NRTA services which may be generated by the development and occupancy of the proposed project in more detail, including the possibility of routing NRTA service on private roads through the project area.

Comment 6: *"The Stop & Shop project was occupied in May 2015 and as such traffic associated with this project should have been included in the 2016 existing traffic volumes."*

Response 6: Although TetraTech correctly notes that these volumes should have been included in the existing conditions volumes, the Stop & Shop expansion traffic was included under the 2023 No-Build volumes and accordingly was accounted for in the comparison between No-Build and Build volumes and traffic operations.

Comment 7: *"Site generated trips [were] not assigned to Lovers Lane via Nancy Ann Lane or via adjacent property driveways. It is expected that a portion of site generated trips oriented to/from the west would use this route, avoiding delays at the Main Site Drive approach to Old South Road. The applicant should explain why site trips were not assigned to Lovers Lane."*

Response 7: Site-generated trips were purposely not assigned to Lover's Lane via Nancy Ann Lane in order to present a worst-case scenario at the main site driveway intersection. In addition, it is highly unlikely that any site traffic will use this somewhat circuitous route considering that projected delays for traffic exiting Lover's Lane are considerably higher than at the main site driveway.

Comment 8: *"Some minor differences in how the capacity analyses were conducted as compared to current MassDOT standards for conducting capacity analyses were noted, but were not considered significant, These included:*

- *A common truck percentage for each approach was utilized. Current MassDOT standards for impact analysis specify that truck percentages by individual turn movement should be utilized.*

- *Capacity analyses conducted of the future conditions utilized existing peak hour factors. Current MassDOT standards for impact analysis specify that future peak hour factors should be assumed to be 0.92.*

Response 8: In accordance with the MassDOT *Transportation Impact Assessment Guidelines,* the percentage of heavy vehicles may be applied on an approach-by-approach basis, or by lane group. MassDOT's recommendation to use a peak hour factor of 0.92 for future-year conditions is applicable primarily when the existing peak hour factor is below that value. The intent is that as volumes grow, the peak hour factor will increase accordingly. In the case of the study intersections, most of the peak hour factors are currently above 0.92 under peak summer conditions. Realistically, these peak hour factors will increase by the 2023 design year. However, no upward adjustments to these factors were made in the study.

Comment 9: *"Pedestrians were not account for in the analyses. The applicant should either confirm that the volume of pedestrians at the study intersection would not have a significant impact on the results of the analyses or redo the analyses to account for pedestrians."*

Response 9: Most of the pedestrians and bicycles counted at the study intersections occurred along the Old South Road Bike Path. These would only affect traffic turning into Macy's Lane (north) and the Nantucket Seafood driveway. As vehicular traffic turning into these streets is minimal during peak hours, the pedestrian and bicycle traffic along the Old South Road Bike Path will have a minimal effect on intersection operations. Pedestrians crossing Old South Road at the various crosswalks within the study area could have an effect on traffic operations.

However, based on the count data, these volumes were minimal during peak hours, as follows:

- 9 to 17 pedestrians crossed Old South Road at the Macy's Lane crosswalk,
- 1 to 11 pedestrians crossed Old South Road at the Lover's Lane crosswalk,
- 1 to 4 pedestrians crossed Old South Road at the Youngs Way crosswalk,
- 2 to 6 pedestrians crossed Old South Road at the Amelia Drive crosswalk,
- 5 to 10 pedestrians crossed Old South Road at the Fairgrounds Road crosswalk.

The traffic analyses performed at the Milestone Rotary included the volume of pedestrians in the model.

Comment 10: *"Nobdadeer Farm Road approaches Milestone Road with one lane although it widens for a distance of approximately 25 feet before the intersection. This intersection should be reanalyzed with one northbound approach lane."*

Response 10: The Milestone Road intersection with Nobadeer Farm Road was reanalyzed as a single-lane approach as requested and the analysis worksheets are attached to this letter. The results indicate that turns exiting Nobadeer Farm Road would operate at the same levels of service as shown in the traffic study, although volume-to-capacity ratios would be slightly higher. It should be noted, however, that due to the flared approach of Nobadeer Farm Road, traffic making left- and right turns onto Milestone Road can be made simultaneously and the operational results presented in the Traffic Impact and Access Study are expected to better reflect actual conditions.

Comment 11: *"The 2016 Existing, 2023 No-Build and 2023 Build Saturday peak hour analyses of the Old South Road/Nobadeer Farm Road intersection were conducted with incorrect southbound right turn volumes. Therefore, the Saturday peak hour capacity analyses for this location should be reanalyzed with the correct volumes."*

Response 11: The capacity analyses were re-run during the Saturday conditions as requested and the analysis worksheets are attached to this letter. The results show no change in level of service to those presented in the traffic study and the southbound Nobadeer Farm Road approach will continue to operate at a desirable level B under all conditions.

Comment 12: *"The 2023 Build afternoon peak our analysis of the Milestone Rotary was conducted with incorrect volumes. The Milestone Road approach volumes were lower than they should be. The analysis should be reanalyzed with the correct volumes."*

Response 12: The volumes on the Milestone Road approach to the Milestone Rotary have been corrected for the 2023 Build weekday PM peak hour condition and the worksheet is attached to this letter. The results show a 1.4 seconds per vehicle increase in delay on the Milestone Road approach and an overall intersection increase in delay of 2.8 seconds per vehicle when compared with the results presented in the traffic study.

Comment 13: *"The Town is proposing modifying the Old South Road/Fairground Road intersection to a modern roundabout. Based on discussions with planning staff, it is currently envisioned that the project would be funded at the local level and design would begin in 2017 with construction completed by 2019. The 2023 future condition analyses of this location should assume these improvements are complete."*

Response 13: The Old South Road and Fairgrounds Road intersection was analyzed assuming completion of the proposed roundabout by the 2023 design year. Based on the preliminary design for the intersection by Greenman-Pedersen, Inc., the roundabout is proposed to be a single-lane roundabout with all approaches providing a single lane. The roundabout diameter is proposed to be 100 feet with an 18-foot circulating width. Table 2 below summarizes the results of these analyses and the analysis worksheets are attached to this letter.

Table 2
Level-of-Service Analysis Summary
Old South Road at Fairgrounds Road with Improvements

Peak Hour/ Movement	2023 No-Build				2023 Build			
	v/c[a]	Del.[b]	LOS[c]	Queue[d]	v/c	Delay	LOS	Queue
Weekday AM Peak								
Fairgrounds Road	0.59	9.2	A	128	0.63	10.2	B	147
Old South Rd. WB	0.76	6.8	A	240	0.87	9.0	A	433
Old South Rd. EB	0.64	7.2	A	157	0.70	8.6	A	205
Overall Intersection	---	**7.5**	**A**	---	---	**9.2**	**A**	---
Weekday PM Peak								
Fairgrounds Road	0.80	17.9	C	264	0.99	44.5	E	553
Old South Rd. WB	0.72	7.9	A	234	0.80	9.3	A	301
Old South Rd. EB	0.82	10.9	B	329	0.96	21.8	C	658
Overall Intersection	---	**11.6**	**B**	---	---	**22.8**	**C**	---
Sat Midday Peak								
Fairgrounds Road	0.59	11.0	B	133	0.72	15.3	C	195
Old South Rd. WB	0.79	7.3	A	280	0.89	9.9	A	478
Old South Rd. EB	0.77	8.8	A	264	0.89	13.9	B	453
Overall Intersection	---	**8.6**	**A**	---	---	**12.4**	**B**	---

[a] Volume-to-capacity ratio.
[b] Average control delay (sec./vehicle).
[c] Level of service.
[d] 95th percentile queue in feet, assuming 25 feet/vehicle.

As shown in this table, construction of a roundabout at the Old South Road and Fairgrounds Road intersection would allow overall acceptable operations during all peak hours, with or without the proposed mixed-use development project. However, the Fairgrounds Road approach is projected to operate near capacity at level-of-service (LOS) E during the weekday PM peak hour. It is recommended that as the design of the intersection advances, consideration be given to constructing a two-lane approach on Fairgrounds Road allowing separate left- and right-turn lanes. An analysis was conducted assuming a 2-lane approach on Fairgrounds Road during the critical weekday PM peak hour under 2023 Build conditions and is attached to this letter. These analyses reveal that the Fairgrounds Road approach would operate at a LOS B with a queue of only 155 feet. Overall the roundabout would operate at LOS B under 2023 Build volume conditions.

Comment 14: *"Intersection Sight Lines (ISD) were measured at the Main Site Drive and Retail Drive and presented in the report. At the Main Site Drive and Retail Drive, the ISD measurements reported in the study, indicate sight lines equal to or greater than 445 feet which is sufficient for the reported 85th percentile speed of 40 mph on Old South Road. It is not clear from the study if these measurements were based on the existing configuration of Old South Road or accounted for the roadway widening associated with the proposed two-way left turn lane."*

Response 14: The sight distance measurements at the main site driveway intersection with Old South Road assumed construction of the proposed improvements to Old South Road as well as the clearing of any obstructions such as landscaping, signs, or fences within the sight triangles.

Comment 15: *"The applicant should confirm that any clearing needed in the intersection sight triangles can be conducted within the Old South Road and Lovers Lane right of ways."*

Response 15: The sight triangles at all proposed site driveways will be kept clear of any obstructions such as landscaping, signs, or fences. At the Lover's Lane driveway, the sight triangles are entirely within the Lover's Lane right-of-way. At the retail and main site driveways, the sight triangles are partially on land controlled by the proponent, who will assure that no obstructions will be placed within these sight triangles.

Comment 16: *"Stopping Sight Distance (SSD) measurements were not presented in the report. The applicant should provide measurements which indicate that adequate SSD is available for all sight driveways."*

Response 16: The measured stopping sight distances at all site driveways (assuming completion of the proposed road improvements along Old South Road) exceed the required minimum distances based on the observed 85th percentile speeds, as shown in Table 3.

Table 3
Stopping Sight Distance Summary

Direction	Measured	Required [a]
Old South Rd. at Main Site Drive		
East of Intersection	400+	305
West of Intersection	400+	305
Old South Rd. at Retail Drive		
East of Intersection	400+	305
West of Intersection	335	305
Lover's Lane at Site Drive		
North of Intersection	280	155
South of Intersection	300+	155

[a] Values based on AASHTO SSD requirements for 85th percentile speeds on Old South Road of 40 mph and an assumed speed of 25 mph on Lover's Lane.

Comment 17: *"The applicant is encouraged to work with the Town of Nantucket to make the following roadway segments public right of ways:*

- Main Site Drive
- Nancy Ann Lane from Main Site Drive to Davkim Lane
- Nancy Ann Lane from Main Site Drive to Lovers Lane
- Davkim Lane from Lovers Lane to Nancy Ann Lane

Response 17: Richmond Great Point Development LLC staff has been discussing this specific issue on an ongoing basis with the representatives of the Town of Nantucket Planning and Land Use Services (PLUS) Department and understands the priorities and expectations of the Town with respect to the particular segments of (existing private) roadways within the project area that are requested to be offered for dedication as public rights of way. It is expected that the conditions of approval, which will be incorporated in the decisions rendered on several of the subdivision applications pending by the project proponent that are currently undergoing review before the Planning Board, will require the offer of dedication of these roadway segments and that such offers of dedication will be agreed to by the project proponent, at no cost to the Town of Nantucket.

Comment 18: *"Based on the Master Plan provided, it appears that pedestrian accommodations will be provided throughout the site. However, a more detailed review should be conducted when a more detailed site plan is submitted."*

Response 18: Fully engineered plans depicting the specific locations and details of the pedestrian improvements, which are anticipated to be provided as part of the proposed development, will be required to be submitted to the Planning Board and reviewed by the Town of Nantucket Planning and Land Use Services (PLUS) Department staff for adequacy. These fully engineered plans will need to be approved in conjunction with the final endorsement of any plans for the proposed development by the Planning Board.

Comment 19: "The site plan and traffic study should indicate how the site's pedestrian and bicycle accommodations will be connected to surrounding neighborhoods."

Response 19: Fully engineered plans depicting the specific locations and details of the pedestrian and bicycle improvements, which are anticipated to be provided as part of the proposed development, including those that will be connecting to/from surrounding neighborhoods, will be required to be submitted to the Planning Board and reviewed by the Town of Nantucket Planning and Land Use Services (PLUS) Department staff for adequacy. Said fully engineered plans will need to be approved in conjunction with the final endorsement of any plans for the proposed development by the Planning Board.

Comment 20: "The Applicant should confirm that they have met with the Nantucket Fire Department and that the Department is comfortable with site access and circulation around the site. The Applicant should provide an AutoTurn analysis showing that the largest emergency vehicle used by the Nantucket Fire Department can adequately access the site and maneuver through the site. The Applicant should address the adequacy of emergency vehicle access to the apartment buildings located between parking areas and single family homes."

Response 20: Representatives of the Nantucket Fire Department, including Mr. Robert Bates, have reviewed the proposed development plans and have participated in consolidated technical review meetings on the proposed development, hosted by the Town of Nantucket Planning and Land Use Services (PLUS) Department staff, to solicit feedbacks and comments from all key Town departments. The Nantucket Fire Department has not indicated that they have any substantial concerns regarding the design of the proposed project as relates to access and maneuverability of emergency vehicles through the site. Additional review of this nature will be conducted by the Nantucket Fire Department prior to the final endorsement of any plans for the proposed development by the Planning Board, where any remaining issues will be addressed and resolved.

Comment 21: *"The Applicant should discuss possible bus pick-up/drop-off locations with the School Department. The anticipated location(s) of any bus stops should have adequate sight lines for vehicles driving behind or opposing the school bus to see the bus's flashing lights."*

Response 21: In the near future, in conjunction with the prospective action on the development applications for the proposed housing components of the project by the Planning Board, Richmond Great Point Development LLC staff anticipates initiating meetings with the Nantucket Public Schools Department staff to discuss prospective specific school bus ridership demands that may be generated by the development and occupancy of the proposed project, including the appropriate (and safe) locations for school bus stop within the site, if any.

Comment 22: *"Adequate pedestrian accommodations should be provided between the residential and retail areas and proposed Nantucket Regional Transit Authority bus stops and school bus stops."*

Response 22: Fully engineered plans depicting the specific locations and details of the pedestrian improvements, which are anticipated to be provided as part of the proposed development, including those that will be providing links by and between the different development components within the site (residential, retail, etc.) and connecting to any proposed NRTA bus stops will be required to be submitted to the Planning Board and reviewed by the Town of Nantucket Planning and Land Use Services (PLUS) Department staff for adequacy. Said fully engineered plans will need to be approved in conjunction with the final endorsement of any plans for the proposed development by the Planning Board.

Comment 23: *"It should be confirmed that there is a legal agreement which will allow the connection between the site and the property between the site and Lovers Lane to be remain in place should the parcels change ownership."*

Response 23: At the current time, both of these properties are under the ownership of Richmond Great Point Development LLC (under common ownership). Prior to the issuance of the initial certificate of occupancy for the proposed retail "liner" buildings, a binding cross easement will be executed and recorded by Richmond Great Point Development LLC, which will ensure that the access connection will continue to stay in place in the future, even if the parcels change ownership and/or if either property becomes under the ownership of different parties.

Comment 24: *"The Applicant may want to consider traffic calming measures such as speed bumps or humps along the proposed site roadways."*

Response 24: Comment noted. The appropriateness and location of any such measures will be further considered and reviewed with the Town of Nantucket Planning and Land Use Services (PLUS) Department staff prior to the submittal and endorsement of final engineered plans for the proposed development by the Planning Board.

Comment 25: *"The Applicant may want to consider on-site wayfinding signs for the condominium units."*

Response 25: Comment noted. Locational signs providing directions to the rental apartment units will be installed by the project proponent. It is noted that the final design and location of such signage will be subject to review by the Town of Nantucket Historic District Commission (HDC) (through its Sign Advisory Council).

Comment 26: *"Should central trash/recycling be proposed, the Applicant should ensure that trash removal vehicles can adequately maneuver through the site."*

Response 26: Comment noted. It is likely that central trash/recycling enclosures will be provided within the rental apartment and retail components of the proposed development. The design and location of any such facilities will be further considered and reviewed with the Town of Nantucket Planning and Land Use Services (PLUS) Department staff prior to the submittal and endorsement of final engineered plans for the proposed development by the Planning Board. It is noted that the final design and location of any such facilities will also be subject to review by the Town of Nantucket Historic District Commission (HDC) prior to the issuance of building permits for the (respective) buildings.

Comment 27: *"Should a central mailing system be implemented, the Applicant should consider a curb bump out or designated parking space for the mail delivery vehicles and motorists picking up/dropping off mail."*

Response 27: Comment noted. It is likely that central mail box facilities will be provided within the rental apartment component of the proposed development. The design and location of any such facilities will be further considered and reviewed with the Town of Nantucket Planning and Land Use Services (PLUS) Department staff and the Town of Nantucket Postmaster prior to the submittal and endorsement of final engineered plans for the proposed development by the Planning Board.

Comment 28: *"Based on input from the Town, it is strongly suggested that the applicant consider an alternative design for Old South Road, one that makes safe pedestrian and bicycle connections to the Old South Road Bike Path a priority, enhances aesthetics of the corridor and encourages driveway consolidation wherever possible. Also, opportunities to provide traditional left turn lanes with center median islands rather than a shared two-way left turn lane are encouraged. Landscaped median islands along Old South Road are suggested and should be considered in subsequent submittals."*

Response 28: The proposed plan for the widening and improvement of Old South Road in the vicinity of the proposed mixed-use development project has been significantly revised from the plan originally included in the Traffic Impact and Access Study, based on input from the Nantucket Planning Board, the Town of Nantucket Planning and Land Use Services (PLUS) Department staff, and area residents. The revised proposed plan is enclosed with this letter. As shown, the center turn lane has been eliminated and replaced with a center median, 10 feet in width, with median breaks at the existing and proposed driveways to allow left-turn movements. The median will be comprised of materials and will be landscaped in a manner to be mutually agreed to by the project proponent and the Town, to be reflected in final design plans. Exclusive left-turn lanes are proposed on Old South Road at the main site driveway and at the retail driveway. A sidewalk will be constructed along appropriate segments on the south side of Old South Road, with sidewalk connections to the proposed retail "liner" buildings and connecting with the main site drive. Crosswalks will be provided across Old South Road at Lover's Lane and at the main site drive to provide connectivity to the Old South Road Bike Path.

To facilitate the safe and efficient circulation and passage of emergency vehicles with the center median, each direction of travel along Old South Road will be 18 feet in width with an 11-foot wide travel lane, a 2-foot wide left shoulder, and a 5-foot wide right shoulder. The right shoulder will be constructed using stamped concrete (or other textured and / or colored material, to differentiate it from the travel lane) so as to minimize the visual effect of the 18-foot wide half section.

The proposed 10-foot wide median and 2-foot wide shoulders on both sides of the median will create the same 14-foot wide area that was previously proposed for the center turn lane. Accordingly, traffic making left turns out of the many driveways and side streets along this section of Old South Road will have the same benefit of making the left-turn movement in two stages, crossing first one direction of traffic and then waiting in the refuge area to turn into the other direction of travel. This will allow improved traffic operations for these turns,

similar to the benefits of the original design of the center turn lane as was described in the Traffic Impact and Access Study.

Based on input from the Board of Trustees and residents of the Naushop neighborhood, Old South Road east of the main site driveway will also be widened to provide an exclusive eastbound left-turn lane into Goldfinch Drive (east), as shown on the attached plan. Finally, and based on input from Nantucket planning staff, Lover's Lane will be widened to provide on-street parking along the west side of the street.

Comment 29: *"The applicant is also encouraged to provide bus stop turnouts with shelters on both sides of Old South Road in the vicinity of Main Site Drive. Adequate pedestrian connections between the bus stops, Old South Road Bike Path and both the residential and retail areas of the project should be provided."*

Response 29: A bus turnout for the NRTA will be constructed along the south side of Old South Road. Based on discussions with Town of Nantucket Planning and Land Use Services (PLUS) Department staff, the bus turnout and shelter are now proposed just west of the main site drive intersection. However, the final location will be determined based on further input from the NRTA and Town of Nantucket Planning and Land Use Services (PLUS) Department staff.

Comment 30: *"To the extent possible, the applicant is encouraged to consolidate curb cuts/driveways along this stretch of road in accordance with good access management strategies."*

Response 30: Comment noted. This issue has been discussed and reviewed in further detail with the Town of Nantucket Planning and Land Use Services (PLUS) Department staff. The number and location of all curb cuts / driveways along Old South Road will be finalized and agreed to by and between the parties prior to the submittal and endorsement of final engineered plans for the proposed development by the Planning Board.

Comment 31: *"Driveway sight distance analyses should be resubmitted reflecting changes to proposed improvements to Old South Road or any changes to driveway locations."*

Response 31: No changes to the site driveway locations are proposed. Although the improvements to Old South Road have been modified, these changes will not affect the available sight lines from the retail or main site driveways.

Comment 32: *"The Lovers Lane driveway is one of several driveways located along the west side of Lovers Lane between Old South Road and Nancy Ann Lane, a distance of approximately 600 feet. Again, the applicant is encouraged to consolidate curb cuts along this stretch of road."*

Response 32: Comment noted. This issue has been discussed and reviewed in further detail with the Town of Nantucket Planning and Land Use Services (PLUS) Department staff. The number and location of all curb cuts / driveways along Lovers Lane will be finalized and agreed to by and between the parties prior to the submittal and endorsement of final engineered plans for the proposed development by the Planning Board.

Comment 33: *"Driveway sight distance analyses should be resubmitted reflecting changes to Lovers Lane, or any changes to driveway locations."*

Response 33: No changes to the site driveway locations are proposed.

Comment 34: *"As the project is anticipated to significantly increase traffic volumes at this [Old South Road at Fairgrounds Road] intersection (approximately 8 percent during the morning peak hour, 11 percent during the afternoon peak hour and 10 percent during the Saturday midday peak hour), the applicant should provide a fair share contribution towards the design and construction of the proposed roundabout."*

Response 35: The specifics of the location, scope, and design of off-site traffic mitigation measures which may be necessitated as a result of a combination of existing traffic, background traffic growth, and traffic generated by the proposed development, including any improvements to be fully funded, designed, and constructed by the project proponent and / or any fair share contributions to be made by the applicant toward the design / construction of off-site traffic improvements, such as the Old South Road and Fairground Road intersection have been discussed in detail by and between the project proponent, the Town of Nantucket Planning and Land Use Services (PLUS) Department staff, and the Planning Board. It is anticipated that the conditions of approval, which are expected to be incorporated in the decisions rendered on several of the subdivision and land use applications pending by the project proponent that are currently undergoing review before the Planning Board, will specify the nature and responsibility for all such off-site traffic improvements that will be borne by the project proponent.

Comment 36: *"The turn lane [at the Old South Road and Macy's Lane intersection] will require widening Old South Road for a distance of approximately 250 feet. The applicant should indicate if sufficient right of way is available to construct the right turn lane. A two-lane approach at a four-way Stopped controlled intersection could be confusing to drivers. Therefore, it is suggested that the applicant consider channelizing the proposed eastbound right turn lane with a triangular island and that the right turn lane be under Yield control."*

Response 36: Topographic survey and right-of-way information for this intersection have since been obtained and an updated conceptual plan is enclosed with this letter. As shown, sufficient right of way is available to construct a right-turn lane under STOP sign control, as was depicted in the conceptual design included with the Traffic Impact and Access Study. However, additional right-of-way would be required to construct the expanded right-turn lane with a channelizing island to place the right-turn movement under YIELD control. Due to uncertainty regarding the ability and cost of obtaining the necessary right-of-way, the project proponent has agreed and is committed to fully funding the completion of the design and the improvements to allow for the reconstruction of the intersection with the right-turn lane under STOP sign control.

To the extent the Town of Nantucket, at its cost and effort, is able to obtain the additional right-of-way to allow construction of a channelizing island within the time frame in which the improvements are necessary to allow for the development and occupancy of the project, the project proponent will work with the Town to incorporate the design and elements of the expanded right-turn lane with a channelizing island to place the right-turn movement under YIELD control into the improvements to be funded and constructed by the project proponent. Otherwise, the project proponent will complete the design and fund and construct the improvements as depicted on the conceptual design enclosed within this letter, thereby allowing the Town of Nantucket to supplement these improvements, by funding and constructing the expanded right-turn lane with a channelizing island to place the right-turn movement under YIELD control if and when it obtains the necessary right-of-way and chooses to implement these improvements.

Comment 37: *"The applicant is encouraged to work with the NRTA to facilitate year round service and to provide adequate bus stop accommodations in the vicinity of Main Site Drive. The applicant should provide bus shelters at all proposed bus stops."*

Response 37: As indicated in the response to Comment #5 above, in conjunction with the prospective action on the development applications for the proposed housing components of the project by the Planning Board, Richmond Great Point Development LLC staff initiated / conducted a meeting with the NRTA staff to discuss prospective future usage and specific ridership demands on NRTA services, which may be generated by the development and occupancy of the proposed project, including the possibility to routing NRTA service on private roads through the project area. This discussion is expected to continue and include the consideration of the number, location, and design of prospective bus stop accommodations within or in the immediate vicinity of the project site, including bus shelters, and what responsibility, if any, the project proponent will have to provide land for and/or to design and construct facilities (including prospective bus shelters).

Comment 38: "A transportation demand management (TDM) plan should be developed and committed to by the proponent. The TDM plan should include elements such as on-site secure bicycle storage."

Response 38: Comment noted. Richmond Great Point Development LLC staff has discussed the prospective elements of a TDM plan and has confirmed its intention to create and submit such a TDM plan to the Town of Nantucket Planning and Land Use Services (PLUS) Department staff for review and consideration. The specific components of the TDM plan will be finalized and agreed to by and between the parties prior to the submittal and endorsement of final engineered plans for the proposed development by the Planning Board.

We hope that the above responses adequately address the TetraTech comments as well as the input received to date from you and your staff and the Planning Board.

Sincerely,

Ron Müller & Associates

Ronald Müller, P.E.
Principal

Enclosures

Figure 4
2016 Existing Saturday
Peak Hour Traffic Volumes

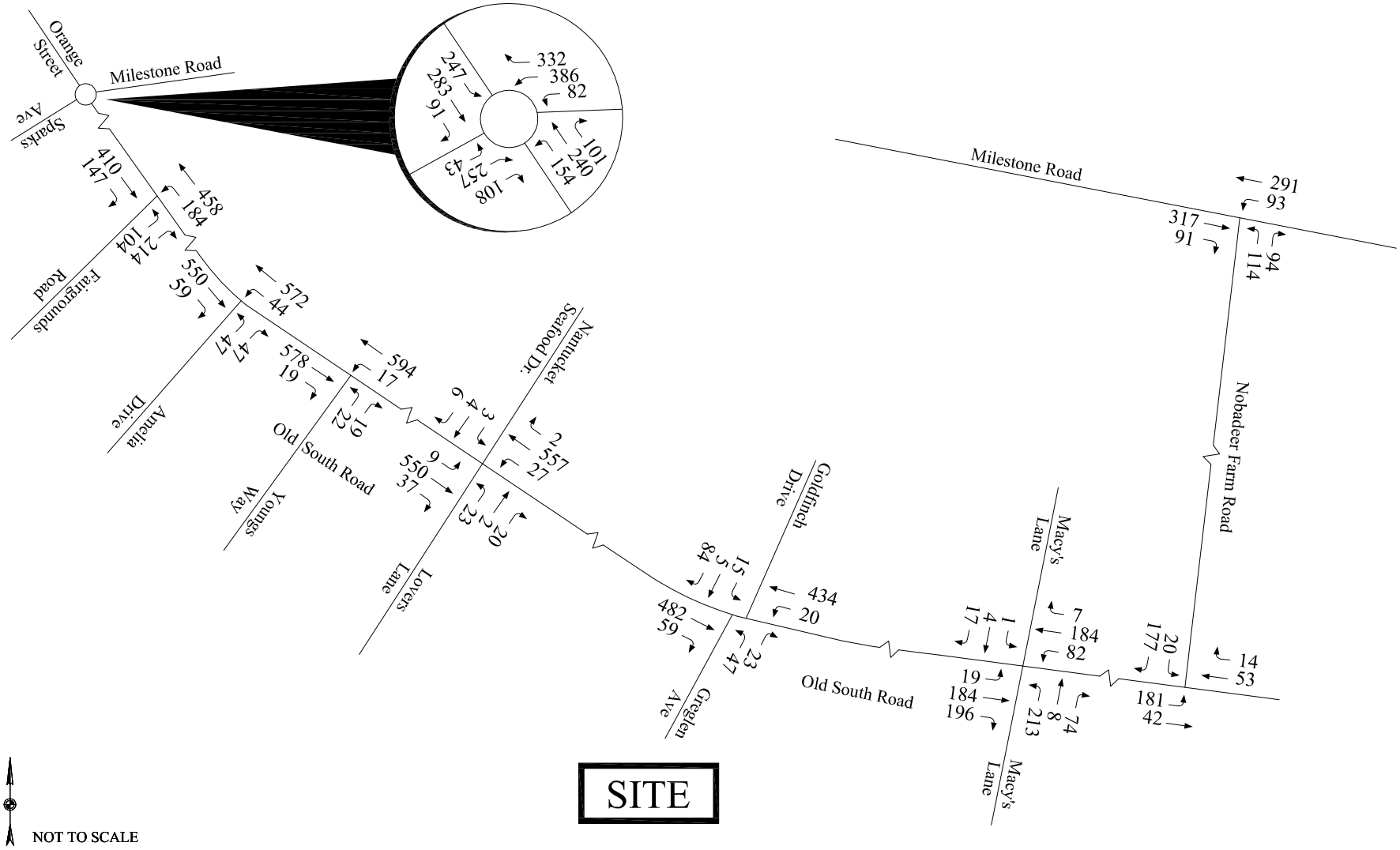


Figure 7
2023 No-Build Saturday
Peak Hour Traffic Volumes

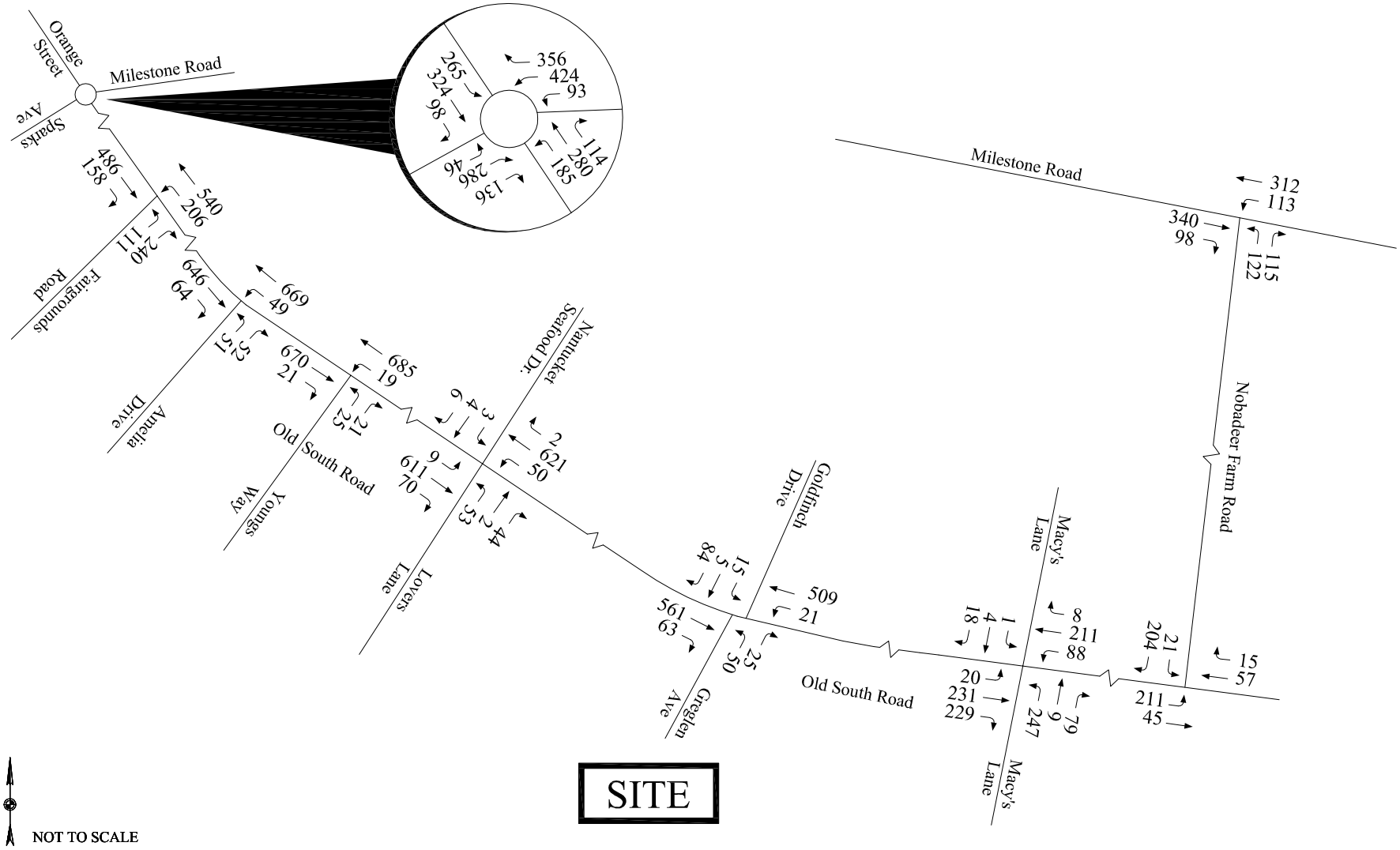
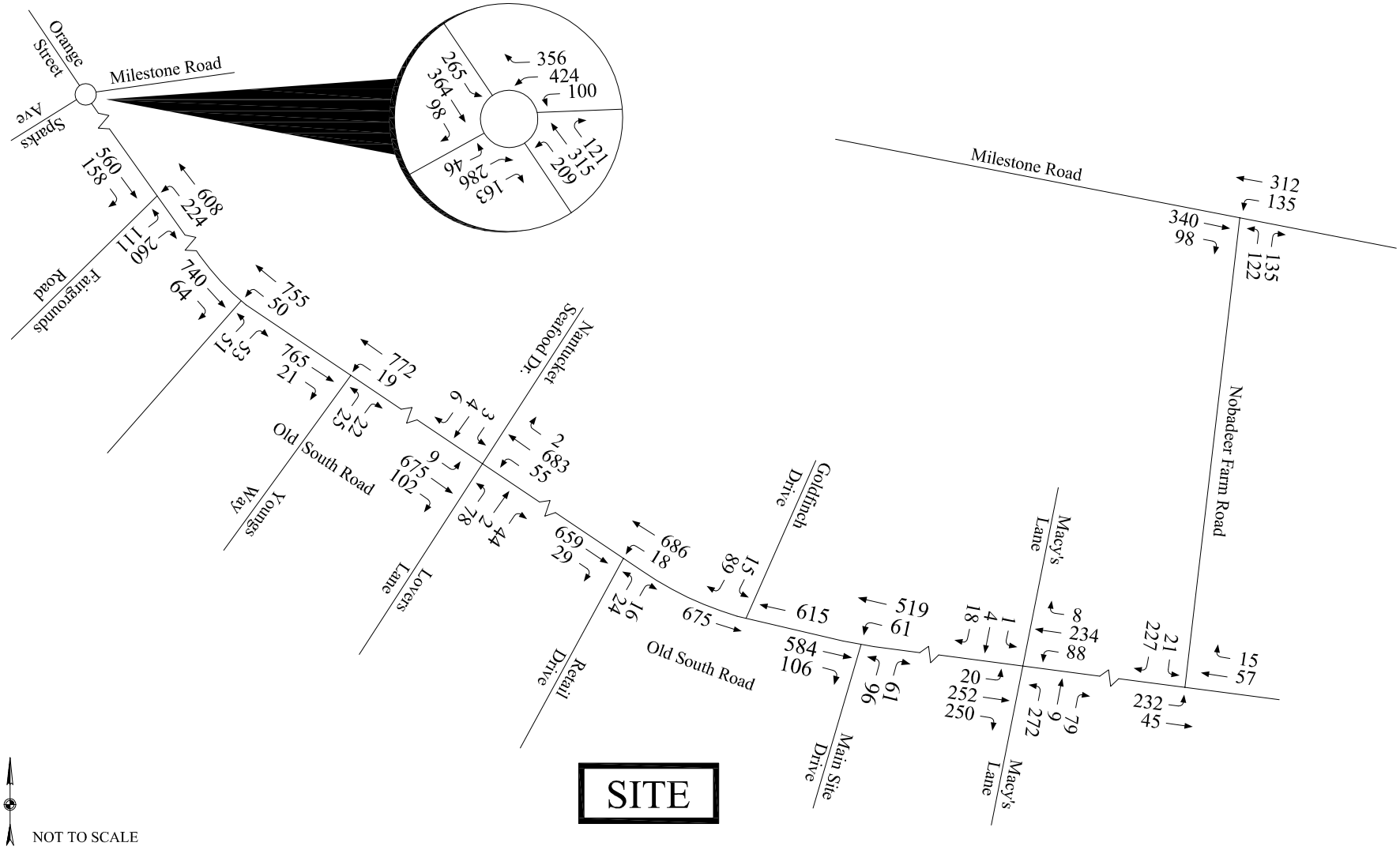


Figure 16
2023 Build Saturday
Peak Hour Traffic Volumes



Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance from Nearest Roadway Intersection
3254753	NANTUCKET	21-Jul-2012	10:40 AM	Not Reported	2	0	0	Rear-end	V1: Travelling straight ahead / V2:Slowing or stopped in traffic	V1:Southbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear/Clear	SPARKS AVENUE / OLD SOUTH ROAD	
3178031	NANTUCKET	30-Jun-2012	11:56 AM	Not Reported	3	0	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead / V3:Travelling straight ahead	V1:Westbound / V2:Westbound / V3:Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V3:Truck/trailer	Dry	Daylight	Clear		1 OLD SOUTH ROAD
3266767	NANTUCKET	19-Aug-2012	8:02 AM	Not Reported	1	0	0	Single vehicle crash	V1: Slowing or stopped in traffic	V1:Westbound	V1: Collision with cyclist (bicycle, tricycle, unicycle, pedal car)	V1: Passenger car	Dry	Daylight	Clear/Clear	OLD SOUTH ROAD / MILESTONE ROAD	
3248316	NANTUCKET	01-Jul-2012	1:42 AM	Non-fatal injury	2	3	0	Head-on	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Westbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Passenger car	Dry	Dark - roadway not lighted	Clear		MILESTONE ROAD / NOBADEER ROAD

massDOT

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3494545	NANTUCKET	04-May-2013	1:27 PM	Non-fatal injury	2	1	0	Unknown	V1: Slowing or stopped in traffic / V2:Travelling straight ahead	V1:Not reported / V2:Not reported	V1: Collision with moped / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:MOPED	Dry	Daylight	Clear		ORANGE STREET / MILESTONE ROAD
3509786	NANTUCKET	12-Jun-2013	5:31 PM	Property damage only (none injured)	2	0	0	Rear-end	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Southbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear/Clear	MILESTONE ROAD	ORANGE STREET / SPARKS AVENUE
3528536	NANTUCKET	09-Jul-2013	12:22 PM	Property damage only (none injured)	2	0	0	Angle	V1: Turning left / V2:Travelling straight ahead	V1:Eastbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear		MILESTONE ROAD / OLD SOUTH ROAD
3588229	NANTUCKET	28-Jun-2013	1:38 PM	Not Reported	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead	V1:Not reported / V2:Not reported	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Passenger car	Wet	Daylight	Cloudy	OLD SOUTH ROAD / FAIRGROUNDS ROAD	OLD SOUTH ROAD / FAIRGROUNDS ROAD
3532833	NANTUCKET	04-Jul-2013	2:27 PM	Not Reported	1	0	0	Single vehicle crash	V1: Travelling straight ahead	V1:Eastbound	V1: Collision with cyclist (bicycle, tricycle, unicycle, pedal car)	V1: Passenger car	Dry	Daylight	Clear		OLD SOUTH ROAD / FAIRGROUNDS ROAD
3743189	NANTUCKET	14-Dec-2013	3:27 PM	Not Reported	3	0	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead / V3:Travelling straight ahead	V1:Not reported / V2:Not reported / V3:Not reported	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V3:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Ice	Daylight	Snow/Cloudy	OLD SOUTH ROAD / FAIR GROUND ROAD	
3613031	NANTUCKET	17-Sep-2013	5:22 PM	Property damage only (none injured)	2	0	0	Sideswipe, same directio	V1: Turning left / V2:Travelling straight ahead	V1:Northbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Unknown heavy truck, cannot classify	Dry	Daylight	Clear	FAIRGROUNDS ROAD / OLD SOUTH ROAD	
3561900	NANTUCKET	10-Aug-2013	5:12 PM	Non-fatal injury	2	1	0	Rear-end	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Southbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear		AMELIA DRIVE / OLD SOUTH ROAD
3753875	NANTUCKET	06-Oct-2013	5:20 AM	Property damage only (none injured)	1	0	0	Single vehicle crash	V1: Travelling straight ahead	V1:Southbound	V1: Collision with animal - deer	V1: Passenger car	Dry	Dark - lighted roadway	Clear/Clear	OLD SOUTH ROAD / AMELIA DRIVE	14 AMELIA DRIVE / OLD SOUTH ROAD
3494567	NANTUCKET	30-Apr-2013	4:24 PM	Not Reported	2	0	0	Rear-end	V1: Travelling straight ahead / V2:Slowing or stopped in traffic	V1:Not reported / V2:Not reported	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear	OLD SOUTH ROAD / AMELIA DRIVE	
3509804	NANTUCKET	07-Jun-2013	3:06 PM	Non-fatal injury	2	1	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead	V1:Eastbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Wet	Daylight	Cloudy/Rain		OLD SOUTH ROAD / LOVERS LANE
3587574	NANTUCKET	31-Aug-2013	5:18 PM	Non-fatal injury	2	1	0	Angle	V1: Turning left / V2:Travelling straight ahead	V1:Southbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear/Clear		OLD SOUTH ROAD / GREGLEN AVENUE
3528009	NANTUCKET	07-Jul-2013	9:23 AM	Not Reported	1	0	0	Head-on	V1: Travelling straight ahead	V1:Westbound	V1: Collision with animal - deer	V1: Passenger car	Dry	Daylight	Clear/Clear	MILESTONE ROAD / NOBADEER FARM ROAD	
3743162	NANTUCKET	18-Dec-2013	8:03 AM	Property damage only (none injured)	1	0	0	Single vehicle crash	V1: Travelling straight ahead	V1:Southbound	V1: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Ice	Daylight	Cloudy/Sleet, hail (freezing rain or drizzle)		MILESTONE ROAD / NOBADEER FARM ROAD

massDOT

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3822130	NANTUCKET	17-Apr-2014	2:50 PM	Property damage only (none injured)	3	0	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead / V3:Travelling straight ahead	V1:Westbound / V2:Westbound / V3:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car / V3:Passenger car	Dry	Daylight	Clear/Clear		ORANGE STREET / MILESTONE ROAD
3925287	NANTUCKET	05-Aug-2014	3:03 PM	Non-fatal injury	2	1	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead	V1:Northbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Daylight	Clear/Clear		1 SPARKS AVENUE
3988623	NANTUCKET	03-Nov-2014	4:32 PM	Non-fatal injury	1	1	0		V1: Travelling straight ahead	V1:Not reported	V1: Collision with cyclist (bicycle, tricycle, unicycle, pedal car)	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Dusk	Clear		1 OLD SOUTH ROAD
3832542	NANTUCKET	08-May-2014	8:58 AM	Non-fatal injury	2	2	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead	V1:Westbound / V2:Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear		2 FAIRGROUNDS ROAD
3777229	NANTUCKET	03-Feb-2014	12:27 PM	Property damage only (none injured)	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead	V1:Northbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Snow	Daylight	Cloudy/Snow		FAIR GROUND ROAD / OLD SOUTH ROAD
4041611	NANTUCKET	31-Dec-2014	11:25 AM	Non-fatal injury	2	2	0	Rear-end	V1: Travelling straight ahead / V2:Turning left	V1:Westbound / V2:Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Daylight	Cloudy		OLD SOUTH ROAD / FAIRGROUNDS ROAD
3976305	NANTUCKET	02-Aug-2014	12:29 PM	Non-fatal injury	2	1	0	Rear-end	V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic	V1:Southbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Wet	Daylight	Rain	OLD SOUTH ROAD / FAIR GROUND ROAD	
3981101	NANTUCKET	25-Aug-2014	9:08 AM	Property damage only (none injured)	2	0	0	Rear-end	V1: Turning left / V2:Slowing or stopped in traffic	V1:Northbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear	FAIRGROUNDS ROAD / OLD SOUTH ROAD	
3970939	NANTUCKET	28-Aug-2014	5:32 PM	Property damage only (none injured)	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2:Turning left	V1:Southbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear	OLD SOUTH ROAD / FAIRGROUNDS ROAD	
3925303	NANTUCKET	12-Jul-2014	12:18 PM	Property damage only (none injured)	2	0	0	Sideswipe, same direction	V1: Travelling straight ahead / V2:Turning right	V1:Westbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Daylight	Clear/Clear		GREGLEN AVENUE / OLD SOUTH ROAD
3890835	NANTUCKET	29-Jun-2014	1:33 AM	Property damage only (none injured)	2	0	0	Head-on	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Westbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Dark - lighted roadway	Clear/Clear	OLD SOUTH ROAD / GOLDFINCH DRIVE	
3928320	NANTUCKET	06-Aug-2014	4:09 PM	Not Reported	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic	V1:Not reported / V2:Not reported	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Passenger car	Dry	Daylight	Clear		OLD SOUTH ROAD / NOBADEER FARM ROAD
3932266	NANTUCKET	31-Jul-2014	12:16 PM	Not Reported	1	0	0	Sideswipe, opposite direction	V1: Travelling straight ahead	V1:Westbound	V1: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Dark - lighted roadway	Clear		NOBADEER FARM ROAD / MILESTONE ROAD
3970937	NANTUCKET	31-Aug-2014	2:28 PM	Not Reported	1	0	0	Angle	V1: Turning left	V1:Not reported	V1: Collision with motor vehicle in traffic	V1: Passenger car	Dry	Daylight	Cloudy	MILESTONE ROAD / NOBADEER FARM ROAD	
3891332	NANTUCKET	24-Jun-2014	5:25 PM	Non-fatal injury	2	2	0	Rear-to-rear	V1: Slowing or stopped in traffic / V2:Travelling straight ahead	V1:Southbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Passenger car	Dry	Daylight	Clear/Clear		MILESTONE ROAD / NOBADEER FARM ROAD
3891737	NANTUCKET	07-Jul-2014	1:57 PM	Not Reported	2	0	0	Sideswipe, same direction	V1: Turning left / V2:Travelling straight ahead	V1:Eastbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Motorcycle	Dry	Daylight	Clear/Clear		MILESTONE ROAD / NOBADEER FARM ROAD

Intersection	
Int Delay, s/veh	14.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	200	148	111	271	181	134
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	95	95	95	95	95	95
Heavy Vehicles, %	8	8	9	9	9	9
Mvmt Flow	211	156	117	285	191	141

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	366	0	807	288
Stage 1	-	-	-	-	288	-
Stage 2	-	-	-	-	519	-
Critical Hdwy	-	-	4.19	-	6.49	6.29
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.281	-	3.581	3.381
Pot Cap-1 Maneuver	-	-	1155	-	341	735
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	583	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1155	-	300	735
Mov Cap-2 Maneuver	-	-	-	-	300	-
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	513	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	44.7
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	401	-	-	1155	-
HCM Lane V/C Ratio	0.827	-	-	0.101	-
HCM Control Delay (s)	44.7	-	-	8.5	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	7.6	-	-	0.3	-

Intersection	
Int Delay, s/veh	10.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	277	145	111	297	143	136
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	96	96	96	96	96	96
Heavy Vehicles, %	5	5	2	2	4	4
Mvmt Flow	289	151	116	309	149	142

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	440	0	905	364
Stage 1	-	-	-	-	364	-
Stage 2	-	-	-	-	541	-
Critical Hdwy	-	-	4.12	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.218	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1120	-	304	676
Stage 1	-	-	-	-	699	-
Stage 2	-	-	-	-	579	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1120	-	266	676
Mov Cap-2 Maneuver	-	-	-	-	266	-
Stage 1	-	-	-	-	699	-
Stage 2	-	-	-	-	507	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	40
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	378	-	-	1120	-
HCM Lane V/C Ratio	0.769	-	-	0.103	-
HCM Control Delay (s)	40	-	-	8.6	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	6.3	-	-	0.3	-

Intersection	
Int Delay, s/veh	6.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	317	91	93	291	114	94
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	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	334	96	98	306	120	99

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	429	0	884	382
Stage 1	-	-	-	-	382	-
Stage 2	-	-	-	-	502	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1125	-	315	663
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	606	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1125	-	282	663
Mov Cap-2 Maneuver	-	-	-	-	282	-
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	542	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	26.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	381	-	-	1125	-
HCM Lane V/C Ratio	0.575	-	-	0.087	-
HCM Control Delay (s)	26.5	-	-	8.5	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	3.5	-	-	0.3	-

Intersection	
Int Delay, s/veh	25.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	214	159	126	291	194	151
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	95	95	95	95	95	95
Heavy Vehicles, %	8	8	9	9	9	9
Mvmt Flow	225	167	133	306	204	159

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	393	0	881	309
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	572	-
Critical Hdwy	-	-	4.19	-	6.49	6.29
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.281	-	3.581	3.381
Pot Cap-1 Maneuver	-	-	1128	-	308	715
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	551	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1128	-	264	715
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	473	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	80.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	365	-	-	1128	-
HCM Lane V/C Ratio	0.995	-	-	0.118	-
HCM Control Delay (s)	80.2	-	-	8.6	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	11.6	-	-	0.4	-

Intersection	
Int Delay, s/veh	20.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	297	155	134	318	153	157
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	96	96	96	96	96	96
Heavy Vehicles, %	5	5	2	2	4	4
Mvmt Flow	309	161	140	331	159	164

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	471	0	1000	390
Stage 1	-	-	-	-	390	-
Stage 2	-	-	-	-	610	-
Critical Hdwy	-	-	4.12	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.218	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1091	-	267	654
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	538	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1091	-	225	654
Mov Cap-2 Maneuver	-	-	-	-	225	-
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	454	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	74.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	337	-	-	1091	-
HCM Lane V/C Ratio	0.958	-	-	0.128	-
HCM Control Delay (s)	74.8	-	-	8.8	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	10.2	-	-	0.4	-

Intersection	
Int Delay, s/veh	9.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	340	98	113	312	122	115
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	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	358	103	119	328	128	121

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	461	0	975	409
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	566	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1095	-	278	640
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	566	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1095	-	241	640
Mov Cap-2 Maneuver	-	-	-	-	241	-
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	491	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	38.2
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	346	-	-	1095	-
HCM Lane V/C Ratio	0.721	-	-	0.109	-
HCM Control Delay (s)	38.2	-	-	8.7	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	5.4	-	-	0.4	-

Intersection	
Int Delay, s/veh	31.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	214	159	134	291	194	174
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	95	95	95	95	95	95
Heavy Vehicles, %	8	8	9	9	9	9
Mvmt Flow	225	167	141	306	204	183

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	393	0	897	309
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	588	-
Critical Hdwy	-	-	4.19	-	6.49	6.29
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.281	-	3.581	3.381
Pot Cap-1 Maneuver	-	-	1128	-	302	715
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	542	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1128	-	256	715
Mov Cap-2 Maneuver	-	-	-	-	256	-
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	460	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	95.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	368	-	-	1128	-
HCM Lane V/C Ratio	1.053	-	-	0.125	-
HCM Control Delay (s)	95.7	-	-	8.6	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	13.3	-	-	0.4	-

Intersection	
Int Delay, s/veh	29.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	297	155	161	318	153	174
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	96	96	96	96	96	96
Heavy Vehicles, %	5	5	2	2	4	4
Mvmt Flow	309	161	168	331	159	181

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	471	0	1057	390
Stage 1	-	-	-	-	390	-
Stage 2	-	-	-	-	667	-
Critical Hdwy	-	-	4.12	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.218	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1091	-	247	654
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	507	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1091	-	200	654
Mov Cap-2 Maneuver	-	-	-	-	200	-
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	411	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	109.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	317	-	-	1091	-
HCM Lane V/C Ratio	1.075	-	-	0.154	-
HCM Control Delay (s)	109.1	-	-	8.9	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	12.9	-	-	0.5	-

Intersection	
Int Delay, s/veh	12

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	340	98	135	312	122	135
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	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	358	103	142	328	128	142

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	461	0	1022	409
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1095	-	260	640
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	539	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1095	-	219	640
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	453	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	48.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	335	-	-	1095	-
HCM Lane V/C Ratio	0.808	-	-	0.13	-
HCM Control Delay (s)	48.5	-	-	8.8	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	6.8	-	-	0.4	-

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	181	42	53	14	20	177
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, %	8	8	8	8	4	4
Mvmt Flow	197	46	58	15	22	192

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	73	0	-	0	504	65
Stage 1	-	-	-	-	65	-
Stage 2	-	-	-	-	439	-
Critical Hdwy	4.18	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.272	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1490	-	-	-	524	993
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	646	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1490	-	-	-	453	993
Mov Cap-2 Maneuver	-	-	-	-	453	-
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	558	-

Approach	EB	WB	SB
HCM Control Delay, s	6.3	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1490	-	-	-	886
HCM Lane V/C Ratio	0.132	-	-	-	0.242
HCM Control Delay (s)	7.8	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	211	45	57	15	21	204
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, %	8	8	8	8	4	4
Mvmt Flow	229	49	62	16	23	222

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	78	0	-	0	578	70
Stage 1	-	-	-	-	70	-
Stage 2	-	-	-	-	508	-
Critical Hdwy	4.18	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.272	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1483	-	-	-	474	987
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	600	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1483	-	-	-	399	987
Mov Cap-2 Maneuver	-	-	-	-	399	-
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	505	-

Approach	EB	WB	SB
HCM Control Delay, s	6.5	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1483	-	-	-	868
HCM Lane V/C Ratio	0.155	-	-	-	0.282
HCM Control Delay (s)	7.9	0	-	-	10.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	1.2

Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	232	45	57	15	21	227
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, %	8	8	8	8	4	4
Mvmt Flow	252	49	62	16	23	247

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	78	0	-	0	623	70
Stage 1	-	-	-	-	70	-
Stage 2	-	-	-	-	553	-
Critical Hdwy	4.18	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.272	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1483	-	-	-	447	987
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	572	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1483	-	-	-	369	987
Mov Cap-2 Maneuver	-	-	-	-	369	-
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	SB
HCM Control Delay, s	6.6	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1483	-	-	-	864
HCM Lane V/C Ratio	0.17	-	-	-	0.312
HCM Control Delay (s)	7.9	0	-	-	11
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.6	-	-	-	1.3

MOVEMENT SUMMARY

Site: Milestone Rotary

2023 Build PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Old South Rd											
3	L2	204	3.0	1.461	232.9	LOS F	78.0	1996.6	1.00	3.99	7.4
8	T1	304	3.0	1.461	228.7	LOS F	78.0	1996.6	1.00	3.99	7.4
18	R2	135	3.0	1.461	228.8	LOS F	78.0	1996.6	1.00	3.99	7.4
Approach		643	3.0	1.461	230.1	LOS F	78.0	1996.6	1.00	3.99	7.4
East: Milestone Rd											
1	L2	145	2.0	0.727	15.1	LOS C	8.7	220.4	0.93	1.03	26.4
6	T1	406	2.0	0.727	10.9	LOS B	8.7	220.4	0.93	1.03	26.3
16	R2	321	2.0	0.490	7.9	LOS A	3.6	91.5	0.77	0.84	27.0
Approach		872	2.0	0.727	10.5	LOS B	8.7	220.4	0.87	0.96	26.6
North: Orange St											
7	L2	363	4.0	0.714	20.9	LOS C	7.1	183.5	0.96	1.19	24.0
4	T1	398	4.0	0.897	28.7	LOS D	14.3	368.7	1.00	1.50	22.0
14	R2	87	4.0	0.897	29.0	LOS D	14.3	368.7	1.00	1.50	21.6
Approach		848	4.0	0.897	25.4	LOS D	14.3	368.7	0.98	1.37	22.8
West: Sparks Ave											
5	L2	70	6.0	1.579	286.5	LOS F	67.0	1755.4	1.00	3.95	6.3
2	T1	294	6.0	1.579	282.3	LOS F	67.0	1755.4	1.00	3.95	6.3
12	R2	129	6.0	1.579	282.4	LOS F	67.0	1755.4	1.00	3.95	6.3
Approach		493	6.0	1.579	282.9	LOS F	67.0	1755.4	1.00	3.95	6.3
All Vehicles		2856	3.5	1.579	111.3	LOS F	78.0	1996.6	0.95	2.28	12.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Old South Road at Fairgrounds Road

2023 No-Build AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Fairgrounds Road											
3	L2	114	2.0	0.590	12.4	LOS B	5.0	128.1	0.81	0.92	28.7
18	R2	332	2.0	0.590	8.1	LOS A	5.0	128.1	0.81	0.92	28.1
Approach		446	2.0	0.590	9.2	LOS A	5.0	128.1	0.81	0.92	28.3
East: Old South Road WB											
1	L2	242	5.0	0.757	10.0	LOS A	9.2	240.4	0.73	0.60	31.2
6	T1	527	5.0	0.757	5.4	LOS A	9.2	240.4	0.73	0.60	31.3
Approach		769	5.0	0.757	6.8	LOS A	9.2	240.4	0.73	0.60	31.3
West: Old South Road EB											
2	T1	437	7.0	0.639	7.2	LOS A	6.0	157.3	0.73	0.73	31.6
12	R2	121	7.0	0.639	7.2	LOS A	6.0	157.3	0.73	0.73	30.9
Approach		558	7.0	0.639	7.2	LOS A	6.0	157.3	0.73	0.73	31.5
All Vehicles		1773	4.9	0.757	7.5	LOS A	9.2	240.4	0.75	0.72	30.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Old South Road at Fairgrounds Road

2023 No-Build PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Fairgrounds Road											
3	L2	162	6.0	0.802	20.8	LOS C	10.1	263.8	1.00	1.26	25.8
18	R2	325	6.0	0.802	16.5	LOS C	10.1	263.8	1.00	1.26	25.3
Approach		487	6.0	0.802	17.9	LOS C	10.1	263.8	1.00	1.26	25.5
East: Old South Road WB											
1	L2	243	3.0	0.720	10.9	LOS B	8.3	213.7	0.76	0.68	31.1
6	T1	457	3.0	0.720	6.3	LOS A	8.3	213.7	0.76	0.68	31.1
Approach		700	3.0	0.720	7.9	LOS A	8.3	213.7	0.76	0.68	31.1
West: Old South Road EB											
2	T1	555	6.0	0.820	10.9	LOS B	12.6	329.3	0.95	0.93	30.2
12	R2	170	6.0	0.820	11.0	LOS B	12.6	329.3	0.95	0.93	29.5
Approach		725	6.0	0.820	10.9	LOS B	12.6	329.3	0.95	0.93	30.0
All Vehicles		1911	4.9	0.820	11.6	LOS B	12.6	329.3	0.89	0.92	29.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Old South Road at Fairgrounds Road

2023 No-Build Sat
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Fairgrounds Road											
3	L2	122	5.0	0.594	13.9	LOS B	5.1	132.7	0.86	1.01	28.1
18	R2	264	5.0	0.594	9.6	LOS A	5.1	132.7	0.86	1.01	27.5
Approach		386	5.0	0.594	11.0	LOS B	5.1	132.7	0.86	1.01	27.7
East: Old South Road WB											
1	L2	226	2.0	0.792	10.6	LOS B	11.0	280.0	0.80	0.63	31.1
6	T1	593	2.0	0.792	6.0	LOS A	11.0	280.0	0.80	0.63	31.2
Approach		820	2.0	0.792	7.3	LOS A	11.0	280.0	0.80	0.63	31.1
West: Old South Road EB											
2	T1	534	4.0	0.770	8.8	LOS A	10.2	264.0	0.86	0.82	31.1
12	R2	174	4.0	0.770	8.8	LOS A	10.2	264.0	0.86	0.82	30.4
Approach		708	4.0	0.770	8.8	LOS A	10.2	264.0	0.86	0.82	30.9
All Vehicles		1913	3.3	0.792	8.6	LOS A	11.0	280.0	0.84	0.77	30.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Old South Road at Fairgrounds Road

2023 Build AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Fairgrounds Road											
3	L2	114	2.0	0.628	13.4	LOS B	5.8	147.0	0.86	0.98	28.4
18	R2	339	2.0	0.628	9.1	LOS A	5.8	147.0	0.86	0.98	27.8
Approach		454	2.0	0.628	10.2	LOS B	5.8	147.0	0.86	0.98	27.9
East: Old South Road WB											
1	L2	267	5.0	0.870	12.2	LOS B	16.6	432.5	0.98	0.67	30.6
6	T1	614	5.0	0.870	7.6	LOS A	16.6	432.5	0.98	0.67	30.6
Approach		881	5.0	0.870	9.0	LOS A	16.6	432.5	0.98	0.67	30.6
West: Old South Road EB											
2	T1	466	7.0	0.703	8.6	LOS A	7.8	204.9	0.83	0.83	31.2
12	R2	121	7.0	0.703	8.6	LOS A	7.8	204.9	0.83	0.83	30.5
Approach		587	7.0	0.703	8.6	LOS A	7.8	204.9	0.83	0.83	31.0
All Vehicles		1922	4.9	0.870	9.2	LOS A	16.6	432.5	0.91	0.79	30.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Old South Road at Fairgrounds Road

2023 Build PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Fairgrounds Road											
3	L2	162	6.0	0.988	47.4	LOS E	21.1	552.6	1.00	1.78	19.7
18	R2	353	6.0	0.988	43.2	LOS E	21.1	552.6	1.00	1.78	19.5
Approach		514	6.0	0.988	44.5	LOS E	21.1	552.6	1.00	1.78	19.5
East: Old South Road WB											
1	L2	259	3.0	0.797	12.3	LOS B	11.8	301.3	0.88	0.74	30.7
6	T1	516	3.0	0.797	7.7	LOS A	11.8	301.3	0.88	0.74	30.7
Approach		775	3.0	0.797	9.3	LOS A	11.8	301.3	0.88	0.74	30.7
West: Old South Road EB											
2	T1	654	6.0	0.955	21.8	LOS C	25.1	658.1	1.00	1.23	26.3
12	R2	170	6.0	0.955	21.9	LOS C	25.1	658.1	1.00	1.23	25.8
Approach		824	6.0	0.955	21.8	LOS C	25.1	658.1	1.00	1.23	26.2
All Vehicles		2113	4.9	0.988	22.8	LOS C	25.1	658.1	0.96	1.19	25.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Old South Road at Fairgrounds Road

2023 Build Sat
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Fairgrounds Road											
3	L2	122	5.0	0.718	18.3	LOS C	7.5	194.9	0.97	1.17	26.6
18	R2	286	5.0	0.718	14.1	LOS B	7.5	194.9	0.97	1.17	26.1
Approach		408	5.0	0.718	15.3	LOS C	7.5	194.9	0.97	1.17	26.3
East: Old South Road WB											
1	L2	246	2.0	0.888	13.2	LOS B	18.8	478.0	1.00	0.71	30.5
6	T1	668	2.0	0.888	8.7	LOS A	18.8	478.0	1.00	0.71	30.5
Approach		914	2.0	0.888	9.9	LOS A	18.8	478.0	1.00	0.71	30.5
West: Old South Road EB											
2	T1	615	4.0	0.887	13.9	LOS B	17.6	453.3	1.00	1.02	29.0
12	R2	174	4.0	0.887	13.9	LOS B	17.6	453.3	1.00	1.02	28.4
Approach		789	4.0	0.887	13.9	LOS B	17.6	453.3	1.00	1.02	28.9
All Vehicles		2111	3.3	0.888	12.4	LOS B	18.8	478.0	1.00	0.92	29.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Old South Road at Fairgrounds Road

2023 Build PM - With Two-Lanes on Fairground Road
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Fairgrounds Road											
3	L2	162	6.0	0.371	14.5	LOS B	2.5	65.6	0.89	0.96	26.9
18	R2	353	6.0	0.594	12.4	LOS B	5.9	154.8	0.99	1.09	27.0
Approach		514	6.0	0.594	13.0	LOS B	5.9	154.8	0.96	1.05	27.0
East: Old South Road WB											
1	L2	259	3.0	0.793	12.2	LOS B	11.4	292.1	0.86	0.74	30.7
6	T1	516	3.0	0.793	7.7	LOS A	11.4	292.1	0.86	0.74	30.8
Approach		775	3.0	0.793	9.2	LOS A	11.4	292.1	0.86	0.74	30.8
West: Old South Road EB											
2	T1	654	6.0	0.952	21.4	LOS C	24.8	648.8	1.00	1.22	26.5
12	R2	170	6.0	0.952	21.4	LOS C	24.8	648.8	1.00	1.22	25.9
Approach		824	6.0	0.952	21.4	LOS C	24.8	648.8	1.00	1.22	26.3
All Vehicles		2113	4.9	0.952	14.9	LOS B	24.8	648.8	0.94	1.00	28.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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