

Appendix B7

Future Conditions Report



Brodhead Road

Corridor Planning Study



Brodhead Road Corridor Planning Study

Future Conditions Summary

September 2021

Beaver County

Center Township, Hopewell Township, and City of Aliquippa, PA

PASHEK  MTR



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Appendix A: 2045 No-Build Operations Analyses Results

1 FUTURE TRAFFIC VOLUMES

Traffic forecasting was performed to project the anticipated Future Year 2045 travel demand along the corridor. These projected traffic volumes were prepared to analyze the future traffic operations.

1.1 Future Traffic Growth

Baseline volumes were projected to 2045 using growth rates developed from available data for Traffic Analysis Zones (TAZs) and routes within the study area. These growth rates were developed using:

- linear growth rates based on volumes from PennDOT's Traffic Information Repository (TIRe),
- municipal growth rates developed by the Southwestern Pennsylvania Commission (SPC),
- factors based on the number of households and employment in traffic analysis zones, and
- substantial impacts to vehicular trips based on new households and jobs with ITE Trip Generation based on known or committed developments.

Traffic growth and adjustments were applied to each origin-destination (O-D) pair in the 2020 travel demand matrices using PTV's VISUM 2021 to determine route choice and travel demand along Brodhead Road.

1.2 2045 No-Build Traffic Volume Adjustments

Changes in travel patterns are most pronounced with the Shell Ethylene Cracker Plant where existing vehicular demand includes the 8,000 temporary construction-related workers on site daily, while future conditions post-construction will account for just 800 permanent workers for the operation of the plant. Forecasting of future vehicular demand was performed in the following steps:

1. Trip generation was performed to predict growth in vehicular demand with growth factors applied to 2020 trips, as detailed above. Areas with new homes and businesses that significantly impacted vehicular demand were evaluated on a case-by-case basis, using the ITE Trip Generation Manual.
2. Trip distribution was performed to determine trip origins and destinations. Trip origins and destinations were related to TAZs in the development of a future year O-D matrix. Most trip distribution was similar to conditions in 2020; however, some TAZs had substantial change in land use for 2045 in which the trips were coming from or going to no longer matched trip distributions in 2020. The Shell Ethylene Cracker Plant changed substantially with a shift from employment for construction in 2020 to employment for factory operation in 2045. This led to a reduction in trips from that TAZ. These reduced trips were distributed based on comparison to TAZs in the study area with similar land use.
3. Route assignment was performed to determine the roadways a vehicle would choose to travel on from their origin to their destination. Route assignment was analyzed using the travel demand model developed with PTV's VISUM 2021 software. 2045 O-D matrices and the VISUM model were used to determine route assignment. With the volume of traffic from the O-D matrices and location of the traffic from the route assignment, 2045 No-Build peak hour volumes were developed. The final set of 2045 No-Build peak hour volumes are summarized in [Exhibit 1](#) through [Exhibit 4](#).

Exhibit 1: AM (PM) Peak Hour Volume Summary – 2045 No-Build Conditions (Map 1 of 4)

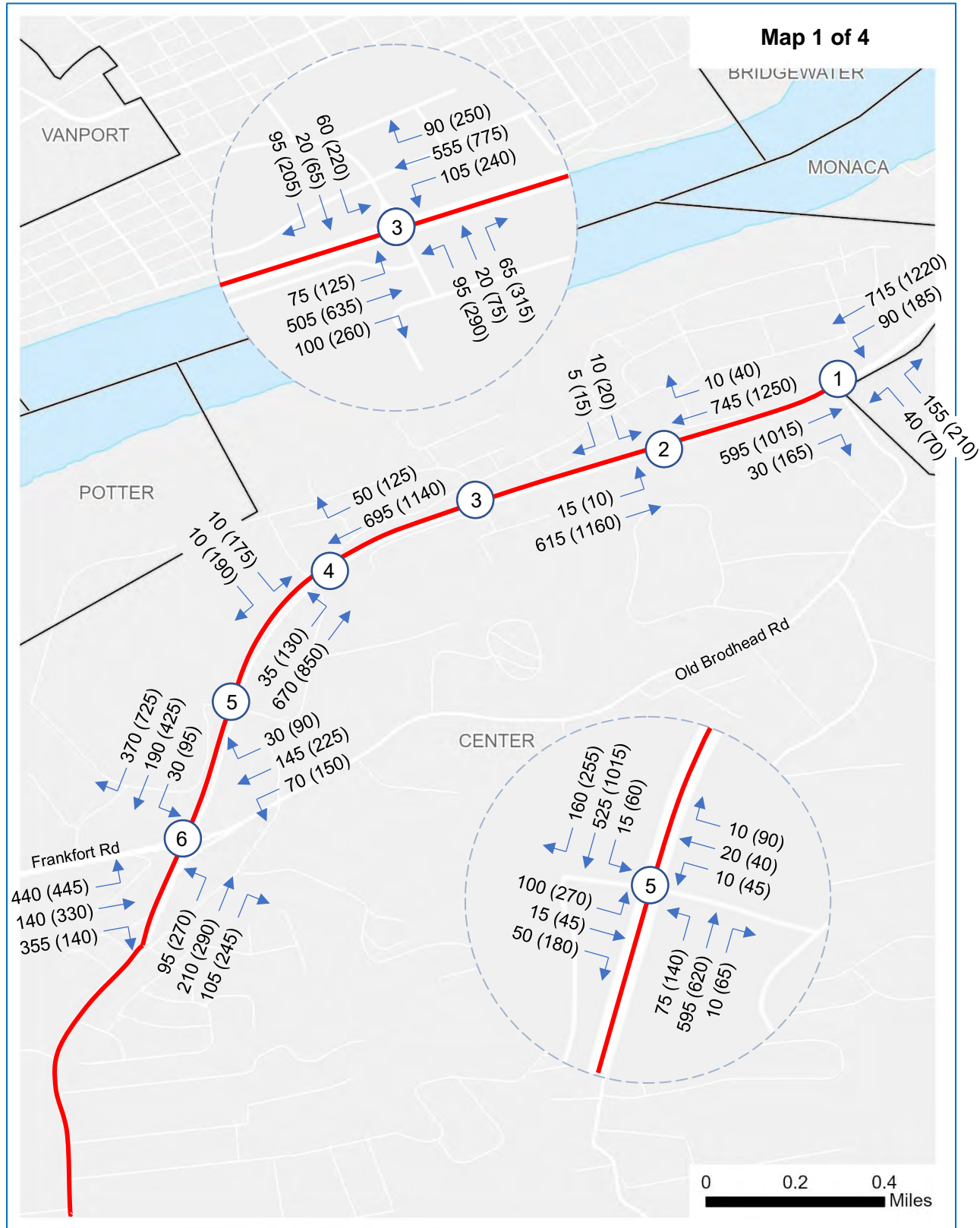


Exhibit 2: AM (PM) Peak Hour Volume Summary – 2045 No-Build Conditions (Map 2 of 4)

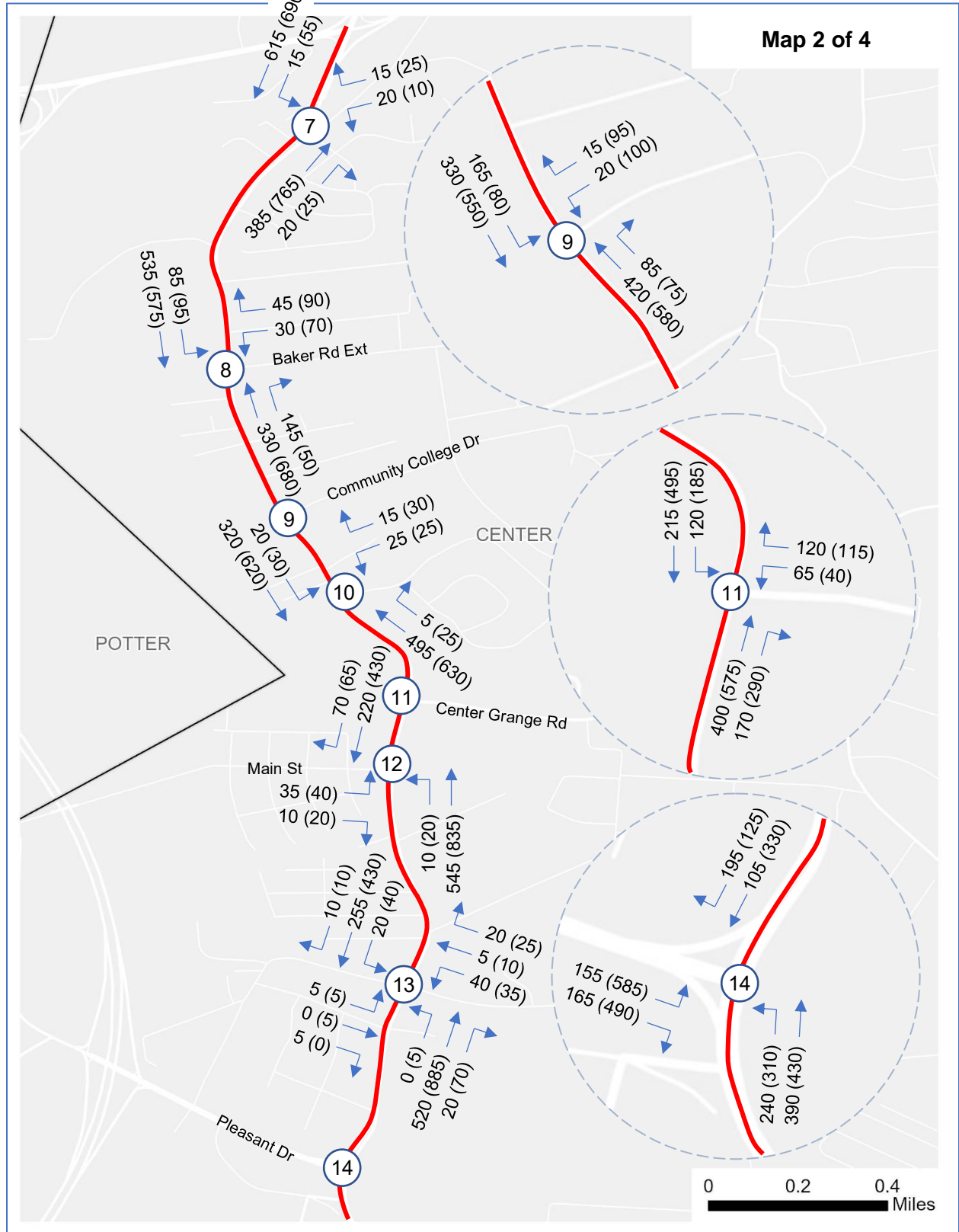


Exhibit 3: AM (PM) Peak Hour Volume Summary – 2045 No-Build Conditions (Map 3 of 4)

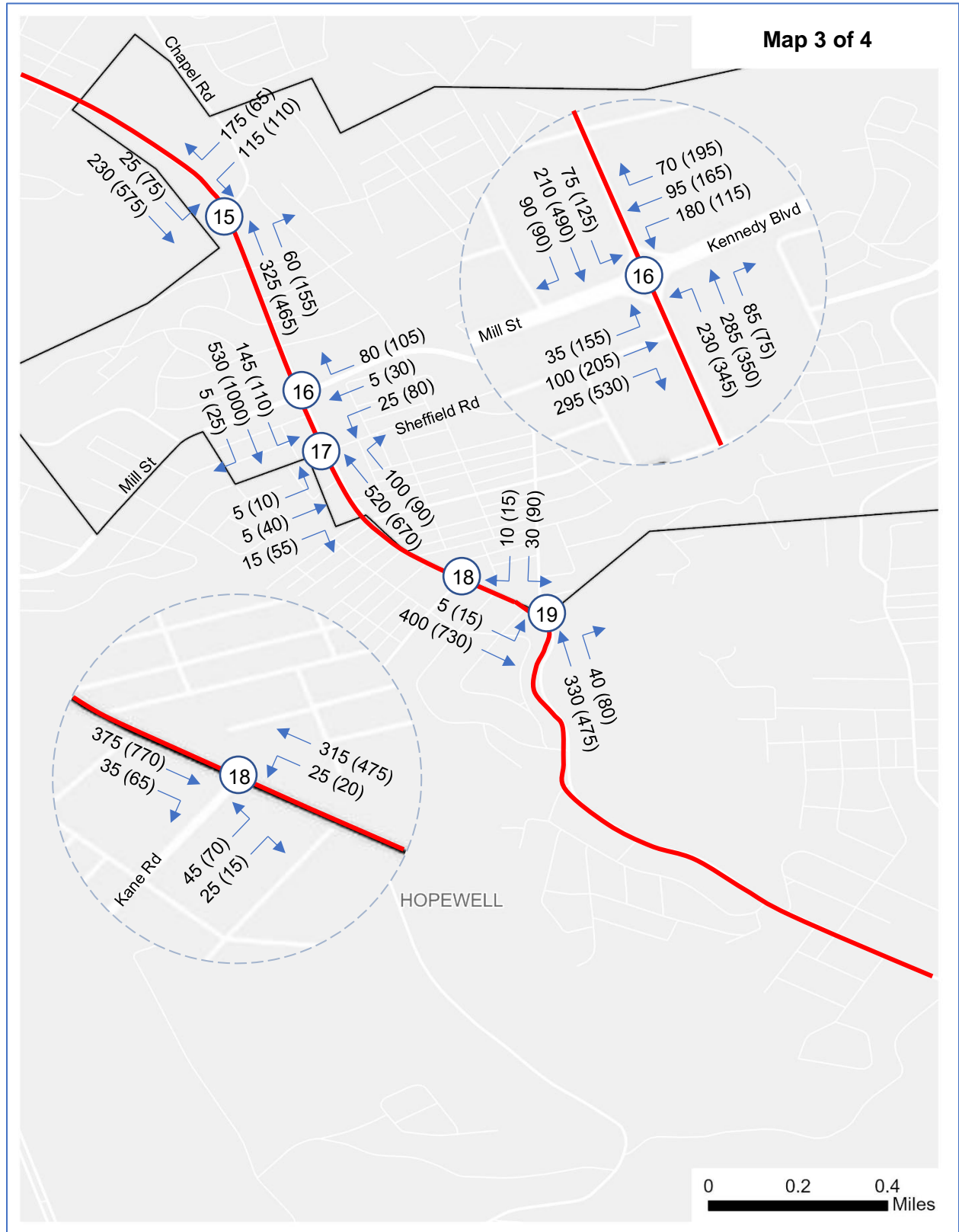
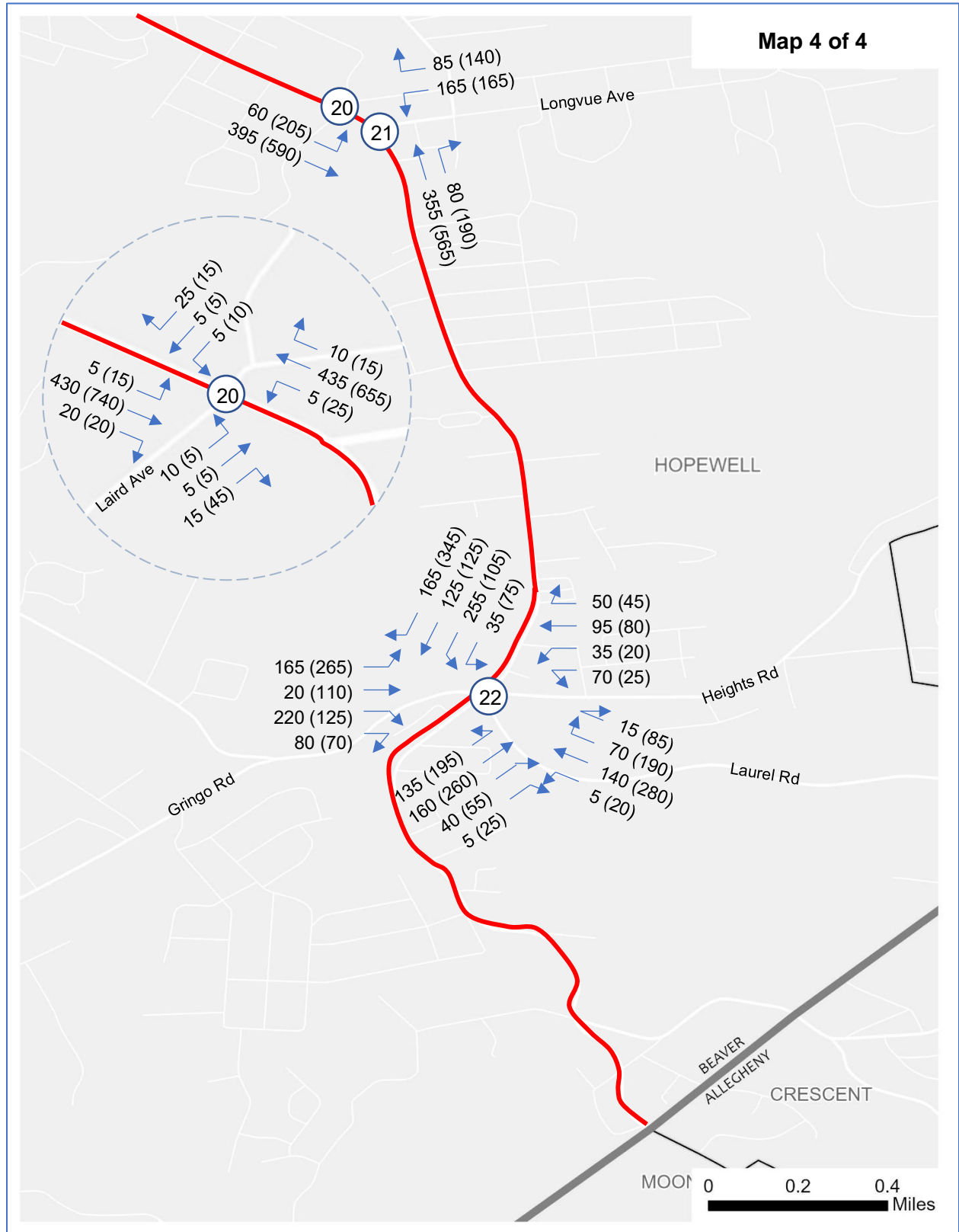


Exhibit 4: AM (PM) Peak Hour Volume Summary – 2045 No-Build Conditions (Map 4 of 4)



2 2045 No-BUILD INTERSECTION OPERATIONS

To assess individual intersection operations throughout the corridor, intersection capacities, delays, and corresponding levels-of-service (LOS) were analyzed based on *Highway Capacity Manual* (HCM) methodologies. This approach associates vehicular delay at intersections with a letter-grade ranging from LOS A, representing the best operating conditions, to LOS F, representing the worst (or failing) conditions. PTV's VISTRO software (Version 2021, Service Pack 2) was used to complete this analysis at the 22 primary study intersections.¹ Detailed delay and LOS results are compiled in [Appendix A – 2045 No-Build Conditions Operations Analysis Results](#).

Summary results in [Exhibit 5](#) reflect the overall intersection LOS for signalized locations, or the worst minor approach LOS for unsignalized locations. Results indicate that only three of the 22 primary study intersections operate acceptably (LOS D or better) for all movements in both peak hours as listed in [Exhibit 5](#). Intersection LOS details include the following:

- Signalized intersections with overall failing LOS E/F in both peak hours:
 - INT 6 Frankfort Road (SR 18) / Old Brodhead Road
 - INT 16 Mill Street / Kennedy Boulevard
 - INT 17 Sheffield Road
 - INT 22 Five Points
- All other signalized intersections have an overall failing LOS E/F in just the PM peak hour, except the following intersections, which did not have any failures in either peak hour:
 - INT 1 Old Brodhead Road
 - INT 4 Center Commons Boulevard
- Unsignalized intersections with side street failures at LOS E/F in both peak hours:
 - INT 14 Pleasant Drive
 - INT 21 Longvue Avenue
- All other unsignalized intersections have side street failures at LOS E/F in just the PM peak hour, except the following intersection, which did not have any failures in either peak hour:
 - INT 10 Sherwood Drive

¹ VISTRO is a macroscopic capacity analysis and signal optimization computer program that follows HCM methodologies. Note, however, that due to limitations within HCM 6 methodologies – such as the ability to handle intersections with complex controller operations or detector placement – HCM 2000 LOS results were compiled from VISTRO for all study area intersections.

FUTURE CONDITIONS SUMMARY

Exhibit 5: Level of Service Summary

#	Brodhead Road at:	Control Type	LOS (AM / PM)									
			Overall	NB	SB	EB	WB	Overall	NB	SB	EB	WB
1	Old Brodhead Road	Signal	C	C	C	-	D	C	C	C	-	D
2	Wagner Road	Stop-Control	-	Free	Free	-	D	-	Free	Free	-	F
3	Short Street / Milne Drive	Signal	D	D	D	E	E	E	D	D	F	E
4	Center Commons Boulevard	Signal	C	C	C	D	-	D	C	D	D	-
5	Beaver Valley Mall Drive / Golfview Drive	Signal	D	D	D	D	D	E	D	E	D	E
6	Frankfort Road / Old Brodhead Road	Signal	F	E	F	F	E	F	E	F	F	E
7	N Branch Road	Stop-Control	-	Free	Free	-	C	-	Free	Free	-	F
8	Baker Road Ext	Stop-Control	-	Free	Free	C	-	-	Free	Free	F	-
9	Community College Drive	Signal	D	E	D	-	D	E	F	D	-	F
10	Sherwood Drive	Stop-Control	-	Free	Free	-	C	-	Free	Free	-	D
11	Center Grange Road	Stop-Control	-	Free	Free	-	D	-	Free	Free	-	F
12	Main Street	Stop-Control	-	Free	Free	C	-	-	Free	Free	E	-
13	Shaffer Road	Stop-Control	-	Free	Free	B	C	-	Free	Free	F	F
14	Pleasant Drive	Stop-Control	-	Free	Free	F	-	-	Free	Free	F	-
15	Chapel Road	Stop-Control	-	Free	Free	-	C	-	Free	Free	-	F
16	Mill Street / Kennedy Boulevard	Signal	E	F	D	D	D	F	F	F	F	D
17	Sheffield Road	Signal	F	F	F	B	B	F	C	F	C	D
18	Kane Road	Stop-Control	-	Free	Free	C	-	-	Free	Free	F	-
19	20 th Street	Stop-Control	-	Free	Free	-	C	-	Free	Free	-	F
20	Laird Avenue	Stop-Control	-	Free	Free	C	C	-	Free	Free	D	F
21	Longvue Avenue	Stop-Control	-	Free	Free	-	F	-	Free	Free	-	F
22	Gringo Road / Laurel Road / Heights Road	Signal	F	F	F	F	F*	F	F	F	F	F*

* LOS F for WB Heights Road and WB Laurel Road (SR 151)