Kimley»Horn
New York

MEMORANDUM

To: Mr. Anthony Carbone
Carbone Brothers 3095, LLC

From: Andrea Connell
John Canning, P.E.
Kimley-Horn Engineering and Landscape Architecture of New York, P.C.

Date: August 10, 2023

Subject: Village Square Development
3095 Albany Post Rd
Buchanan, New York

Kimley-Horn provides the following responses to comments provided by Colliers Engineering & Design in their letter of July 24, 2023:

1. On Page 7 under Item J, subitem i., all three boxes (Morning, Evening, Weekend) should be checked. In addition to the morning hours, it should also indicate the evening hours, i.e., 4:00 PM – 6:00 PM and weekend hours, 11:00 AM – 2:00 PM, which should be checked on the form.

   Response, Comment noted.

2. Under Item J, subitem v., description of the access modifications should include a reference to the proposed new site driveway connection to Route 9A..

   Comment noted.

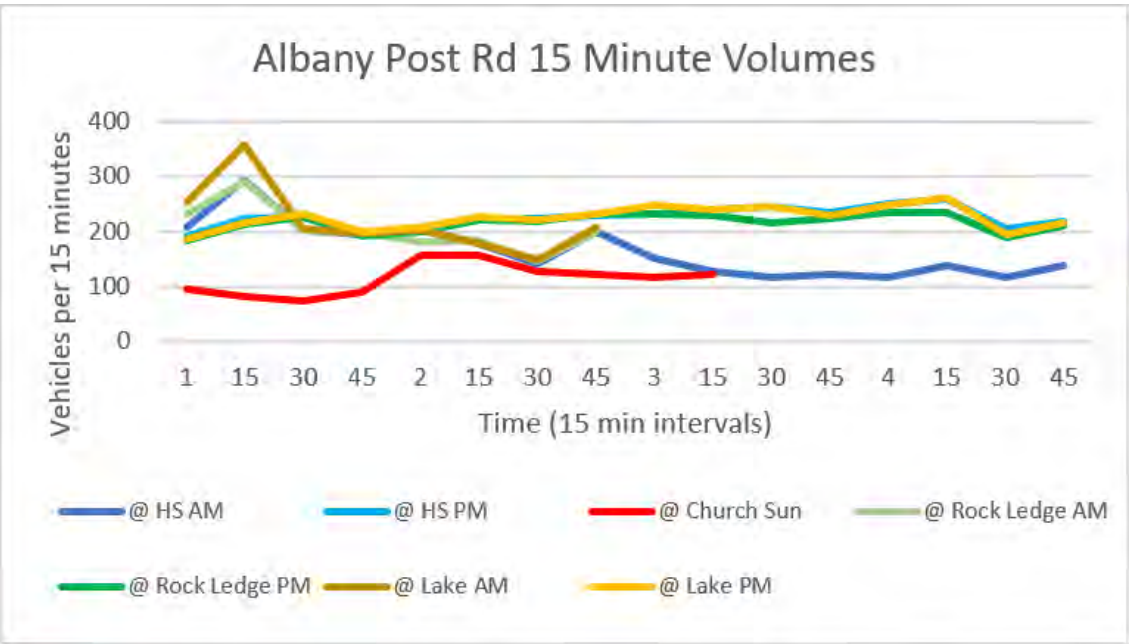
3. A copy of the EAF, plan, and TIS should be forwarded to NYSDOT for their review and input.

   A copy of the EAF, plan, and TIS was forwarded to NYSDOT for their review and input on July 10, 2023. It is noted that any improvements proposed in NYSDOT's right-of-way on Albany Post Road will require review and approval by NYSDOT prior to any work to ensure that the improvements are designed and will be constructed to safely and efficiently accommodate project and non-project traffic.

4. An expanded discussion of the conditions in the vicinity of the high school and how that affects traffic flow along the corridor should be added to this description to provide a better understanding of the operation of this portion of the Route 9A corridor.

   Response: Generally speaking, the operation of the high-school has little affect on traffic flow along the corridor. Only for 15 minutes of each day, from 7:15 to 7:30, does the High School affect traffic flow. During that 15minute period, vehicles turning left into the school briefly delay northbound through-moving vehicles on Albany Post Road. As indicated in the traffic study, the average delay for left-turning vehicles is 12 seconds during this period and the average delay for the entire northbound approach is 3 seconds. Based on the weighted average calculation of the 103 left-turners and 350 through/right-turners, the calculated additional delay to through-moving traffic is only 1 second.

   Traffic volumes during this 15-minute period at this location are 22% greater than any other 15-minute period at any other location along the corridor during any hour of the day. The analyses indicate that the High School has little to no affect on the corridor traffic flow during the other peak-15-minute periods and for all but 45 minutes per week, traffic volumes are less than 75% of the morning peak 15-minute period.



Albany Post Road 15-minute volumes

	Lake Street*		@ Church Sun	Rock Ledge Ave*		School Exit Driveway	
	@ Lake AM	@ Lake PM		@ Rock Ledge AM	@ Rock Ledge PM	@ HS AM	@ HS PM
1	253	186	96	232	183	208	193
15	**358**	217	82	**290**	213	**294**	225
30	205	233	73	203	228	203	228
45	198	201	89	198	193	194	194
2	203	207	156	181	199	203	209
15	179	226	**158**	185	221	178	221
30	149	221	127	147	220	141	224
45	207	232	123	201	231	199	229
3		247	116		232	153	232
15		241	122		229	128	240
30		245			216	116	246
45		230			225	123	235
4		247			**235**	116	252
15		**261**			234	138	**258**
30		194			188	117	206
45		215			210	139	219

*South Church Driveway on Sunday

Percent below peak	-27%	-56%	-19%	-34%	-18%	-28%
Percent above next	22%					

5. Note that the afternoon peak did not include the period of peak dismissal time at the high school. Based on the ATR counts, this time period should also be reviewed, especially in relationship to the trip generation for the retail component of the project and as it relates to school pick-up and other activities

   Response, as indicated in the table below, the afternoon peak did include the peak hour and the peak 15-minute period of high-school dismissal activity at the intersection of the High school driveway with Lake Street and Albany Post Road for both the high school driveway and the intersection as a whole.

		15 Min	Hour
14:00 - 14:15	186	186	837
14:15 - 14:30	217	217	858
14:30 - 14:45	233	233	867
14:45 - 15:00	201	201	855
15:00 - 15:15	208	207	886
15:15 - 15:30	226	226	926
15:30 - 15:45	224	221	941
15:45 - 16:00	233	232	965
16:00 - 16:15	247	247	963
16:15 - 16:30	241	241	963
16:30 - 16:45	245	245	**983**
16:45 - 17:00	232	230	932
17:00 - 17:15	248	247	917
17:15 - 17:30	261	**261**	
17:30 - 17:45	195	194	
17:45 - 18:00	216	215	

Intersction of Lake Stert with 9A

		IN	OUT	TOTAL	Hour
		9	0	**9**	**81**
		17	6	**23**	**87**
		14	13	**27**	**84**
		16	6	**22**	**69**
		12	3	**15**	**56**
		16	4	**20**	**50**
		8	4	**12**	**38**
		8	1	**9**	**39**
		7	2	**9**	**54**
PHF		8	0	**8**	**68**
	94%	11	2	**13**	**108**
		23	1	**24**	**116**
		20	3	**23**	**105**
		44	4	**48**	
		20	1	**21**	
		13	0	**13**	

HS Driveway Opposite Lake St

6. The trip rates used for the residential portion of the development are based on the average trip rates. We would recommend that the "higher" equation computed rates and peak hour of generator rates be used in a sensitivity analysis to determine if this would significantly change any of the results. This may be especially important at the Route 9A/Lake Street/access intersection.

   Response, as can be seen from the attached Exhibit, the equation computed rates are not reflective of the data for smaller developments (the value calculated using the equation for developments of 100 units or less would be higher than all but 1 of the 12 AM data points and higher than all but 2 of the 16 PM data points. The 85th percentile value is calculated to be 0.48 in the AM and 0.6 in the PM (which is higher than the AM generator hour rate of 0.47 and the PM generator hour rate of 0.57)

   Using the 85th percentile values (which are higher than the generator-hour values), the 51 units would generate 4 more trips than evaluated in the traffic study during the weekday AM peak hour and 5 more trips than evaluated in the traffic study during the

weekday AM peak hour. This difference would not materially change the outcome of the traffic study analyses (see revised analyses attached).

7. The trip credits are based on ITE data, and while we generally agree with these credits, the New York State Department of Transportation should weigh in on the acceptability of these credits as part of their review of this project since they may require to use somewhat lower credits.

   Response: a 25% pass-by credit was taken for the coffee/donut shop. In reality, especially during the busier morning peak hour, more than half of a coffee shop's customers are already passing by on the street. The 5% pedestrian walk in credit constitute just 5 customers walk-in customers. We agree that NYSDOT will consider these values as part of their review and approval process.

8. We have no further comments on the arrival and departure distributions used in the report.

   Response: Comment noted.

9. The volumes should be updated to reflect the comments on site generated traffic and other related comments.

   Response: The volumes were be updated to reflect the comments on site generated traffic and other related comments at the critical intersection of Route 9A with Lake Street (see attached). The analyses results were generally the same, F level of service for 15 minutes on the Lake Street approach to Albany Post Road in the AM peak hour (delays increase by approximately 10 seconds). Delays in the PM peak hour increased by 1 second, triggering a threshold change in Level of Service on the Lake Street approach to Albany Post Road from "D" to "E". At the other intersections, the requested higher trips rates will add no more than 3 trips to any other intersection and these trips will be, almost exclusively, on the major movements and result in no perceptible changes.

10. Generally, we agree with the capacity analysis results as summarized on Tables No. 4 and 5 contained in the KH study. It should be noted that as shown in the tables, delay increases for vehicles exiting from Lake Street are expected to increase between 5 and 35 seconds from the No-Build to Build condition depending on the specific time period. See other comments below. The NYSDOT should also provide input on the proposed access connection and expected operations. Also, no capacity analysis was provided for the Route 9A/New Site Access and this should be provided for our review.

Response: Capacity analysis was provided for the Route 9A/New Site Access. The analysis indicates Level-of-Service "D" conditions during the peak AM highway hour and Level of Service "C" conditions during the peak PM highway hour.
and this should be provided for our review

11. Even though the accident rates appear to be below statewide averages, some potential mitigation should be identified at the locations where multiple accidents were noted

    Response: As detailed below, there were no discernable patterns that could be used to identify mitigation measures at locations with multiple accidents over 5 years. However, the applicant will continue to work with the NYSDOT through the permitting process to implement safety improvements, as appropriate.

    There were three accidents on Albany Post Road at its intersection with Lindsey Avenue. One was attributable to driver inattention, one was attributable to improper passing and the third was in response to the action of another vehicle.

    There were three accidents on Albany Post Road at its intersection with Rockledge Avenue. Two were the result of one motorist flowing another too closely and the third was attributable to driver inexperience.

    There were two accidents on Albany Post Road at its intersection with Lake Street. One was the result of one motorist flowing another too closely and the other was due to the action of an animal.

    There were two accidents on Albany Post Road at its intersection with Catherine Street. One was the result of driver inattention and the other was attributable to driver inexperience.

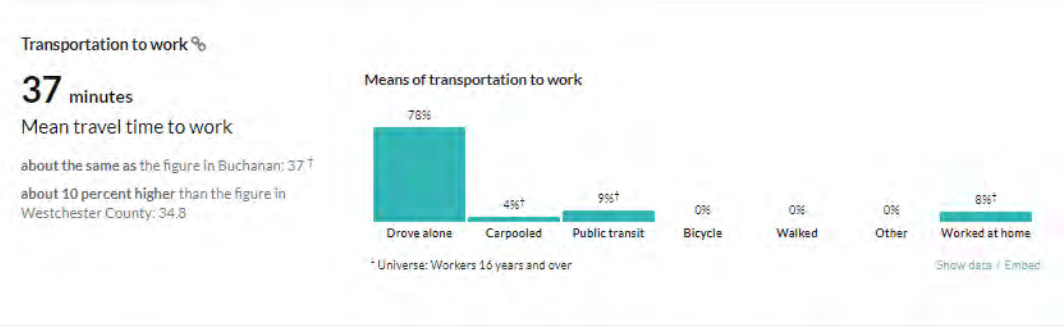
    There were three accidents on Albany Post Road between Rockledge Avenue and Catherin Street that did not occur at intersections. One was the result of steering failure, another was due to the action of an animal, and the third was a result of one motorist flowing another too closely.

    At only one location was there more than one accident of the same type in five years (two following two closely accidents on Albany Post Road at Rockledge Avenue, neither of which resulted in an injury).

12. Some additional discussion on expected use of these services by the project should be added to the study.

Response: Although the traffic study took no credit for transit ridership[1], if 5% of the Project's potential trips were to be by bus[2], there would be eleven more bus riders (and 10 fewer car trips) in the AM peak hour and 6 more bus riders (and 5 fewer car trips) in the PM peak hour. These numbers are believes to be conservative[3], and the addition of these extra riders is not expected to impact the overall transit system.

Journey-to-work data for the Village of Buchanan



13. The proposed access connections should be reviewed in terms of the sight distances provided and compared to AASHTO and NYSDOT Standards. The sight distance evaluation should include a review of both Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD) for the proposed access connection to Route 9A and Lake Street.

    Response: The posted speed limit on Albany Post Road is 30 mph and the 85th percentile speed is 37 mph[4]. Albany Post Road is generally straight and flat in the vicinity of the site and the roadway is not part of the National Highway system. Assuming that motorists should be able to stop safely while traveling at the 85th percentile speed and that the Village would want motorists to travel at the posted design speed, intersection and stopping sight distances for the site access points were calculated as follows[5]:

    - Stopping Sight Distance (mandatory): 240 feet
    - Intersection Sight Distance to the left (recommended): 290 feet
    - Intersection Sight Distance to the right (recommended): 335 feet
    - Intersection Sight Distance to the ahead (recommended): 245 feet

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[1] It was assumed that 5 of the coffee store's customers in the AM peak hour and 2 or 3 in the afternoon would be walk-in customers.
[2] Census data indicates that 9% take public transit to get to or from work. Assumed 4% take the train and 5% take the bus.
[3] It is unlikely that people will take the bus just to get coffee.
[4] 37 mph in both/either direction.
[5] At least 200 feet of sight distance can be provided at the Lake Street driveway, sufficient for 30 mph.

As shown on the attached exhibit, an inspection of conditions at the site access points on Albany Post Road indicates that the above sight distances can be accommodated (485' and above sight distances are available). The areas to be kept clear of sightline obstructions are shown on the exhibit (and below).

14. The Traffic Signal Warrant Analysis indicates that a traffic signal is not warranted at the intersections analyzed. However, NYSDOT will have to review this to make a determination based on the local conditions. An additional warrant analysis should also be completed for Route 9A/Lake Street for the volume conditions without the separate Route 9A driveway.

    Response: An additional warrant analysis was conducted for Route 9A/Lake Street for the volume conditions without the separate Route 9A driveway for the peak-hour and 4-hour conditions. The result of this analysis indicated that the peak-hour warrant is not satisfies by either of the peak hours and that only the AM peak-hour meets the four-hour signal warrant requirements. Based on these findings, it is unlikely that the NYSDOT would approve the installation of a traffic signal for 51 residential units, a coffee shop, a school bus depot and six tennis courts. However, we agree that NYSDOT will have to review this to make a determination on this issue based on the local conditions.

15. The Left Turn Warrant Analysis was prepared at the various intersections. Note that based on the through traffic volumes along the Route 9A corridor, the lack of turning lanes may be critical to overall operations. NYSDOT will have to review and determine what improvements they will require.

    Response: Comment noted.

16. Final details of mitigation measures required by NYSDOT will be covered as part of the Highway Work Permit for the project and should be included as a requirement of any Site Plan approval from the Village.

    Response: Comment noted.

17. A separate capacity analysis should be completed for conditions without the direct driveway connection to Lot 2 from Route 9A, i.e., only with an internal connection and all vehicle access via Lake Street. This would simplify vehicle/pedestrian conflicts and also allow internal trips between the development and the retail to occur without effecting Route 9A.

    Response: A separate capacity analysis has been completed and is attached for conditions without the direct driveway connection to Lot 2 from Route 9A, i.e., only with an internal connection and all vehicle access via Lake Street. As indicated in the analysis, this results in longer delays on Lake Street. As shown on the Site Plan, an internal pedestrian connection is shown between the residential and the commercial components of the project which would permit internal trips between the development and the retail to occur without effecting Route 9A.

18. Vehicle turning tracks should be provided to indicate whether or not all vehicle types can adequately maneuver through the driveway as well as the adjacent Route 9A/Lake Street intersection.

    Response: Vehicle turning tracks have been provided to indicate that all vehicle types servicing the Site can adequately maneuver through the driveway as well as the adjacent Route 9A/Lake Street intersection.

19. The Traffic Signal Warrant Analysis indicates that a traffic signal is not warranted at the intersections analyzed. However, NYSDOT will have to review this to make a determination based on the localized conditions including pedestrian conditions.

    Response: Comment noted.

20. The Left Turn Lane Warrant Analysis was prepared at the various intersections requested. Note that based on the through traffic volumes along the Route 9A corridor, the lack of turning lanes may be critical to overall operations and NYSDOT should opine on this condition.

    Response: NYSDOT will have to opine as to the need for left-turn lanes. It is noted that any more than 5 vehicles triggers the warrant for a left-turn lane on Albany Post Road. By this standard, every commercial driveway and intersecting street on Albany

Post Road in the Village of Buchanan should have a left-turn lane, yet the accident history seems to indicate that they all operate acceptably[5].

21. Pedestrian movements and accommodations will be significant relative to the project and pedestrian improvements should be provided at the direction of NYSDOT to provide connectivity to the Village Center and to and from areas both north along Route 9A and west of Route 9A. The pedestrian improvements should also be coordinated with the proposed AMS Development.

    Comment noted, the Applicant is proposing pedestrian improvements which will be reviewed and approved by NYSDOT.

22. As previously indicated, NYSDOT will make determinations on the improvements within the right-of-way. The proposed separate driveway to the retail component should be analyzed as an alternative. The elimination of the Route 9A driveway would avoid an additional curb cut, reduce vehicle conflicts, and allow internal trips from the residential portion of the development to the retail portion of the development to occur without exiting onto the external roadway system.

    Response: The elimination of the proposed separate driveway to the retail component of the Project has been analyzed as an alternative. While it does avoid an additional curb cut, it considerably worsens conditions on Lake Avenue, and an internal pedestrian connections already allows internal trips from the residential portion of the development to the retail portion of the development without exiting onto the external roadway system. The analysis indicates that the commercial component of the developments generates substantially more traffic than the residential component of the development and that this component of the development is best accommodated with a driveway on Albany Post Road. However, the final configuration of access to the development will be confirmed by the NYSDOT.

23. We disagree with the statement on Page 3 that pedestrian activity crossing Route 9A will be a slight increase and this should be explored by the Applicant. Not only will residents cross here but with the presence of the coffee shop, crossings are likely to increase significantly from the high school as well as from the neighborhood on the west side of Route 9A

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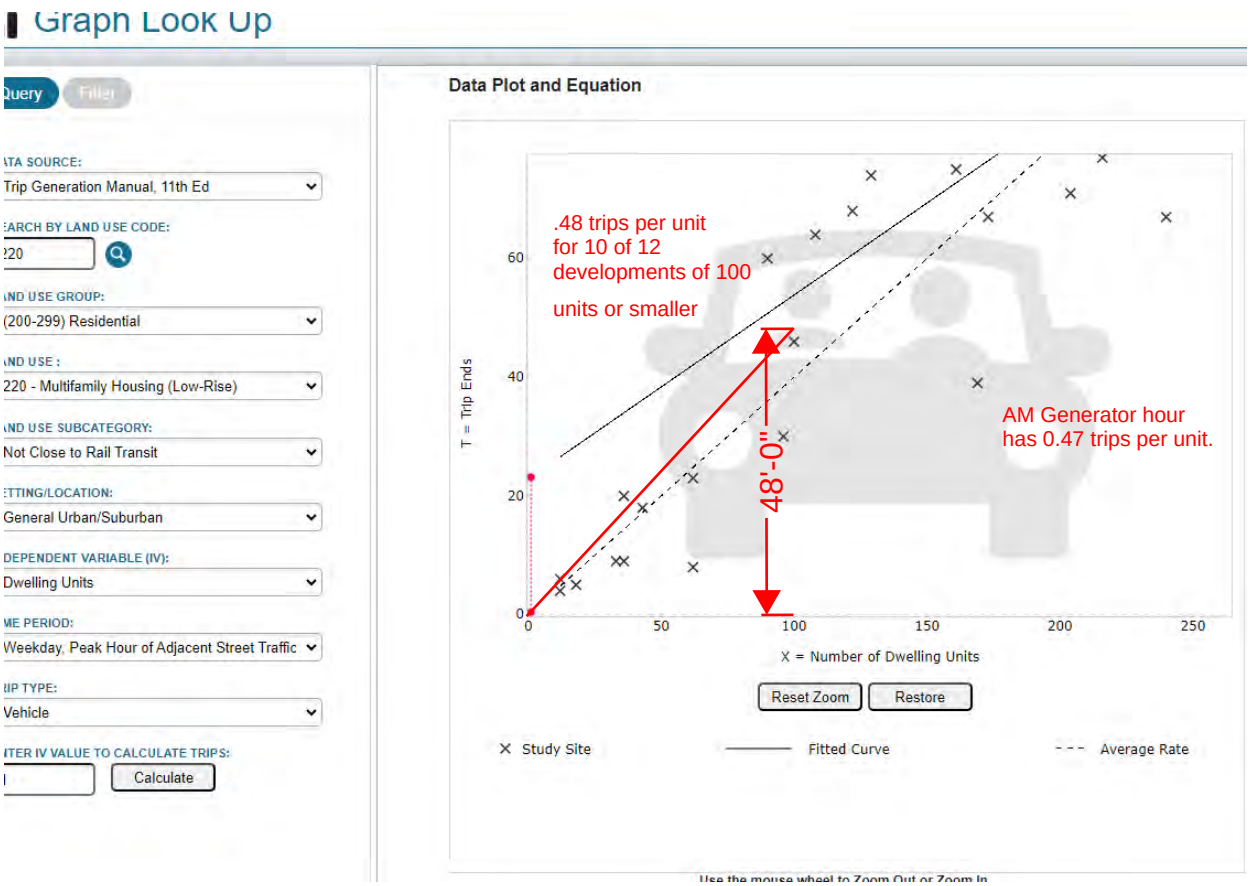
[5] Fewer than one accident per year on the 3/10th of a mile section of Albany Post Road studied that could be attributed to the need for a left-turn lane ("following too closely accidents might fit this category).

Response: The Applicant is proposing pedestrian improvements, including sidewalks and crosswalks (with signing and striping) to better accommodate increased pedestrian traffic and will be guided by the NYSDOT's directives in this regard.

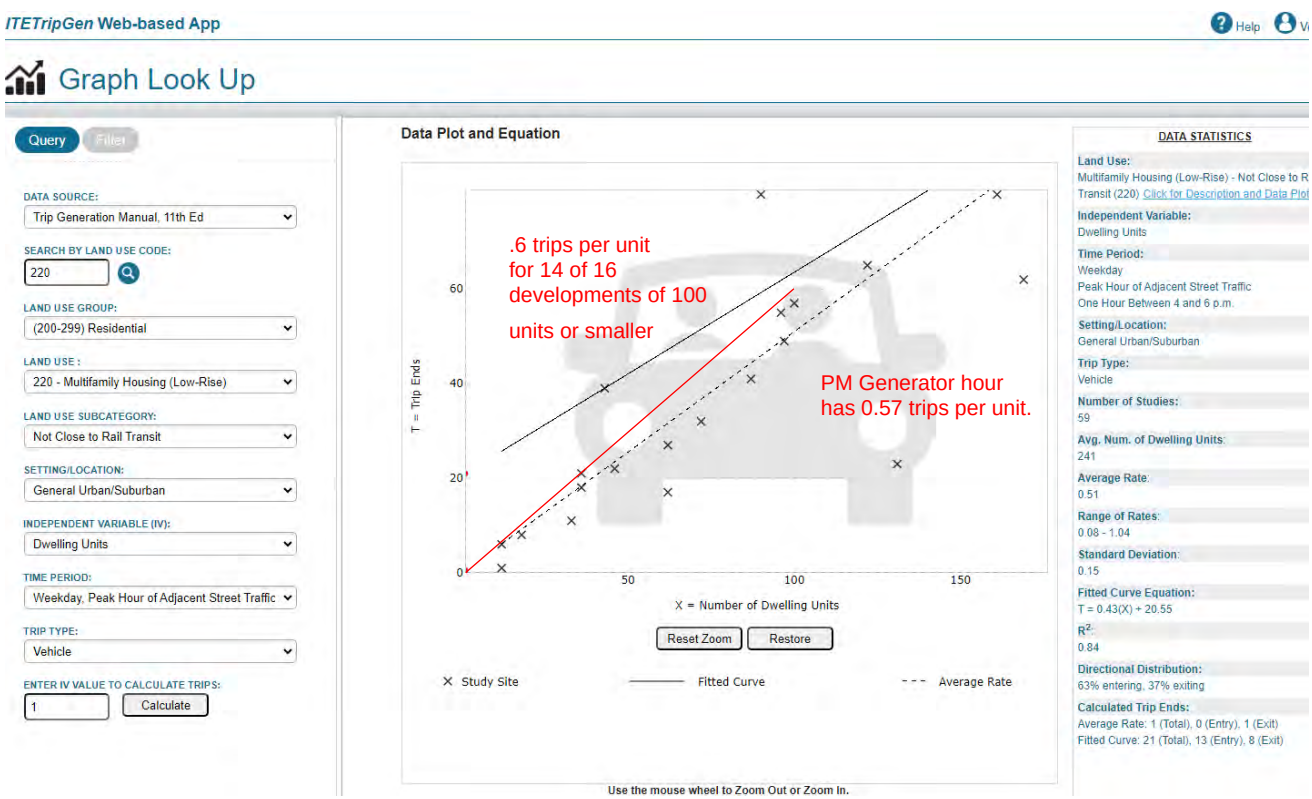
24. Please provide us with the electronic Synchro files for our review.

Response: The electronic Synchro files have been provided to Colliers Engineering& Design for review.

AM Highway Hour



PM Highway Hour



Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	20	1	12	108	341	10	6	541	141
Future Vol, veh/h	0	0	0	20	1	12	108	341	10	6	541	141
Conflicting Peds, #/hr	9	0	0	0	0	9	7	0	1	1	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	4	-	-	-1	-	-	-1	-
Peak Hour Factor	71	71	71	100	100	100	71	71	71	71	71	71
Heavy Vehicles, %	0	0	0	33	0	51	14	13	37	70	5	4
Mvmt Flow	0	0	0	20	1	12	152	480	14	8	762	199

Major/Minor	Minor1		Major1			Major2			
Conflicting Flow All	1670	1776	497	968	0	0	495	0	0
Stage 1	792	792	-	-	-	-	-	-	-
Stage 2	878	984	-	-	-	-	-	-	-
Critical Hdwy	7.53	7.3	7.11	4.24	-	-	4.8	-	-
Critical Hdwy Stg 1	6.53	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.53	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.797	4	3.759	2.326	-	-	2.83	-	-
Pot Cap-1 Maneuver	61	56	460	666	-	-	794	-	-
Stage 1	333	338	-	-	-	-	-	-	-
Stage 2	296	264	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	41	0	456	666	-	-	793	-	-
Mov Cap-2 Maneuver	41	0	-	-	-	-	-	-	-
Stage 1	228	0	-	-	-	-	-	-	-
Stage 2	289	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	115.9	2.8	0.1
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	666	-	-	62	793	-	-
HCM Lane V/C Ratio	0.228	-	-	0.532	0.011	-	-
HCM Control Delay (s)	12	0	-	115.9	9.6	0	-
HCM Lane LOS	B	A	-	F	A	A	-
HCM 95th %tile Q(veh)	0.9	-	-	2.1	0	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	0	7	22	0	15	65	568	22	12	389	33
Future Vol, veh/h	3	0	7	22	0	15	65	568	22	12	389	33
Conflicting Peds, #/hr	6	0	0	0	0	6	21	0	1	1	0	21
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	4	-	-	-1	-	-	-1	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	2	0	0	0	3	5	6	5	0
Mvmt Flow	3	0	7	23	0	16	69	604	23	13	414	35

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1247	1245	453	1216	1251	623	470	0	0	628	0	0
Stage 1	479	479	-	755	755	-	-	-	-	-	-	-
Stage 2	768	766	-	461	496	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.92	7.3	6.6	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.92	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.92	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4	3.3	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	152	176	611	120	132	457	1102	-	-	935	-	-
Stage 1	571	558	-	339	355	-	-	-	-	-	-	-
Stage 2	397	415	-	524	491	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	130	152	598	108	114	454	1078	-	-	934	-	-
Mov Cap-2 Maneuver	130	152	-	108	114	-	-	-	-	-	-	-
Stage 1	503	535	-	305	320	-	-	-	-	-	-	-
Stage 2	343	374	-	508	471	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18	35.7	0.9	0.2
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1078	-	-	288	156	934	-	-
HCM Lane V/C Ratio	0.064	-	-	0.037	0.252	0.014	-	-
HCM Control Delay (s)	8.6	0	-	18	35.7	8.9	0	-
HCM Lane LOS	A	A	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	0.9	0	-	-

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	56	35	302	51	43	632
Future Vol, veh/h	56	35	302	51	43	632
Conflicting Peds, #/hr	0	0	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	-2	-	-	-1
Peak Hour Factor	92	92	71	92	92	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	61	38	425	55	47	790

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1338	454	0	0	481	0
Stage 1	454	-	-	-	-	-
Stage 2	884	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	169	606	-	-	1082	-
Stage 1	640	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	156	605	-	-	1081	-
Mov Cap-2 Maneuver	156	-	-	-	-	-
Stage 1	639	-	-	-	-	-
Stage 2	373	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	34.5	0	0.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	218	1081	-
HCM Lane V/C Ratio	-	-	0.454	0.043	-
HCM Control Delay (s)	-	-	34.5	8.5	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	2.2	0.1	-

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	19	560	26	16	411
Future Vol, veh/h	23	19	560	26	16	411
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	-2	-	-	-1
Peak Hour Factor	92	92	94	92	92	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	21	596	28	17	424

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1068	610	0	0	624	0
Stage 1	610	-	-	-	-	-
Stage 2	458	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	245	494	-	-	957	-
Stage 1	542	-	-	-	-	-
Stage 2	637	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	239	494	-	-	957	-
Mov Cap-2 Maneuver	239	-	-	-	-	-
Stage 1	542	-	-	-	-	-
Stage 2	622	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.5	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	312	957	-
HCM Lane V/C Ratio	-	-	0.146	0.018	-
HCM Control Delay (s)	-	-	18.5	8.8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	55.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	76	1	47	108	290	61	49	485	141
Future Vol, veh/h	0	0	0	76	1	47	108	290	61	49	485	141
Conflicting Peds, #/hr	9	0	0	0	0	9	7	0	1	1	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	4	-	-	-1	-	-	-1	-
Peak Hour Factor	71	71	71	100	100	100	71	71	71	71	71	71
Heavy Vehicles, %	0	0	0	33	0	51	14	13	37	70	5	4
Mvmt Flow	0	0	0	76	1	47	152	408	86	69	683	199

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1677	1783	461	889	0	0	495	0	0
Stage 1	756	756	-	-	-	-	-	-	-
Stage 2	921	1027	-	-	-	-	-	-	-
Critical Hdwy	7.53	7.3	7.11	4.24	-	-	4.8	-	-
Critical Hdwy Stg 1	6.53	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.53	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.797	4	3.759	2.326	-	-	2.83	-	-
Pot Cap-1 Maneuver	~ 61	56	485	714	-	-	794	-	-
Stage 1	349	354	-	-	-	-	-	-	-
Stage 2	279	250	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	~ 35	0	480	714	-	-	793	-	-
Mov Cap-2 Maneuver	~ 35	0	-	-	-	-	-	-	-
Stage 1	245	0	-	-	-	-	-	-	-
Stage 2	229	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 755.7	2.7	0.7
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	714	-	-	54	793	-	-
HCM Lane V/C Ratio	0.213	-	-	2.296	0.087	-	-
HCM Control Delay (s)	11.4	0	-	$ 755.7	10	0	-
HCM Lane LOS	B	A	-	F	A	A	-
HCM 95th %tile Q(veh)	0.8	-	-	12.5	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	4.2

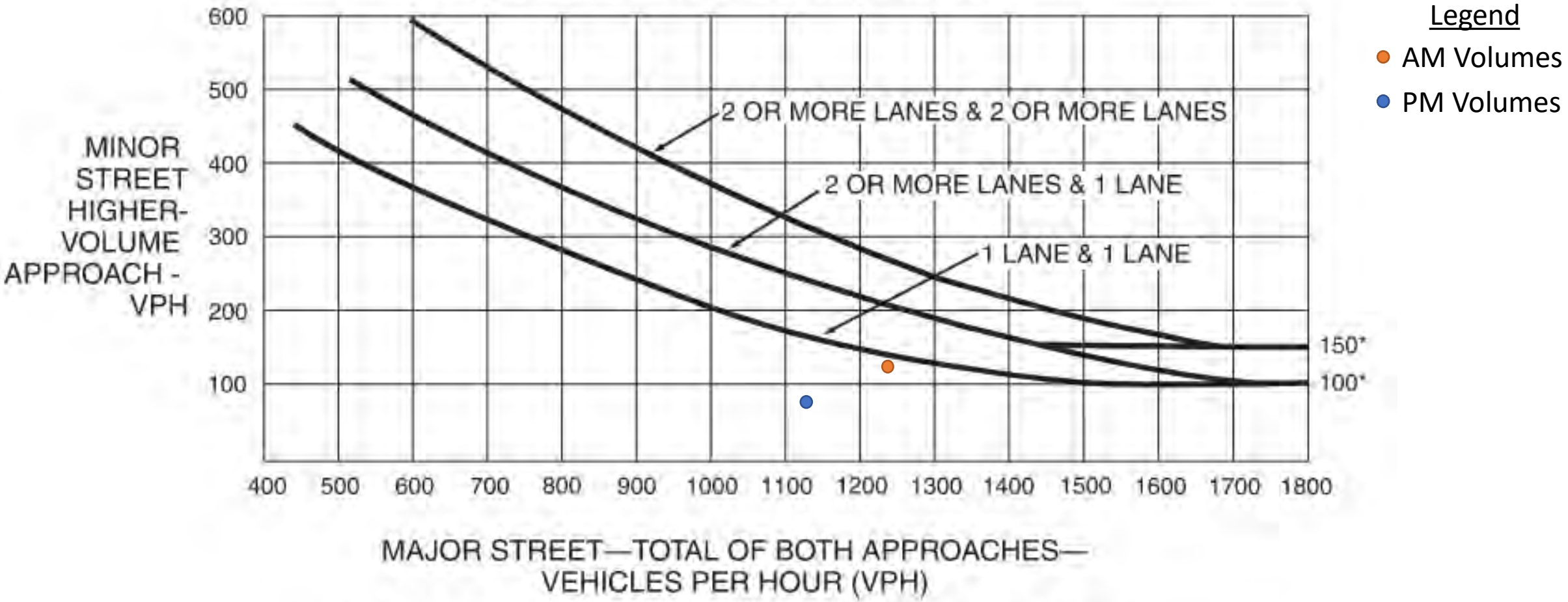
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	0	7	45	0	34	65	542	48	28	366	33
Future Vol, veh/h	3	0	7	45	0	34	65	542	48	28	366	33
Conflicting Peds, #/hr	6	0	0	0	0	6	21	0	1	1	0	21
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	4	-	-	-1	-	-	-1	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	2	0	0	0	3	5	6	5	0
Mvmt Flow	3	0	7	48	0	36	69	577	51	30	389	35

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1253	1255	428	1212	1247	610	445	0	0	629	0	0
Stage 1	488	488	-	742	742	-	-	-	-	-	-	-
Stage 2	765	767	-	470	505	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.92	7.3	6.6	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.92	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.92	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4	3.3	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	150	173	631	121	133	465	1126	-	-	934	-	-
Stage 1	565	553	-	346	361	-	-	-	-	-	-	-
Stage 2	399	414	-	517	486	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	121	146	617	107	112	462	1102	-	-	933	-	-
Mov Cap-2 Maneuver	121	146	-	107	112	-	-	-	-	-	-	-
Stage 1	499	518	-	312	326	-	-	-	-	-	-	-
Stage 2	330	373	-	489	455	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.5	50	0.8	0.6
HCM LOS	C	F		

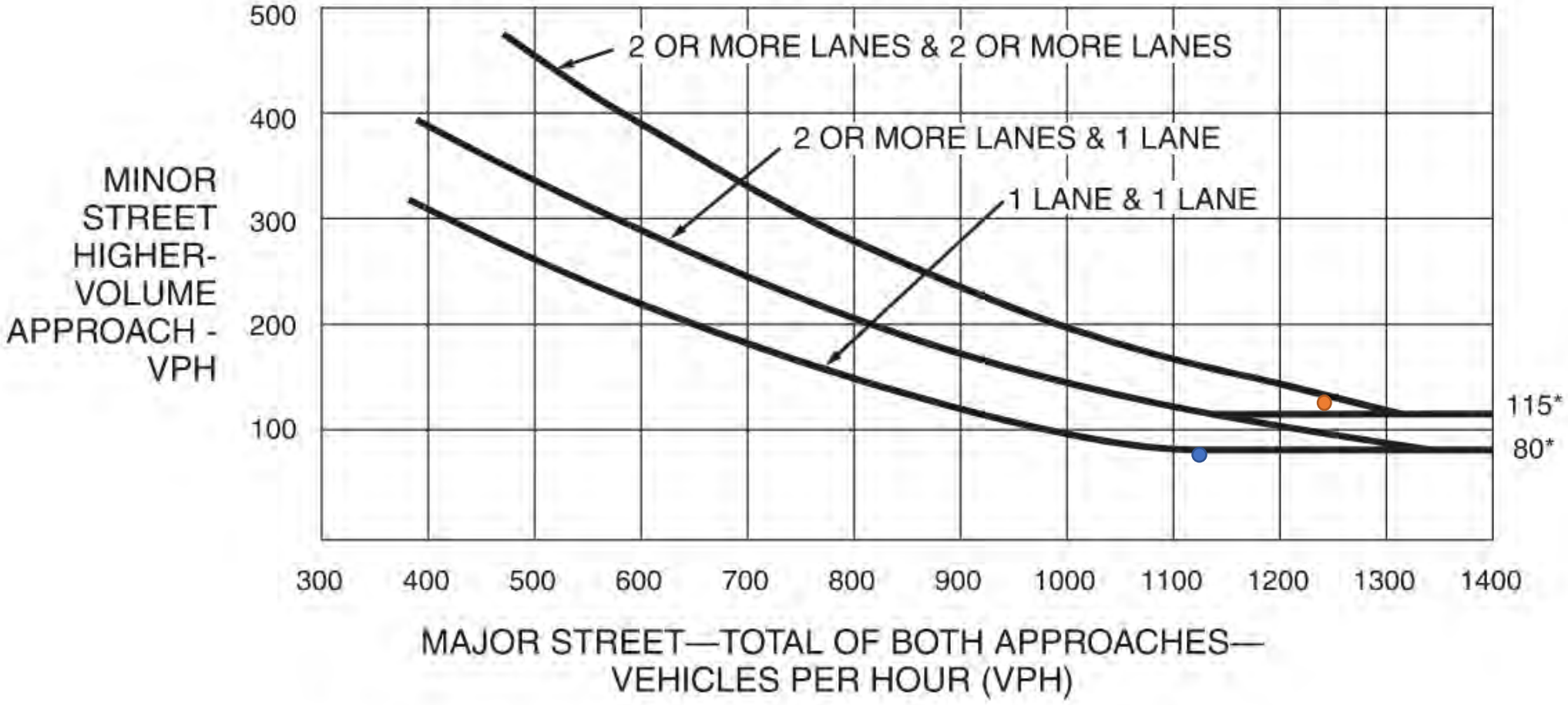
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1102	-	-	277	160	933	-	-
HCM Lane V/C Ratio	0.063	-	-	0.038	0.525	0.032	-	-
HCM Control Delay (s)	8.5	0	-	18.5	50	9	0	-
HCM Lane LOS	A	A	-	C	F	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	2.6	0.1	-	-

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

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



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend

- AM Volumes
- PM Volumes

Minimum Safe Stopping Distance Requirements

AASHTO	2018
Location:	Lake Street @ Albany Post Road
Movement:	Northbound/Southbound
Grade (%)	0
Design Speed (mph)	**37**
Deceleration	11.2
T (sec)	2

Perception & Reaction Distance	Braking Distance (AASHTO)	Stopping Distance (AASHTO)
108.5 Feet	131.2 Feet	**240** Feet

Desirable Intersection Sight Distances
AASHTO 2018

Location:	Lake Street @ Albany Post Road	
Movement:	Southbound Left Turn	
V=	30	Highway design speed in mph
Stop Control ?	y	
Yield Control ?		
Lanes on Left/ahead ?	1	Needed to be crossed by left and thru vehicles
Lanes on Right ?	1	Needed to be crossed by thru vehicles only'
Minor Street Grade ?	0.00	
"Car", "SU" or "TT" ?	Car	
Major St Left	y	
Minor St Thru only		
Minor Street L only		
Minor St. L, T & R		
Minor Street R only		

Desirable sight distance: 245 Feet ahead
0

Desirable Intersection Sight Distances
AASHTO 2018

Location:	Lake Street @ Albany Post Road	
Movement:	Westbound Left Turn Only	
V=	30	Highway design speed in mph
Stop Control ?	y	
Yield Control ?		
Lanes on Left/ahead ?	1	Needed to be crossed by left and thru vehicles
Lanes on Right ?	1	Needed to be crossed by thru vehicles only'
Minor Street Grade ?	0.00	
"Car", "SU" or "TT" ?	Car	
Major St Left		
Minor St Thru only		
Minor Street L only	y	
Minor St. L, T & R		
Minor Street R only		

Desirable sight distance:	335	Feet	to the left
	290	Feet	to the right

Desirable Intersection Sight Distances
AASHTO 2018

Location:	Lake Street @ Albany Post Road	
Movement:	Westbound Thru Only	
V=	30	Highway design speed in mph
Stop Control ?	y	
Yield Control ?		
Lanes on Left/ahead ?	1	Needed to be crossed by left and thru vehicles
Lanes on Right ?	1	Needed to be crossed by thru vehicles only'
Minor Street Grade ?	0.00	
"Car", "SU" or "TT" ?	Car	
Major St Left		
Minor St Thru only	y	
Minor Street L only		
Minor St. L, T & R		
Minor Street R only		

Desirable sight distance:	290	Feet	to the left
	290	Feet	to the right

Desirable Intersection Sight Distances
AASHTO 2018

Location:	Lake Street @ Albany Post Road	
Movement:	Westbound Right Turn Only	
V=	30	Highway design speed in mph
Stop Control ?	y	
Yield Control ?		
Lanes on Left/ahead ?	1	Needed to be crossed by left and thru vehicles
Lanes on Right ?	1	Needed to be crossed by thru vehicles only'
Minor Street Grade ?	0.00	
"Car", "SU" or "TT" ?	Car	
Major St Left		
Minor St Thru only		
Minor Street L only		
Minor St. L, T & R		
Minor Street R only	y	

Desirable sight distance: 290 Feet to the left
0

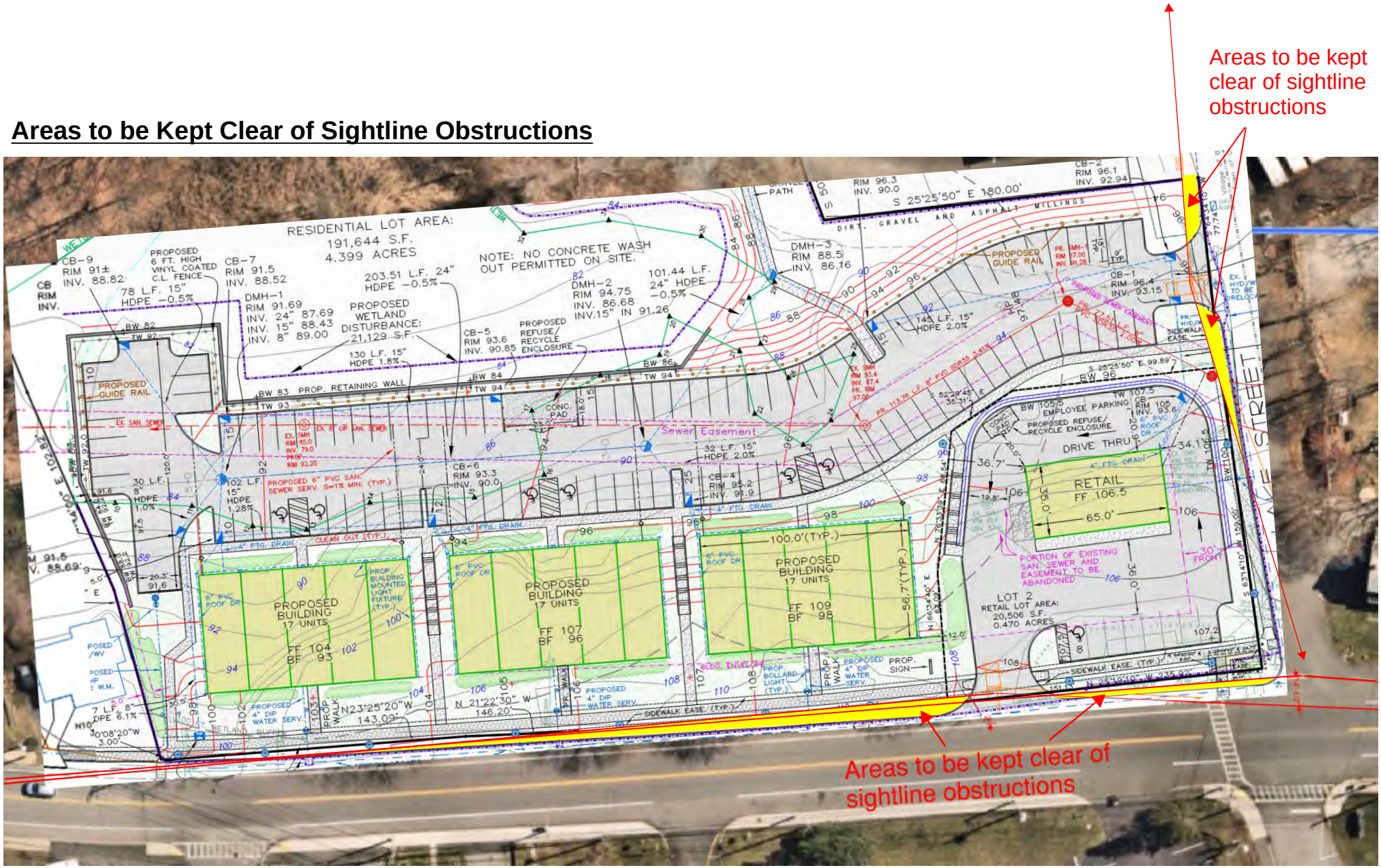
Desirable Intersection Sight Distances
AASHTO 2018

Location:	Lake Street @ Albany Post Road	
Movement:	Westbound Left Turn, Thru, and Right Turn	
V=	30	Highway design speed in mph
Stop Control ?	y	
Yield Control ?		
Lanes on Left/ahead ?	1	Needed to be crossed by left and thru vehicles
Lanes on Right ?	1	Needed to be crossed by thru vehicles only'
Minor Street Grade ?	0.00	
"Car", "SU" or "TT" ?	Car	
Major St Left		
Minor St Thru only		
Minor Street L only		
Minor St. L, T & R	y	
Minor Street R only		

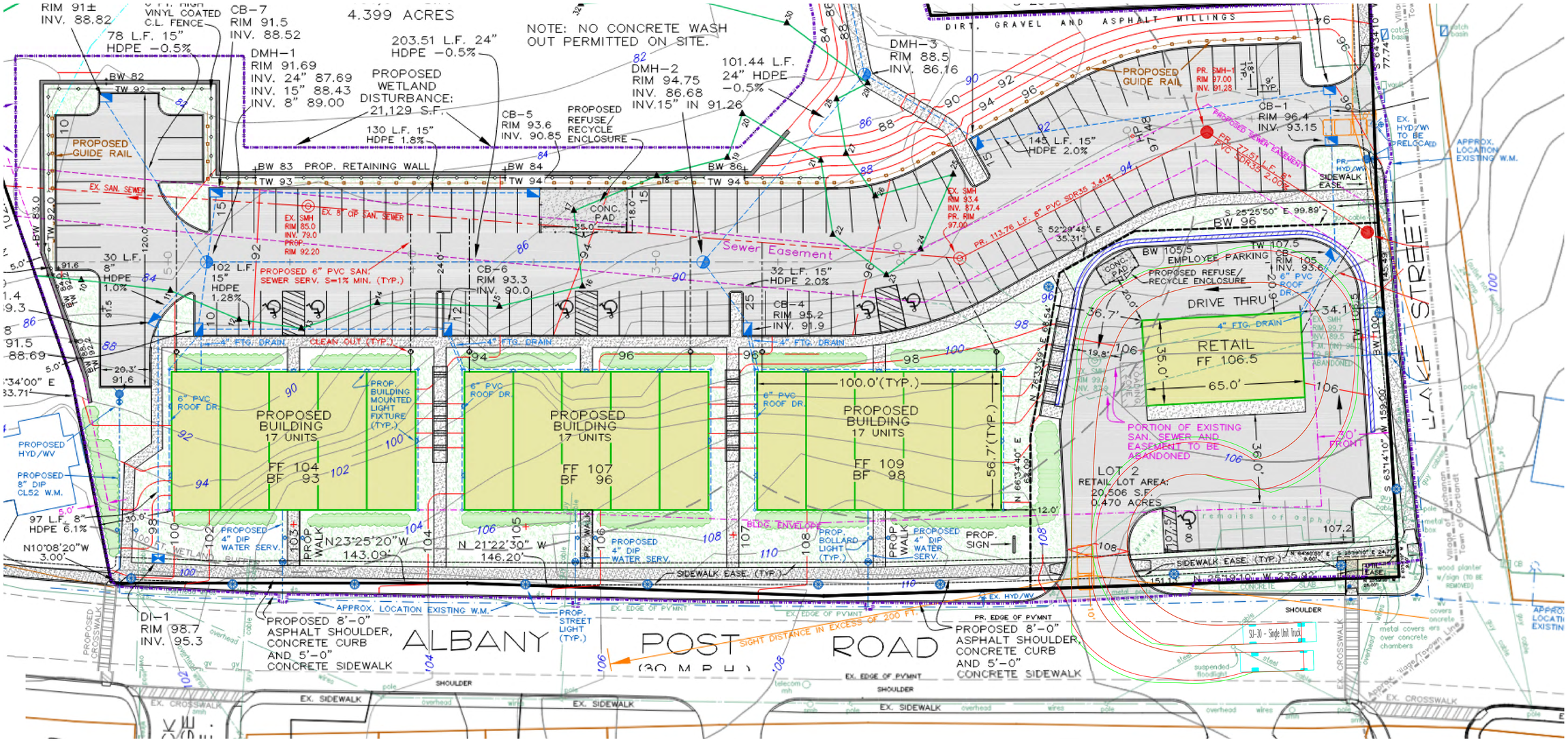
Desirable sight distance:	335	Feet	to the left
	290	Feet	to the right

Available Sightlines

Areas to be Kept Clear of Sightline Obstructions



SU-30 garbage or delivery vehicle at Coffee Shop



SU-30 garbage or delivery vehicle at Residences