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MEMORANDUM

To: Tina Bohl, Park and Ride Program Manager, VTrans

Cc:

From: Jason Sobel, P.E., PTOE; Green International Affiliates, Inc. (Green)
Dennis Vertiyev, E.I.T.; Green International Affiliates, Inc. (Green)

Date: November 30, 2017

Project: Berlin Park and Ride Expansion (Green No. 15025.02X)

Subject: Berlin Park and Ride: Alternatives Analysis Memo

EXECUTIVE SUMMARY

Green International Affiliates, Inc. (Green) has developed and evaluated alternatives for the proposed I-89 Exit 7 Berlin Park and Ride Expansion project. The project is intended to address deficiencies at the existing Park and Ride Facility. This project began with investigations of the existing conditions, which included an existing conditions survey, and a field visit to observe operations and to verify more detailed conditions at the facility. After having gained the information needed to discuss the existing facility and its deficiencies, a Local Concerns Meeting was held on October 25, 2016. The meeting was held to gather further information from local residents and users of the facility. After gathering all this information, Green developed six (6) design alternatives that addressed the deficiencies in the existing facility, while considering the concerns of the local residents. Green considered three (3) key categories; economics, location, and site characteristics while evaluating each alternative. An Alternatives Evaluation Matrix was developed to track each alternative's score. Based on the evaluation, Alternative 2 is recommended to be the preferred alternative.

EXISTING CONDITIONS

The I-89 Exit 7 Berlin Park and Ride Facility is located at the corner of VT Route 62 and Paine Turnpike North, with the single driveway off Pike Drive. The existing facility has a total of seventy-six (76) parking spaces, including four (4) handicap accessible parking spaces, one (1) of which is van accessible. There is one (1) bicycle rack, with the capacity to hold five (5) bicycles. The facility also includes a bus stop which is served by Stagecoach Transportation's "89er North" bus route, which runs on I-89 from South Royalton and Randolph to Montpelier with one (1) round trip in both the morning and afternoon peak hours. The Park and Ride facility also serves as an active carpool facility for commuters and other travelers in the Barre-Montpelier area.

There are several deficiencies that prevent the existing facility from better serving the current users. The pavement is deteriorated and the markings are faded throughout most of the parking lot making it difficult for motorists to determine where to park. This leads to users parking in unofficial spaces and general inefficiencies within the park and ride facility. Another issue is the location of the driveway on Pike Drive, which is located approximately 25 feet from the intersection of Pike Drive and Paine Turnpike North. Pike

Drive is a private road; VTrans has an easement to allow access to the existing Park and Ride, but the easement on Pike Drive does not extend beyond the existing driveway location. The short distance between the existing Park and Ride driveway and Paine Turnpike North, approximately one vehicle length, can create queuing problems on Pike Drive and within the Park and Ride when several vehicles leave the facility at the same time and are forced to wait to turn onto Paine Turnpike. This problem is exacerbated when the vehicular queue on Paine Turnpike North extends back from the intersection with VT Route 62 beyond Pike Drive intersection. In addition, the current bus shelter is located at the far west end of the Park and Ride and is an inconvenience to passengers, as they must walk all the way to one end to wait for the bus. Other deficiencies include a lack of a designated area for carpool pickup (passengers have been observed waiting in the middle of the lot while waiting for another driver to arrive), the lack of stormwater treatment consistent with current requirements, the poor condition of the bus shelter, and the lack of functional lighting which creates an unsafe environment at night. It is also noted that the width of the existing Park and Ride facility does not allow for a bus to turn around in one continuous movement. As a result, there is a large open area of pavement towards the west end of the existing facility that is used by the buses for maneuvering, which is an inefficient use of space and reduces the number of parking spaces that could otherwise be provided. The additional maneuvering required by large buses also prevents the bus vehicles from stopping adjacent to the existing bus shelter.

The I-89 Exit 7 Berlin Park and Ride is a well-used facility. Green conducted field observations on Tuesday, October 18, 2016 and Wednesday, October 19, 2016. During these field observations, the Park and Ride was never more than 68% occupied, and never less than 30% occupied. Over the course of observations, the facility experienced several shifts in utilization. The most striking observation was the lack of a defined peak hour in the morning, with occupancy holding at about 62% for much of the time. The highest observed occupancy of 68%, was at 12 PM. In the afternoon, there was a drop off in occupancy after 4 PM, when the occupancy fell from 55% to 41% between 4 and 5 PM. Table 1 shows the results of the parking utilization counts performed during our field observations.

Table 1 - Summary of Parking Utilization Counts

	Time	Total # of Free Spaces	Number of Occupied Spaces	Percent Occupied
Wednesday October 19, 2016	7:00	36	40	53%
	8:00	29	47	62%
	9:00	29	47	62%
	10:00	28	48	63%
	11:00	28	48	63%
	12:00	24	52	68%
Tuesday October 18, 2016	1:00	32	44	58%
	2:00	36	40	53%
	3:00	33	43	57%
	4:00	34	42	55%
	5:00	45	31	41%
	6:00	53	23	30%

PROPOSED EXPANSION ALTERNATIVES

In the development of expansion alternatives for the Park and Ride facility, consideration was given to the input gathered from the Local Concerns Meeting, as well as the Town's transportation goals as articulated in the 2012 Berlin Town Plan. After these considerations, two groupings of alternatives emerged; expansion of the facility on the current site, or construction of an entirely new facility at an alternate site. In general, the existing site is as close as possible to I-89, but it is located in a somewhat constrained Right-of-Way (ROW). While the potential alternate sites are located farther from I-89, they could provide more space for additional future expansion. The alternatives evaluated would have minimal, if any, environmental impacts with the exception of one (1) alternative. The alternate site on Paine Turnpike North, located south of VT Route 62 across from the newly constructed Maplewood travel service center, is within a Wetland Advisory Area, which is a potential wetland area unconfirmed by the Vermont Agency of Natural Resources (VANR). While there are VANR Class II wetlands in the wider area surrounding the potential sites, the only area in which they would come into conflict with any alternate site would be behind the Midstate Library on Paine Turnpike. This area is not proposed to be used as part of the current expansion, but set aside for future growth. An overview map of the project area layered with the VANR Wetland Mapping layers can be found in the attached Appendix. There are no Historical Resources sites identified by the State at any of the potential locations evaluated.

In addition to the expansion alternatives, "Do Nothing" and "Minimal Change" alternatives were also considered. As the "Do Nothing" alternative would not solve the issues noted above with the current facility nor meet the goals for the project, this alternative was not advanced. The "Minimal Change" alternative (labeled below as Alternative 5) would provide restriping and improved amenities at the existing Park and Ride facility, but not expand beyond the existing pavement area. This option would provide fewer parking spaces, due to the need to provide circulation lane widths and parking spaces that are consistent with current design standards. Notably, the current Park and Ride facility striping has narrow aisles which can make parking maneuvers difficult, particularly with larger SUV's and/or pick-up trips using the facility. The number of spaces would decrease from 76 existing spaces to 71 parking spaces. This would not meet the project goal of increasing parking capacity and improving bus circulation within the facility.

Locations of proposed Park and Ride expansion alternatives in relation to each other

Alternative Layouts on the Current Site

Several possible alternatives for the expansion of the Park and Ride Facility would involve enlarging on the existing site. The State ROW extends west along VT Route 62, allowing for expansion in that direction. In addition, a minor widening of the Park and Ride facility is possible in the southern direction, toward VT Route 62, by expanding into the existing tree line and drainage ditch. This change would facilitate improved bus circulation.

The layout of the expansion alternatives at the existing site would follow the general layout of the existing Park and Ride, with some minor modifications. The parking area would be rectangular, with angled spaces along both sides and a one-way aisle separating them from two center rows of angled spaces.

- Alternative 1 would relocate the Park and Ride entrance, farther west on Pike Drive, to be across from the Vermont State Employees Credit Union (VSECU) driveway. This alternative would also have a right-turn only exit (slip lane) onto VT Route 62 Westbound.
- Alternative 2 would relocate the driveway on Pike Drive (similar to Alternative 1). Instead of adding a slip lane directly onto VT Route 62 Westbound, the Paine Turnpike North southbound approach to VT Route 62 would be widened to provide an exclusive right-turn lane.
- In Alternative 3, the existing entrance onto Pike Drive would be retained in its current location, while adding a slip lane right-turn only exit directly onto VT Route 62 Westbound, as in Alternative 1.
- Alternative 4 would maintain the existing driveway location on Pike Drive (similar to Alternative 3). Instead of adding a slip lane driveway directly onto VT Route 62 Westbound, the Paine Turnpike

North southbound approach to VT Route 62 would be widened to provide an exclusive right-turn lane, as in Alternative 2.

In all expansion alternatives (1-4), the bus stop area would be relocated from the western corner of the facility to a dedicated bus pull out area along the north side of the Park and Ride facility. This would provide an area outside the path of vehicle circulation for passengers to board or alight, and make the bus and vehicle pick up/drop off quicker, safer, and more convenient compared to the current location. The wider pavement in alternatives 1-4 would also allow buses to turn around in a single maneuver, which will maximize the efficiency of the proposed parking spaces. In addition, all expansion alternatives (1-4) would accommodate expanded stormwater management facilities in the southeast corner of the area, closest to the Paine Turnpike North and VT Route 62 intersection. All alternative conceptual layouts are attached to this memorandum.

From an operational and vehicular circulation perspective, the most beneficial driveway configuration is presented in Alternative 1 or 2 where the driveway connection to Pike Drive is moved to the west to align with the existing VSECU driveway. This provides a significant benefit to circulation, as the increased distance to Paine Turnpike North from the driveway would provide a larger queuing area for multiple vehicles departing the Park and Ride and eliminate a difficult turning maneuver for buses exiting the Park and Ride facility. However, as noted previously VTrans currently has an easement along Pike Drive only large enough to allow for the current location of the facilities driveway. To relocate the entrance would require either a new access agreement with the owners of the private road, or for the Town of Berlin to acquire the private road as a public way. Either of these alternatives would trigger additional ROW processes as opposed to retaining the entrance in its current location.

Intersection Analysis

The functionality of the Park and Ride facility's access and egress is closely tied to the traffic operations at the intersection of Paine Turnpike North and VT Route 62. VT Route 62 provides access to I-89 to Barre, and to Montpelier via US 302. It was noted at the local concerns meeting that the vehicular queue on the Paine Turnpike North southbound approach to VT Route 62 often extends past the intersection of Pike Drive, which can lead to backups within the existing Park and Ride facility. This occurs primarily during the afternoon peak periods. A suggestion at the local concerns meeting was to provide an exclusive right turn lane to the southbound approach along Paine Turnpike. We considered that suggestion in our analysis of the intersection, as well as modifying the signal timings to provide more green time for the Paine Turnpike North southbound movement. A summary of the intersection capacity analyses for these alternatives and the baseline No Build alternative is shown in Table 2.

When looking at traffic volumes to use to analyze the intersection of Paine Turnpike North and VT Route 62, we followed the guidance contained in the VTrans Continuous Traffic Counter Report (i.e. "The Redbook"), published in September 2016. For the analyses, we used intersection Turning Movement Count (TMC) data collected at the intersection by VTrans on May 29, 2015. We developed Design Hourly Volumes (DHV) based on AADT values listed in the route log, and compared them to roadway segment volumes calculated from the TMC data. We found that the PM DHV on VT Route 62 were approximately 10% higher than the TMC volumes, while the PM DHV on Paine Turnpike ranged from 45% to 60% lower than the TMC volumes. The decision was made to use the TMC volumes for the analysis. This was done primarily due to the relative consistency of the VT Route 62 TMC volumes and the calculated DHV's. Furthermore, lowering the volumes on Paine Turnpike North below the actual observed traffic volumes would not provide a realistic analysis. This is permitted by the Redbook, which says that "The highest hour may or may not be a reasonable DHV estimate." These TMC volumes were seasonally adjusted to represent average volumes in a year, and

projected to future year conditions using growth factors published in The Redbook, first from 2015 to 2016, and then from 2016 to the design year of 2036. We did not account in our adjustment for the potential increased traffic volume due to increased use of the expanded Park and Ride facility. The TMC data calculations and the intersection capacity worksheets are included in the attached Appendix A and B, respectively.

Table 2 - Summary of Intersection Capacity Analysis – Weekday Peak Hours

	2036 No Build Condition				2036 Timing Changes Only				2036 SB R Lane + Timing Changes			
	Delay	LOS	v/c	95th % Queue (ft.)	Delay	LOS	v/c	95th % Queue (ft.)	Delay	LOS	v/c	95th % Queue (ft.)
Route 62 at Paine Turnpike North AM Peak Hour												
Route 62 EB L	50.0	D	0.60	137	44.7	D	0.50	126	32.9	C	0.43	111
Route 62 EB T	24.9	C	0.47	165	26.3	C	0.45	173	16.2	B	0.32	143
Route 62 EB R	0.6	A	0.16	0	0.6	A	0.16	0	0.3	A	0.12	0
Route 62 WB L	37.9	D	0.35	73	39.2	D	0.33	75	28.3	C	0.26	66
Route 62 WB T	24.9	C	0.46	133	27.2	C	0.46	143	18.3	B	0.38	117
Route 62 WB R	0.2	A	0.05	0	0.2	A	0.05	0	0.1	A	0.04	0
Paine Turnpike North NB L	54.5	D	0.67	155	40.0	D	0.49	114	18.9	B	0.04	14
Paine Turnpike North NB TR	15.6	B	0.32	106	13.8	B	0.28	94	19.0	B	0.48	94
Paine Turnpike North SB LTR	36.1	D	0.59	118	36.3	D	0.56	120	-	-	-	-
Paine Turnpike North SB LT	-	-	-	-	-	-	-	-	27.6	C	0.29	75
Paine Turnpike North SB R	-	-	-	-	-	-	-	-	0.2	A	0.08	0
Overall Intersection	27.4	C	0.67	-	26.8	C	0.56	-	17.5	B	0.48	-
Route 62 at Paine Turnpike North PM Peak Hour												
Route 62 EB L	48.5	D	0.47	87	62.6	E	0.55	101	47.7	D	0.46	85
Route 62 EB T	32.2	C	0.62	193	46.2	D	0.73	250	32.9	C	0.64	197
Route 62 EB R	1.8	A	0.23	9	2.8	A	0.26	16	1.3	A	0.23	4
Route 62 WB L	75.1	E	0.88	235	62.7	E	0.75	238	60.1	E	0.79	220
Route 62 WB T	27.6	C	0.49	164	34.6	C	0.50	204	27.0	C	0.48	165
Route 62 WB R	0.0	A	0.00	0	0.0	A	0.00	0	0.0	A	0.00	0
Paine Turnpike North NB L	>120	F	1.24	283	64.3	E	0.77	248	25.2	C	0.53	132
Paine Turnpike North NB TR	19.9	B	0.43	177	18.6	B	0.37	181	19.8	B	0.45	172
Paine Turnpike North SB LTR	62.2	E	0.89	311	54.4	D	0.80	323	-	-	-	-
Paine Turnpike North SB LT	-	-	-	-	-	-	-	-	43.6	D	0.65	167
Paine Turnpike North SB R	-	-	-	-	-	-	-	-	1.9	A	0.16	16
Overall Intersection	49.8	D	1.24	-	42.3	D	0.80	-	29.7	C	0.79	-

Abbreviations:

EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound

L=Left, T=Through, R=Right

Delay = Average delay per vehicle (measured in seconds)
LOS = Level of Service
v/c = Volume-to-Capacity Ratio
95th % Q = 95th percentile queue length (measured in feet), assumes 25 feet per vehicle

As indicated in Table 2, timing changes alone would result in only moderate improvements for the Paine Turnpike North southbound approach, and may have undesired consequences for the VT Route 62 approaches. The addition of a southbound right turn lane improves flow on the southbound approach without negatively impacting to the rest of the intersection, but would not completely solve the problem cited at the local concerns meeting. The 95th percentile queue on Paine Turnpike North in the through/left turn lane is still anticipated to back up past Pike Drive in the afternoon peak hour. But the southbound queue on Paine Turnpike North would be significantly reduced, thereby reducing amount of time that Pike Drive is blocked. It is noted that in the area to the west of Paine Turnpike North (between the roadway and the

existing Park and Ride), there are overhead utility poles, underground drainage structures, and an existing strain pole for the traffic signal span wire. Therefore, roadway widening to accommodate a new southbound right-turn lane would be proposed on the east side of Paine Turnpike North to avoid these conflicts. It is also noted that the roadway widening would need to extend north of Pike Drive to provide sufficient space to allow vehicles using the right turn lane to bypass the queue in the through/left lane. This would result in minor adjustments to the southern driveway at the Berlin Fire Department on the east side of Paine Turnpike North. The Paine Turnpike North southbound right-turn lane is shown in Alternatives 2 and 4.

Another potential solution would be to add a right-turn only exit from the Park and Ride directly onto VT Route 62 westbound. This possibility was discussed at the local concerns meeting, and would minimize the circulation concerns at the Pike Drive / Paine Turnpike North intersection. This alternative solution is shown in Alternatives 1 and 3. This driveway would be located on the south side of the facility and connect directly with VT Route 62. The proposed geometry of the exit and the existing raised median on VT Route 62 would serve to limit the usage of the exit to vehicles exiting the Park and Ride onto VT Route 62 westbound only. It is anticipated that buses will need to encroach upon the right most lane of VT Route 62 while turning out of the exit. One concern with the potential slip lane is the spacing between the proposed slip lane location and the intersection of Paine Turnpike North with VT Route 62. The potential slip lane creates a new conflict point on a portion of roadway that is otherwise a limited access facility. This could pose a safety issue if vehicles departing the intersection of Paine Turnpike North with VT Route 62 aren't anticipating vehicles exiting from the Park and Ride. The slip lane also potentially creates a new traffic weave between the slip lane and the I-89 southbound on-ramp that could be difficult to negotiate as drivers accelerate away from the Paine Turnpike north intersection. Another concern with the potential slip lane would the potential for cut-through traffic coming from Paine Turnpike North and using the Park and Ride to avoid the signal at the VT Route 62/Paine Turnpike North intersection. This could cause additional congestion in the Park and Ride and the additional traffic would exacerbate any potential safety issues with the slip lane. A further concern is the narrow width of the shoulder on VT Route 62 where the slip lane would tie into and utilize as Due to the narrower width, and as noted above, buses exiting the Park and Ride would need to encroach into the right most travel lane on VT Route 62. This could pose a safety problem as buses accelerate slower to traffic speeds. Due to these concerns, the slip lane is not preferred relative to the alternatives with the exclusive right-turn lane on the Paine Turnpike North southbound approach.

Potential Alternate Sites

Based on feedback received from local residents and stakeholders during the Local Concerns Meeting, three (3) alternate sites for a new Park & Ride facility were identified. These sites are located along Paine Turnpike North. One potential alternate site is situated north of the intersection with VT Route 62, at the location of the current Midstate Regional Library Center, while the other two (2) are located south of VT Route 62. One (1) location is located south of VT Route 62 between the Shaw's driveway and the Comstock Road intersection. The second is located south of VT Route 62 between 802 Honda and the Shaw's driveway. These three (3) sites would have the potential to accommodate a considerably larger facility than what currently exists.

Midstate Regional Library

The first suggested alternative site is at the current location of the Midstate Regional Library Center, a support facility run by the Vermont Department of Libraries. It is situated at the intersection of Paine Turnpike North and Richardson Road, approximately 1,500 feet north of VT Route 62. The state owns approximately eight (8) acres in total at this site, and the library only uses a small portion of the land. If the Park and Ride were to be relocated to this site, it would have a shared driveway with the library, and the

Park and Ride facility would be located behind the library. This could create a safety issue, as the proposed Park and Ride site would not be visible from Paine Turnpike North, as it would be obscured by the library building. However, the layout of this site could feature a separated pick-up/drop-off loop for bus circulation and rows of 90-degree parking spaces. Additionally, this site is large enough to accommodate a potential increase in demand in the future. A conceptual layout for this alternate location is attached to this memorandum.

Midstate Library Center as seen from Paine Turnpike North. Proposed Park and Ride site would be located behind the existing building.

South of the Shaw's Entrance (Across from Current Maplewood Travel Center Site)

The second suggested alternative site lies on Paine Turnpike North, approximately 1,000 feet south of the intersection with VT Route 62. It is south of the Shaw's shopping center entrance, approximately across from the south entrance of the newly-built Maplewood Travel Service Center. The layout of this site would depend on the desired capacity, with the possibility for interior rows of parking to extend east away from Paine Turnpike North, as well as north toward the Shaw's driveway. However, it should be noted that this site is privately owned land, which would have to be acquired by the State for the expansion. This could be a potential time delay to the project, and a significant expense to VTrans. Another concern would be that the site is located on a grade, which would require significant earthwork to accommodate a Park & Ride. In addition, much of this potential site is also within a Wetland Advisory Area as discussed above. Due to the number of concerns at this location a conceptual layout was not developed, as it is unlikely that this option will be pursued further.

Vermont Natural Resources Atlas image showing south of Shaw's site. Property lines are in red, while the green is Wetlands Advisory Layer.

North of the Shaw's Entrance (South of 802 Honda)

Another potential alternative site would be the area bounded by the Shaw's Plaza entrance to the south, the Shaw's Plaza parking lot to the east, Paine Turnpike North to the west, and 802 Honda to the north. This would be the closest to VT Route 62 of any of the proposed alternate sites. However, this site could face a difficult process regarding property acquisition. As with the other site south of VT Route 62, this site is currently privately-owned land, which would require acquisition. However, this area of land may have multiple property owners, thereby increasing the potential costs to the State. Based on these significant concerns, a conceptual layout was not developed, as it is unlikely that this alternative will be pursued further.

All alternate sites also have a distinct disadvantage, when compared with the existing Park and Ride location, due to their distance from VT Route 62. None of the sites are visible from VT Route 62 and all the sites are located farther from the I-89 Exit 7 interchange. The farther distance and lack of visibility from VT Route 62 could lead to a decreased utilization at the facility relative to the existing Park and Ride location.

CONSTRUCTION

As the existing Park and Ride facility is active and well utilized, provisions would need to be made for the continued use of the facility during construction of any expansion. With the potential alternate sites, this would be relatively simple as the existing facility could continue to be used until the new Park and Ride facility was constructed. For Alternatives 1 through 4, one option would be a phased construction schedule that would allow for continued use of the Park and Ride facility during construction. The potential drawbacks to this approach include reduced Park and Ride capacity during construction, and an extended construction duration.

Another option would be to utilize a temporary offsite parking location during the reconstruction of the existing Park and Ride facility. Three (3) potential temporary sites were considered based on field observations. These sites include leasing a portion of the Shaw's Plaza parking lot on Paine Turnpike North south of the VT Route 62 intersection, leasing a portion of the Berlin Mall parking lot, or leasing a portion of the Kohl's parking lot on Berlin Mall Road. These three (3) sites are all privately-owned parking lots and would require agreements with the owners, but all of them were observed to possess enough excess capacity to serve the normal demand of the existing Park and Ride on a temporary basis.

ALTERNATIVES EVALUATION

To determine the alternative to recommend, Green considered three key categories; economics, location, and site characteristics. The economic considerations included ease of acquisition, which included whether the site was already state-owned and cost of site development. The location considerations accounted for the access to I-89, the proximity to existing bus routes, and convenience of use. The site characteristics considerations accounted for the potential use of each site, as well as the impacts to neighbors and the environment. Each alternative was numerically scored on the same criteria, and a weighted average was calculated to determine which alternative best met the most criteria over all three categories.

The scoring levels for the criteria entailed certain thresholds that had to be met by each site. As an example, for Ease of Acquisition the highest scores are given to the alternatives that are on the existing Park and Ride site, and utilized the existing driveway location (except for the Midstate Library site, which has the similar advantage of being a state-owned property). This eliminates the need for acquisition of new land, be it an easement for a new driveway on Pike Drive or a new site from private landowners, both of which rank lower in this category. The site development cost considers the difference between expanding on the existing site versus an entirely new site. Similarly, the Proximity to I-89 score is based on distance from the driveway to the entrance ramps, with the current site scoring highest as it is the closest to VT Route 62 and the I-89 interchange. Visibility and security were primarily based on the view from adjacent streets and buildings, giving the lowest score to the Midstate Library site, which is set back behind the building.

The full Alternatives Evaluation Matrix can be found Table 3, with the justification for each criterion in Appendix C. Plans were only prepared for alternatives that scored above 50% maximum points in the evaluation matrix and met the project goals.

Table 3 – Alternative Evaluation Matrix

Item/Criteria	Max Points	Alternatives								
		Do Nothing	Minimal Change (Alternative 5)	1	2	3	4	A	B	C
Location	---	--	Existing P&R Lot	Existing P&R Lot with Relocated Entrance & Slip Lane	Existing P&R Lot with Relocated Entrance & Right Turn Lane	Existing P&R Lot and Entrance with Slip Lane	Existing P&R Lot and Entrance with Right Turn Lane	Behind Midstate Library Center	Behind Shaw's Plaza	West of Shaw's Plaza
Property Owner	---	State of VT	State of VT	State of VT	State of VT	State of VT	State of VT	State of VT	Shaw's Plaza Owner	Multiple
Ease of Acquisition	30	30	30	25	25	30	30	30	15	5
Site Development Cost	10	10	10	10	10	10	10	5	0	5
Total Points – Economic Considerations	40	40	40	35	35	40	40	35	15	10
Proximity to I-89	10	10	10	10	10	10	10	0	0	5
Transit Service Access	10	5	5	10	10	5	5	5	5	5
Visibility/Security	10	5	5	10	10	10	10	0	5	10
Access Convenience, Safety, and Congestion	15	3	3	10	15	5	10	5	10	5
Total Points – Location Considerations	45	23	23	40	45	30	35	10	20	25
Impact to Environmental Resources	10	10	10	5	5	5	5	5	0	5
Compatibility/Affects to Adjacent Property	10	10	10	8	8	8	8	5	10	5
Number of Spaces and Expansion Potential	15	5	5	10	10	10	10	15	15	5
Permitability	10	10	10	10	10	10	10	10	5	5
Total Points – Site Considerations	45	35	35	33	33	33	33	35	30	20
Total Points	130	98	98	108	113	100	108	80	65	55
Weighted Average % of Maximum	100%	75%	75%	83%	87%	77%	83%	62%	50%	42%

RECOMMENDATIONS

Based on the evaluation summarized in this memorandum, Green recommends Alternative 2 as the preferred alternative. The proposed layout on the existing site would increase the number of spaces from 76 to 135, relocate the main entrance on Pike Drive approximately 150 feet to the west (aligning it with the existing VSECU driveway), improve bus circulation within the Park and Ride, and construct an exclusive right-turn lane on the Paine Turnpike North southbound approach. These improvements can all be done while taking the advantage of the current site's proximity to I-89.

Recognizing the potential difficulty in realizing Alternative 2 in regards to potential ROW access along Pike Drive, Green also recommends Alternative 4 as the second choice as it retains many features from of Alternative 2 without being able to shift the driveway from its existing location.

In terms of construction scheduling, Green recommends that temporary off-site parking be pursued at the Shaw's Plaza site. This would allow for a shorter construction duration and fewer inconveniences for users of the Park and Ride, who would be redirected to a different site. If that is not found to be feasible, it will also be possible to use phased construction while maintaining access to the Park and Ride

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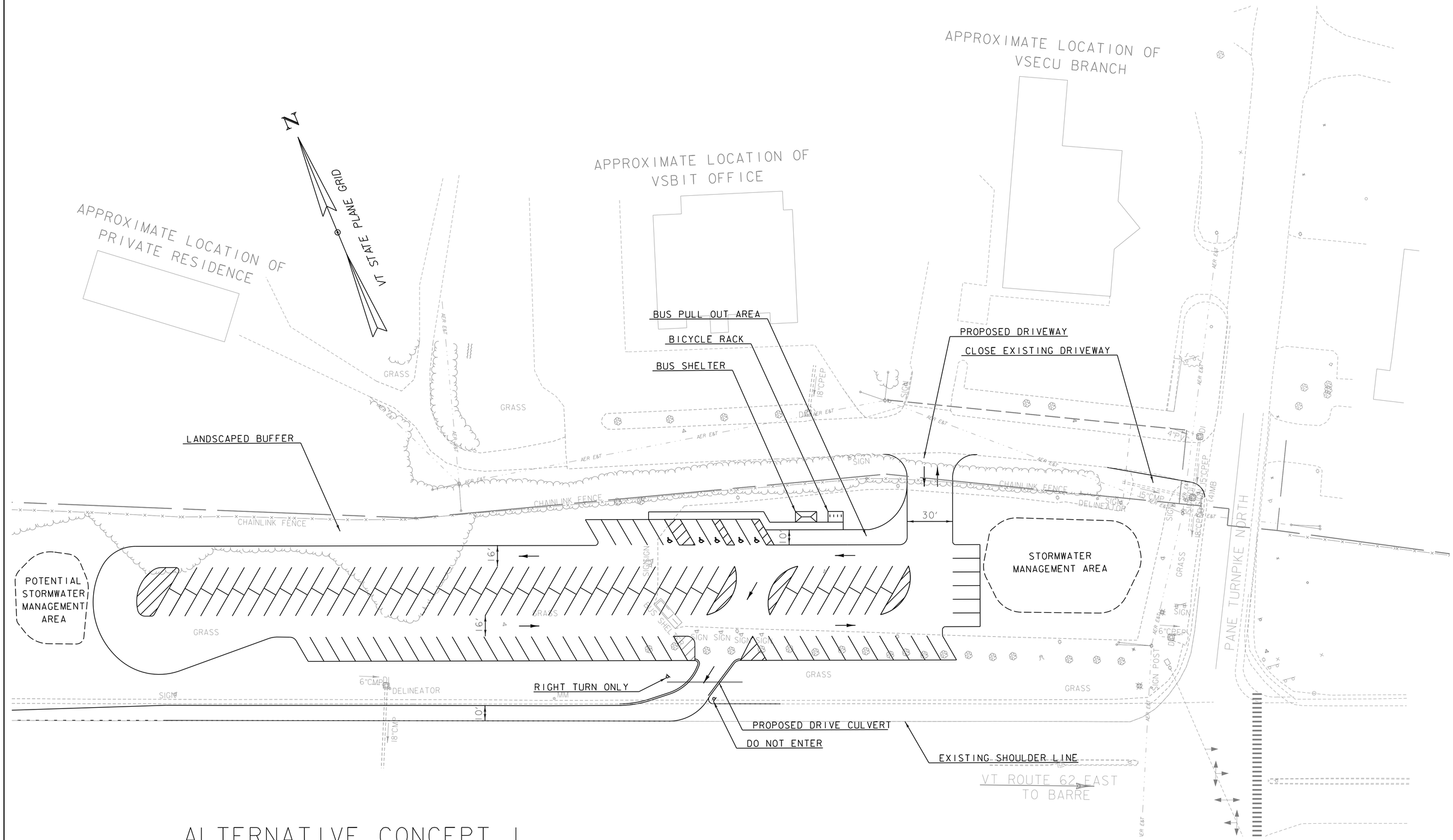
ALTERNATIVE CONCEPTUAL LAYOUT PLAN SHEETS

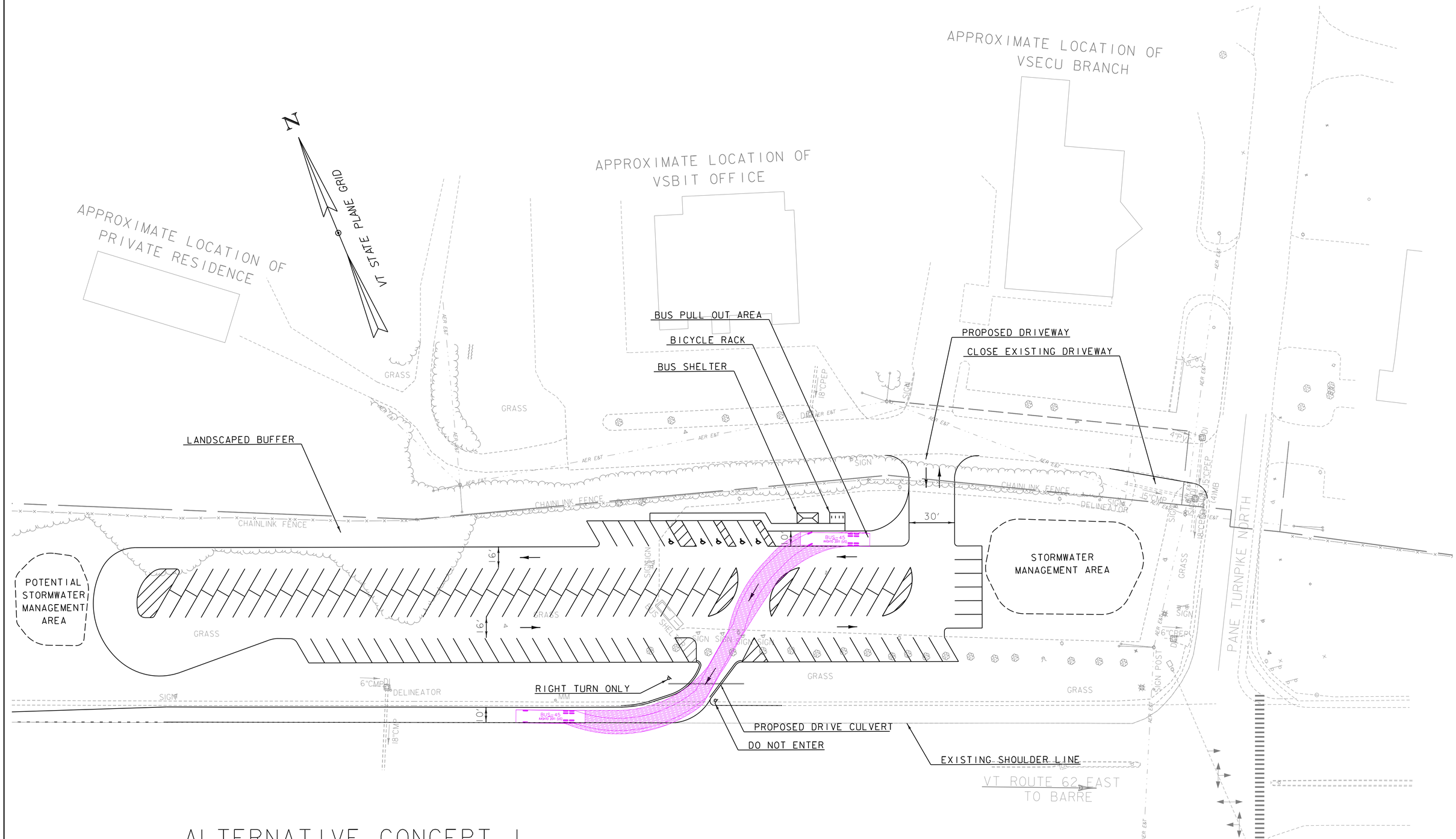


ALTERNATIVE CONCEPT I
EXISTING SPACES: 76
PROPOSED SPACES: 135
ACCESSIBLE SPACES: 5

0 30 60
SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)
FILE NAME: z12k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT I	SHEET 1 OF 6



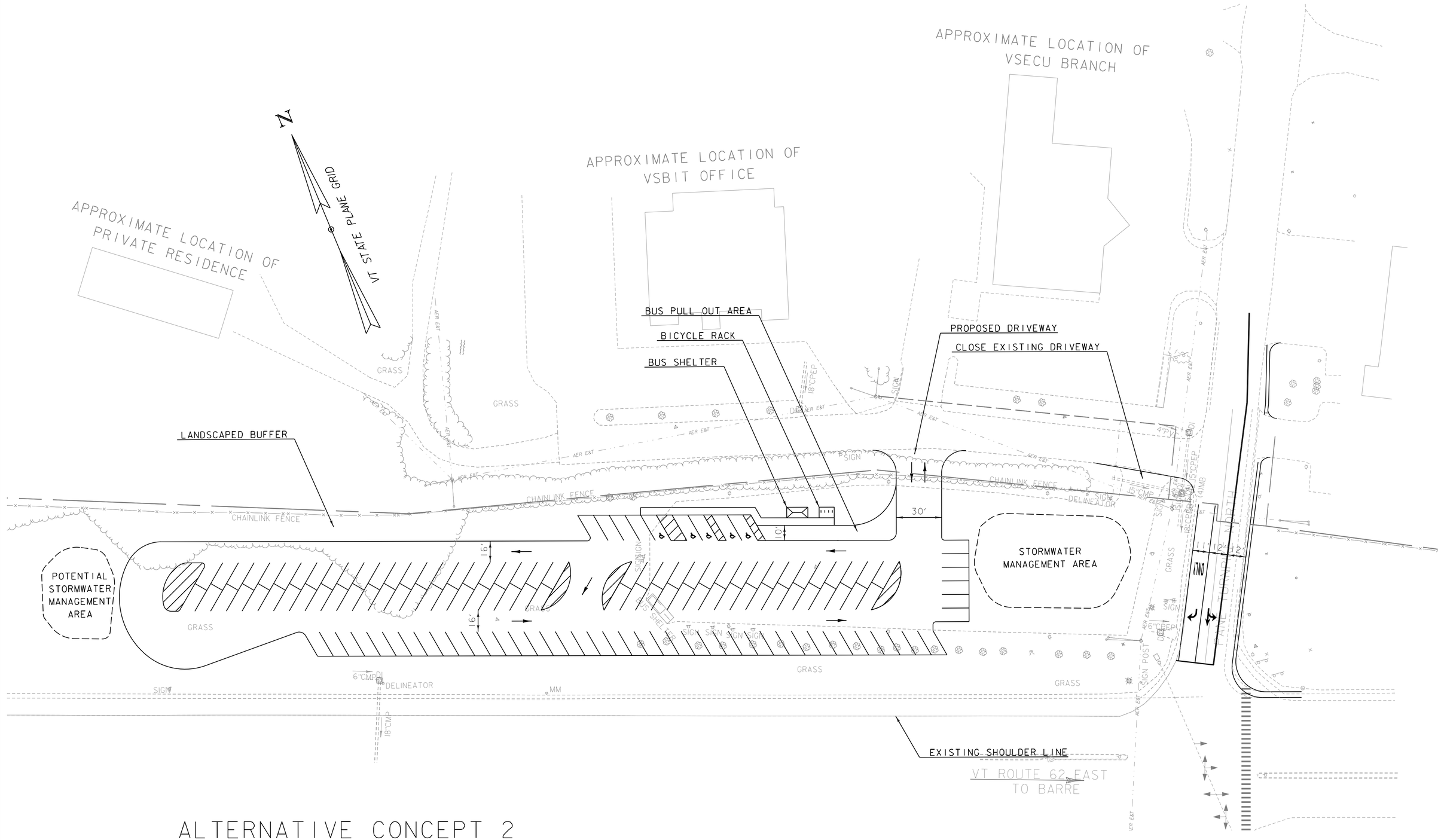
ALTERNATIVE CONCEPT I
EXISTING SPACES: 76
PROPOSED SPACES: 135
ACCESSIBLE SPACES: 5

0 30 60
SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)

FILE NAME: z12k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT I	SHEET 1 OF 6



PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)
FILE NAME: z12k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT 2	SHEET 2 OF 6

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

APPROXIMATE LOCATION OF VSECU BRANCH

APPROXIMATE LOCATION OF VSBIT OFFICE

APPROXIMATE LOCATION OF PRIVATE RESIDENCE

N

VT STATE PLANE GRID

BUS PULL OUT AREA

BICYCLE RACK

BUS SHELTER

PROPOSED DRIVEWAY

CLOSE EXISTING DRIVEWAY

LANDSCAPED BUFFER

POTENTIAL STORMWATER MANAGEMENT AREA

STORMWATER MANAGEMENT AREA

EXISTING SHOULDER LINE

VT ROUTE 62 EAST TO BARRE

ALTERNATIVE CONCEPT 2
EXISTING SPACES: 76
PROPOSED SPACES: 135
ACCESSIBLE SPACES: 5

0 30 60
SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)
FILE NAME: z12k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT 2	SHEET 2 OF 6


APPROXIMATE LOCATION OF PRIVATE RESIDENCE
N
VT STATE PLANE GRID
APPROXIMATE LOCATION OF VSBIT OFFICE
APPROXIMATE LOCATION OF VSECU BRANCH
BUS PULL OUT AREA
BICYCLE RACK
BUS SHELTER
PROPOSED DRIVEWAY
CLOSE EXISTING DRIVEWAY
LANDSCAPED BUFFER
POTENTIAL STORMWATER MANAGEMENT AREA
STORMWATER MANAGEMENT AREA
CHAINLINK FENCE
GRASS
30'
16'
10'
DELINEATOR
6"CMP
18"CMP
EXISTING SHOULDER LINE
VT ROUTE 62 EAST TO BARRE

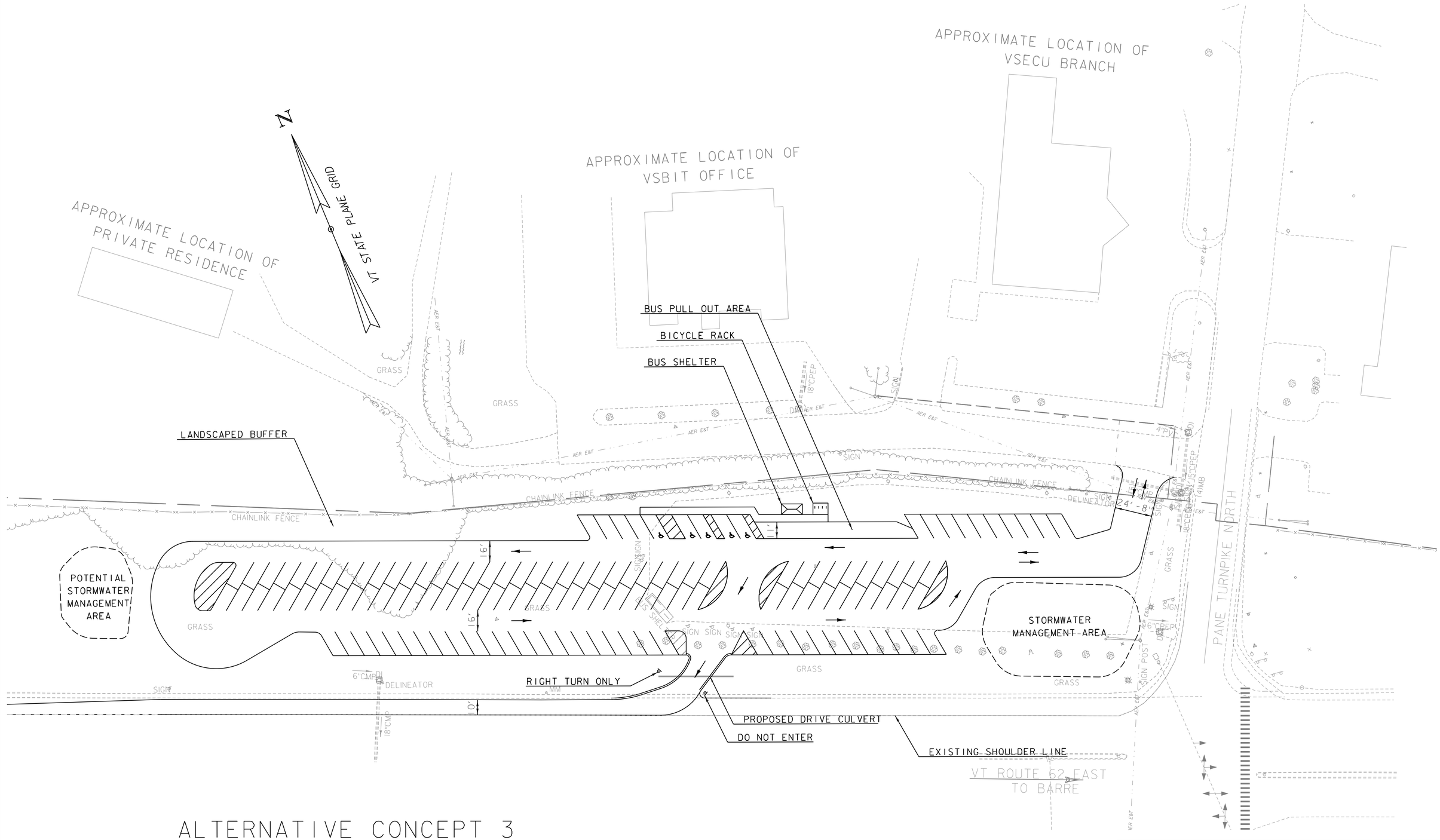
ALTERNATIVE CONCEPT 2
EXISTING SPACES: 76
PROPOSED SPACES: 135
ACCESSIBLE SPACES: 5

0 30 60
SCALE IN FEET

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)

FILE NAME: zl2k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT 2	SHEET 2 OF 6

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

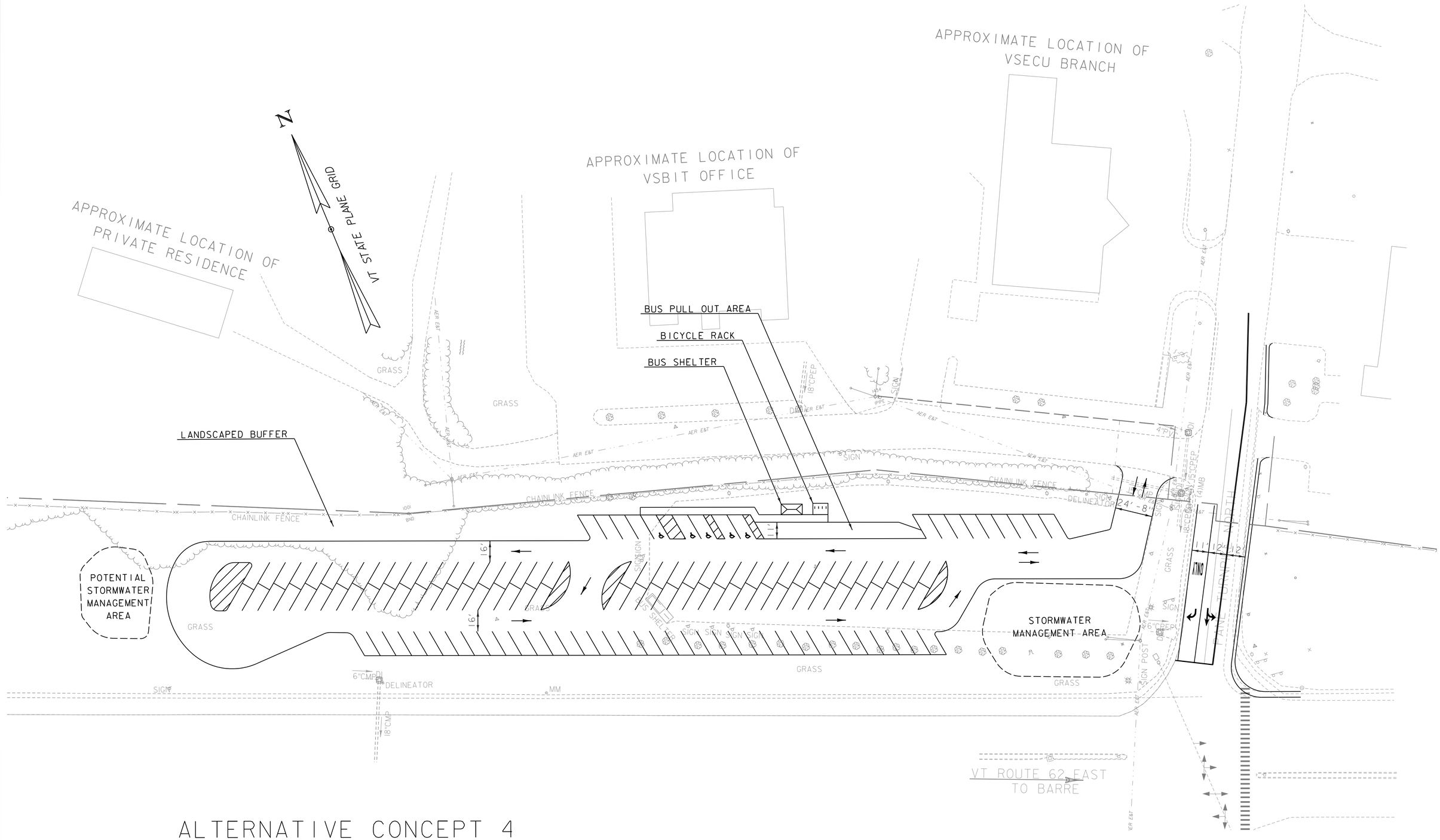


ALTERNATIVE CONCEPT 3
EXISTING SPACES: 76
PROPOSED SPACES: 135
ACCESSIBLE SPACES: 5

0 30 60
SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)
FILE NAME: z12k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT 3	SHEET 3 OF 6



ALTERNATIVE CONCEPT 4
EXISTING SPACES: 76
PROPOSED SPACES: 135
ACCESSIBLE SPACES: 5

0 30 60
SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)
FILE NAME: z12k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT 4	SHEET 4 OF 6

ALTERNATIVE CONCEPT 4

EXISTING SPACES: 76

PROPOSED SPACES: 135

ACCESSIBLE SPACES: 5

0 30 60

SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)

FILE NAME: zl2k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT 4	SHEET 4 OF 6

APPROXIMATE LOCATION OF VSECU BRANCH

APPROXIMATE LOCATION OF VSBIT OFFICE

APPROXIMATE LOCATION OF PRIVATE RESIDENCE

N

VT STATE PLANE GRID

BUS PULL OUT AREA

BICYCLE RACK

BUS SHELTER

LANDSCAPED BUFFER

POTENTIAL STORMWATER MANAGEMENT AREA

STORMWATER MANAGEMENT AREA

GRASS

CHAINLINK FENCE

SIGN

DELINEATOR

VT ROUTE 62 EAST TO BARRE

ALTERNATIVE CONCEPT 4
EXISTING SPACES: 76
PROPOSED SPACES: 135
ACCESSIBLE SPACES: 5

0 30 60
SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)
FILE NAME: z12k460bdr.dgn	PLOT DATE: 11/28/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P. CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT 4	SHEET 4 OF 6

ALTERNATIVE CONCEPT 5
EXISTING SPACES: 76
PROPOSED SPACES: 71
ACCESSIBLE SPACES: 5

0 30 60
SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME: BERLIN
PROJECT NUMBER: CMG PARK (45)

FILE NAME: zl2k460bdr.dgn
PROJECT LEADER: J. SOBEL
DESIGNED BY: P. CALVES
ALTERNATIVE CONCEPT 5

PLOT DATE: 11/28/2017
DRAWN BY: P. CALVES
CHECKED BY: D. VERTIYEV
SHEET 5 OF 6

ALTERNATIVE CONCEPT A
PROPOSED SPACES: 142
ACCESIBLE SPACES: 6

0 40 80
SCALE IN FEET

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

PROJECT NAME:	BERLIN
PROJECT NUMBER:	CMG PARK (45)
FILE NAME: z12k460bdr.dgn	PLOT DATE: 10/25/2017
PROJECT LEADER: J. SOBEL	DRAWN BY: P.CALVES
DESIGNED BY: P. CALVES	CHECKED BY: D. VERTIYEV
ALTERNATIVE CONCEPT A	SHEET 6 OF 6

APPENDIX A

TRAFFIC VOLUMES

Peak Hour Data for Intersection

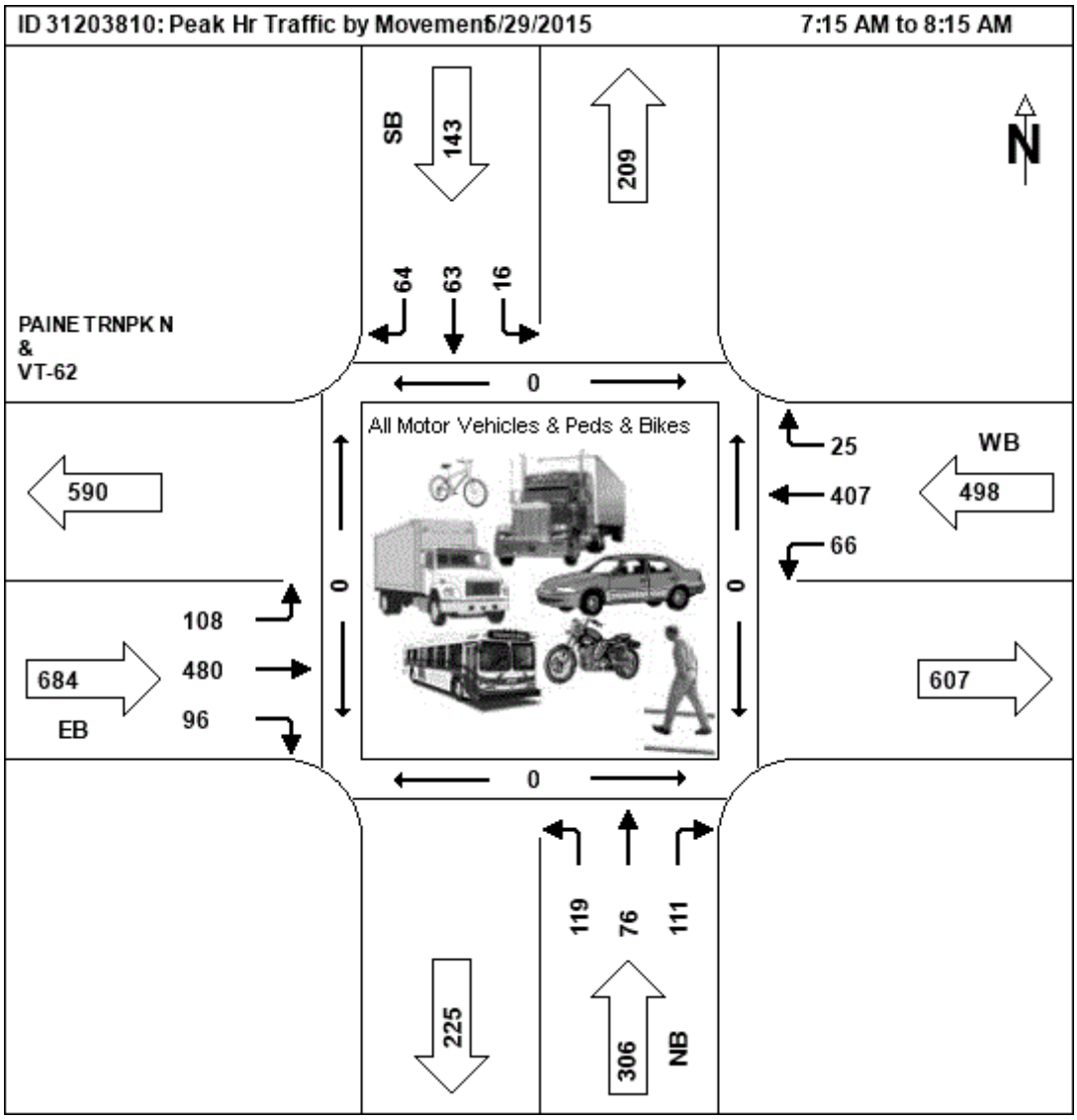
Int ID:	31203810		
Community:	BERLIN	Corridor:	NA
Road 1:	PAINE TRNPK N	Road 3:	PAINE TRNPK
Road 2:	VT-62	Road 4:	VT-62

|<< < > >>| 1-4 of 4

AM Peak Hour
05/29/2015

Start Time	NB Left	NB Thru	NB Right	NB Ped	NB App Total	EB Left	EB Thru	EB Right	EB Ped	EB App Total	SB Left	SB Thru	SB Right	SB Ped	SB App Total	WB Left	WB Thru	WB Right	WB Ped	WB App Total	Int Total
7:15 AM	33	24	27	0	84	14	93	19	0	126	1	13	22	0	36	24	120	5	0	149	395
7:30 AM	30	20	29	0	79	30	119	29	0	178	7	22	16	0	45	9	100	10	0	119	421
7:45 AM	26	19	26	0	71	38	165	26	0	229	3	16	9	0	28	14	104	3	0	121	449
8:00 AM	30	13	29	0	72	26	103	22	0	151	5	12	17	0	34	19	83	7	0	109	366
Total	119	76	111	0	306	108	480	96	0	684	16	63	64	0	143	66	407	25	0	498	1631
PHF	0.90	0.79	0.96		0.91	0.71	0.73	0.83		0.75	0.57	0.72	0.73		0.79	0.69	0.85	0.63		0.84	
HV %	4	3	10			0	5	13			0	6	2			12	6	0			

☑ Cars ☑ Trucks ☑ Pedestrians ☑ Bikes



Midday Peak Hour
05/29/2015

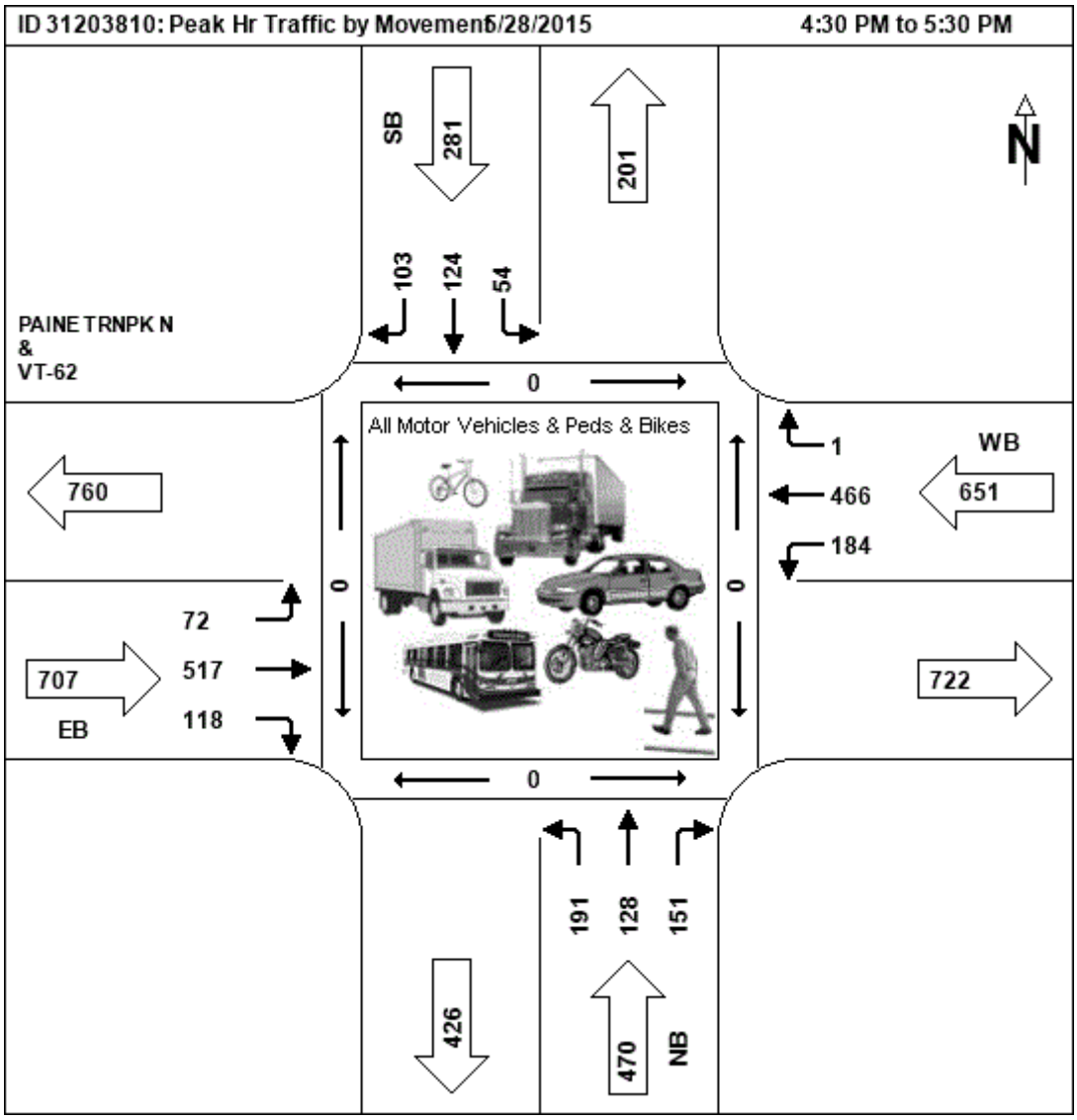
Start Time	NB Left	NB Thru	NB Right	NB Ped	NB App Total	EB Left	EB Thru	EB Right	EB Ped	EB App Total	SB Left	SB Thru	SB Right	SB Ped	SB App Total	WB Left	WB Thru	WB Right	WB Ped	WB App Total	Int Total
11:00 AM	18	22	23	0	63	8	63	16	0	87	5	18	7	0	30	32	53	0	0	85	265

11:15 AM	17	21	22	0	60	9	73	12	0	94	8	14	10	0	32	37	76	12	0	125	311
11:30 AM	20	23	33	0	76	10	67	13	0	90	9	19	8	0	36	23	57	6	0	86	288
11:45 AM	20	23	33	0	76	8	79	16	0	103	10	38	9	0	57	43	79	3	0	125	361
Total	75	89	111	0	275	35	282	57	0	374	32	89	34	0	155	135	265	21	0	421	1225
PHF	0.94	0.97	0.84		0.90	0.88	0.89	0.89		0.91	0.80	0.59	0.85		0.68	0.78	0.84	0.44		0.84	
HV %	8	1	2			11	11	7			0	2	3			1	5	0			

PM Peak Hour
05/28/2015

	NB					EB					SB					WB						
Start Time	Left	Thru	Right	Ped	App Total	Left	Thru	Right	Ped	App Total	Left	Thru	Right	Ped	App Total	Left	Thru	Right	Ped	App Total	Int Total	
4:30 PM	47	33	43	0	123	20	131	41	0	192	15	21	31	0	67	44	124	0	0	168	550	
4:45 PM	51	37	39	0	127	18	142	26	0	186	14	37	20	0	71	58	108	0	0	166	550	
5:00 PM	44	31	31	0	106	22	114	12	0	148	15	35	37	0	87	37	130	1	0	168	509	
5:15 PM	49	27	38	0	114	12	130	39	0	181	10	31	15	0	56	45	104	0	0	149	500	
Total	191	128	151	0	470	72	517	118	0	707	54	124	103	0	281	184	466	1	0	651	2109	
PHF	0.94	0.86	0.88		0.93	0.82	0.91	0.72		0.92	0.90	0.84	0.70		0.81	0.79	0.90	0.25		0.97		
HV %	2	1	1			0	2	3			0	0	0			3	1	0				

☑ Cars ☑ Trucks ☑ Pedestrians ☑ Bikes



Red Book Growth Rate 2015-2016	1.01
Red Book Growth Rate 2016-2036	1.12

	2015 Count Data		Seasonal Adjustment Factor		Adjusted 2016 Volumes		Future Volumes	
	AM	**PM**	**0.827**	**0.903**	**AM**	**PM**	**AM**	**PM**
Route 62 at Paine Turnpike N	7:15-8:15	4:30-5:30	**AM**	**PM**				
Route 62 EB L	108	72	89	65	90	66	101	74
Route 62 EB T	480	517	397	467	401	472	449	528
Route 62 EB R	96	118	79	107	80	108	90	121
Route 62 WB L	66	184	55	166	55	168	62	188
Route 62 WB T	407	466	337	421	340	425	381	476
Route 62 WB R	25	1	21	1	21	1	23	1
Paine Turnpike N NB L	119	191	98	172	99	174	111	195
Paine Turnpike N NB T	76	128	63	116	63	117	71	131
Paine Turnpike N NB R	111	151	92	136	93	138	104	154
Paine Turnpike N SB L	16	54	13	49	13	49	15	55
Paine Turnpike N SB T	63	124	52	112	53	113	59	127
Paine Turnpike N SB R	64	103	53	93	53	94	60	105

		K Factor	0.1126			
Leg	AADT (Route Log)	DHV (Equation)	DHV (K value)	Link Volumes from TMC	Volumes as Percent of DHV (Equation)	Volumes as Percent of DHV (K factor)
Route 62 East	13600	1504.96	1531.36	1373	91%	90%
Route 62 West	13800	1526.68	1553.88	1467	96%	94%
Paine Turnpike N North	2800	332.08	315.28	482	145%	153%
Paine Turnpike N South	4900	560.14	551.74	896	160%	162%

Leg	AADT (Traffic map)	DHV (Equation)	DHV (K value)	Link Volumes from TMC	Volumes as Percent of DHV (Equation)	Volumes as Percent of DHV (K factor)
Route 62 East	13635	1508.761	1535.301	1373	91%	89%
Route 62 West				1467		
Paine Turnpike N North	2943	347.6098	331.3818	482	139%	145%
Paine Turnpike N South				896		

Other Factors		
Day Adjustment	.827 AM	.903 PM
AADT Growth	1.12 over 20 years	

APPENDIX B

INTERSECTION CAPACITY ANALYSIS WORKSHEETS

2016 EXISTING CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	401	80	55	340	21	99	63	93	13	53	53
Future Volume (vph)	90	401	80	55	340	21	99	63	93	13	53	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	335		0	350		0	0		0	0		0
Storage Lanes	1		1	1		1	1		0	0		0
Taper Length (ft)	80			80			25			25		
Satd. Flow (prot)	1719	3438	1538	1703	3406	1524	1703	1633	0	0	1709	0
Flt Permitted	0.950			0.950			0.950				0.935	
Satd. Flow (perm)	1719	3438	1538	1703	3406	1524	1703	1633	0	0	1606	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			198			198		51			24	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		835			754			524			589	
Travel Time (s)		19.0			17.1			11.9			13.4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	5%	5%	5%	6%	6%	6%	6%	6%	6%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	99	441	88	60	374	23	109	171	0	0	130	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2			6				4		
Detector Phase	5	2	2	1	6	6	3	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	15.0	15.0	8.0	15.0	15.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0	29.0	15.0	25.0	25.0	15.0	25.0		25.0	25.0	
Total Split (s)	15.0	31.0	31.0	18.0	34.0	34.0	15.0	36.0		25.0	25.0	
Total Split (%)	10.9%	22.5%	22.5%	13.0%	24.6%	24.6%	10.9%	26.1%		18.1%	18.1%	
Maximum Green (s)	8.0	24.0	24.0	11.0	27.0	27.0	8.0	29.0		18.0	18.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0			7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	8.1	21.1	21.1	8.5	18.3	18.3	8.1	25.1			10.0	
Actuated g/C Ratio	0.11	0.29	0.29	0.12	0.25	0.25	0.11	0.35			0.14	
v/c Ratio	0.52	0.44	0.15	0.30	0.44	0.04	0.58	0.29			0.54	
Control Delay	43.7	24.3	0.5	35.5	24.6	0.1	46.7	14.0			33.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay	43.7	24.3	0.5	35.5	24.6	0.1	46.7	14.0			33.2	
LOS	D	C	A	D	C	A	D	B			C	
Approach Delay		24.0			24.8			26.8			33.2	
Approach LOS		C			C			C			C	

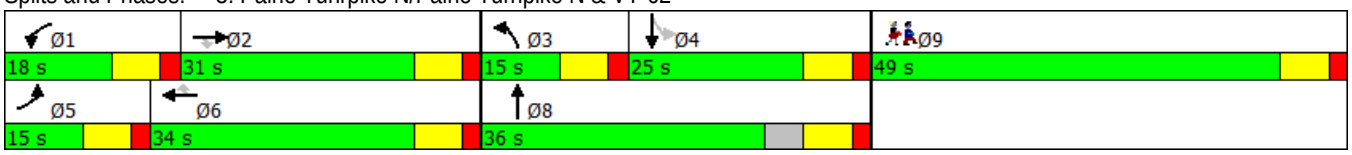
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	49.0
Total Split (s)	49.0
Total Split (%)	36%
Maximum Green (s)	42.0
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	35.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	42	87	0	25	73	0	46	36			44	
Queue Length 95th (ft)	#113	143	0	65	117	0	#129	91			104	
Internal Link Dist (ft)		755			674			444			509	
Turn Bay Length (ft)	335			350								
Base Capacity (vph)	190	1205	667	259	1274	694	189	774			418	
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	
Reduced v/c Ratio	0.52	0.37	0.13	0.23	0.29	0.03	0.58	0.22			0.31	

Intersection Summary			
Area Type:	Other		
Cycle Length: 138			
Actuated Cycle Length: 72.6			
Natural Cycle: 135			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 25.5		Intersection LOS: C	
Intersection Capacity Utilization 54.3%		ICU Level of Service A	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Paine Tunrpike N/Paine Turnpike N & VT-62



Lane Group	Ø9
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	472	108	168	425	1	174	117	138	49	113	94
Future Volume (vph)	66	472	108	168	425	1	174	117	138	49	113	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	335		0	350		0	0		0	0		0
Storage Lanes	1		1	1		1	1		0	0		0
Taper Length (ft)	80			80			25			25		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1787	1729	0	0	1789	0
Flt Permitted	0.950			0.950			0.950				0.865	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1787	1729	0	0	1561	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			198			198		40			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		835			754			524			589	
Travel Time (s)		19.0			17.1			11.9			13.4	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	492	113	175	443	1	181	266	0	0	267	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2			6				4		
Detector Phase	5	2	2	1	6	6	3	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	15.0	15.0	8.0	15.0	15.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0	29.0	15.0	25.0	25.0	15.0	25.0		25.0	25.0	
Total Split (s)	15.0	31.0	31.0	18.0	34.0	34.0	15.0	36.0		25.0	25.0	
Total Split (%)	10.9%	22.5%	22.5%	13.0%	24.6%	24.6%	10.9%	26.1%		18.1%	18.1%	
Maximum Green (s)	8.0	24.0	24.0	11.0	27.0	27.0	8.0	29.0		18.0	18.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0			7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	8.0	19.5	19.5	11.0	25.7	25.7	8.0	33.1			18.0	
Actuated g/C Ratio	0.09	0.23	0.23	0.13	0.30	0.30	0.09	0.39			0.21	
v/c Ratio	0.41	0.60	0.22	0.76	0.41	0.00	1.07	0.38			0.77	
Control Delay	45.3	32.3	1.1	58.9	25.8	0.0	130.5	18.1			47.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay	45.3	32.3	1.1	58.9	25.8	0.0	130.5	18.1			47.0	
LOS	D	C	A	E	C	A	F	B			D	
Approach Delay		28.4			35.2			63.6			47.0	
Approach LOS		C			D			E			D	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	49.0
Total Split (s)	49.0
Total Split (%)	36%
Maximum Green (s)	42.0
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	35.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

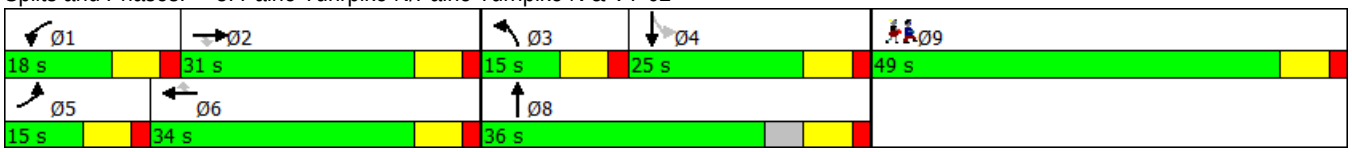
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	35	123	0	91	103	0	~108	83			126	
Queue Length 95th (ft)	79	172	2	#204	146	0	#248	157			#264	
Internal Link Dist (ft)		755			674			444			509	
Turn Bay Length (ft)	335			350								
Base Capacity (vph)	167	1005	591	230	1184	661	169	699			346	
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	
Reduced v/c Ratio	0.41	0.49	0.19	0.76	0.37	0.00	1.07	0.38			0.77	

Intersection Summary			
Area Type:	Other		
Cycle Length: 138			
Actuated Cycle Length: 84.6			
Natural Cycle: 145			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 40.8		Intersection LOS: D	
Intersection Capacity Utilization 74.7%		ICU Level of Service D	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Paine Tunrpike N/Paine Turnpike N & VT-62



Lane Group	Ø9
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

2036 NO-BUILD CONDITIONS

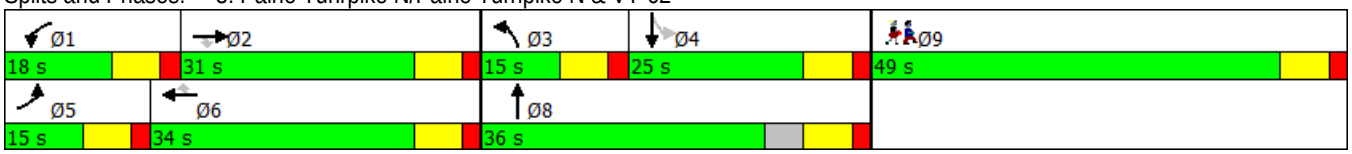
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	449	90	62	381	23	111	71	104	15	59	60
Future Volume (vph)	101	449	90	62	381	23	111	71	104	15	59	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	335		0	350		0	0		0	0		0
Storage Lanes	1		1	1		1	1		0	0		0
Taper Length (ft)	80			80			25			25		
Satd. Flow (prot)	1719	3438	1538	1703	3406	1524	1703	1633	0	0	1707	0
Flt Permitted	0.950			0.950			0.950				0.931	
Satd. Flow (perm)	1719	3438	1538	1703	3406	1524	1703	1633	0	0	1597	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			198			198		50			24	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		835			754			524			589	
Travel Time (s)		19.0			17.1			11.9			13.4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	5%	5%	5%	6%	6%	6%	6%	6%	6%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	493	99	68	419	25	122	192	0	0	147	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2			6				4		
Detector Phase	5	2	2	1	6	6	3	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	15.0	15.0	8.0	15.0	15.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0	29.0	15.0	25.0	25.0	15.0	25.0		25.0	25.0	
Total Split (s)	15.0	31.0	31.0	18.0	34.0	34.0	15.0	36.0		25.0	25.0	
Total Split (%)	10.9%	22.5%	22.5%	13.0%	24.6%	24.6%	10.9%	26.1%		18.1%	18.1%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0			7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	8.1	22.7	22.7	8.7	20.0	20.0	8.1	25.9			10.8	
Actuated g/C Ratio	0.11	0.30	0.30	0.12	0.27	0.27	0.11	0.34			0.14	
v/c Ratio	0.60	0.47	0.16	0.35	0.46	0.05	0.67	0.32			0.59	
Control Delay	50.0	24.9	0.6	37.9	24.9	0.2	54.5	15.6			36.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay	50.0	24.9	0.6	37.9	24.9	0.2	54.5	15.6			36.1	
LOS	D	C	A	D	C	A	D	B			D	
Approach Delay		25.4			25.4			30.7			36.1	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	49	102	0	30	84	0	55	46			53	
Queue Length 95th (ft)	#137	165	0	73	133	0	#155	106			118	
Internal Link Dist (ft)		755			674			444			509	
Turn Bay Length (ft)	335			350								
Base Capacity (vph)	184	1168	653	251	1233	678	182	750			403	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	49.0
Total Split (s)	49.0
Total Split (%)	36%
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	
Reduced v/c Ratio	0.60	0.42	0.15	0.27	0.34	0.04	0.67	0.26			0.36	

Intersection Summary			
Area Type:	Other		
Cycle Length: 138			
Actuated Cycle Length: 75.2			
Natural Cycle: 135			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 27.4		Intersection LOS: C	
Intersection Capacity Utilization 56.9%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Paine Tunrpike N/Paine Turnpike N & VT-62



Lane Group	Ø9
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	528	121	188	476	1	195	131	154	55	127	105
Future Volume (vph)	74	528	121	188	476	1	195	131	154	55	127	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	335		0	350		0	0		0	0		0
Storage Lanes	1		1	1		1	1		0	0		0
Taper Length (ft)	80			80			25			25		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1787	1729	0	0	1791	0
Flt Permitted	0.950			0.950			0.950				0.857	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1787	1729	0	0	1549	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			198			198		40			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		835			754			524			589	
Travel Time (s)		19.0			17.1			11.9			13.4	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	550	126	196	496	1	203	296	0	0	298	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2			6				4		
Detector Phase	5	2	2	1	6	6	3	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	15.0	15.0	8.0	15.0	15.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0	29.0	15.0	25.0	25.0	15.0	25.0		25.0	25.0	
Total Split (s)	15.0	31.0	31.0	18.0	34.0	34.0	15.0	36.0		25.0	25.0	
Total Split (%)	10.9%	22.5%	22.5%	13.0%	24.6%	24.6%	10.9%	26.1%		18.1%	18.1%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0			7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	8.0	21.7	21.7	11.0	24.7	24.7	8.0	33.0			18.0	
Actuated g/C Ratio	0.09	0.25	0.25	0.13	0.28	0.28	0.09	0.38			0.21	
v/c Ratio	0.47	0.62	0.23	0.88	0.49	0.00	1.24	0.43			0.89	
Control Delay	48.5	32.2	1.8	75.1	27.6	0.0	183.7	19.9			62.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay	48.5	32.2	1.8	75.1	27.6	0.0	183.7	19.9			62.2	
LOS	D	C	A	E	C	A	F	B			E	
Approach Delay		28.8			41.0			86.6			62.2	
Approach LOS		C			D			F			E	
Queue Length 50th (ft)	41	140	0	109	117	0	~143	104			154	
Queue Length 95th (ft)	87	193	9	#235	164	0	#280	177			#311	
Internal Link Dist (ft)		755			674			444			509	
Turn Bay Length (ft)	335			350								
Base Capacity (vph)	163	979	581	224	1102	629	164	682			334	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	49.0
Total Split (s)	49.0
Total Split (%)	36%
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

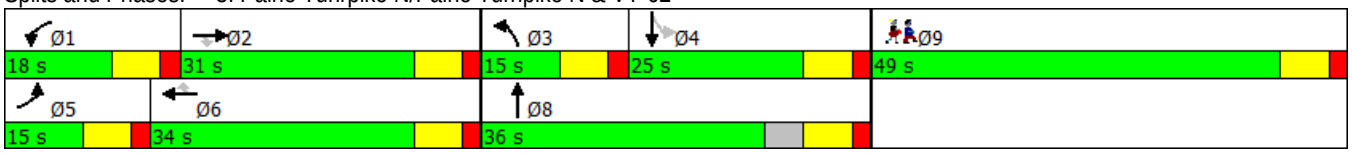
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	
Reduced v/c Ratio	0.47	0.56	0.22	0.88	0.45	0.00	1.24	0.43			0.89	

Intersection Summary			
Area Type:	Other		
Cycle Length: 138			
Actuated Cycle Length: 86.8			
Natural Cycle: 145			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.24			
Intersection Signal Delay: 49.8		Intersection LOS: D	
Intersection Capacity Utilization 80.8%		ICU Level of Service D	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Paine Tunrpike N/Paine Turnpike N & VT-62



Lane Group	Ø9
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

2036 BUILD CONDITIONS,

TIMING CHANGES ONLY

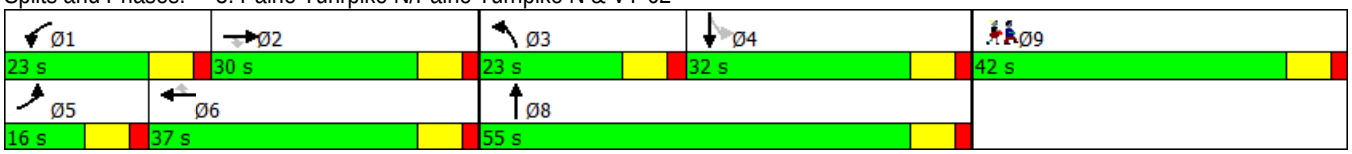
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	449	90	62	381	23	111	71	104	15	59	60
Future Volume (vph)	101	449	90	62	381	23	111	71	104	15	59	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	335		0	350		0	0		0	0		0
Storage Lanes	1		1	1		1	1		0	0		0
Taper Length (ft)	80			80			25			25		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1787	1714	0	0	1773	0
Flt Permitted	0.950			0.950			0.950				0.929	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1787	1714	0	0	1657	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182			182		52			24	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		835			754			524			589	
Travel Time (s)		19.0			17.1			11.9			13.4	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	468	94	65	397	24	116	182	0	0	140	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2			6				4		
Detector Phase	5	2	2	1	6	6	3	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	15.0	15.0	8.0	15.0	15.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0	29.0	15.0	25.0	25.0	15.0	25.0		25.0	25.0	
Total Split (s)	16.0	30.0	30.0	23.0	37.0	37.0	23.0	55.0		32.0	32.0	
Total Split (%)	10.7%	20.0%	20.0%	15.3%	24.7%	24.7%	15.3%	36.7%		21.3%	21.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0			7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	9.1	22.8	22.8	8.8	19.0	19.0	10.3	28.1			10.7	
Actuated g/C Ratio	0.12	0.29	0.29	0.11	0.25	0.25	0.13	0.36			0.14	
v/c Ratio	0.50	0.45	0.16	0.33	0.46	0.05	0.49	0.28			0.56	
Control Delay	44.7	26.3	0.6	39.2	27.2	0.2	40.0	13.8			36.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay	44.7	26.3	0.6	39.2	27.2	0.2	40.0	13.8			36.3	
LOS	D	C	A	D	C	A	D	B			D	
Approach Delay		25.6			27.5			24.0			36.3	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	47	98	0	29	83	0	52	42			52	
Queue Length 95th (ft)	#126	173	0	75	143	0	114	94			120	
Internal Link Dist (ft)		755			674			444			509	
Turn Bay Length (ft)	335			350								
Base Capacity (vph)	208	1147	636	370	1387	731	373	1095			557	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	42.0
Total Split (s)	42.0
Total Split (%)	28%
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	
Reduced v/c Ratio	0.50	0.41	0.15	0.18	0.29	0.03	0.31	0.17			0.25	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 77.5			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 26.8		Intersection LOS: C	
Intersection Capacity Utilization 56.9%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Paine Tunrpike N/Paine Turnpike N & VT-62



Lane Group	Ø9
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

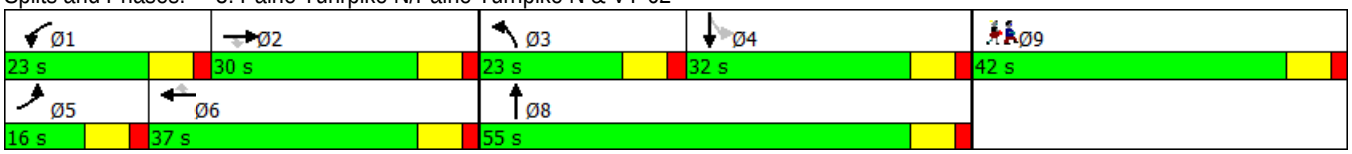
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	528	121	188	476	1	195	131	154	55	127	105
Future Volume (vph)	74	528	121	188	476	1	195	131	154	55	127	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	335		0	350		0	0		0	0		0
Storage Lanes	1		1	1		1	1		0	0		0
Taper Length (ft)	80			80			25			25		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1787	1729	0	0	1791	0
Flt Permitted	0.950			0.950			0.950				0.860	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1787	1729	0	0	1554	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182			182		42			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		835			754			524			589	
Travel Time (s)		19.0			17.1			11.9			13.4	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	550	126	196	496	1	203	296	0	0	298	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2			6				4		
Detector Phase	5	2	2	1	6	6	3	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	15.0	15.0	8.0	15.0	15.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	15.0	29.0	29.0	15.0	25.0	25.0	15.0	25.0		25.0	25.0	
Total Split (s)	16.0	30.0	30.0	23.0	37.0	37.0	23.0	55.0		32.0	32.0	
Total Split (%)	10.7%	20.0%	20.0%	15.3%	24.7%	24.7%	15.3%	36.7%		21.3%	21.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0			7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	8.6	23.0	23.0	16.0	30.4	30.4	16.0	48.0			25.0	
Actuated g/C Ratio	0.08	0.21	0.21	0.15	0.28	0.28	0.15	0.44			0.23	
v/c Ratio	0.55	0.73	0.26	0.75	0.50	0.00	0.77	0.37			0.80	
Control Delay	62.6	46.2	2.8	62.7	34.6	0.0	64.3	18.6			54.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay	62.6	46.2	2.8	62.7	34.6	0.0	64.3	18.6			54.4	
LOS	E	D	A	E	C	A	E	B			D	
Approach Delay		40.6			42.5			37.2			54.4	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	52	187	0	132	152	0	137	113			185	
Queue Length 95th (ft)	101	250	16	#238	204	0	#248	181			#323	
Internal Link Dist (ft)		755			674			444			509	
Turn Bay Length (ft)	335			350								
Base Capacity (vph)	147	753	480	262	995	576	264	791			372	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	42.0
Total Split (s)	42.0
Total Split (%)	28%
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	
Reduced v/c Ratio	0.52	0.73	0.26	0.75	0.50	0.00	0.77	0.37			0.80	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 108			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 42.3		Intersection LOS: D	
Intersection Capacity Utilization 80.8%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Paine Tunrpike N/Paine Turnpike N & VT-62



Lane Group	Ø9
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

2036 BUILD CONDITIONS,

SOUTHBOUND RIGHT-TURN LANE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	449	90	62	381	23	11	71	104	15	59	60
Future Volume (vph)	101	449	90	62	381	23	11	71	104	15	59	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	335		0	350		0	0		0	0		200
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	80			80			25			25		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1787	1714	0	0	1881	1615
Flt Permitted	0.950			0.950			0.405				0.878	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	762	1714	0	0	1668	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			210			210		54				151
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		835			754			524			589	
Travel Time (s)		19.0			17.1			11.9			13.4	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	468	94	65	397	24	11	182	0	0	77	63
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		3	8			4	5
Permitted Phases			2			6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		4	4	5
Switch Phase												
Minimum Initial (s)	8.0	15.0	15.0	8.0	15.0	15.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	15.0	29.0	29.0	15.0	25.0	25.0	15.0	25.0		25.0	25.0	15.0
Total Split (s)	15.0	29.0	29.0	19.0	33.0	33.0	15.0	40.0		25.0	25.0	15.0
Total Split (%)	11.5%	22.3%	22.3%	14.6%	25.4%	25.4%	11.5%	30.8%		19.2%	19.2%	11.5%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0			7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	None
Act Effct Green (s)	8.2	24.0	24.0	8.5	17.5	17.5	11.6	11.6			9.4	24.7
Actuated g/C Ratio	0.14	0.41	0.41	0.14	0.30	0.30	0.20	0.20			0.16	0.42
v/c Ratio	0.43	0.32	0.12	0.26	0.38	0.04	0.04	0.48			0.29	0.08
Control Delay	32.9	16.2	0.3	28.3	18.3	0.1	18.9	19.0			27.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	32.9	16.2	0.3	28.3	18.3	0.1	18.9	19.0			27.6	0.2
LOS	C	B	A	C	B	A	B	B			C	A
Approach Delay		16.6			18.8			19.0			15.3	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	31	63	0	19	52	0	3	37			22	0
Queue Length 95th (ft)	#111	143	0	66	117	0	14	94			75	0
Internal Link Dist (ft)		755			674			444			509	
Turn Bay Length (ft)	335			350								200
Base Capacity (vph)	246	1574	820	370	1603	832	293	1008			523	766

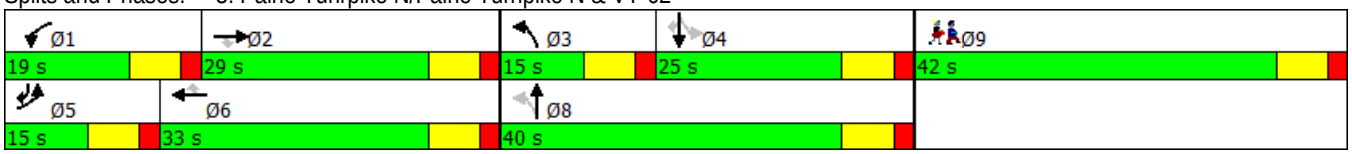
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	42.0
Total Split (s)	42.0
Total Split (%)	32%
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.43	0.30	0.11	0.18	0.25	0.03	0.04	0.18			0.15	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 58.8			
Natural Cycle: 130			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 17.5		Intersection LOS: B	
Intersection Capacity Utilization 52.7%		ICU Level of Service A	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Paine Tunrpike N/Paine Turnpike N & VT-62



Lane Group	Ø9
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

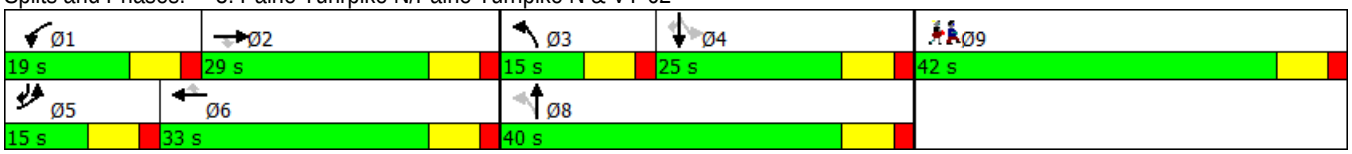
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	528	121	188	476	1	195	131	154	55	127	105
Future Volume (vph)	74	528	121	188	476	1	195	131	154	55	127	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	335		0	350		0	0		0	0		200
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	80			80			25			25		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1787	1729	0	0	1872	1615
Flt Permitted	0.950			0.950			0.419				0.791	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	788	1729	0	0	1503	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			210			210		44				151
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		835			754			524			589	
Travel Time (s)		19.0			17.1			11.9			13.4	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	550	126	196	496	1	203	296	0	0	189	109
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		3	8			4	5
Permitted Phases			2			6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		4	4	5
Switch Phase												
Minimum Initial (s)	8.0	15.0	15.0	8.0	15.0	15.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	15.0	29.0	29.0	15.0	25.0	25.0	15.0	25.0		25.0	25.0	15.0
Total Split (s)	15.0	29.0	29.0	19.0	33.0	33.0	15.0	40.0		25.0	25.0	15.0
Total Split (%)	11.5%	22.3%	22.3%	14.6%	25.4%	25.4%	11.5%	30.8%		19.2%	19.2%	11.5%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0			7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	None
Act Effct Green (s)	8.0	20.9	20.9	12.0	24.9	24.9	31.5	31.5			16.5	31.5
Actuated g/C Ratio	0.09	0.24	0.24	0.14	0.29	0.29	0.37	0.37			0.19	0.37
v/c Ratio	0.46	0.64	0.23	0.79	0.48	0.00	0.53	0.45			0.65	0.16
Control Delay	47.7	32.9	1.3	60.1	27.0	0.0	25.2	19.8			43.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	47.7	32.9	1.3	60.1	27.0	0.0	25.2	19.8			43.6	1.9
LOS	D	C	A	E	C	A	C	B			D	A
Approach Delay		29.2			36.3			22.0			28.4	
Approach LOS		C			D			C			C	
Queue Length 50th (ft)	41	142	0	107	117	0	78	101			96	0
Queue Length 95th (ft)	85	197	4	#220	165	0	132	172			167	16
Internal Link Dist (ft)		755			674			444			509	
Turn Bay Length (ft)	335			350								200
Base Capacity (vph)	166	912	564	249	1078	628	384	695			317	691

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	42.0
Total Split (s)	42.0
Total Split (%)	32%
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.46	0.60	0.22	0.79	0.46	0.00	0.53	0.43			0.60	0.16

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 85.5			
Natural Cycle: 130			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 29.7		Intersection LOS: C	
Intersection Capacity Utilization 74.4%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Paine Tunrpike N/Paine Turnpike N & VT-62



Lane Group	Ø9
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

APPENDIX C

ALTERNATIVES EVALUATION MATRIX CRITERIA

EVALUATION CRITERIA		
CRITERIA	**POINTS**	**ASSUMPTIONS**
Economic Considerations (30%)		
Ease of Acquisition	30	Already Owned
	15	Purchase Possible
	0	Least Possible
Site Development Cost	10	Reasonable/Less
	5	Major
	0	Excessive
SUBTOTAL POTENTIAL POINTS	**40**	
Location Criteria (35%)		
Proximity to I-89	10	Access within 2500 feet
	5	Access within 3000 feet
	0	Access farther than 3000 feet
Transit Service Access	10	On existing route, easy access
	5	On existing route, difficult access
	0	Off existing route
Visibility/Security	10	Very visible from a major roadway/major activity
	5	Minimal visibility from a roadway/major activity
	0	Not visible from any roadway/major activity
Access Convenience, Safety & Congestion	15	Optimal ingress and egress
	10	Good ingress and egress
	5	Fair ingress/egress
	0	Poor ingress/egress
SUBTOTAL POTENTIAL POINTS	**45**	
Site Considerations (35%)		
Impact to Environmental Resources	10	Minimal Impacts
	5	Some impacts
	0	Serious impacts
Compatibility/Affects to Adjacent Property	10	Very compatible
	5	Some compatibility
	0	No compatibility
Number of Spaces & Expansion Potential	15	Site large enough to accommodate 135 spaces with plenty of expansion potential
	10	Site large enough to accommodate 135 spaces with some expansion potential
	5	Site large enough to handle 135 spaces
	0	Site unable to handle 135 spaces
Permitability	10	Good
	5	Some issues
	0	Permitting questionable
SUBTOTAL POTENTIAL POINTS	**45**	
TOTAL POTENTIAL POINTS	**130**	

APPENDIX D

WETLAND OVERVIEW MAP

VTrans Working To Get You There VERMONT AGENCY OF TRANSPORTATION

GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS

NOT TO SCALE

LEGEND
VT ANR CLASS 2 WETLANDS
VT ANR WETLAND ADVISORY AREA
VT ANR MAPPED STREAMS

WETLANDS OVERVIEW
BERLIN CMG PARK (45)

VT AGENCY OF NATURAL RESOURCES MAP