November 30, 2020

MAX-0466019.00

Ms. Kathleen Colwell
Planning Division Director
Department of Economic and Community Development
41 Pleasant Street
Methuen, Massachusetts 01844

SUBJECT: Response to TEC Peer Review Comments
Proposed Contractor Buildings
18 - 20 Ayers Village Road (Route 97)
Methuen, Massachusetts 01844

Dear Ms. Colwell:

Greenman-Pedersen Inc. (GPI) has prepared this Response to Comments (RTC) letter to respond to the comments provided in a letter from the City's peer review consultant, The Engineering Corp (TEC), dated November 4, 2020 regarding the proposed contractor buildings to be located at 18 - 20 Ayers Village Road (Route 97) in Methuen, Massachusetts. We have prepared the following responses to TEC's comments related to the Site Plans, Stormwater Management and Traffic Impact Assessment (TIA) associated with the Project.

The original comments are provided in italics and GPI's responses are provided in plain text. Enclosed for your information and use in your review are the following documents:

- Site Re-Development Plans;
- Revised O&M;
- Updated Figure 6;
- Updated Table 7 – Capacity and Queue Summary;
- Updated Capacity Worksheets.

Site Development Plans

Comment 1: *The project proposes to provide 70 off-street parking spaces including five (5) handicap spaces. For the proposed 30,000 SF of contractor building, the City of Methuen requires 25 off-street parking spaces. The ITE publication, Parking Generation, 5th Edition suggests providing 53 spaces, which is more than double the city bylaw. A peak parking demand would require 71 total spaces (including parking supply of 18 spaces for a retail use in an extreme worst-case scenario). The Applicant currently meets zoning requirements, and nearly meets ITE suggested spaces. TEC concurs that sufficient parking will be provided on-site.*

Response 1: Comment acknowledged; no response required.

Comment 2: *The Applicant should coordinate with the City of Methuen Fire Department to resolve the issues stated in their November 2nd email correspondence.*

Response 2: The plans were revised based on the review comments received from the Fire Department and discussions with Captain Matt Tulley on 11/20/20.

Comment 3: *The Applicant should coordinate with the City of Methuen Fire Department for preferred locations for fire hydrants.*

Response 3: The plans have been revised based on a discussion with the Methuen Fire Department on 11/20/20.

Comment 4: *It appears that the two parking spaces at the end of the southerly most parking zone adjacent to the sales office have insufficient space for a vehicle to be able to back out based on the placement of the dumpster enclosure. The Applicant should consider adjusting this configuration.*

Response 4: The two parking spaces closest to the dumpster enclosure have been eliminated.

Comment 5: *The queue as reported in the TIAS for the site driveway during the weekday evening peak hour is 93 feet and would be expected to extend beyond the parking along both sides of the Site Driveway, conflicting with and blocking approximately 5 parking spaces on each side of the driveway.*

Response 5: Please see Response 43. The 2027 Build with COVID-19 Adjustment volumes were adjusted and a 95th percentile queue of two vehicles or less (48 feet) is expected during the weekday PM peak hour. Therefore, it is anticipated that the maximum queue will not block the proposed parking spaces.

Comment 6: *TEC recommends that the wetland buffers be shown on all sheets within the site plan set, including the Demolition Plan and Erosion & Sediment Control Plan.*

Response 6: Wetland buffers have been added to the sheets indicated.

Comment 7: *A limit of work and limit of clearing should be established and depicted on sheets 2-8 of the site plan set.*

Response 7: To minimize excess information on the other sheets, the limits of work are only depicted on the Erosion Control Plan as shown by the limits of the erosion control barriers along the perimeter of the site work.

Comment 8: *Proposed work, including landscaping, within the public right-of-way will require coordination with the Methuen Department of Public Works. Temporary traffic control may be required to remove the existing gravel driveway and to place new loam and sod.*

Response 8: Comment acknowledged. Additional coordination between the City and the applicant/contractor will take place prior to construction.

Comment 9: *The project, as designed, appears to meet the zoning requirements listed within Section VI of the City of Methuen Zoning Ordinance (frontage, setbacks, lot coverage, parking, etc.).*

Response 9: Comment Acknowledged, no response required.

Comment 10: *TEC recommends that the Applicant label doorways/entrances to the existing/proposed buildings to confirm site grading is appropriate.*

Response 10: Doorways and entrances have been added to the plans where appropriate.

Comment 11: *The Applicant should confirm if the existing 20-foot wide driveway easement will be abandoned as part of the project.*

Response 11: A note has been added to the Site Plans indicating that the easement will be abandoned.

Comment 12: *TEC suggests that the silt fence abutting the roadway be extended to the silt fence abutting 22 Ayers Village Road to prevent runoff and erosion on said property.*

Response 12: Silt fence has been expanded as suggested.

Comment 13: *The limits of 6" loam and hydroseed should be shown clearly within a limit of work line.*

Response 13: See Response 7 above.

Comment 14: *The proposed land alterations within the 100-foot buffer zone will require a Notice of Intent to be filed with the City of Methuen's Conservation Commission and Massachusetts Department of Environmental Protection.*

Response 14: Comment acknowledged, an NOI package has been filed with the City of Methuen and DEP and the Conservation Commission closed the public hearing on 11/5/20.

Comment 15: *Pavement, curbing, a dumpster, and transformer are proposed within 100-feet of wetlands which also places the project under jurisdiction of the City of Haverhill's Conservation Commission.*

Response 15: Based on discussions with the City of Haverhill Conservation Commission agent, an RDA has been filed with the City of Haverhill on 11/19/20 and corresponding meeting date set for 12/10/20.

Comment 16: *The Applicant should clarify if permits are being sought for work within the City of Haverhill.*

Response 16: At this time, except for the RDA filing noted above, no additional work is proposed with the City of Haverhill land and therefore no additional permitting is required. We will work with the City of Haverhill and will follow the required permitting procedures as needed for any future work within the City limits.

<u>Stormwater Management Review</u>

Comment 17: *TEC concurs with GPI's assessment that the project will reduce impervious area, improve the collection and treatment of stormwater, and provide improved groundwater recharge by increasing greenspace.*

Response 17: Comment acknowledged; no response required.

Comment 18: *The project has been designed to meet the Massachusetts Stormwater Standards to the maximum extent practicable.*

Response 18: Comment acknowledged; no response required.

Comment 19: *Standard 1 is fully met by the project. Existing drainage patterns are retained and TEC has reviewed and concurs with the rip rap sizing of stormwater outfalls to prevent erosion.*

Response 19: Comment acknowledged; no response required.

Comment 20: *Standard 2 is fully met because the project will reduce overall impervious area onsite by eliminating large areas of gravel, and replacing these areas with manicured landscaping. Peak rates of runoff are reduced at all design points.*

Response 20: Comment acknowledged; no response required.

Comment 21: *The stormwater report shows that runoff rates to the municipal stormwater system are decreased in peak rainfall events. The Applicant should coordinate with the City of Methuen DPW to confirm that the drainage connection is acceptable.*

Response 21: The plans and report have been reviewed and approved by the City Engineering Department.

Comment 22: *Standard 3 is met to the maximum extent practicable. TEC agrees that infiltration at the site is not feasible due to shallow groundwater conditions. Test pit logs show that estimated seasonal high groundwater is within 3-feet of the ground surface throughout the site. Providing infiltration BMPs under these conditions is not feasible because a minimum of 2-feet of separation is required per the MA Stormwater Handbook. Overall, the project will provide improved groundwater recharge over current conditions by increasing greenspace and directing stormwater to sediment forebays, water quality swales, and a bioretention area.*

Response 22: Comment acknowledged; no response required.

Comment 23: *Standard 4 is met to the maximum extent practicable. Only one treatment train does not provide the full 80% TSS removal (79% removal is provided). In this area, the project will provide an improvement in water quality leaving the site by installing deep sump catch basins with hoods and a water quality unit.*

Response 23: Comment acknowledged; no response required.

Comment 24: *TEC concurs with the sizing calculations provided for the water quality unit.*

Response 24: Comment acknowledged; no response required.

Comment 25: *TEC concurs that Standard 5 is not applicable to the project.*

Response 25: Comment acknowledged; no response required.

Comment 26: *TEC concurs that Standard 6 is not applicable to the project.*

Response 26: Comment acknowledged; no response required.

Comment 27: *The project does qualify as a redevelopment project under Standard 7. TEC concurs with the Applicant that Standard 3 and 4 are met to the maximum extent practicable.*

Response 27: Comment acknowledged; no response required.

Comment 28: *An Erosion & Sedimentation Control Plan has been provided by the Applicant, consistent with Standard 8. TEC has commented on erosion control in the previous section of this report.*

Response 28: Comment acknowledged; no response required.

Comment 29: *TEC recommends that the property owner's information be listed within the O&M Plan where it states the "Party of Parties Responsible for Operation and Maintenance".*

Response 29: The future property owner's information has been added to the O&M as suggested.

Comment 30: *TEC recommends that Section 1 of the O&M Plan be revised to state that the responsibility for maintenance of the stormwater system will run with the property in perpetuity.*

Response 30: A note has been added to the O&M as suggested.

Comment 31: *An estimated annual budget should be added to the Operation and Maintenance Plan to be in compliance with Standard 9.*

Response 31: An estimated annual budget will be provided to the City once a contractor is chosen as part of the site O&M ongoing plan.

Comment 32: *The street sweeping section of the O&M Plan should describe the type of machine that will be used for sweeping and the frequency to obtain the 5% TSS removal credit, consistent with Volume 2 Chapter 1 of the Stormwater Handbook.*

Response 32: The type of machine used for street sweeping has been outlined int the O&M as suggested.

Comment 33: *Standard 10 is fully met by the project. An illicit discharge statement has been provided.*

Response 33: Comment acknowledged; no response required.

Comment 34: *The Applicant should confirm the origin of the 6" and 12" pipes that are shown to enter the municipal system at the existing catch basin east of the gravel driveway. If feasible, these pipe connections should be removed as part of the project.*

Response 34: The 12" RCP appears to go towards the existing adjacent lot and is not part of this development. The 6" PVC appears to be an underdrain or foundation drain for the existing Laschi's nursery. Prior to construction the contractor shall investigate the origin of the 6" pipe and will disconnect as needed.

Traffic Impact Assessment

Comment 35: *The Site Plans provided by the Applicant only show the new components of the site within the City of Methuen. The Site Plans also show the extension of access/egress into the Haverhill portion of the site which includes substantial area. The TIAS, as prepared by GPI, does not include any building program or traffic projections for the Haverhill portion of the site, which appear to need use of the driveway along Ayers Village Road in Methuen as the only access/egress point. The Applicant should provide details to the Haverhill portion of the site and adjust the traffic impact at the Ayers Village Road driveways accordingly.*

Response 35: At this point in time there are no plans for the redevelopment of the property in Haverhill. The Applicant understands that if/when they move forward with a development on the Haverhill portion of the site, they will also need to coordinate with Methuen Community Development for approval as the only access and egress to this portion of the site is in Methuen. Since nothing on the Haverhill portion is expected to change as part of the current Application, no traffic from the existing site has been removed from the traffic-volume networks.

Comment 36: *The study area as depicted in the TIAS has been coordinated with TEC and is sufficient based on the assumed nature of the site's building program.*

Response 36: Comment acknowledged; no response required.

Comment 37: *The Applicant has provided traffic data collection along Ayers Village Road and at the site driveway intersections during the weekday morning and weekday evening peak periods. TMCs were conducted on Tuesday, September 15, 2020 and ATRs were conducted on Tuesday, September 15, 2020; through Wednesday, September 16, 2020. Due to COVID-19, both dates represent a period before Methuen Public Schools began in-person/hybrid classes as well as a large percentage of the population is working from home. The Applicant has provided a separate sensitivity analysis which depicts an increase in traffic volumes in order to take into account the effects of COVID on ADT in the area.*

Response 37: Comment acknowledged; no response required.

Comment 38: *The TIAS provides a crash analysis at the site driveway intersections on Ayers Village Road. TEC's review of the MassDOT IMPACT Crash Portal indicates 3 crashes during the study period defined in the TIAS. There does not appear to be any notable crash trends based on the data.*

Response 38: Comment acknowledged; no response required.

Comment 39: *Table 4 does not include sight distance measurements for both driveways. The Applicant should revise the TIAS to include sight distance measurements at both driveway locations.*

Response 39: The driveway at #20 Ayers Village Road (Route 97) will be closed as part of the Project and, therefore, will not be accessible for entering or exiting vehicles. It's because of this closure that no sight distances were measured. It should be noted, however, that Table 4 (Sight Distance Summary) is mis-labeled which could have lead to some confusion. It should say "Ayers Village Road (Route 97) at #18 Ayers Village Road Driveway:" rather than "Ayers Village Road (Route 97) east of Laschi East Driveway:".

Comment 40: *The TIAS provides information related to other developments in the area; including #65 Ayers Village Road through the Methuen Planning Division. Given the proximity of the site to Haverhill, MA as well as Salem, NH, the Applicant should coordinate with the respective planning boards to identify additional future developments in the area.*

Response 40: GPI reached out to the Town of Salem, NH (Mr. Ross Moldoff - Planning Director) and the City of Haverhill, MA (Mr. William Pillsbury - Economic Director & Planning Director) regarding future developments in the area. Mr. Moldoff confirmed on November 9, 2020 and Mr. Pillsbury confirmed on November 10, 2020 that there are no projects other projects which would contribute traffic through the study area.

Comment 41: *Site trip generation calculations for the proposed uses were generated based on the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition for Land Use Code (LUC) 180 – Specialty Trade Contractor. TEC generally concurs with this methodology as the ITE Trip Generation Manual is an industry standard; however, please note from Comment #1 any additional traffic that would be generated within the Haverhill portion of the site which will access/egress the site via Ayers Village Road.*

Response 41: See Response to Comment 35.

Comment 42: *Site generated trip distribution for the site is based upon existing traffic patterns and a review of existing trip distributions utilized for other local developments. TEC generally concurs with methodology used in the TIAS.*

Response 42: Comment acknowledged; no response required.

Comment 43: *The TIAS provides the results of both the capacity and queue analysis and the sensitivity analysis for traffic impact at the site driveways. The results of the sensitivity analysis show LOS A on the Ayers Village Road mainline; but show excessive delay on the #18 Ayers Village Road Site Driveway. This includes increasing the delay on the opposing driveway to the site from D to E and on the site driveway from C to F. Note that this does not include any increase of trip generation from the Haverhill portion of the site. The Applicant should revise the analysis to include the additional Haverhill trip generation to show the full impact of development on the site.*

Response 43: As noted in Comment # 35, there are currently no plans for the redevelopment of the property in Haverhill. GPI did review the 2027 No-Build and 2027 Build with COVID-19 Adjustment volumes and noticed that the new site-generated trips for the proposed Contractor buildings had inadvertently been increased by the 65 percent COVID adjustment. As the site-generated trip

rates are assumed to be unaffected by COVID (at least for the purposes of permitting), these volumes were adjusted and re-analyzed. The resulting traffic operations are summarized in the updated Table 7 from the TIAS where the updated values are shown in red. The detailed capacity and queue worksheets and the updated Figure 6 traffic volume network are provided in the Attachments.

TIAS TABLE 7 - UPDATED
Intersection Capacity Analysis Summary – With COVID-19 Adjustment

Intersection/Peak Hour/Lane Group	2027 No-Build (COVID-19 Adjustment)				2027 Build (COVID-19 Adjustment)			
	V/C [a]	Del. [b]	LOS [c]	Queue [d]	V/C	Del.	LOS	Queue
Route 97 at 18 Ayers Village Road Driveway								
Weekday AM:								
Route 97 EB approach	0.00	10.0	A	--/<25	0.03	8.5	A	--/<25
Route 97 WB approach	0.00	0.0	A	--/<25	0.00	0.0	A	--/<25
15 Ayers Village Rd NB approach	0.02	29.9	D	--/<25	0.02	32.7	D	--/<25
Site Driveway SB approach	0.00	0.0	A	--/<25	0.05	18.1	C	--/<25
Weekday PM:								
Route 97 EB approach	0.02	9.4	A	--/<25	0.03	9.7	A	--/<25
Route 97 WB approach	0.00	0.0	A	--/<25	0.00	0.0	A	--/<25
15 Ayers Village Rd NB approach	0.00	0.0	A	--/<25	0.00	0.0	A	--/<25
Site Driveway SB approach	0.09	17.8	C	--/<25	0.43	40.8	E	--/48
Route 97 at 20 Ayers Village Road Driveway								
Weekday AM:								
Route 97 EB approach	0.01	8.3	A	--/<25	0.00	0.0	A	--/<25
Route 97 WB approach	0.00	0.0	A	--/<25	0.00	0.0	A	--/<25
19 Ayers Village Road NB approach	0.00	0.0	A	--/<25	0.00	0.0	A	--/<25
Site Driveway SB approach	0.00	0.0	A	--/<25	-	-	-	--/--
Weekday PM:								
Route 97 EB approach	0.00	9.3	A	--/<25	0.00	0.0	A	--/<25
Route 97 WB approach	0.00	0.0	A	--/<25	0.00	0.0	A	--/<25
19 Ayers Village Road NB approach	0.00	0.0	A	--/<25	0.00	0.0	A	--/<25
Site Driveway SB approach	0.00	14.3	B	--/<25	-	-	-	--/--

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

As shown in the updated Table 7, the delay for the 15 Ayers Village Road northbound approach is still anticipated to increase in delay (2.8 seconds) compared to the 2027 No-Build condition due to the increased trips at the opposing driveway. The increase in delay, however, is no longer anticipated to result in change in level-of-service (LOS). It's also important to note that there are no trips added to the northbound movement as part of the redevelopment and that the 65 percent increase to mainline traffic is conservative and reduces the availability of gaps on the mainline roadway.

The site driveway is now anticipated to experience a reduction in LOS from C to E and a 95th percentile queue of two vehicles or less (48 feet) during the weekday PM peak hour. Therefore, it is anticipated that the maximum queue will not block the proposed parking spaces.

Should you have any questions, require additional information, of if we can be of any assistance during the review process, please feel free to contact Chris at (603) 632-3509 or Heather at (978) 570-2968.

Sincerely,

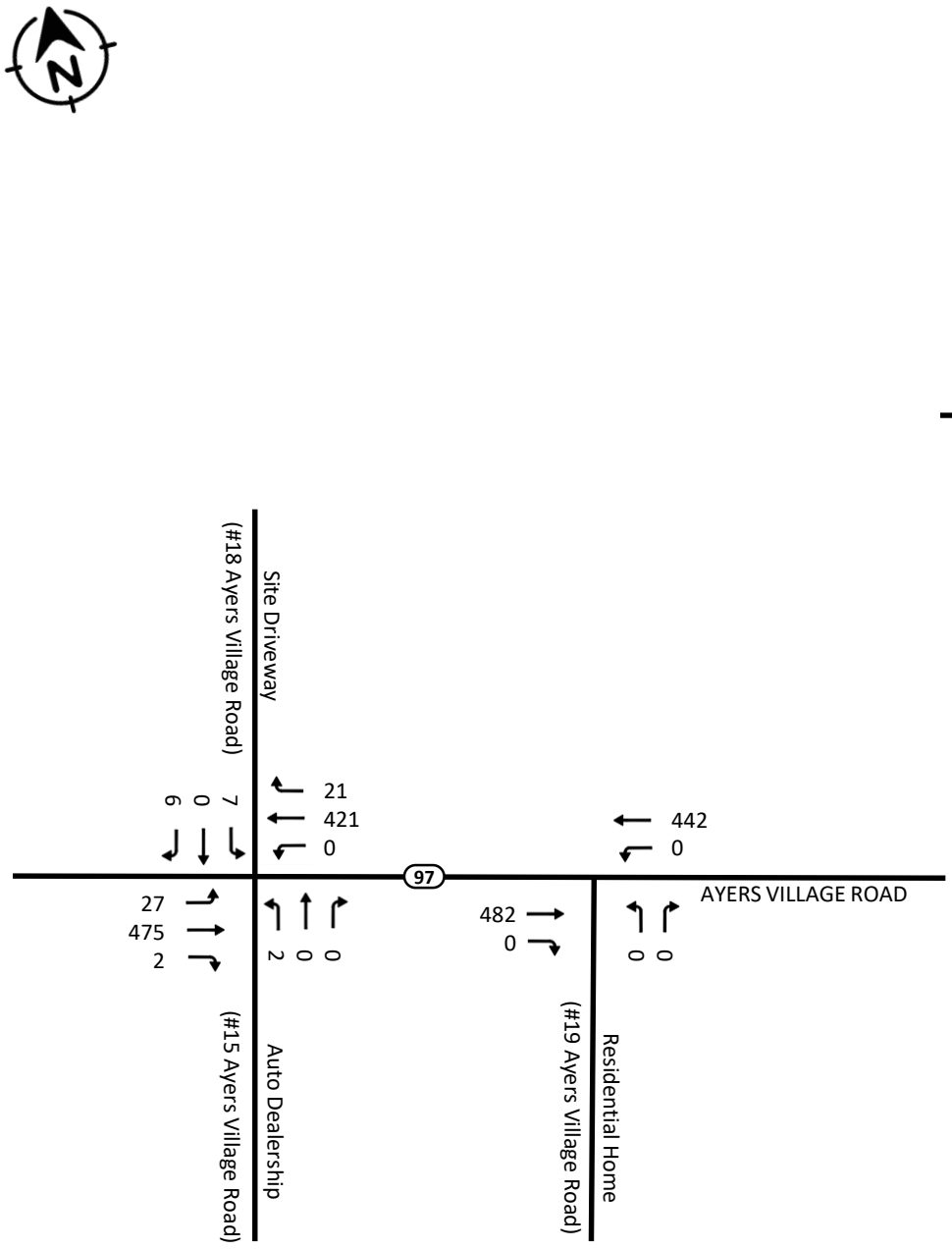
GREENMAN-PEDERSEN, INC.

Christopher Tymula
Project Manager

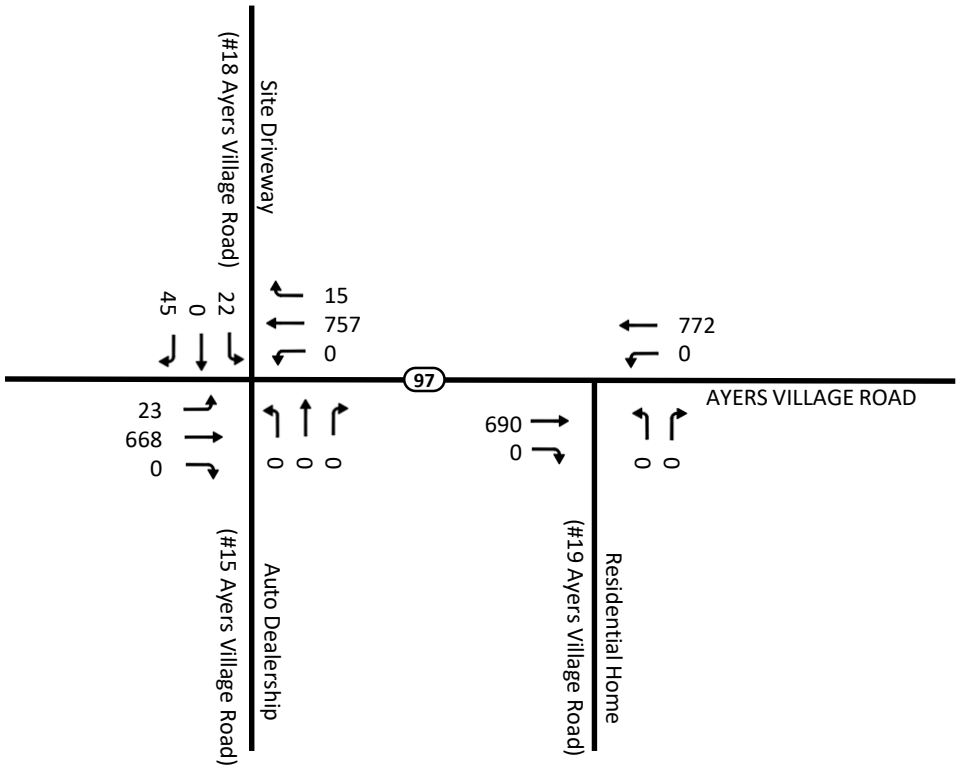
Heather L. Monticup, P.E.
Assistant Vice President / Director of Land Development Traffic

Attachments:
Site Re-Development Plans (separate PDF)
Revised O&M (separate PDF)
Updated Figure 6
Updated Capacity Worksheets

cc: (via email)
Mr. Tom Evangelista – Sonny Valley, LLC.
Peter Ellison - TEC
Samuel Gregorio - TEC



WEEKDAY AM PEAK HOUR



WEEKDAY PM PEAK HOUR

UPDATED FIGURE 6

2027 BUILD TRAFFIC VOLUMES – WITH COVID-19 ADJUSTMENT
WEEKDAY AM & PM PEAK HOUR

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	475	2	0	421	21	2	0	0	7	0	6
Future Volume (vph)	27	475	2	0	421	21	2	0	0	7	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	14	14	14	16	16	16	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.994						0.937	
Flt Protected		0.997						0.950			0.974	
Satd. Flow (prot)	0	1938	0	0	1939	0	0	1023	0	0	1927	0
Flt Permitted		0.997						0.950			0.974	
Satd. Flow (perm)	0	1938	0	0	1939	0	0	1023	0	0	1927	0
Link Speed (mph)		35			35			20			20	
Link Distance (ft)		475			163			452			458	
Travel Time (s)		9.3			3.2			15.4			15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	50%	0%	4%	2%	100%	0%	0%	2%	0%	2%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	27	475	2	0	421	21	2	0	0	7	0	6
Future Vol, veh/h	27	475	2	0	421	21	2	0	0	7	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	4	50	0	4	2	100	0	0	2	0	2
Mvmt Flow	29	516	2	0	458	23	2	0	0	8	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	481	0	0	518	0	0	1048	1056	517	1045	1046	470
Stage 1	-	-	-	-	-	-	575	575	-	470	470	-
Stage 2	-	-	-	-	-	-	473	481	-	575	576	-
Critical Hdwy	4.16	-	-	4.1	-	-	8.1	6.5	6.2	7.12	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	7.1	5.5	-	6.12	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.1	5.5	-	6.12	5.5	-
Follow-up Hdwy	2.254	-	-	2.2	-	-	4.4	4	3.3	3.518	4	3.318
Pot Cap-1 Maneuver	1061	-	-	1058	-	-	137	227	562	207	230	594
Stage 1	-	-	-	-	-	-	366	506	-	574	563	-
Stage 2	-	-	-	-	-	-	424	557	-	503	505	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1061	-	-	1058	-	-	132	218	562	201	221	594
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	218	-	201	221	-
Stage 1	-	-	-	-	-	-	352	487	-	552	563	-
Stage 2	-	-	-	-	-	-	419	557	-	484	486	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	32.7	18.1
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	132	1061	-	-	1058	-	-	289
HCM Lane V/C Ratio	0.016	0.028	-	-	-	-	-	0.049
HCM Control Delay (s)	32.7	8.5	0	-	0	-	-	18.1
HCM Lane LOS	D	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	482	0	0	442	0	0
Future Volume (vph)	482	0	0	442	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	14	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1968	0	0	1968	1900	0
Flt Permitted						
Satd. Flow (perm)	1968	0	0	1968	1900	0
Link Speed (mph)	35			35	20	
Link Distance (ft)	163			497	447	
Travel Time (s)	3.2			9.7	15.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	3%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	482	0	0	442	0	0
Future Vol, veh/h	482	0	0	442	0	0
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, %	3	0	0	3	0	0
Mvmt Flow	524	0	0	480	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	524	0	1004	524
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	480	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1053	-	270	557
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	627	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1053	-	270	557
Mov Cap-2 Maneuver	-	-	-	-	270	-
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	627	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1053	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	668	0	0	757	15	0	0	0	22	0	45
Future Volume (vph)	23	668	0	0	757	15	0	0	0	22	0	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	14	14	14	16	16	16	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.997						0.909	
Flt Protected		0.998									0.984	
Satd. Flow (prot)	0	1983	0	0	1962	0	0	2153	0	0	1828	0
Flt Permitted		0.998									0.984	
Satd. Flow (perm)	0	1983	0	0	1962	0	0	2153	0	0	1828	0
Link Speed (mph)		35			35			20			20	
Link Distance (ft)		475			163			452			458	
Travel Time (s)		9.3			3.2			15.4			15.6	
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	0%	0%	3%	2%	0%	0%	0%	2%	0%	7%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

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	23	668	0	0	757	15	0	0	0	22	0	45
Future Vol, veh/h	23	668	0	0	757	15	0	0	0	22	0	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	0	0	3	2	0	0	0	2	0	7
Mvmt Flow	25	726	0	0	823	16	0	0	0	24	0	49

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	839	0	0	726	0	0	1632	1615	726	1607	1607	831
Stage 1	-	-	-	-	-	-	776	776	-	831	831	-
Stage 2	-	-	-	-	-	-	856	839	-	776	776	-
Critical Hdwy	4.12	-	-	4.1	-	-	7.1	6.5	6.2	7.12	6.5	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.12	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.12	5.5	-
Follow-up Hdwy	2.218	-	-	2.2	-	-	3.5	4	3.3	3.518	4	3.363
Pot Cap-1 Maneuver	796	-	-	886	-	-	82	105	428	85	106	362
Stage 1	-	-	-	-	-	-	393	410	-	364	387	-
Stage 2	-	-	-	-	-	-	355	384	-	390	410	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	796	-	-	886	-	-	68	99	428	82	100	362
Mov Cap-2 Maneuver	-	-	-	-	-	-	68	99	-	82	100	-
Stage 1	-	-	-	-	-	-	372	388	-	345	387	-
Stage 2	-	-	-	-	-	-	307	384	-	369	388	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	0	40.8
HCM LOS			A	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	796	-	-	886	-	-	171
HCM Lane V/C Ratio	-	0.031	-	-	-	-	-	0.426
HCM Control Delay (s)	0	9.7	0	-	0	-	-	40.8
HCM Lane LOS	A	A	A	-	A	-	-	E
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	1.9

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	690	0	0	772	0	0
Future Volume (vph)	690	0	0	772	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	14	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1987	0	0	1968	1900	0
Flt Permitted						
Satd. Flow (perm)	1987	0	0	1968	1900	0
Link Speed (mph)	35			35	20	
Link Distance (ft)	163			497	452	
Travel Time (s)	3.2			9.7	15.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	3%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	690	0	0	772	0	0
Future Vol, veh/h	690	0	0	772	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	750	0	0	839	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	750	0	1589	750
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	839	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	868	-	120	415
Stage 1	-	-	-	-	470	-
Stage 2	-	-	-	-	427	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	868	-	120	415
Mov Cap-2 Maneuver	-	-	-	-	120	-
Stage 1	-	-	-	-	470	-
Stage 2	-	-	-	-	427	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	868	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-