

EXECUTIVE SUMMARY

JTB Homes is proposing to construct a new single- and multi-family residential development located at the existing Gracewil Country Club in Alpine Township. The proposed development is expected to consist of 590 units of single- and multi-family development and be fully constructed and occupied by the year 2042. At the request of the Kent County Road Commission, this study examines the site in three phases: Phase 1 in 2023, the approximate mid-point of development in 2032, and full build out of the development in 2042.

Access to the development is proposed to be served via three full movement access points, with one access point each on 4 Mile Road, Walker Avenue, and Peach Ridge Avenue. The access point on 4 Mile Road will be constructed during Phase 1 of development, while the access point on Walker Avenue will be constructed by the mid-point of development in 2032, and the access point on Peach Ridge Avenue will be constructed by full development build out in 2042.

The report analyzes and presents the traffic impacts that the proposed residential development will have on the following intersections in the project study area:

- Peach Ridge Avenue and 4 Mile Road
- Walker Avenue and 4 Mile Road
- Proposed Site Driveway and 4 Mile Road
- Proposed Site Driveway and Walker Avenue
- Proposed Site Driveway and Peach Ridge Avenue

The above-mentioned intersections were analyzed for the morning and afternoon peak hours for the following conditions:

- Existing 2021 Conditions
- Future 2023 No-Build Conditions
- Future 2032 No-Build Conditions
- Future 2042 No-Build Conditions
- Projected 2023 Build Conditions
- Projected 2032 Build Conditions
- Projected 2042 Build Conditions

The elements to be covered in the traffic study were discussed with the Kent County Road Commission and Alpine Township prior to the study commencing.

Existing Conditions

Based on the intersection counts, the overall morning peak hour was found to occur between the hour of 7:15 a.m. and 8:15 a.m. while the afternoon peak hour was found to occur between the hour

of 4:45 p.m. and 5:45 p.m. These time periods were selected for analysis of existing and future year conditions.

The capacity analyses for existing conditions revealed that the study area intersections and all individual movements currently operate at an acceptable level of service, with the exception of the eastbound shared through/right-turn movement and overall eastbound approach of 4 Mile Road to Walker Avenue during the weekday morning peak hour. These both operate acceptably during the weekday afternoon peak hour. Field visits during the weekday morning and afternoon peak hours confirmed lengthy vehicle delay and queuing for the eastbound 4 Mile Road approach to Walker Avenue. During the capacity analysis, the addition of an eastbound right turn lane was found to mitigate delay and provide an acceptable level of service.

Future No-Build Conditions

An evaluation of traffic impacts associated with the proposed residential development relies on an understanding of the future traffic conditions in the study area without the proposed development. Traffic volumes for the future no build 2023, 2032, and 2042 conditions were estimated by applying traffic growth rates to the existing traffic volumes to develop the future 2023, 2032, and 2042 traffic volumes and adding traffic from approved developments in the area. Per growth projections provided by Grand Valley Metro Council, a 2.07% per year growth rate was utilized between 2021 to 2025, while a 0.72% per year growth rate was utilized between 2025 to 2042. Based on discussions with Alpine Township and the City of Walker, three approved developments were identified in or near the project area that were to be considered in the study: the English Hills multi-family housing development, the Northridge East IPUD development, and the remainder of the Walkerview development.

Future 2023 No-Build Conditions

The future 2023 no build conditions revealed that the southbound Peach Ridge Avenue approach to 4 Mile Road is expected to operate at level of service E during the weekday morning peak hour. It is not uncommon for unsignalized side-street approaches onto major roadways to operate poorly during peak hours. The southbound queues are expected to be minimal under the future no build 2023 conditions and the volume to capacity ratio is under 1.0, therefore no further mitigation should be required under the future 2023 no build conditions.

Improvements are needed at the intersection of Walker Avenue and 4 Mile Road in order to mitigate the future no build conditions. The existing mitigation recommendation of an eastbound right turn lane was first examined and found to not provide enough capacity to improve the level of service to an acceptable level under the future 2023 no build conditions. Installation of a traffic signal was evaluated and found to result in an acceptable level of service for all intersection movements/approaches. It should be noted that given the misalignment of the Walker Avenue

approaches to the intersection, the northbound and southbound approaches were examined with a split-phase traffic signal operation.

Future 2032 No-Build Conditions

Since no improvement strategies discussed under existing or future no build 2023 conditions were assumed to be in place for the future 2032 no build conditions analyses, the two study area intersections will continue to have the same movements operate with unacceptable levels of service (with greater delays) during the weekday morning and weekday afternoon peak hours. Additional movements at the Walker Avenue and 4 Mile Road intersection will also begin to operate at unacceptable levels of service by the year 2032.

Similar to the future no build 2023 conditions, the southbound Peach Ridge Avenue approach to 4 Mile Road is expected to operate at a poor level of service during the weekday morning peak hour under future no build 2032 conditions. The addition of a 100' auxiliary left turn lane on the southbound Peach Ridge Avenue approach to 4 Mile Road was investigated as a remedial measure in order to improve the delays and level of service for this approach. It was found that implementing a 100' southbound left turn lane on the Peach Ridge Avenue approach to 4 Mile Road would reduce delay and queuing on the approach. Although the southbound left turn movement and overall approach will still operate at a level of service F, no further mitigation should be required at this intersection for the future 2032 no build conditions.

At the intersection of Walker Avenue at 4 Mile Road, converting the intersection to traffic signal control would continue to provide acceptable levels of service for all intersection movements. No further mitigation is required at this intersection for the future no build 2032 conditions.

Future 2042 No-Build Conditions

Since none of the improvement strategies discussed under existing, future no build 2023 conditions, or future no build 2032 conditions were assumed to be in place for the future 2042 no build conditions analyses, the two study area intersections will continue to have the same operational issues during the weekday morning and weekday afternoon peak hours with significant delays. In addition, other movements at the Walker Avenue and 4 Mile Road intersection will also begin to operate at unacceptable levels of service by the year 2042.

Similar to 2023 and 2032 no build conditions, it was found that implementing a southbound left turn lane on the Peach Ridge Avenue approach to 4 Mile Road would reduce delay and queuing on the approach and result in a volume to capacity ratio below 1.0. However, the southbound left turn movement and overall approach will still operate at a level of service F. As the traffic volumes remain relatively low on this approach and the volume to capacity ratio remains less than 1.0, no further mitigation should be required for the future 2042 no build conditions.

At the intersection of Walker Avenue at 4 Mile Road, it was found that additional mitigation would need to be required under traffic signal control in order to provide acceptable levels of service for all movements and approaches. During the analysis, it was determined that an auxiliary right-turn lane on the eastbound approach would need to be added to provide acceptable levels of service for each movement and approach at the intersection. Installing a traffic signal at the intersection and adding an eastbound right turn lane will result in acceptable levels of service for all movements/approaches under the future 2042 no build conditions. It should be noted that the traffic signal control continued to be examined with a split-phase for the northbound/southbound approaches due to their existing misalignment at the intersection.

Projected Build Conditions

The projected build out years examined include the following:

- The year 2023 when Phase 1 of the proposed residential development (91 units) is expected to be complete with construction of the site access to 4 Mile Road also completed. The dwelling units are split among 13 houses, 26 villas, and 13 townhomes with 4 units per building.
- The year 2032 at an approximate mid-point of the residential development (322 units) with construction of the second site access to Walker Avenue also completed. The dwelling units are split among 138 houses, 48 villas, 26 duplexes, and 21 townhomes with 4 units per building.
- The year 2042 when the proposed residential development is expected to be fully built out (590 units) and construction of the third site access to Peach Ridge Avenue is completed. The dwelling units are split among 307 houses, 105 villas, 47 duplexes, and 21 townhomes with 4 units per building.

The study area intersections were evaluated with the future build traffic volumes to determine the future intersection operations with the proposed residential development project. Traffic volumes for the projected 2023 build, 2032 build, and 2042 build conditions were derived from developing the trip generation, distribution, and assignment for the proposed residential development and adding these trips to the no build traffic volumes projected for 2023, 2032, and 2042 without the proposed project.

New trips to be generated by the proposed residential development were estimated based on information and procedures contained in the Institute of Transportation Engineer's (ITE) report Trip Generation Manual, Eleventh Edition, September 2021. Single Family Detached Housing, Land Use Code 210, was utilized to estimate the morning and afternoon trip generation for the dwelling units in the houses and villas, while Single-Family Attached Housing, Land Use Code 215, was utilized for the morning and afternoon trip generation for the dwelling units in the duplexes and townhomes. By Phase 1 in 2023, the proposed development is projected to generate a total of 53 weekday morning

peak hour trips and 68 weekday afternoon peak hour trips. At the approximate mid-point of development in 2032, the development is projected to generate a total of 196 weekday morning peak hour trips and 256 weekday afternoon peak hour trips. And by full project build out in 2042, a total of 358 weekday morning peak hour trips and 479 weekday afternoon peak hour trips are projected to be generated by the development. The estimated number of weekday morning and weekday afternoon peak hour trips was distributed to the surrounding roadway network using traffic volume distributions approved by the Kent County Road Commission.

Projected 2023 Build Conditions

The capacity analysis for the projected 2023 build conditions under Phase 1 of development revealed that the same improvements identified under the no build 2023 conditions would be required under the projected build conditions. No further mitigation would be needed at the primary study intersections, beyond the mitigation recommended under the future no build 2023 conditions, to accommodate the traffic generated by the proposed residential development in the year 2023.

Turn lane warrants were examined to determine if a right or left turn lane would be needed along 4 Mile Road at the proposed site access with Phase 1 of development. Based on the volume warrants, a westbound right turn taper only is recommended at the proposed site access on 4 Mile Road and has been included in the proposed site plan. A left-turn lane on 4 Mile Road is not warranted at the proposed site access with Phase 1 of development. The capacity analyses for the proposed site access revealed that all movements at its intersection with 4 Mile Road are expected to operate acceptably during the morning and afternoon peak hours.

Projected 2032 Build Conditions

The study area intersections were again evaluated with the future 2032 build traffic volumes to determine the intersection operations at the approximate mid-point of the residential development. The capacity analysis for the projected 2032 build conditions revealed that additional improvements beyond those identified under the no build 2032 conditions would be required at the intersection of Walker Avenue and 4 Mile Road due to the traffic generated by the proposed residential development.

The construction of a left turn lane on the southbound Peach Ridge Avenue approach to 4 Mile Road is expected to improve the weekday morning peak hour approach delay, but the approach is still expected to operate at level of service F, as is the southbound left-turn movement. The expected volume to capacity ratio is expected to remain below 1.0 and queues are expected to be minimal for this approach. The 100' auxiliary left turn lane on the southbound Peach Ridge Avenue approach to 4 Mile Road that was recommended under the future 2032 no-build conditions will continue to accommodate the queuing expected for this movement. No further mitigation should be required at this intersection for future 2032 build conditions.

The analysis for the intersection of Walker Avenue at 4 Mile Road determined that signaling the intersection alone would not provide acceptable levels of service under 2032 build conditions as it did under the 2032 no build conditions. An auxiliary eastbound right turn lane would also need to be constructed along 4 Mile Road at Walker Avenue to provide acceptable levels of service at the study area intersection.

Turn lane warrants were again examined to determine if a right or left turn lane would be needed along 4 Mile Road at the proposed site access as well as along Walker Avenue at the second proposed site access. Based on the volume warrants, right and left turn lanes are warranted along 4 Mile Road at the site access to the development, while neither a right nor left turn lane are warranted along Walker Avenue at the second site access to the development. The capacity analyses for the proposed site accesses revealed that all movements at the intersections are expected to operate acceptably, with the exception of the southbound left turn movement and overall southbound approach from the site access to 4 Mile Road during the weekday morning peak hour. It is common for unsignalized side-street approaches onto major roadways to operate poorly during peak hours. The southbound left-turn queues exiting the development are expected to be minimal, with the signalization at the Walker Avenue and 4 Mile Road intersection, therefore no further mitigation should be required.

Projected 2042 Build Conditions

The study area intersections were finally evaluated with the future 2042 build traffic volumes to determine the future intersection operations at full build out of the proposed residential development. The capacity analysis for the projected 2042 build conditions revealed that additional improvements beyond those identified under the no build 2042 conditions would be required at the Peach Ridge Avenue and 4 Mile Road intersection due to the traffic generated by the proposed residential development.

The installation of a left turn lane on the southbound Peach Ridge Avenue approach to 4 Mile Road is expected to improve weekday morning peak hour approach delay, but the approach is still expected to operate at level of service F. It is not uncommon for unsignalized side-street approaches onto major roadways to operate poorly during peak hours. While a volume to capacity ratio above 1.0 is expected for the southbound left turn lane, a southbound left-turn lane providing 150 feet of storage will accommodate the anticipated queuing during the weekday morning and afternoon peak hours. This is an additional 50 feet in length from the 2042 no build conditions due to the development traffic. Signalizing the intersection of Walker Avenue at 4 Mile Road will provide the necessary gaps for traffic to enter 4 Mile Road from Peach Ridge Avenue. Additionally, signalizing the intersection of 4 Mile Road at Walker Avenue provides a more efficient intersection for southbound study area traffic to utilize, therefore it is reasonable to assume that vehicles heading south from 6 Mile Road to 4 Mile Road may instead use Walker Avenue rather than Peach Ridge Avenue.

At the intersection of Walker Avenue at 4 Mile Road, the movements/approaches that were found to operate poorly due to the proposed development traffic were already deficient movements for the other scenarios examined and were already identified as requiring mitigation. No additional movements were identified as requiring improvements due to the proposed development traffic. The traffic signal control mitigation was again investigated under a split-phase signal operation for the northbound and southbound approaches as well as the addition of an auxiliary eastbound right turn lane. This mitigation scenario that was recommended under the projected build 2032 conditions will continue to provide acceptable levels of service under the projected build 2042 conditions. No further mitigation is required for this scenario.

Turn lane warrants were again examined to determine if a right or left turn lane would be needed along Walker Avenue at the second proposed site access and along Peach Ridge Avenue at the third proposed site access. Right and left turn lanes were warranted along 4 Mile Road at the first site access to the development under projected 2032 build conditions. A right turn lane or taper is not required on Walker Avenue at the second site access nor on Peach Ridge Avenue at the third site access. A left turn lane is warranted along Walker Avenue at the second site access, while a left turn lane is not warranted at the Peach Ridge Avenue site access. The capacity analyses for the proposed site accesses revealed that all movements at the intersections are expected to operate acceptably, with the exception of the southbound left turn movement and overall approach from the site access to 4 Mile Road. The volume to capacity ratio is expected to remain less than 1.0 and queuing is minimal, thus no improvements are typically necessary to mitigate these side-street movements. In the analysis of mitigation strategies, it was found that converting the intersection of Walker Avenue at 4 Mile Road to traffic signal control will result in an expected 95th percentile queue length less than 100' on the site access approach to 4 Mile Road during the morning peak hour. In addition, drivers from the development can choose to access Walker Avenue and utilize the improved Walker Avenue and 4 Mile Road intersection instead of attempting to turn left onto 4 Mile Road during the peak hours. No further mitigation should be required for this site access.

Summary

Improvements that are needed in order to mitigate the future 2023, 2032, and 2042 no build conditions include:

- By 2023, installation of a traffic signal with split phase operation at the intersection of Walker Avenue at 4 Mile Road.
- By 2032, addition of a 100' southbound left-turn lane on the southbound Peach Ridge Avenue approach to the intersection with 4 Mile Road.
- By 2042, an eastbound right turn lane along 4 Mile Road at Walker Avenue would be required with the earlier traffic signal mitigation.

The same mitigation strategies are needed to provide acceptable levels of service under projected 2023, 2032 and 2042 build conditions except for the following alterations:

- Under traffic signal control for the Walker Avenue and 4 Mile Road intersection, the eastbound auxiliary right-turn lane would need to be constructed by 2032.
- The southbound left-turn lane on the southbound Peach Ridge Avenue approach will need to be extended to 150' by 2042 to accommodate the expected queue lengths with the project traffic.

At the proposed site accesses, a westbound right turn taper along 4 Mile Road is required for the initial phase of development in 2023. By 2032, a full-width right turn lane and left-turn lane are warranted along 4 Mile Road at the site access. Neither a left or right turn lane is warranted at the Peach Ridge Avenue driveway under any future year scenario. Neither a left or right turn lane is warranted at the Walker Avenue driveway under 2023 or 2032 conditions, however, a full northbound left turn lane is warranted along Walker Avenue at the site access for the full build out conditions in 2042.